

SHAWNEE NATIONAL FOREST

BIOLOGICAL EVALUATION OF REGIONAL FORESTER SENSITIVE SPECIES

REVISED LAND AND RESOURCE MANAGEMENT PLAN SHAWNEE NATIONAL FOREST

December 17, 2004

LOCATION

The Shawnee National Forest (SNF) is located in the southern tip of Illinois. Land ownership includes portions of Alexander, Gallatin, Hardin, Jackson, Johnson, Massac, Pope, Saline, Union and Williamson counties. The area is bordered on the east and south by the Ohio River and on the west by the Mississippi River. The boundary of the Shawnee encompasses parts of three physiographic provinces including extensions of the Ozarks Plateaus, the Interior Low Plateaus, and the Gulf Coastal Plain (Fralish et al. 2002). These three provinces include seven ecological subsections including the Illinois Ozark Hills, Greater Shawnee Hills, Lesser Shawnee Hills, Cretaceous Hills, Mississippi River Alluvial Plain, Lower Ohio-Wabash River Alluvial Plain, and the Ohio-Cache River Alluvial Plain (Fralish et al. 2002). Each of the ecological subsections can be further differentiated into six ecological land types (ELT's). These include southwest slopes, south slopes, ridge top sites, north slopes, low slopes and alluvial sites (Fralish et al. 2002). Forests in these ELT's are predominately western mesophytic forest dominated by oak-hickory forests on the drier sites and mesophytic species (beech and maple) on the moist sites.

The mix of habitat types ranges from mature forest to openland within these three physiographic provinces and provides habitat for approximately 500 vertebrate species that live within the Shawnee. These include 51 mammals, 237 birds, 47 reptiles, 32 amphibians, 112 fish, and numerous insects and invertebrates. The role they play in the Forest ecosystem is vital.

The proposed Forest Plan Revision describes the environmental effects of four proposed alternatives that present a range of activities that either have no effect, a positive effect or a negative effect on fish and wildlife resources. Negative effects are mitigated by either implementing Forest-wide or species-specific standards and guidelines.

PROPOSED ACTION – Alternative 2

Alternative 2 responds to public concerns about Forest management expressed during the need-for-change process that identified elements of the 1992 Plan requiring revision. Alternative 2 is based, for the most part, on the "Need for Change" document that resulted in the notice of intent to revise the 1992 Plan, scoping comments received regarding the notice of intent, 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 threatened, endangered and sensitive species and species of concern would be revised in all alternatives. Natural areas would be protected.

The proposed action eliminates the 1992 ALRMP standards and guidelines for openland management and creates large openland management areas. Openland tracts larger than 80 acres in size are maintained to provide habitat for declining species that depend upon this habitat type. The alternative reduces the number of existing wildlife openings that can be managed from 1630 to between 500 and 700 and applies the existing 1992 Land and Resource Management Plan management guidelines to these openings. This reduces the number of wildlife openings to less than 2% of the Forest area.

The proposed action reduces the list of Management Indicator Species (MIS's) from eighteen (18) to five (5) species of birds and updates the standard and guidelines to promote recovery and management of Federal threatened and endangered species, Regional Forester Sensitive species (RFSS), and species of concern, which were identified in an extensive viability analysis. Some but not all State of Illinois threatened and endangered species are included in all three above categories of species. It incorporates by reference all federally listed and Regional Forester sensitive species. Species of recreational interest are included in planned monitoring activities.

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 in all alternatives, the list of management-indicator species would be focused on five species of birds that represent openland and forest habitats; species of recreational interest would no longer be listed. 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. ATVs and OHMs would be restricted to up to 50 percent of dirt- and grass-surface roads (Levels 1 and 2) posted for ATV/OHM use, unless monitoring indicates that illegal off-road use is resulting from this access. Licensed vehicle use would be allowed on the remainder of Levels 1 and 2 roads, and on all other open roads. Mountain bicycles would be allowed on open roads and on system trails designated for bicycle use. Additional developed recreation sites would be allowed under this alternative.

Forest ecosystem health and sustainability would be the goal under Alternative 2 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 predominant 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 under this alternative 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 Fountain Bluff and 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 still protecting the 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 (the formerly 9.3 Wilderness Study Area) Ripple Hollow 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.

Alternative 2 makes some changes regarding land-ownership adjustment. The priority list for land-ownership 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.

CURRENT (FOREST PLAN DIRECTION) AND DESIRED FUTURE CONDITION (REVISED FOREST PLAN DIRECTION)

Current Forest Plan Direction (Alternative 1):

The 1992 Shawnee Amended Land and Resource Management Plan (ALRMP) was prepared to meet the requirements of the National Forest Management Act (NFMA) of 1976. The 1992 ALRMP list of Regional Forester Sensitive species included 14 animals (3 invertebrates, 2

reptiles/amphibians, 2 fish, 2 birds and 5 mammals). One hundred and nineteen Forest-listed species (84 plants, 2 invertebrates, 5 amphibians/reptiles, 3 fish, 16 birds and 4 mammals) are identified (ALRMP IV 51-54). All one hundred and nineteen species were either state endangered or threatened at the time the ALRMP was adopted. Eighteen Management Indicator Species (MIS's) are identified (17 birds and 1 fish) (ALRMP IV 66-67). Forest-wide and management area specific standards and guidelines are written into the ALRMP to protect suitable habitat or manage habitat for all Regional Forester Sensitive species, Forest-listed species and MIS's.

Eighteen forest interior management units FIMU's are identified as forest interior bird habitat. Seven FIMU's are managed under prescription for management area 6.4. Seven are managed as inclusions within management area 5.1. One is managed as an inclusion within management area 9.3, two are managed as inclusions within management area 9.4, and one is an inclusion within management area 8.2. Management area standards and guidelines for 6.4 management areas provide guidance for the management of forest interior habitat.

Revised Forest Plan Direction (Proposed Action):

The effects of the proposed alternatives on the revised October 2003 Regional Forester Sensitive species list of (16) animal species are addressed in this Biological Evaluation. The revised Regional Forester Sensitive species list includes 5 invertebrates, 3 reptiles/amphibians, 2 fish, 4 birds, and 2 mammals. The following species are included in the revised list: Indiana crayfish, Kentucky crayfish, bigclaw crayfish (*Orconectes placidus*), subtle cave amphipod, carinate pillsnail, northern copperbelly watersnake, timber rattlesnake, bird-voiced treefrog, bantam sunfish, bluehead shiner, cerulean warbler, Swainson's warbler, loggerhead shrike, Henslow's sparrow, eastern woodrat, and southeastern myotis. The hellbender, alligator snapping turtle, Bachman's sparrow, Keen's myotis, Eastern small-footed bat, and Rafinesque's big-eared bat were included as RFSS on the Shawnee NF in the 1992 ALRMP but were removed from the Regional Forester Sensitive animal species list in 2000 and are not included as RFSS for Plan Revision.

An evaluation of all sensitive species was completed in 2000 and the Regional Forester's Sensitive species list was issued. The list has been updated at least twice since 2000 with the most current list dated October 28, 2003. Depending upon the needs of each of these species, management will range from protection of special habitats to active management or restoration of suitable habitat.

As part of the part of the Forest Plan revision, the revised Plan will not include a list of Regional Forester Sensitive animals; however, the revised Plan will reference the current Regional list. This will allow us to keep the official list current and eliminate the need to revise the Plan should the species list change in the future. New or revised standards and guidelines have been incorporated into the revised Forest Plan that should provide for the long-term recovery of the following Regional Forester Sensitive species:

Cerulean warbler – Cerulean warbler populations have declined throughout the eastern United States since 1992. The species is currently being considered for Federal listing. Its status was elevated to Regional Forester Sensitive in 2000.

New guidelines for FIMU's apply to even-aged hardwood (EH) management area and mature

hardwood management areas (MH) where federal ownership is at least one mile-diameter in size and lacking developments that contribute to opening the forest canopy such as power lines, paved roads, levees and lakes. These management standards and guidelines will be applied to approximately 60,000 acres.

Henslow's sparrow – Henslow's sparrow populations were not known from the Forest when the 1992 ALRMP was written and were therefore not identified as a Regional Forester Sensitive species in 1992. Henslow's sparrows are obligate grassland species and are declining throughout most of its range due to loss of grassland habitat. Its status was elevated to Regional Forester Sensitive in 2000.

New guidelines for the management of openland tracts greater than 80 acres in size include objectives for maintenance of early successional habitat using mechanical or chemical treatments, the removal of small trees including hardwood shrubs, Eastern red cedars and invasive shrubs such as Autumn olive. Management will emphasize restoration of these openlands and include the use of prescribed fire and the planting of native grasses and forbs.

Loggerhead shrike – New guidelines for the management of openland tracts greater than 80 acres in size include objectives for maintenance of early successional habitat and some provisions for the maintenance of small areas dominated by thorny shrubs and small trees. The inclusion of these areas in large openland tracts would provide for the maintenance of a small population of this species in southern Illinois. The Forest would not be able to provide for the long-term viability of this species on the Forest alone due to the limited amounts of available habitat for the species on the Forest.

Swainson's warbler – The species was identified as a Forest-listed species in the 1992 ALRMP. Since 1992 the species has declined sharply in Illinois. Loss of habitat may have contributed to its disappearance from the Forest. Its status was elevated to Regional Forester Sensitive in 2000.

Existing guidelines for the Cave Valley (CV) management area and new guidelines for Mississippi and Ohio River Flood Plains (MO) management area maintain and restore both early and late successional bottomland hardwood forests. Over time, the Forest will not be able to provide for the long-term viability of this species. Even with restoration of 3,000-5,000 acres of additional bottomland hardwoods, there would only be small amounts of habitat for this species on the Forest. The Forest will through the revised Forest Plan maintain a small population of this species on the periphery of its range and help to maintain genetic diversity for the species. If the Forest acquires more, large acreages of historical bottomland habitats in the Mississippi River floodplain or other large river floodplains, this will contribute to maintenance of the long term diversity of the species and possibly lead to viable populations in the long term, future.

Eastern woodrat – The incorporation of recently developed recovery objectives along with new guidelines for oak silvicultural practices should provide for the long-term viability of this species.

Southeastern myotis – Existing standards and guidelines for the protection and management of known summer and winter roosts should contribute to the long-term viability of this species in southern Illinois.

Timber rattlesnake – This species was not listed in the 1992 ALRMP. Since 1992 the species has declined dramatically throughout the eastern United States. Its addition to the list of state

threatened species prompted a Forest status review and the elevation to Regional Forester Sensitive Species status in 2000.

An existing Forest Order for the protection of snakes along with new guidelines for den site protection and management and for oak silvicultural practices should provide for the long-term viability of this species on the Forest and in southern Illinois.

Northern copperbelly watersnake – Distribution of this species is limited to the Eastside of the Forest. The species had a Conservation Agreement for its management signed by three states and historically has been considered for Federal listing. The agreement expired in 2001 and has not been renewed to date. The species was added to the Regional Forester Sensitive Species list in 2000 based on its range-wide rarity and the identified need for management throughout its range in Illinois, Indiana and Kentucky.

The existing Forest Order for the protection of snakes along with standards and guidelines for habitat protection and management covered in FR, NA, CR, and MO management prescriptions and riparian filterstrip standards and guidelines should provide for the long-term viability of this species.

Bird-voice treefrog – This species is threatened in Illinois and is known only from a few isolated locations in extreme southern counties. The species was added to the Regional Forester Sensitive Species list in 2000.

Existing standards and guidelines for habitat protection, management, and restoration covered in FR, NA, CR, and MO management prescriptions and in riparian filterstrip standards and guidelines should provide for the long-term viability of this species.

Indiana crayfish – Indiana crayfish have a limited distribution on the Shawnee Forest, which includes portions of the Saline Creek and Honey Creek drainages. Since 1992, populations in Illinois and the Shawnee National Forest appear to be stable. This crayfish was added to the Regional Forester Sensitive Species list in 2000.

Kentucky crayfish – Kentucky crayfish are relatively rare on the Forest, occurring only within the Big Creek Drainage. This crayfish was identified as a Forest-listed species in the 1992 ALRMP. Populations in Illinois and on the Forest appear to be stable since 1992.

Orconectes placidus (bigclaw crayfish) – This species is found only within the Big Creek drainage on the Forest and is considered relatively rare. Populations of this species appear to be stable since 1992. This species was added to the Regional Forester's Sensitive species list in 2000.

Forest-wide standards and guidelines specific to these crayfish state that in project areas with streams known to contain these species, stream impoundment, instream removal of gravel and cobble, and input of sediment or toxins from runoff should be minimized. These standards and guidelines also prohibit the use of non-native crayfish in streams containing these species and prohibit the interbasin transfer of non-native crayfish. New Forest-wide standard and guidelines for water quality, filter strips, riparian areas, and bare soil exposure limits should reduce sedimentation and habitat degradation. These guidelines should provide for the long-term viability of these species.

Subtle cave amphipod and carinate pillsnail– The distributions of these two species are very restricted. As stated in the revised Forest-wide standards and guidelines, protection of available habitat and the improvement and/or maintenance of groundwater quality in areas where these two invertebrate species are known to occur should provide for their long-term viability on the Forest.

Bluehead Shiner – This species is found only within Wolf Lake and southern portions of the Larue swamp within the Larue-Pine Hills Ecological Area. This fish was identified as a Forest-listed species in the 1992 ALRMP.

Bantam Sunfish – This species is restricted to LaRue Swamp, Wolf Lake, and Grantsburg Swamp.

This fish was identified as a Forest-listed species in the 1992 ALRMP.

Revised Forest-wide standards and guidelines specific to these two species prohibit the introduction of live fish or crayfish in waters where this species is known to occur, except as needed to maintain or restore native populations. Revised standards and guidelines also state that high quality; bald cypress swamp habitat should be maintained across the Forest. These standards and guidelines should ensure the continued viability of the bantam sunfish. The bluehead shiner is currently considered extirpated in southern Illinois. In order to maintain viability of this species on the Forest, reintroduction efforts are needed in conjunction with standards and guidelines.

CUMULATIVE EFFECTS

Cumulative effects analysis takes in to account all known past actions, the proposed action, present actions, and reasonably foreseeable future actions, which could or will impact the analyses areas. Past actions within vicinities of the SNF include farming, grazing, land clearing of forest and old fields for agriculture and residential developments, pine and hardwood plantation establishment, timber harvest, recreational facility construction and maintenance, road construction, maintenance and use; Natural Area (8.2) designation (including management and maintenance by the Illinois Department of Natural Resources – IDNR) in Lusk Creek/Indian Kitchen state-owned Natural Area, power line construction and maintenance, wilderness designation and management, homesteads, user-created equestrian and hiker trails, unauthorized user-created all terrain vehicle (ATV) trails, increased equestrian trail use especially in the last ten years, mining, tree planting and timber stand improvements including tree thinning and use of herbicides to reduce vegetative competition; ATV and Off Highway Vehicle (OHV=4-wheel drive) and sport utility vehicles (SUV) and trucks and off-road motorcycle use, outdoor recreational uses (hunting, fishing, and hiking), wildfires, prescribed burning, fire suppression, wildlife opening construction and maintenance, openland management, implementation of standards and guidelines directed at improving habitat for T/E/S species, pond and waterhole construction, levee construction (LaRue Swamp area in particular), and railroad construction and use.

Present actions in the project area vicinities include: trail maintenance, construction and use of existing designated trails; designation of equestrian confinement areas, power line maintenance, prohibition of ATV (mostly unauthorized on National Forest) and OHV use, timber harvest (predominantly on private lands), management of the Dixon Springs Agriculture Center, agricultural management (row cropping and pasture) on private lands, fires (wild and prescribed),

fire suppression, use of user-created equestrian trails, road maintenance and use, tree planting, railroad maintenance and use, trail rehabilitation, continued and increasing equestrian use, recreational facility management and maintenance, wilderness management, the marking of Natural Area boundaries, and outdoor recreation use (hiking, hunting and fishing).

Future actions will include most of the past and present actions with some modifications on National Forest (see Alternatives described below).

ALTERNATIVES

Alternative 1 retains the current standards and guidelines for the management of federally and state endangered or threatened species, Regional Forester Sensitive species and species of concern identified in the viability analysis. Alternatives 2, 3 and 4 revise the current standards and guidelines for the management of these listed species. All alternatives incorporate by reference the most current list of federally listed species. All alternatives reduce the number of MIS's from (18) to (5). All alternatives revise the current list of Regional Forester Sensitive animal species and incorporate list of animal species by reference. All alternatives provide a mix of management prescriptions and practices scattered across the Forest landscape that protect, manage or create varying amounts of suitable habitat. All alternatives maintain viable populations of all species where that is physically and ecologically possible.

ALTERNATIVE 1 – No Action – Implementation of the 1992 ALRMP

This alternative revises the list of Regional Forester Sensitive animal species and makes revisions to the current forest-wide and management area specific standards and guidelines that either protect or manage their habitat. The 1992 list of Regional Forester Sensitive animal species can be found in the ALRMP Supplemental FEIS Chapter 3 pages 63-64. The cumulative effects of the alternatives on these species can be found in the Supplemental FEIS Chapter 4 pages 118-119.

Alternative 1 allows equestrian use off system trails, allows motorized use, manages riparian areas and filter strips as management area (MA) 6.3, manages 7 FIMU's as MA 6.4, maintains every old field or grassland over 80 acres in MA 2.1 (uneven-aged hardwood forests), manages MA 6.3 (riparian areas), MA 6.6 (mature hardwood forests) and MA 9.2 (candidate wild and scenic rivers), retains all existing wildlife openings (1630), manages federally endangered or threatened species, state endangered or threatened, Regional Forester Sensitive species and species of concern the same as alternative 2, creates a modified list of MIS's that is similar to alternative 2, retains the list of species of recreational interest, allows designated system and equestrian trail in natural areas, identifies 286 miles of ATV/OHM corridors and restrict use to designated travel ways.

Alternative 1 allows a trail density of one mile per square mile, allows for pesticide use only when "essential" to meet management objectives, specifies 3.4 million board feet of allowable timber sale and classifies 22% of the landbase as suitable for timber management, specifies uneven-aged using group selection as the predominate means of harvesting timber, specifies a vegetation composition objective of 25% oak-hickory in uneven-aged and mature hardwood forest, permits removal of pine for the restoration of natural ecosystems except in wilderness areas and allows range management in uneven-aged and mature hardwood forest.

Alternative 1 identifies areas suitable for oil, gas and mineral exploration, manages Ripple Hollow as recommended for wilderness study, identifies and directs protection of ¼ mile corridors adjacent to 6 rivers classified as Wild and Scenic, fails to address statutory boundary adjustment needs and directs acquiring only the interest needed to achieve the land management objective rather than acquiring all available property rights.

ALTERNATIVE 2 – Proposed Federal Action – See Proposed Action Above

ALTERNATIVE 3 – “Custodial Management”

Highlights of Alternative 3 include placing an emphasis on protection of water-quality, applying revised filter strip guidelines to lakeshores and streams, excluding prescribed burning in designated filter strips, emphasizing wetland development, restoration and management and adding the Mississippi and Ohio River floodplains to management area 6.2. Unlike alternative 2 this alternative does not allow vegetative management or road construction.

Unlike alternatives 2 and 4, this alternative retains FIMU's; however, no wildlife or forest management occurs in designated forest-interior management units. Areas of 500 or more acres of contiguous forest systems lands are maintained as unmanaged forest for interior bird habitat.

Unlike alternatives 1, 2, and 4, commercial or non-commercial cutting of trees is allowed only for health and safety reasons. Non-native pine removal is emphasized on historical oak-hickory sites and sites determine to be unsuitable as pine plantations.

Unlike alternatives 1 and 4, this alternative eliminates the 1992 ALRMP standards and guidelines for openland management. Openland tracts are reforested except for barrens, glades and hill prairies.

Unlike alternatives 1, 2 and 4 this alternative eliminates management of 1630 existing wildlife openings.

Unlike alternatives 1, 2 and 4 prescribed burning occurs infrequently for small projects such a natural areas and only after pre-burn flora and fauna surveys have been performed.

Like alternatives 1, 2 and 4 this alternative also reduces the list of Management Indicator Species (MIS's) from eighteen to five species of birds and updates the standard and guidelines to promote recovery and management Federally, Regional Forester Sensitive, and state-listed and species of concern, which were identified in an extensive viability analysis.

Alternative 3 incorporates by reference all federal and state endangered or threatened species and Regional Forester sensitive species. Species of recreational interest are included in planned monitoring activities.

This alternative is similar to alternative 2 except no equestrian use in natural areas is allowed. Existing trails in Lusk Creek, Garden of the Gods and LaRue Pine Hills natural areas are eliminated.

Alternative 3 allows for the use of pesticides and biological treatments following a site-specific environmental analysis.

Alternative 3 is similar to alternative 2 except seasonal and weather-related trails closures to equestrian and mountain bikes occur. Unlike alternatives 1 and 2 the trail goal is limited to 350-450 miles with 150-200 miles of dual designated system trails and roads.

Rather than place a moratorium on ATV and OHM use like alternative 2 does this alternative prohibits their use. Like alternatives 2 and 4, the use of mountain bikes is restricted to open roads and system trails designate for their use and excluded in wilderness areas.

ALTERNATIVE 4 – “Recreation Emphasis”

The similarities between this alternative and alternative 2 include: placing an emphasis on protection of water-quality, applying revised filter strip guidelines to lakeshores and streams, excluding prescribed burning in designated filter strips, emphasizing wetland development, restoration and management and creating the Mississippi and Ohio River floodplains management area 6.2. Unlike alternative 3 this alternative allows vegetative management and road construction.

Like alternatives 2 this alternative eliminates FIMU's and converts these areas to even-aged hardwood 3.1 management areas or mature hardwood forest management areas 6.6. Like alternatives 1 and 2 wildlife management is allowed.

Like alternative 1 removal of pine for restoring natural ecosystems is permitted except in wilderness areas.

Like alternatives 1 and 2 timber harvest is allowed. Shelterwood harvest is employed and prescribe burning is used to favor open understories and large mast producing trees.

Like alternatives 1 this alternative maintains the 1992 ALRMP standards and guidelines for openland management. Unlike alternative 3 barrens, glades and hill prairies and like alternative 1 this alternative retains management 1630 wildlife openings. Unlike alternative 2 this alternative does not reduce the number of existing wildlife openings to 700.

Like alternatives 2 prescribe burning is allowed. Unlike alternative 3 prescribe burning is not limited to infrequent burns and small projects such a natural areas and a pre-burn flora and fauna survey.

Like alternatives 1, 2 and 3 this alternative also reduces the list of Management Indicator Species (MIS's) from eighteen (18) to five (5) species of birds and updates the standard and guidelines to promote recovery and management Federally, Regional Forester sensitive, state-listed and species of concern, which were identified in an extensive viability analysis. It incorporates by reference all federally and state endangered or threatened species and Regional Forester sensitive species. Species of recreational interest are included in planned monitoring activities.

Like alternatives this alternative allows equestrian use in natural areas on designated trails. The designation of user-created trails as system trails is allowed where appropriate. Like alternative 2, trail density standards are dropped and a similar goal of 600-700 miles of system trails is set. Trails density goals are nearly two times greater than alternatives 1 and 3.

Like alternatives 2 and 3 this alternative also allows for the use of pesticides and biological treatments following a site-specific environmental analysis

Like alternative 1 this alternative identifies corridors for 286 miles of ATV/OHM trails. Trails are prohibited in wilderness areas (MA 5.1), natural areas (MA 8.2), and significant heritage resources sites (MA 8.3). Licensed vehicle use is allowed on Level 1 and 2 roads and other roads open to use. Like alternatives 2 and 3, the use of mountain bikes is restricted to open roads and system trails designate for their use and excluded in wilderness areas (MA 5.1).

SCOPING AND SURVEYS

Significant portions of the Shawnee National Forest (planning area) including ecological areas and zoological Areas, openland areas and timber stands that are included in the planning area have been surveyed many times by numerous researchers from Southern Illinois University (SIU), by IDNR Heritage Staff, and by Shawnee National Forest wildlife biologists and botanists over the last 30 years and especially since the early 1970's. Many of these areas have been surveyed in the last 1-5 years by Beth Shimp, Mike Welker, Mike Spanel, and Steve Widowski, Botanist, Fisheries Biologist, and Wildlife Biologists respectively on the Shawnee National Forest.

The "Endangered and Threatened species of Illinois: Status and Distribution, Volume I - Plants," "Endangered and Threatened species of Illinois: Status and Distribution, Volume II - Animals," "Additions, deletions and changes to the Illinois list of Threatened and Endangered species," "October 2003 USDA Forest Service Eastern Region Regional Forester's Sensitive Species List," "1999 Checklist of endangered and threatened animals and plants of Illinois," and Illinois Department of Natural Resource's "Biological Conservation Database (March 2001)" were reviewed for current listings, habitat, and known location information. Public scoping on this project was also conducted. Species distribution records and site specific field surveys indicate the sixteen (16) Regional Forester Sensitive animals being evaluated in this Biological Evaluation occur in the following counties within the planning areas:

REGIONAL FORESTER SENSITIVE ANIMAL SPECIES

Table 1: Forester Sensitive animal species known to occur in 2004 in the listed SNF counties

Species Common/Scientific Name:	Alx	Gal	Har	Jak	Jon	Mas	Pop	Sal	Uni	Wil
AMPHIBIANS AND REPTILES:										
Bird-voiced treefrog (<i>Hyla avivoca</i>)			x		x		x	x	x	
x										
Timber rattlesnake (<i>Crotalus horridus</i>)	x	x	x	x	x		x	x	x	x
Northern Copperbelly watersnake (<i>Nerodia erythrogaster neglecta</i>)			x		x	x	x	x		

Species Common/Scientific Name:	Alx	Gal	Har	Jak	Jon	Mas	Pop	Sal	Uni	Wil
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BIRDS:

Henslow's sparrow (<i>Ammodramus henslowii</i>)						X	X	X	X	X
Cerulean warbler (<i>Dendroica cerulea</i>)	X	X	X	X	X		X	X	X	X
Migrant loggerhead shrike (<i>Lanius ludvicianus migrans</i>)	X	X	X	X	X	X	X	X	X	X
Swainson's warbler (<i>Limnothlypis swainsonii</i>)	X			X	X		X			X

MAMMALS:

Southeastern myotis (<i>Myotis austroriparius</i>)	X		X		X		X		X	
Eastern woodrat (<i>Neotoma floridana</i>)				X						X

FISH:

Bantam sunfish (<i>Lepomis symmetricus</i>)	X									X
Bluehead shiner (<i>Pteronotropis hubbsi</i>)										X

INVERTEBRATES:

Indiana crayfish (<i>Orconectes indianensis</i>)		X	X		X		X	X		X
Kentucky crayfish (<i>Orconectes kentuckiensis</i>)			X							
Crayfish spp. (<i>Orconectes placidus</i>)			X	X	X					
Subtle cave amphipod (<i>Stygobromus subtilis</i>)				X						X
Carinate pillsnail (<i>Stenotrema (=Euchemotrema) hubrichti</i>)										X

Habitat for these (16) sixteen Regional Forester's Sensitive species occurs within SNF in the counties identified in the above table. The management practices proposed in the four alternatives may either have no effect, a positive effect or a negative short-term, long-term or cumulative effect as noted in the table below. Forestwide and management area specific standards and guidelines are incorporated into each alternative. The implementation of these standards and guidelines will result in the continued maintenance of small populations of all (16) Regional Forester Sensitive animal species on the Forest. Some of these small populations may not be large enough to be fully viable and self-sustaining populations on the Forest because of the overall rarity of habitats for the species on the Forest and/or rarity of the species itself for reasons beyond the control of the Forest. They would however contribute to maintaining viable populations over larger geographical scales and the genetic diversity of individual species.

AMPHIBIANS AND REPTILES:

Bird-voiced treefrog (*Hyla avivoca*):

This species occurs in closed canopy cypress-tupelo deep water swamps in Jackson, Williamson Union, Pope, Alexander and Massac counties (Bradon and Ballard 1977). Breeding individuals are found on vines, branches, stems and buttonbush or other shrubs above the water in levels ranging from less than 3.2 cm in summer to as much as 1.5 m in winter (Redmer et al., 1999b). The period of activity for this treefrog in southern Illinois ranges from mid-April to mid-October. Much of its habitat is fragmented and disturbed (Redmer et. al., 1996). Roads in urban environments may limit their dispersal (Paton and Egan 2001). Pesticides affect their behavior and exposure to environmental contaminants may affect their development (Bridges 1999). The species is nocturnal and almost never seen except during nighttime choruses; apparently it remains in the treetops during the day (Behler and King 2000).

In preserving or restoring amphibian habitat, it is important to remember that many amphibians occur in metapopulations where some of these populations undergo periodic extinctions even in undisturbed situations (Mierzwa 1998). This 'pond-as-patches' view of amphibian spatial dynamics highlights the importance of regional and landscape processes in determining local patterns of abundance (Marsh and Trenham 2000).

From a conservation perspective, it may not always be important what biological processes cause turnover in pond use – all biological causes of turnover reinforce the conclusions that apparent local extinctions are not necessarily permanent, that unused habitats may be important for the long-term persistence of species, and that maintaining connectivity between habitat patches is a priority (Marsh and Trenham 2000).

Threats to existing populations include loss of habitat, habitat fragmentation, pollutions, toxins and exposure to environmental contaminants

Alternative 1:

This alternative continues the implementation of the existing 1992 ALRMP. The mix of habitat conditions for each management prescription and the continued implementation of both Forestwide and management area specific standards and guidelines in management areas 6.3, 8.2 and 9.2 are designed to insure the continued viability of the bird-voiced treefrog within the planning area.

Because this species only occurs in protected, closed canopy, cypress-tupelo, deep water swamps its habitat or populations would not be impacted in the short-term or long-term by the following practices: roads and trails management (user created trails allowed), recreational trail/road use, dispersed recreational use, developed recreational use, timber harvest methods, vegetation treatments, integrated pest management, opening/openland management, and minerals management. These activities are not expected to occur in cypress-tupelo swamps known to contain populations of the bird-voiced tree frog.

Restrictive management in floodplain and filter strip management areas, natural areas, cave valley, wildernesses, and candidate wild and scenic river study areas in this alternative would indirectly, benefit the species by protecting existing wetland habitat.

Fire management, primarily prescribed burning could occur adjacent to known habitats for this species. Prescribed burning has occurred and may continue to occur in the understory of upland and bottomland forests immediately adjacent to swamps. Since the species is primarily arboreal and aquatic and spends little if any time on the ground, few if any measurable, negative effects on the species from prescribed burning are anticipated in this alternative. Only few individuals are anticipated to be negatively affected in early fall and spring. No long term effects on the populations of bird-voiced treefrogs are anticipated.

Aquatic resource management, primarily management of streams, lakes and ponds for sport fishing would not affect the species as none of this type of management is done in swamp habitats on the Forest. Management of Oakwood Bottoms Greentree Reservoir primarily through the management of small amounts of permanent wetlands (borrow pits and some ditches) should indirectly, benefit the species by maintenance and improvement of these wetlands.

Land ownership adjustment, would have positive, indirect, short-term and long-term effects where newly acquired parcels have existing or potential habitat.

Alternative 2:

This alternative implements the Proposed Federal Action. The mix of habitat conditions for each management prescription and the continued implementation of both Forestwide and management area specific standards and guidelines in management areas are designed to insure the continued viability of this species within the planing area.

Habitat or populations of the bird-voiced treefrog would not be directly or indirectly impacted in the short-term or long-term by the following practices: roads and trails use (seasonal closure allowed), recreational trail/road use, dispersed recreational use, developed recreational use, timber harvest methods, integrated pest management, opening/openland management, and minerals management. These activities are not expected to occur in cypress-tupelo swamps known to contain populatons of the Bird-voiced tree frog.

Restrictive management in Mississippi and Ohio River floodplains, natural areas, riparian filter strips, water-supply watersheds, cave valley, wildernesses, and candidate wild and scenic river study areas would protect existing wetland habitats and indirectly benefit the species.

Vegetation treatements, primarily reforestation of some cypress dominated wetlands in the Mississippi River floodplains should indirectly benefit the species as some historical habitats for the species are restored.

Fire management, primarily prescribed burning could occur adjacent to known habitats for this species. Prescribed burning has occurred and may continue to occur in the understory of upland and bottomland forests immediately adjacent to swamps. Since the species is primarily arboreal and aquatic and spends little if any time on the ground, few if any measurable, negative effects on the species from prescribed burning are anticipated in this alternative. Only few individuals are anticipated to be negatively affected in early fall and spring. No long term effects on the populations of bird-voiced treefrogs are anticipated.

Aquatic resource management, primarily management of streams, lakes and ponds for sport fishing would not affect the species as none of this type of management is done in swamp habitats on the Forest. Management of Oakwood Bottoms Greentree Reservoir primarily through the management of small amounts of permanent wetlands (borrow pits and some ditches) should indirectly, benefit the species. Restoration of some permanent and ephemeral wetlands in the Mississippi River floodplains should indirectly benefit the species as some historical habitats are restored.

Land ownership adjustment, would have positive, indirect, short-term and long-term effects where newly acquired parcels have existing or potential habitat.

Alternative 3:

Habitat or populations of the bird-voiced treefrog would not be directly or indirectly impacted in the short-term or long-term by the following practices: roads and trails use (seasonal closure

allowed), recreational trail/road use, dispersed recreational use, developed recreational use, timber harvest methods, integrated pest management, opening/openland management, and minerals management. These activities are not expected to occur in cypress-tupelo swamps known to contain populations of the Bird-voiced tree frog.

Restrictive management in Mississippi and Ohio River floodplains, natural areas, riparian filter strips, water-supply watersheds, cave valley, wildernesses, and candidate wild and scenic river study areas would protect existing wetland habitats and indirectly benefit the species.

Vegetation treatments, primarily reforestation of some cypress dominated wetlands in the Mississippi River floodplains should indirectly benefit the species as some historical habitats for the species are restored.

Fire management, primarily prescribed burning could occur adjacent to known habitats for this species. Prescribed burning has occurred and may continue to occur in the understory of upland and bottomland forests immediately adjacent to swamps. Since the species is primarily arboreal and aquatic and spends little if any time on the ground, few if any measurable, negative effects on the species from prescribed burning are anticipated in this alternative. Less prescribed burning would occur in this alternative than in all others. Even fewer individuals are anticipated to be negatively affected in early fall and spring. No long term effects on the populations of bird-voiced treefrogs are anticipated.

Aquatic resource management, primarily management of streams, lakes and ponds for sport fishing would not affect the species as none of this type of management is done in swamp habitats on the Forest. Management of Oakwood Bottoms Greentree Reservoir primarily through the management of small amounts of permanent wetlands (borrow pits and some ditches) should indirectly, benefit the species. Restoration of some permanent and ephemeral wetlands in the Mississippi River floodplains should indirectly benefit the species as some historical habitats are restored.

Land ownership adjustment, would have positive, indirect, short-term and long-term effects where newly acquired parcels have existing or potential habitat.

Alternative 4:

Like alternative 2, placing an emphasis on protection of water-quality, applying revised filter strip guidelines to lakes and streams, emphasizing wetland development and management, aquatic resource management and creating the Mississippi and Ohio River floodplains management area (6.2) would have positive, indirect, short-term, long-term effects. These activities would protect existing habitat. Effects would be similar to Alternative 2 above.

Summary

In summary for all alternatives, roads and trails management and use, dispersed recreational use, developed recreation site use, timber harvest methods, integrated pest management, opening/openland management, and minerals management are expected to have no direct or indirect effect on the species. Restrictive management, vegetation treatments, aquatic resource management, and land ownership adjustment would have positive, direct and indirect, short-term and long-term effects on these species. Fire management (primarily prescribed fire) may have

slight, short-term, direct effects negative effects but are not predicted to have any direct or indirect effects in the long-term.

Cumulative Effects

Cumulative effects of all alternatives would be comparable to direct and indirect effects except that effects on overall, populations of bird-voiced treefrogs would be less negative or beneficial as large populations of the species occur on other public ownerships in southern Illinois and would be protected by the Illinois Department of Natural Resources and the U. S. Fish and Wildlife Service and thus would be unaffected by Shawnee National Forest management activities. However, most actions on private lands in the Ohio and Mississippi River floodplains except for those in the Wetland Reserve Program would continue to fragment the wetland landscapes and habitats on the Forest and in southern Illinois in all alternatives.

All Citations Taken From PVA Species Data Form – August 01- Literature Search

Behler J. L. and F.W. King. 2000. National Audubon Society Field Guide to North American Amphibians. Alfred A. Knopf, New York.

Brandon R.A. and S.R. Ballard. 1997. Are frogs, toads and salamanders declining in Illinois? Illinois Audubon 259:4-9

Bridges C.M. 1999. Effects of a Pesticide on Tadpole Activity and Predator Avoidance behavior. Journal of Herpetology 33(2): 303-306.

Marsh D.M. and P.C. Trenham. 2000. Metapopulation Dynamics and Amphibian Conservation. Conservation Biology 15(1): 40-49.

Mierzwa K.S. 1998. Amphibian Habitat in the midwestern United States. Pp. 16-23 in Status and Conservation of Midwestern Amphibians (ed. M.J. Lannoo), University of Iowa Press, Iowa City.

Paton P. and S. Egan. 2001. Effects of roads on amphibian community structure at breeding ponds in Rhode Island. Federal Highway Administration, Transportation Environmental Research Program (TERP). Abstract available at: [Http://www.uri.edu/cels/nrs/paton/effects_roads.html](http://www.uri.edu/cels/nrs/paton/effects_roads.html)

Redmer M.D., L.E. Brown and R.A. Brandon. 1996. Distribution and Conservation of Two Austroriparian Treefrogs (*Hyla avivoca* and *Hyla cinerea*) in Illinois. Abstracts for the 3rd Annual Meeting of the US Central Division of Declining Amphibian Populations Task Force, 14-15 Sept. 1996, Indiana Dunes National Lakeshore.

Redmer M.D., L.E. Brown and R.A. Brandon. 1999. Natural History of the Bird-voiced Treefrog (*Hyla avivoca*) and Green Treefrog (*Hyla cinerea*) in Southern Illinois. Illinois Natural History Survey Bulletin 36(2): 37-66.

Timber rattlesnake (*Crotalus horridus*)

This species is a State of Illinois threatened species. Populations of this species in the State of Illinois and throughout its range in the eastern United States are low or declining compared to historical records. In Illinois, the species usually uses forested areas with bluffs and rock

outcrops, and occasionally uses upland forest and crop field (Smith 1961 in Herkert 1994). They also are found in lightly wooded clearings and oak-hickory forests usually containing boulders, rock slabs and outcrop fissures and bottomland forests (Brown 1992).

This species is known from 9 SNF counties (Alexander, Gallatin, Hardin, Jackson, Johnson, Pope, Saline, Union and Williamson). Overall, timber rattlesnakes in eastern Pennsylvania used sites with 62.1% mean canopy closure and 19.3 cm mean canopy tree dbh (Reinert 1984a).

They are active day and night. Their food consists extensively of mammals and birds. During the summer months timber rattlesnakes may be found in upland and bottomland forests or even in cultivated fields. Brush piles are especially attractive places to find them. Gravid females tend to use rocky, more open sites closer to dens where they bask and feed.

Most rattlesnake activity occurs within transient habitat or approximately 200 meters from the den site. Brown (1993) estimates that a population of 50 adults would require at least 7 square miles, within a 1.5 mile radius of protected land around the den. In the fall timber rattlesnakes congregate at denning sites, which are usually near rock bluffs containing deep cracks and fissures. They hibernate between 7.5 and 9 months, depending on geographic location (Brown 1982, Brown 1991). In southern Indiana, snakes entered hibernacula in early October, and emergence typically occurred during early May (Walker 2000). Brown (1992) reported dispersal from hibernacula as far as 7200 m.

Threats to existing populations include loss of habitat from urban development, destruction of denning sites, logging damage to summer habitats (Brown 1993), predation and hunting during long distance migrations to hibernacula (Kingsbury and Coppola 2000), unregulated skin trade (Berish 1998), sponsored hunting and subsequent release to different locations than where they were captured (Reinert 1990), indiscriminate killing by people and vehicles and clearing of forest habitats (Phillips et al 1999).

Alternative 1:

This alternative continues the implementation of the existing 1992 ALRMP. The mix of habitat conditions for each management prescription, continued implementation of Forestwide and management area specific standards and guidelines, an existing Forest Order for the protection of snakes, and guidelines for den site protection and management should provide for the long-term viability of this species.

Restrictive management in floodplains, filter strips, riparian areas, natural areas, cave valley, heritage resource areas, forest interior management units, wilderness areas, Camp Hutchins, areas recommended for wilderness study, and candidate wild and scenic river study areas and a increased emphasis on non-motorized use would have positive, indirect, short-term and long-term effects. These activities would protect existing den habitats and some mature forest feeding habitat in close proximity. It would also limit vehicle and rattlesnake encounters and some direct, negative effects on timber rattlesnakes that follow.

Roads and trails management and associated dispersed and developed recreational use would have some minor, direct negative effects on the species as rattlesnake and recreational user encounters usually end up with killing or seriously injuring snakes. Trails and roads are located to avoid den and migration sites, however snake mortality on some other public roads and trails

still occurs annually. Overall, encounters in general are low but do occur with the most frequency on the westside of the Forest where populations are highest and more widespread. Forest orders and prohibitions on killing or harassing snakes and some road closures during migration also reduce some of these effects. Populations have not been negatively affected in most locations by our present road and trail recreational uses in the last 15 years. The exceptions maybe near intensive trail use on the eastside of the Forest.

Timber harvest in this alternative would be done primarily in Unevenaged Hardwood Forest and Mature Forest management areas. Group selection harvest would be done in hardwood forests and shelterwood harvest would be done in pine plantations in these management areas. Timber rattlesnakes would be affected directly and indirectly by harvests in mature upland and bottomland hardwood forests and hardwood restorations in pine plantations within 1.5 miles of den sites. Harvest would have beneficial indirect effects on the species in both the short and long terms as early successional forest habitats with high prey content and brush piles would be created in the short term providing abundant food and cover. In the long term, maintenance of mature oak-hickory forests, that are high quality habitat for timber rattlesnakes would also have beneficial effects on the species.

Harvest activities would also have minor, short term, direct negative effects on a few individuals from equipment operation and contact in their habitats. Most individuals would avoid areas of high activity during harvest, and these effects would be very minor on overall populations.

Vegetative treatments include timber stand improvement and reforestation primarily in UH, MH, and OB and FR management areas to favor and aid oak-hickory forest regeneration would have short and long term benefits for timber rattlesnake as food and cover habitat for the species would be maintained and improved.

Fire management including prescribed burning would have a slight, short-term, direct negative effect on individual timber rattlesnakes remaining outside the den sites when upland forests are burned, however because of the potentially long hibernation period (7.5 to 9 months) and the location of dens sites (rock outcrops and fissures) few individuals are likely to be affected. Prescribed burning in upland and bottomland hardwoods and openlands will also have long term, indirect, beneficial effects on the species as oak-hickory forests and old fields, preferred habitats for the species for foraging would be maintained.

Pesticide use as part of integrated pest management would have no effects on the species. Most applications would be to reduce or eliminate non-native, plant species and would be applied on a limited basis and in site-specific locations. These actions would have no measurable effect on timber rattlesnakes.

Continued management of existing wildlife openings and large openlands in close proximity to den sites will have a short-term and long term, indirect, beneficial effect by increasing prey availability of small mammals and foraging habitats for the species. Disking, plowing and mowing activities in openings and portions of openlands can have short term, direct, minor negative effects on the species as some individuals maybe killed or injured by these activities. Historically, when we were actively managing openings and openlands, these encounters were extremely rare across the forest. This same level of direct effects are anticipated in the future in Alternative 1.

Aquatic resource management, primarily management of Mississippi River and Big Muddy River floodplain wetlands including Oakwood Bottoms Greentree Reservoir (OB) would have beneficial, indirect effects on the species. In the late spring and early summer OB has provided and will continue to provide quality bottomland forest, foraging habitat for the species in both the short and long term. The restored wetlands and bottomland forest areas in the Mississippi River and Big Muddy River floodplain will provide similar benefits in the long term.

Minerals management will result in infrequent and small scale disturbances, primarily of foraging habitat for the species. Most of these habitat disturbances would not have any effects on the species because they are so small scale that beneficial or negative direct or indirect effects are anticipated to be minimal and immeasurable.

Land ownership adjustment, would have a positive short-term and long-term, indirect, beneficial effects on the species where newly acquired parcels have existing den sites or foraging habitats.

Alternative 2:

This alternative implements the Proposed Federal Action. The mix of habitat conditions for each management prescription, continued implementation of Forestwide and management area specific standards and guidelines, an existing Forest Order for the protection of snakes, and guidelines for den site protection and management should provide for the long-term viability of this species.

Restrictive management in floodplains, filter strips, natural areas, cave valley, water-supply watersheds, heritage resource areas, wildernesses, non-motorized recreation areas, and candidate wild and scenic river study areas and a increased emphasis on non-motorized use would have positive, indirect, short-term and long-term effects. These activities would protect existing den habitats and some mature forest feeding habitat in close proximity. It would also limit vehicle and rattlesnake encounters and some direct, negative effects on timber rattlesnakes that follow.

Roads and trails management and associated dispersed and developed recreational use would have some minor, direct negative effects on the species similar to those discussed in Alternative 1 above.

Timber harvest in this alternative would be done primarily in Evenaged Hardwood Forest (EH) and Mature Forest (MF) management areas. Shelterwood harvest would be done in hardwood forests and in pine plantations in these management areas. Timber rattlesnakes would be affected directly and indirectly by harvests in mature upland and bottomland hardwood forests and hardwood restorations in existing pine plantations within 1.5 miles of den sites. Harvest would have beneficial indirect effects on the species in both the short and long terms similar to those described above in Alternative 1. More oak-hickory forest would be maintained and restored in this Alternative than in Alternative 1 and subsequently there would be more indirect, beneficial effects from these actions.

Also similar to Alternative 1, harvest activities would also have minor, short term, direct negative effects on a few individuals from equipment operation and contact in their habitats. As in Alternative 1, most individuals would avoid areas of high activity during harvest, and these effects would be very minor on overall populations.

Vegetative treatments include timber stand improvement and reforestation primarily in EH, MH, and OB management areas to favor and aid oak-hickory forest regeneration would have short and long term benefits for timber rattlesnake as food and cover habitat for the species would be maintained and improved.

Fire management including prescribed burning would have similar direct effects to those described in Alternative 1 above. Prescribed burning in upland and bottomland hardwoods and openlands will also have long term, indirect, beneficial effects on the species as identified in Alternative 1 except that there would be preferred habitat burned and these beneficial effects would be greater.

The effect of pesticide use as part of integrated pest management would be similar in effects on the species as in Alternative 1 above.

The effects of management of existing wildlife openings and large openlands in close proximity to den sites will have a short-term and long term, indirect, beneficial effect as in Alternative 1 except that less openlands would be managed and beneficial effects would be correspondingly less.

Aquatic resource management, primarily management of Mississippi River and Big Muddy River floodplain wetlands (MO) and in Oakwood Bottoms Greentree Reservoir (OB) would have beneficial, indirect effects on the species comparable to Alternative 1.

The effects of both minerals management and land ownership adjustment on the species would be similar to Alternative 1 above.

Alternative 3:

Alternative 3 would increase the amounts and correspondingly the effects of restrictive management on timber rattlesnakes. Restrictive management would occur on more acres and in more management areas than in Alternatives 1 or 2 above including in MH areas. This would have positive, indirect, short-term and long-term effects. These activities would protect existing den habitats and some mature forest feeding habitat in close proximity and as in Alternatives 1 and 2 would also limit vehicle and rattlesnake encounters and some direct, negative effects on timber rattlesnakes that follow.

Roads and trails management and associated dispersed and developed recreational use would have some minor, direct negative effects on the species similar to those discussed in Alternatives 1 and 2 above except that there would be less trails and thus less human-rattlesnake encounters and subsequently less direct effects.

Timber harvest, fire management, opening/openland management and pesticide use associated with integrated pest management would have no measurable negative or positive, direct or indirect effects on the species as little if any of these activities would occur except for some minor amounts of burning in NA management areas.

Vegetation treatments would also be substantially less and only occur in OB and NA management area. Subsequently, direct and indirect effects on timber rattlesnakes would be substantially less than those in Alternatives 1 and 2.

The direct and indirect effects of aquatic resource management, minerals management, and land ownership adjustment on the species would be similar to Alternative 2 above.

Alternative 4:

The direct and indirect effects of Alternative 4 on the timber rattlesnake would be comparable to Alternative 2 for timber harvest, fire management (prescribed burning), vegetation treatments, integrated pest management, aquatic resource management, minerals management, and land ownership adjustment. The direct and indirect effects of Alternative 4 on timber rattlesnakes would be comparable to Alternative 1 for road and trail management and dispersed and developed recreational use and opening/openlands management.

Restrictive area management would involve less acres and management areas than Alternative 2 and would correspondingly have less, beneficial, direct and indirect effects on timber rattlesnakes.

Summary

In summary for all alternatives, integrated pest management and minerals management are expected to have no direct or indirect effect on the species. Restrictive management, vegetation treatments, aquatic resource management, and land ownership adjustment would have positive, direct and indirect, short-term and long-term effects on these species. Fire management (primarily prescribed fire) and timber harvest may have slight, short-term, direct effects negative effects but are predicted to have beneficial, indirect effects in the long-term. Roads and trails management and use and dispersed and developed recreational use would have short term, direct and indirect effects on the species but no effects in long term.

Cumulative Effects

Past, present and future actions on both public and private lands in the Shawnee National Forest boundary and in southern Illinois that are described above in this BE have resulted in the majority of the existing and potential timber rattlesnake habitat including den sites and foraging habitats in southern Illinois occurring primarily on the Shawnee National Forest. Therefore, the effects of activities on the Forest have a large effect on populations of the species in southern Illinois, and direct and indirect effects identified above for Alternatives 1-4 would also be equivalent to the cumulative effects on the species.

All Citations Taken From PVA Species Data Form – August 01- Literature Search

Berish, J.E.D. 1998. Characterization of rattlesnake harvest in Florida. *Journal of Herpetology* 32:551-557.

Brown, W.S. 1982. Overwintering body temperature of Timber Rattlesnakes (*Crotalus horridus*) in northeastern New York. *Journal of Herpetology* 16:145-150

Brown, W.S. 1991. Female reproductive ecology in northern population of the Timber Rattlesnake, (*Crotalus horridus*), *Herpetological* 47: 101-115.

Brown, W.S. 1992. Emergence, ingress, and seasonal captures at the dens of northern Timber Rattlesnake, (*Crotalus horridus*), Pages 251-258 in J.A. Campbell and E.D. Brodie (eds.). *Biology of the Pitvipers*. Selva Press Tyler, Texas, USA

Brown, W.S. 1993. Biology, status, and management of the Timber Rattlesnake (*Crotalus horridus*): a guide for conservation. SS Amphibians and Reptiles Herpetological Circular no. 22

Kingsbury and Coppola 2000

Reinert H. K. 1984a. Habitat separation between sympatric snake populations. *Ecology* 65:478-486.

Reinert H. K. 1990. A profile and impact assessment of organized rattlesnake hunts in Pennsylvania. *Journal of the Pennsylvania Academy of Science* 64:136-144.

Smith 1961 in Herkert J.R. 1994. Endangered and threatened species of Illinois: status and distribution. Volume 3: 1994 changes to the Illinois list of endangered and threatened species. Illinois Endangered Species Protection Board, Illinois, USA.

Walker, Z. J. 2000. The spatial ecology of the Timber Rattlesnake (*Crotalus horridus*) in south central Indiana. Master's thesis, Purdue University, West Lafayette, Indiana, USA.

Northern Copperbelly watersnake (*Nerodia erythrogaster neglecta*)

The species has declined significantly throughout much of its range, especially the northern portions, due to habitat destruction. *Nerodia erythrogaster neglecta* now occurs in only about half the counties from which it was once known. (The Nature Conservancy, ESA). It congregates in shrubby wetlands and swamps during the breeding season and moves overland to other wetlands as seasonal ponds dry up.

It requires a matrix of upland travel lanes that provide protection from predation and harassment as it moves among wetlands. Hibernation apparently occurs in upland, rocky sites which are critical to the protection and preservation of the species.

In a Kentucky study at Hardy Slough, it was most often found within 50cm of either side of the shoreline. This coincides with the lifestyle of its prey, anurans. Of the three *Nerodia* species (midland, diamondback, and copperbellied), copperbellied are the most terrestrial (Kingsbury et al. 1999).

At the landscape level, large, patches of convoluted scrub-shrub wetlands with saturated soils within a matrix of intermittently flooded palustrine forest habitat is prime copperbelly habitat. Copperbelly watersnakes do best in extensive, flood-prone areas with persistently flooded complexes of scrub-shrub and emergent wetlands surrounded by temporarily flooded forest. Good copperbelly habitat is structurally diverse, and contains an assortment of scrub-shrub wetlands and emergent pools, surrounded by forest.

The hydrology of such sites is unpredictable in the sense that water levels fluctuate dramatically. Adult copperbelly watersnakes appear to readily use moist soil units, managed units for waterfowl which resemble possible reclamation efforts. Juveniles have also been found in such areas (Kingsbury et al. 1999).

Copperbelly watersnakes may persist for some time in marginal landscapes if they can move from fragment to fragment, or if the inhabited area is large. Populations in such areas tend to be very low, however, and such populations will be vulnerable at the local level (Kingsbury et al. 1999).

The species is known from 9 SNF counties (Gallatin, Johnson, Massac, Pope, Pulaski, Saline, Wabash, White and Hamilton). Surveys conducted in Illinois and Indiana were largely focused on sites along the Wabash River and watersheds draining into it.

New sites along the Saline River confirm previous observations that copperbelly watersnakes are still present at numerous sites along the length of the river and its main branches, but that population densities are not high anywhere (Kingsbury et al. 1999).

In Illinois, the copperbelly watersnake occurs throughout the southeastern corner of the state (Smith, 1961) and intergrades broadly with the yellowbelly variant in central southern Illinois (Smith, 1961; Brandon and Blanford, 1994) and the two subspecies appear to be genetically contiguous along this zone.

The copperbelly watersnake appears to occur without intergradation throughout the southeastern corner of the state as far as Pulaski county and as far north as Wabash county and perhaps farther.

Distribution of this species is limited to the Eastside of the Forest. At the landscape level, large, patches of scrub-shrub wetlands with saturated soils within a matrix of intermittently flooded palustrine forest habitat is prime copperbelly habitat. Copperbelly watersnakes do best in extensive, flood-prone areas with persistently flooded complexes of scrub-shrub and emergent wetlands surrounded by temporarily flooded forest.

Management efforts should avoid deep, fast-moving, and/or extensive open water. Small, isolated patches of habitat are also not useful (Kingsbury et al. 1999). Securing habitat and safe corridors of movement between habitat patches will go a long way to protecting many populations (Kingsbury et al. 1999). There is a need to coincide the timing of tilling and mowing to avoid contact with dispersing animals and to develop brush piles for cover and sunning sites if lacking. Logging should occur during the hibernation season and only to open, small sunning spots, as needed. High water quality standards should be maintained. (The Nature Conservancy, ESA).

Threats to existing populations include surface mining, agricultural conversion, urban sprawl, channelization, clearing of bottomland forest and road construction.

Alternative 1:

The mix of habitat conditions for each management prescription, continued implementation of Forestwide and management area specific standards and guidelines especially riparian filterstrip guidelines, an existing Forest Order for the protection of snakes, guidelines for den site protection and management, and standards and guidelines for the protection and management existing habitat in management prescriptions FR, NA and CR in Alternative 1 should provide for the long-term viability of this species.

Habitat or populations of the Northern copperbelly watersnake will not be directly or indirectly affected in the short-term or long-term by the following practices: dispersed recreational use, developed recreation site use, timber harvest, vegetation treatments (timber stand improvement

or reforestation) and minerals management. These activities are not expected to occur in occupied habitat because habitat for this species is so restricted and limited to primarily swamp habitats on the eastside of the Forest.

Restrictive management activities in NA, CR, and FR management areas would limit disturbances to the species or its habitat and should have overall, direct and indirect beneficial effects on the species.

Northern copperbelly watersnake would continue to be negatively affected by road use adjacent to swamp or broad floodplain habitats on the eastside of the Forest. A few individual snakes are killed annually crossing county and state highways adjacent to these habitats. County and state highway management and use are outside the jurisdiction of the Forest and nothing can be done by the Forest to prevent these negative effects. The species continues to persist in adjacent habitats on National Forest despite these direct negative effects. No National Forest roads are known to affect the species.

The species may also be indirectly, negatively affected by recreational trail use, primarily user-created trails in or adjacent to swamp habitats on the eastside of the Forest. The effects are encounters with humans resulting in death or injury to individual snakes. Forest order 08-05 protects many snakes from harm, however some death and injury to individual copperbelly watersnakes still occurs primarily because of its close resemblance to the venomous cottonmouth, a coinhabitant of the same swamps. Despite these indirect and direct effects, the species still persists in swamp habitats on the eastside of the Forest.

Fire management including prescribed fire would not affect the species as these are done infrequently near swamps on the eastside of the Forest and are usually done in adjacent habitats during time periods when the species is in hibernation or at den sites when and where the species would not be affected.

Integrated pest management including pesticide and herbicide applications would be extremely minimal in this alternative and only done when proven essential. Most past use has been on administrative sites that are not habitats for the species. Some future uses on the Forest in this alternative may include the use of rotenone for fish pond monitoring and maintenance and/or application of herbicides for control of non-native, invasive plants and animals. No ponds that maybe habitat for the species would be affected by rotenone application as part of fish pond monitoring and maintenance and/or non-native, fish species control. Other means (ie. pond draining during dormant seasons) would be used to accomplish those control and management needs. No herbicide applications are anticipated in swamp habitats or on ponds or pond edges where the species is known to occur. No measurable, direct or indirect effects on the species from planned integrated pest control in this alternative are anticipated.

Maintenance of wildlife openings or openlands adjacent to ponds or waterholes (breeding areas) that may provide suitable habitat (basking areas) for copperbelly watersnakes could have a short-term negative effects on copperbelly watersnakes. However, forestwide standards and guidelines would protect wooded and permanently wet waterbodies in occupied habitat. The implementation of these guidelines should result in no measurable direct or indirect effects on the species from wildlife opening and openland management.

Aquatic resource management including pond and waterhole management and maintenance in close proximity to existing swamps on the eastside of the Forest should generally, indirectly benefit the species as these ponds and waterholes and the frog populations that they support would continue to provide food and cover for the species. Management of these ponds could also have some minor, indirect and direct negative effects on the species from the mowing maintenance activities if done when the animals are present. Individuals animals could be directly, harmed or killed by these actions and/or terrestrial cover immediately adjacent to aquatic habitats would be reduced. Few ponds provide habitat for the species and therefore these negative effects are believed to be minor.

Land ownership adjustment, would have positive, indirect, short-term and long-term effects on the species where newly acquired parcels include existing or potential habitat.

Alternative 2:

The mix of habitat conditions for each management prescription, continued implementation of Forestwide and management area specific standards and guidelines especially riparian filterstrip guidelines, an existing Forest Order for the protection of snakes, guidelines for den site protection and management, and standards and guidelines for the protection and management existing habitat in management areas WW, MO, NA, and CR in Alternative 2 should provide for the long-term viability of this species.

Habitat or populations of the Northern copperbelly watersnake will not be directly or indirectly affected in the short-term or long-term by the same practices identified in Alternative 1 above for the same reasons.

Restrictive management activities in NA, CR, MO, and WW management areas on the eastside of the Forest in Alternative 2 would limit disturbances to the species or its habitat and should have overall, direct and indirect beneficial effects on the species.

Effects on the northern copperbelly watersnake for all other management activities would be similar to those discussed above for Alternative 1 with the following exceptions. Recreational trail use would have less direct or indirect, negative effects on the species from human encounters because user-developed trails would not be allowed and use would be primarily on designated trails designed and managed to lessen or eliminate negative effects on the species. Direct and indirect, negative effects on the species from wildlife openings and openlands would be even less than those in Alternative 1 because less openings and openland acreage would managed in Alternative 2.

Alternative 3:

The mix of habitat conditions for each management prescription, continued implementation of Forestwide and management area specific standards and guidelines especially riparian filterstrip guidelines, an existing Forest Order for the protection of snakes, guidelines for den site protection and management, and standards and guidelines for the protection and management existing habitat in management areas WW, MO, NA and CR in Alternative 3 should provide for the long-term viability of this species.

Habitat or populations of the Northern copperbelly watersnake will not be directly or indirectly affected in the short-term or long-term by the same practices identified in Alternative 1 above and also by wildlife opening/openland management since these activities would not occur in habitats for the species in this Alternative.

The remaining management activities would have similar effects on the northern copperbelly watersnake as in Alternative 2 above except that no use of pesticides would occur in Alternative 3 and thus no direct or indirect effects on the species from this use would occur.

Alternative 4:

The mix of habitat conditions for each management prescription, continued implementation of Forestwide and management area specific standards and guidelines especially riparian filterstrip guidelines, an existing Forest Order for the protection of snakes, guidelines for den site protection and management, and standards and guidelines for the protection and management existing habitat in management areas WW, MO, NA, and CR in Alternative 4 should provide for the long-term viability of this species.

Habitat or populations of the Northern copperbelly watersnake will not be directly or indirectly affected in the short-term or long-term by the same practices identified in Alternative 2 above for the same reasons.

Restrictive management activities in NA, CR, MO, and WW management areas on the eastside of the Forest in Alternative 2 would limit disturbances to the species or its habitat and should have overall, direct and indirect beneficial effects on the species.

Effects on the northern copperbelly watersnake for all other management activities would be similar to those discussed above for Alternative 2 with the following exceptions. Recreational trail use would have more direct or indirect, negative effects on the species from human encounters because trails and use would increase in Alternative 4. Direct and indirect, negative effects on the species from wildlife openings and openlands would be the same as those in Alternative 1 because openings and openland acreage would be comparable.

Summary

For all alternatives, dispersed and developed recreation use, timber harvest, vegetation treatments, fire management, integrated pest management and minerals management are expected to have no direct or indirect effect on the species. Restrictive management and land ownership adjustment would have positive, direct and indirect, short-term and long-term effects on these species. Roads and trails management and use, opening and openlands management, and aquatic resource management would have minor, short term, direct and indirect, negative effects on the species but no effects in long term.

Cumulative Effects

There are a few privately and state owned and managed swamps adjacent to those on National Forest. Much of the larger stream and river floodplains adjacent to habitats on National Forest in Johnson, Saline, Pope, Massac, Gallatin and Hardin counties are privately owned. Farming activities and associated, increased sedimentation in or adjacent to swamps and floodplains has

had and continues to have indirect, negative effects on the species primarily through reductions in water quality and subsequent reductions in aquatic prey abundance and aquatic vegetation, food and cover for the species.

State and county roads and their use and management adjacent to swamps and floodplains continue to have direct effects on the species through associated, annual snake mortality.

All of the above past, present and future actions on private lands have resulted in the only quality habitats for the species within entire Forest boundary in swamps on National Forest or other public ownership. Even these habitats on National Forest are slightly, negatively affected by these actions on private lands especially through habitat fragmentation. However, they are still the best habitats for species and harbor the largest populations within the Forest boundary. Therefore, cumulative effects on the species and its habitat within the Forest boundary would be approximately, equivalent to the indirect and direct effects discussed above for each Alternative. Populations of the species within the Forest boundaries are predicted to be maintained or improved in all Alternatives associated with National Forest management.

Literature Citations:

Brandon, R. A. and Blanford. 1994. Research concerning distribution, habitat requirements, and hibernation sites of the copperbelly watersnake (*Nerodia erythrogaster neglecta*) and intergradation with the yellowbelly watersnake (*Nerodia erythrogaster flavigaster*). Report to the United State department of Interior, Fish and Wildlife Service.

Kingsbury B. A., E. J. Laurent. 1999. Copperbelly Watersnake Conservation Agreement 1999 Annual Report presented to the: Kentucky Department of Fish and Wildlife resources for the Copperbelly Water Snake Conservation Agreement Technical Advisory Group, Department of Biology, Indiana-Purdue University, Fort Wayne, IN. USA.

Kingsbury, B. A. 1999a. Copperbelly Watersnake Conservation Agreement, University of Kentucky Seminar.

Smith, P.W. 1961. The Amphibians and Reptiles of Illinois, State of Illinois, Department of Registration and Education, Illinois Natural History Survey Bulletin, Vol. 28, Article 1. Urbana, Illinois, USA.

The Natural Conservancy. Element Stewardship Abstract for *Nerodia erythrogaster neglects*, Copperbelly watersnake 6 pp.

BIRDS:

Henslow's sparrow (*Ammodramus henslowii*)

This species has been noted in 5 SNF counties (Johnson, Pope, Saline, Union and Williamson). In Illinois, total abundance is estimated at below 500 individuals, and likely below 250 (Pruitt 1996). The species formerly wintered in southern Illinois but hasn't been detected in Christmas Bird Counts since 1965 (Bohlen 1989). Herkert (1997) reports 7.1% annual declines between 1975 and 1996 from the Illinois Spring Bird Count.

Populations of the species have increased recently due to the creation of large amounts of suitable habitat by the Conservation Reserve Program. The species is now known from more locations in counties that it was in the late 1980's and early 1990's. It was recently changed from endangered to threatened status in Illinois (2/04-Actions of the Illinois Endangered Species Protection Board).

This species utilizes large grasslands (generally > 30 ha) with sufficient leaf litter to cover its nest (Brauning et al. 2001) along with some woody shrubs (Peterson 1983, Zimmerman 1988, Winter 1999, Cully and Michaels 2000) as its preferred breeding habitat (Burhans 2001).

In Illinois the average size of the grassland occupied by Henslow's sparrows was 1,040 acres and reached 50% incidence in 136 acres (Herkert 1994a). Henslow's sparrows were not encountered on tracts <25 acres. However, size of an individual field may become less important if it is in a cluster of several grasslands (Wood 1995).

Henslow's sparrows have been found to be 6-28 more times more abundant in unmowed fields and to abandon mowed fields (Brauning et al. 2001). In southern Illinois, Harroff (1999) found that vegetation of 40-50 cm in height was required for birds to nest. Mowing and prescribed burning removes leaf litter, eliminates song perches, reduces cover for nests and can render areas inhospitable (Pruitt 1996, Herkert 2001). In eastern Illinois higher abundances of Henslow's sparrows occurred in fields planted to warm season grasses (Walk and Warner 2000)

The negative effects of prescribed burning and mowing can be greatly reduced by burning or mowing after the nesting season, managing portions of fields, and mowing on a bi-or triennial rotation (Brauning et al. 2001). In southwestern Missouri, clutch initiation occurred during early May (Winter 1999).

Maintenance of large openland tracts by disking, mowing, seeding and planting to native grasses and forbs could have a short term negative effect on Henslow's sparrows due to vegetative change and disturbance. This action, however, would result in a long-term positive effect on the species.

Threats to existing populations include loss of habitat, a decline in habitat quality, habitat fragmentation (The Nature Conservancy 1999), changes in vegetative structure associated with specific features such as dense litter layer, tall dense layer of vegetation, and high cover of standing dead residual vegetation (Robins 1971a, Herkert 1994a), the use of pesticides that could negatively affect insect food base (Hands et al. 1989) and nest predation by brown-headed cowbirds (Winter 1999).

Alternative 1:

This alternative continues the implementation of the existing 1992 ALRMP. The mix of habitat conditions for each management prescription and continued implementation of Forestwide and management area specific standards and guidelines should contribute to maintaining and improving populations of the Henslow's sparrow and its habitat on the Forest and in southern Illinois. These guidelines identify the need to manage openland tracts greater than 80 acres in size including objectives for the maintenance of early successional habitat using mechanical or

chemical treatment, the removal of small trees, including hardwood shrubs, Eastern red cedars and invasive shrubs such as Autumn olive. Management emphasizes the restoration of large openlands that include the use of prescribed fire and the planting of native grasses and forbs.

Distribution of this species is limited to large grasslands, generally larger than 130 acres in size. In Illinois, total abundance is estimated at below 500 individuals, and likely below 250. Habitat and/or populations of the Henslow's sparrow will not be directly or indirectly affected in the short-term and long-term by the following practices because habitat for this species is so restricted, and the species does not occur in locations on the Forest where these practices will be implemented: most restrictive area management, roads and trails management, recreational trail/road use, dispersed recreational use, developed recreation site use, timber harvest, aquatic resource management, and minerals management.

One Research Area (RA) on the Forest, Dixon Springs Agricultural Center, includes over 3,900 acres of non-native, grasslands and old fields that are managed primarily as pastures and hayfields to support livestock production and management associated with the Center. Some of these grasslands, when idled occasionally as pasture or hayfield, have provided some habitat for the species, however no large populations of Henslow's sparrow have ever been reported there. Restrictive management in this RA that emphasizes livestock production has had only minor, indirect, positive effects on the species in the short term in years when large grasslands and old fields have been and would continue to be idled during the nesting seasons.

Vegetative treatments including the mechanical removal of hardwood shrubs, Eastern red cedars and invasive shrubs such as Autumn olive could have an indirect, short-term, negative effect as restored habitat is not often reoccupied immediately following treatment. Mowing, fire management (prescribed burning), and the use of pesticides including herbicides to control fescue and reduce woody vegetation will also have a similar indirect, short-term negative effect. These activities, however, will have a positive, indirect, long-term effect on the species as newly restored openland habitat is reoccupied and extensively used.

Wildlife opening management will not have any direct or indirect, short-term or long-term effects as these small opening are not utilized by Henslow's sparrows.

Openland management will focus on management of the larger openland sites that are currently occupied or were historically used by the species. The management of these openland sites will have an indirect, short-term, negative effect on the species as restored habitat is not often reoccupied immediately following treatment. However, openland management will have an indirect, long-term, positive effect on the Henslow's sparrow because high quality, grassland habitat will be maintained in these areas of the Forest.

Land ownership adjustment, would have a indirect, short and long term, positive effect on the species as large openlands (greater than 80 acres in size) are acquired.

Alternative 2:

Management associated with the Large Openland (LO) management areas and large openland inclusions in the Water Supply Watershed (WW) management area and implementation of

Forestwide and management area specific standards and guidelines should contribute to maintaining and/or improving populations of the Henslow's sparrow and its habitat on the Forest and in southern Illinois in Alternative 2. These guidelines identify the need to manage 13 openland tracts greater than 80 acres in size including objectives for the maintenance of early successional habitat using mechanical or chemical treatment, the removal of small trees, including hardwood shrubs, Eastern red cedars and invasive shrubs such as Autumn olive. Management emphasizes the restoration of large openlands that include the use of prescribed fire and the planting of native grasses and forbs.

Habitat and/or populations of the Henslow's sparrow will not be directly or indirectly affected in the short-term and long-term by same management practices and for the same reasons as in Alternative 1 above. Effects on the species from the management of Dixon Springs Agricultural Center (RA) would be similar to those discussed above in Alternative 1 since management of this area would not change in any Alternatives.

Vegetative treatments including the mechanical removal of hardwood shrubs, Eastern red cedars and invasive shrubs such as Autumn olive in large openlands in the LO and WW management areas could have an indirect, short-term, negative effect similar to Alternative 1 as restored habitat is not often reoccupied immediately following treatment. Mowing, fire management (prescribed burning), and the use of pesticides including herbicides to control fescue and reduce woody vegetation will also have a similar indirect, short-term negative effect. These activities, however, will have a positive, indirect, long-term effect on the species as newly restored openland habitat is reoccupied and extensively used.

Wildlife opening management will not have any direct or indirect, short-term or long-term effects as these small opening are not utilized by Henslow's sparrows.

Openland management in LO and WW management areas only will focus on management of the larger openland sites that are currently occupied or were historically used by the species. The management of these openland sites will have an indirect, short-term, negative effect on the species as restored habitat is not often reoccupied immediately following treatment. However, openland management will have an indirect, long-term, positive effect on the Henslow's sparrow because high quality, grassland habitat will be maintained in these areas of the Forest.

Land ownership adjustment, would have a indirect, short and long term, positive effect on the species as large openlands (greater than 80 acres in size) are acquired.

Alternative 3:

There is no management of openlands planned in this alternative except for small amounts of management of glades and barrens in Natural Area (NA) management areas. No habitat will be maintained for the species in the short and long term. The direct and indirect effects of this alternative on the Henslow's sparrow are loss of all habitat for the species and subsequently of breeding populations of the species on the Forest and an overall, decline in the breeding population of the species in southern Illinois. Most management practices would have no effect on the species in this Alternative with the exception of restrictive management activities, vegetation treatments, fire management, openlands management and land-ownership adjustment.

Restrictive management activities that do not allow vegetation management to maintain large grassland and old field habitats for the species would have indirect, negative effects on Henslow's sparrows in both the short and long term as habitats for the species is lost and allowed to succeed to hardwood forest. Dixon Springs Agricultural Center (RA) would also have similar effects on the species to those list in Alternative 1 since management would be the same in all Alternative.

Vegetation treatments, primarily tree planting in large openlands and old fields on the Forest would have indirect, negative effects on the species in both the short and long terms as grassland habitats for the species are lost and converted quickly to hardwood forests.

Fire management, primarily prescribed burning would not occur in the large grasslands and old fields on the Forest. This would have an indirect, negative effect on Henslow's sparrow as large, grassland habitats, important for the species are not maintained with fire.

Large grasslands and old fields would be reforested and/or allowed to succeed to hardwood forest except for barrens, glades and hill prairies. No habitat will maintained for the species in the short and long term. The direct and indirect effects of this alternative on the Henslow's sparrow are loss of all habitat for the species and subsequently of breeding populations of the species on the Forest.

Land ownership adjustment, would have an indirect, positive effect on the species in the short-term, as large grasslands and old fields are acquired. However, there would be no indirect effects on the species from these practices in the long term as grasslands and old fields succeed to hardwood forest with lack of management.

Alternative 4:

Alternative 4 is similar to Alternative 1 in the management of large openlands and old fields and the effects of all management activities would also be similar.

Summary

For all alternatives the following management practices would have no effect on the species: roads and trails management and use, dispersed and developed recreational use, timber harvest methods, aquatic resources management, and minerals management. Restrictive management primarily in one RA area would have positive effects on the species in all alternatives.

Vegetation treatments, fire management, integrated pest management and large openland management would have minor, indirect negative effects on the species in the short term but positive effects on the species in the long term in Alternatives 1, 2, and 4. Lack of these same treatments would have indirect, negative effects on the species in Alternative 3.

Cumulative Effects

Some large openlands exist on other ownerships, primarily on reclaimed coal mines within or adjacent to the Forest. Pryamid Lake State park also manages large grasslands north of the Forest. There are also some large old fields on the State and Federal lands south of the Forest associated with the Cache River State Natural Area and Cypress Creek National Wildlife Refuge. The former are presently maintained as grasslands and provide large acreages of nesting habitat

for Henslow's sparrow in southern Illinois. Most of the latter along the Cache River have been planted or are being allowed to succeed to bottomland hardwood forest and will not be habitat for Henslow's sparrow in the long term. Some large acreages of private land, former farmland are currently enrolled in the Conservation Reserve Program and also provide habitat for the species in southern Illinois. The CRP habitat should be habitat for the species at least for 10 year CRP periods.

Southern Illinois including the lands within the boundary of the Shawnee National Forest, presently include some of the largest, remaining blocks of habitat for the Henslow's sparrow in Illinois and in the Central Hardwood's Bird Conservation Region (CHBCR) (Fitzgerald 2003). The Henslow's sparrow has also been identified as a priority management species in the CHBCR (BCR #24, Ford *et al.* 2000).

Past land uses within the Forest boundary, primarily forest clearing to create croplands and grasslands and historical grassland conversion to farmland have had a major influence on habitats for the species in southern Illinois. Presently, there maybe more grassland habitat for the species in southern Illinois than there was historically.

Taking past, present and future actions including those on private lands into consideration, the effects of Alternatives 1, 2 and 4 would be to maintain the largest, grassland and old field habitats on the Forests and thus would indirectly, maintain a small-medium sized breeding population of Henslow's sparrows on the Forest. These populations on National Forest would be large enough and distributed well enough to interact with those on private and other public lands in the vicinity and contribute to maintaining the relatively large population of the species in southern Illinois.

Alternative 3 would not maintain the large openlands on the Forest and thus would not contribute to the long term maintenance of the species on the Forest or in southern Illinois.

All Citations Taken From PVA Species Data Form – August 01- Literature Search

Bohlen D.H. 1989. The Birds of Illinois. Indiana University Press, Bloomington, Indiana, USA.

Brauning, D.M., Grishaver, and C. Grainer. 2001. Nesting-season responses of three grassland sparrow species to previous-year mowing on reclaimed surface mines in Clarion County, Pennsylvania. *Journal of the Pennsylvania Academy of Science* 75:23-26.

Burhans D.E. 2001. Conservation assessment for Henslow's Sparrow *Ammodramus henslowii*. USDA Forest Service, North Central Research Station, Columbia, Missouri, USA.

Cully J. F., Jr. and H. L. and Michaels. 2000. Henslow's Sparrow habitat associations on Kansas tallgrass prairies. *Wilson Bulletin* 112:115-123.

Fitzgerald, J. 2003. Central Hardwoods Joint Venture Concept Plan – 2003. American Bird Conservancy. 30 pp.

Ford, R., S. Carr., C. Harter., J. York. And M. Roedel. 2000. Partners in Flight Bird Conservation Plan for the Interior Low Plateau. Draft. U. S. Fish and Wildlife Service. 60 pp.

Hands, H. M., R.D. Drobney, and M.R. Ryan. 1989. Status of the Henslow's Sparrow in the northcentral United States. Missouri Cooperative Fish and Wildlife Research Unit, University of Missouri, Columbia, Missouri, USA.

Harroff, N.K. 1999. Investigating the status of the Henslow's Sparrow in southern Illinois. Meadowlark 48:48-49.

Herkert, J. R. 1994a. Status and habitat selection of the Henslow's Sparrow in Illinois. Wilson Bulletin 106:35-45.

Herkert, J.R. 1997. Population trends of the Henslow's Sparrow in relation to the Conservation Reserve Program in Illinois, 1975-1995. Journal of Field Ornithology 68:235-244.

Herkert, J.R. 2001. Effects of management practices on grassland birds: Henslow's Sparrow. U.S.G.S. Northern Prairie Wildlife Research Center, Jamestown, North Dakota, USA. Available at: <http://www.npwrc.usgs.gov/resource/literature/grasbird/henslows.html>.

Peterson, A. 1983. Observations on habitat selection by Henslow's Sparrow in Broome County, New York. Kingbird 33:155-164.

Pruitt, L. 1996. Henslow's Sparrow Status Assessment. U.S. Fish and Wildlife Service, Bloomington, Indiana, USA.

Robins, J.D. 1971a. A study of Henslow's Sparrow in Michigan. Wilson Bulletin 83:39-48

The Nature Conservancy. 1999. Species Management Abstract Henslow's Sparrow (*Ammodramus henslowii*). The Nature Conservancy, Arlington, Virginia, USA. Available: http://www.conserveonline.org/programs/international/regional_divisions/wings_of_the_americas_program:internal&action=buildframes.action

Walk, J. W. and R.E. Warner. 2000. Grassland management for the conservation of songbirds in the Midwestern USA. Biological Conservation 94:165-172

Winter, M. and J. Faaborg. 1999. Patterns of area sensitivity in grassland-nesting birds. Conservation Biology 13:1424-1436.

Wood, B.A. 1995. Behavioral characteristics and habitat preferences of Henslow's Sparrow (*Ammodramus henslowii*). Thesis, Southern Illinois University, Carbondale, Illinois, USA.

Zimmerman, J.L. 1988. Breeding season habitat selection by Henslow's Sparrow (*Ammodramus henslowii*) in Kansas. Wilson Bulletin 100:17-24

Swainson's warbler (*Limnothlypis swainsonii*)

This species has been found in 6 SNF counties (Alexander, Jackson, Johnson, Pope, and Union). Habitat of the Swainson's warbler is characterized by high canopy closure (approximately 80%) and a dense understory of giant cane (*Arundinaria gigantea*), averaging 8,202 stems/acre (Eddleman et. al, 1980). They prefer contiguous tracts of mature or later successional-stage forest >865 acres (Eddleman et. al. 1980).

The only two documented breeding areas in southern Illinois are the Cave-Cedar creeks tributary of the Big Muddy River and Heron Pond-Cache River and the only nest records are from Jackson and Johnson Counties (Graber et. al. 1983). The population at Cave Creek was only 1-3 pairs in early 1970's (George 1972). Eddleman et. al (1980) studied the habitats of 42 male warblers at Cave Creek and Cedar Creek in the late 1970's.

Probable breeding populations have now been documented in a wide variety of habitats that lack canebrakes; fragments of old-growth bottomland forest, young pines plantations with significant deciduous component, live oak thickets and old growth forests in coastal Texas, second growth bottomland forest with shrub palmetto undergrowth, and in Rhododendron and Kalmia thickets, as well as hardwood cove forests, in the Appalachian mountains (Graves 2001).

Giant cane itself is not a requirement, although canebrakes may provide prime breeding habitat, especially in coastal plain forests (Meanley 1971, Sallabanks 2000). Swainson's warblers prefer mature foests with rivers and streams, deep shade and a thin layer of leaf litter. Herbaceous vegetation is usually absent (Meanley 1966, Eddleman et.al. 1980, Graves 2001). The presence of extensive carpets of leaf litter overlaying moist soil is a common denominator of every documented breeding locality (Graves 1998).

To date, one attempt to use forest harvest to open the canopy and regenerate canebrakes, has not been successful on the SNF (The Nature Conservancy 1998). Small group selection cutting and thinning to stimulate distrubance to canopy trees has been proposed as a management tool (Hamel 1980 in The Nature Conservancy 1998). Graves (2001) concurred that frequent gap stimulations should be incorporasted in forest restoration efforts aimed at this species.

Threats to the existing populations include habitat destruction, both on the breeding grounds and wintering grounds. It is the greatest threat to the Swainson's warbler (Brown and Dickson 1994). The effects of habitat destruction and fragmentation could be exacerbated by the tendency to nest in "colonies" (Morse 1989). Other threats include, habitat fragmentation, changes in vegetative structure, nest predation, and the interaction of among these threats.

Alternative 1:

Existing guidelines in the Cave Valley (CV) management area and guidelines in the Mature Hardwood (MH) management area maintain and restore some small amounts of early successional and relatively, large amounts of late successional, bottomland hardwood forests. Existing guidelines for Candidate Wild and Scenic River Study Areas (CR) would also maintain mature, bottomland hardwood forests in the short and long terms. The mix of habitat conditions for each management prescription and the continued implementation of Forestwide and management area specific standards and guidelines should maintain the historically, small population of Swainson's warbler on the Forest.

Historical habitat for the species is limited to only two documented breeding areas in southern Illinois, the Cave and Cedar creeks tributaries of the Big Muddy River and Heron Pond-Cache River. The former breeding area is on National Forest. The only nest records are correspondingly from Jackson and Johnson Counties associated with historical habitat. Habitat or populations of the Swainson's warbler will not be directly or indirectly affected in both the short and long terms in Alternative 1 by the following practices because habitat for the species is so

restricted, and the species is not known to occur on the Forest outside of Cave Valley (CV) and the Big Muddy Wild and Scenic River Study Area (CR) where these activities occur: developed recreation site use, aquatic resource management and minerals management.

Restrictive area management in CV and Big Muddy CR area and forestwide standards and guidelines to maintain habitat for the species would generally maintain, mature hardwood forest overstories and the associated dense understories necessary for the species. The effect would be an indirect, positive effect on the species in both the short and long term.

Recreational trail and road management and use including ATV use, dispersed recreational use, fire management, prescribed burning (landscape level), and the use of pesticides would have an indirect, short-term negative effect on the Swainson's warbler when these activities would occur in CV or the Big Muddy River CR management units. These activities could alter habitats for the species in the short term, making them unattractive as nesting habitat. Currently trail and road management and use occur at low levels in the CV and CR management areas. Trail use is restricted by standards and guidelines near known nest sites of the species to periods after the nesting season in all management areas. However some low levels of illegal ATV use do occur in these management areas at all seasons. The species could be indirectly affected by human disturbances near nest sites associated with illegal ATV use. Increased human use near a nest site or potential nest can cause the species to not select the site or abandon nesting at the site. At the worst case, this could cause the animals to seek nesting sites in marginal habitats and be more susceptible to failure. Nest site abandonment from recreational trail use in historical Swainson's warbler habitats on the Forest has not been documented in previous studies in the historical nesting habitats (Eddleman *et al.* 1980).

No timber harvest for commercial purposes is planned in historical habitats. Minor amounts of timber harvest including group selection and thinning could be done in CV to stimulate dense understories and giant cane regenerations specifically for the Swainson's warbler. These harvest methods including thinning to allow for giant cane regeneration will have indirect, positive, short and long term effects by creating new or improving existing nesting and foraging habitats.

Vegetation treatments including timber stand improvement and reforestation would have some minor effects on the species. Reforestation of former wildlife openings or former openlands in CV or the Big Muddy River CR management areas could provide habitat for the species in the next 10-30 years and thus have an indirect, positive effect on species. Timber stand improvement to enhance oak regeneration could occur in the Big Muddy River CR. This would involve primarily removal or girdling of competitive tree saplings and mature shade tolerant, non-oak trees near oak saplings. This would reduce woody, stem densities and have an indirect, short term negative effect on the Swainson's warbler by negatively affecting nesting and foraging habitats in the short term. Overall, negative effects on the species are predicted to be minor as this action would not be extensive in the Big Muddy CR management area and only small amounts of habitat for the species in this management area would be planned for this treatment at any one time.

Prescribed burning is planned in the Big Muddy CR in both the short and long terms to regenerate bottomland oak forests. All burning would be done outside of the nesting season, however burning could modify habitats immediately prior to nesting and possibly cause some individual animals to seek nesting sites in marginal habitats and be more susceptible to failure. Negative habitat modifications would be the short term loss of leaf litter important as foraging habitat for

the species. This could have an indirect, short-term negative effect on a few individual Swainson's warblers attempting to nest in the Big Muddy River CR.

No integrated pest management including pesticide application is planned in or near historical habitats in either of the two management areas. Therefore, this practice would not have any effects on the species.

Wildlife opening management is planned in only small amounts in CV or the Big Muddy River CR and would have minor, indirect, negative short and long term effects on the species as maintained openings in bottomland habitat utilized by the Swainson's warbler encourage nest parasitism and predation. The management of large openland sites will not have any direct or indirect effects as these large areas are located outside of CV or the Big Muddy River CR and are not suitable habitat for the Swainson's warbler.

Land ownership adjustment, would have an indirect, positive short and long term effect as newly acquired bottomland forest sites would provide habitat for the species.

Alternative 2:

As in Alternative 1, habitat or populations of the Swainson's warbler will not be affected directly or indirectly in the short or long term by the following practices because habitat is so limited for the species and the species would not occur where these management practices would be applied: developed recreation site use, aquatic resource management and minerals management.

The effects of restrictive area management, road and trail management and use, timber harvest, vegetation treatments, prescribed burning, integrated pest management and land-ownership adjustment practices on the Swainson's warbler would be the same as those listed above for Alternative 1 as management areas for historical habitats and standards and guidelines for the species would be similar. The exception is that Alternative 2 includes approximately 8,600 acres in the Mississippi and Ohio River Flood Plain (MO) management area. Approximately 3,000 acres of this is restored farmland in the Mississippi River Floodplain that will in the long term be mature bottomland hardwoods and/or floodplain forests and future habitat for the Swainson's warbler. Most of the MO management area and those restoration areas in particular will have an indirect, long term, positive effect on the Swainson's warbler as unproductive, farmland habitats are restored to productive bottomland and floodplain forest habitats for the species.

Unlike alternative 1, wildlife opening management would not occur in CV or or the Big Muddy River CR. However, giant cane would colonize the abandoned wildlife openings to an even greater degree than in Alternative one where some openings would continue to be managed. The effect of elimination of wildlife opening in CV and Big Muddy CR management areas would have an indirect, positive, short and long term effect as these abandoned, small openings provide opportunities nesting sites containing regenerated stands of giant cane. The management of large openland sites will not have any direct or indirect effects as these large areas are located outside of CV or the Big Muddy River CR and are not suitable habitat for the Swainson's warbler as in Alternative 1.

Alternative 3:

As in Alternatives 1 and 2, habitat or populations of the Swainson's warbler will not be affected directly or indirectly in the short or long term by the following practices because habitat is so limited for the species and the species would not occur where these management practices would be applied: developed recreation site use, aquatic resource management and minerals management.

The effects of restrictive area management, road and trail management and use, timber harvest, vegetation treatments, prescribed burning, integrated pest management and land-ownership adjustment practices on the Swainson's warbler would be the same as those listed above for Alternatives 1 and 2 as management areas for historical habitats and standards and guidelines for the species would be similar. Alternative 3 would also have effects similar to Alternative 2 for the Swainson's warbler associated with the MO management area.

Effects on Swainson's warblers from wildlife opening management would be similar to those above Alternative 2 as all wildlife opening management would be abandoned in CV and the Big Muddy CR management areas. No large openland sites would be managed in this Alternative and none of the existing areas are located in the CV or the Big Muddy River CR. Thus, their management including abandonment would not have any direct or indirect effects for the Swainson's warbler as no suitable habitat for the species would be affected.

Alternative 4:

Effects on Swainson's warbler would be similar to Alternative 2 above for all management practices except for wildlife openings and openlands since management is similar. Effects on Swainson's warblers from wildlife openings and openlands would be similar to Alternative 1 since opening and openland management would be the same.

Summary

For all alternatives the following management practices would have no effect on the species: roads and trails management, developed recreational use, integrated pest management, aquatic resources management, and minerals management. Restrictive management and land-ownership adjustment would have positive, indirect effects on the species in all alternatives. Recreational trail use, dispersed recreation use and fire management would have slight, short term negative effects and no long term effects in alternatives 1, 2, and 4. These practices would have no effects in alternative 3. Vegetation treatments would have positive, indirect effects on the species in both the short and long terms in alternatives 1, 2, and 4 and no effects in alternative 3. Wildlife opening management would have minor, indirect negative effects on the species in alternatives 1 and 4 in both the short and long term and indirect, positive effects in both the short and long terms in alternatives 2 and 3 primarily from lack of opening management in former wildlife openings.

Cumulative Effects

Historically, most of the major floodplains within or adjacent to the Forest Boundary were cleared and farmed. Since the start of the Shawnee National Forest in the 1930's, bottomland and floodplain forest habitats on the Forest have been regenerating and reforesting with little past or present disturbances by any management practices or actions. This trend in the regeneration and

restoration of floodplain and bottomland forest habitats on the National Forest will continue in all Alternatives.

As discussed above, the only known locations for the species are on National Forest in the Cave and Cedar Creek Floodplains in Jackson County and on the Cache River State Natural Area in Johnson County. The latter area is south of the Forest boundary. Also south and east of the Forest boundary, there is potential habitat for the species in restored areas of the Cypress Creek National Wildlife Refuge. Management of these wetlands and regenerating bottomland and floodplain forests on State and National wildlife refuges will benefit the Swainson's warbler as both Bottomland and Floodplain forest are restored as well as cane thickets as part of their management focus.

Many of the larger river and stream floodplains on the National Forest on both the eastern and western parts have some potential habitat for the species. All of these are protected by management area direction or standards and guidelines that would not degrade existing habitat conditions and would even improve habitats for Swainson's warbler in the future. Alternatives 2-4 would also include additional habitat in the MO management area for the species in the future associated with bottomland and floodplain forest restoration. The cumulative effects of all Alternatives on the Swainson's warbler within the Forest Boundary would be similar to the direct and indirect effects listed above for each since basically all existing and potential habitats within the boundary are on National Forest. Historical and potential habitats would also be maintained or improved in the short and/or long term in all alternatives. Populations of the Swainson's warbler within the Forest boundary and in southern Illinois should improve in the future as a result of management on the Forest as well as on nearby State and Federal lands in the Cache River area. However, because southern Illinois is on the northern periphery of the range of the species and historical and potential habitats are limited in size; maintenance of a viable population (over 500 pairs) of the species in southern Illinois including the Forest areas is unlikely. The species is also affected by habitat management on the wintering grounds that are beyond the control of land managers in southern Illinois. Maintenance of a small to medium-sized population on the fringe of the range of the species that will continue to maintain the genetic diversity of the species in the future is a more likely result and cumulative effect in all alternatives.

All Citations Taken From PVA Species Data Form – August 01- Literature Search

Brown, R.E. and J.G. Dickson. 1994. Swainson's Warbler (*Limnothlypis swainsonii*) In The Birds of North America No 564 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.:The American Ornithologists' Union.

George, W. G. 1972. Breeding Status of the Purple Gallinule, Brown Creeper, and Swainson's Warbler in Illinois. Wilson Bulletin 84: 208-210.

Grabler, J. W., R. R. Grabler, and E.L. Kirk. 1983. Illinois Birds: Wood warblers. Illinois Natural History Survey, Biological Notes No. 118.

Graves, G. R. 1998. Stereotyped foraging behavior of the Swainson's Warbler. Journal of Field Ornithology 69:121-127.

Garves, G. R. 2001. Factors governing the distribution of Swainson's Warbler along a hydrological gradient in Great Dismal Swamp. *Auk* 118:650-664.

Eddleman, W. R., K.E. Evans, and W.H. Elder. 1980. Habitat characteristics and management of Swainson's warbler in Southern Illinois. *Wildlife Society Bulletin* 8:228-233.

Meanley, B. 1971. Natural History of the Swainson's Warbler. *North American Fauna*. 69.

Meanley, B. 1966. Some observations on the habitat of the Swainson's Warbler. *Wilson Bulletin* 81: 246-257.

Morse, D. H. 1989. American warblers: an ecological and behavioral perspective. Harvard University Press, Cambridge, Massachusetts, USA.

Sallabanks, R. J. R. Walters, and J.A. Collazo. 2000. Breeding bird abundance in bottomland hardwood forests: Habitat, edge, and patch size effects. *Condor* 102L748-758

Cerulean warbler (*Dendroica cerulea*)

The cerulean warbler is a Neotropical migrant and forest interior species of mature forested landscapes >50 year old. The species is highly area-sensitive (Herkert et al. 1993) and requires unbroken forest patches of at least 1,700 acres to as much as 4,000 acres in Mississippi Alluvial Valley of Tennessee (Peterjohn and Rice 1991, Robbins et al. 1992). It is most numerous in mature bottomland forest along streams and rivers, but is also found in mature upland forests (Hamel 2000). In the SNF cerulean warblers have not been observed in tracts smaller than 1000–2000 acres (SVE Panel 2002). Cerulean warblers nest on lateral limbs of deciduous hardwood trees in both overstory and midstory canopies (Hamel 2000).

Oliarnyk (1996) found unsuccessful nests of cerulean warblers were associated with a denser understory. In a detailed study of cerulean warbler in extensive forest in Ontario, Oliarnyk (1996) noted that selective cutting at one of the sites has not significantly altered the forest structure, or cerulean warbler reproductive success, relative to the two unmanaged sites. Summer habitat characteristics in Missouri included canopy cover of only 65-85% (Kahl et al. 1985).

Cerulean warblers also occur in some disturbed forest areas where the canopy has opened up. In Illinois, their nests are often parasitized by brown-headed cowbirds (Vanderah 1993). In general their populations are declining precipitously throughout their range in United States.

In Illinois, the species was recently (2/04) added to the threatened list. Locally, populations of breeding birds occur in 9 SNF counties (Alexander, Gallatin, Hardin, Jackson, Johnson, Pope, Saline, Union and Williamson). Populations on the Shawnee are relatively high especially in high quality habitats such as Cedar Creek and Cave Valley (Vanderah and Robinson 1992). Cerulean warblers are also known to occur in Little Grand Canyon/Horseshoe Bluff and LaRue-Pine Hills/Otter Pond Ecological Areas.

Threats to existing populations include habitat loss, decline in habitat quality, changes in understory vegetative composition, timber harvest in bottomland forest, forest fragmentation, nest

site parasitism by brown-headed cowbirds and events and conditions that occur during on-distance migrations to South America.

Alternative 1:

This alternative continues the implementation of the existing 1992 ALRMP. The mix of habitat conditions for each management prescription, continued implementation of Forestwide and management area specific standards and guidelines. Existing guidelines in the Cave Valley (CV) management area and guidelines in the Mature Hardwood Forest (MH) management area maintain and restore both early and late successional bottomland hardwood forests. Over time the implementation of these management guidelines will provide for the long-term viability of the species in southern Illinois including the Shawnee National Forest.

Distribution of this species is limited to 9 SNF counties with the highest concentration of breeding birds occurring in the Cave-Cedar creek tributaries of the Big Muddy River. Habitat or populations of the Cerulean warbler will not be impacted directly or indirectly in the short-term, or long-term by the following practices because habitat for the species is relatively limited and these practices would generally not occur in locations where the species occurs: developed recreation site use, dispersed recreational use other than road and trail use, integrated pest management, aquatic resource management and minerals management.

Restrictive management in floodplains and filter strip management areas (FR), significant heritage resource areas (HR), wildernesses (WD), Natural Areas (NA), candidate wild and scenic river study areas (CR), Forest Interior Management Units (FI) and an increased emphasis on non-motorized use will have an indirect, positive, short-term and long-term effect on the species because these practices and management areas would protect existing habitat now and in the future.

Since the species is a canopy nesting and foraging species, road and trail use and management in any of the management areas would have no direct effects on the species. Management of narrow roads and trails on the Forest would not have any direct or indirect effects on the species since these are not known to contribute to forest fragmentation. Road management, primarily the maintenance of wide, surfaced roads would have an indirect, negative effect on the species in both the short and long term by maintaining fragmented, forest conditions conducive for cowbird parasitism and predation of the species.

Timber harvest methods including thinning and group selection harvest would have a direct and indirect, negative, short-term effect on the cerulean warbler by removing potential nest sites and causing potential forest fragmentation by opening the canopy. In the long term, uneven-aged timber management would create mature hardwood forests with multi-layered canopies, suitable as cerulean warbler nesting habitats. Therefore, long term indirect effects would be positive. All timber activities would be done primarily outside of the larger, unfragmented forest areas and floodplain forests in Uneven-aged Hardwood Forest (UH) and MH management areas and thus overall, short term negative effects on the species should be minor.

Vegetation treatments including timber stand improvements (TSI- selective, understory thinnings to release oak saplings and seedlings from competition) and reforestation and fire management (predominantly prescribed burning) should not have any direct or indirect, short term effects on the species as nests or habitats would not be directly, affected or changed. In the long term, both

activities would have an indirect, positive effect on the species as mature, oak-dominated (including white oak) forests would be maintained and/or restored by these practices where they are applied.

Wildlife opening management would have an indirect, negative short and long term effect as openings fragment forests and attract cowbirds and nest predators that can directly affect cerulean warblers. Few if any openings would be created or maintained in the CV area where the largest concentration of cerulean warblers on the Forest occurs. Openings would also not be maintained in the core areas of FI management areas or anywhere in WD management areas. FI and WD management areas include the largest tracts of contiguous forests and the most potential habitat for the species. Therefore, the overall negative effects on the species from wildlife opening management would be relatively minor and outside the higher quality habitats for the cerulean warbler on the Forest. The management of large openland sites will not have a direct or indirect short-term or long-term effect as these large areas are not suitable habitat for the cerulean warbler.

Land ownership adjustment, would have an indirect, positive, short-term and long-term effect on the cerulean warbler as newly acquired sites have existing or potential habitat.

Alternative 2:

Similar to Alternative 1, habitat or populations of the Cerulean warbler will not be affected in the short or long term by the following practices because habitat is relatively limited and these practices would generally not occur in locations where the species occurs: developed recreation site use, dispersed recreational use other than road and trail use, integrated pest management, aquatic resource management and minerals management.

Restrictive management in riparian, filterstrips and floodplains affected by protective, filterstrip standards and guidelines, significant heritage resource areas (HR), wildernesses (WD), Natural Areas (NA), candidate wild and scenic river study areas (CR), and Water Supply Watersheds (WW) would have an indirect, positive, short-term and long-term effect on the species because these practices and management areas would protect existing habitat now and in the future.

Direct and indirect effects on cerulean warblers from road and trail use and management, vegetation treatments, fire management (including prescribed burning) and land-ownership adjustment would be similar to those in Alternative 1 above since application of these management practices would be similar in both alternatives.

Timber harvest methods primarily shelterwood harvest and shelterwood harvest with reserves in Even-aged Hardwood Forest (EH) and MH management areas would have a direct and indirect, negative, short-term effect on the cerulean warbler by removing potential nest sites and causing potential forest fragmentation by opening the canopy. Harvest is planned to occur in many of the largest tracts of contiguous forest outside of WD management areas. However, harvest in these larger blocks of forest would specifically be done primarily on the upper slopes and ridgetops that are generally not used extensively by cerulean warblers. Harvest methods in these larger blocks would be a shelterwood with reserves. That is 30-40 percent of the mature, hardwood trees would be left indefinitely to provide old growth forest conditions in the future stands. These management methods and locations were chosen specifically to improve these areas in the future for forest interior birds such as the cerulean warbler. In the long term, timber management using

these harvest methods would create mature hardwood forests with multi-layered canopies dominated by oaks and suitable as cerulean warbler nesting habitats. Therefore, long term indirect effects would be positive.

Similar to Alternative 1, continued wildlife opening management in this alternative would have a indirect, negative, short-term and long-term effect as these small opening provide opportunities for increased nest parasitism by cowbirds and predation by nest predators. However, overall these effects would be less since less openings and opening acreage would be managed in Alternative 2. The effects of management of large openland sites on the cerulean warbler would be the same those identified above in Alternative 1 for the same reasons.

Alternative 3:

Habitat or populations of the Cerulean warbler will not be affected in the short or long term by the following practices because habitat is relatively limited and these practices would generally not occur in locations where the species occurs: developed recreation site use, dispersed recreational use other than road and trail use, integrated pest management, aquatic resource management and minerals management.

Restrictive management in riparian, filterstrips and floodplains affected by protective, filterstrip standards and guidelines, significant heritage resource areas (HR), wildernesses (WD), Natural Areas (NA), candidate wild and scenic river study areas (CR), and Water Supply Watersheds (WW) would have an indirect, positive, short-term and long-term effect on the species similar to Alternative 2 because these practices and management areas would protect existing habitat now and in the future.

Direct and indirect effects on cerulean warblers from road and trail use and management would be similar to those described above for Alternatives 1 and 2 because existing, highly developed roads and their management in the Forest would not change in this alternative and less developed roads and trails would not affect the species also as identified in Alternatives 1 and 2 above.

This alternative would limit all vegetation disturbances associated with timber harvest to insignificant levels. In the short term, this would have no direct or indirect effect on the cerulean warbler as existing, mature hardwood forest habitats and cerulean nests would not be affected. In the long term, this would have both an indirect, positive and negative effect on the species. The indirect, positive effect would be from the large amounts of mature, hardwood forest habitat that would be present in the future. The negative effect would be from the loss of mature oaks from the forest, especially white oaks, a preferred nest tree for cerulean warblers in Illinois (Roberstson, personal communication).

Both vegetation treatments and fire management (including prescribed burning) would be extremely limited in this Alternative as would their effects on cerulean warblers. Vegetation treatments including TSI and prescribed burning would be limited to NA's dominated by barrens and prairie remnants and in the OB management area. No direct or indirect effects on cerulean warblers would occur since both management areas are not habitat for the species. No cerulean warbler nests or nesting habitats would be affected by these management activities.

No wildlife openings are maintained in this alternative. This would have indirect, positive short-term and long term effect on the cerulean warbler as forest openings can contribute to forest

fragmentation and increased nest parasitism by brown-headed cowbirds and predation by edge predators. Openlands are reforested except for barrens, glades and hill prairies. Lack of openland management would not have a direct or indirect short-term effect on the cerulean warbler because they do not utilize these habitats. In the long term, as the reforested openlands grow into mature, oak-dominated hardwood forests, they would be cerulean warbler habitats. The long term, indirect effects of no openland management would be positive for the species.

The direct and indirect effects of land-ownership adjustment would be similar to those in Alternative 1 above since application of these management practices would be similar in both alternatives.

Alternative 4:

Direct and indirect effects of Alternative 4 on cerulean warblers would be comparable to Alternative 2 for all activities except wildlife openings since proposed actions are similar in scope and locations. Direct and indirect effects of wildlife openings for Alternative 4 on cerulean warblers would be similar to those identified above for Alternative 1 since those activities are similar in both Alternatives.

Summary

For all alternatives the following management practices would have no effect on the species: trails management and use, dispersed and developed recreational use, integrated pest management, aquatic resources management, and minerals management. Restrictive management and land-ownership adjustment would have positive, indirect effects on the species in all alternatives. Road management and recreational road use would have indirect, negative effects on the species in both the short and long term. Timber harvest would have slight, negative, direct and indirect effects in the short term and positive effects on the species in the long term in Alternatives 1, 2, and 4. There would be no effects from lack of timber harvest in the short and both negative and positive, indirect effects from lack of timber harvest in the long term in Alternative 3. Fire management and vegetation treatments would have slight, short term negative effects and positive, indirect effects on the species in long term term in Alternatives 1, 2, and 4. Fire management and vegetation treatments would have no effects in alternative 3. Wildlife opening management would have negative indirect effects on the species in alternatives 1, 2, and 4 in both the short and long term and indirect, positive effects in both the short and long terms in alternative 3 primarily from lack of opening management in former wildlife openings.

Cumulative Effects

The entire southern Illinois, forested landscape is highly fragmented by farms, pastures, and small urban and rural developments. There are many roads dissecting the lands to access and foster these private land uses. The 840,000 acres of land within the Forest boundary are part of this landscape and mimic the fragmentation. Only approximately 34% of the land within the Forest Boundary is National Forest and the largest, contiguous blocks of forested land on the National Forest are approximately 25,000-30,000 acres on the westside of the Forest in Jackson and Union counties. This area includes two wildernesses (Bald Knob and Clear Creek), a large Research Natural Area (Pine Hills), and a roadless study area (Camp Hutchins-CH). Wildernesses, roadless and wilderness study areas (CH and Ripple Hollow-RW), CR and CV management areas include the largest contiguous blocks of National Forest and forest land within the boundary.

These management areas are all protected from any major vegetation disturbances, and all will be old growth, hardwood forest in the long term future in all Alternatives. These all include the most suitable habitats for cerulean warblers within the Forest boundary and in southern Illinois. So the net, cumulative effects of all alternatives for the cerulean warbler populations and its habitat are positive in both the short and long term.

Cumulative effects of all alternatives would generally be comparable to their direct and indirect effects with few management practices having measurable effects on the species or its habitat in each other than vegetation management actions. And then basically, the alternatives only differ in their management and effects on the cerulean warbler in the smaller, forested fragments from 500 acres to approximately 3,000 acres in size in the UH, EH and MH management areas.

Alternative 1 includes an additional 7 FI management areas that include approximately 1100 acres of contiguous hardwood forest each at least 750 acres of which is mature forest over 50 years old. These areas have limited roads within their bounds and would be managed similarly to roadless and wilderness study areas. That is, there would be no vegetation management in the forest and most wild openings would be eliminated except for those near the outer, more fragmented edges. Management of these areas would have similar cumulative effects on cerulean warblers as identified in Alternative 3. The remaining, contiguous, forested areas of the Forest between approximately 500-3000 acres would be managed with uneven-aged, timber harvest to maintain oak forest diversity and would have similar cumulative effects on cerulean warblers to those listed below for Alternatives 2 and 4. The net cumulative effects on cerulean warblers of these latter actions and the FI management areas would be minor, negative effects on the habitat and no measurable effects on populations of cerulean warblers. The long term effects would be slight increases in populations and habitats for the species.

Alternatives 2 and 4 would manage these 500-3,000 acre blocks of forest to maintain oak diversity on the upper slopes and ridgetops as well as to produce, mature, multi-layered hardwood forests. These in turn would have some, minor short term effects on habitat for cerulean warblers as some mature hardwood forests are cut to regenerate oak forests and diversity. These would generally be more marginal cerulean warbler habitats. The cumulative effects of these alternatives would be minor, negative effects on the habitat and no measurable effects on populations of cerulean warblers. The long term effects would be slight increases in populations and habitats for the species.

Alternative 3 would only have positive cumulative effects on the cerulean warbler in the short term and a mixture of positive and negative effects in the long term in these smaller blocks of Forest. In the short term, the mature forests would be unchanged for the species, and populations of the species and its habitat would be maintained or improved. In the long term, forest habitats would mature but the diversity of the habitats would decrease, especially of oak species and abundance. These would have both positive and negative, long term cumulative effects on the species and its habitat.

All Citations Taken From PVA Species Data Form – August 01- Literature Search

Hamel, P. B. 2000. U. S. Forest Service, Southern Research Station, cerulean warbler Status Assessment. 141 pp.

Herkert, J.R. 1993. Additions, deletions and changes to the Illinois list of threatened and endangered species. Illinois Endangered Species Protection Board, Springfield, Illinois, USA.

Kahl, R.B., T.S. Baskett, J.A. Ellis, and J.N. Burroughs. 1985. Characteristics of summer habitats of selected nongame birds in Missouri. University of Missouri –Columbia Agriculture Research Station Bulletin 1056.

Oliarnyk, C.J. 1996. Habitat selection and reproduction success in a population of cerulean warblers in southwestern Ontario. Thesis, Queen's Iniveristy, Kingston, Ontarior, Canada.

Peterjohn, B.G. and D.L. Rice. 1991. The ohio breeding bird atlas. Ohio Department of Natural Resources, Division of Natural Areas and preserves, Columbus, hio, USA.

Robbins, C.S., J.W. Fitzpatrick and P.B. Hamel. 1992. A warbler in trouble, *Dendroica cerulea*. Pages 549-562 in J.M. Hagan, III and D.W. Johnson, editors. Ecology and conservation of neotropical migrant landbirds. Smithsonian Institute Press, Washington, D.C., USA.

Vanderah, G.C. and S.K. Robinson. 1992. Distribution and Habitat Selection of the Cerulean warbler (*Dendrica cerulea*) in Southern Illinois. Report submitted to The Audubon Council of Illinois. 9 pp.

Migrant loggerhead shrike (*Lanius ludvicianus migrans*)

This species prefers brushy old fields, hedgerows and fencerows and is often observed perched along roadsides on telephone wires and fences (Hands et al 1989). The species uses scattered, densely branched trees and shrubs such as eastern redcedar, most pines and multiflora rose for nesting and perching.

This species is a threatened species in Illinois. Although considered a rare-uncommon resident and migrant species in southern Illinois shrikes can be found in all 10 SNF counties (Alexander, Gallatin, Hardin, Jackson, Johnson, Massac, Pope, Saline, Union, and Williamson) (Barbour et al. 2002). J. Herkert (pers. comm.) noted that while the species does still occur in northern and central Illinois, it is at much lower densities than in the southern part of the state.

BBS data confirm that shrike populations have continued to decline in recent years. In 1996, Illinois recorded only 10 shrikes on the BBS routes in Illinois, the fewest ever recorded. The 1996 total is about 6% below the 30 year average of 30 birds for the state's core 64 routes. (Pruitt 2000).

They prefer crop and pasture lands for foraging, but will also use grasslands and open woodlands. Loggerhead shrikes nest in trees or shrubs with denses cover, and in Illinois are most often found in eastern red cedar (*Juniperus virginiana*), osage orange (*Maclura omifera*), and multiflora rose (*Rosa multiflora*); but also hawthorns (*Crataegus* spp.), honey locust (*Gleditsia triacanthos*), and other thorny species (Graber et al. 1973). Territiries of loggerhead shrikes range from 11-30 acres, and males forage as far as 0.25 miles from the nest (Kidelbaugh 1983). Areas managed for shrikes should be large enough to support several average-sized territories (about 2.7-25 ha/territory) of asymmetrical shape (Collister 1994, Yosef 1996).

Hands et al. (1989) suggested that burning may be used to maintain dense herbaceous cover and prevent woody vegetation from dominating an area, but cautioned against burning too frequently and eliminating all trees and shrubs. Patchy burns provide high structural diversity preferred by loggerhead shrikes. Mowing or manual removal of shrubs and trees may be used to manage woody vegetation in place of herbicides. Low, thick shrubs and trees along fence lines and throughout open fields can be maintained or planted to improve nesting habitat (Kiedlbaugh 1982). Yahner (1995) recommended maintaining a minimum of 100 m of fencerows in addition to at least 5 isolated tree/shrubs of suitable species per ha in Pennsylvania pastures being intensively managed for loggerhead shrikes.

Threats to the existing populations include loss and degradation of suitable habitat, habitat succession as old fields and shrublands succeed to mature forest, prescribed burning and mowing that totally eliminates thorny plants and perch sites from openlands, increased pesticide use as well as other chemicals that may reduce the prey base for shrikes, collisions with vehicles, weather related factors that may affect nesting success and interspecific competition, specifically with the American kestrel, European straling, *Isturnus vulgaris*) and eastern kingbird (Cadman 1985).

Alternative 1:

This alternative continues the implementation of the existing 1992 ALRMP. The mix of habitat conditions for each management prescription and the continued implementation of Forestwide and management area specific standards and guidelines. These guidelines identify the need to manage openland tracts greater than 80 acres in size and include objectives for the maintenance of small areas dominated by thorny shrubs and small trees. The inclusion of these areas in large openland tracts should provide for maintenance of a small population of this species on the SNF.

Habitat and/or populations of the loggerhead shrike will not be directly or indirectly affected in the short-term and long-term by the following practices because habitat for this species is limited to the few, large openlands and old fields comprising approximately 1% of the Forest, and the species does not occur in locations on the Forest where these practices would be implemented: most restrictive area management, roads and trails management, recreational trail/road use, dispersed recreational use, developed recreation site use, timber harvest, aquatic resource management, and minerals management.

One Research Area (RA) on the Forest, Dixon Springs Agricultural Center, includes over 3,900 acres of non-native, grasslands and old fields that are managed primarily as pastures and hayfields to support livestock production and management associated with the Center. Some of these grasslands, when idled occasionally as pasture or hayfield, have provided some habitat for the species, however no large populations of loggerhead shrike's have ever been reported there. Restrictive management in this RA that emphasizes livestock production for agricultural extension purposes has had only minor, indirect, positive effects on the species in the short term in years when large old fields have been and would continue to be idled during the nesting seasons.

Vegetative treatments including the mechanical removal of hardwood shrubs, eastern red cedars and invasive shrubs such as autumn olive; and fire management, including the use of prescribed fire in managing openland habitat would have a direct and indirect, short-term, negative effect on shrikes as a shrike nest may be directly affected during some of the management activities and

the amount of suitable nesting habitat is reduced. The chances of the former happening would be extremely rare since nesting of shrikes is extremely rare on the Forest. The removal of nesting habitat (hardwood shrubs) by burning and by mechanical equipment would not have a long-term, indirect effect on the species as these management activities would not be designed to eliminate all the suitable nesting structure.

The use of pesticides, primarily to control non-native invasive plant species in openlands could have an indirect, short-term, negative effect on shrikes by reducing the prey base. Use of pesticides, primarily herbicides to control non-native invasive species would be rare anywhere in this Alternative. The indirect, reduction of prey would be temporary and small scale and would not have a long term, indirect effect on the species.

Wildlife opening management would not have any direct or indirect, short or long-term effects as these small openings are not utilized by shrikes for foraging or nesting. Management of large openlands would have an indirect, short-term, negative effect on shrikes as the amount of suitable nesting habitat is decreased by thinning, mowing and prescribed fire. The mosaic pattern of prescribed burning on large openlands would retain shrubs to provide suitable nesting habitat for shrikes in all managed openland habitats. This should result in an indirect, positive, long-term effect on the species.

Land ownership adjustment, would have a indirect, positive short and long term effect on the species as newly acquired sites would have existing or potential habitat.

Alternative 2:

Direct and indirect effects on shrikes from all management practices would be similar to Alternative 1. The acreages, locations, and management of the managed, large openlands on the Forest would be similar, and these are the main habitats on the Forest that affect this species.

Alternative 3:

Management practices in this alternative would have similar effects on shrikes as those identified in Alternatives 1 and 2 above except for vegetation treatments, fire management, integrated pest management, and opening and openland management.

Vegetative treatments in openlands would only include artificial reforestation. Former openland areas would be allowed succeed to hardwood forest. This would include an increase in shrub/small tree nesting habitats and a loss of short grass foraging habitats in the short term. The net effect would be an indirect, slight negative effect on the species and its habitat in both the short and long terms as most shrub and grassland habitats in large openlands on the Forest including known habitat succeed to forest and do not provide either nesting or foraging habitat for the species.

Fire management in this alternative would only include prescribed fire in NA management areas in small barrens, glades and hill prairies and thus would not have any direct or indirect effects on the loggerhead shrike as these are not habitat for the species.

This alternative would prohibit the use of pesticides and allow only mechanical, manual or limited biological controls for non-native, invasive species. This action could include the

removal of non-native shrub species such as autumn olive in some openlands and thus would have indirect, negative, short-term effects by reducing the nesting cover for the species. These activities would not have any indirect, long-term effects on the species.

Opening and openland management would not occur in this alternative. All openings and openlands except for native barrens and glades in NA management areas would be allowed to succeed to hardwood forest. This would include all of the large (over 80 acres in size) openlands. There would be no direct or indirect effects on the shrike from abandonment of wildlife openings. This alternative would include artificial reforestation of some openings and openlands if needed. The indirect effects of the reforestation of the large openlands on the loggerhead shrike in the short term would be both positive as shrub/brush habitats for the shrike in former, large openland areas increases and negative as short grass feeding areas diminish. The result would be a slight, indirect, negative effect on the species in the short term. In the long term, there would be an indirect, negative effect on the shrike as all shrubby and grassland habitats associated with the large openlands succeed to forest and no longer would provide habitat for the species.

Alternative 4:

Direct and indirect effects on shrikes from all management practices would be similar to Alternative 1. The acreages, locations, and management of the managed, large openlands on the Forest would be similar in both alternatives, and these are the main habitats on the Forest that affect this species.

Summary

For all alternatives the following management practices would have no effect on the species: roads and trails management and use, dispersed and developed recreational use, timber harvest methods, aquatic resources management, and minerals management. Restrictive management primarily in one RA area would have positive effects on the species in all alternatives. Vegetation treatments, fire management, integrated pest management would have minor, indirect negative effects on the species in the short term but positive effects on the species in the long term in Alternatives 1, 2, and 4. Lack of vegetation treatments would have indirect, positive effect in the short term and negative effects on the species in the long term in Alternative 3. Lack of fire and integrated pest management would have no effects on the species in Alternative 3. Management of large openlands would have minor, short term, direct and indirect effects and positive, indirect effects on the species in the long term. Lack of openland management would have positive, indirect effects in the short term and negative effects in the long term in Alternative 3.

Cumulative Effects

Historically, habitat for the species in southern Illinois and within the Forest boundary has been primarily on private land associated with small farms and pastures and their associated fencerows and hedgerows. Historically, habitat for the species was extremely abundant around the turn of the 20th century. In recent time, small farms and their fencerows have declined in southern Illinois but not as precipitously as in the remainder of Illinois. The Shawnee National Forest historically was made up of many of these small farms that were restored to forestland. Overall there still appears to be abundant suitable habitat for the species. Reclaimed stripmines owned

privately and by the State of Illinois presently provide the largest acreages of suitable habitat for the species in southern Illinois and within and near the Forest boundary.

Habitat for the species on the Forest presently is confined to large grassland and shrubland complexes that the Forest has acquired since 1990. Currently, there are about 3,000 acres of large openland complexes on the Forest or about 1 percent of the Forest. Most of these are currently being planned for management to maintain grassland and shrubland species associated with these habitats. The species is known to nest successfully at one of the largest, managed openlands on the Forest, but overall, continues to decrease in numbers in Illinois including southern Illinois despite what appears to be large acreages of suitable habitat (Robinson *et al.* 1999).

Based upon past, present and future actions, Alternatives 1, 2 and 4 would maintain all the suitable habitat on the Forest including existing habitats for loggerhead shrikes and many other associated grassland and shrubland bird species. Cumulative effects of these alternatives on the loggerhead shrike would be to maintain habitat and a small population of the species on the Forest and in southern Illinois with the majority of habitat for the species still provided by private and state lands especially on reclaimed and managed strip mines. Populations outside of the Forest may continue to slowly decline except on reclaimed stripmines.

Cumulative effects of Alternative 3 based upon past, present and future actions on the loggerhead shrike would be the overall loss of habitat and a small population of the species on the National Forest in the short and long term. Populations of the species would continue to decline and remain small in southern Illinois.

Literature Citations:

Barbour, M. S. and G. M. Mohr, Jr. 2002. Biological Evaluation for Regional Forester's Sensitive Species, Forest-listed, Illinois State Threatened and Endangered Animal Species, and Management Indicator Species, Submitted by Cooperative Wildlife Research Laboratory, Southern Illinois University at Carbondale, Illinois, USA.

Cadman, M.D. 1985. Status report on the loggerhead shrike (*Lanius ludovicianus*) in Canada. Committee on the status of endangered wildlife in Canada 95pp.

Collister, D.M. 1994. Breeding ecology and habitat preservation of Loggerhead Shrikes inhabiting roadsides in a Midwestern agro environment. M.S. Thesis. Iowa State University, Ames, Iowa 51 pages.

Grabler, R.R., J.W. Graber, and E.L. Kirk. 1973. Illinois birds: laniidae. Illinois Natural History Survey Biological Notes Number 83.

Hands, H.M., R.D. Drobney, M.R. Ryan. 1989. Status of the Loggerhead Shrike in Northeastern United States. Missouri Cooperative Fish and Wildlife Research Unit School of Forestry, Fisheries, and Wildlife. University of Missouri, Columbia, MO. U.S. Fish and Wildlife Service, Federal Building, Fort Snelling, Twin Cities, Minnesota.

Kridelbaugh, A. L. 1982. An ecological study of Loggerhead Shrikes in central Missouri. M.S. thesis. University of Missouri, Columbia, Missouri. 114 pages.

Kridelbaugh, A. L. 1983. Nesting ecology of the Loggerhead Shrike in central Missouri. *Wilson Bulletin* 95:303-308.

Pruitt, L. 2000. Loggerhead Shrike Status Assessment, U.S. Fish and Wildlife Service, Nongame Bird Coordinator, federal Bldg. 1 Federal Dr. Ft. Snelling, MN. 169 pp.

Robinson, S. K., E. J. Heske, and J. D. Brawn. 1999. Factors affecting the nesting success of edge and shrubland birds. Final Report, Federal Aid project No. W-125-R. 255 pp.

Yahner, R.H. 1995. Pennsylvania recovery and management program for the loggerhead shrike (*Lanius ludovicianus*). Report prepared by The Pennsylvania State Univ., School of Forest Resources. 71pp.

Yosef, R. 1996. Loggerhead Shrike (*Lanius ludovicianus*). A Poole and F. Gill, editors, *The birds of North America*, no. 231. The Academy of Natural Sciences, Philadelphia, Pennsylvania: The American Ornithologists' Union, Washington, D.C.

Southeastern myotis (*Myotis austroriparius*)

This species occupies caves, mines, and mature forested wetlands. Summer roosts are usually in hollow bottomland forest trees near water but can also be in caves and mines. They forage over water in floodplain, riparian hardwood and upland oak-hickory forests. Winter hibernacula are generally caves. The species is a State of Illinois endangered species. Recent extensive searches in Illinois indicated that the population has become more restricted than in the past; only one hibernating colony was located, compared to nine previously known hibernating sites. Southeastern myotis may hibernate as long as 7 months (September or October to February or March) in the north and remain active throughout much of the winter in the south. The species is known from 5 SNF counties (Alexander, Hardin, Johnson, Pope and Union).

Southeastern myotis maternity colonies have been identified in the Cache River area of Johnson and Pope counties (Hofmann et. al. 1999). Summer roosts have been found in live tupelo gum (*Nyssa aquatica*) trees, and bald cypress (*Taxodium distichum*) trees (Hofmann et al. 1999). Summer roost sites are poorly known from this part of their range. At least one cave in Indiana had bats every month except May, June, and July (Mumford and Whitaker 1982). Only two maternity colonies have been reported in this region, one in the Kentucky cave already mentioned, and another smaller colony in southern Illinois, where radio tagging led to the discovery of a maternity colony in a hollow tree in a hardwood swamp (Gore and Hovis 1992).

The key characteristics for maternity sites are high humidity and constant warm temperatures. Foraging habitat is riparian floodplain forests or wooded wetlands with permanent open water nearby (MacGregor 1992, Gardner et al. 1992, Humphrey and Gore 1992).

Female *Myotis septentrionalis* had an average foraging home range of 61.1 hectares (Menzel et al. 1999), equivalent to a circle with a diameter of 880 meters.

The species is identified as declining in Illinois (Gardner et al 1992). There are several caves and mines in the SNF that provide suitable wintering habitat for southeastern myotis. Known roosting

and foraging habitat includes but is not limited to Little Grand Canyon/Horseshoe Bluff, LaRue-Pine Hills/Otter Pond, and Grantsburg Swamp (Bell Pond) ecological areas and vicinities.

The mix of habitat conditions for each management prescription and the continued implementation of both Forestwide and management area specific standards and guidelines contained in the Forest Land and resource Management Plan are designed to insure the continued existence of this species within the planning area. The species is on the northern fringes of its range in southern Illinois and on the Forest. Historical viable populations of the species probably occurred in southern Illinois associated with large expanses of cypress/tupelo swamps and the karst areas of the lesser Shawnee Hills and Osark Hills. The Forest included relatively small amounts of cypress/tupelo swamps historically. Currently approximately 1000 acres of this habitat occurs on the forest along with many caves and mines. All these habitats are protected by management prescriptions and/or forest-wide standards and guidelines. These protected habitats would not be large enough to maintain viable populations of the species on the Forest alone but would contribute substantially to maintaining viable populations of the species in southern Illinois.

Management recommendations include: Protection of cave roost sites from human disturbance and maintenance of high quality forested wetlands with component of large hollow trees near permanent water.

Threats to the existing population include improper cave gating or entrance closure, disturbance by humans, flooding, and clearcutting around a cave may cause local declines (Gore and Hovis 1992).

Alternative 1:

This alternative continues the implementation of the existing 1992 ALRMP. The mix of habitat conditions for each management prescription and the continued implementation of both Forestwide and management area specific standards and guidelines are designed to insure the continued viability of the southeastern myotis within the planning area. The short-term, long-term and cumulative effects of management and use on the southeastern myotis are either positive, negative or neutral as displayed in Table 2.

Forest-wide and management area specific standards and guidelines will insure that occupied habitat (mature floodplain and bottomland forests and riparian corridors) is protected. Therefore its habitat or populations would not be affected directly or indirectly in the short-term or long-term by the following practices: roads and trails management (user created trails allowed), recreational trail/road use, dispersed recreational use, developed recreational use, timber harvest methods, integrated pest management, opening/openland management, and minerals management.

Restrictive management in forest-wide standards and guidelines for caves, floodplain and filter strip management areas, natural areas, Cave Valley, wildernesses, and candidate wild and scenic river study areas and aquatic resource management in this alternative would indirectly, benefit the species in both the short and long term by protecting and improving existing wetland foraging and summer roosting and winter hibernation habitat.

Vegetation treatments, primarily reforestation in floodplains would indirectly benefit the species as newly created habitat is reoccupied.

Fire management, primarily prescribed burning could occur in occupied summer habitats for this species and near some hibernation habitats. Prescribed burning has occurred and may continue to occur in the understory of upland and bottomland forests immediately adjacent to swamps; however, few if any measurable, direct or indirect, negative effects on the species from prescribed burning are anticipated in this alternative as relatively few mature trees are affected. Most burning is done when the species is still in hibernation caves, and areas immediately around cave entrances would be avoided during burning. Burning would also have some indirect, positive effects by creating more cavities and hollows in some mature bottomland trees. Only few individuals are anticipated to be directly or indirectly, negatively affected by early fall or spring burning and then only disturbances of a few hours during burning are anticipated. No long term effects on the populations of southeastern myotis are anticipated.

Aquatic resource management, primarily management of streams, lakes and ponds would affect the species only in the management of Oakwood Bottoms. Management of Oakwood Bottoms Greentree Reservoir primarily through the management of small amounts of permanent wetlands (borrow pits and some ditches) should indirectly, benefit the species by maintenance and improvement of these wetlands as foraging habitat.

Land ownership adjustment, would have a positive, indirect, short-term and long-term effect where newly acquired parcels have existing or potential habitat.

Alternative 2:

Like alternative 1, habitat or populations of the southeastern myotis would not be directly or indirectly affected in the short-term or long-term by the following practices: roads and trails use (seasonal closure allowed), recreational trail/road use, dispersed recreational use, developed recreational use, timber harvest methods, integrated pest management, opening/openland management, and minerals management.

Restrictive management in Mississippi and Ohio River floodplains, natural areas, forestwide standards and guidelines for riparian filter strips, floodplains and caves; water-supply watersheds, Cave Valley, wildernesses, and candidate wild and scenic river study areas would protect existing wetland and riparian habitats and indirectly benefit the species.

Vegetation treatments, primarily reforestation of some wetlands in the Mississippi River floodplains should indirectly benefit the species as newly created habitat is created and restored and reoccupied by the species in the long term.

Like alternative 2, fire management, primarily prescribed burning could occur in and adjacent to known summer foraging and roosting habitats and winter hibernation habitat for this species. Effects would be similar to those described above for prescribed burning in Alternative 2.

Similar to alternative 2, aquatic resource management, primarily management of streams, lakes and ponds would have no direct or indirect effects on the species. Management of Oakwood Bottoms Greentree Reservoir primarily through the management of small amounts of permanent wetlands (borrow pits and some ditches) should indirectly, benefit the species. Restoration of

some permanent and ephemeral wetlands in the Mississippi River floodplains should indirectly benefit the species as newly created habitats become occupied.

Land ownership adjustment, would have a positive, indirect, short-term or long-term effect where newly acquired parcels have existing or potential habitat.

Alternative 3

Habitat or populations of the southeastern myotis would not be directly or indirectly impacted in the short-term or long-term by the following practices: roads and trails use (seasonal closure allowed), recreational trail/road use, dispersed recreational use, developed recreational use, timber harvest methods, integrated pest management, opening/openland management, and minerals management.

Like alternatives 1 and 2, restrictive management in Mississippi and Ohio River floodplains, natural areas, riparian filter strips, water-supply watersheds, Cave Valley, wildernesses, and candidate wild and scenic river study areas along with forestwide standards and guidelines for riparian filter strips, floodplains and caves would protect existing summer and winter habitats and indirectly benefit the species.

The effects of vegetation treatments would be similar to Alternatives 1 and 2 above.

Fire management, primarily prescribed burning would occur only in natural areas with barrens and oak/hickory forests in this alternative. There would be less forested areas adjacent to known habitats for this species affected than in Alternatives 1 and 2. Prescribed burning would occur in the understory of upland and bottomland forests immediately adjacent to some swamp habitats however, few if any measurable, direct or indirect, negative effects on the species from prescribed burning are anticipated in this alternative. Some indirect, positive effects would be anticipated as cavities and hollows are created in some mature trees as a result of burning. Since less prescribed burning would occur in this alternative than in all others, fewer individuals are anticipated to be directly or indirectly, negatively affected by early fall or spring burning. No long term effects on the populations of southeastern myotis are anticipated.

Similar to alternatives 1 and 2, aquatic resource management, primarily management of streams, lakes and ponds would not have any direct affect the species. Management of Oakwood Bottoms Greentree Reservoir primarily through the management of small amounts of permanent wetlands (borrow pits and some ditches) should indirectly, benefit the species. Restoration of some permanent and ephemeral wetlands in the Mississippi River floodplains should indirectly benefit the species as newly created habitats become occupied.

Land ownership adjustment, would have a positive, indirect, short-term and long-term effect where newly acquired parcels have existing or potential habitat.

Alternative 4

The direct and indirect effects of Alternative 4 on the southeastern bat and its habitats would be similar to those identified above in Alternative 2 for all management use and activities.

Summary

In summary for all alternatives, roads and trails management and use, dispersed recreational use, developed recreation site use, timber harvest methods, integrated pest management, opening/openland management, and minerals management are expected to have no direct or indirect effect on the species. Restrictive management, vegetation treatments, aquatic resource management, and land ownership adjustment would have positive, direct and indirect, short-term and long-term effects on the species. Fire management (primarily prescribed fire) may have slight, short-term, direct effects negative effects but are not predicted to have any direct or indirect effects in the long-term.

Cumulative Effects

Historically, many of the cypress/tupelo swamps in southern Illinois were drained and cut for timber/wood products and future farming. Those that were not totally destroyed and retained some of their diversity are presently in state or federal ownership in refuges, natural areas, nature preserves or National Forests. Most of these are in the process of ecological recovery and native forest maturation. In general, management actions on private lands would continue to fragment wetland landscapes, upland forest and bottomland forest habitats surrounding the Forest. Overall, more foraging and roosting habitat for the species has been managed to the benefit of the species in the last ten years in southern Illinois than in the previous hundred. Summer roosting and foraging habitat will continue to increase in the future for the species in southern Illinois associated with these protected areas and the restoration efforts within them.

Tripoli mining has created many, abandoned underground mines some of which can provide suitable habitat for the wintering/hibernating cave dwelling bats. Historically most caves and cave resources were affected by human disturbances including harassment and killing of roosting bats. Today, many caves in southern Illinois are protected by state or federal management, however some occur on private lands and have no official protection.

Taking these past, present and future actions into account in the Forest vicinity, few if any negative direct or indirect effects on southeastern bats are anticipated from planned Forest actions in any of the four Alternatives. Summer and winter habitats for the species are protected on the Forest in all Alternatives. Cumulative effects of all alternatives would be comparable to direct and indirect effects on the species and its habitats on the Forest. However, the protected habitats on the Forest would not be large enough to maintain viable populations of the species on the Forest alone but would contribute substantially to maintaining viable populations of the species in southern Illinois.

Literature Citations:

Gardner, J. E., et. al. 1992. Distribution and status of *Myotis austroriparius* (southeastern bat) in Illinois. Unpubl. report, Ill. Nat. Hist. Surv., Urbana, IL. 38pp.

Gore, J. A., and J. A. Hovis. 1992. The southeastern bat: another cave-roosting species in peril. *Bats* 10(2):10-12.

Hoffman, J.E., J.K. Krejoa, and J.D. Garner. 1999. Summer records and a maternity toost of the southereastern myotis (*Myotis austroriparius*) in Illinois. *Transactions of the Illinois State Academy of Science* 92:95-107.

Humphrey, S. R., and J. A. Gore. 1992. Southeastern brown bat *Myotis austroriparius*. Pages 335-342 in S. R. Humphrey, editor. Rare and endangered biota of Florida. Vol. I. Mammals. University Press of Florida, Gainesville

Mumford, R. E., and J. O. Whitaker, Jr. 1982. Mammals of Indiana. Indiana University Press, Bloomington. 537 pp.

Eastern woodrat (*Neotoma floridana*)

The eastern wood rat is currently listed as an endangered species within the State of Illinois. Existing at the remote northern edge of its range in Illinois, the eastern wood rat has only been recorded from Hardin, Monroe, Randolph, Union and Jackson counties. Current research (1995-1997) shows that this mammal is known to occur at La Rue Pine Hills in Union County and Horseshoe Bluff, Fountain Bluff and Little Grand Canyon in Jackson County (Nawrot and Klimstra 1976, Monty et al. 1995). J. Nawrot (1974) documented 24 sites showing past wood rat occurrence throughout the Shawanee National Forest; unfortunately, *N.f. illinoensis* populations have declined throughout their range. (IL Strategic Recovery Plan, 2000).

Ongoing recovery efforts are focusing on establishing metapopulations of ≥ 50 individuals (fall estimate) in the unoccupied part of the wood rat's historical range on the eastern part of the SNF in the counties of (Johnson, Saline, Gallatin, Pope, or Hardin).

At LaRue Pine Hills, woodrats are found in white oak (*Quercus alba*)-hickory communities on the north and east facing slopes of the limestone cliffs as well as in the blackoak (*Quercus velutina*) community on the south and west facing slopes (Nawrot and Klimstra 1976). At Fountain Bluff and Horseshoe Bluff, wood rats inhabit sandstone bluffs with similar tree species as LaRue Pine Hills (Nawrot and Klimstra 1976). Habitat in Little Grand Canyon consists of limestone bluffs and sandstone canyons (Monty et al. 1995).

Nawrot and Klimstra (1976) speculated unusually harsh winters during 1912 and 1918 caused a large decline in numbers of wood rats at Pine Hills and extirpation of colonies in the eastern part of the SNF where sites were isolated by man-made barriers to dispersal and weathered sandstone bluffs and outcrops provided relatively few secure locations for nests.

Eastern woodrats forage on mast and herbaceous plants throughout the year (Wagle and Feldhamer 1997). In the spring and summer, woodrats rely on cached mast and a variety of herbaceous plants (Wagle and Feldhamer 1997).

Habitat management to open up the understory near active colonies may benefit the species (Illinois Strategic Recover Plan 2000).

Clearcutting had minimal impact on woodrat (*N. magister*) movements, home range, and habitat use when sufficient intact forest was retained adjacent to colonies in the central Appalachians of West Virginia (Castleberry et. al. 2001). Wood rats used forested and clearcut areas in proportion to their availability (Castleberry et. al. 2001) and exploited new sources of foods on clearcut areas such as succulent growth from hardwood stump sprouts and soft mast from blackberry, grape, and blueberry plants (Castleberry 2000). In less intensively managed forest (i.e., those with little or no commercial timber harvest), measures such as crop tree release and stand thinning are

recommended because these practices help to stimulate acorn production and maintain oaks as dominate species (Castleberry et. al. 2002).

Threats to the existing population include include weather, predation, reduced food supply, habitat fragmentation, disturbances to or modifications of the existing vegetation in the vicinity of a bluff site containing known populations of wood rats and parasitism and possible fatal exposure as a secondary host to the racoon nematode parasite, *Baylisascaris procyonis* (Feldhamer and Monte 2002-Conservation Assessment).

Alternative 1

Habitat or populations of the eastern woodrat will not be indirectly or directly affected in the short-term or long-term by the following practices: developed recreation site use, integrated pest management, opening and openland management, aquatic resource management and minerals managment. These management practices are not expected to occur in occupied wood rat habitat.

Restrictive management in floodplains and filter strips management areas, natural areas, heritage resource areas, wildernesses, and candidate wild and scenic river could have a positive, indirect, short-term and long-term effect. These activities would protect existing habitat.

Some direct, short-term, minor negative impacts to the woodrat could occur as a result of recreational trail and road management, continued road and trail use (user created trails allowed) of trails adjacent to occupied habitat, dispersed recreational use and timber harvest methods. These practices could result in rare instances when a few individuals would be accidentally killed or disturbed from their nest sites during these actions. However, these will not result in any long-term effects on the species because the area and habitat affected would be relatively small and localized and the chances to affect individual woodrats would be rare and isolated in space and time. Timber harvest would also have a long term, indirect beneficial effect on woodrats by promoting the growth and long term dominance of oak-hickory forests, habitat for the species.

Vegetative treatments including timber stand improvement and reforestation would have indirect, beneficial effects on the woodrats as these actions are done to promote the growth and dominance of oak-hickory forests, habitat for the species.

Fire managment including prescribed burning could have a slight direct, short-term negative effect on few, individual wood rats that might be in forested areas outside of rock bluff nest sites. It would also have an indirect, beneficial effect on the woodrats as these actions are done to promote the growth and dominance of oak-hickory forests, habitat for the species.

Land ownership adjustment, would have a positive, indirect, short-term and long-term effect where newly acquired parcels have existing or potential habitat.

Alternative 2

Direct and indirect effects on woodrats from management use and activies would be mostly similar to Alternative 1. Differences would be more, long term, indirect, beneficial effects of maintaining oak-hickory forest habitats for the species as more timber harvest, prescribed burning, and vegetation treatments would be done to promote oak-hickory forest.

Alternative 3

Habitat or populations of the eastern woodrat will not be indirectly or directly affected in the short-term or long-term by the following practices: developed recreation site use, integrated pest management, opening and openland management, aquatic resource management and minerals management. These management practices are not expected to occur in occupied wood rat habitat.

There would be more area in and emphasis on restrictive management in this alternative. This would result in no short term, direct or indirect effects on the species in some instances and in some cases some short term, indirect positive effects on the species. In the long term, there would be some indirect, negative effects on the woodrat as lack of disturbances and maintenance of large areas of oak-hickory forest would reduce overall habitat for the species.

There would be minor, direct and indirect, beneficial effects on woodrats in the long term as there would be less road and trail management and use in the vicinities of woodrat habitats. Short term effects would be similar to Alternative 2.

There would be long term, indirect, negative effects on the species from lack of timber harvest and a subsequent loss of oak-hickory forest habitats. There would be no effects from lack of timber harvest in the short term.

Vegetation treatments and prescribed burning would only occur in natural areas dominated by oak-hickory forest and barrens habitats. Fire management could have some short term, negative direct and indirect effects and long term, beneficial indirect effects. Vegetation treatments would have short and long term, beneficial effects on the species as oaks are promoted in close proximity to much of the existing woodrat habitats.

Land ownership adjustment, would have a positive, indirect, short-term and long-term effect where newly acquire parcels have existing or potential habitat

Alternative 4:

Direct and indirect effects would be similar to Alternative 2

Summary

In summary for all alternatives, roads and trails management and use, dispersed recreational use, developed recreation site use, timber harvest methods, integrated pest management, opening/openland management, and minerals management are expected to have no direct or indirect effect on the species. Restrictive management, vegetation treatments, and land ownership adjustment would have positive, direct and indirect, short-term and long-term effects on these species. Timber harvest would have minor, short term, negative direct effects and long term, positive, indirect effects in Alternatives 1, 2, and 4. In Alternative 3, lack of timber harvest would have no short term, direct or indirect effects but would have negative, indirect effects in the long term. Fire management (primarily prescribed fire) may have slight, short-term, direct, negative effects and long term, positive, indirect effects in all alternatives.

Cumulative Effects

The only existing habitat remaining for the woodrat in Illinois is on the Shawnee National Forest. Past actions on the Forest that affected the species included reforestation, natural area designation and management and dispersed recreation management in the vicinities of existing populations. These have had primarily beneficial direct and indirect effects on the species. These actions continue as present actions along with existing, beneficial, forest-wide standards and guidelines for the species and their cliff and cave habitats along with woodrat population reintroduction efforts on the eastside of the Forest. Present actions and forestwide standards and guidelines are also planned as future management actions for woodrats in all Alternatives. Cumulative effects on the species and its habitats are primarily the direct and indirect effects described above for Alternative 1-4. Viable populations of woodrats would be maintained in all alternatives with the largest populations predicted in Alternatives 2 and 4 that promote the most oak-hickory forest habitats in the future.

Literature Citations:

Castleberry, S.B., T.L. King, P.B. Wood and W.M. Ford. 2000. Microsatellite DNA markers for the study of Allegheny woodrat (*Neotoma magister*) populations and cross-species amplification in genus *Neotoma*. *Molecular Ecology* 9:824-826

Castleberry, S.B., W.M. Ford, P.B. Wood, N.L. Castleberry and M.T. Mengak. 2001. Movements of Allegheny woodrats in relation to timber harvesting. *Journal of Wildlife Management* 65:148-156

Castleberry, N.L., S.B. Castleberry, W.M. Ford, P.B. Wood and M.T. Mengak. 2002. Allegheny woodrat (*Neotoma magister*) food habits in central Appalachians. *American Midland Naturalist* 147:80-92

Monty, A.E. R. Wagle, R.E. Emerson, and G.A. Feldhamer. 1995. Recently discovered populations of eastern woodrats (*Neotoma floridana*) in southern Illinois. *Transactions of the Illinois State Academy of Science* 88:43-47.

Nawrot J.R. and W.D. Klimstra. 1976. Present and past distribution of the endangered southern Illinois woodrat (*Neotoma floridana illinoensis*). *Chicago Academy of Sciences Natural History Miscellanea* 196:1-12.

Wangle E.R. and G.A. Feldhamer. 1997. Feeding habitats of the eastern woodrat (*Neotoma floridana*) in southern Illinois. *Transactions of the Illinois State Academy of Science* 90:171-177.

Crustaceans

Subtle cave amphipod (*Stygobromus subtilis*)

This species was described by Hubricht (1943) from a small seep in a sandstone sinkhole just west of Bat (Toothless) Cave, Jackson County, Illinois. This is the only known location within the boundaries of the SNF. The species is known only from groundwater seeps and drip pools in caves. Peck & Lewis (1978) noted the affinity of this species for sandstone seeps. They noted that of the cave populations sampled, an ovigerous female had been found only in one locality (Toothless Cave), leading them to speculate that this species usually reproduces in the confines of interstitial groundwaters rather than caves.

In Bat (Toothless) Cave, a small streamless cave formed near the sandstone/limestone contact, the amphipods occur in drip pools where they enter the cave from above. This is suggestive of an inhabitant of epikarstic groundwater.

Threats to the existing population include: (1) susceptibility to groundwater contamination from sewage or fecal contamination, including sewage plant effluent, septic field waste, campground outhouses, feedlots, grazing pressures or any other source of human or animal waste (Harvey and Skelton, 1968; Quinlan and Rowe, 1977, 1978; Lewis, 1993; Panno, et. al. 1996, 1997, 1998); (2) pesticides or herbicides used for crops, livestock, trails, roads or other applications; fertilizers used for crops and lawns (Keith and Poulson, 1981; Panno et al. 1998); (3) hazardous material introductions via accidental spills or deliberate dumping, including road salting (Quinlan and Row, 1977, 1978; Lewis, 1993, 1996). Quarry activities in the immediate vicinity of occupied habitats could also affect the species (Bretz and Harris, 1961). Road construction could also affect the species if the activity occurred in the immediate vicinity of occupied habitats.

The only known location for the species is Toothless Cave the entrance of which is privately owned. The cave was gated by the Illinois Department of Natural Resources to protect cave resources under an agreement with the landowner. Much of the watershed for the cave and the surface area above the cave is in National Forest ownership. The gate protects the interior of cave from human disturbances. A natural area protects the surface area above the cave in National Forest ownership. Forestwide standards and guidelines provide protection for the groundwater and karst areas on National Forest that would affect the cave environment.

In all Alternatives restrictive management, roads and trails management, recreational trail/road use, dispersed and developed recreation site management, timber harvest, vegetation treatments, fire management, integrated pest management, opening and openland management, aquatic resource management and minerals management would not have any direct or indirect short or long-term effects on the subtle cave amphipod. This is because natural area management and protection for much of the above ground surface of the cave and forestwide standards and guidelines would maintain and improve habitat for the species and provide for its long-term existence on the Forest.

Land acquisition in all alternatives could result in indirect, positive short-term and long-term effects where newly acquired parcels have existing or potential habitat for the subtle cave amphipod.

Cumulative Effects:

Toothless cave historically had higher levels of human disturbances. Dances are known to have been held in the cave in the more distant past. Timber harvest and farming have occurred in the past in the cave watershed and no doubt had some effects on groundwater quality in the cave watershed. Presently the cave is gated and receives little human use as a result. Most of the watershed for the cave is forested and little disturbed and as a result water quality for the cave is good. The watersheds for karst areas on the westside of the Forest are heavily forested and water quality is for these potential habitats for the species is also good. Watershed and cave protection are planned for this Toothless Cave and other potential habitats in the karst areas on the westside of the Forest in the future.

Historically, there were more threats for the species and its habitat than at present or anticipated in the future. Taking into account past, present and future actions on both public and private lands in the Shawnee National Forest boundary and in southern Illinois, all alternatives would have no effects on existing a or potential habitats or existing populations for the species. Cumulative effects of all alternatives would be maintenance or improvement of the existing populations and their habitats on the Forest.

Citations taken from the Conservation Assessment for the (*Stygobromus subtilis*), Subtle Cave Amphipod, October 2002 , Julian J. Lewis, Ph.D. author

Bretz, J. Harlen and Stanely E. Harris .1961. Caves of Illinois, Illinois State Ecological Report of Investigations 215, 87 pp.

Harvey, S.J. and J. Skelton. 1968. Hydrogeologic study of a waste-disposal problem in a karst area at Springfield, Missouri. U.s. Geological Survey Professional paper 600-C: C217-C220

Hubricht , Leslie. 1943. Studies of the Nearartic freshwater Amphipodia III. Notes on the freshwater Amphipoda of eastern United States, with descriptions of ten new species. American Midland Naturalist, 29 (3): 683-712.

Keith, J. H. and T.L. Poulson. 1981. Broken-back syndrome in *Amblyopsis spelaea*, Dondadson-Twin Caves, Indiana. Cave Research Foundation 1979 Annual report, 45-48.

Lewis, Julian J. 1993. Life returns to Hidden River Cave: The rebirth of a destroyed cave system. National Speleological Society News, (June) 208-213.

Peck, Steward B. and Julian J. Lewis. 1978. Zoogeography and evolution of the subterranean invertebrate faunas of Illinois and southeastern Missouri. N.S.S. Bulletin, 40 (2): 39-63.

Quinlan, J.F. and D.R. Rowe. 1977. Hydrology and water quality in the central Kentucky karst. University of Kentucky Water Resources Institute, Research Report 101, 93 pp.

Quinlan, J.F. and D.R. Rowe. 1978. Hydrology and water quality in central Kentucky karst: Phase II, Part A. Preliminary summary of the hydrology of the Mill Hole sub-basin of Turnhole Spring groundwater basin. University of Kentucky Water Resources Institute, Research Report 109, 42 pp.

Panno, S.V., I.G. Krapac, C.P. Weibel and J.D. Bade. 1996. Groundwater contamination in karst terrain of southwestern Illinois. Illinois Environmental Geology Series EG 151, Illinois State Geological Survey, 43 pp.

Panno, S.V., C.,P. Weibel, I.G. Krapac and E.C. Stormont. 1997. Bacterial contamination of groundwater from private septic systems in Illinois' sinkhole plain: regulatory considerations. Pages 443-447 In B.F. Beck and J.B. Stephenson (eds). The engineering geology and hydrology of karst terranes. Proceedings of the sixth multidisciplinary conference of sinkholes and the engineering and environmental impacts of karst. Spring, Missouri.

Panno, S.V., W.R. Kelly, C.P. Weibel, I.G. Krapac and S.L. Sargent. 1998. The effects of land use on water quality and agrichemical loading in Fogelpole Cave groundwater basin,

southwestern Illinois. Proceedings of the Illinois Groundwater Consortium Eighth Annual Conference, Research on agriculture chemicals in Illinois groundwater, 215-233.

Mollusks

Carinate pillsnail (*Stenotrema (=Euchemotrema) hubrichti*)

This species was once believed to be extinct. The species has been taken alive from LaRue/Pine Hills Ecological area on the Shawnee National Forest and is currently being studied by researchers at Southern Illinois University. Identification of these individuals has been confirmed and radula and genitalia descriptions have been completed by a malacologist (R. Smith personal correspondence). This is the only site where the species occurs on the SNF.

Habitat is described as crevices of shaded cliffs often more than 6 m. above the ground (Hubricht 1985). The snail is not listed as endangered or threatened in Illinois. The original description in Pilsbry (1940) indicates that the species was taken by Leslie Hubricht as fossils from Pleistocene deposits in talus that had been disturbed for road construction.

Threats to the existing population include disturbances to cliffs from dispersed recreation and prescribed burning; however, because of the isolated location of the species and protection afforded the habitats by Research Natural Area (RNA) status and management, these threats are very minimal.

In all alternatives restrictive management afforded by the LaRue/Pine Hills RNA would provide protection and beneficial effects on the species. Also in all Alternatives, roads and trails management, recreational trail/road use, developed recreation site management, timber harvest, vegetation treatments, integrated pest management, opening and openland management, aquatic resource management and minerals management would not have any direct or indirect, short or long-term effects on the subtle cave amphipod because current forestwide and management area specific standards and guidelines would have result in no effects on the species.

Dispersed recreational use primarily from hikers in all alternatives could result in some minor human-induced disturbances in the vicinities of known populations. However, cliff areas are rarely frequented or actually affected by most hikers and any negative effects from this use on existing cliff habitats and indirect effects on the pillsnail would be very minor and immeasurable.

Prescribed burning is planned in the LaRue/Pine Hills RNA in all Alternatives. The burning would temporarily affect minor amounts of herbaceous vegetation and leaf litter near cliff habitats. Any snails in this vegetation near the cliffs could be directly affected and some minor amounts of snail mortality could occur. There would be no direct effects on the cliffs themselves where the majority of the snails reside from the prescribed burning activities. Burning may also have a minor, indirect and short term negative effect on food sources for the pillsnail. However, new growth vegetation would occur quickly and eliminate these effects very shortly following burns.

Land acquisition in all Alternatives could result in indirect positive short-term and long-term effects where newly acquired parcels have existing or potential habitat for the carinate pillsnail.

Cumulative Effects:

Historically the Pine Hills area was heavily logged in the late 1800's. Since that time, the area has had little additional disturbances except for an occasional prescribed fire in the 1990's. The area has had a protective status and management emphasis since the late 1930's. The entire population and habitat for the pillsnails is on National Forest in the LaRue/Pine Hills RNA. Taking into account past, present and future actions on both public and private lands in the LaRue/Pine Hills RNA all Alternatives would have no effects or no measurable effects or beneficial cumulative effects on the species and its habitat. Existing populations of the species on the Forest and in southern Illinois should be maintained or improved as a result in all Alternatives.

Citations taken from The Nature Conservancy – Element Stewardship Abstract for *Euchemotrema hubrichti*, Carinate pillsnail.

Hubricht, L. 1985. The distribution of the native land mollusks of the eastern United States. *Fieldiana, Zoology, New Series, No. 24.* Field Museum of Natural History, Chicago.

Pilsbry, H.A. 1940. Land Mollusca of North America (north of Mexico), Vol. I., part 2. The Acad. Of Natural Sciences of Philadelphia Monographs: no. 3.

Smith, R. 1994. Personal correspondence with Steve Mighton, Regional Threatened and Endangered Species Program Manager, Eastern Region, U.S. Forest Service, Milwaukee, WI.

AQUATIC SPECIES

The following aquatic species are listed as Regional Forester Sensitive Species: bluehead shiner, bantam sunfish, Indiana crayfish, Kentucky crayfish, and bigclaw crayfish. Management and use activities (Table 2) within the four alternatives anticipated to have direct or indirect effects on these species include: restrictive management, road and trails management, recreational trail/road use, timber harvest, integrated pest management, aquatic resource management, minerals management, and land ownership adjustment. Other activities, such as dispersed recreation, developed recreation site use, vegetation treatments, fire management, and opening/openland management are anticipated to have little or no direct or indirect impact on these species.

Because of similarities in habitat, effects on the bantam sunfish and bluehead shiner are analyzed together. Likewise, effects on the Kentucky crayfish and the bigclaw crayfish, which occupy similar habitat within the same drainage, are analyzed together. The Indiana crayfish, which does not occupy the same habitat as other species, is analyzed separately. The short-term, long-term, and cumulative effects of management and use on these species are summarized in Table 2.

Bantam sunfish (*Lepomis symmetricus*) and bluehead shiner (*Pteronotropis hubbsi*)

Habitat requirements for the bantam sunfish include clear, quiet waters with considerable aquatic vegetation, standing timber, and soft bottom substrates (Burr and Mayden 1979; Pflieger 1997). On the Shawnee Forest, populations of the species are found in Wolf Lake and Pine Hills Swamp. The Amended Land and Resource Management Plan (USDA FS, 1992) prohibits the introduction of live fish or crayfish into these waters, except as needed to maintain or restore historic populations.

In Illinois, the bantam sunfish is listed as State Threatened (IESPB 1999). Based upon recent collections, the population status appears to be stable; however, NatureServe (2003) lists the species as critically imperiled in Illinois. Potential threats to the viability of this species include: 1) draining of swamp habitats, 2) tree harvesting and the subsequent loss of stable buffer zones, 3) increased sedimentation leading to high turbidity, loss of vegetation communities, and negative impacts to spawning, and 4) pollution events that impact water quality.

Ranvenstel and Burr (2002) summarized the habitat requirements, distribution, status, and potential threats to populations of the bluehead shiner. Habitat for the bluehead shiner is backwater areas of sluggish streams and oxbow lakes with heavy vegetation and submersed macrophytes. Preferred substrate is generally mud, detritus, or mixed mud and sand.

On the Shawnee Forest, populations of the bluehead shiner were historically found in Wolf Lake, LaRue Swamp, and Otter pond. However, no specimens have been collected from these locations since 1974. The Amended Land and Resource Management Plan (USDA FS, 1992) included plans to reintroduce the bluehead shiner into the Larue/Pine Hills Ecological Area and Wolf Lake to ensure their continued existence. In 1992, an attempt was made to reestablish the species into Otter Pond, but was apparently unsuccessful.

In Illinois, the bluehead shiner is listed as State Endangered, but has likely been extirpated. Potential threats to the reestablishment of this species include degradation of swamp-like habitats by: 1) draining of swamp habitats, 2) tree harvesting and the subsequent loss of stable buffer zones, 3) increased sedimentation leading to high turbidity, loss of vegetation communities, and negative impacts to spawning, and 4) pollution events that impact water quality. None of these threats are likely to occur directly from planned Forest management use or activities in any of the Alternatives. Draining, tree harvesting and increased sedimentation would not occur in existing habitats from planned Forest management activities as none of these actions are planned in these watersheds or forestwide and management area standards and guidelines would prevent them from having any effects. However, they could occur from private lands actions in the Wolf Lake watershed.

Dispersed recreation use, primarily driving on open roads on the Forest could result in possible pollution events from vehicle accidents in the watershed of Wolf Lake, LaRue Swamp and Otter Pond. Public roads that allow yearround or seasonal motor vehicle access adjoin portions of LaRue Swamp and Otter Pond. A pollution event on private lands in Wolf Lake (on Ensign-Bickord property) did result in a substantial fish kill in Wolf Lake in the 1970's so the likelihood of such an event happening on National Forest is a real but remote possibility and potential indirect effect.

Habitat on the Forest for the bantam sunfish and bluehead shiner occurs only in bald cypress swamps. Therefore, existing habitat and populations are not expected to be impacted in the short-term, long-term, or cumulatively by the following practices: recreational trail use, , developed recreational use, timber harvest methods, fire management, opening/openland management, and minerals management. These activities are not expected to occur, under any of the alternatives, in habitats known to contain populations of the bantam sunfish or in historical habitat once occupied by the bluehead shiner.

Alternative 1

This alternative continues the implementation of the existing 1992 ALRMP. Restrictive management practices are included in the Forest-wide Standards and Guidelines and Management Prescriptions for Filter Strip and Riparian Areas (FR) and Natural Areas (NA). These practices are designed to protect critical habitat and ensure the continued viability of the bantam sunfish and bluehead shiner.

Forest-wide Standards and Guidelines offer protection for water quality, establish filter strips in riparian areas, and address management of Regional Forester Sensitive Species. Specific direction is given to prohibit the introduction of live fish or crayfish into the historical habitat area, except as needed to reintroduce the species. Under this alternative, there is also specific direction to reintroduce the bluehead shiner into historic habitat areas to ensure their continued existence.

The NA management prescription preserves, protects, and enhances unique features on the Forest (e.g., Natural Areas, Ecological Areas, Zoological Areas). Historical habitat for these species falls entirely within an 8.2 management area that is also a Research Natural Area. Within this management prescription, vegetation management is allowed, but only to restore native communities, existing wetland habitat is protected from alteration, timber harvest is prohibited, and human disturbance is minimized.

Additional protection under this alternative is provided by the FR management prescription, which provides for a minimum filter strip width around wetlands of 25 ft. Special management areas, combined with standards and guidelines specific to these species and their habitat, provide direct and indirect, short-term and long-term benefits.

Roads and trails management, recreational road use and dispersed recreational use that allow and encourage driving on open roads on the Forest could result in possible pollution events from vehicle accidents in the watershed of Wolf Lake, LaRue Swamp and Otter Pond. Public roads that allow yearround or seasonal motor vehicle access adjoin portions of LaRue Swamp and Otter Pond. A pollution event on private lands in Wolf Lake (on Ensign-Bickord property) did result in a substantial fish kill in Wolf Lake in the 1970's so the likelihood of such an event happening on National Forest is a real but remote possibility and potential indirect effect. There would be no effects of these activities and management on existing populations of bluehead shiner since the species is presumed to be extirpated from its former swamp habitats on the Forest. However, these actions could have an indirect, negative effect albeit remote on existing habitats and populations of the bantam sunfish.

Forest-wide standards and guidelines offer little specific direction for integrated pest management. This alternative would allow for integrated pest management only when "essential" to meet management objectives. Populations of predatory fish, competing native species, and non-native invasive species may hinder the success of reintroduction and recovery efforts of the bluehead shiner, as well as the continued viability of bantam sunfish populations. Under this alternative, pesticides could be used to control other species, as needed, to ensure success of reintroduction efforts and maintain existing populations. Although it is unlikely that pesticides would be applied to existing areas which offer habitat for these species (e.g., Wolf Lake, LaRue Swamp, and Otter Pond), pesticide use may be needed as new habitat is created or as new habitat is acquired through land acquisition. In newly acquired or created habitats, pesticides could be used to control or eradicate competing or invasive species.

Similarly, land ownership adjustment could have positive, indirect short-term and long-term effects where newly acquired parcels have existing or potential habitat. Standards and guidelines stipulate that sensitive species management is a priority for land acquisition.

In summary, restrictive management activities, aquatic resource management, and land ownership adjustment should have positive, direct and indirect, short-term and long-term effects on the viability of bantam sunfish populations, habitat for both species, and reintroduction/recovery efforts for the bluehead shiner. Vegetative treatments as part of NA management are expected to have neutral effects on these species and associated habitat. Integrated pest management would have neutral short-term, but potentially positive, indirect long-term impacts for the recovery of bluehead shiners and management of existing bantam sunfish populations.

Alternative 2

Alternative 2 retains the FR and NA management areas, providing protection of riparian areas and natural areas. In addition, this alternative creates the Mississippi and Ohio River Floodplains Management Area (MO). This new management area will emphasize wetland development, restoration, and management. The protection of existing swamp and oxbow habitat, combined with potential formation of new habitat would provide positive, direct and indirect, short-term and long-term benefits for both species.

Alternative 2 also makes some changes to Forest-wide Standards and Guidelines for water quality, Regional Forester Sensitive Species, and the control of invasive species. Under this alternative the width of filter strips adjacent to wetlands is increased to a minimum of 100 ft (compared to 25 ft in Alternative 1). Direction is given in guidelines for Regional Forester Sensitive Species to maintain high quality, bald cypress swamp habitat for both species and continue reintroduction efforts for the bluehead shiner. Standards and guidelines are also included to allow control of invasive plants and animals using mechanical, biological, and chemical means. These new guidelines, should provide positive, indirect, short-term and long-term benefits by protecting available habitat and minimizing the impact from competing species.

This alternative allows limited chemical use, which could be beneficial to the reintroduction of the bluehead shiner. Populations of predatory fish, competing native species, and non-native invasive species may hinder the success of reintroduction and recovery efforts of the bluehead shiner, as well as the continued viability of bantam sunfish populations. Under this alternative, pesticides could be used to control other species, as needed, to ensure success of reintroduction efforts and maintain existing populations. Although it is unlikely that pesticides would be applied to existing areas which offer habitat for these species (e.g., Wolf Lake, LaRue Swamp, and Otter Pond), pesticide use may be needed as new habitat is created or as new habitat is acquired through land acquisition. In newly acquired or created habitats, pesticides could be used to control or eradicate competing or invasive species, resulting in a positive, indirect, long-term effect.

Land ownership adjustment could have positive, indirect, short-term and long-term effects where newly acquire parcels have existing or potential habitat. Standards and guidelines stipulate that sensitive species management is a priority for land acquisition.

In summary, restrictive management, aquatic resource management, and land ownership adjustment provide positive, direct and indirect, short-term and long-term effects on these species.

Integrated pest management would have no short-term, direct effects, but long-term indirect benefits of integrated pest management would be positive (i.e., control of predatory, competing, or invasive species that would hinder reintroduction of the bluehead shiner or continued viability of the bantam sunfish).

Alternative 3

An increased emphasis on protection of water-quality, applying revised filter strip guidelines to lakes and streams, emphasizing wetland development and management, aquatic resource management, and creating the MO management area would have positive, indirect, short-term and long-term effects on the bantam sunfish and bluehead shiner by protecting existing habitat. Likewise, land ownership adjustment would have positive, indirect, short-term and long-term effects where newly acquired parcels have existing or potential habitat. Similar to all alternatives, Forest-wide Standards and Guidelines stipulate that sensitive species management is a priority for land acquisition.

Alternative 3 prohibits integrated pest management and allows only mechanical, manual or limited biological controls of forest pests. Under this alternative, the inability to use pesticides to control invasive species and eliminate competing or predatory fishes could have negative, long-term, indirect effects on the reintroduction and recovery of the bluehead shiner and the viability of the bantam sunfish. Although it is unlikely that pesticides would be applied to existing areas which offer habitat for these species (e.g., Wolf Lake, LaRue Swamp, and Otter Pond), pesticide use may be needed as new habitat is created or as new habitat is acquired through land acquisition. In newly acquired or created habitats, pesticides may be needed to control or eradicate competing or invasive species; otherwise, reintroduction efforts would likely fail.

In summary, restrictive management, aquatic resource management, and land ownership adjustment provide positive, direct and indirect, short-term and long-term effects on these species. Integrated pest management could result in negative, indirect, long-term effects, because pesticides would not be allowed to control predatory, competing, or invasive species.

Alternative 4

Direct and indirect effects would be similar to Alternative 2 as most activities are similar. Restrictive management, aquatic resource management, and land ownership adjustment provide positive, direct and indirect, short-term and long-term effects on these species. Integrated pest management would result in no direct, short-term effects; however, indirect, long-term benefits of integrated pest management should be positive (i.e., control of predatory, competing, or invasive species that would hinder reintroduction of the bluehead shiner or continued viability of the bantam sunfish). Vegetation treatments should have no direct or indirect, short-term or long-term effects.

Cumulative Effects

Past, present, and foreseeable future actions have and will continue to restrict available habitat to the Shawnee National Forest for both species. As discussed above, the only known locations for these species in Southern Illinois are on the National Forest in Wolf Lake, LaRue Swamp, and Otter Pond. There are a few privately owned and managed swamps, lakes, and wetlands adjacent to those on the National Forest; however, none of these harbor existing populations of bantam

sunfish and habitat is not likely suitable for reintroduction of bluehead shiner. Draining, tree harvesting, increased sedimentation and pollution have occurred and could continue to sporadically occur on or associated with private lands bordering Wolf Lake, LaRue Swamp, and Otter Pond. However, the chances for these actions to continue to occur in bluehead shiner and bantam sunfish habitats are much less than historical periods due to increased state and federal regulations applicable to private lands and to overall changes in private land uses to less disturbing management actions adjacent to National Forest.

Because populations and suitable habitat are limited to the Forest, activities on the Forest have a large effect on populations of these species, as well as available habitat. Thus, direct and indirect effects identified above would also be equivalent to cumulative effects on both species.

Indiana crayfish (*Orconectes indianensis*)

The Indiana crayfish lives in rocky riffles and pools of small to medium-sized streams (Page, 1985). In Illinois, the Indiana crayfish usually occurs in first, second, or third order streams. Within these streams, the species is frequently found under rocks and in woody debris. Brown (1955) reported finding some Indiana crayfish in shallow (“several inches”) burrows under rocks in streambeds. Page and Mottes (1995) reported collecting the species exclusively from sites with water depths less than 50 cm.

On the Shawnee Forest, populations of the species most likely occur in the following streams; headwater tributaries of Eagle Creek drainage (Gallatin County), Little Saline River and tributaries (Pope and Johnson counties), Rock and Haney Creek drainage (Hardin County), and a 3/4 mile stretch of Sugar Creek approximately 4 miles northeast of Creal Springs (Williamson County). Under the Amended Land and Resource Management Plan (USDA FS, 1992), the Forest Service is directed to “protect and/or manage habitat to ensure the continued existence” of the Indiana crayfish. Specifically, the plan calls for the protection of all pool/riffle complexes in streams known to contain the species from activities that may result in habitat degradation.

In Illinois, the Indiana crayfish is listed as State Endangered by the Illinois Endangered Species Protection Board (IESPB 1999). The overall status of the Indiana crayfish appears to be stable (Page 1985; Page and Mottes 1995); however nearly a decade has passed since intensive surveys were conducted. The primary threats to the continued existence of the Indiana crayfish include habitat alteration (i.e., sedimentation, channelization, impoundment, removal of instream substrate, and impairment of water quality) and the introduction of non-native species (NatureServe 2003).

Alternative 1

This alternative continues implementation of the 1992 ALRMP. Existing Forest-wide Standards and Guidelines protect water quality, establish filter strips adjacent to lakes, wetlands, perennial streams, and intermittent streams, protect all pool riffle complexes known to contain the Indiana crayfish, and establish that management of sensitive species is a priority for land management acquisition. These standards and guidelines are designed to protect populations of the Indiana crayfish and protect existing habitat.

Additional protection for this species and its habitat is provided by the FR management area, which protects and manages riparian areas Forest-wide and supercedes all less restrictive

management area standards and guidelines. Under this prescription, filter strips and bare soil exposure limits are established adjacent to perennial and intermittent streams, riparian vegetation is protected, and stream channel modifications are discouraged.

Within Alternative 1, there is no specific direction for control of invasive species, except within Natural Areas and Wilderness Areas, and pesticide use is allowed only when “essential” and following a site-specific environmental analysis. Although direction is not entirely clear, control of invasive species is allowed. Thus, indirect, short-term effects would likely be neutral and indirect, long-term effects would likely be positive.

Under Alternative 1, timber would be harvested in uneven-aged management practices and areas managed for timber production would usually be harvested in small groups. Additionally, there would be no harvest near lakes, streams, or sensitive areas. The primary effect to this species would be sedimentation of aquatic habitat from erosion in areas where timber harvest occurs. However, little erosion and subsequent sedimentation is likely to occur from these practices. In addition, Forestwide Standards and Guidelines for filter strips and Regional Forester Sensitive Species management and the FR management prescription should preclude any indirect, short-term or long-term effects on this species.

Under this alternative, there are some potential, indirect, negative effects from the Forest wide Standards and Guidelines. The current Forest Plan allows equestrian use off system trails, allows continued use of user-created trails, and allows equestrian use in all seasons (i.e., no seasonal closure). All of these above factors could potentially increase sediment loads to streams and impact aquatic resources. Although indirect, short-term effects are not expected, indirect long-term effects are expected to be negative if erosion from trails continues to introduce sediment into aquatic habitats occupied by the Indiana crayfish.

In summary, restrictive management, aquatic resource management, and land ownership adjustment are expected to have positive, direct and indirect, short-term and long-term impacts to this species. Dispersed recreational use, developed recreation site use, timber harvest methods, fire management, opening/openland management, and mineral management are expected to have neutral effects. Road and trails management and recreational trail/road use should have no direct or indirect, short-term effects, but may have negative, indirect long-term effects. Integrated pest management would have no short-term effects, but indirect, long-term effects would likely be positive.

Alternative 2

This alternative implements the Proposed Federal Action. Forest-wide Standards and Guidelines in Alternative 2 apply the same protection to Regional Forester Sensitive Species as Alternative 1, including a biological evaluation prior to project implementation when this species may be affected. This alternative specifically addresses the habitat requirements of the Indiana crayfish and states “in streams known to contain these species, minimize stream impoundment, instream removal of gravel and cobble, and input of sediment and toxins from runoff.” Additional protection is afforded under Alternative 2 with the prohibition of non-native crayfish as fishing bait and the interbasin transfer of non-native crayfish in areas where these species exist. Forest-wide Standards and Guidelines under this alternative vary the width of filter strips along intermittent, perennial, and ephemeral streams according to slope.

Unlike Alternative 1, this proposal adds protection to ephemeral streams along with increased protection for high gradient areas of intermittent and perennial streams and lakes. Bare soil exposure limits are also applied to the three stream categories. These measures should decrease sediment input to streams and positively affect aquatic resources.

Under this alternative, ATVs and OHMs would be restricted to up to 50 percent of dirt- and grass-surface roads (Levels 1 and 2) posted for ATV/OHM use, unless monitoring indicates that illegal off-road use is resulting from this access. This should reduce some of the illegal use which can seriously damage riparian areas and degrade stream habitat. Similarly, this alternative restricts equestrian use to designated trails and roads, allows for seasonal closure of trails, and allows for closure of user-created trails that are not designated trails. New guidelines for ATV/OHV and equestrian use should help to minimize erosion from roads and trails and subsequently reduce the impacts of sedimentation to aquatic resources.

Under this alternative, shelterwood harvesting with even-aged management is the predominant silvicultural method to be employed. Uneven-aged management would be allowed to meet other resource objectives. The primary effect to this species would be sedimentation of aquatic habitat from erosion in areas where timber harvest occurs. However, these timber harvest practices are not expected to result in erosion and contribute sediment to aquatic habitats. In addition, Forestwide Standards and Guidelines for filter strips and Regional Forester Sensitive Species management and FR management prescription should preclude any direct or indirect, short-term or long-term effects on this species from timber harvest.

Alternative 2 develops standards and guidelines, following regional and national guidelines, for the prevention and control of invasive animals. Non-native invasive species management is allowed. Measures designed to prevent invasion will be implemented and known populations of invasives will be controlled or reduced. Integrated pest management is allowed and could be used as a tool to control invasive species.

As in Alternative 1, land ownership adjustment in Alternative 2 would have positive short-term and long-term impacts where newly acquired parcels have existing or potential habitat.

In summary, dispersed recreational use, developed recreation site use, timber harvest methods, vegetation treatments, fire management, opening/openland management, and minerals management are expected to have no direct or indirect effect. Restrictive management, roads and trails management, recreational trail/road use, integrated pest management, aquatic resource management, and land-ownership adjustment are expected to have positive, direct and indirect, short-term and long-term effects on the Indiana crayfish.

Alternative 3

Under this alternative, an increased emphasis on protection of water-quality, application of revised filter strip guidelines to lakes and streams, and an emphasis on aquatic resource management would have positive, direct and indirect, short-term and long-term effects on the Indiana crayfish

Alternative 3 prohibits ATV and OHM use forest-wide. Road and trail use throughout the Forest

would not include user developed trails, but would be restricted to designated and managed trails. In addition, there would be fewer miles of designated trail, compared to Alternatives 1 and 2. This alternative would also require seasonal and weather-related trail closures. Thus, Alternative 3 should help to reduce sedimentation impacts to stream habitats and provide positive, indirect short-term and long-term impacts to these species.

Alternative 3 allows no timber harvest other than for human health and safety reasons, firewood, or administrative needs. Since the primary effect of timber harvest would be increased sedimentation from erosion, the lack timber harvest precludes any direct or indirect effect to this species.

This alternative prohibits integrated pest management and allows only mechanical, manual or limited biological controls of forest pests. While no short-term, direct effects are expected, long-term, indirect effects could be negative. The inability to control or eradicate invasive species could potentially affect the long-term viability of this species.

The effects of land ownership adjustment would be similar to Alternatives 1 and 2.

In summary, dispersed recreational use, developed recreation site use, timber harvest methods, vegetation treatments, fire management, opening/openland management, and minerals management are expected to have no direct or indirect effect on this species. Integrated pest management would have a neutral, direct, short-term effect, but long-term, indirect effects would likely be negative. Restrictive management, road and trails management, recreational trail/road use, aquatic resource management, and land ownership adjustment would have positive, direct and indirect, short-term and long-term effects on these species.

Alternative 4

Like Alternative 2, this alternative provides an increased emphasis on protection of water-quality, applies revised filter strip guidelines to lakes and streams, excludes prescribed burning in filter strips, and focuses on aquatic resource management. All of these measures would have positive, direct and indirect, short-term and long-term effects on the Indiana crayfish.

Under this alternative, there are some potential negative effects from the Forestwide Standards and Guidelines. Similar to Alternative 1, this alternative allows equestrian use off system trails, allows continued use of user-created trails, and allows equestrian use in all seasons (i.e., no seasonal closure). All of these above factors could potentially increase sediment loads to streams and impact aquatic resources. Although short-term, direct effects are not expected, long-term, indirect effects are expected to be negative if erosion from trails continues to introduce sediment into aquatic habitats occupied by the Indiana crayfish.

Alternative 4 allows for shelterwood harvest and is similar in most respects to Alternative 2. Limited erosion and subsequent sedimentation is likely to occur from these practices. In addition Forestwide Standards and Guidelines for filter strips and Regional Forester Sensitive Species management and the MO management prescription should preclude any indirect, short-term or long-term effects on this species.

Like Alternatives 1 and 2, this alternative allows for integrated pest management and biological treatments following a site-specific environmental analysis. Integrated pest management and

biological treatments should aid in control of invasive species and provide positive, indirect long-term effects.

The effects of land ownership adjustment would be similar to Alternative 2.

In summary, dispersed recreational use, developed recreation site use, timber harvest methods, vegetation treatments, fire management, opening/openland management, and minerals management are expected to have no direct or indirect effect on these species. Restrictive management, road and trails management, integrated pest management, aquatic resource management, and land ownership adjustment would have positive, direct and indirect, short-term and long-term effects on these species. Conversely, recreational trail/road management and use is expected to have no short-term, direct effects and negative, indirect, long-term effects.

Cumulative Effects

Cumulative effects of all alternatives would be comparable to direct and indirect effects; however, these effects on overall populations of Indiana crayfish would be somewhat less negative or beneficial because other populations are found on protected areas of the Hoosier National Forest in Indiana. Habitat on private land is likely suitable for Indiana crayfish and populations of this species may be present off the National Forest. Past, present, and foreseeable future actions (i.e., channelization, impoundment of streams, and sedimentation from associated land use) off the Forest will likely minimize available habitat and restrict the majority of populations to streams on the National Forest. Therefore, streams on the Shawnee National Forest will remain an important refuge and play a role in the continued viability of this species.

Kentucky crayfish (*Orconectes kentuckiensis*) and Bigclaw Crayfish spp. (*Orconectes placidus*)

The Kentucky crayfish is most common in small to large streams, ranging in width from 2 to 8 m, with bottom substrates of cobble and large gravel and abundant pool habitat. Woody debris in silt-bottom areas of streams may also provide a minor habitat component (Page 1995; NatureServe 2003). In Illinois, the species is historically known only to occur in Big, Hosick, and Peters creeks, which are direct tributaries to the Ohio River in Hardin County. On the Shawnee Forest, populations of the species are found in Big Creek and two tributaries, Goose and Hogthief creeks. Under the Amended Land and Resource Management Plan (USDA FS, 1992), the Forest Service is directed to “protect and/or manage habitat to ensure the continued existence” of the Kentucky crayfish. Specifically, the plan calls for the protection of all pool/riffle complexes in streams known to contain the species from activities that may result in habitat degradation.

In Illinois, the Kentucky crayfish is listed as State Endangered by the Illinois Endangered Species Protection Board (IESPB 1999). Based upon recent collections by the Illinois Natural History Survey, the overall status of the Kentucky crayfish appears to be stable. However, NatureServe (2003) states that the species is declining in Illinois. The primary threats to the continued existence of the Kentucky crayfish include habitat alteration (i.e., sedimentation, channelization, impoundment, removal of instream substrate, and impairment of water quality) and the introduction of non-native species. Management activities within watersheds known to contain the Kentucky crayfish must minimize or eliminate: 1) the impoundment of flowing streams, 2) the instream removal of gravel/cobble substrates and woody debris, and 3) the input of runoff from

agricultural and industrial activities.

The bigclaw crayfish occupies rocky riffles and pools with scattered cobble or fractured bedrock in small to large-sized streams and rivers (Page 1985). In Illinois, the species is found in only first, second, and third order streams. Within these streams, the species is frequently found under rocks and cobble at water depths ranging from 0.1 to 1.0 m.

On the Shawnee Forest, populations of the bigclaw crayfish are found only in the Big Creek Drainage, including Big and Goose creeks and an unnamed tributary to Big Creek. Under the Amended Land and Resource Management Plan (USDA FS, 1992), the Forest Service is directed to “protect and/or manage habitat to ensure the continued existence” of the bigclaw crayfish. Specifically, the plan calls for the protection of all pool/riffle complexes in streams known to contain the species from activities that may result in habitat degradation.

In Illinois, the bigclaw crayfish is listed as State Endangered by the Illinois Endangered Species Protection Board (IESPB 1999). The overall status of the bigclaw crayfish appears to be stable; however, it is unknown if the populations within Illinois have experienced significant declines or increases in the recent past. The primary threats to the continued existence of the bigclaw crayfish include habitat alteration (i.e., sedimentation, channelization, impoundment, removal of instream substrate, and impairment of water quality) and the introduction of non-native species.

Alternative 1

This alternative continues implementation of the 1992 ALRMP. Existing Forest-wide Standards and Guidelines protect water quality, establish filter strips adjacent to lakes, wetlands, perennial streams, and intermittent streams, and protect all pool/riffle complexes known to contain these crayfish. Forest-wide Standards and Guidelines also establish that management of sensitive species as a priority for land management acquisition. These standards and guidelines provide positive direct and indirect effects on the two crayfish species by minimizing sedimentation and protecting existing habitat (i.e., pool/riffle complexes where they are known to occur).

Within the Forestwide Standards and Guidelines, negative impacts may occur from recreation. Under this alternative, equestrian use is permitted off designated trails or on “user created” trails. The absence of a designated and well maintained system of trails would have negative, indirect, long-term impacts to aquatic habitat and the continued viability of these species.

Several management prescriptions have direct implications to these species and their habitat. The FR management prescription protects and manages riparian areas Forest-wide and supercedes all less restrictive management area standards and guidelines. Under FR management prescription, filter strips and bare soil exposure limits are established adjacent to perennial and intermittent streams, riparian vegetation is protected, and stream channel modifications are discouraged. The NA management prescription preserves, protects, and enhances unique features on the Forest (e.g., Natural Areas, Ecological Areas, Zoological Areas). This management prescription protects Big Creek, which is a Natural Area and harbors the only known populations of the Kentucky crayfish and a bigclaw crayfish on the Forest, from any stream channel alteration and habitat degradation. The CR management prescription protects and maintains land and resource conditions for those streams (e.g., Big Creek) recommended for study and possible inclusion into the National Wild and Scenic River System. Each of these management prescriptions provides protection for the species and protect known habitat from degradation, which results in positive,

direct and indirect, short-term and long term impacts.

Under this alternative, there is no specific direction for control of invasive species, except within Natural Areas and Wilderness Areas, and pesticide use is allowed only when “essential” and following a site-specific environmental analysis. Although direction is not entirely clear, control of invasive species is allowed. Thus, direct, short-term effects would be neutral and indirect, long-term effects would be positive.

In summary, some Forest-wide Standards and Guidelines, as well as the FR, NA and CR management prescriptions, provide adequate protection for this species and its habitat. The only anticipated negative impact under this alternative would be from the lack of a designated trail system. Dispersed recreational use, developed recreation site use, timber harvest methods, fire management, opening/openland management, and mineral management are expected to have no direct or indirect effects. Road and trails management, recreational trail/road use, and integrated pest management will have neutral, direct and indirect short-term effects, but negative, indirect long-term effects. Restrictive management, aquatic resource management, and land ownership adjustment are expected to have positive, direct and indirect, short-term and long-term impacts to these species.

Alternative 2

This alternative implements the Proposed Federal Action. The mix of habitat conditions for each management prescription and the continued implementation of both Forest-wide and management area specific standards and guidelines are designed to ensure the continued viability of this species within the planning area.

Although not referenced by name, the standards and guidelines in Alternative 2 apply the same protection as Alternative 1, including a biological evaluation prior to project implementation when this species may be affected. This alternative specifically addresses the habitat requirements of these crayfish species and states “in streams known to contain these species, minimize stream impoundment, instream removal of gravel and cobble, and input of sediment and toxins from runoff.” Additional protection is afforded by the prohibition of non-native crayfish as fishing bait and the interbasin transfer of non-native crayfish in areas where these species exist.

Under this alternative, Forestwide Standards and Guidelines for filter strip widths along intermittent, perennial, and ephemeral streams are varied according to slope. Unlike Alternative 1, this proposal adds protection to ephemeral streams along with increased protection for high gradient areas of intermittent and perennial streams and lakes. Bare soil exposure limits are also applied to the three stream categories. All of these measures should decrease sedimentation to streams and positively affect aquatic resources.

Under this alternative, ATVs and OHMs would be restricted to up to 50 percent of dirt- and grass-surface roads (Levels 1 and 2) posted for ATV/OHM use, unless monitoring indicates that illegal off-road use is resulting from this access. This should reduce some of the illegal use which can seriously damage riparian areas and degrade stream habitat. Similarly, this alternative restricts equestrian use to designated trails and roads, allows for seasonal closure of trails, and allows for closure of user-created trails that are not designated trails. New guidelines for equestrian use should help to reduce erosion from roads and trails and subsequently minimize the impacts of sedimentation to aquatic resources.

Alternative 2 develops standards and guidelines, following regional and national guidelines, for the prevention and control of invasive animals. Non-native invasive species management is allowed. Measures designed to prevent invasion will be implemented and known populations of invasives will be controlled or reduced. Integrated pest management is allowed and could be used as a tool to control non-native species.

Likewise, land ownership adjustment would have positive, indirect, short-term and long-term impacts where newly acquired parcels have existing or potential habitat.

In summary, dispersed recreational use, developed recreation site use, timber harvest methods, vegetation treatments, fire management, opening/openland management, and minerals management are expected to have no direct or indirect effect. Restrictive management, roads and trails management, recreational trail/road use, integrated pest management, aquatic resource management, and land-ownership adjustment are expected to have positive, direct and indirect, short-term and long-term effects on these crayfish.

Alternative 3

Under this alternative, the CR management prescription protects and maintains land and resource conditions for those streams (e.g., Big Creek) recommended for study and possible inclusion into the National Wild and Scenic River System. This management prescription protects Big Creek, which harbors the only known populations of the bigclaw crayfish on the Forest, from any stream channel alteration and habitat degradation. This added protection provides positive, direct and indirect, short-term and long-term impacts to the species.

Under this alternative, an increased emphasis on protection of water-quality, application of revised filter strip guidelines to lakes and streams, and aquatic resource management would have positive, direct and indirect, short-term and long-term effects on these species of crayfish.

Alternative 3 prohibits ATV and OHM use forest-wide. Road and trail use throughout the Forest would not include user developed trails, but would be restricted to designated and managed trails. In addition, there would be fewer miles of designated trail, compared to Alternatives 1 and 2. This alternative would also require seasonal and weather-related trail closures. Thus, Alternative 3 should help to reduce sedimentation impacts to stream habitats and provide positive, direct and indirect, short-term and long-term impacts to these species.

This alternative prohibits integrated pest management and allows only mechanical, manual or limited biological controls of forest pests. While no direct, short-term effects are expected, indirect, long-term effects could be negative. The inability to control or eradicate invasive species could potentially affect the long-term viability of this species.

Land ownership adjustment would have a positive, indirect, short-term and long-term effect, where newly acquire parcels have existing or potential habitat.

In summary, dispersed recreational use, developed recreation site use, timber harvest methods, vegetation treatments, fire management, opening/openland management, and minerals management are expected to have no direct or indirect effect on these species. Integrated pest management would have a no direct, short-term effect, but indirect, long-term effects would

likely be negative. Restrictive management, road and trails management, recreational trail/road use, aquatic resource management, and land ownership adjustment would have positive, direct and indirect, short-term and long-term effects on these species.

Alternative 4

Like Alternative 2, this alternative provides an increased emphasis on protection of water-quality, applies revised filter strip guidelines to lakes and streams, and focuses on aquatic resource management. All of these measures would have positive, direct and indirect, short-term, long-term and cumulative effects on these two species of crayfish.

Under this alternative, there are some potential negative effects from the Forestwide Standards and Guidelines. Similar to Alternative 1, this alternative allows equestrian use off system trails, allows continued use of user-created trails, and allows equestrian use in all seasons (i.e., no seasonal closure). All of these above factors could potentially increase sediment loads to streams and impact aquatic resources. Although direct, short-term effects are not expected, indirect, long-term effects are expected to be negative if erosion from trails continues to introduce sediment into aquatic habitats occupied by these crayfish.

Like Alternative 2, this alternative allows for integrated pest management and biological treatments following a site-specific environmental analysis. Integrated pest management and biological treatments should aid in control of invasive species and provide positive, indirect, long-term effects.

The effects of land ownership adjustment would be similar to those in Alternative 2.

In summary, dispersed recreational use, developed recreation site use, timber harvest methods, vegetation treatments, fire management, opening/openland management, and minerals management are expected to have no direct or indirect effect on these species. Restrictive management, road and trails management, integrated pest management, aquatic resource management, and land ownership adjustment would have positive, direct and indirect, short-term and long-term effects on these species. Conversely, recreational trail/road use is expected to have no direct, short-term effects, but indirect, long-term effects will likely be negative.

Cumulative Effects

Cumulative effects of all alternatives would be comparable to direct and indirect effects; however, effects on overall populations of the two crayfish species would be somewhat less negative or beneficial because other populations of Kentucky crayfish are found in Michigan and Kentucky and populations of a big-claw crayfish are found in Alabama, Kentucky, and Tennessee. Habitat on private land is likely suitable for both crayfish species and populations of these species may be present off the National Forest. In Southern Illinois, past, present, and foreseeable future actions (i.e., channelization, impoundment of streams, and sedimentation from associated land use) off the Forest will likely minimize available habitat and restrict the majority of populations to streams on the National Forest. Therefore, streams on the National Forest will be an important refuge for these species in the State of Illinois.

Literature Cited

Brown, P. L. 1955. The Biology of Crayfishes of central and southeastern Illinois. Doctoral Dissertation, University of Illinois, Urbana-Champaign. 158 pp.

Burr, B. M. and R. L. Mayden. 1979. Fishes of the Shawnee National Forest. Department of Zoology. Southern Illinois University, Carbondale.

Illinois Endangered Species Protection Board. 1999. Checklist of endangered and threatened animals and plants of Illinois. Illinois Endangered Species Protection Board, Springfield.

NatureServe. 2003. NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.8 NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: March 26, 2004)

Page, L. M. 1985. The crayfishes and shrimps (Decapoda) of Illinois. Illinois Natural History Survey Bulletin 33: 335-448.

Page, L. M. and G. B. Mottes. 1995. The distribution and status of the Indiana crayfish, +*Orconectes indianensis*, with comments on the crayfishes of Indiana. Proceedings of the Indiana Academy of Science 104: 103-111.

Pflieger, W. L. 1997. The fishes of Missouri. Missouri Department of Conservation, Jefferson City.

Ranvenstel, A. W. and B. M. Burr. 2002. Conservation assessment for the bluehead shiner, *Pteronotropis hubbsi*. Department of Zoology and Center for Systematic Biology. Southern Illinois University, Carbondale.

USDA Forest Service. 1992. Amended Land and Resource Management Plan, Shawnee National Forest. Harrisburg, Illinois.