Appendix F3

to the
Final Environmental Impact Statement
for the
Wayne National Forest 2006 Land and Resource Management Plan

Final Biological Evaluation

on the
Wayne National Forest Land and Resource Management Plan

Prepared by

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Biological Evaluation

Organization of the Biological Evaluation

The Biological Evaluation includes introductory information as well as the effects analyses for Regional Forester sensitive species (RFSS) and species proposed for RFSS designation. For a summary of this Biological Evaluation, please refer to Chapter 3 of the Final EIS, *Habitat Indicator 7*.

Table 1. Contents of the Biological Evaluation.

Introduction

The Land and Resource Management Plan (Forest Plan) is a strategic document that establishes land allocations as well as goals, desired conditions, objectives, standards and guidelines for the Wayne National Forest (WNF). The Forest Service initiated the Forest Plan revision process in April 2002 with the publication of the Notice of Intent to revise the Forest Plan in the Federal Register.

As part of the Forest Plan revision process, alternatives were developed to address issues raised during public involvement and comment periods. A Biological Evaluation was prepared and published in the Draft Environmental Impact Statement (EIS) (DEIS-Appendix F). It identified and addressed the potential effects of the alternatives on federally listed species, Regional Forester sensitive species, and species proposed for Regional Forester sensitive species designation.

Upon consideration of public comments received during the 90-day formal comment period of the Draft EIS (April 1- July 1, 2005), the Regional Forester made the decision to modify the Preferred Alternative (E), resulting in what will now be designated as the Selected Alternative, or Alternative E_{mod}.

Under Forest Service Manual (FSM) 2672.41, objectives for completing biological evaluations for proposed Forest Service programs and activities are: 1) to ensure that Forest Service actions do not contribute to loss of viability of any native or desired non-native plant or animal species, 2) to ensure that Forest Service activities do not cause any species to move toward federal listing, and 3) to incorporate concerns for sensitive species throughout the planning process, reducing negative impacts to species and enhancing opportunities for mitigation.

The Biological Evaluation will document the direct, indirect, and cumulative effects on RFSS and species proposed for RFSS designation for each of the alternatives developed as part of the Forest Plan revision process. In addition, it will demonstrate how each alternative meets requirements of FSM 2672.3 (i.e., the objectives of the Forest Plan must include overall goals of effecting recovery and achieving eventual delisting of any federally listed species known to occur within the National Forest).

Location and Ecological Setting of the Proposed Action

Wayne National Forest

The WNF proclamation boundary encompasses 853,531 acres in 12 southeastern Ohio counties: Athens, Gallia, Hocking, Jackson, Lawrence, Monroe, Morgan, Noble, Perry, Scioto, Vinton, and Washington. There are 238,053 acres of NFS lands within the WNF proclamation boundary; the remaining lands are state-owned, privately-owned, or lands owned by local governments. The WNF is broken into three administrative units (Athens, Ironton, and Marietta).

The WNF is located in the Southern Unglaciated Allegheny Plateau (Ecological Section 221E). The topography is characterized by numerous narrow ridges and deep valleys. Topographic relief ranges from a minimum of 500 feet to a maximum of over 1,000 feet. Slopes are typically benched or segmented with alternating steep and moderate slope gradients. Most gradients average 25 to 55 percent.

The bedrock geology is characterized by inter-bedded sedimentary strata of Permian age on the Marietta Unit, while bedrock underlying the Athens Unit and the Ironton Ranger District is of Pennsylvanian age. Most of the surface soils are silt loam, loam or sandy loam. However, the subsurface soils range from sandy loam to clay. Soil type and topography contribute to some areas of the WNF having high potential for soil erosion.

The WNF is located in the heart of Ohio's oil, gas and coal deposits. Industrial minerals such as sand, gravel, limestone, clay, shale, sandstone, and salt are also found within the National Forest. About 40% of the WNF

is currently underlain by federally owned minerals, including oil and gas. Reserved and/or outstanding minerals wholly or partially encumber the remaining 60% of the National Forest.

Extraction of coal, clay, limestone and iron ore have occurred in southeastern Ohio during the last 150 years. Today, remnants of this industrial era are present on the WNF in the form of abandoned surface and underground mines. Features associated with these abandoned mine lands affect riparian and water quality.

The WNF is part of the mixed mesophytic forest region. Approximately 80% of all lands within the WNF proclamation boundary are forested (Ohio Land Use Cover, based on Landsat TM 1994). Just over 94% of NFS lands are forested with the remaining 6% covered by non-forest lands such as roads, water, grasslands and other openland. National Forest System lands are dominated by hardwood forest types, however some pine is present (Table 2).

Table 2. Acres of forest types by age class on National Forest System lands*.

Age (years)	Pine	Pine - Hardwood	Oak - Hickory	Yellow Poplar	Lowland Hardwood	Maple-Beech	Upland Hardwood	Total
No Age	52	23	138		74		34	321
0-9	55	279	110	13	275		312	1,044
10-19	953	640	4,632	93	349	74	4,974	11,715
20-29	1,217	532	4,343	614	747	196	4,725	12,374
30-39	4,470	1,811	4,417	1,088	2,297	274	6,962	21,319
40-49	3,539	3,157	3,024	2,129	1,844	189	7,427	21,309
50-59	2,233	3,093	5,724	3,019	1,281	596	9,239	25,185
60-69	1,405	1,986	10,493	2,792	720	443	8,221	26,060
70-79	364	650	13,120	1,691	505	675	6,254	23,259
80-89	85	297	13,722	899	257	755	3,179	19,194
90-99		352	13,628	347	69	347	2,021	16,764
100-109		34	14,131	125	63	360	1,073	15,786
110-119			10,524	93	17	148	574	11,356
120-129			6,625	12		117	172	6,926
130-139		22	1,859		34	70	51	2,036
140-149			988			20	78	1,086
150+			197			15	28	240
Total	**14,373**	**12,876**	**107,675**	**12,915**	**8,532**	**4,279**	**55,324**	**215,974**

**Data in this table do not include the approximately 9,300 acres of NFS lands where a silvicultural examination has yet to be conducted.*

Of the forested NFS lands, oak-hickory is the major forest type, comprising 47% of all forested stands. The majority of the WNF has been harvested one or more times since the late 1700s. Cultivation or grazing followed the harvest of many forest stands. Today, many forest

communities were established after timber harvesting that occurred about 80-140 years ago.

All streams in the WNF proclamation boundary flow towards the Ohio River. There are 31 fifth-level watersheds that contain part of the WNF proclamation boundary; however only 15 of these watersheds contain more than 1% NFS lands (Table 3).

Table 3. Fifth level watersheds encompassing the WNF proclamation boundary.

Watershed Name	Hydrologic Unit Code	Watershed Size (acres)	NFS land (%)
Monday Creek	0503020406	74,209	44.7
Pine Creek	0509010302	117,859	36.5
Symmes Creek (Black Fork to Buffalo Creek)	0509010109	64,168	35.1
Little Muskingum River (Clear Fork to Ohio R.)	0503020110	106,032	26.5
Ohio River (Sunfish Cr. to Muskingum River)	0503020102	87,344	22.3
Sunday Creek	0503020407	88,773	21.9
Symmes Creek (Buffalo Creek to Ohio River)	0509010110	96,987	17.9
Little Muskingum River (above Clear Creek)	0503020109	95,313	15.5
Ohio River (below Big Sandy R. to Pine Cr.)	0509010301	83,471	13.1
Hocking River (Enterprise to Monday Cr.)	0503020405	80,819	10.4
Symmes Creek (headwaters to Black Fork)	0509010108	76,244	10.1
Raccoon Creek (headwaters to Hewett Fork)	0509010102	86,715	6.7
Hocking River (Monday Creek to Athens)	0503020408	65,523	5.2
East Fork of Duck Creek	0503020111	87,190	1.7
Raccoon Creek (Hewett Fork to Elk Fork)	0509010103	99,234	1.4
Little Scioto River (Rocky Fork to Ohio River)	0509010304	97,405	0.37
Federal Creek	0503020409	92,547	0.34
Middle Fork of Salt Creek	0506000208	69,738	0.17
Raccoon Creek (Little Raccoon Cr. to Ohio R.)	0509010106	90.082	0.17
Duck Creek (except East Fork)	0503020112	95,765	0.16
Salt Creek (Queer Cr to Scioto River)	0506000210	85,157	0.07
Hocking River (Athens to Ohio River)	0503020410	70,213	0.01
Wolf Creek	0504000409	98,776	0
Seneca Fork Wills Creek	0504000501	96,296	0
Ohio River (Muskingum R. to Hocking R.)	0503020201	90,407	0
Rush Creek (Little Rush Cr. to Hocking River)	0503020403	87,046	0
Ohio River (Fish Creek to Sunfish Creek)	0503020101	79,210	0
Moxahala Creek	0504000405	69,353	0
Rush Creek (headwaters to Little Rush Creek)	0503020402	63,267	0
Ohio River (Kanawha River to Raccoon Cr.)	0509010101	29,064	0
Ohio River (Raccoon Cr. to Symmes Cr.)	0509010107	88,976	0
Total		**2,523,191**	**9.43**

Riparian areas, wetlands and floodplains have been affected by extensive disturbance and modifications. Nearly all floodplains and riparian areas, and most of the wetlands on NFS lands were cleared, drained, and farmed in the past. Transportation corridors, including roads and railroads, were developed through these areas by early settlers. Riparian and aquatic resources have also been affected by stream channel alteration (typically by straightening stream channels and the filling in of oxbows), streamside forest clearing, livestock access to streams, cultivation of fields up to the edge of the channel, and more recently from increased development of residential sites in the floodplain on private lands. Such activities have resulted in altered hydrologic regimes, increased erosion and sedimentation within stream channels, degraded water quality and aquatic habitat.

The landscape of the WNF, including NFS lands and other ownerships, is fragmented by residences, farms, mines and quarries, industrial developments, and towns. The scattered pattern of NFS lands, including subsurface ownership of minerals, has resulted in the construction of roads and utility corridors across NFS lands to access these private inholdings.

Description of the Alternatives

The National Forest Management Act requires the development and analysis of a broad range of reasonable alternatives that respond to the issues and concerns identified during the planning process. For purposes of this Forest Plan revision, each alternative had a different approach to managing the resources on the WNF. While all alternatives provided a wide range of multiple uses, goods and services, they addressed the issues in different ways.

Preliminary themes for revised Forest Plan alternatives were developed during public and employee collaborative workshops in 2003. These themes were designed to address the issues and concerns identified early on in the planning process. The themes were used to develop five alternatives, in addition to the No Action Alternative (Alternative A) that carried forward the emphasis of the current Forest Plan.

Alternative E was identified as the Preferred Alternative with the release of the Draft EIS and Proposed Revised Forest Plan (announced in the Federal Register on April 1, 2005). After review of public comments received during the subsequent 90-day comment period, the Regional Forester chose to modify the Preferred Alternative, and identified E_{mod} as the Selected Alternative.

The Selected Alternative (Alternative E_{mod}) provides the management strategy that will guide all resource management activities and will establish management direction for the WNF for the next 10-15 years.

Management Areas (MA) are the foundation of a Forest Plan (see Chapter 3 of the revised Forest Plan). Each MA emphasizes different management prescriptions and uses (Table 4). The alternatives, including Alternative E_{mod}, consist of a specific arrangement of MAs on the ground, otherwise known as the MA allocation. Allocation includes the type, amount and distribution of the MAs referenced in Table 4.

For comparison purposes, Table 5 is provided to show how Alternative E_{mod} falls within the range of MA allocations analyzed for Alternatives A-F in the Biological Evaluation for the Draft EIS (DEIS-Appendix F). Table 5 shows that the acreages associated with the MA allocation for Alternative E_{mod} are within the range of those acreages analyzed for Alternatives A-F.

To achieve the desired future condition for each MA, various management activities are projected to occur in each of the alternatives, including Alternative E_{mod}. For analysis purposes, the intensity of management activities is projected out for 10 years. Table 6 is provided to show how the projected management activities associated with Alternative E_{mod} fall within the range of management activities previously analyzed for Alternatives A-F (see the Biological Evaluation - DEIS, Appendix F).

Table 4. Brief description of the management areas.

Management Area Name	Description
Candidate Areas (CA)	Emphasis is on the preservation of potentially unique natural areas. These areas possess potentially significant natural or historic characteristics. Management is directed at protecting the potentially unique characteristics of these areas until they can be studied for designation as research natural areas, special areas, or other management areas.
Developed Recreation (DR)	Emphasis is on the management of existing recreation facilities and the future needs for the highly developed sites that serve large numbers of people. It covers the most developed range of recreation opportunities provided on the Forest. By offering a variety of recreation opportunities, services, and facilities in a natural setting, the Forest intends to provide visitors with a quality outdoor recreation experience.
Diverse Continuous Forest (DCF)	Provides mature forest habitat for conservation of forest interior species.
Diverse Continuous Forest with OHVs (DCFO)	Emphasizes trails for motorized recreation and mature forest habitat for conservation of forest interior species.
Forest and Shrubland Mosaic (FSM)	Sustains a distribution of early successional habitat conditions interspersed throughout a forested landscape. Dispersed, non-motorized recreation opportunities are offered in this management area.
Forest and Shrubland Mosaic with OHVs (FSMO)	Emphasizes trails for motorized recreation as well as early successional habitat conditions interspersed throughout a forested landscape.
Future Old Forest (FOF)	Characterized mostly by old forest that change only as a result of natural disturbances and natural succession. These areas offer Forest visitors opportunities to experience solitude and closeness to nature. Such opportunities may be limited in the vicinity of private oil and gas rights until the oil and gas reservoirs are depleted.
Future Old Forest with Mineral Activity (FOFM)	This management area is located on the Marietta Unit of the Athens Ranger District. It continues a primarily custodial regime of vegetation management. Its two objectives are (a) promotion of mostly old forest that changes only as a result of natural disturbance and succession; and (b) opportunities for relatively primitive recreation experiences. Unlike the FOF Management Area, surface occupancy of federal oil and gas leases is permitted in this management area. Many oil and gas wells are already present within this management area, both on lands in private surface ownership and on NFS land where the subsurface minerals are privately owned (outstanding and reserved rights).
Grassland and Forest Mosaic (GFM)	Emphasizes habitat for grassland-dependent wildlife species on expanses of reclaimed coal mine lands. Dispersed, non-motorized recreation opportunities are offered in this management area.
Historic Forest (HF)	The emphasis of this management area is moving conditions toward the “historic range of variability.” This includes maintaining and increasing the predominance of oaks and hickories on most sites, featuring larger and older trees with more open stands than currently cover most of this area. These conditions would be promoted through a combination of mostly uneven-aged timber harvest, frequent prescribed fire, and herbicide use, where necessary, to promote oak and hickory regeneration.
Historic Forest with OHVs (HFO)	Emphasizes trails for motorized recreation as well as moving forest conditions back toward their “historic range of variability”. This includes maintaining and increasing the predominance of oaks and hickories on most sites, with larger, older trees and stands more open than those currently found in this area. These conditions are to be attained by a combination of mostly uneven-aged timber harvest, frequent prescribed fire, and herbicide use, where necessary, to promote oak and hickory regeneration.
Research Natural Areas (RNA)	Includes designated Research Natural Areas which emphasize preservation of unique ecosystems for scientific purposes; and research to better understand natural processes.
River Corridors (RC)	Emphasizes retaining, restoring, and enhancing the inherent ecological processes and functions associated with riverine systems. Management will protect or enhance the scenic quality of these areas. As a result, high-quality riverine recreation opportunities should be available in these river corridors. Areas allocated to this management area are linear-shaped and occur along the mainstem of Symmes Creek, the Hocking River, the Little Muskingum River, and along the Ohio River.

Table 4. Brief description of the management areas.

Management Area Name	Description
Special Areas (SA)	Emphasizes the preservation, management, and study of unique natural areas. These areas are regionally or locally significant and have been formally designated after recommendation by a review committee and approved by the Regional Forester. These areas meet one or more of the following criteria: (a) be representative of unique geological, ecological, cultural or other scientific values; (b) be an appropriate area for scientific research; and (c) have potential to be a regional or national landmark based on its natural or cultural values.
Timbre Ridge Lake (TRL)	Focus of this management area is the scenery and recreation afforded by the 100-acre Timbre Ridge Lake and the rugged, wooded hills that surround it.

Table 5. Management area allocation by acres of NFS lands across the alternatives.

	A *No Action*	B	C	D	E	E_{mod} *Selected*	F
Candidate Areas	981	981	981	981	981	981	981
Developed Recreation	1,839	1,839	4,078	4,078	4,078	4,078	4,078
Diverse Continuous Forest	155,408	12,079	98,292	83,405	55,089	55,267	45,971
Diverse Continuous Forest with OHVs	45,010	27,851	43,901	29,846	22,278	22,953	22,278
Forest and Shrubland Mosaic	0	143,329	22,946	45,536	57,562	54,580	35,779
Forest and Shrubland Mosaic with OHVs	0	17,159	0	0	0	0	0
Future Old Forest	18,470	9,603	23,649	8,793	13,496	16,478	26,326
Future Old Forest with Mineral Activity	0	8,867	0	10,154	10,154	10,154	28,225
Grassland and Forest Mosaic	0	0	5,334	5,334	5,334	5,334	5,334
Historic Forest	0	0	17,869	17,869	26,456	26,278	26,456
Historic Forest with OHVs	0	0	0	14,054	21,622	20,947	21,622
Research Natural Areas	117	117	117	117	117	117	117
River Corridors	8,682	8,682	12,544	12,544	12,544	12,544	12,544
Special Areas	7,546	7,546	7,546	7,546	7,546	7,546	7,546
Timbre Ridge Lake	0	0	796	796	796	796	796
Total	238,053	238,053	238,053	238,053	238,053	238,053	238,053

Table 6. Upper limits of projected outputs for management activities for the first decade.

Units of measure – acres (unless otherwise noted)	A *No Action*	B	C	D	E	E_{Mod} *Selected*	F
Vegetation Management							
Even-aged Hardwood Timber Harvest	0	5,960	1,630	1,780	1,820	1,725	1,370
Even-aged Pine Timber Harvest	0	200	200	200	200	200	200
Uneven-aged Timber Harvest	5,000	5,000	16,120	15,470	14,590	14,556	13,500
Thinning	0	0	940	1,230	1,540	1,460	970
Crop Tree Release	1,150	3,250	3,239	2,786	2,142	2,113	1,719
Grape Vine Control	1,500	3,720	4,148	3,544	2,711	2,683	2,212
Site Prep for Native Pine	200	200	200	200	200	200	200
Reforestation	500	500	500	500	500	500	500
Prescribed Fire							
Oak Regeneration	6,764	12,214	35,725	40,599	46,611	46,215	44,537
NNIS	200	200	200	200	200	200	200
Herbaceous Habitat	1,500	1,500	1,500	1,500	1,500	1,500	1,500
Hazardous Fuels	61,355	55,905	32,394	27,520	21,508	21,904	23,582
Herbicide Application							
Oak Regeneration	800	4,376	7,236	9,005	11,155	10,994	10,846
NNIS	600	600	600	600	600	600	600
Development of Permanent Forest Openings	500	500	500	500	500	500	500
Maintenance of Permanent Forest Openings and other Herbaceous Habitats (Mechanical)	5,000	5,000	5,000	5,000	5,000	5,000	5,000
Control of Non-Native Invasive Species							
Mechanical	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Biological	100	100	100	100	100	100	100
Wetland Restoration & Enhancement	150	150	150	150	150	150	150
Waterhole Construction	15	15	15	15	15	15	15
Fishing Pond/Lake Construction	15	15	15	15	15	15	15
Restoration & Improvement of Aquatic/Riparian Habitat							
Lentic	150	150	150	150	150	150	150
Lotic	20 miles	20 miles	20 miles	20 miles	20 miles	20 miles	20 miles
Installation of Bat-Friendly Gates on Mines	20-30 gates	20-30 gates	20-30 gates	20-30 gates	20-30 gates	20-30 gates	20-30 gates

Table 6. Upper limits of projected outputs for management activities for the first decade.

Units of measure – acres (unless otherwise noted)	A *No Action*	B	C	D	E	E_{Mod} *Selected*	F
Recreation Management							
OHV Trail Construction	223	223	150	187	150	150	110
Hiking Trail Construction	8.5	8.5	18	18	18	18	18
Horse Trail Construction	36	36	61	61	61	61	61
Mountain Bike Trail Construction	36	36	36	36	36	36	36
Recreation Facility Construction & Parking Lots	60	60	60	60	60	60	60
Transportation Management							
Temporary Road Construction	118	130	146	146	145	146	140
Permanent Road Construction	52	68	74	74	74	74	71
Permanent Road Reconstruction	145	223	320	317	311	318	284
Road Decommissioning	29	29	29	29	29	29	29
Skid Trails and Landings	198	441	747	739	718	740	634
Energy Minerals Management							
Surface Coal Mining Activities	1,250	1,250	1,250	1,250	1,250	1,250	1,250
Reclamation of Depleted or Orphan Wells	128 wells (70 acres)	128 wells (70 acres)	128 wells (70 acres)	128 wells (70 acres)	128 wells (70 acres)	128 wells (70 acres)	128 wells (70 acres)
Oil & Gas Well Development	234 wells (121 acres)	234 wells (121 acres)	234 wells (121 acres)	234 wells (121 acres)	234 wells (121 acres)	234 wells (121 acres)	234 wells (121 acres)
Special Uses Management							
Utility Corridor Development & Maintenance	50	50	50	50	50	50	50
Agricultural Crop Production & Grazing	50	50	50	50	50	50	50
Watershed Management							
Treatment of AMD	270	270	270	270	270	270	270
Surface Mine Reclamation	20	20	20	20	20	20	20
Closure of Open Mine Portal/Subsidence	232	232	232	232	232	232	232
Stabilization of Disturbed Areas	100	100	100	100	100	100	100
Fire Management							
Reduction of Hazardous Fuels - Mechanical	10,181	10,181	10,181	10,181	10,181	10,181	10,181
Lands Acquisition Management							
Land Acquisition	Up to 40,000 acres	Up to 40,000 acres	Up to 40,000 acres	Up to 40,000 acres	Up to 40,000 acres	Up to 40,000 acres	Up to 40,000 acres
Land Exchange	400	400	400	400	400	400	400

Species Evaluated

Regional Forester Sensitive Species

There are 23 plant and animal species on the WNF RFSS list (Table 7) Regional Forester Sensitive Species include U. S. Fish and Wildlife Service candidate species, species delisted by the U. S. Fish and Wildlife Service in the last five years, and species with The Nature Conservancy's Global, Trinomial, or National Ranks of G1-G3, T1-T3 or N1-N3 documented within the WNF proclamation boundary. All RFSS are considered in this Biological Evaluation.

Table 7. Regional Forester Sensitive Species occurring within the WNF.

Mammals	Bobcat	*Lynx rufus*
	Black Bear	*Ursus americanus*
Birds	Henslow's Sparrow	*Ammodramus henslowii*
	Cerulean Warbler	*Dendroica cerulean*
Reptiles	Timber Rattlesnake	*Crotalus horridus*
Amphibians	Eastern Hellbender	*Cryptobranchus alleganiensis*
Fish	Western Lake Chubsucker	*Erimyzon sucetta*
	Eastern Sand Darter	*Etheostoma pellucidum*
	Ohio Lamprey	*Ichthyomyzon bdellium*
Mollusks	Round Hickorynut	*Obovaria subrotunda*
	Lilliput	*Toxolasma parvus*
	Little Spectaclecase	*Villosa lienosa*
	Salamander Mussel	*Simpsonaias ambigua*
Insects	Grizzled Skipper	*Pyrgus wyandot*
Plants	Juniper Sedge	*Carex juniperorum*
	Yellowish Gentian	*Gentiana alba*
	Striped Gentian	*Gentiana villosa*
	Butternut	*Juglans cinerea*
	Umbrella Magnolia	*Magnolia tripetala*
	Blue Scorpionweed	*Phacelia ranunculacea*
	Yellow-fringed Orchid	*Platanthera ciliaris*
	Rock Skullcap	*Scutellaria saxatilis*
	Pigeon Grape	*Vitis cinerea*

Species Proposed for Regional Forester Sensitive Species Designation

There are 20 plant and animal species proposed for RFSS designation which are not currently listed as RFSS, but were recommended for listing as RFSS after risk evaluations were conducted, in accordance with (FSM 2670, Supplement 2600-2001-1) (Table 8). The formal RFSS update process is scheduled to occur in 2005. Until this process is completed, these species will be identified as species proposed for RFSS designation for the WNF. However, they will be treated as though they have the formal status of a RFSS. All species proposed for RFSS designation will be addressed in this Biological Evaluation.

Table 8. Species Proposed for RFSS Designation occurring within the WNF.

Amphibians	Blanchard's cricket frog	*Acris crepitans blanchardi*
	Four-toed salamander	*Hemidactylium scutatum*
	Green salamander	*Aneides aeneus*
	Mud salamander	*Pseudotriton montanus*
Insects	Rapids clubtail	*Gomphus viridifrons*
	Green-faced clubtail	*Gomphus quadricolor*
Mollusk	Sheepnose	*Plethobasus cyphyus*
Plants	Butterfly pea	*Clitoria mariana*
	Carolina thistle	*Cirsium carolinianum*
	Dwarf iris	*Iris verna*
	Featherbells	*Stenanthium gramineum*
	Lined sedge	*Carex striatula*
	Little headed nutrush	*Scleria oligantha*
	Marshes St. John's wort	*Triadenum tubulosum*
	Pale straw sedge	*Carex albolutescens*
	Pinxter flower	*Rhododendron nudiflorum*
	Smooth beardtongue	*Penstemon laevigatus*
	Sparse-lobed grape fern	*Botrychium biternatum*
	Tall nut rush	*Scleria triglomerata*
	Yellow crownbeard	*Verbesina occidentalis*

Overview of the Effects Analysis

This analysis of effects is programmatic in that it addresses only the effects of the alternatives, including the Selected Alternative, which includes revised Forest Plan direction (Forest-wide goals, objectives, standards and guidelines and Management Area desired future conditions, objectives, standards and guidelines) on the RFSS and species proposed for RFSS designation. In addition, the programmatic effects analysis addresses the projected management activities which could occur in the first decade of implementation of any of the alternatives; these management activities are displayed in Table 6.

All management actions proposed under the alternatives, including the Selected Alternative, would be subject to second level, site-specific analysis once they were authorized with a Record of Decision.

The projected land allocations and management activities that would occur as a result of implementing the alternatives are displayed in Table 5 and Table 6 of this Biological Evaluation. It is important to note that one aspect of an activity may have a beneficial effect on one or more species, while other aspects of the same activity could have a potentially adverse effect on one or more species. These effects will be displayed individually, and then summarized in a table at the end of each species analysis.

Because the Selected Alternative falls within the range of the previously analyzed Alternatives A-F, the effects disclosed for Alternatives A-F will be similar for Alternative E_{mod}. For all species, direct and indirect effects could occur on NFS lands or could occur off-site onto other ownerships.

Cumulative effects, as defined for the National Environmental Policy Act, are the impacts on the environment which result from the incremental impact of the action when added to other past, present, and reasonable foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions. For terrestrial species, the cumulative effects area will coincide with the WNF proclamation boundary. For aquatic species, the cumulative effects analysis area will include the 31, 5^{th} level watersheds that contain the WNF proclamation boundary. This spatial area was chosen because the direct and indirect effects associated with the alternatives are expected to be contained within this cumulative effects analysis area.

Effects on Regional Forester Sensitive Species

Analysis Process

In association with the Forest Plan revision process, the Forest Service undertook a review of its RFSS list. Based on risk evaluations that were completed, as required in FSM 2670, Supplement 2600-2001-1, six species will be dropped from the RFSS list. Viability of these species would not be affected by the alternatives either because (1) the species population levels are increasing to the point where taxonomic experts do not consider them to be at-risk of losing viability within the planning area; or (2) the species is not present within the planning area. These six species will not be addressed further in this analysis.

- **River Otter** – This species is a conservation success story. It was reintroduced into certain watersheds in Ohio, including the Little Muskingum River, in the 1980s-1990s. Population levels have increased to the point where the Ohio Division of Wildlife has removed it from state threatened and endangered status and has given it furbearer status. Trapping is allowed in certain areas of Ohio with a special beaver/otter permit.
- **Evening Bat** – This species has not been found in the WNF for almost 25 years, despite much effort to locate it (i.e., surveys conducted in 1997, 1998, 1999, 2000, 2003, and 2004). The WNF is located on the northern edge of its range. Efforts to document its occurrence within the planning area will continue, and if it is located, a risk evaluation will be conducted to see whether it should have RFSS status.
- **Olympia Marble** – The Olympia marble has been extirpated from the State of Ohio (D. Parshall, pers. comm.). It is doing well in Michigan and eastern West Virginia, but the taxonomic experts consider the WNF a fringe zone for this species. Efforts to document its occurrence within the planning area will continue, and if it is located, a risk evaluation will be conducted to see whether it should have RFSS status.
- **Wabash River Cruiser** – This dragonfly does not occur within the planning area. There is some debate whether it may be a hybrid of the royal river cruiser (*M. taeniolata*) and the gilded river cruiser (*M. pacifica*) (Garrison 1995 in Glotzhober and McShaffrey 2002). Efforts to document its occurrence within the planning area will continue, and if it is located, a risk evaluation will be conducted to see whether it should have RFSS status.
- **Philadelphia Panic Grass** – The one record from the WNF was stored at the state herbarium and was reviewed by taxonomic

experts (Jim McCormac, Ohio Division of Wildlife and Rick Gardner, Ohio Division of Natural Areas and Preserves). The WNF record is a misidentification and is likely gattinger panic grass (*Panicum gattingeri*). According to these experts, Philadelphia panic grass is not likely to occur in the planning area.

- **Bicknell's Panic Grass** – The taxonomy of this species has been controversial, resulting in a variety of synonymous names (i.e., *Dicanthelium boreale*, *Panicum boreale* and *Panicum bicknelli*). The most recent publications have grouped *D. bicknelli* with *D. boreale* (Freckman and Lelong, 2003) causing the listing of Bicknell's panic grass as a RFSS to undergo review on the Forest. Ohio Department of Natural Resources botanists (J. McCormac and R. Gardner) both advised dropping this species from the WNF RFSS list since it is no longer recognized as a species by other states. Bicknell's panic grass will be removed from the Ohio state rare plant list during the next update (R. Gardner pers. comm.).

Twenty-three plant and animal species remain on the RFSS list. The effects of the alternatives on the species were evaluated using information collected from currently accepted and applicable scientific literature, other scientific sources, from taxonomic experts, and with professional judgment of Forest Service biologists. The Biological Evaluation provides two assessments of impacts to the species, (a) habitat outcomes and (b) determination of effects.

Habitat Outcomes

The habitat outcome (also known as viability outcome in the species viability evaluations) was determined for historic, current and likely future environmental conditions for RFSS on NFS lands and on all lands in the cumulative effects analysis area for each alternative (Table 10 and Table 11). The habitat outcome is a judgment, based on scientific information found in the literature and from discussion with taxonomic experts. It should be thought of as an index of the capability of the environment to support population abundance and distribution of RFSS, but not as an actual prediction of population occurrence, size, density or other demographic characteristics (T. Schenck. pers. comm.).

The current and likely future habitat outcomes for RFSS were determined for each alternative. "Future" is defined as decades 2, 5, and 10 of the revised Forest Plan implementation. Analysis focused on the risk factors pertinent to the species within the planning area and within the control of the Forest Service. The assessment of future habitat conditions, distribution and quality were based on the knowledge of the species distributional range and life history. For example, some of these species occur naturally in a localized or patchy distribution, and would not occur in the conditions described in habitat outcomes A-C because their natural

condition may be D or E. A judgment of historical environmental conditions provides a reference or context within which to evaluate the impacts to evaluate the impacts of the alternatives.

The majority of RFSS were included in the species viability evaluation process. This process is summarized in Appendix E of the Final EIS. The process included exhaustive literature searches to compile information about these species life histories, occurrences, population and habitat trends, and threats to viability. Taxonomic experts provided additional information about the species, including general information about the effects of management activities on individual or groups of species. The historical, current and future habitat outcomes were determined by the Forest Service after review of data and discussions with taxonomic experts. Some habitat outcomes were changed from that which was displayed in the Species Data Collection Forms (i.e., a product of the species viability evaluations process) because additional information had been acquired after the evaluations were completed. For RFSS not included in the species viability evaluation process, habitat outcomes were determined by the Forest Service after review of conservation assessments and discussions with taxonomic experts.

Judgments of habitat outcomes within the cumulative effects analysis area is displayed for each species by alternative. There has likely been a reduction in the species historical range in the cumulative effects analysis area, except for some species which occur in localized or patchy distributions.

For many species, in general, cumulative and direct/indirect effects are similar. Since historical times, similar types of disturbances and management practices have occurred in the cumulative effects analysis area as have occurred on NFS lands.

Table 10. Definition of habitat outcomes used to estimate current and likely future conditions for RFSS on NFS lands.

Habitat Outcome	Definition
A	Suitable ecological conditions are broadly distributed and of high abundance across the historical range of the species within the planning area. The combination of distribution and abundance of ecological conditions provides opportunity for continuous or nearly continuous intraspecific interactions for the species.
B	Suitable ecological conditions are either broadly distributed or of high abundance across the historical range of the species within the planning area, but there are gaps where suitable ecological conditions are absent or only present in low abundance. However, the disjunct areas of suitable ecological conditions are typically large enough and close enough to permit dispersal among subpopulations and potentially to allow the species to interact as a metapopulation across its historical range within the planning area.
C	Suitable ecological conditions are distributed frequently as patches and/or exist at low abundance. Gaps where suitable ecological conditions are either absent, or present in low abundance, are large enough that some subpopulations are isolated, limiting opportunity for species interactions. There is opportunity for subpopulations in most of the species range to interact as a metapopulation, but some subpopulations are so disjunct or of such low density that they are essentially isolated from other populations. For species for which this is not the historical condition, reduction in overall species range from historical within the planning area may have resulted from this isolation.
D	Suitable ecological conditions are frequently isolated and/or exist at very low abundance. While some of the subpopulations associated with these ecological conditions may be self-sustaining, there is limited opportunity for population interactions among many of the suitable environmental patches. For species for which this is not the historical condition within the planning area, reduction in overall species range from historical condition within the planning area may have resulted from this isolation.
E	Suitable ecological conditions are highly isolated and exist at very low abundance, with little or no possibility of population interactions among suitable environmental patches, resulting in strong potential for extirpations within many of the patches, and little likelihood of re-colonization of such patches. There has likely been a reduction in overall species range from historical within the planning area, except for some rare, local endemics that may have persisted in this condition since the historical period.

Table 11. Definition of habitat outcomes used to estimate current and likely future conditions for RFSS in the cumulative effects analysis area.

Habitat Outcome	Definition
A	The combination of environmental and population conditions provides opportunity for the species to be broadly distributed and of high abundance across its historical range within the cumulative effects analysis area. There is potential for continuous or nearly continuous intraspecific interactions at high population size.
B	The combination of environmental and population conditions provide opportunity for the species to be broadly distributed and/or of high abundance across its historical range within the cumulative effects analysis area, but there are gaps where populations are potentially absent or present only in low density as a result of environmental or population conditions. However, the disjunct areas of higher potential population density are typically large enough and close enough to other subpopulations to permit dispersal among subpopulations and potentially to allow the species to interact as a metapopulation across its historical range within the cumulative effects analysis area.
C	The combination of environmental and population conditions restrict the potential distribution of the species, which is characterized by patchiness and/or areas of low abundance. Gaps where the likelihood of population occurrence is low or zero are large enough that some subpopulations are isolated, limiting opportunity for species interactions. There is opportunity for subpopulations in most of the species range to interact as a metapopulation, but some subpopulations are so disjunct or of such low density that they are essentially isolated from other populations. For species for which this is not the historical condition within the planning area, reduction in overall species range from historical condition may have resulted from this isolation.
D	The combination of environmental and population conditions restrict the potential distribution of the species, which is characterized by areas with high potential for population isolation and/or very low potential abundance. While some of these subpopulations may be self-sustaining, gaps where the likelihood of population occurrence is low or zero are large enough that there is limited opportunity for interactions among them. For species for which there is not the historical condition within the planning area, reduction in overall species range from historical has likely resulted from this isolation.
E	The combination of environmental and population conditions restricts the potential distribution of the species, which is characterized by high levels of isolation and very low potential abundance. Gaps where the likelihood of population occurrence is low or zero are large enough there is little or no possibility of interactions, strong potential for extirpations, and little likelihood of recolonization. There has likely been a reduction in overall species range from historical within the planning area, except for some rare, local endemics that may have persisted in this condition since the historical period.

Determination of Effect

This analysis of effects is programmatic in that it addresses only the effects of Forest-wide goals, objectives, standards and guidelines and Management Area desired future conditions, objectives, standards and guidelines, and variations in land allocations and management activities among the alternatives, on the RFSS. All management actions proposed under the alternatives would be subject to second level, site-specific analysis once they were authorized with a Record of Decision.

The projected land allocations and management activities that would occur as a result of implementing any of the alternatives are displayed in Table 5 and Table 6 of this Biological Evaluation (near the beginning of this document). It is important to note that one aspect of an activity may have a beneficial impact, while other aspects of the same activity may have a potentially negative impact. These effects will be summarized in a table at the end of the analysis.

Judgments of the determination of effects of the alternatives on RFSS are expressed as "likelihoods" or "risk" because of uncertainty inherent in evaluating future scenarios and because the environmental conditions of many RFSS are not often well understood.

Conservation Measures Common to all Alternatives

All alternatives include a Forest-wide Goal (5.2) that states, "Promote conservation activities that protect, restore, or enhance habitat for RFSS." In addition, all alternatives incorporate Forest-wide standards and guidelines to ensure the protection and sustained viability of any RFSS on NFS lands. These include:

- **(TES-32) –** Protect and improve occupied Regional Forester sensitive species habitat.
- **(TES-33) –** Do not conduct vegetation management within a 50-foot radius of rock shelters and within 50 feet of the base and 50 feet of the top (measured horizontally) of naturally occurring, large rock faces or outcrops, unless designed to enhance the site characteristics for a Federally listed species or a known population of RFSS. Large rock faces or outcrops are defined as rock outcrop areas 15 feet or more in height and 100 feet or more in length. These rock outcrop habitats are not limited to solid "cliffs" and may include discontinuous rock faces, if the outcrop area is predominantly rock faces.
- **(TES-34) –** Avoid vegetation management within 50 feet of the base and 50 feet of the top of smaller rock faces (approximately 15 feet or more in height and less than 100 feet in length).

- **(TES-35) –** Do not permit collection of Regional Forester sensitive plant or animal species, except for scientific or educational purposes. Require a permit for such collecting.
- **(TES-36) –** Localized removal of vegetation to reduce woody encroachment (e.g., mowing, brush removal in the understory, selective thinning of the overstory, grazing) may be used to maintain or improve habitat for RFSS.
- **(Revised Forest Plan, Appendix D) –** Maintain a RFSS list, per Regional policy direction. Coordinate and cooperate with experts from other agencies, universities and organizations to conserve, protect, and monitor populations and habitats of Regional Forester sensitive species

Affected Environment

Habitat and behavior information, occurrences in the planning area, and threats to the viability of the RFSS are identified in Table 12. A detailed description of the threats to viability for most species is contained in the Species Data Collection Forms prepared as part of the species viability evaluation process. These are found in the Forest Plan revision planning record. Threats to viability addressed in the effects analysis section are those in which the Forest Service can assert control during implementation of any of the alternatives.

Table 12. Affected environment for RFSS.

Species	Habitat	Occurrence	Threats to Viability
Black bear	Black bears can be found in a wide variety of the more heavily wooded habitats, ranging from swamps and wetlands to dry upland hardwood and coniferous forests. Although they will utilize open areas, bears prefer wooded cover with a dense understory. Winter den sites include dense thickets, hollow logs, tree or rock cavities, and caves.	Forest-wide (bear sightings have been steadily increasing since the mid-1980s, and evidence suggests Ohio may support a small breeding population)	Locally threatened by habitat loss and interference by humans (NatureServe, 2004).
Blue Scorpionweed	Blue scorpionweed can be found in sunny or semi-shaded areas in a variety of moist or well-drained woods and thickets (Spooner, 1985). The species occurs on the WNF in several habitats: sandy soil in a riparian area adjacent to a stream in partial shade (ODNR, 2003a), south-facing, semi-shaded upland slopes (McCartney and Goodwin, 2003a), and open, sunny floodplains. The species occurs in areas with, and appears to favorable respond to, disturbance from flooding and prescribed fire (J. Dumke, pers. comm.).	Handley Branch Special Area, Ironton Ranger District. A second population has been found in Lawrence County, outside the Handley Branch Special Area.	Direct loss of occupied habitat; decline in habitat suitability resulting from introduction of non-native invasive species (McCartney and Goodwin, 2003a).

Table 12. Affected environment for RFSS.

Species	Habitat	Occurrence	Threats to Viability
Bobcat	Bobcats may be found in a wide variety of habitats ranging from lowland swamps to partially forested mountainous areas; understory density can vary from open areas such as a stand of pines to more dense areas of growth like a regenerating clearcut area. Den sites include caves/mines, rocky outcrops, hollow trees and logs.	Forest-wide (48 unverified sightings state-wide in 2002). Verified sightings in Lawrence County in 2004 and 2005.	Conversion of habitat to commercial, residential, or agricultural uses (NatureServe, 2004).
Butternut	Typical habitat for butternut is mesic ravine slopes of mixed hardwood stands, creek bottoms, and riverbanks.	All counties within WNF proclamation boundaries.	Butternut canker, loss of canker-resistant reproductive individuals.
Cerulean warbler	Cerulean warblers are described as using riparian forests, lowland forests, bottomland forests, floodplain forests, and forested wetlands (Burhans et al., 2002). Other habitat descriptions include mature deciduous forest, mesic forest, or floodplain with a closed or semi-open canopy (Rosenburg et al., 2000) and predominantly forested landscapes, mature forest, large and tall trees of broad-leaved, deciduous species with an open understory; in wet bottoms, or upland situations including mesic slopes, and mountains from <100 to >3,280 feet elevation (Hamel, 2000). Cerulean warblers have been associated with dry oak-hickory woodlands, mesophytic forests, and wet beech-maple woodlands in Ohio (Peterjohn and Rice, 1991). The species also will use second-growth forest previously cleared for agriculture (Oliarnyk, 1996 in Hamel, 2000). Research of mature forests in southeastern Ohio showed that cerulean warblers were associated with dry, steep areas such as hillsides and ridges (Dettmers and Bart, 1999).	Forest-wide	Loss of mature interior forest habitat (Ewing, 2003a)
Eastern hellbender	Hellbenders are habitat specialists, restricted to clean, cool, relatively-shallow streams with many large rocks scattered on the bottom with substrates of sand and gravel (Bishop, 1943, Hillis and Bellis, 1971, Nickerson and Mays, 1973, Taber et al., 1975, Williams et al., 1981). They are usually found in smaller rivers and large streams, in water about 0.5 to 2 m deep (Petranka, 1998). Lotic systems that have areas of moderate to fast-flowing rapids are ideal for these salamanders (Hulse et al., 2001). Hellbenders depend on highly vascularized skin folds for gas exchange (Ultsch et al., 1990), which limits them to well-oxygenated aquatic systems with cool to cold water and high flow.	Little Muskingum River	Degradation of water quality and aquatic habitat (Johnson, 2003a; Mayasich and Phillips, 2003).

Table 12. Affected environment for RFSS.

Species	Habitat	Occurrence	Threats to Viability
Eastern sand darter	The eastern sand darter is often associated with clean sandy bottoms of streams and rivers and sandy shoals in lakes (Smith, 1985, Holm and Mandrak, 1996).	Little Muskingum River, Symmes Creek	Degradation of water quality and aquatic habitat (Wu, 2003a).
Grizzled Skipper	Openings in the forest with populations of the host plant, Canada cinquefoil, such as pipelines, power cuts, clear-cuts, open barrens/glades of all types, and even areas adjacent to woods and roadsides (Parshall, 2002). South facing slopes and ridges are more likely to be dry, and are suitable sites for the skipper.	Athens Unit (Dorr Run area) – only known site in Ohio	Habitat destruction; decline in habitat quality due to over-shading; prescribed fire; insecticides used to treat gypsy moth infected areas (Parshall, 2002).
Henslow's sparrow	In addition to prairie, Henslow's sparrows use secondary grasslands such as hayfields and pastures (Smith and Smith, 1992). It requires grasslands with tall, dense grass; a good layer of litter and dead components; and fairly long intervals between burning and grazing. Reclaimed coalmines, such as those in Ohio and Indiana, provide additional habitat (Bajema et al., 2001; USFWS, 1998).	Reclaimed surface mine areas and some hayfields on the Athens Unit and the Ironton Ranger District	Encroachment of woody vegetation through natural succession in occupied areas; improper maintenance of grassland habitat (Ewing, 2003b).
Juniper sedge	The Lawrence County population was found growing on a ridge top with a closed canopy dominated by oak (ODNR, 2003b) and with underlying clay soils in 1995 (McCartney and Goodwin 2003b). The Athens County population was found growing in an oak-hickory forest surrounding a prairie opening with an underlying clay lens in 2002 (ODNR, 2003b). The WNF populations are limited by shade and presence of alkaline, clay soils (SVE Sedges Panel, 2003). Habitat structure with full sunlight conditions is preferred by *C. juniperorum*. However, it can tolerate fair amounts of shade as large plants have been observed growing in dense cedar stands (Gardner, pers. comm.), although these represent relic populations (McCartney and Goodwin, 2003b). Unpublished monitoring data suggests this species responds favorably to burns (R. Gardner, pers. comm.).	Isolated locations on Athens Unit and Ironton Ranger District	Direct loss of occupied habitat; decline in habitat suitability resulting from encroachment of woody vegetation through natural succession in occupied areas, fire suppression, or introduction of non-native invasive species (McCartney and Goodwin 2003b).
Lilliput	This species is most commonly found in shallow water in lentic environments in mud, sand or fine gravel. This species is probably a long-term brooder (bradytictic). Gravid females have been have been observed May-July (Roe, 2002a). Potential host fishes include *Lepomis cyanellus* and *L. gulosus*; other centrarchids have been also implicated as hosts (Roe, 2002a).	Symmes Creek (upper area of watershed), Hocking River	Degradation of water quality and aquatic habitat (Roe, 2002a).
Little spectaclecase	The little spectaclecase is typically found in slower currents of shallow sand/mud bottom of small creeks to medium-size rivers.	Symmes Creek, Pine Creek	Degradation of water quality and aquatic habitat (Wu, 2003b).

Table 12. Affected environment for RFSS.

Species	Habitat	Occurrence	Threats to Viability
Ohio lamprey	Ohio lampreys spawn in the spring, usually in the first or second week of May, in Ohio. They move upstream into moderate sized tributaries, where they build nests in sand and gravel areas near riffles. After spawning, the adults die (Rice and Michael, 2001).	Little Muskingum River	Degradation of water quality and aquatic habitat (Wu, 2003c).
Pigeon grape	The pigeon grape typically grows in moist alluvial soil (Gleason and Cronquist, 1991); floodplains forests (Oklahoma University, 2003), and in rich, low thickets, bottoms, and banks of streams in semi-shade or no shade (Plants For a Future, 1997-2000). It occurs in moist situations, often in alluvial soils (Burns, 1982).	Pine Creek on the Ironton Ranger District	Direct loss of occupied habitat (felling of host trees); direct loss of individuals through cattle grazing in riparian areas; decline in habitat suitability resulting from introduction of NNIS and fire-related activities (McCartney and Swiezynski, 2003a).
Rock Skullcap	Rock skullcap tends to grow in oak-hickory forests in lowland areas, ridge tops and slopes, and along streams and trails and it has also been found growing in hemlock stands interspersed with hardwoods (McCartney and Goodwin, 2003c). Partially open canopy forests with sparse understory are the preferred habitat for this species. It is known to occur in dry woods, but occasionally is found in moist areas along streams (Spooner, 1983).	One isolated population on Marietta Unit and various woodland locations in Gallia and Lawrence counties on the Ironton Ranger District	Direct loss of occupied habitat; decline in habitat suitability resulting from removal of canopy, prescribed fire, or introduction of non-native invasive species (McCartney and Goodwin, 2003c).
Round hickorynut	This species is typically found in medium to large sized rivers in gravel substrates of moderate current at depths of up to two meters (Gordon and Layzer, 1989). This species is bradytictic. Females are gravid from September to June. No host fishes have been determined for this species (Roe, 2002b).	Little Muskingum River, Little Scioto River, Pine Creek, Symmes Creek, Hocking River	Degradation of water quality and aquatic habitat (Roe, 2002b).
Salamander mussel	The salamander mussel prefers sand and silt substrates under flat rocks, which is also a preferred habitat for its host, the mudpuppy (Roe, 2002c). It may also be found under other similar objects in streams, or on mud or gravel bars (Cummings and Mayer, 1992; Watters, 1995). It generally inhabits medium to large rivers (Cummings and Mayer, 1992).	Little Muskingum River, Symmes Creek	Degradation of water quality and aquatic habitat (Ewing, 2003c).
Striped Gentian	Striped gentian tends to grow in mesic woodlands, pinelands, dry ravines and roadsides (Andreas, 1984). This gentian has also been associated with dry upland woods (Radford et al., 1968). One population was found in an oak barren/wildlife opening on the WNF.	Ironton Ranger District	Direct loss of occupied habitat; decline in habitat suitability resulting from encroachment of woody vegetation through natural succession in occupied areas, fire suppression, or introduction of non-native invasive species (McCartney and Goodwin, 2003d).

Table 12. Affected environment for RFSS.

Species	Habitat	Occurrence	Threats to Viability
Timber rattlesnake	Dens are underground crevices usually found in rocky areas (Brown, 1993). Gravid females bask on rocks in close proximity to the den (Reinert, 1984). Summer habitat is described as "lightly wooded clearings and oak-hickory knolls usually containing boulders, rock slabs, and outcrop fissures."	Limited numbers occur in Adams, Athens, Hocking, Jackson, Pike, Ross, Scioto, and Vinton counties (ODNR, 2003c), Lawrence County (Ewing, 2003d)	Disturbance of den sites; decline of habitat quality around dens and basking areas and within foraging areas; human disturbance (Ewing, 2003d).
Umbrella Magnolia	Umbrella magnolia tends to grow in wet woods and margins of swamps (Gleason and Cronquist, 1991). It prefers rich, moist, well-drained soils, often along creeks, in partial to full-shade (Floridata, 2000). It grows well in acidic soils (Floridata, 2000) and requires an overstory canopy that protects it from full sun (Schneider, 1994).	Mesic shaded ravines and coves on the Athens Unit and Ironton Ranger District	Direct loss of occupied habitat; decline in habitat suitability resulting from removal of canopy, or introduction of non-native invasive species (McCartney and Swiezynski, 2003b).
Western lake chubsucker	This species tends to inhabit lakes and large, low gradient, vegetated streams. This species requires high quality habitat including clean sand, marl and organic debris substrate, submerged aquatic vegetation, and clear waters usually in natural lakes and slow-water sections of large streams.	Symmes Creek (upper area of watershed)	Degradation of water quality and aquatic habitat (Wu, 2003d).
Yellow Fringed Orchid	Yellow fringed orchid prefers sunny, wet situations in acidic, often sandy substrates (Cusick and Burns, 1983). This orchid occurs in pastures, wet fields, seepage areas, roadbanks and ditches. It also inhabits bogs, swamps, marshes, wet sandy barrens, thickets bordering streams or ponds. Southern Ohio populations are known from a mixed hardwood-pine association (Cusick and Burns, 1983)	Two populations on Marietta Unit	Direct loss of occupied habitat; decline in habitat quality resulting from encroachment of woody vegetation through natural succession in occupied areas or introduction of non-native invasive species (McCartney and Swiezynski, 2003c).
Yellow gentian	The historic distribution of yellow gentian possibly followed the distribution of little and big bluestem prairies throughout the Prairie Peninsula, which extended into various locations within the Unglaciated Plateau of southeastern Ohio. The gentian seems to prefer open, prairie-like habitat patches with calcareous soils. Both populations within Athens County are adjacent to oak-hickory woods, which likely indicate that the prairie patches are remnant ecosystems that are being threatened by reforestation.	Two isolated occurrences on the Athens Unit	Direct loss of occupied habitat; decline in habitat suitability resulting from encroachment of woody vegetation through natural succession in occupied areas, fire suppression, or introduction of non-native invasive species (Larson, 2003).

Direct, Indirect, and Cumulative Effects

Aquatic Species

- Eastern hellbender
- Eastern sand darter
- Lilliput
- Little spectaclecase
- Ohio lamprey
- Round hickorynut
- Salamander mussel
- Western lake chubsucker

Activities with No Impact

Some activities projected to occur during the first decade would have no effect on these species or their suitable habitat. These activities are not ground disturbing and would not pose a threat to increased sedimentation or changes in water quality.

- Crop tree release and grape vine control involving the manual treatment of individual vines and girdling or felling of individual trees
- Development and maintenance of permanent forest openings using mechanical methods (e.g., mowing, chainsaw work)
- Control or eradication on non-native invasive species using mechanical methods (e.g., brushing, mowing) or biological methods
- Restoration and improvement of ponds and lakes (e.g., placing underwater habitat structures)
- Herbicide application (i.e., spot treatment)
- Installation of bat-friendly gates

Activities with Beneficial Effects

National Forest activities which protect and improve stream habitat and water quality would benefit these species.

The RC Management Area was established to emphasize the retention, restoration, and enhancement of the inherent ecological processes and functions associated with riverine systems. All alternatives allocate NFS lands to the RC Management Area along Symmes Creek, the Hocking

River, and the Little Muskingum River; however, Alternatives C, D, E, E_{mod}, and F also allocate lands along the Ohio River for the RC Management Area.

Each alternative incorporates Forest-wide goals (2.1 and 3.1) and objectives (2.1a-c, 3.1a-d) which promote the restoration and improvement of riparian and watershed health. Each alternative also includes numerous Forest-wide standards and guidelines that protect aquatic resources from potential sources of non-point source pollution. Beneficial management activities that are projected to occur during the first decade of implementation of the alternatives include:

- 500 acres of reforestation
- 150 acres of wetland restoration
- 20 miles of stream restoration and improvement
- 10 miles of road decommissioning
- reclamation of 128 orphan or depleted oil and gas wells (70 acres)
- treatment of 180 abandoned mine land features that contribute to acid mine drainage conditions (270 acres)
- closure of 155 open mine features that contribute to acid mine drainage conditions (232 acres)
- 20 acres of surface mine reclamation
- stabilization of 100 acres of disturbed areas
- land acquisition of up to 40,000 acres

Activities that May Impact Individuals but are Not Likely to Cause a Trend toward Federal Listing or Loss of Viability

Established Forest-wide standards and guidelines minimize the scale of the potential impact to a point where changes to water quality would not likely be detected.

- **Timber harvesting** (i.e., all methods) involves the felling of trees, removal of trees to a landing, and transport off-site. Mechanical reduction of hazardous fuels may involve the dragging of trees and limbs across the ground. The act of dragging trees to the landing could result in some soil disturbance, but filterstrips minimize the potential for sediment introduction into streams (ARR-5 and 6). If any soil was to enter a stream during the removal of trees, it would likely be minimal and undetectable in mainstem habitats, even in those alternatives with higher harvest rates.
- **Site prep for native pine** - when regenerating native pine, the forest floor must be opened to full sunlight and soil must be

exposed so that native pine seeds can germinate and survive. In most cases, soil disturbances from logging or removal of leaf litter during prescribed fire will be enough to allow seeds to contact soil. However, in certain sites, it may be necessary to scarify the soil (site prep) to facilitate the appropriate environment for seed germination. The objective is to create small, scattered patches of exposed soil, but ground cover would remain on 75 percent or more of the treatment area. Filterstrips would minimize the potential for sediment introduction into streams from such activities (ARR-5 and 6).

- The **construction of firelines** using bulldozers for prescribed fire activities could result in soil disturbance, whereas firelines constructed by hand only affect the litter layer. The Forest Service attempts to use existing roads and fire breaks to avoid constructing fire line (FIRE-7). Furthermore, action would be taken to minimize the potential for sediment movement into streams (FIRE-12 and 13). If any soil were to enter the stream as a result of fireline construction, the amount would likely be minimal and undetectable in mainstem habitats.
- Surface erosion in relation to forest **roads/trails** is dependant on soils, road surfacing, road grade, and age of the road, traffic volumes, and the effectiveness and spacing of drainage structures. Proper design and placement of drainage structures are critical to minimizing the amount of surface flow and surface erosion.

  Road surfacing, maintenance and grade play a role in surface erosion. Some roads are surfaced with limestone aggregate or native material. When roads are not located, designed, or maintained properly to divert water from streams, aggregate or native material can move into streams during rainfall events. Movement of material into ditch lines and streams can be increased on roads with steeper grades. Grades of over 12% average slope are avoided unless there are stringent erosion control practices installed.

  Sediment delivery to streams may be higher during and just after construction, but raw ditch lines and road surfaces with little binder can also remain chronic sources of sediment. High volumes of traffic on roads with aggregate and native material have a greater affect on the integrity of the road and surfacing than it does on asphalt-surfaced roads.

  Road-stream or trail-stream crossings can accelerate inputs of sediment. Use of native materials or aggregate that contain sand or materials smaller than ½ inch in size for road surfaces can degrade channels by filling in pools downstream of crossings. This generally occurs where the road slope approaching the channel is

steep. Surface erosion can occur on roads/trails that are located in the floodplain of streams, specifically with roads/trails surfaced with native materials or aggregate. Floodwaters can wash over the road/trail surface and carry material into the stream.

The amount of area that could potentially be disturbed by permanent and temporary roads and from trails varies among the alternatives. The least amount of area would be disturbed in Alternative A (816 acres), whereas Alternative D would have the highest road and trail disturbance (1,578 acres). These roads and trails would be spread out across the landscape, rather than concentrated in one watershed. Forest-wide standards and guidelines are incorporated in all alternatives to reduce the effects of roads on aquatic systems (i.e., filterstrips, stream crossings). The WNF, in all new construction and re-construction, is meeting or exceeding best management practices and professional engineering practices to reduce any effect the road system may have on soil transport (USDA Forest Service, 2003). Based on this, it is likely some sediment will enter the stream systems from roads and trails (i.e., more in Alternative D, less in Alternative A); however the amount is not expected to alter existing water quality or the composition of stream substrates.

- **Oil and gas activities** have the potential to affect water quality as a result of soil disturbance and subsequent sedimentation. Effects are generally short-lived; revegetation of areas disturbed during the construction of the access road and well pad reduces the potential for soil erosion. Established Forest-wide standards and guidelines can mitigate the effects of oil and gas exploration and development (i.e., filterstrips, stream crossings, stabilizing disturbed areas, NSO on steep slopes). Controlled surface use is allowed in riparian areas and floodplains. In these cases, roads, well pads, tank batteries may be allowed in riparian areas or floodplains when placement of such facilities in adjacent upland areas would cause long-term effects to other resources (e.g., TES species, cultural site).

  For reserved and outstanding rights oil and gas wells, operators must follow state regulations which include best management practices for protecting aquatic resources.

  Brine or oil spills could occur during oil and gas well operations, although they are rare. The operator is required to construct berms around the wells to contain any oil leaks. The brine is required to be removed by tank truck. Forest-wide standards and guidelines require the installation of control valves on all pipelines crossing streams so that supply and flow of oil and gas can be shut down immediately upon detection of a leak.

All alternatives project up to 121 acres could be disturbed from oil and gas well development. Some sediment could enter the stream systems; however the amount is not expected to alter existing water quality or the composition of stream substrates.

- **Surface coal mines** could alter surface and subsurface hydrology, and subsequently degrade existing stream habitat. Approximately 1,250 acres of NFS land could be affected by surface mining in the future. The Forest Service has no control over this projected activity since private mineral rights are involved in these possible activities. However at a minimum, the operator would need to follow state regulations associated with protection of aquatic resources.
- Nutrient enrichment of localized stream reaches could occur as a result of **grazing allotments**. However, surface runoff from such operations would need to flow through filterstrips, which are designed to decrease nutrient loading of streams.
- Construction of **utility corridors**, specifically those which contain buried transmission lines, causes ground disturbance. Forest-wide standards and guidelines for stream crossings for pipelines (ARR-13 to ARR-17), and filterstrips (ARR-5 and 6) would minimize the potential for sediment introduction into streams.
- Up to 400 acres of **land exchange** could occur in the first decade of the plan. Land exchange can be beneficial (e.g., acquiring frontage along occupied habitat). The exchange could be negative if degradation of aquatic or riparian habitat occurred after the tract was in private ownership. But, there is no certainty in how the landowner would mange the land after it is exchanged out of federal ownership.

Summary of Direct and Indirect Effects

Potential direct and indirect effects on aquatic RFSS from the alternatives would likely be short-lived and small in scale, and could be mitigated with the use of established Forest-wide standards and guidelines. In some cases (i.e., reserved or outstanding oil and gas wells, or surface mining), other state and federal regulations provide added mitigation measures for potential impacts to aquatic systems.

In all cases, the likelihood is very low that the alternatives and the associated management activities projected to occur in the first decade could affect habitat suitability on NFS lands to the point where habitat outcomes would be decreased (Table 13– found at the end of the RFSS section). Forest-wide standards and guidelines are incorporated into all alternatives to minimize the potential for such activities to degrade water quality or aquatic habitat.

The historic and current habitat outcomes for all aquatic species demonstrate that these species were not and are not naturally widespread in distribution across the cumulative effects analysis area (Table 14).

- The Ohio lamprey, hellbender, and western lake chubsucker are limited in distribution to one watershed, or even certain parts of one watershed. Their microhabitat requirements have not been identified in any other watersheds in the planning area, so therefore it is unlikely they could expand their distributions with or without implementing any of the alternatives.
- The little spectaclecase mussel is a species associated with the pre-glacial Teays River drainage, and therefore its historic and current distributions are restricted to the Pine Creek and Symmes Creek watersheds on the Ironton Ranger District.
- Based on their habitat requirements and likely conditions historically, the eastern sand darter, round hickorynut, salamander mussel and lilliput likely had the widest distribution in the planning area historically, compared to other Regional Forester aquatic sensitive species. Today they are located in specific sections of at least two watersheds, but their potential distribution could be limited from other watersheds by water quality and aquatic habitat degradation that has resulted from past mining activities.

It is possible that efforts to restore mining-degraded aquatic systems on the Athens Unit and the Ironton Ranger District could result in the recolonization of currently uninhabitable sections of watersheds on these units by the eastern sand darter, round hickorynut, lilliput, or salamander mussel. Recovery of streams affected by acid mine drainage takes a very long time, therefore any potential for improved habitat outcomes for these species were not expected to occur until the tenth decade of the implementation of the alternatives.

Cumulative Effects

Water quality and aquatic habitat have improved in certain watersheds in recent years, as evidenced by the mileage of streams that are attaining Ohio EPA's use designations. However, some streams remain impacted by past mining activities (i.e., primarily watersheds on the Athens Unit, but some streams in the Pine Creek watershed on the Ironton Ranger District), and from non-point source pollution (USDA Forest Service, 2001; 2002).

A minimal amount of timber harvesting occurs on private lands, but these activities are generally small in size and are scattered across the watershed rather than being concentrated in one area. This trend is likely to continue in the future. An evaluation of logging best management practices on private lands indicated that best management practices were employed in

at least 80% of all timber harvests and 95% of these best management practices were rated effective at minimizing sedimentation of streams (McClenahen et al., 1999).

Oil and gas well development on private lands may increase from present levels, based on a reasonably foreseeable future development scenario for federal lands. Operators are required to follow state regulations, which include best management practices for controlling erosion and minimizing impacts from potential spills.

Township and county governments are likely to continue maintaining existing roads, depending on funding. Maintenance primarily targets human safety, with environmental conditions secondary in concern. Some of the roads and road-stream crossings under these jurisdictions may continue to contribute to sedimentation or aquatic habitat modifications in the future.

Efforts by the Forest Service, other state and federal agencies, conservation organizations, and private landowners continue to result in improved water quality conditions within the planning area. The added impact of Forest Service activities on NFS lands could have a minimal adverse effect on water quality and sedimentation of habitats, but mitigation measures incorporated into each alternative would reduce the cumulative impact to the point where it is unlikely habitat outcomes would change in the cumulative effects analysis area with implementation of any alternative, in the short-term or in the long-term (Table 14).

Determination of Effect

Though the probability is low, each alternative may impact individuals, but no alternative is likely to cause a trend toward federal listing or loss of viability of any aquatic RFSS (Table 15).

Black Bear and Bobcat

Activities with No Impact

Of the management activities projected to occur during the first decade, the following are not likely to impact the black bear and bobcat. Some of these activities remain the same across the alternatives, while others may vary. None pose any threat to loss or conversion of forest habitat used by these species.

- Herbicide application
- Grazing or hayfield allotments (these occur on existing agricultural land)
- Stabilization of disturbed areas

- Control of non-native invasive species with herbicides, biological, or mechanical means
- Restoration of aquatic habitat (lentic)

Activities with Beneficial Effects

Each alternative incorporates a variety of management prescriptions that can create a diversity of habitats favorable to these species. In addition, some NFS lands are incorporated into the FOF and FOFM MAs and would provide habitat that is relatively secluded from human disturbance. Alternative F has the greatest amount of NFS lands allocated to these MAs, followed by Alternatives $E_{mod} \rightarrow C$ and $E \rightarrow D \rightarrow A$ and B.

The following management activities are projected to occur in the first decade and would result in beneficial improvements to forest habitat for the black bear and bobcat. These activities improve habitat quality of feeding and drinking sources, both in the short-term and for the long-term. Some of these activities may vary in amount among the alternatives, while others would not.

- Crop tree release
- Grape vine control
- Site prep for native pine
- Reforestation
- Development and maintenance of permanent forest openings
- Wetland restoration and enhancement
- Waterhole construction
- Fishing pond/lake construction
- Restoration of lotic aquatic habitat
- Road decommissioning
- Reclamation of depleted or orphan wells
- Treatment of AMD
- Surface mine reclamation
- Land acquisition

Activities that May Impact Individuals, but Not Likely to Cause a Trend toward Federal Listing or Loss of Viability on NFS Lands

There are management activities which may have the potential to disturb individuals for a short period of time and may alter the forest vegetation

structure temporarily, but the activities result in long-term improvements to bobcat and black bear habitat.

- **Timber harvesting** (all kinds) would alter the vegetation structure, providing small (uneven-aged management) to larger areas (even-aged management) of herbaceous-brushy growth that directly provides food (soft/hard mast) for black bears. It may indirectly provide food for bobcat prey (soft/hard mast attracts small mammals).
- Smoke from **prescribed fire** may disturb individuals in the area, but the increased vegetation growth after fire could have the same benefits as timber harvesting.
- **Mechanical treatment of hazardous fuels** reduces the risk of wildfire, but may involve noisy machines for a period of time.
- **Road construction** removes forest habitat, but the edge that is created offers opportunities for enhanced foraging for both species. There would be a low risk of mortality for these species from road-vehicle encounters since the majority of roads projected for construction would be administrative in nature and lightly used for short periods of time.
- Forest habitat is permanently lost as a result of **oil and gas well development**, but the impact Forest-wide would only be 121 acres. The opening could result in increased local diversity and could provide some limited foraging opportunities for the bobcat.
- Forest canopy is lost as a result of **utility corridor construction**. The resulting herbaceous or shrubby habitat could provide enhanced foraging opportunities for both species.
- In most cases **land exchange** is beneficial for these species; however there is always a chance that an unknown den site could be exchanged.

Two management activities could adversely affect these two species are:

- **Trail construction** would not cause a significant loss of habitat in any of the alternatives, but the subsequent use of the trails by Forest visitors could lead to the increased potential for disturbance of individual bobcats and black bears. Hiking, mountain bike and horse trails are likely to occur in different parts of the planning area, but OHV trails would be concentrated in designated areas on the Athens Unit and Ironton Ranger District. The risk for disturbance is highest in these OHV areas because of the concentration of trails.
- Both species may use abandoned mines found in this region, as well as rocky outcrops and hollow trees and logs for den sites. The

likelihood is low, but **closure of open mine portals** for treatment of AMD or to protect human safety could affect individuals using them for den sites. There are hundreds of open mine sites on the WNF to provide other suitable denning areas, as well as natural occurring rock features and downed wood.

Summary of Direct and Indirect Effects

The black bear and bobcat are wide-ranging species and use a variety of forest habitats (NatureServe, 2004). A few individuals have been observed within the planning area within recent years. Both species could be affected by human disturbance, but they are tolerant to some degree of human interaction because the planning area is comprised of a mixture of inhabited and uninhabited lands. Disturbance generated from projected management activities in each alternative is expected to be minimal, with the exception of recreational trails that could lead to increased use by forest visitors. The use of non-motorized trails is typically low and the level of disturbance of these species would not be expected to differ from current conditions. Motorized trails would be concentrated in certain areas of the WNF. Black bear and bobcat abundance may be lower in these concentration areas, or they could avoid the areas altogether.

About 1% of NFS lands are likely to be converted from forest to non-forest during the first decade (e.g., construction of roads, oil/gas wells, recreation facilities). Forest habitat would be altered as a result of timber harvesting and prescribed fire, but these effects would be short-lived and considered beneficial to these species over time.

The historical habitat outcome was likely greater for the black bear and bobcat than it is currently, but increases in forest cover on NFS lands provides well-distributed and widespread suitable habitat currently. In all cases, the likelihood is very low that the alternatives and the associated management activities projected to occur in the first decade could affect habitat suitability on NFS lands to the point where habitat outcomes would be decreased (Table 13 – found at the end of the RFSS section).

Cumulative Effects

The Ohio Division of Wildlife considers eastern Ohio to have a large amount of suitable, but unoccupied habitat for these two species, and expects populations of black bear and bobcat to increase (ODNR, 2004).

Loss of forest habitat could occur on private lands within the WNF proclamation boundary in the future, primarily from development of new homes, oil and gas wells, and roads. With the exception of the possible Nelsonville Bypass project, these activities would not be expected to increase significantly from current levels. The Nelsonville Bypass project could result in the loss of up to 768 acres of forested habitat on the Athens

Unit. Activities that could occur on NFS lands in the future, in any alternative, are generally beneficial in nature. The added impact of Forest Service activities on NFS lands in any of the alternatives is not expected to have any cumulative adverse effects on black bear or bobcat habitat, and it is unlikely habitat outcomes in the cumulative effects analysis area would change with implementation of any alternative, in the short-term or in the long-term (Table 14 – found at the end of this RFSS section).

Determination of Effect

Though the probability is low, each alternative may impact individuals, but no alternative is likely to cause a trend toward federal listing or loss of viability (Table 15 – found at the end of this RFSS section).

Cerulean Warbler

The cerulean warbler is identified as a management indicator species for this Forest Plan revision process. An analysis of how the alternatives address the habitat needs of this species is detailed in the Final EIS, *Habitat Indicator 4*.

Activities with No Impact

There are management activities that may occur in the alternatives which would not result in the loss of mature interior forest habitat, or decline in suitable cerulean warbler habitat. These include:

- Crop tree release
- Grape vine control
- Site prep for native pine
- Control of non-native invasive species (all methods)
- Wetland restoration and enhancement
- Waterhole construction
- Restoration and improvement of aquatic habitats (lentic and lotic)
- Installation of bat-friendly gates
- Treatment of AMD
- Closure of open mine portals and subsidences

Activities with Beneficial Effects

The amount of mature forest habitat would increase in all alternatives as a result of varying habitat management regimes. This trend in mature forest habitat is explained in detail in the Final EIS - *Habitat Indicator 4.*

- Timber harvesting that creates gaps in the canopy and promotes the growth of large trees (especially oaks) is beneficial to this species in the long-term. Uneven-aged management, Historic Forest prescriptions, and thinning are more likely to result in immediate improvements to habitat suitability than would even-aged management. Timber harvesting using even-aged methods creates early successional forest habitat that is used by cerulean warblers during post-breeding for feeding, and possible predator avoidance (Vitz, 2003).
- Reforestation, reclamation of depleted or orphan wells, surface mine reclamation, stabilization of disturbed areas, and road decommissioning are activities that long-term effects on the restoration of forest cover and potentially suitable cerulean warbler habitat.
- Taxonomic experts involved in the species viability evaluation process consider the cerulean warbler a species associated with oak and hickory species. Prescribed fire can contribute to the regeneration of oaks.
- Reduction of hazardous fuels minimizes risk of wildfire. The smoke and heat of an uncontrolled wildfire during the breeding season could affect individuals.
- Land acquisition and land exchange aids in consolidation of NFS lands, which provides more opportunity for landscape level forest management.

Activities that May Impact Individuals, but Not Likely to Cause a Trend toward Federal Listing or Loss of Viability on NFS Lands

In each of the alternatives, there are activities that have the potential to negatively impact these RFSS or their habitat. Some of these management activities vary across alternatives, while others do not. Refer to Table 6 for projected outputs for the following activities across alternatives.

- **Even-aged timber harvesting** may cause habitat fragmentation of mature interior forest. Fragmentation could lead to increased nest predation and parasitism. Even-aged management varies by alternative from none in Alternative A to 5,960 acres per decade in Alternative B.
- Rich et al. (1994) inferred that most of interior forest bird species do not perceive narrow forest dividing corridors (e.g., **roads and trails**) as sources of forest fragmentation, but predators could gain better access to interior forest areas. However, edge effects on nesting success appear to be influenced by the degree of habitat fragmentation at the landscape scale rather than the local scale (Chalfoun et al., 2001; Stephens et al., 2003), as evidenced in

studies conducted in the Midwest (Robinson et al.,1995), Northeast (Gale et al., 1997), Pennsylvania (Rodewald, 2002), and within the WNF (Dettmers, 1997). The WNF lies within a heavily forested landscape where 80% of all the lands within the proclamation boundary are covered by forest (Landsat TM, 1994). Potential disturbance from roads and trails vary by alternative, from 816 acres in alternative A to 1,552 acres in Alternative C to 816.5.

- Development of permanent openings, construction of fishing ponds and lakes, construction of **recreational facilities and parking lots**, development of **oil and gas wells**, and **surface mining** would reduce the amount of potentially suitable cerulean warbler habitat currently available and could have the same fragmentation effects as roads and trails. These activities do not vary between alternatives. Development of permanent openings, construction of fishing ponds and lakes, development of oil and gas wells and parking lots would result in small openings in the canopy, which may be favorable to this species.
- **Land exchange** is typically beneficial because it can aid in the consolidation of NFS lands and improve landscape-level management. It is adverse when suitable mature interior forest habitat is proposed for exchange. Such an exchange could not only result in the inability to provide appropriate habitat management for this species, it could result in the fragmentation of the larger interior forest landscape for this area-sensitive species.

Summary of Direct and Indirect Effects

Over time, each alternative would incorporate habitat management activities that would result in the majority of the WNF being covered by mature forest habitat. The structure and/or composition of the mature forest would vary from having a high likelihood of providing optimal cerulean warbler habitat (e.g., uneven-aged management and Historic Forest prescriptions). The cerulean is generally associated with oak-hickory forests in the planning areas. All alternatives would likely result in a decline of oak-hickory dominated stands, but alternatives that incorporate both even-aged management and Historic Forest prescriptions would maintain more oak-hickory dominated stands on NFS lands.

There are management activities incorporated into the alternatives which could promote habitat fragmentation and the subsequent possibility for increased rates of nest predation or parasitism. However, most of these effects may be moderated by the fact that the WNF is located within a heavily forested landscape. One exception is the possible 1,200 acre surface mine that could occur on the Ironton Ranger District. Habitat on this large tract of forested land could be unsuitable for decades.

The likelihood is very low that Alternatives A, C, D, E, E_{mod}, and F and the associated management activities projected to occur in the short-term or long-term could affect habitat suitability on NFS lands to the point where habitat outcomes would be decreased (Table 13). In the short-term, Alternative B would not likely impact habitat suitability on NFS lands to the point where habitat outcomes would be decreased. In the long-term (e.g., decade 10), almost 79% of the Wayne National Forest may be covered by mature forest habitat in Alternative B, but more of the Wayne National Forest is allocated to even-aged management in this alternative. Approximately 6,500 acres would be harvested by even-aged methods each decade. Even-aged management can temporarily fragment mature, contiguous forest until the stand once again reaches a successional stage that is no longer an ecological barrier to forest-interior species (Rosenberg et al., 2003). Even-aged management can create edge habitat that increases local diversity while reducing habitat quality and quantity for certain species, including Neotropical migratory forest-interior songbirds. It is possible habitat outcomes could decrease over time with implementation of Alternative B.

Cumulative Effects

The WNF is within the core breeding range of the cerulean warbler. Mature interior forest habitat has increased over the last few decades as lands within the WNF proclamation boundary increased in forest cover. Some timber harvesting, oil and gas well development, and road development could occur on other lands in the future. The trend for most of these activities would likely be similar to levels occurring at present. The exception could be the possible Nelsonville Bypass project in the vicinity of the Athens Unit. Up to 768 acres of forested habitat on public and private lands, which currently do not exhibit a high degree of fragmentation, could be converted to non-forest.

Some Forest Service management activities may occur in proximity to the Nelsonville Bypass project area, such as OHV trail relocation, timber harvesting and prescribed fire. The Forest Service can use the project level planning process to consider how timber harvesting, specifically even-aged management, projects might influence short-term and long-term mature interior forest habitat in this part of the Athens Unit.

Potential adverse cumulative effects may occur if the potential 1,200 acre surface mine comes to fruition. The Forest Service has no authority over private mineral rights; however it can use the project level planning process to consider how Forest Service management activities might influence short-term and long-term available habitat in this part of the Ironton Ranger District.

The habitat outcomes for the cumulative effects analysis area (Table 14 - found at the end of this RFSS section) are not likely to differ from those identified for NFS lands (Table 13).

Determination of Effect

Though the probability is low, each alternative may impact individuals, but no alternative is likely to cause a trend toward federal listing or loss of viability (Table 15 - found at the end of this RFSS section).

Henslow's Sparrow

The Henslow's sparrow is identified as a management indicator species for this Forest Plan revision process. An analysis of how the alternatives address the habitat needs of this species is detailed in Final EIS – *Habitat Indicator 6*. This species may occur in larger, isolated hayfields, but this analysis focuses on the GFM management area which was developed to provide quality habitat for this area-sensitive grassland obligate species.

Activities with No Impact

There are management activities that may occur in the alternatives which are not associated with grassland habitat quality or its maintenance. These include:

- Timber harvesting (all kinds)
- Crop tree release
- Site prep for native pine
- Grape vine control
- Restoration or improvement of aquatic habitats (lentic and lotic)
- Installation of bat-friendly gates
- OHV trail construction (not permitted in the GFM MA)
- Treatment of AMD
- Closure of open mine portals or subsidences.

Activities with Beneficial Effects

The GFM management area was developed to accommodate the needs of obligate grassland species using reclaimed mine lands on the WNF. Alternatives C, D, E, E_{mod}, and F each allocate 5,334 acres of NFS lands to the GFM management area, while Alternatives A and B do not allocate any NFS lands to this management area.

Other management activities which could occur in the alternatives include:

- Mowing, prescribed fire and light grazing may be used to stop encroachment of woody vegetation and to maintain appropriate vegetation structure (e.g., amounts of thatch) and composition (e.g., native legumes and grasses vs. non-native plant species). These activities can affect the structure of the herbaceous vegetation and make it unsuitable for a season, but they improve vegetation structure over the long-term. Each alternative incorporates management area guidance to conduct these activities on a rotational basis to ensure the majority of the grasslands are in a suitable condition for species that use such habitat.
- Control of non-native invasive plant species may benefit the Henslow's sparrow, especially if native species can provide the grassland structure preferred by this species. Occupied reclaimed mine lands are primarily composed of 3-4 non-native plant species. The taxonomic experts involved in the species viability evaluation process noted that the Henslow's sparrow uses these areas, but once legumes are introduced to the mix of non-natives, numbers of Henslow's sparrows increase (Ewing, 2003b).
- Surface mining can cause adverse effects to many species, but the reclamation process can result in Henslow's sparrow habitat. The habitat created is not as desirable as that found in native prairies and grasslands. Surface mining and reclamation can result in compacted and acidic soils which could affect the grassland vegetation diversity.
- Reclamation of depleted or orphan wells, stabilization of disturbed areas, and road decommissioning could result in revegetation of lands, and reduced habitat fragmentation.
- Reduction of hazardous fuels in nearby forested areas could reduce the risk of uncontrolled wildfire spreading to grassland habitat. Wildfire could adversely affect this species if it occurred during the breeding season or if large acreages of habitat were burned.
- Land acquisition and land exchange aids in consolidation of NFS lands, which provides more opportunity for landscape level forest management.

Activities that May Impact Individuals, but Not Likely to Cause a Trend toward Federal Listing or Loss of Viability on NFS Lands

In each of the alternatives, there are activities that have the potential to negatively impact these RFSS or their habitat. Some of these management activities vary across alternatives, while others do not. Refer to Table 6 for projected outputs for the following activities across alternatives.

- Habitat suitability of existing suitable habitat would be lost with the reforestation of existing reclaimed mine lands.

- In some parts of its range the Henslow's sparrow will be found in damp, low lying areas. However, waterhole and fishing pond/lake construction or wetland restoration could increase habitat edge and indirectly increase predator abundance. The probability of constructing or restoring such features in these grassland areas areas is low, but could occur.
- Construction of roads and non-motorized trails would reduce grassland habitat and could provide easy travel ways for predators. These reclaimed areas have a network of roads and trails from the mining and reclamation process, therefore the construction of new roads and trails would likely be minimal.
- Construction of oil and gas wells would reduce grassland habitat, but by a minor amount. For example, each well site usually encompasses an area up to two acres in size.
- Maintenance regimes of utility corridors in suitable habitat in the GFM MA could result in adverse effects if mowing is conducted before late-summer (i.e., when the Henslow's sparrow completes the nesting season). Infrequent mowing of utility corridors could result in encroachment of woody vegetation and the subsequent decline in habitat quality.
- Land exchange is typically beneficial because it can aid in the consolidation of NFS lands and improve landscape management. It is adverse when suitable grassland habitat is proposed for exchange. Such an exchange could not only result in the inability to provide appropriate habitat management for this species, it could result in the fragmentation of the larger grassland landscape for this area-sensitive species.

Activities with a High Risk of Los of Viability on NFS Lands, but Not Likely to Cause a Trend toward Federal Listing

The GFM management area was developed to accommodate the needs of obligate grassland species using reclaimed mine lands on the WNF. Alternatives A and B do not allocate any NFS lands to this management area.

In Alternative A, the 973 acres of open grassy habitat currently existing in the Brady Run, Shawnee and Peabody areas would be located within the DCF and DCFO management areas. In Alternative B, these 973 acres would occur in the FSM and DCFO management areas. These open, grassy acres may or may not be maintained in Alternatives A or B because habitat composition objectives for these management areas call for only so much herbaceous or herbaceous-shrub habitat to be maintained (3-6 percent in FSM; 2-4% in DCF and DCFO). In other words, the amount of existing open, grassy habitat could decline or become non-existent in

Alternatives A and B, depending on how much herbaceous or herbaceous-shrubland habitat is needed elsewhere in these management areas for other species. If management is not emphasized on these grasslands, it is possible that these extensive grasslands would decline in habitat quality and become unsuitable for the Henslow's sparrow.

Summary of Direct and Indirect Effects

As indicated by the historical outcome for the Henslow's sparrow in Table 13 (found at the end of this RFSS section), grassland habitat did not exist in southeastern Ohio in historic times. Surface mining and reclamation laws enacted after 1977 resulted in the creation of large tracts of grassland habitat. The current habitat outcome reflects the limited distribution of grassland habitat on the WNF. There are three larger complexes of reclaimed mine lands on the Wayne, plus some additional smaller, isolated reclaimed areas or fields under special use permit for hay production.

Alternatives C, D, E, E_{mod}, and F allocate NFS lands to the GFM MA, which would be spatially located around the three larger complexes of reclaimed mine land on the WNF (Brady Run, Peabody, and Shawnee areas). As pointed out above, there are activities which could directly or indirectly affect suitable habitat or individuals, but the effects are likely to minimal. Management area direction and guidance incorporated into Alternatives C, D, E, E_{mod}, and F could result in improved habitat quality for the species. The likelihood is very low that Alternatives C, D, E, E_{mod}, and F and the associated management activities projected to occur in short-term or long-term could affect habitat suitability on NFS lands to the point where habitat outcomes would be decreased (Table 13).

Table 13 highlights the fact that the GFM MA is not incorporated into Alternatives A and B, therefore potential exists for existing grassland habitat to disappear over time. In this scenario, Henslow's sparrow numbers on NFS lands would decline, and individuals would be relegated to smaller hayfields. Because it is an area-sensitive species, these hayfields would provide marginal habitat at best. Individuals may occur on these marginal NFS lands, but nesting success may be compromised by increased predators or hayfield mowing done earlier than late-August.

Cumulative Effects

The Henslow's sparrow moved out of western and northwestern Ohio as the prairie and grassland habitats disappeared and reclaimed coal mine lands increased in southeastern Ohio, generally in proximity to the Athens Unit and Ironton Ranger District. Within the WNF proclamation boundary, the Crown City Wildlife Management Area offers suitable habitat for this species. The Nature Conservancy owns a large tract of reclaimed coal mine land on the Ironton Ranger District, adjacent to the Brady Run area. The Nature Conservancy has shown interest in selling

this property to the Forest Service. In the event this was to happen, the majority of this tract of land would fall within the GFM management area in Alternatives C, D, E, E_{mod}, and F. Other smaller patches or groups of reclaimed coal mine lands exist on the Athens Unit. Management of these areas is under the discretion of the landowner; in some cases landowners reforest these reclaimed lands or sometimes leave them in a grassy or shrubby condition.

The cumulative effects of NFS activities in the alternatives may vary. In Alternatives A and B, there would be no designated GFM MA and existing grassland habitat could decline or disappear over time on NFS lands. This could result in cumulative effects on the abundance and distribution of this species in the planning area since the Crown City Wildlife Management Area is the only property with extensive grassland habitat managed for the Henslow's sparrow. Management of other lands with existing grassland habitat may or may not be managed for this species out into the future. The habitat outcomes in the cumulative effects analysis area may decline with implementation of Alternatives A and B in the long-term (Table 14, found at the end of this RFSS section). The added impact of Forest Service activities on NFS lands in Alternatives C, D, E, E_{mod}, and F is not expected to have any cumulative adverse effects on the Henslow's sparrow, and it is unlikely habitat outcomes in the cumulative effects analysis area would change with implementation of these alternatives, in the short-term or in the long-term (Table 14).

Determination of Effect

Alternatives C through F may impact individuals, but would not likely cause a trend toward federal listing or loss of viability. Alternatives A and B may cause the loss of viability of the Henslow's sparrow on NFS lands, but Alternatives A and B are not likely to cause a trend toward federal listing (Table 15, found at the end of this RFSS section).

Timber Rattlesnake

Activities with No Impact

There are management activities projected to occur during the first decade which would not be expected to affect potentially suitable den, basking or foraging habitat. These include the following:

- Maintenance of existing permanent openings with mechanical methods
- Grape vine control
- Crop tree release
- Site prep for native pine

- Control of non-native invasive species with herbicide, mechanical or biological means
- Wetland restoration and enhancement
- Waterhole construction
- Fishing pond/lake construction
- Restoration of aquatic habitat (lotic or lentic)
- Installation of bat-friendly gates
- Grazing or hayfield allotments
- Treatment of AMD
- Closure of open mine portals or subsidences
- Land acquisition

Activities with Beneficial Effects

Based on information from various studies (Ewing, 2003d), this species is likely to occur on drier sites (ridges and southwest facing slopes) where the understory vegetation is not as dense as mesic sites. It has been found in areas where canopy cover varied from 25%-60%. Uneven-aged management, Historic Forest prescriptions, thinning, shelterwood, clearcut with reserves and two-age harvesting may improve foraging and basking habitat by reducing dense canopy cover. Reforestation would restore habitat, but the benefits would be more evident in the long-term.

Activities that May Impact Individuals, but Not Likely to Cause a Trend toward Federal Listing or Loss of Viability

Certain management activities are projected to occur that could adversely impact individuals.

- Studies have shown that the timber rattlesnake will use forest areas with partial canopy cover, especially where basking sites occur. The **clearcut method** would likely reduce the canopy cover to less than preferable levels. However, this is a short-term effect because the forest stand would mature over time and become suitable once again. The clearcut method may be indirectly beneficial in that prey sources could increase for a period of time. The ODNR (2004) reports that this species uses regenerating clearcuts within mature forest areas for feeding. The amount of clearcutting would likely be minimal since two-age, shelterwood and clearcut with reserves methods are more likely to be favored when implementing even-aged management methods. Each alternative incorporates established Forest-wide standards that address vegetation management around rock outcrops, which are considered potential

habitat for this species (TES-33 and 34). Several closed-canopy plant and animal species occur in association with rock features, therefore vegetation management is not allowed within 50 feet of these areas so as to maintain microclimate conditions. However, vegetation management may be allowed around rock habitats that are found to be occupied by the timber rattlesnake (TES-33 and TES-34). Management of the canopy could enhance habitat conditions.

- No information was found in the literature about the effects of **prescribed fire** on timber rattlesnakes; however, ground fires have the potential to harm individuals that do not move away from the area. The majority of prescribed fires would occur prior to leaf-on (mid-April) or after leaf-off (late-October). The rattlesnake generally emerges from the den in mid-April and re-enters the den in September. A prescribed fire that occurs after April 15th could adversely affect the species if conducted in suitable habitat. Prescribed fire may result in enhanced growth of the understory, which could be beneficial for prey species. The amount of prescribed fire does not vary across the alternatives.
- The risk for human-snake interaction and harm to individual snakes is increased where **roads or trails** occur in suitable habitat. Road and trail construction varies across alternatives.
- In most cases **land exchange** is beneficial; however, there is always a chance that an unknown den site could be exchanged.
- **Oil and gas well development**, **utility corridor construction**, and **construction of recreation facilities** would result in the permanent loss of forest habitat. These activities are not likely to differ across the alternatives. Loss of potentially suitable habitat would be minimal (less than 225 acres across the entire WNF).

Summary of Direct and Indirect Effects

The historical habitat outcome reflects that the distribution of habitat for this species was not widespread. Iron ore and coal mining that occurred since the early 1800s likely eliminated habitat for this species over time. Therefore the current habitat outcome is reduced from historical levels. The Ohio Division of Wildlife reports there may be only three remaining viable reproducing populations left in Ohio, all outside the boundaries of the WNF in Scioto and Vinton counties (ODNR, 2003c). The timber rattlesnake is considered rare in the WNF proclamation boundary. Reliable observations of the species are limited in number, possibly because the animal is secretive. Within the past 5 years, Ohio Division of Wildlife officers or snake experts have confirmed four timber rattlesnake sightings. Two were individual snakes that had been killed on roads by vehicles. These occurred in the Dorr Run area of the Athens Unit and the Hoadley

area of the Ironton Ranger District. The third confirmed sighting was of a snake killed in a logging incident, west of Nelsonville (ODOT, 2002). The fourth was a rattlesnake that was run over on an OHV trail in 2005. Other sightings have been noted in the Dorr Run area and on the Ironton Ranger District (ODOT, 2002; Martin and Fox, unpublished). No den sites have been located on NFS lands.

Human disturbance of denning sites or of individuals is one of the primary threats to this species. The Forest Service cooperates with the Ohio Division of Wildlife in providing education about the timber rattlesnake to local residents and Forest visitors.

The permanent loss of forest habitat occurring from projected management activities in the alternatives would be minimal (i.e., about 1% of the WNF), and alteration of forest habitat that could occur would be short-term in nature. In all cases, the likelihood is very low that the alternatives and the associated management activities projected to occur in the first decade could affect habitat suitability on NFS lands to the point where habitat outcomes would be decreased (Table 13, found at the end of this RFSS section). Forest-wide standards and guidelines are incorporated into all alternatives to minimize the potential for such activities to adversely affect potentially suitable denning sites, basking areas, and foraging areas.

Cumulative Effects

The historical habitat outcome reflects that the distribution of habitat for this species was not likely widespread in the cumulative effects analysis area, but may have been higher than the current habitat outcome. Iron ore and coal mining that occurred since the early 1800s, as well as road construction along the Ohio River bluffs, likely eliminated habitat for this species over time.

This species has close ties to its natal den, and taxonomic experts believe a viable population includes about 40 individuals of both sexes and various ages (Ewing, 2003d). Sightings of this species in the cumulative effects analysis area have included only individuals, although searches for den sites have been conducted. This species is secretive in nature, and could be affected by ground disturbing activities on other lands. Some timber harvesting, oil and gas well development, and road development could occur on these other lands in the future. The trend for most of these activities would likely be similar to levels occurring at present. The exception could be the possible Nelsonville Bypass project in the vicinity of the Athens Unit. This project could occur in an area where timber rattlesnake sightings have been concentrated. Surveys of the area, to date, have not identified den sites. However, capture and radio-tracking studies have not been performed in this area to rule out the lack of denning sites.

Mitigation measures have been designed into the Nelsonville Bypass project to minimize potential impacts to this species.

Some Forest Service management activities may occur in proximity to the Nelsonville Bypass project area, such as OHV trail relocation, timber harvesting and prescribed fire. However, protective measures integrated into each alternative, in addition to site-specific analysis at the project level, would reduce any cumulative impacts. The added impact of Forest Service activities on NFS lands in Alternatives A-F is not expected to have any cumulative adverse effects on the timber rattlesnake, and it is unlikely habitat outcomes in the cumulative effects analysis area would change with implementation of these alternatives, in the short-term or in the long-term (Table 14, found at the end of this RFSS section).

Determination of Effect

Though the probability is low, each alternative may impact individuals, but no alternative is likely to cause a trend toward federal listing or loss of viability (Table 15, found at the end of this RFSS section).

Grizzled Skipper

Activities with No Impact

There are activities projected to occur in each of the alternatives that would not be result in habitat destruction or the decline of suitable habitat quality, therefore these activities would not impact the grizzled skipper.

- Crop tree release
- Site prep for native pine
- Grape vine control
- Reforestation of disturbed areas and riparian areas
- Herbicide application to treat stump sprouting or non-native invasive species
- Wetland restoration and enhancement
- Restoration or improvement of aquatic habitat (lentic and lotic)
- Installation of bat-friendly gates
- Reclamation or orphan or depleted wells
- Road decommissioning
- Grazing or hayfield allotments
- Reclamation of abandoned mine lands

Activities with Beneficial Effects

Each alternative incorporates management activities that could result in more favorable habitat for the grizzled skipper or its host plant (Canada cinquefoil). Some of these activities may vary across alternatives.

- Timer harvesting (all kinds) can open up the forest to provide more favorable light conditions.
- Development and maintenance of forest openings
- Control of non-native plant species with mechanical or biological methods
- Utility corridor development and maintenance (if maintenance was appropriate for cinquefoil management)
- Stabilization of disturbed areas
- Reduction of hazardous fuels using mechanical methods can open up the forest floor to more favorable growing conditions for the cinquefoil host species.
- Land acquisition.

Activities that May Impact Individuals, but Not Likely to Cause a Trend toward Federal Listing or Loss of Viability

The one known grizzled skipper site in Ohio occurs on privately-owned land adjacent to NFS lands. Measures incorporated within each of the alternatives would protect this known occupied site from management activities on adjacent NFS lands (TES-32).

The following management activities could impact unknown populations on NFS lands.

- **Prescribed fire** could impact an unknown grizzled skipper population, but may aid in the restoration of areas that are potential reintroduction sites. Each alternative incorporates the same amount of prescribed fire.
- Potentially suitable habitat could be permanently lost or altered by construction of **waterholes**, **fishing ponds/lakes**, **trails, roads**, **recreation facilities and parking lots**, **surface mines**, **and oil and gas well development**. Site-specific review of projects would occur at the project level analysis, and at that time biologists would identify potentially suitable habitat and recommend option to avoid impacting it.
- In most cases **land exchange** is beneficial; however, there is always a chance that an unknown den site could be exchanged.

Insecticides used to treat gypsy moth invasions are implicated as one of the possible causes for the decline of this species. No gypsy moth insecticide treatments are projected to occur in any alternative. However, if the need to treat an infestation arose, a site-specific analysis would be conducted and mitigation measures identified to protect known occupied grizzled skipper sites.

Summary of Direct and Indirect Effects

Although the oak forests of southeastern Ohio were considered to be more open in historic times, a characteristic possibly beneficial for the species, the historical and current habitat outcomes are probably similar. The Canada cinquefoil (its host plant) is widely distributed, but taxonomic experts speculate that certain soil types may also play a role in habitat suitability for the grizzled skipper (L. Andrews, pers. comm.). Therefore, historical distributions of suitable habitat may have been more limited.

The alternatives would not impact the species at its known occupied site. But, there are activities incorporated into each alternative that may impact unknown populations on NFS lands. However, these impacts could be reduced in intensity at the project level as site-specific analysis occurs. In all cases, the likelihood is very low that the alternatives and the associated management activities projected to occur in the first decade could affect habitat suitability on NFS lands to the point where habitat outcomes would be decreased (Table 13, found at the end of this RFSS section).

Cumulative Effects

The historical habitat outcome in the cumulative effects analysis area was not likely different than that on NFS lands, nor is it likely to be different from the current habitat outcome. The increase in forest cover has been implicated as one possible cause for this species decline.

Loss of habitat on other lands within the proclamation boundary could result from the construction of homesites within forested areas, development of oil and gas wells, and roads (i.e., mostly access roads to homes and well sites). These activities may slightly increase from present levels, but would not be concentrated in any one area. The exception to this is the Nelsonville Bypass project. The only known site for the grizzled skipper is located within the bypass project area, however mitigation measures have been incorporated to reduce impacts to this species and its habitat. Potentially suitable habitat is available to the grizzled skipper on adjacent NFS lands, but habitat quality could decline in the immediate future without some active timber harvesting to increase light levels.

Some Forest Service management activities may occur in proximity to the Nelsonville Bypass project area, such as OHV trail relocation, timber harvesting and prescribed fire. However, protective measures integrated

into each alternative, in addition to site-specific analysis at the project level, would reduce any cumulative impacts. The added impact of Forest Service activities on NFS lands in Alternatives A-F is not expected to have any cumulative adverse effects on the grizzled skipper, and it is unlikely habitat outcomes in the cumulative effects analysis area would change with implementation of these alternatives, in the short-term or in the long-term (Table 14, found at the end of this RFSS section).

Determination of Effect

Though the probability is low, each alternative may impact individuals, but no alternative is likely to cause a trend toward federal listing or loss of viability (Table 15, found at the end of this RFSS section).

Mature, Closed-canopy Forest Plants -- Umbrella Magnolia and Rock Skullcap

Both of these species have been identified as species potentially threatened by increased exposure to sunlight. The major threat to umbrella magnolia has been identified as opening of canopy by logging operations (Spooner and Schneider, 1994). Threats to rock skullcap are unknown, but may include exposure to sunlight after logging (Spooner, 1983). Taxonomy experts involved in the species viability evaluation process (McCartney and Goodwin, 2003c) identified preferred rock skullcap habitat as closed canopy. However, 2004 field discoveries of new skullcap populations on the WNF were found in ice damaged stands of varying light intensities, and along old logging roads; all populations were healthy and reproductive. One taxonomic expert also found rock skullcap in more exposed habitats in 2004 and believes the species may be able to endure more exposed light habitats than originally thought (R. Gardner, pers. comm.). While these recent observations could indicate that light exposure may not have as detrimental impact as originally believed, rock skullcap will be included in this closed-canopy plants section until further information on this species' light requirements are known. Non-native invasives also pose a threat to both of these species and their habitat.

Activities with No Impact

Of the management activities projected to occur during the first decade, the following are not likely to have impacts since the activities do not occur in areas with suitable habitat for these species.

- Wetland restoration and enhancement
- Timber stand improvement activities (crop tree release and grape vine control) in young stands
- Site prep for native pine (habitat not suitable for umbrella magnolia)

- Maintenance of wildlife openings
- Restoration of lakes and ponds
- Grazing permits

Activities with Beneficial Effects

Certain management activities that may occur within the first decade could benefit species habitat. These activities improve habitat by improving or increasing forested conditions, controlling NNIS that degrade habitat and consolidating federal management of lands. Management areas that do not allow vegetation management (e.g. FOF, TRL) would benefit these species by promoting growth of mature, shaded forests. SA, RNA and CA areas are also hands-off management in some cases, though vegetation management can occur (e.g. prescribed burning) if determined necessary for rare species within these areas.

- Land acquisition
- Surface mine reclamation and stabilization of disturbed areas
- Restoration and improvement of stream habitat
- Reforestation
- Control of NNIS (mechanical and biological methods)

Activities that May Impact Individuals, but Not Likely to Cause a Trend toward Federal Listing or Loss of Viability

In each of the alternatives, there are activities that have the potential to negatively impact these RFSS or their habitat. Some of these management activities vary across alternatives, while others do not. Refer to Table 6 for projected outputs for the following activities across alternatives.

- **Construction of roads, trails**, **recreation facilities and parking lots** have the potential to affect suitable habitat. Construction activities, involving the use of heavy machinery, often result in vegetation removal, soil compaction, erosion, and increased susceptibility for NNIS invasion. Such developments could result in the loss of suitable habitat. During construction and use, unsurfaced roads and trails have the potential to cause soil erosion and spread NNIS. However, each alternative has Forest-wide standards and guidelines to reduce erosion and sedimentation impacts and to provide normal drainage control on designated trails (Goal 2.1 and associated standards and guidelines, REC-29 and Objective 17.3a). Each alternative includes a Forest-wide goal (7.2) to control NNIS populations. Forest-wide standards and guidelines outline combating NNIS establishment and spread through project level prevention and treatment efforts (FH-1),

equipment cleaning (FH-8), and use of native plants for restoration (FH-10 and FH-11).

- **Uneven-aged** methods can open the canopy and increase light penetration into forested stands. An established Forest-wide standard (TES-8) directs the Forest Service to maintain at least 60% canopy cover in all hardwood stands treated with uneven-aged timber harvest methods. Opening the canopy during logging could impact both of these shade loving species. Forest-wide standards and guidelines require filterstrips along riparian systems, which would protect umbrella magnolia habitat in these areas. Increased light penetration has been suggested as a potential threat to rock skullcap, but it is not known for sure (see above discussion). Since 60% of the canopy cover is retained during this management activity, the impacts on skullcap and its habitat may be minimal.
- **Even-aged management** involves harvests from 2-30 acres in size. These methods could impact habitat of these species by increasing light levels to the understory. Known populations of these species would be protected (Goal 5.2, TES-32). Impacts on potential habitat are short-term since stands will regenerate over time, as will suitable habitat for these species.
- Both uneven- and even-aged vegetation management could have impacts on habitat through: vegetation removal, construction of roads, skid trails and log landings, alterations in light environments and increasing the likelihood for NNIS invasion. All skid trails and log landings are temporary in stature and are rehabilitated after use to control any erosion or NNIS concerns. Forest-wide standards and guidelines exist in all alternatives to address non-native invasive species establishment and spread during construction activities.
- Site prep for native pine could disturb habitat for rock skullcap, but the disturbance would be small in scope and a site-level field review would identify suitable habitat to avoid.
- **Prescribed fire** creates a more open understory and may create snags by killing overstory trees; however the largest impact would be the mortality of seedlings and saplings of shade tolerant tree species. Fire could impact seedlings and saplings of umbrella magnolia, however burning in its habitat is likely to be mosaic since preferred habitat is mesic areas, and therefore the likelihood of young magnolias being impacted is reduced. Creation of snags could increase light penetration, however the killing of overstory trees would be similar to natural tree mortality and should not have significant effects on light environments for either species. Direct effects of fire on rock skullcap are unknown. However, since

prescribed burning primarily occurs in fall and early spring, the possibility of direct impacts to rock skullcap plants is low. Decreasing of understory woody vegetation could benefit skullcap be reducing competition, while increased light penetration through sapling and seedling mortality could negatively impact the species.

- The **construction of firelines** using bulldozers for prescribed fire activities could result in soil disturbance, soil compaction, removal of vegetation and increased susceptibility for invasion by NNIS, whereas firelines constructed by hand would only affect the litter layer. The Forest Service attempts to use existing roads and fire breaks to avoid constructing fire line (FIRE-7) and minimize erosion (FIRE-12 and FIRE-13).
- **Mechanical reduction of hazardous fuels** could impact these species or their habitat. Reduction activities involve cutting and possible removal of woody materials on the ground. It is possible that a leaning or standing tree could be felled, either as part of the fuels reduction work or to protect workers from a potential hazard tree. Increased light penetration due to tree removal could occur. However, areas targeted for this treatment would often be areas that have experienced natural disasters (e.g. ice storms) and likely have already altered light regimes, making light penetration from hazard fuel removal minimal in comparison to changes already incurred. Dragging and movement of woody fuels may disturb soils, but would be mitigated by Forest-wide standards and guidelines in all alternatives. Construction of roads, trails and landings during hazard fuel treatment projects would have similar impacts as those discussed for roads and trails.
- **Surface coal mines** could alter and remove surface soils and vegetation, and subsequently degrade existing habitat. Approximately 1,250 acres of NFS land could be affected by surface mining in the future. The Forest Service has no control over this projected activity since private mineral rights are involved. However, the operator would need to follow state regulations for reclamation of the surface.
- **Oil and gas activities** have the potential to affect habitat in a similar manner as roads and trails. Effects from road and well pad construction are long-term since they remain in use until mineral resources are depleted. Once depleted the operators are required to restore the areas they disturbed (Obj. 10.2a and b, MIN-2, MIN-8). Established Forest-wide standards and guidelines incorporated in all alternatives mitigate the effects of oil and gas exploration and development (i.e., filterstrips, stream crossings, stabilizing disturbed areas, NNIS prevention and analysis, NSO (MIN-9) on steep slopes and riparian areas). For reserved and outstanding

rights oil and gas wells, operators must follow state regulations which include best management practices for protecting natural resources. All alternatives project up to 121 acres (0.0005% of the Forest) could be disturbed from oil and gas well development over the next decade. Some potential habitat could be lost; however the amount is not expected to significantly affect the overall amount of habitat or the viability of these RFSS species.

- **Brine or oil spills** could occur during oil and gas well operations, although they are rare. The operator is required to construct berms around the wells to contain any oil leaks. The brine is required to be removed by tank truck. Each alternative has Forest-wide standards and guidelines that require the installation of control valves on all pipelines crossing streams so that supply and flow of oil and gas can be shut down immediately upon detection of a leak until repairs and cleanup have occurred (MIN-3, 4, 5).
- **Road decommissioning** and **reclamation of orphan gas and oil wells** activities may have initial impacts similar to road construction and oil and gas construction, but over the long-term closures may increase the acres of suitable habitat and benefit the environment by preventing future impacts.
- **Construction of utility corridors**, specifically buried transmission lines, cause ground disturbance, soil compaction, alterations of vegetation structure, and make areas more susceptible to invasion by non-native invasive species. Other **special use permits**, such as road access and grazing permits, have similar affects on local soils and vegetation. Overall, these activities are projected to impact 50 acres over the next decade, or 0.0002% of the Forest. The overall small amount of area impacted, in combination with the probability of affecting potential habitat is unlikely to impact population viabilities for these species.
- **Herbicides** use will primarily involve selective, spot spraying to avoid affecting non-target vegetation. Each alternative contains Forest-wide standards and guidelines that emphasize proper use of herbicides to protect non-target vegetation (FH 17, 18, 19, 20, 21). Although selective vegetation management is preferred for utility or other rights-of-way or easements, use of herbicides may occur in areas with written Forest Supervisor approval. Aerial spraying of herbicides is sometimes conducted on utility corridors that have outstanding rights. Special use permits for utility corridors would contain provisions for all herbicide use and require permittees to abide by Forest-wide standards and guidelines. By following standards and guidelines for herbicide usage, the potential for herbicides to drift onto suitable habitat, or an individual, would be low.

- **Creation of permanent wildlife openings, construction of small lakes, ponds and waterholes** all have the potential to affect species and their habitat. However, creation of openings primarily is from the designation of existing open land on acquired properties (WLF-4, 5, 6). Impounding a stream to create lakes or ponds is unlikely, since most ponds constructed, in the past, were a result of reclamation efforts. Waterhole construction would be built in forested areas already disturbed by other project activities (e.g. timber harvests), thus tree removal would not occur primarily for waterhole construction. While these activities could potentially impact forested habitat, it is unlikely that tree removal or impoundments would occur for their creation.
- Watershed improvements involve **treatment of AMD** and **closure of subsidences and open portals** that present safety concerns and/or contribute to AMD. These activities would involve vegetation removal, soil disturbance and compaction by machinery, and increased susceptibility to NNIS invasion. Approximately 502 acres are projected for treatment, or 0.002% of the Forest. Improvement activities occur within areas heavily impacted by underground and surface mining activities which often offer low quality habitat. The likelihood that these species would occur initially in these highly disturbed areas are low, however after improvement activities, these areas could provide improved habitat conditions for establishment. NNIS impacts will be lessened by reseeding guidelines (WSH-6, 7) and management (Goal 7.2 and associated standards and guidelines).
- **Installation of bat-friendly gates** involves the removal of a small amount of soil around mine openings in order to sink gates below ground surface. Removal of soil in these areas could directly impact any plants or habitat present. Soils removed during installation are returned afterwards to pre-installation conditions to avoid changing airflows and micro-environments, thus retaining any seedbanks that may exist for the species. Many of the areas impacted by installation are devoid of vegetation due to any combination of dense shade, acid mine drainage, or soil compaction. The small amount of soil disturbance coupled with the low probability of potential habitat occurring in these areas makes the likelihood of impact on these species low.
- Up to 400 acres of **land exchange** could occur in the first decade of the plan. Land exchange can be beneficial (e.g., acquiring potential habitat, or actual populations of RFSS), but could be negative if such habitat was exchanged into private ownership. Each exchange is reviewed by Forest Service biologists to identify any potential impacts to RFSS.

Summary of Direct and Indirect Effects

As indicated by the historical outcome for these species, closed-canopy forest existed in southeastern, pre-settlement Ohio (Table 13). The combined deforesting activities from timber harvesting, oil and gas production and surface mining in the 1800's and early 1900's reduced these habitats significantly. Since the Depression, forest cover has increased across Ohio from about 15% in 1940 to almost 30% today (Ohio Division of Forestry 2004). Almost 80% of the lands (public and private) within the WNF proclamation boundary are forested (Ohio Land Use Cover, based on Landsat TM 1994). Riparian corridors within the proclamation boundary are primarily forested (i.e., 72.5%) (National Landcover Database, 1992).

These reforestation activities have improved habitat potential on the WNF for umbrella magnolia and rock skullcap in the last half-century. The current habitat outcome for umbrella magnolia remains lower than the historic due to the isolation of populations during the industrial boom, and their restricted ability to disperse and colonize current potential habitat. The rock skullcap, on the other hand, was a species identified by taxonomic experts during the species viability evaluation process to have the ability to disperse and increase if suitable habitat is available. While the alternatives are not likely to change habitat outcomes for the umbrella magnolia; rock skullcap habitat outcomes could be either positively or negatively impacted by the tenth decade of Forest Plan implementation (Table 13). These impacts are driven by the acreages projected for timber harvest in the alternatives.

Cumulative Effects

Loss of rock skullcap habitat could occur on private lands within the WNF proclamation boundary in the future, primarily from timber harvesting, construction of homes and roads and oil and gas well activities. Likewise the potential surface mining project of 1,250 acres could impact this species. The potential cumulative effect of NFS activities on rock skullcap vary by alternative (Table 14). These impacts mirror those of direct and indirect effects for the alternatives, since activities on non-federal lands are expected to have similar impacts on the species.

For umbrella magnolia, any potential adverse cumulative effects that may occur on NFS lands as a result of implementing any of the alternatives would be mitigated through the implementation of the protective Forest-wide standards and guidelines that are incorporated into all alternatives, especially those protecting riparian habitats (Table 14). Activities that occur on non-federal lands within the WNF proclamation boundary include private oil and gas development, surface mining of coal, clay, and limestone, construction of buildings and other structures, road construction and maintenance, and timber harvest. There is a possibility that any of

these activities could impact suitable habitat or existing populations of this species. Management of non-federal lands are under the discretion of the landowner and conservation measures applied on NFS lands may not be used on these other ownerships. These activities are usually small in nature and scattered across the landscape and would not likely cause a change in future habitat outcomes for the species.

Determination of Effect

There is a probability that each alternative may impact individuals or habitat, but no alternative is likely to cause a trend toward federal listing or loss of viability for umbrella magnolia (Table 15), since the mesic habitat of this species reduces the potential for timber harvesting activities in suitable habitat. Likewise, while habitat outcomes for rock skullcap may change by the tenth decade across all alternatives, activities are not likely to cause a trend toward federal listing (Table 15) due to rock skullcap's believed ability to establish in undisturbed habitats such as those provided by hands-off management areas (i.e. FOF, RNA). As discussed earlier, impacts on rock skullcap from light alterations may be less than previously thought, since populations have been found in stands with increased light penetration. However, research or monitoring of light alteration effects on the species is needed before legitimizing this assumption; thus, habitat outcomes and effect determinations were based on the belief that alterations of light by logging could negatively impact this species.

Mature, Open to Semi-open Forest Plants (threatened by overshading) - Striped Gentian, Blue Scorpionweed, Butternut, and Yellow-fringed Orchid

The primary threat to these species is overshading by natural succession and competition from non-native invasive species (Andreas, 1984; Cusick and Burns, 1983; NatureServe, 2004). Additional threats include, fire suppression for striped gentian (McCartney and Goodwin, 2003d), overbrowsing by deer and erosion from flooding for blue scorpionweed (McCartney and Goodwin, 2003a), alterations of water supply, soil compaction and over collection for yellow-fringed orchid (Cusick and Burns, 1983), and overcrowding and harvesting of healthy, canker resistant, butternut trees (NatureServe Explorer, 2004).

Activities with No Impact

Of the management activities projected to occur during the first decade, the following are not likely to have impacts since the activities do not occur in areas with suitable habitat for these species.

- Timber Stand Improvement (crop tree release and grape vine control) of young stands

- Site prep for native pine (no habitat for the striped gentian)
- Restoration of lakes and ponds
- Wetland restoration or enhancement.

Activities with Beneficial Effects

Certain management activities that may occur within the first decade could benefit species habitat. These activities improve habitat by returning disturbed areas to vegetated conditions, managing areas to prevent woody overgrowth, controlling NNIS that degrade habitat and consolidating federal management of lands. Management areas that implement vegetation management to create diverse forested areas with more open canopies, such as DCF and HF, would provide suitable habitat for these species.

- Uneven-aged Timber Harvesting
- Prescribed Fire
- Surface mine reclamation and stabilization of disturbed areas
- Restoration and improvement of stream habitat
- Control of NNIS (mechanical and biological methods)
- Maintenance of wildlife openings.
- Land acquisition

Activities that May Impact Individuals, but Not Likely to Cause a Trend toward Federal Listing or Loss of Viability

In each of the alternatives, there are activities that have the potential to negatively impact these RFSS or their habitats. Some of these management activities vary across alternatives, while others do not. Refer to Table 6 for projected outputs for the following activities across alternatives.

- **Construction of roads, trails**, **recreation facilities and parking lots** have the potential to affect suitable habitat. Construction activities, involving the use of heavy machinery, often result in vegetation removal, soil compaction, erosion, and increased susceptibility for NNIS invasion. Such developments could result in the loss of suitable habitat. During construction and use, unsurfaced roads and trails have the potential to cause soil erosion and spread NNIS. However, Forest-wide standards and guidelines, incorporated in all alternatives, reduce erosion and sedimentation impacts and provide normal drainage control on designated trails (Goal 2.1 and associated standards and guidelines, REC-29 and Objective 17.3a). Forest-wide standards and guidelines outline

combating NNIS establishment and spread through project level prevention and treatment efforts (FH-1), equipment cleaning (FH-8), and use of native plants for restoration (FH-10 and FH-11).

- **Even-aged management** involves harvests from 2-30 acres in size. These methods could impact habitat of species that require semi-open habitat by increasing light levels to the understory. Known populations of these species would be protected (Goal 5.2, TES-32). Unknown populations or suitable habitat could be temporarily impacted until stands and potential habitat could regenerate.
- The removal of trees during **uneven-aged management** would benefit these species by creating more open canopies. However, both uneven- and even-aged vegetation management could impact habitat through: construction of roads, skid trails and log landings, and increasing the likelihood for NNIS invasion. All skid trails and log landings are temporary in stature and are rehabilitated after use to control any erosion or NNIS concerns. Forest-wide standards and guidelines exist in all alternatives to address non-native invasive species establishment and spread during construction activities.
- **Site prep for native pine** (blue scorpionweed, butternut, and yellow-fringed orchid) – soil disturbance associated with this activity could affect potentially suitable habitat, however, the disturbance would be small in scope and pre-project surveys would identify areas to avoid.
- While the use of prescribed fire would benefit all of these species, the **construction of firelines** could impact the species. The **construction of firelines** using bulldozers for prescribed fire activities could result in soil disturbance, soil compaction, removal of vegetation and increased susceptibility for invasion by NNIS, whereas firelines constructed by hand would only affect the litter layer. The Forest Service attempts to use existing roads and fire breaks to avoid constructing fire line (FIRE-7) and minimize erosion (FIRE-12 and FIRE-13).
- **Mechanical reduction of hazardous fuels** could involve cutting and possible removal of woody material on the ground. A leaning or standing tree could be felled, either as part of the fuels reduction work or to protect workers from a potential hazard tree. Increased light penetration due to tree removal would likely benefit these species and their habitat. Dragging and movement of woody fuels may disturb soils, but would be mitigated by Forest-wide standards and guidelines in all alternatives. Construction of roads, trails and landings during hazard fuel treatment projects would have similar impacts as those discussed for roads and trails.

- **Surface coal mines** could alter and remove surface soils and vegetation, and subsequently degrade existing habitat. Approximately 1,250 acres of NFS land could be affected by surface mining in the future. The Forest Service has no control over this projected activity since private mineral rights are involved. However, the operator would need to follow state regulations for reclamation of the surface.
- **Oil and gas activities** have the potential to affect habitat in a similar manner as roads and trails. Effects from road and well pad construction are long-term since they remain in use until mineral resources are depleted. Once depleted the operators are required to restore the areas they disturbed (Obj 10.2a and b, MIN-2, MIN-8). Established Forest-wide standards and guidelines incorporated in all alternatives mitigate the effects of oil and gas exploration and development (i.e., filterstrips, stream crossings, stabilizing disturbed areas, NNIS prevention and analysis, NSO on steep slopes and riparian areas). For reserved and outstanding rights oil and gas wells, operators must follow state regulations which include best management practices for protecting natural resources. All alternatives project up to 121 acres (0.0005% of the Forest) could be disturbed from oil and gas well development over the next decade. Some potential habitat could be lost; however, the amount is not expected to significantly affect the overall amount of habitat or the viability of these RFSS species.
- **Brine or oil spills** could occur during oil and gas well operations, although they are rare. The operator is required to construct berms around the wells to contain any oil leaks. The brine is required to be removed by tank truck. Each alternative has Forest-wide standards and guidelines that require the installation of control valves on all pipelines crossing streams so that supply and flow of oil and gas can be shut down immediately upon detection of a leak until repairs and cleanup have occurred (MIN-3, 4, 5).
- **Road decommissioning** and **reclamation of orphan gas and oil wells** activities may have initial impacts similar to road construction and oil and gas construction, but over the long-term closures may increase the acres of suitable habitat and benefit the environment by preventing future impacts.
- **Construction of utility corridors**, specifically buried transmission lines, cause ground disturbance, soil compaction, alterations of vegetation structure, and make areas more susceptible to invasion by non-native invasive species. Other **special use permits**, such as road access and grazing permits, have similar affects on local soils and vegetation. Overall, these activities are projected to impact 50 acres over the next decade, or 0.0002% of the Forest. The overall

small amount of area impacted, in combination with the probability of affecting potential habitat, is unlikely to impact population viabilities for these species.

- **Herbicides** use will primarily involve selective, spot spraying to avoid affecting non-target vegetation. Each alternative contains Forest-wide standards and guidelines that emphasize proper use of herbicides to protect non-target vegetation (FH 17, 18, 19, 20, 21). Although selective vegetation management is preferred for utility or other rights-of-way or easements, use of herbicides may occur in areas with written Forest Supervisor approval. Aerial spraying of herbicides is sometimes conducted on utility corridors that have outstanding rights. Special use permits for utility corridors would contain provisions for all herbicide use and require permittees to abide by Forest-wide standards and guidelines. By following standards and guidelines for herbicide usage, the potential for herbicides to drift onto suitable habitat, or an individual, would be low.
- **Creation of permanent wildlife openings, construction of small lakes, ponds and waterholes** all have the potential to affect species and their habitat. However, creation of openings primarily is from designation of existing open land on acquired properties (WLF-4, 5, 6). Impounding a stream to create lakes or ponds is unlikely, since most ponds constructed, in the past, were a result of reclamation efforts. Waterhole construction would be built in forested areas already disturbed by other project activities (e.g. timber harvests), thus tree removal would not occur primarily for waterhole construction. While these activities could potentially impact forested habitat, it is unlikely tree removal or impoundments would occur for their creation.
- **Wetland restoration and enhancement** activities often occur in bottomland areas that have been tiled or ditched to promote agricultural use (ARR-25). Any of these species can occur in open areas, such as roadsides or stream banks. Therefore, there is the possibility that wetland management activities could affect habitat or individuals in the area. However, most agricultural areas are often still recovering from disturbance and other impacts, so the likelihood of these species existing in these areas tends to be low, and the probability for impacts is unlikely. The projection for wetland activities are 150 acres over the next decade, or 0.0006% of the Forest.
- Watershed improvements involve **treatment of AMD** and **closure of subsidences and open portals** that present safety concerns and/or contribute to AMD. These activities may involve vegetation removal, soil disturbance and compaction by machinery, and

increased susceptibility to NNIS invasion. Approximately 502 acres are projected for treatment, or 0.002% of the Forest. Improvement activities occur within areas heavily impacted by underground and surface mining activities which often offer low quality habitat. The likelihood that these species would occur initially in these highly disturbed areas are low, however after improvement activities, these areas could provide improved habitat conditions for establishment. NNIS impacts will be lessened by reseeding guidelines (WSH-6, 7) and management (Goal 7.2 and associated standards and guidelines).

- **Installation of bat-friendly gates** involves the removal of a small amount of soil around mine openings in order to sink gates below ground surface. Removal of soil in these areas could directly impact any plants or habitat present. Soils removed during installation are returned afterwards to pre-installation conditions to avoid changing airflows and micro-environments, thus retaining any seedbanks that may exist for theses species. Many of the areas impacted by installation are devoid of vegetation due to any combination of dense shade, acid mine drainage, or soil compaction by human use. The small amount of soil disturbance coupled with the low probability of potential habitat occurring in these areas makes the chance of impact low.
- Up to 400 acres of land exchange could occur in the first decade of the plan. Land exchange can be beneficial (e.g., acquiring potential habitat, or actual populations of RFSS), but could be negative if such habitat was exchanged into private ownership. Each exchange is reviewed by Forest Service biologists to identify any potential impacts to RFSS.

Summary of Direct and Indirect Effects

As indicated by the historic and current habitat outcomes, striped gentian and blue scorpionweed are not naturally widespread in distribution across the planning area (Table 13). The two species that were more common historically are butternut, whose current population declines are primarily due to infestation by butternut canker disease, and yellow-fringed orchid which was plentiful enough for collection and use by Native Americans (McCartney and Swiezynski, 2003c). Population declines for the herbaceous species probably occurred during the heavy impacts of timber harvesting, oil and gas development and iron ore and coal mining from the 1800s to the early 1900s. While these species are threatened by natural succession and shading, the full sunlight and heavy soil compaction and erosion conditions during this time period likely eliminated many populations.

Since the Depression, forest cover has increased across Ohio from about 15% in 1940 to almost 30% today (Ohio Division of Forestry, 2004). Almost 80% of the lands (public and private) within the WNF proclamation boundary are forested (Ohio Land Use Cover, based on Landsat TM 1994). Riparian corridors within the proclamation boundary are primarily forested (i.e., 72.5%) (National Landcover Database, 1992). These reforestation activities may have improved habitat potential on the WNF for these species to an extent. Current management plans to create more open, forest communities with fire and vegetation management is likely to increase the amount of suitable habitat for the herbaceous species, however the ability for these species to disperse and colonize these areas will be inhibited current population isolation. The plight of the butternut relies on research efforts to find canker resistant strains that can perpetuate the species.

In all cases, the likelihood is very low that the alternatives and their associated management activities projected to occur in the first decade could affect habitat suitability on NFS lands to the point where habitat outcomes would be decreased (Table 13).

Cumulative Effects

Habitat quality has improved on the landscape since the Forest Service began acquiring land in southeast Ohio. Some areas remain impacted, but projects to rehabilitate heavily impacted areas (e.g. strip mines, agricultural fields) overtime will continue to provide more areas with suitable habitat for these species.

Loss of suitable habitat could occur on private lands within the WNF proclamation boundary in the future, primarily from construction of roads and homes, oil and gas wells, and surface mining activities. There is a possibility that any of these activities could impact suitable habitat for, or existing populations of, these species. However, with the exception of the potential 1,250 acres of surface mining, these activities would not be expected to increase significantly from current levels. Any potential adverse cumulative effects that may occur on NFS lands as a result of implementing any of the alternatives would be mitigated through the implementation of the protective Forest-wide standards and guidelines that are incorporated into all alternatives (Table 14).

Determination of Effect

Each alternative may impact individuals, but no alternative is likely to cause a trend toward federal listing or loss of viability (Table 15).

Fire-adapted Plants, Open to Semi-open habitat - Juniper Sedge and Yellow Gentian

Threats to these species include overshading by natural succession and fire suppression (Cusick, 1993; Andreas, 1981). Non-native invasives also pose a threat to these species and their habitat. Both species have been managed with fire on the WNF, and both have responded well to this management tool (Andreas, 1981; McCartney and Goodwin, 2003b).

Activities with No Impact

Of the management activities projected to occur during the first decade, the following are not likely to have impacts since the activities do not occur in areas with suitable habitat for these species.

- Restoration and improvement of stream habitat
- Wetland restoration and enhancement
- Timber Stand Improvement (crop tree release and grape vine control)
- Site prep for native pine (no habitat for yellow gentian)
- Restoration and improvement of lake and pond habitat
- Restoration and improvement of stream habitat
- Watershed improvements (treatment of AMD, closure of open mine portals/subsidence).

Activities with Beneficial Effects

Certain management activities that may occur within the first decade could benefit species habitat. These activities improve habitat by maintaining more open understory, restoring unsuitable habitats to suitable habitat, controlling NNIS that degrade habitat and consolidating federal management of lands. Management areas that implement vegetation management to create diverse forested areas with more open canopies, such as DCF and HF, would provide suitable habitat for these species.

- Prescribed Fire
- Uneven-aged timber management
- Creation of permanent wildlife openings
- Maintenance of wildlife openings
- Surface mine reclamation and stabilization of disturbed areas
- Control of NNIS (mechanical and biological methods)
- Land acquisition.

Activities that May Impact Individuals, but Not Likely to Cause a Trend toward Federal Listing or Loss of Viability

In each of the alternatives, there are activities that have the potential to negatively impact these RFSS or their habitats. Some of these management activities vary across alternatives, while others do not. Refer to Table 6 for projected outputs for the following activities across alternatives.

- **Construction of roads, trails**, **recreation facilities and parking lots** have the potential to affect suitable habitat. Construction activities, involving the use of heavy machinery, often result in vegetation removal, soil compaction, erosion, and increased susceptibility for NNIS invasion. Such developments could result in the loss of suitable habitat. During construction and use, unsurfaced roads and trails have the potential to cause soil erosion and spread NNIS. However, each alternative has Forest-wide standards and guidelines to reduce erosion and sedimentation impacts and to provide normal drainage control on designated trails (Goal 2.1 and associated standards and guidelines, REC-29 and Objective 17.3a). Forest-wide standards and guidelines outline combating NNIS establishment and spread through project level prevention and treatment efforts (FH-1), equipment cleaning (FH-8), and use of native plants for restoration (FH-10 and FH-11).
- **Even-aged management** involves harvests from 2-30 acres in size. These methods could improve habitat for the gentian by opening the canopy. The increase in light from removing the canopy could be too much for juniper sedge, however, known populations of this species would be protected (Goal 5.2, TES-32). Unknown populations or suitable habitat could be temporarily impacted until stands could regenerate as would potential habitat for these species.
- While **uneven- and even-aged** vegetation management could improve habitat for these species, they also can negatively impact habitat, through construction of roads, skid trails and log landings; and increasing the likelihood for NNIS invasion. Skid trails and log landings are temporary in stature and would be rehabilitated after use to control any erosion or NNIS concerns. Forest-wide standards and guidelines exist in all alternatives to address non-native invasive species establishment and spread during construction activities.
- **Site prep for native pine** (juniper sedge) – soil disturbance associated with this activity could affect potentially suitable habitat, however, the disturbance would be small in scope and pre-project surveys would identify areas to avoid.

- While the use of prescribed fire would benefit these species, the construction of firelines could impact the species. The **construction of firelines** using bulldozers for prescribed fire activities could result in soil disturbance, soil compaction, removal of vegetation and increased susceptibility for invasion by NNIS, whereas firelines constructed by hand only affect the litter layer. The Forest Service attempts to use existing roads and fire breaks to avoid constructing fire line (FIRE-7) and minimize erosion (FIRE-12 and FIRE-13).
- **Mechanical reduction of hazardous fuels** could involve cutting and possible removal of woody material on the ground. A leaning or standing tree could be felled, either as part of the fuels reduction work or to protect workers from a potential hazard tree. Increased light penetration due to tree removal would likely benefit these species and their habitat. Dragging and movement of woody fuels may disturb soils, but would be mitigated by Forest-wide standards and guidelines in all alternatives. Construction of roads, trails and landings during hazard fuel treatment projects would have similar impacts as those discussed for roads and trails.
- **Surface coal mines** could alter and remove surface soils and vegetation, and subsequently degrade existing habitat. Approximately 1,250 acres of NFS land could be affected by surface mining in the future. The Forest Service has no control over this projected activity since private mineral rights are involved. However, the operator would need to follow state regulations for reclamation of the surface.
- **Oil and gas activities** have the potential to affect habitat in a similar manner as roads and trails. Effects from road and well pad construction are long-term since they remain in use until mineral resources are depleted. Once depleted the operators are required to restore the areas they disturbed (Obj 10.2a and b, MIN-2, MIN-8). Established Forest-wide standards and guidelines incorporated in all alternatives mitigate the effects of oil and gas exploration and development (i.e., filterstrips, stream crossings, stabilizing disturbed areas, NNIS prevention and analysis, NSO on steep slopes and riparian areas). For reserved and outstanding rights oil and gas wells, operators must follow state regulations which include best management practices for protecting natural resources. All alternatives project up to 121 acres (0.0005% of the Forest) could be disturbed from oil and gas well development over the next decade.

- **Brine or oil spills** could occur during oil and gas well operations, although they are rare. The operator is required to construct berms around the wells to contain any oil leaks. The brine is required to be removed by tank truck. Each alternative has Forest-wide standards and guidelines that require the installation of control valves on all pipelines crossing streams so that supply and flow of oil and gas can be shut down immediately upon detection of a leak until repairs and cleanup have occurred (MIN-3, 4, 5).
- **Road decommissioning** and **reclamation of orphan gas and oil wells** activities may have initial impacts similar to road construction and oil and gas construction, but over the long-term closures may increase the acres of suitable habitat and benefit the environment by preventing future impacts.
- **Construction of utility corridors**, specifically buried transmission lines, cause ground disturbance, soil compaction, alterations of vegetation structure and composition, and make areas more susceptible to invasion by non-native invasive species. Other **special use permits**, such as road access and grazing permits, have similar affects on local soils and vegetation. Overall, these activities are projected to impact 50 acres over the next decade, or 0.0002% of the Forest. The overall small amount of area impacted, in combination with the probability of affecting potential habitat, is unlikely to impact population viabilities for these species.
- **Herbicides** use will primarily involve selective, spot spraying to avoid affecting non-target vegetation. Each alternative contains Forest-wide standards and guidelines that emphasize proper use of herbicides to protect non-target vegetation (FH 17, 18, 19, 20, 21). Although selective vegetation management is preferred for utility or other rights-of-way or easements, use of herbicides may occur in areas with written Forest Supervisor approval. Aerial spraying of herbicides is sometimes conducted on utility corridors that have outstanding rights. Special use permits for utility corridors would contain provisions for all herbicide use and require permittees to abide by Forest-wide standards and guidelines. By following standards and guidelines for herbicide usage, the potential for herbicides to drift onto suitable habitat, or an individual, would be low.
- **Waterhole construction** would occur in forested areas already disturbed by other project activities (e.g. timber harvests), thus tree removal would not occur primarily for waterhole construction.
- **Installation of bat-friendly gates** involves the removal of a small amount of soil around mine openings in order to sink gates below ground surface. Removal of soil in these areas could directly impact any plants or habitat present. Soils removed during

installation are returned afterwards to pre-installation conditions to avoid changing airflows and micro-environments, thus retaining any seedbanks that may exist for the species. Many of the areas impacted by installation are devoid of vegetation due to any combination of dense shade, acid mine drainage, or soil compaction by human use. The small amount of soil disturbance coupled with the low probability of potential habitat occurring in these areas makes the likelihood of impact on these species low.

- Up to 400 acres of **land exchange** could occur in the first decade of the plan. Land exchange can be beneficial (e.g., acquiring potential habitat, or actual populations of RFSS), but could be negative if such habitat was exchanged into private ownership. Each exchange is reviewed by Forest Service biologists to identify any potential impacts to RFSS.

Summary of Direct and Indirect Effects

As indicated by the historical outcome for these species, juniper sedge occurrence is unknown since it is a newly described species within the last decade. Yellow gentian was not common historically since it inhabited prairie extensions, a minority habitat in the predominately forested area of southeast Ohio. Following the Great Depression, fire suppression efforts and reforestation projects turned natural prairie remnant habitats into forested habitats too shaded for the gentian to persist.

While the alternatives overall should improve habitat for these two species, through uneven-aged vegetation management and prescribed fire, the isolation of existing populations will likely prevent the dispersal and establishment of these species to new suitable habitat. Thus the habitat outcomes for these species are not expected to change across the alternatives (Table 13).

Cumulative Effects

Loss of habitat for these species could occur on private lands within the WNF proclamation boundary, primarily from construction of homes and roads, oil and gas development and surface mining activities. Conversely, the prescribed burning activities of other land management areas (e.g. State Forests) along with timber harvesting on private and state owned properties will continue to create more suitable habitat for these species. Both negative and positive impacting activities that occur on private lands are usually small in nature and scattered across the landscape. Any potential adverse cumulative effects that may occur on NFS lands as a result of implementing any of the alternatives would be mitigated through the implementation of the protective Forest-wide standards and guidelines that are incorporated into all alternatives. Therefore, cumulative effects of

activities are unlikely to change the habitat outcomes for either of these species (Table 14).

Determination of Effect

Each alternative may impact individuals, but no alternative is likely to cause a trend toward federal listing or loss of viability (Table 15).

Pigeon Grape

Pigeon grape typically grows in moist, semi-open habitats in alluvial soil of low woods, thickets, fencerows and stream banks. Threats to pigeon grape include the felling of trees upon which the species grows (Burns, 1982a), fire, and decline in habitat quality due to NNIS invasion (McCartney and Swiezynski, 2003a).

Activities with No Impact

Of the management activities projected to occur during the first decade, the following are not likely to have impacts since the activities do not occur in areas with suitable habitat for these species.

- Maintenance of wildlife openings
- Site prep for native pine
- Restoration of lakes and ponds
- Wetland restoration and enhancement.

Activities with Beneficial Effects

- Surface mine reclamation and stabilization of disturbed areas
- Restoration and improvement of stream habitat
- Control of NNIS (mechanical and biological methods)
- Land acquisition.

Activities that May Impact Individuals, but Not Likely to Cause a Trend toward Federal Listing or Loss of Viability

In each of the alternatives, there are activities that have the potential to negatively impact this RFSS or its habitat. Some of these management activities vary across alternatives, while others do not. Refer to Table 6 for projected outputs for the following activities across alternatives.

- **Construction of roads, trails**, **recreation facilities and parking lots** have the potential to affect suitable habitat. Construction activities, involving the use of heavy machinery, often result in vegetation removal, soil compaction, erosion, and increased susceptibility for NNIS invasion. Such developments could result

in the loss of suitable habitat. During construction and use, unsurfaced roads and trails have the potential to cause soil erosion and spread NNIS. However, each alternative has Forest-wide standards and guidelines to reduce erosion and sedimentation impacts and to provide normal drainage control on designated trails (ARR-4, ARR-10, Goal 2.1 and associated standards and guidelines, REC-29 and Objective 17.3a). Forest-wide standards and guidelines outline combating NNIS establishment and spread through project level prevention and treatment efforts (FH-1), equipment cleaning (FH-8), and use of native plants for restoration (FH-10 and FH-11).

- **Uneven-aged** methods can open the canopy and increase light penetration into forested stands. An established Forest-wide standard (TES-8) directs the Forest Service to maintain at least 60% canopy cover in all stands treated with uneven-aged. Opening the canopy during logging could impact semi-shade environment or remove a tree supporting the species. Each alternative has Forest-wide standards and guidelines that require filterstrips along riparian systems (ARR-5 and 6), which would help protect pigeon grape habitat in most areas. Since 60% of the canopy cover is retained during this management activity, the impacts on pigeon grape habitat would be minimal.
- **Even-aged management** involves harvests from 2-30 acres in size. These methods will impact habitat of these species by increasing light levels to the understory. Known populations of this species would be protected (Goal 5.2, TES-32). The use of even-aged management in riparian areas would not be common and any impacts on potential habitat would be short-term since stands and potential habitat would regenerate over time.
- Both uneven- and even-aged vegetation management could have impacts on suitable habitat, through vegetation removal; construction of roads, skid trails and log landings; alterations in light environments and increasing the likelihood for NNIS invasion. Skid trails and log landings are temporary in stature and are rehabilitated after use to control any erosion or NNIS concerns. Each alternative has Forest-wide standards and guidelines to address non-native invasive species establishment and spread during construction activities.
- **Prescribed fire** creates a more open understory and may create snags by killing overstory trees, however the largest impact would be the mortality of seedlings and saplings of shade tolerant tree species. Fire has been identified as a threat to the species, however burning in riparian areas would likely result in mosaic patterns due to mesic conditions. This would reduce the likelihood of direct

impacts from fire on the species. Creation of snags could increase light penetration, however the killing of overstory trees would likely be similar to natural tree mortality and should not have significant effects on light environments for the species.

- The **construction of firelines** using bulldozers for prescribed fire activities could result in soil disturbance, soil compaction, removal of vegetation and increased susceptibility for invasion by NNIS, whereas firelines constructed by hand would only affect the litter layer. The Forest Service attempts to use existing roads and fire breaks to avoid constructing fire line (FIRE-7) and minimize erosion (FIRE-12 and FIRE-13). Construction of fireline in riparian areas would be unlikely since streams could be used as natural firelines and filterstrip requirements (ARR-5).
- **Mechanical reduction of hazardous fuels** could impact pigeon grape or its habitat if supporting trees were cut. Reduction activities involve cutting and possible removal of woody materials on the ground. It is possible that a leaning or standing tree could be felled, either as part of the fuels reduction work or to protect workers from a potential hazard tree. Pre-project surveys of the treatment area and identified hazard trees would occur to determine if pigeon grape occurred prior to project implementation. Dragging and movement of woody fuels may disturb soils, but would be mitigated by Forest-wide standards and guidelines in all alternatives. Construction of roads, trails and landings during hazard fuel treatment projects would have similar impacts as those discussed for roads and trails.
- **Surface coal mines** could alter and remove surface soils and vegetation, and subsequently degrade existing habitat. Approximately 1,250 acres of NFS land could be affected by surface mining in the future. The Forest Service has no control over this projected activity since private mineral rights are involved. However, the operator would need to follow state regulations for reclamation of the surface.
- **Oil and gas activities** have the potential to affect habitat in a similar manner as roads and trails. Effects from road and well pad construction are long-term since they remain in use until mineral resources are depleted. Once depleted the operators are required to restore the areas they disturbed (Obj. 10.2a and b, MIN-2, MIN-8). Forest-wide standards and guidelines incorporated in all alternatives can mitigate the effects of oil and gas exploration and development (i.e., filterstrips, stream crossings, stabilizing disturbed areas, NNIS prevention and analysis, NSO on steep slopes and riparian areas). For reserved and outstanding rights oil and gas wells, operators must follow state regulations which

include best management practices for protecting natural resources. All alternatives project up to 121 acres (0.0005% of the Forest) could be disturbed from oil and gas well development over the next decade. Some potential habitat could be lost temporarily; however the amount is not expected to significantly affect the overall amount of habitat or the viability of this RFSS species.

- **Brine or oil spills** could occur during oil and gas well operations, although they are rare. The operator is required to construct berms around the wells to contain any oil leaks. The brine is required to be removed by tank truck. Each alternative has Forest-wide standards and guidelines that require the installation of control valves on all pipelines crossing streams so that supply and flow of oil and gas can be shut down immediately upon detection of a leak until repairs and cleanup have occurred (MIN-3, 4, 5).
- **Road decommissioning** and **reclamation of orphan gas and oil wells** activities may have initial affects on habitat similar to road construction and oil and gas construction, but over the long-term closures may increase the acres of suitable habitat and benefit the environment by preventing future impacts.
- **Construction of utility corridors**, specifically buried transmission lines, cause ground disturbance, soil compaction, alterations of vegetation structure and composition, and make areas more susceptible to invasion by non-native invasive species. Other **special use permits**, such as road access and grazing permits, have similar affects on local soils and vegetation. Overall, these activities are projected to impact 50 acres over the next decade, or 0.0002% of the Forest. The overall small amount of area impacted, in combination with the probability of affecting potential habitat, is unlikely to impact population viabilities for this species.
- **Herbicides** use will primarily involve selective, spot spraying to avoid affecting non-target vegetation. Each alternative contains Forest-wide standards and guidelines that emphasize proper use of herbicides to protect non-target vegetation (FH 17, 18, 19, 20, 21). Although selective vegetation management is preferred for utility or other rights-of-way or easements, use of herbicides may occur in areas with written Forest Supervisor approval. Aerial spraying of herbicides is sometimes conducted on utility corridors that have outstanding rights. Special use permits for utility corridors would contain provisions for all herbicide use and require permittees to abide by Forest-wide standards and guidelines. By following standards and guidelines for herbicide usage, the potential for herbicides to drift onto suitable habitat, or an individual, would be low.

- **Creation of permanent wildlife openings, construction of small lakes, ponds and waterholes** all have the potential to affect species and their habitat. However, creation of openings is primarily from the designation of existing open land on acquired properties (WLF-4, 5, 6). Impounding a stream to create lakes or ponds is unlikely, since most ponds constructed, in the past, were a result of reclamation efforts. Waterhole construction would be built in forested areas already disturbed by other project activities (e.g. timber harvests), thus tree removal would not occur primarily for waterhole construction. While these activities could potentially impact trees supporting pigeon grape, they are unlikely to occur in pigeon grape habitat.
- **Grape vine control** and **crop tree release** involve the treatment of young, even-aged stands (15-25 years old) by ground crews. While cutting of vines and trees supporting vines could impact this species, all alternatives contain Forest-wide standard and guidelines (VEG-14) which prohibits cutting of pigeon grapes.
- Watershed improvements involve **treatment of AMD** and **closure of subsidences and open portals** that present safety concerns and/or contribute to AMD. These activities could involve vegetation removal, soil disturbance and compaction by machinery, and increased susceptibility to NNIS invasion. Approximately 502 acres are projected for treatment, or 0.002% of the Forest. Improvement activities occur within areas heavily impacted by underground and surface mining activities which often offer low quality habitat. The likelihood that these species would occur initially in these highly disturbed areas are low, however after improvement activities, these areas could provide suitable habitat conditions for establishment. NNIS impacts will be lessened by reseeding guidelines (WSH-6, 7) and management (Goal 7.2 and associated standards and guidelines).
- **Installation of bat-friendly gates** involves the removal of small amounts of soil around mine openings in order to sink gates below ground surface. Removal of soil in these areas could directly impact any plants or habitat present. Soils removed during installation are returned afterwards to pre-installation conditions to avoid changing airflows and micro-environments, thus retaining any seedbanks that may exist for the species. Many of the areas impacted by installation are devoid of vegetation due to any combination of dense shade, acid mine drainage, or soil compaction by human use. Occasionally, trees occur near or above mine openings that may need to be removed. Pre-implementation evaluation of these sites would determine if trees with pigeon grape occurred. The small amount of soil disturbance coupled with

the small probability of potential habitat occurring in these areas makes this impact insignificant.

- Up to 400 acres of **land exchange** could occur in the first decade of the plan. Land exchange can be beneficial (e.g., acquiring potential habitat, or actual populations of RFSS), but could be negative if such habitat was exchanged into private ownership. Each exchange is reviewed by Forest Service biologists to identify any potential impacts to RFSS.

Summary of Direct and Indirect Effects

As indicated by the historic and current habitat outcomes, pigeon grape is not widespread in distribution across the planning area (Table 13) This species is primarily confined to forested, riparian areas. During the 1800s and early 1900's areas containing habitat for this species were degraded during the industrial boom of southeast Ohio.

Since the Depression, forest cover has increased across Ohio and along riparian corridors within the proclamation boundary (National Landcover Database, 1992). Reforestation activities have increased the amount of potential habitat for this species. Continues efforts to improve riparian habitats will improve suitable habitat as well, however the ability of this species to disperse and colonize these areas is inhibited by current population isolation.

Cumulative Effects

Riparian habitat quality has improved on the landscape since the Forest Service began acquiring land in southeast Ohio. Some areas remain impacted, but projects to rehabilitate heavily impacted areas (e.g. strip mines, agricultural fields) overtime will continue to provide more areas with suitable habitat for this species.

Loss of suitable habitat could occur on private lands within the WNF proclamation boundary in the future, primarily from construction of roads and homes, oil and gas wells, and surface mining activities. There is a possibility that any of these activities could impact suitable habitat for, or existing populations of, this species. However, with the exception of the potential 1,250 acres of surface mining, these activities would not be expected to increase significantly from current levels. Any potential adverse cumulative effects that may occur on NFS lands as a result of implementing any of the alternatives would be mitigated through the implementation of the protective Forest-wide standards and guidelines that are incorporated into all alternatives (Table 14).

Determination of Effect

Each alternative may impact individuals, but no alternative is likely to cause a trend toward federal listing or loss of viability (Table 15).

Table 13. Comparison of habitat outcomes for Regional Forester sensitive species on NFS lands.

Species	Historic /Current	Alt. A			Alt. B			Alt. C			Alt. D			Alt. E			Alt. E_{mod}			Alt. F		
Decade		2	5	10	2	5	10	2	5	10	2	5	10	2	5	10	2	5	10	2	5	10
Mammals																						
Bobcat	A/B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Black bear	A/B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Birds																						
Henslow's sparrow	+/D	D	E	E	D	E	E	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
Cerulean warbler	A/B	B	B	B	B	B	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Amphibians																						
Hellbender	E/E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Reptiles																						
Timber rattlesnake	D/E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Fish																						
Eastern sand darter	C/D	D	D	C	D	D	C	D	D	C	D	D	C	D	D	C	D	D	C	D	D	C
Western lake chubsucker	E/E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Ohio lamprey	E/E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Mussels																						
Round hickorynut	C/D	D	D	C	D	D	C	D	D	C	D	D	C	D	D	C	D	D	C	D	D	C
Salamander mussel	C/D	D	D	C	D	D	C	D	D	C	D	D	C	D	D	C	D	D	C	D	D	C
Lilliput	D/D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
Little spectaclecase	D/D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
Insects																						
Grizzled skipper	E/E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Plants																						
Pigeon grape	D/D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
Umbrella magnolia	D/E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Juniper sedge	-/E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Yellow gentian	E/E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Rock skullcap	B/C	C	C	B	C	C	D	C	C	D	C	C	D	C	C	D	C	C	D	C	C	D
Striped Gentian	D/D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
Butternut	B/C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Blue scorpionweed	D/D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
Yellow-fringed orchid	D/D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
Summary of Habitat Outcome Changes from Current Outcomes																						
Positive change		0	0	4	0	0	3	0	0	3	0	0	3	0	0	3	0	0	3	0	0	3
No change		23	22	18	23	22	17	23	23	19	23	23	19	23	23	19	23	23	19	23	23	19
Negative change		0	1	1	0	1	3	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1

+ Habitat for this species did not occur in planning area historically. - Newly described species in 1990's, historical occurrence unknown.

Table 14. Comparison of habitat outcomes for RFSS in the cumulative effects analysis area.

Species	Historic /Current	Alt. A			Alt. B			Alt. C			Alt. D			Alt. E			Alt. E_{mod}			Alt. F		
Decade		2	5	10	2	5	10	2	5	10	2	5	10	2	5	10	2	5	10	2	5	10
Mammals																						
Bobcat	A/B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Black bear	A/B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Birds																						
Henslow's sparrow	+/D	D	E	E	D	E	E	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
Cerulean warbler	A/B	B	B	B	B	B	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Amphibians																						
Hellbender	E/E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Reptiles																						
Timber rattlesnake	D/E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Fish																						
Eastern sand darter	C/D	D	D	C	D	D	C	D	D	C	D	D	C	D	D	C	D	D	C	D	D	C
Western lake chubsucker	E/E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Ohio lamprey	E/E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Mussels																						
Round hickorynut	C/D	D	D	C	D	D	C	D	D	C	D	D	C	D	D	C	D	D	C	D	D	C
Salamander mussel	C/D	D	D	C	D	D	C	D	D	C	D	D	C	D	D	C	D	D	C	D	D	C
Lilliput	D/D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
Little spectaclecase	D/D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
Insects																						
Grizzled skipper	E/E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Plants																						
Pigeon grape	D/D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
Umbrella magnolia	D/E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Juniper sedge	-/E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Yellow gentian	E/E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Rock skullcap	B/C	C	C	B	C	C	D	C	C	D	C	C	D	C	C	D	C	C	D	C	C	D
Striped Gentian	D/D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
Butternut	B/C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Blue scorpionweed	D/D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
Yellow-fringed orchid	D/D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
Summary of Habitat Outcome Changes from Current Outcomes																						
Positive change		0	0	4	0	0	3	0	0	3	0	0	3	0	0	3	0	0	3	0	0	3
No change		23	22	18	23	22	17	23	23	19	23	23	19	23	23	19	23	23	19	23	23	19
Negative change		0	1	1	0	1	3	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1

+ Habitat for this species did not occur in planning area historically. - Newly described species in 1990's, historical occurrence unknown.

Table 15. Summary of the determination of effects for RFSS.

Species	A	B	C	D	E	E_{mod}	F
Mammals							
Bobcat	MI	MI	MI	MI	MI	MI	MI
Black bear	MI	MI	MI	MI	MI	MI	MI
Birds							
Henslow's sparrow	LV	LV	MI	MI	MI	MI	MI
Cerulean warbler	MI	MI	MI	MI	MI	MI	MI
Amphibians							
Hellbender	MI	MI	MI	MI	MI	MI	MI
Reptiles							
Timber Rattlesnake	MI	MI	MI	MI	MI	MI	MI
Fish							
Eastern sand darter	MI	MI	MI	MI	MI	MI	MI
Western lake chubsucker	MI	MI	MI	MI	MI	MI	MI
Ohio lamprey	MI	MI	MI	MI	MI	MI	MI
Mussels							
Round hickorynut	MI	MI	MI	MI	MI	MI	MI
Salamander mussel	MI	MI	MI	MI	MI	MI	MI
Lilliput	MI	MI	MI	MI	MI	MI	MI
Little spectaclecase	MI	MI	MI	MI	MI	MI	MI
Insects							
Grizzled skipper	MI	MI	MI	MI	MI	MI	MI
Plants							
Pigeon grape	MI	MI	MI	MI	MI	MI	MI
Umbrella magnolia	MI	MI	MI	MI	MI	MI	MI
Juniper sedge	MI	MI	MI	MI	MI	MI	MI
Yellow gentian	MI	MI	MI	MI	MI	MI	MI
Rock skullcap	MI	MI	MI	MI	MI	MI	MI
Striped gentian	MI	MI	MI	MI	MI	MI	MI
Butternut	MI	MI	MI	MI	MI	MI	MI
Blue scorpionweed	MI	MI	MI	MI	MI	MI	MI
Yellow-fringed orchid	MI	MI	MI	MI	MI	MI	MI

NI = No impacts

BE = Beneficial effects

MI = May impact individuals, but it is not likely to cause a trend to federal listing or loss of viability

LV = High risk of loss of viability in the planning area, but not likely to cause a trend toward federal listing

Species Proposed for RFSS Designation

Affected Environment

Habitat and behavior information, occurrences in the planning area, and threats to the viability of the species proposed for RFSS designation are identified in Table 16.

Table 16. Affected environment for species proposed for RFSS designation.

Species	Habitat and Behavior	Occurrence	Threats to Viability
Blanchard's cricket frog	Breeding occurs in the spring in permanent or semi-permanent lentic systems with shallow slopes toward the water and mud and bank vegetation (Burkett, 1984; Jung, 1993). It feeds primarily out of water (Brown, 1974; Johnson and Christiansen, 1976) on terrestrial invertebrates and has been observed feeding on land up to 51 inches from the shoreline (Dickson, 2002). For resting, this frog prefers permanent water to temporary pools, and avoids areas with thick vegetation near the surface of the ground (Mount, 1975).	Hanging Rock, Brushy Fork, Pleasant Valley Church and Carter Abel areas on the Western edge of the Ironton Ranger District	Natural succession of bank vegetation around occupied sites is an immediate threat; sedimentation of aquatic habitat from nearby land management activities (Johnson, 2003b).
Butterfly pea	Grows in open to semi-open situations in dry to moist soil in upland woods, borders of prairie openings, and barrens (Burns, 1982b; Gleason and Cronquist, 1991). May respond favorably to prescribed fire (McCartney and Goodwin 2003e).	Ironton Ranger District (Lake Vesuvius and Fradd Hollow areas in Lawrence County)	Encroachment of woody vegetation through natural succession in occupied areas; introduction of non-native invasive species (McCartney and Goodwin, 2003e).
Carolina thistle	It is an open forest or open woodland species (McCartney and Swiezynski, 2003d) and thrives in dry soil with moderate to full exposure to sun; therefore, it does not typically grow in wet habitats or in habitats with dense canopy cover (Burns and Cusick, 1983).	Athens Unit (Buffalo Beats RNA in Athens County); Ironton Ranger District (Lawrence County)	Encroachment of woody vegetation through natural succession in occupied areas; introduction of non-native invasive species (McCartney and Swiezynski, 2003d).
Dwarf iris	In the planning area, the dwarf iris has been found growing in open oak woods and on a dry, open roadbank along a ridgetop (McCartney and Swiezynski, 2003e).	Ironton Ranger District (Lawrence and Scioto counties); Athens Unit (Athens County)	Encroachment of woody vegetation through natural succession in occupied areas; overcollection (McCartney and Swiezynski, 2003e).
Featherbells	It is a facultative wetland plant (Reed, 1988) and is not typically found in upland areas; thrives with filtered sunlight; therefore, it does not typically grow in habitats with dense shade (McCartney and Swiezynski, 2003f).	Ironton Ranger district (Gallia and Lawrence counties)	Encroachment of woody vegetation through natural succession in occupied areas; introduction of non-native invasive species (McCartney and Swiezynski, 2003f).

Species	Habitat and Behavior	Occurrence	Threats to Viability
Four-toed salamander	Mossy vernal pools and boggy areas in mature forest (minimum of 50-year old trees) with a damp forest floor is considered optimal habitat in southern Ohio (Johnson, 2003c). Females construct or use existing cavities in or below moss mats along margins of ponds and bogs (Bishop, 1941; Gilbert, 1941; Wood, 1955; Petranka, 1998). Eggs have also been found in leaf litter, rotted wood, under loose bark, clumps of grasses and rushes, mounds of pine needles (Petranka, 1998) and grass tussocks (Johnson, 2003c). Food consists of insects and other arthropods found on the forest floor (Pfingsten and Downs, 1989). It may spend most of the day on the ground hiding under objects, whereas during cold weather, it is found beneath surface objects or buried beneath the substrate (Bishop, 1941). Logs and other downed woody material is an essential habitat component in the range of this salamander (Harris and Gill, 1980; Wallace, 1984; Saugey and Trauth, 1991).	Ironton Ranger District (Pine Creek watershed)	Loss or decline in habitat quality of vernal ponds; sedimentation of vernal pool habitat; loss of mature forest cover and mature forest travel corridors (Johnson, 2003c).
Green salamander	In most parts of its range, it inhabits crevices in rock outcrops that are usually well-shaded by mixed mesophytic forest; however Pfingsten and Downs (1989) reported that many Ohio populations dwell either on south-facing or unshaded outcrops, perhaps due to their being on the northern edge of the species range. Eggs are laid in the rock crevice and the female broods them for three months until they typically hatch in September (Pfingsten and Downs, 1998).	Ironton Ranger District (Hanging Rock area in Lawrence County)	Loss or decline of habitat quality due to microclimate changes to habitat.
Green-faced clubtail	Its flight season in Ohio is from May through July (Glotzhober and McShaffrey, 2002), during which time mating occurs and eggs are laid in rocky rivers and streams with a mixture of gravelly sand and silt among rocks (Dunkle, 2000). Eggs hatch and larvae spend two years in the stream until it emerges in the late spring or early summer (Glotzhober and McShaffrey, 2002).	Marietta Unit (Little Muskingum River watershed)	Changes in water quality and sedimentation of egg and larval habitat; loss riparian forest that reduces shade and increases water temperatures (Schaeffer, 2003a).
Lined sedge	Dry to mesic woods (Gleason and Cronquist, 1991); filtered light to closed canopy habitat (McCartney and Swiezynski, 2003g).	Ironton Ranger District (Lawrence County)	Removal of canopy (i.e., even-aged management); introduction on non-native invasive species (McCartney and Swiezynski, 2003g).
Little headed nutrush	Habitat in Ohio is xeric oak barrens with dolomite or limestone based soils (R. Gardner, pers. comm.). The two current occurrences on the WNF occur in fire-managed areas.	Ironton Ranger District (Lawrence County)	Fire Suppression; non-native invasive species (R. Gardner, pers. comm.).
Marshes St. John's wort	Swamps, floodplain forests, often on rotting logs or about the bases of trees, wet seepage areas by woodland streams, marshy shores, amongst cypress and gum trees on pond or lake shores (Godfrey and Wooten, 1981).	Ironton Ranger District (Gallia County)	Loss of habitat due to alteration of surface hydrology or non-native invasive species (McCartney and Goodwin, 2003f).

Species	Habitat and Behavior	Occurrence	Threats to Viability
Mud salamander	It is considered a fossorial salamander because it uses burrows that lead down into a series of complex submerged channels in perennial seeps, springs, and slow-flowing headwater streams (1st order) (Petranka, 1998; Johnson, 2003d). Eggs are laid in the fall or early winter, and hatch during late-winter (Petranka, 1998). Larvae hatch and remain in aquatic habitats until metamorphosis, which occurs between 1.5 and 2.5 years following hatching (Bruce, 1978). Adults forage in the wet ground immediately bordering the aquatic habitat (Bishop, 1947), but have been known to prey on smaller salamanders and most small invertebrates (Petranka, 1998).	Ironton Ranger District, Gallia area in the Symmes Creek watershed	Alteration of surface and subsurface hydrology resulting from loss of forest canopy cover and road construction (Johnson, 2003d).
Pale straw sedge	It is found in swamps, low woods, and thickets (Gleason and Cronquist, 1991). On the WNF, it typically grows in wet habitats, commonly found in large wetland complexes that were created or altered by beavers, and prefers open areas receiving ample amounts of sunlight (Gardner, 2001; McCartney and Swiezynski, 2003h).	Ironton Ranger District (Lawrence County)	Changes in hydrology of occupied sites; natural succession of occupied sites; introduction on non-native invasive species (McCartney and Swiezynski, 2003h).
Pinxter flower	Typically grows in moist or dry woods and bogs on acidic, humus-laden soils in shaded or sunny conditions (Gleason and Cronquist, 1991, Hilton Pond Center, 2002). However, it will tolerate dry, sandy or rocky soils (Missouri Botanical Garden, 2003). Well-drained soils are essential, poor drainage inevitably leads to root rot (Missouri Botanical Garden, 2003).	Ironton Ranger District (Lawrence County)	Introduction on non-native invasive species; overcollection; encroachment of woody vegetation through natural succession in occupied areas (McCartney and Swiezynski, 2003i).
Rapids clubtail	Its flight season in July is late-May to mid-July (Glotzhober and McShaffrey, 2002), during which time mating occurs and eggs are laid at the heads of riffles in large streams with gravel in the rocky riffles or rapids (Dunkle, 2000). Eggs hatch and larvae spend two years in the stream until it emerges in the late spring or early summer (Glotzhober and McShaffrey, 2002).	Marietta Unit (Little Muskingum River watershed)	Changes in water quality and sedimentation of egg and larval habitat; loss riparian forest that reduces shade and increases water temperatures (Schaeffer, 2003b).
Sheepnose mussel	The sheepnose is a larger stream species, occurring primarily in shallow shoal habitats with moderate to swift currents over coarse sand and gravel, but some individuals may occur in deeper run habitat (USFWS, 2002).	Not within the proclamation boundary, but in the Ohio River in the vicinity of the WNF (Belville-Meldahl pools)	Sedimentation and acid mine drainage (USFWS, 2002).
Smooth beardtongue	Appears to favor edge on the WNF, but has been found in meadows and moist or dry woods (Gleason and Cronquist, 1991) and in low meadows and forest edges, in moist but sandy soil (Radford et al., 1968) in other parts of its range.	Marietta Unit (Monroe County)	Changes in light from encroachment of woody vegetation through natural succession in occupied areas; non-native invasive species; mortality of NFS population from illegal off-road vehicle trail use (McCartney and Goodwin, 2003g).

Species	Habitat and Behavior	Occurrence	Threats to Viability
Sparse-lobed grape fern	Grows in bottomland forests to mesic forests in ravines and semi-shaded, moist sites, but not swamps or wetlands (Steyermark, 1963; McCartney and Goodwin, 2003h).	Ironton Ranger District (Lawrence County)	Changes in microclimate due to canopy reduction; introduction of non-native invasive species (McCartney and Goodwin, 2003h).
Tall nut rush	Habitat is variable within its range, but on the WNF, populations have been found in open oak woods and an oak barren. The Wayne is on the northern edge of its range and therefore it may demand a greater open condition than in other parts of its range due to lower light intensity (J. Dumke and R. Gardner, pers. comm.).	Ironton Ranger District (Lawrence County)	Encroachment of woody vegetation through natural succession in occupied areas; introduction of non-native invasive species (McCartney and Goodwin, 2003i).
Yellow crownbeard	It occurs in open to semi-open habitats in pastures, roadsides, meadows, and floodplains (McCartney and Goodwin, 2003j).	Ironton Ranger District (Gallia and Lawrence counties)	Decline of habitat quality due to encroachment of woody vegetation through natural succession in occupied areas; introduction of non-native invasive species (McCartney and Goodwin 2003j).

Direct, Indirect and Cumulative Effects

The habitat outcome (also known as viability outcome in the species viability evaluations) was determined for historic, current and likely future environmental conditions for species proposed for RFSS designation on NFS lands for each alternative. The habitat outcome is a judgment, based on scientific information found in the literature and from discussion with taxonomic experts. It should be thought of as an index of the capability of the environment to support population abundance and distribution of these species, but not as an actual prediction of population occurrence, size, density or other demographic characteristics (T. Schenck, pers. comm.). The likely habitat outcomes for species proposed for RFSS designation that could be supported by conditions on NFS lands (i.e., direct and indirect effects of alternatives) and on all lands (i.e., cumulative effects of alternatives) under each alternative are defined in Tables 10 and 11, located in the previous effects analysis for RFSS.

The historical, current and future habitat outcomes were determined by the Forest Service after review of the species data collection forms compiled during the species viability evaluation process, and after discussions with the taxonomic experts. Some species proposed for RFSS designation were not included in the species viability evaluation process, but were only recently documented within the WNF proclamation boundary. Habitat outcomes for these species were determined by the Forest Service after review of literature and discussions with taxonomic experts.

Analysis of direct, indirect, and cumulative effects focused on the risk factors pertinent to the species within the planning area and within the control of the Forest Service. The assessment of future habitat conditions, distribution and quality were based on the knowledge of the species distributional range and life history. Most of these species occur naturally in localized or patchy distributions, and would not occur in the conditions described in habitat outcomes A-C because their natural condition may be D or E. A judgment of historical environmental conditions provides a reference or context within which to evaluate the impacts to evaluate the impacts of the alternatives. The cumulative effects analysis area was defined as all lands within the WNF proclamation boundary.

Blanchard's Cricket Frog

The range of this species continues to constrict and move westward. Natural succession of areas around occupied ponds and wetlands poses the primary threat to this species; however sedimentation of its habitat is also a concern. These threats are best addressed at the project level.

Activities with No Impact

There are some activities that could occur over the next decade that would not affect the integrity of ponds or wetlands located in open areas. These activities include:

- Timber harvesting – suitable habitat would not occur in a forested setting
- Restoration of lentic habitat
- Installation of bat-friendly gates
- Reduction of hazardous field using mechanical methods – suitable habitat would not occur in areas where fuels reduction would be necessary

Activities with Beneficial Effects

National Forest activities which protect and improve water quality in ponds or wetlands that occur in open areas would benefit this species, as would activities that reduce encroachment of woody vegetation around these aquatic habitats.

Each alternative incorporates Forest-wide goals (2.1 and 3.1) and objectives (2.1a-c, 3.1a-d) which promote the restoration and improvement of riparian and watershed health. Each alternative also includes numerous Forest-wide standards and guidelines that protect aquatic resources from potential sources of non-point source pollution.

Beneficial management activities that are projected to occur during the first decade of implementation of the alternatives include:

- Wetland restoration
- Road decommissioning
- Reclamation of orphan or depleted oil and gas wells
- Treatment of abandoned mine land features that contribute to acid mine drainage conditions
- Closure of open mine features that contribute to acid mine drainage conditions
- Surface mine reclamation
- Stabilization of disturbed areas
- Land acquisition
- Land exchange
- Herbicide application to reduce encroachment of woody vegetation
- Development and maintenance of permanent openings adjacent to ponds and wetlands
- Control of non-native invasive species (all methods)
- Construction of ponds, lakes, and waterholes
- Agricultural crop production and grazing in areas with occupied habitat may aid in maintaining appropriate vegetative conditions

Activities that May Impact Individuals, but Not Likely to Cause a Trend toward Federal Listing or Loss of Viability

The following activities have the potential to adversely affect water quality or suitable habitat conditions around pond and wetland margins, however Forest-wide standards and guidelines reduce or eliminate potentially adverse effects.

- Reforestation (around occupied or potentially suitable habitat)
- Site prep for native pine
- Construction of roads and trails and recreational facilities
- Development of mineral resources
- Utility corridor development in the vicinity of occupied habitat
- Land exchange may be beneficial, but could impact individuals if unknown occupied habitat was exchanged

Summary of Direct and Indirect Effects

The alternatives would have no effect on the Blanchard's cricket frog in areas where it is known to be present. Forest-wide guidance (TES-36) is

incorporated into the alternatives that allow localized removal of vegetation to reduce woody encroachment to maintain or improve habitat for RFSS. Ground-disturbing activities that could cause sedimentation of aquatic habitats could occur in varying degrees in each alternative. However, the habitat outcomes for the Blanchard's cricket frog are not expected to change with implementation of any alternative, in the short-term or in the long-term (Table 17, found at the end of this section). In addition to incorporating specific goals and objectives for sustaining riparian and ecological processes and aquatic and riparian-dependent plant and animal communities (Goal 3.1, Objectives 3.1a-d), each alternative has incorporated Forest-wide standards and guidelines that minimize the potential for sedimentation of habitat, or changes in water quality (see Goal 2.1, Managing Disturbed Areas and Soil Resources). These include measures on how or when to: stabilize disturbed areas and implement erosion control practices. Each alternative also contains Forest-wide standards and guidelines that specifically address management in riparian corridors, including the use of filterstrips to minimize sedimentation of aquatic habitats (ARR-5 and ARR-6). Past monitoring of vegetation management projects on the Wayne-Hoosier National Forest indicated that projects in compliance with Forest Plan standards and guidelines were not exhibiting significant soil and water resource problems (USDA Forest Service, 1988). A controlled surface use stipulation in riparian areas has been placed on all federal oil and gas leases to ensure aquatic and riparian habitat integrity is maintained during oil and gas development and extraction activities.

Cumulative Effects

Aquatic habitat is limited in abundance in the WNF proclamation boundary, but the majority of ponds and wetlands are found on NFS lands. However, private lands offer some habitat where small ponds occur in cattle pastures or in hayfields that are mowed. The vegetation around the banks of these small ponds is likely to be maintained in suitable conditions for this species by this private land management regime. Ground-disturbing activities do occur on private lands, but the potential for large-scale impacts to this relatively uncommon resource are not expected. No cumulative adverse effects are expected to occur to this species or its habitat as a result of implementing any of the alternatives; therefore it is unlikely habitat outcomes would change with implementation of any alternative, in the short-term or in the long-term (Table 18, found at the end of this section).

Determination of Effect

Though the probability is low, each alternative may impact individuals, but no alternative is likely to cause a trend toward federal listing or loss of viability (Table 19, found at the end of this section).

Mud Salamander

Activities with No Impact

Please refer to the discussion of *Activities with No Impact* for the aquatic RFSS, in the previous section. Those effects would be the same for the mud salamander.

Activities with Beneficial Effects

Please refer to the discussion of *Activities with Beneficial Effects* for the aquatic RFSS, in the previous section. Those effects would be the same for the mud salamander. In addition, each alternative incorporates specific Forest-wide guidance for the protection of spring habitat (ARR-29).

Activities that May Impact Individuals, but Not Likely to Cause a Trend toward Federal Listing or Loss of Viability

Please refer to the discussion of *Activities that May Impact Individuals, but Not Likely to Cause a Trend toward Federal Listing or Loss of Viability* for the aquatic RFSS, in the previous section. Those effects would be the same for the mud salamander.

Summary of Direct and Indirect Effects

Perennial springs and seeps are not very common on the WNF. Mining and land clearing that occurred since the 1800s may have altered surface and subsurface hydrology and may have subsequently reduced the number of springs and seeps.

Management activities that could affect spring or seep habitat for this species may occur in any of the alternatives. These activities include timber harvesting, road construction or reconstruction, trail construction, construction of recreational facilities, and oil and gas well development.

While these activities are projected to occur in varying amounts in the alternatives, the habitat outcomes for this species proposed for RFSS designation are not expected to change with implementation of any alternative, in the short-term or in the long-term (Table 17, found at the end of this section). In addition to incorporating specific goals and objectives for sustaining riparian and ecological processes and aquatic and riparian-dependent plant and animal communities (Goal 3.1, Objectives 3.1a-c), each alternative has incorporated a Forest-wide guideline specifically for the purpose of protecting spring habitat from potential effects of canopy removal or ground-disturbing activities (ARR-29).

There is a possibility that a 1,200 acre surface mine could occur on the Ironton Ranger District in the future. This activity is outside the control of the Forest Service. A 1999-2000 Forest Service abandoned mine land

survey covered large portions of the Pine Creek watershed and some portions of the Symmes Creek watershed, both on private and public lands. Any springs and seeps were noted, and this information was provided to taxonomic experts who looked for mud salamanders at these sites. None of the springs or seeps contained suitable habitat for the mud salamander. The location of this surface mine is in the Pine Creek watershed, and the trend in lack of suitable habitat elsewhere in the watershed is most likely to be the same for this tract of land. However, in the event the mine becomes a reality, a project-level review of habitat for this species and others would occur.

Cumulative Effects

The two occupied sites within the planning area include a large spring that serves as a water source for local residents and a small spring on NFS lands. Because the large spring is used by people for drinking water, care is taken by the local residents to protect it. Activities that could affect perennial springs and seeps on NFS lands may also occur on private and state-owned lands in the future, but implementation of protective measures are left to the discretion of the land manager or property owner. However, springs and seeps are not common features on the landscape. No cumulative adverse effects are expected to occur to this species or its habitat as a result of implementing any of the alternatives; therefore it is unlikely habitat outcomes would change with implementation of any alternative, in the short-term or in the long-term (Table 18, found at the end of this section).

Determination of Effect

Though the probability is low, each alternative may impact individuals, but no alternative is likely to cause a trend toward federal listing or loss of viability (Table 19, found at the end of this section).

Four-toed Salamander

Activities with No Impact

Some management activities may occur over the next decade which would not affect forest canopy or the integrity of vernal pools. Such activities include:

- Crop tree release
- Grape vine control
- Herbicide application
- Control of non-native invasive species
- Restoration of lentic or lotic habitat

- Installation of bat-friendly gates
- Agricultural crop production and grazing on existing agriculture lands
- Restoration of lentic and lotic habitat
- Waterhole construction
- Maintenance of existing permanent forest openings

Activities with Beneficial Effects

All alternatives incorporate Forest-wide standards and guidelines to protect vernal pool habitat that is used by this species during reproduction (ARR-23). In addition, occupied habitat would be protected during implementation of all projects (TES-32). In addition to these conservation measures, the following management activities that may occur in the next decade could be beneficial to this species:

- Land acquisition
- Land exchange
- Reclamation of abandoned mine lands, stabilization of disturbed areas, restoration of orphan and depleted wells
- Restoration of wetlands.

Activities that May Impact Individuals, but Not Likely to Cause a Trend toward Federal Listing or Loss of Viability

Certain management activities which may occur in the first decade could adversely impact suitable four-toed salamander habitat. These activities include:

- Canopy removal during timber harvest activities (even-aged timber harvesting would reduce canopy levels more so than uneven-aged or thinning methods)
- Site prep for native pine
- Prescribed fire when individuals are active
- Development of permanent openings
- Fishing pond/lake construction
- Road, trail or facilities construction
- Mineral development activities
- Mechanical removal of hazardous fuels
- Development of utility corridors

- Land exchange may be beneficial, but could impact individuals if unknown occupied habitat was exchanged
- Utility corridor construction.

Summary of Direct and Indirect Effects

This species has been found in two sites on the Ironton Ranger District, both in the Bear Run area. One of the sites is atypical for four-toed habitat. Larvae were found in a roadside ditch on a ridgetop with some cattails, located under a powerline cut and adjacent to scrubby woods (Johnson, 2003c). Loss of mature forest canopy or alteration of vernal pools could affect this species.

Management activities which could reduce canopy cover or affect vernal pools include even-aged timber harvesting, construction of roads, trails, or recreation facilities, development of oil and gas wells, surface mining, and development of utility corridors.

The alternative should have no effect on vernal pool habitat. Each incorporates a measure to protect ephemeral wetlands (i.e., vernal pools) by avoiding them during ground-disturbing activities (ARR-23).

There are 73,388 acres of even-aged mature forest (80+ years) present on the WNF today. Some other NFS acres have been treated with uneven-aged management in recent years, but there are no acres categorized as having three or more age classes. Within 100 years, each alternative would result in a net increase of mature forest habitat. Alternative A allocates all of the WNF to uneven-aged management and to natural succession prescriptions, so it is assumed that the entire landbase would be covered by mature forest at some point in the future (i.e., with the exception of roads, lakes, etc.). The majority of forest cover on the WNF would also be categorized as mature forest habitat in the remaining alternatives (in order of decreasing percent composition): F (86.8%) → C (82.4%) → D (81.9%) → E_{mod} (81.2%) → E (80.9%) → B (78.5).

In 100 years, almost 79% of the WNF may be covered by mature forest habitat in Alternative B, but more of the WNF is allocated to even-aged management. Approximately 6,500 acres would be harvested by even-aged methods each decade. Even-aged management can temporarily fragment mature, contiguous forest until the stand once again reaches a successional stage that is no longer an ecological barrier to forest-interior species (Rosenberg et al., 2003). It is possible that dispersal of this species could be adversely affected based upon the potential for periodic habitat fragmentation of mature forest communities on a landscape scale. Therefore the long-term habitat outcome for this species could be reduced (Table 17, found at the end of this section).

Prescribed fire may affect the species or habitat, but no information was found to about this in the literature. However, prescribed fire has the potential to change the microclimate of the forest floor, and can temporarily reduce invertebrate abundance (Boehner, 2000). Prescribed fire is an integral component of Historic Forest and Historic Forest Management Areas, found in Alternatives C-F. Short-term and long-term habitat outcomes could be reduced in Alternatives D-F because a Historic Forest management prescription would be applied in proximity to known locations of this species. NFS lands in this area could be treated with prescribed fire as much as twice per decade. The effects may be reduced to a degree since prescribed fire in mesic areas (i.e., preferred habitat) is more likely to be of a low intensity and more likely to burn in a mosaic pattern because of the moist conditions. Each alternative incorporates guidance (WLF-2) that encourages mosaic pattern burning for these reasons.

Cumulative Effects

Activities that could affect ephemeral wetlands and mature forest on NFS lands may also occur on private and state-owned lands in the future, but implementation of habitat protection measures are left to the discretion of the land manager or property owner. It is likely that activities on NFS lands would not result in cumulative effects to this species in Alternatives A or C (Table 18, found at the end of this section). However, Alternatives B could have adverse cumulative effects in relation to the ability of individuals to disperse between suitable habitat patches. This would not likely occur until after several decades of alternative implementation. Alternatives D, E and F could have adverse cumulative effects to the habitat quality of this species due to prescribed fire activities. Known occupied areas would be protected (TES-32), but the microclimate could be altered in undocumented sites.

Determination of Effect

Though the probability is low, each alternative may impact individuals, but no alternative is likely to cause a trend toward federal listing or loss of viability (Table 19, found at the end of this section).

Green Salamander

Activities with No Impact

Certain projected management activities could occur in the next decade but would not likely pose any impact on the green salamander or its habitat. These projects would not occur near or affect rock outcrop habitat:

- Crop tree release
- Grape vine control

- Site prep for native pine
- Prescribed fire
- Mechanical fuels reduction
- Herbicide application
- Maintenance of existing forest openings
- Control of non-native invasive species
- Wetland restoration
- Pond, lake, or waterhole construction
- Restoration of lentic or lotic habitat
- Road decommissioning
- Agricultural crop production and grazing
- Abandoned mine land reclamation and stabilization of disturbed areas.

Activities with Beneficial Effects

The importance of rock outcrop habitat is recognized in each alternative. Forest-wide standards do not allow vegetation management within certain distances of rock outcrops in order to maintain a closed-canopy condition (TES-33 and TES-34). Other beneficial management activities which may occur in the next decade are:

- Reforestation
- Land acquisition
- Land exchange

Activities that May Impact Individuals, but Not Likely to Cause a Trend toward Federal Listing or Loss of Viability

Some management activities have the potential to reduce canopy cover near rock outcrop habitat; however the effects would be minimal at most because of the established conservation measures that have been incorporated into each alternative (TES-33 and TES-34):

- Timber harvest
- Development of permanent openings
- Road, trail and facility construction
- Utility corridor development
- Land exchange may be beneficial, but could impact individuals if unknown occupied habitat was exchanged.

Summary of Direct and Indirect Effects

A population of 18 individuals was recently identified on the WNF. It is limited in its distribution to rock outcrops. Prefers deep moist cracks in limestone cliffs during the day and ventures out onto the cliff face as night approaches in search of food. Alteration of the microclimate of the rock outcrop could affect the species.

Habitat outcomes are not expected to change with the implementation of any alternative, in the short-term or the long-term (Table 17, found at the end of this section). Two established Forest-wide standards (TES-33 and TES-34) protect large and small rock outcrops, rock shelters and rock faces from changes in microclimate that could result from canopy alteration activities.

Cumulative Effects

The species distribution in the WNF proclamation boundary is limited to Lawrence and Scioto counties (Pfingsten and Downs, 1989; ODNR, 2004). Rock outcrops occur on private lands in the Ironton Ranger District, especially along the Ohio River. Management of these lands are under the discretion of the private landowner, but based on visual observations over the last ten years, only small amounts of forest cover have been impacted in this area. It is possible that some vegetation removal could occur around rock outcrops on private land in the future, but these sites generally occur in steep and inaccessible places. Therefore large-scale impacts are not expected to occur. No cumulative adverse effects are expected to occur to this species or its habitat as a result of implementing any of the alternatives; therefore it is unlikely habitat outcomes would change with implementation of any alternative, in the short-term or in the long-term (Table 18, found at the end of this section).

Determination of Effect

Though the probability is low, each alternative may impact individuals, but no alternative is likely to cause a trend toward federal listing or loss of viability (Table 19, found at the end of this section).

Rapids Clubtail and Green-faced Clubtail

Activities with No Impact

Please refer to the discussion of *Activities with No Impact* for the aquatic RFSS, in the previous section. Those effects would be the same for the rapids clubtail and the green-faced clubtail.

Activities with Beneficial Effects

Please refer to the discussion of *Activities with Beneficial Impacts* for the

aquatic RFSS, in the previous section. Those effects would be the same for the rapids clubtail and the green-faced clubtail.

Activities that May Impact Individuals, but Not Likely to Cause a Trend toward Federal Listing or Loss of Viability

Please refer to the discussion of *Activities that May Impact Individuals, but Not Likely to Cause a Trend toward Federal Listing or Loss of Viability* for the aquatic RFSS, in the previous section. Those effects would be the same for the rapids clubtail and the green-faced clubtail.

Summary of Direct and Indirect Effects

Habitat on the WNF for the rapids clubtail and green-faced clubtail is limited to the Little Muskingum River, and specifically to its larger riffle habitat (Schaeffer, 2003a; 2003b). It was most likely limited in distribution to this stream historically since there are no indications that any other WNF stream system possessed the habitat required by this species.

Management activities that could affect water quality or riffle habitat for these species may occur in any of the alternatives. These activities include timber harvesting, road construction or reconstruction, trail construction, construction of recreational facilities, and oil and gas well development.

While these activities are projected to occur in varying amounts in the alternatives, the habitat outcomes for these two species proposed for RFSS designation are not expected to change with implementation of any alternative, in the short-term or in the long-term (Table 17, found at the end of this section). In addition to incorporating specific goals and objectives for sustaining riparian and ecological processes and aquatic and riparian-dependent plant and animal communities (Goal 3.1, Objectives 3.1a-c), each alternative has incorporated Forest-wide standards and guidelines that minimize the potential for sedimentation of habitat, or changes in water quality (see Goal 2.1, Managing Disturbed Areas and Soil Resources). These include measures on how or when to: stabilize disturbed areas and implement erosion control practices, construct or improve stream crossings (ARR-7 to ARR-12), and allow or prohibit removal of material from streams (ARR-18). Each alternative also contains Forest-wide standards and guidelines that specifically address management in riparian corridors, including the use of filterstrips to minimize sedimentation of aquatic habitats (ARR-5 and ARR-6). Past monitoring of vegetation management projects on the Wayne-Hoosier National Forest indicated that projects in compliance with Forest Plan standards and guidelines were not exhibiting significant soil and water resource problems (USDA Forest Service, 1988). A controlled surface use stipulation in riparian areas has been placed on all federal oil and gas leases to ensure aquatic and riparian habitat integrity is maintained during

oil and gas development and extraction activities. In addition to these measures, the Little Muskingum River mainstem is included in the River Corridor Management Area, which emphasizes retaining, restoring and enhancing the inherent ecological processes and functions associated with riverine systems.

Cumulative Effects

The Little Muskingum River watershed has been impacted by past land clearing, agricultural production, and oil and gas development, however over time it has reforested and a significant portion of the mainstem attains Ohio EPA Exceptional Warmwater Habitat status (USDA Forest Service, 2002). A minimal amount of timber harvesting occurs on private lands, but these activities are generally small in size and are scattered across the watershed rather than being concentrated in one area. An evaluation of logging best management practices on private lands indicated that best management practices were employed in at least 80% of all timber harvests and 95% of these best management practices were rated effective at minimizing sedimentation of streams (McClenehen et al., 1999). Oil and gas development on private lands is likely to continue at current levels, or slightly increase in the foreseeable future based on reasonably foreseeable development trends for federal energy minerals. The topography is steep in the Little Muskingum River watershed and it is likely that some sedimentation could occur from township and county roads, or privately-owned roads, in the future. The added impact of Forest Service activities on NFS lands could have a minimal adverse effect on water quality and sedimentation of habitats, but mitigation measures incorporated into each alternative would reduce the cumulative impact to the point where it is unlikely habitat outcomes would change with implementation of any alternative, in the short-term or in the long-term (Table 18, found at the end of this section).

Determination of Effect

Though the probability is low, each alternative may impact individuals, but no alternative is likely to cause a trend toward federal listing or loss of viability (Table 19, found at the end of this section).

Sheepnose

Activities with No Impact

Please refer to the discussion of *Activities with No Impact* for the aquatic RFSS, in the previous section. Those effects would be the same for the sheepnose.

Activities with Beneficial Effects

Please refer to the discussion of *Activities with Beneficial Impacts* for the aquatic RFSS, in the previous section. Those effects would be the same for the sheepnose.

Activities that May Impact Individuals, but Not Likely to Cause a Trend toward Federal Listing or Loss of Viability

Please refer to the discussion of *Activities that May Impact Individuals, but Not Likely to Cause a Trend toward Federal Listing or Loss of Viability* for the aquatic RFSS, in the previous section. Those effects would be the same for the sheepnose.

Summary of Direct and Indirect Effects

The sheepnose does not occur within the WNF proclamation boundary (Watters, 1988; Hoggarth, 2001), but exists in the Ohio River downstream of NFS lands. It is a larger stream or river species. Streams within the WNF are primarily small, headwater streams; however larger Ohio River tributaries do pass through the proclamation boundaries. These larger tributaries (i.e., Pine Creek, Storms Creek, Raccoon Creek, Hocking River, and Little Muskingum River) do not possess the habitat qualities desired by the sheepnose. Its host fish is the sauger (Watters, 1995), and it does occur within the proclamation boundary in Pine Creek and Symmes Creek. Threats to the sheepnose and its habitat from National Forest management activities are sedimentation of aquatic habitats or changes in water quality from ground disturbing activities. Threats to the sauger and its habitat are the same.

In all cases, the likelihood is very low that the alternatives and the associated management activities projected to occur in the first decade could affect aquatic habitat or populations of sheepnose or sauger to the point where habitat outcomes would be decreased (Table 17, found at the end of this section). As described for the rapids clubtail and green-faced clubtail, protective measures incorporated into each alternative would minimize the potential for management activities to degrade water quality or aquatic habitat. It is possible that ongoing and future efforts to restore mining-degraded aquatic systems on the Ironton Ranger District could result in the recolonization of currently uninhabitable sections portions of Pine Creek by the sauger.

Cumulative Effects

Ground-disturbing activities will likely occur on other lands in the WNF proclamation boundary in the future which could result in sedimentation of aquatic habitat, but as explained in the effects analysis for the rapids clubtail and green-face clubtail, efforts are being made by other landowners to minimize sedimentation of aquatic habitats. Efforts by the

Forest Service, other state and federal agencies, conservation organizations, and private landowners continue to result in improved water quality conditions within the planning area. The added impact of Forest Service activities on NFS lands could have a minimal adverse effect on water quality and sedimentation of habitats, but mitigation measures incorporated into each alternative would reduce the cumulative impact to the point where it is unlikely habitat outcomes would change with implementation of any alternative, in the short-term or in the long-term (Table 18, found at the end of this section).

Determination of Effect

Though the probability is low, each alternative may impact individuals, but no alternative is likely to cause a trend toward federal listing or loss of viability (Table 19, found at the end of this section).

Open Habitat, Early Successional Species

Pale straw sedge, smooth beardtongue and featherbells inhabit disturbed, early successional habitats such as open fields, roadsides, powerline right-of-ways, open woods and forest borders. The primary threat to these species is overgrowth by woody species through succession and non-native invasive species. Pale straw sedge is also threatened by modification of hydrology in known areas of occurrence.

Activities with No Impact

- Timber stand improvement of young stands
- Site prep for native pine (no habitat for smooth beardtongue)
- Restoration of lakes and ponds
- Installation of bat-friendly gates

Activities with Beneficial Effects

Certain management activities that may occur within the first decade could benefit species habitat. These activities improve habitat by maintaining more open habitat, restoring suitable habitat, controlling NNIS that degrade habitat and consolidating federal management of lands.

- Wetland restoration and enhancement would benefit the pale straw sedge by creating or improving potential habitat. These activities would have no impact on smooth beardtongue or featherbells.
- Uneven-aged timber harvesting
- Restoration of stream habitat
- Control of NNIS (mechanical and biological)

- Creation and maintenance of wildlife openings
- Even-aged management
- Watershed improvements (AMD treatment, closure of mine portals/subsidences)
- Land acquisition.

Activities that May Impact Individuals, but Not Likely to Cause a Trend toward Federal Listing or Loss of Viability

Please refer to the discussion of *Activities that May Impact Individuals, but Not Likely to Cause a Trend toward Federal Listing or Loss of Viability* for the fire-adapted RFSS, in the previous section, for explanation of impact for those areas not described below: the effects are the same as those of the fire-adapted RFSS.

- **Construction of roads, trails, recreation facilities and parking lots.** Construction activities with heavy machinery would likely result in soil compaction, erosion and increased susceptibility to NNIS invasion that would not be beneficial to these species. However, in areas where NNIS do not occur, roadsides and created edge habitat could be beneficial for these species.
- Site prep for native pine could disturb habitat for pale straw sedge and featherbells, but the disturbance would be small in scope and a site-level field review would identify suitable habitat to avoid.
- **Prescribed fire.** Direct impacts of fire on these species are unknown. Beneficial effects would include the removal of understory woody vegetation and increased light. Prescribed fire construction could directly impact individuals if present, however, it could provide potential edge habitat for the species.
- Mechanical fuel reduction
- Surface Coal mining
- **Oil and gas activities.** These activities would have similar impacts as the above described road construction activities.
- **Road decommissioning and reclamation or orphan gas and oil wells.** Initially these areas would provide habitat for early successional species, however with time, growth of trees and other woody vegetation would reduce the suitability of habitat for these species.
- **Construction of utility corridors.** Impacts from these and other special use permit activities are similar to those of road construction.

- **Surface mine reclamation and stabilization of disturbed areas.** Theoretically the conversion of these areas back to forested areas would decrease potential habitat for these species, however, in most circumstances these areas are currently dominated by barren soils, spoil piles and non-native species that would not provide suitable habitat for these species.
- Herbicides
- Land Exchange.

Summary of Direct and Indirect Effects

Following the Great Depression, fire suppression efforts and reforestation projects turned many open, disturbed areas back to forested conditions which likely decreased populations by creating environments too shaded for these species to inhabit.

Natural succession of forest communities could result in reduced habitat quality, and loss of undocumented populations of these species. The Forest Service would continue to conduct plant surveys on the WNF in the future, but surveys may not occur as frequently in FOF and FOFMA management areas because surveys are usually done in conjunction with active management project activities. Ground disturbing activities could result in the loss of undocumented populations (e.g., road and trail construction, oil and gas well development), but this is unlikely since Forest Service botanists review active management project areas for suitable habitat or presence of the species.

While the alternatives should improve habitat for these species, through uneven-aged and even-aged vegetation management, the isolation of existing populations will likely prevent the dispersal and establishment of these species to new suitable habitat. While management activities projected to occur in the first decade could affect habitat suitability on NFS lands, Forest-wide standards and guides will prevent effects that would current habitat outcomes (Table 17, found at the end of this section).

Cumulative Effects

Loss of habitat for these species could occur on private lands within the WNF proclamation boundary, primarily from construction of homes and roads, oil and gas development and surface mining activities. Conversely, timber harvesting on private and state owned properties will continue to create suitable habitat for these species. Both negative and positive impacting activities that occur on private lands are usually small in nature and scattered across the landscape. Any potential adverse cumulative effects that may occur on NFS lands as a result of implementing any of the alternatives would be mitigated through the implementation of the

protective Forest-wide standards and guidelines that are incorporated into all alternatives. Therefore, cumulative effects of activities are unlikely to change the habitat outcomes for either of these species (Table 18, found at the end of this section).

Determination of Effect

Each alternative may impact individuals, but no alternative is likely to cause a trend toward federal listing or loss of viability (Table 19, found at the end of this section).

Mature Open, Semi-Open Woodland Species

Dwarf iris and pinxter flower are two species that occur in open woodlands and are threatened by overcollection and the introduction of non-native species. Dwarf iris is also threatened by shading by woody growth.

Activities with No Impact

Please refer to the discussion of *Activities with No Impact* for the mature, open to semi-open Forest RFSS, in the previous section. Those effects would be the same for the dwarf iris and pinxter flower.

Activities with Beneficial Effects

Please refer to the discussion of *Activities with Beneficial Impacts* for mature, open to semi-open Forest RFSS, in the previous section. Those effects would be the same for the dwarf iris and pinxter flower with the exception of prescribed fire, which has a may impact effect on these species.

Activities that May Impact Individuals, but Not Likely to Cause a Trend toward Federal Listing or Loss of Viability

Please refer to the discussion of *Activities that May Impact Individuals, but Not Likely to Cause a Trend toward Federal Listing or Loss of Viability* for the mature, open to semi-open Forest RFSS, in the previous section. Those effects would be the same for the dwarf iris and pinxter flower, with the addition of prescribed fire.

- **Prescribed fire** could benefit the species by reducing woody overgrowth and maintaining a more open habitat. Direct effects of fire on the iris are unknown. Pinxter flower typically is top-killed, however it survives by sprouting from the remnant root-crown. The effects of fireline construction are the same as those discussed for the RFSS.

- Site prep for native pine could disturb habitat for dwarf iris and pinxter flower, but the disturbance would be small in scope and a site-level field review would identify suitable habitat to avoid.

Summary of Direct and Indirect Effects

Historic and current habitat outcomes indicate that these two species are not widespread in distribution across the planning area (Table 17, found at the end of this section). The heavy impacts of timber harvesting, oil and gas development and iron ore and coal mining from the 1800's to the 1900's likely caused population declines. However, forest cover has increased and almost 80% of lands within the WNF proclamation boundaries are forested (Ohio Land Use Cover, based on Landsat TM 1994).Current management plans to create more open, forest communities with fire and vegetation management is likely to increase the amount of suitable habitat for these species, however their ability to disperse and colonize these areas are inhibited by current population isolation.

Threats to viability associated with overcollection are addressed in each alternative by a Forest-wide Goal (5.2) to promote conservation activities that protect, restore, or enhance habitat for RFSS, and a Forest-wide standard (TES-35) that prohibits the collection of RFSS.

In all cases, the likelihood is very low that the alternatives and their associated management activities projected to occur in the first decade could affect habitat suitability on NFS lands to the point where habitat outcomes would be decreased (Table 17, found at the end of this section).

Cumulative Effects

The cumulative effects for these species are the same as those discussed for similar habitat RFSS above, please refer to this section for cumulative impacts. The cumulative effects are not likely to affect the habitat outcomes for these species (Table 18, found at the end of this section).

Determination of Effect

Each alternative may impact individuals, but no alternative is likely to cause a trend toward federal listing or loss of viability (Table 19, found at the end of this section).

Fire Adapted Plant Species

Several species proposed for RFSS designation are adapted to fire and prescribe burning. They are threatened primarily by encroachment of woody vegetation through natural succession. These are species for which open areas or open woods provide appropriate growing conditions. These species include: butterfly pea, Carolina thistle, little headed nutrush, tall

nut rush, and yellow crownbeard. All of these species are also threatened by the introduction or spread of non-native invasive species.

The Forest Service proactively established three new Special Areas (i.e., Fradd Hollow, Bluegrass Ridge and Handley Branch) because populations of some of these species were found within these areas. These plant populations are considered fire-adapted since they have responded favorably to past prescribed fires in these areas.

Activities with No Impact

Please refer to the discussion of *Activities with No Impact* for the fire-adapted RFSS, in the previous section. Those effects would be the same for these species of viability concern.

Activities with Beneficial Effects

Activities that would benefit these species are ones that maintain or create open areas and woodlands. Please refer to the discussion of *Activities with Beneficial Impacts* for the fire-adapted RFSS, as these effects are the same. The one exception is including the creation and maintenance of wildlife openings which would only benefit the yellow crownbeard. The other species tend to occur in more open woodland environments, so wildlife openings would have no impact on them.

Activities that May Impact Individuals, but Not Likely to Cause a Trend toward Federal Listing or Loss of Viability

Please refer to the discussion of *Activities that May Impact Individuals, but Not Likely to Cause a Trend toward Federal Listing or Loss of Viability* for the fire-adapted RFSS, in the previous section. Those effects would be the same for the butterfly pea, Carolina thistle, little headed nutrush, tall nut rush, and yellow crownbeard.

Summary of Direct and Indirect Effects

They species were not common historically. Open area and open woodland habitats decreased during reforestation and fire suppression projects following the Great Depression.

The alternatives would have no effect on any known populations of these species because the alternatives incorporate Forest-wide guidance that allows localized removal of vegetation to reduce woody encroachment may be used to maintain or improve habitat for RFSS (TES-36) and a management area standard (S-FOF-WLF-1 and S-FOFMA-WLF-1) enables the Forest Service to conduct localized management for these plant species if their populations fell within the FOF and FOFMA boundaries.

Natural succession of forest communities could result in reduced habitat quality, and loss of undocumented populations of species. The Forest Service would continue to conduct plant surveys on the WNF in the future, but surveys may not occur as frequently in FOF and FOFMA management areas because surveys are usually done in conjunction with active management project activities. Ground disturbing activities could result in the loss of undocumented populations (e.g., road and trail construction, oil and gas well development), but this is unlikely since Forest Service biologists review active management project areas for suitable habitat or presence of rare species. Thus the habitat outcomes for these species would not change with implementation of any of the proposed Forest Plan alternatives (Table 17, found at the end of this section).

Cumulative Effects

Activities likely to occur on other lands in the WNF proclamation boundary that could impact these species include natural succession, and ground disturbing activities such as road and trail construction, and oil and gas development. The added impact of Forest Service activities on NFS lands could effect suitable habitats, but mitigation measures incorporated into each alternative would reduce the cumulative impact to the point where it is unlikely habitat outcomes would change (Table 18, found at the end of this section).

Determination of Effect

Though the probability is low, each alternative may impact individuals, but no alternative is likely to cause a trend toward federal listing or loss of viability (Table 19, found at the end of this section) of these fire-adapted species.

Mature Woodland Plant Species

Lined sedge and sparse-lobed grape fern are species threatened by removal of forest canopy that results in unsuitable light intensity levels. Both species do well in filtered light and closed canopy conditions. Lined sedge populations may increase quickly under temporary canopy openings, but will not tolerate full sun or very dense shade. The sparse-lobed grape fern is threatened by soil compaction and drying of habitat from vegetation removal. The introduction of non-native invasive plant species is also a threat to both species.

Activities with No Impact

Please refer to the discussion of *Activities with No Impact* for the mature woodland RFSS, in the previous section. Those effects would be the same for these species of viability concern.

Activities with Beneficial Effects

Please refer to the discussion of *Activities with Beneficial Impacts* for the mature woodland RFSS, in the previous section. Those effects would be the same.

Activities that May Impact Individuals, but Not Likely to Cause a Trend toward Federal Listing or Loss of Viability

Please refer to the discussion of *Activities with No Impact* for the aquatic RFSS, in the previous section. Those effects would be the same. The direct effects of fire on these species are unknown. Because of the sparse-lobed grape fern's preference for mesic habitats, its likely that burns would be low intensity and mosaic in pattern, reducing the potential for direct impacts on this species.

Summary of Direct and Indirect Effects

Activities which have the potential to reduce canopy could affect undocumented species. Such projects may include even-aged vegetation management, oil and gas activity, construction of utility corridors, surface mining, and creation of permanent forest openings. The potential for loss of undocumented populations is minimized because Forest Service biologists review project areas for suitable habitat or presence of these species prior to implementation. If identified, protective measures found in each of the alternatives would be implemented (TES-32 and TES-36). In all cases, the likelihood is very low that the alternatives and their associated management activities projected to occur in the first decade could affect habitat suitability on NFS lands to the point where habitat outcomes would be decreased (Table 17, found at the end of this section).

Cumulative Effects

Forest canopy removal projects will likely occur on other lands in the WNF proclamation boundary, including timber harvests, oil and gas development, and construction of roads, trails and buildings. Implementation of habitat protection measures are left to the discretion of the land manager or property owner. The added impact of Forest Service activities on NFS lands could have a minimal adverse effect on suitable habitat, but mitigation measures incorporated into each alternative would reduce the cumulative impact to the point where it is unlikely habitat outcomes would change with implementation of any alternative (Table 18, found at the end of this section).

Determination of Effect

Though the probability is low, each alternative may impact individuals, but no alternative is likely to cause a trend toward federal listing or loss of viability (Table 19, found at the end of this section).

Marshes St. John's-wort

This mesic species is threatened by alterations of surface hydrology and competition from non-native invasive species. In southern Ohio, it is known to occur primarily in riparian habitats and may follow the preglacial Teays River drainage lines and major tributaries in the Unglaciated Allegheny Plateau.

Activities with No Impact

Please refer to the discussion of *Activities with No Impact* for the RFSS, pigeon grape, in the previous section. Those effects would be the same for this riparian species, plus timber stand improvement activities which would have no impact on this St. John's wort.

Activities with Beneficial Effects

Please refer to the discussion of *Activities with Beneficial Impacts* for the RFSS, pigeon grape in the previous section. Beneficial effects are the same for large marsh St. John's wort; in addition wetland restoration would also be considered a benefit for this species since wetlands can provide suitable habitat for this species.

Activities that May Impact Individuals, but Not Likely to Cause a Trend toward Federal Listing or Loss of Viability

Please refer to the discussion of *Activities that May Impact Individuals, but Not Likely to Cause a Trend toward Federal Listing or Loss of Viability* for the RFSS, pigeon grape, in the previous section. Effects would be the same for this species of viability concern with the exception of grape vine control and crop tree release (timber stand improvement activities) was moved to the No Impact section for this species of viability concern.

Summary of Direct and Indirect Effects

The suspected link of this species to the preglacial Teays river drainage indicates that historically this species was not common. Activities which have the potential to affect surface hydrology could affect undocumented individuals of this species. Timber harvest and prescribed burning could occur in riparian habitats. Other projects with the potential for impact include small lake and pond construction, oil and gas activity, surface mining, construction of utility corridors, road and trail construction and watershed improvement activities. As described for the rapids clubtail and green-faced clubtail, protective measures incorporated into each alternative would minimize the potential for management activities to degrade water quality or aquatic habitat. Likewise, the potential for loss of undocumented populations is minimized because Forest Service biologists will review project areas for suitable habitat, or presence, of this species. If identified, protective measures found in each of the alternative (TES-32

and TES-36) would be implemented.

In all cases, the likelihood is very low that the alternatives and the associated management activities projected to occur in the first decade could affect aquatic habitat or populations of large marsh St. John's-wort to the point where habitat outcomes would be decreased (Table 17, found at the end of this section). It is possible that ongoing and future efforts to restore mining-degraded aquatic systems could increase suitable habitat for this species.

Cumulative Effects

Ground-disturbing activities will likely occur on other lands in the WNF proclamation boundary in the future which could result in sedimentation of aquatic habitat, but efforts are being made by other landowners to minimize sedimentation of aquatic habitats. Efforts by the Forest Service, other state and federal agencies, conservation organizations, and private landowners continue to result in improved water quality conditions within the planning area. The added impact of Forest Service activities on NFS lands could have a minimal adverse effect on water quality and sedimentation of habitats, but mitigation measures incorporated into each alternative would reduce the cumulative impact to the point where it is unlikely habitat outcomes would change with implementation of any alternative (Table 18, found at the end of this section)

Determination of Effect

Though the probability is low, each alternative may impact individuals, or habitat, but none are likely to cause a trend toward federal listing or loss of viability (Table 19, found at the end of this section).

Table 17. Comparison of habitat outcomes for species proposed for RFSS designation on NFS lands.

		Alt. A			Alt. B			Alt. C			Alt. D			Alt. E			Alt. E_{mod}			Alt. F		
Decade		2	5	10	2	5	10	2	5	10	2	5	10	2	5	10	2	5	10	2	5	10
Amphibians																						
Green salamander	E/E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Mud salamander	D/E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Four-toed salamander	E/E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Blanchard's cricket frog	D/E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Mussels																						
Sheepnose mussel	*	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Insects																						
Rapids clubtail	E/E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Green-faced clubtail	E/E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Plants																						
Marshes St. John's wort	D/D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
Smooth beardtongue	D/D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
Little headed nutrush	E/E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Butterfly pea	E/E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Tall nut rush	D/D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
Sparse-lobed grape fern	D/D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
Carolina thistle	E/E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Pinxter flower	D/D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
Feather bells	D/D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
Lined sedge	C/C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Pale straw sedge	D/D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
Dwarf iris	C/C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Yellow crownbeard	D/D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
Summary of Habitat Outcome Changes from Current Outcomes																						
Positive change		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
No change		19	19	19	19	19	18	19	19	19	18	18	18	18	18	18	18	18	18	18	18	18
Negative change		0	0	0	0	0	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1

*The sheepnose does not occur within the WNF proclamation boundary. Habitat outcomes for each of the alternatives are provided for its habitat in the Ohio River and for its host fish (sauger) which occurs within the proclamation boundary. It is not included in the summary of change at the bottom of the table.

Table 18. Comparison of habitat outcomes for species proposed for RFSS designation on all lands in the cumulative effects analysis area.

		Alt. A			Alt. B			Alt. C			Alt. D			Alt. E			Alt. E_{mod}			Alt. F		
Decade		2	5	10	2	5	10	2	5	10	2	5	10	2	5	10	2	5	10	2	5	10
Amphibians																						
Green salamander	E/E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Mud salamander	D/E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Four-toed salamander	E/E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Blanchard's cricket frog	D/E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Mussels																						
Sheepnose mussel	*	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Insects																						
Rapids clubtail	E/E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Green-faced clubtail	E/E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Plants																						
Marshes St. John's wort	D/D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
Smooth beardtongue	D/D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
Little headed nutrush	E/E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Butterfly pea	E/E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Tall nut rush	D/D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
Sparse-lobed grape fern	D/D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
Carolina thistle	E/E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Pinxter flower	D/D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
Feather bells	D/D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
Lined sedge	C/C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Pale straw sedge	D/D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
Dwarf iris	C/C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Yellow crownbeard	D/D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
Summary of Habitat Outcome Changes from Current Outcomes																						
Positive change		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
No change		19	19	19	19	19	18	19	19	19	18	18	18	18	18	18	18	18	18	18	18	18
Negative change		0	0	0	0	0	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1

*The sheepnose does not occur within the WNF proclamation boundary. Habitat outcomes for each of the alternatives are provided for its habitat in the Ohio River and for its host fish (sauger) which occurs within the proclamation boundary. It is not included in the summary of change at the bottom of the table.

Table 19. Summary of the determination of effects for Species proposed for RFSS designation.

	A	B	C	D	E	E_{mod}	F
Amphibians							
Blanchard's cricket frog	MI	MI	MI	MI	MI	MI	MI
Four-toed salamander	MI	MI	MI	MI	MI	MI	MI
Green salamander	MI	MI	MI	MI	MI	MI	MI
Mud salamander	MI	MI	MI	MI	MI	MI	MI
Mussels							
Sheepnose	MI	MI	MI	MI	MI	MI	MI
Insects							
Rapids clubtail	MI	MI	MI	MI	MI	MI	MI
Rapids clubtail	MI	MI	MI	MI	MI	MI	MI
Plants							
Butterfly pea	MI	MI	MI	MI	MI	MI	MI
Carolina thistle	MI	MI	MI	MI	MI	MI	MI
Dwarf iris	MI	MI	MI	MI	MI	MI	MI
Featherbells	MI	MI	MI	MI	MI	MI	MI
Lined sedge	MI	MI	MI	MI	MI	MI	MI
Little headed nutrush	MI	MI	MI	MI	MI	MI	MI
Marshes St. John's wort	MI	MI	MI	MI	MI	MI	MI
Pale straw sedge	MI	MI	MI	MI	MI	MI	MI
Pinxter flower	MI	MI	MI	MI	MI	MI	MI
Smooth beardtongue	MI	MI	MI	MI	MI	MI	MI
Sparse-lobed grape fern	MI	MI	MI	MI	MI	MI	MI
Tall nut rush	MI	MI	MI	MI	MI	MI	MI
Yellow crownbeard	MI	MI	MI	MI	MI	MI	MI

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