South Branch Kinzua Creek

Environmental Assessment

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Department of
Agriculture

Forest
Service

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Marienville Ranger District
Allegheny National Forest

Wetmore and Hamlin Townships
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Acronyms and Abbreviations

ANF	Allegheny National Forest
AMFC	Accelerate Mature Forest Conditions
BA	Biological Assessment
BE	Biological Evaluation
BO	Biological Opinion
CFR	Code of Federal Regulations
CE	Cumulative Effects
CI	Cumulative Impacts
CVE	Cumulative Vegetation Effects
EA	Environmental Assessment
EAM	Even-aged Management
EIS	Environmental Impact Statement
ELT	Ecological Land Type
FEIS	Final Environmental Impact Statement
FR	Forest Road
GIS	Geographic Information System
HQ-CWF	High Quality Cold Water Fisheries
HWA	Hemlock Woolly Adelgid
ID	Interdisciplinary
LRMP	Land and Resource Management Plan
MA	Management Area
Mbf	Thousand Board Feet
MIS	Management Indicator Species
MMBF	Million Board Feet
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NFS	National Forest System
NNIS	Non-native Invasive Species
NWI	Nationally Inventoried Wetland
OGM	Oil, Gas, and Mineral
OHV	Off-highway Vehicle
PA DEP	Pennsylvania Department of Environmental Protection
RAP	Roads Analysis Project
RFSS	Regional Forester's Sensitive Species
ROS	Recreation Opportunity Spectrum
RUMFC	Restore Understory to Mature Forest Condition
SBKC	South Branch Kinzua Creek
SIL	Scenic Integrity Level
SL	Sensitivity Level
TSL	Traffic Service Level
UEAM	Uneven-aged Management
U.S.	United States
USDA-FS	United States Department of Agriculture-Forest Service
USDI-FWS	United States Department of the Interior-Fish and Wildlife Service

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Summary

The Marienville Ranger District of the Allegheny National Forest is proposing the following management activities for the South Branch Kinzua Creek Project (Alternative 2: Proposed Action):

- Create approximately 311 acres of early-successional habitat utilizing even-aged management in Management Area 3.0.
- Perform associated reforestation activities to develop adequate advanced seedling regeneration to ensure that the stands become fully stocked.
- Perform wildlife habitat enhancements on approximately 130 acres of National Forest land.
- Control and eliminate the spread of non-native invasive plant species (NNIS) on approximately 15 acres of National Forest land.
- Construct approximately 2.8 miles of roads, which includes using approximately 2.7 miles of existing road corridors, decommission approximately 2.1 miles of unneeded roads, and accomplish maintenance on approximately 14.4 miles of forest roads including applying limestone surfacing to approximately 0.7 miles of road. This would involve expanding three existing stone pits (6 acres), developing one new stone pit (3 acres), and reclaiming 16 acres of stone pits.

This proposed action implements the 2007 ANF Land and Resource Management Plan (LRMP) (USDA-FS 2007a), and the analysis in this Environmental Assessment is tiered to the Final Environmental Impact Statement (USDA-FS 2007b) and Record of Decision (USDA-FS 2007c) for the 2007 Forest Plan. The harvest of 7.7 million board feet will result from the proposed activities.

The **project and analysis area** encompasses the National Forest System lands on which management activities are proposed to occur. The project area contains approximately 4,774 acres, which includes 4,748 acres of National Forest land and 26 acres of private land. The project area contains portions of Management Areas 2.2 and 3.0.

An interdisciplinary team of Forest Service resource specialists chose the initial treatment areas from an analysis of existing conditions within the project area **(Purpose for the Action)**. Analyzing the land capability, existing conditions, and landscape needs, the team identified the need to manage individual stands within the project area to help achieve the desired condition in the ANF LRMP. This includes establishing areas of young forest, improving stand conditions for optimum tree growth, improving forest structure, providing high quality hardwood timber, and improving wildlife habitat **(Need for the Action)**. Many of these stands have interfering understory vegetation that may require reforestation treatments, such as herbicide application or site preparation to facilitate the development of adequate advanced tree seedlings and to enhance the diversity of understory vegetation.

The interdisciplinary team have also considered a no action alternative and developed a second action alternative to address issues (no new roads, timber management in the South Branch Kinzua Creek valley, dispersal of treatment areas, and increasing uneven-aged management) associated with the South Branch Kinzua Creek project. The proposed activities for the three alternatives are summarized in Table 1**.** The action alternatives are

described in further detail in Chapters 1 and 2. A description of the current condition of the project area is found in Chapter 3. An analysis of the effects for each alternative is included in Chapter 4.

Table 1. Activities Proposed for South Branch Kinzua Creek Project by Alternative

Proposed Activity	Alt 1	Alternative 2		Alternative 3	
Timber Harvest (Acres)		**1st entry**	**2nd entry**	**1st entry**	**2nd entry**
Even-Aged Regeneration Treatments (Total)	**0**	**788**		**717**	
		251	537	229	488
Shelterwood Seed Cut	0	251	226	229	208
Shelterwood Removal	0	0	311	0	280
Even-Aged Intermediate Treatments (Total)	**0**	**852**		**564**	
Commercial Thinning	0	748		556	
Salvage Thinning	0	8		8	
Thinning to Accelerate Mature Forest Conditions (AMFC)	0	96		0	
Uneven-Aged Treatments (Total)	**0**	**594**		**558**	
Uneven-Aged Management Improvement Cut	0	50		50	
Restore Understory Mature Forest Conditions (RUMFC)	0	243		225	
Group Selection	0	**301**		**283**	
	0	0	301	0	283
Non-Commercial Treatments (Total)	**0**	**633**		**549**	
Non-Commercial Thinning	0	84		0	
Crop Tree Management	0	393		393	
Crop Tree Release	0	156		156	
Volume (MMbf)	0	7.7		6.3	
Reforestation/Understory Restoration Activities					
Site Preparation	0	812		750	
Herbicide Application	0	896		834	
Fence	0	746		686	
Fertilization	0	96		96	
Tree Shelter Natural Regeneration	0	75		73	
Planting	0	200		191	
Release	0	654		610	

Wildlife Habitat Enhancements			
Plant (acres)	0	53	53
Re-Plant (acres)	0	55	55
Fence (acres)	0	93	93
Songbird Nestbox/Bat Roosting Box/Flying Squirrel Box Installation (number of structures)	0	14	14
Fruit Tree Pruning (acres)	0	25	25
Opening Maintenance Seed/Disc/Lime/Fertilize) (acres)	0	16	16
Non-Native Invasive Plant Species (NNIS) Control			
NNIS Treatments (acres)	0	15	15
Soil and Water Restoration Activities			
Rehabilitate and Place Barricades on Illegal ATV trails (number)	0	3	3
Planting trees/shrubs adjacent to Hubert Run (acre)	0	0.25	0.25
Transportation Activities			
Road Construction – new corridor (miles)	0	0.1	0
Road Construction – existing corridor (miles)	0	2.7	2.2
Road Decommissioning (miles)	0	2.1	2.1
Road Maintenance (miles)	0	14.4	14.4
Limestone Surfacing (miles)	0	0.7	0.7
Number of Stone Pits to be Expanded	0	3	3
Stone Pit Expansion (acres)	0	6	6
Number of Stone Pits to be Developed	0	1	1
Stone Pit Development (acres)	0	3	3
Stone Pit Reclamation (acres)	0	16	16
Road Barricade Placement (number of devices)	0	5	5

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Chapter 1: Proposed Action and Purpose and Need

1.1 Introduction, Document Structure, and Public Input Process

The Forest Service has prepared this analysis and document in compliance with the National Environmental Policy Act of 1969 (NEPA), the Appeals Reform Act of 1993 (ARA), and other relevant federal laws and regulations as part of the environmental analysis for the South Branch Kinzua Creek (SBKC) Project. This environmental assessment (EA) discloses the proposed action, connected actions, affected environment, issues, design features, alternatives to the proposed action, and analysis of the direct, indirect, and cumulative environmental impacts that would result if the proposed action or its alternatives (including no action) were implemented. This document has six parts:

- Chapter 1: Purpose and Need for Action: This section includes information on the history of the project proposal, the purpose and need for action, the agency's proposal for achieving that purpose and need, public involvement, issues, and alternatives considered but not analyzed in detail.
- Chapter 2: Alternatives including the Proposed Action: This section provides a more detailed description of the proposed action, the no action alternative, and one additional action alternative. These alternatives were developed based on anticipated and known public and agency issues. This chapter also summarizes and compares the outputs of the alternatives and provides a summary displaying the environmental effects (measurement indicators).
- Chapter 3: Affected Environment: This section provides a description of the present condition of the project area and the affected environment.
- Chapter 4: Environmental Consequences: This section provides an analysis of the environmental effects of the proposed action and its alternatives. The analysis for this project is tiered to the Final Environmental Impact Statement (FEIS) (USDA-FS 2007b) and Record of Decision (ROD) (USDA-FS 2007c) for the 2007 ANF Land and Resource Management Plan (LRMP) (USDA-FS 2007a).
- Chapter 5: List of Preparers: This section provides a list of persons consulted during the development of this environmental assessment.
- Appendices: The appendices provide further information on the project and the environmental analysis for the project.

Additional documentation regarding environmental effects may be found in the planning record (or project file) located at the Marienville Ranger District office in Marienville, Pennsylvania.

1.2 Tiering to the Final Environmental Impact Statement for the Allegheny National Forest Land and Resource Management Plan

The analysis for this project is tiered to the Final Environmental Impact Statement (FEIS) (USDA-FS 2007b) and Record of Decision (ROD) (USDA-FS 2007c) for the 2007 ANF Land and Resource Management Plan (LRMP or Forest Plan) (USDA-FS 2007a).

Tiering is described in Forest Service Handbook (FSH) (1909.15) as a process of summarizing and incorporating by reference from other environmental documents of broader scope to eliminate repetitive discussions of the same issues and to focus on the actual issues ripe for decision (USDA-FS 1992, FSH 1909.15, Chapter 42.1). The handbook specifically notes that the Environmental Impact Statement (EIS) for a land and resource management plan is an example of a "broad" EIS prepared for a program or policy statement (USDA-FS 1992, FSH 1909.15, Chapter 22.31). The SBKC Project is a project-level analysis. The scope of the SBKC EA will be confined to addressing issues and possible environmental consequences of this project. It will not attempt to address decisions made at higher levels. It will, however, implement direction provided at those higher levels.

The ANF LRMP is a programmatic document that implements the Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA), as amended by the National Forest Management Act of 1976 (NFMA). The ANF LRMP implements NFMA by providing "for diversity of plant and animal communities based on the suitability and capability of the (ANF) in order to meet overall multiple-use objectives and within the multiple-use objectives of a land management plan" (16 USC 1604(g)(3)(B)).

The ANF LRMP provides guidance for managing resources and uses on the ANF. All applicable laws, regulations, policies and national and regional direction, as detailed in the Forest Service Manual and Handbook, are part of ANF LRMP direction. In the ANF LRMP, goals and objectives present a picture of what the ANF should look like and what services, products, and experiences it would provide. Standards and guidelines provide direction for implementing projects and activities. Monitoring evaluates whether the goals and objectives are being met and determines if additional or different management direction is necessary.

The ANF LRMP has divided the Forest into management areas (MA). Each MA has particular goals and objectives. The SBKC Project contains portions of MA 3.0 (3,216 acres), MA 2.2 (1,532 acres), and 26 acres of private land.

1.3 Background

The SBKC project area consists of 4,748 acres of National Forest System (NFS) lands and 26 acres of private land and is located on the Marienville Ranger District of the ANF in northwestern Pennsylvania. The project is bounded on the east by a large parcel of private land located on the western side of U.S. Route 6, on the north by South Branch Kinzua Creek, on the west by a parcel of private land and State Route 321, and on the south by a large parcel of private land located to the north and northwest of Kane, Pennsylvania.

Previous projects, which have been conducted in the past 20 years within the SBKC project area, include South Branch EA (1987), Gladwater EA (1993), Tree Mortality and Ecosystem Sustainability on the Allegheny National Forest (1995), and the Gladwater Supplemental EA (1999). These previous NEPA documents analyzed similar types of activities (timber harvesting, reforestation, wildlife habitat enhancements, and transportation activities) as those proposed in the SBKC project.

1.4 Purpose for the Action

The purpose of the SBKC project is to accomplish resource objectives to meet the overall management goals for the ANF, as established in the ANF LRMP. Management within the project area is intended to meet Forest-wide, MA 2.2, and MA 3.0 goals and objectives including:

Forest-wide Direction/Goals (USDA-FS 2007a, pp. 12-16)

The following forest-wide goals apply to the SBKC Project:

- Provide a diversity of vegetation patterns across the landscape that represents well distributed habitats, a range of forest age classes and vegetative stages, a variety of healthy functioning vegetation layers, moderate to well-stocked forest cover, and the variety of vegetation species or forest types necessary to achieve multiple resource objectives and sustain ecosystem health.
- Continue to implement and monitor a range of silvicultural and reforestation practices in order to be responsive to emerging issues and regenerate stands to a diversity of tree seedlings of good quality, form and health.
- Manage vegetation to provide high quality, hardwood sawtimber from land suitable for harvest at a sustainable level to meet multiple resource objectives.
- Maintain and enhance the distribution and diversity of plant and animal species by providing a diversity of high quality habitats across the landscape.
- Provide habitat for game species to make opportunities available for quality hunting and fishing experiences while promoting the management of game species that sustains healthy forest understories.
- Develop and maintain mast-producing species on a variety of sites including lowlands, mid slopes and ridge tops. Maintain a diversity of understory and overstory mast-producing species.
- Forest infrastructure, including facilities and transportation systems, will provide a safe, efficient, and economical system that is responsive to public and administrative needs; having minimal adverse effects on ecological processes and ecosystem health, diversity, and productivity; and is in balance with needed management actions.

Primary Purpose For MA 2.2 (USDA-FS 2007a, p.109)

- Contribute to the desired condition by providing predominantly late structural forest habitat that follows the major river valleys with linkages across the plateau and connects with other management areas that also provide late structural habitat.

Primary Purpose For MA 3.0 (USDA-FS 2007a, p. 113)

- Contribute to the desired condition by providing a mix of vegetative conditions and quality timber products that contribute to the local and regional economy.
- Maintain or create age and structural class diversity on lands suitable for timber management.

1.5 Need for the Action

The ANF LRMP describes the desired condition for lands allocated to MAs 2.2 and 3.0. There are several site-specific opportunities for vegetation management within the project area that would change or enhance present conditions to help achieve the desired condition described in the ANF LRMP. An opportunity to enhance a resource is defined as a "need."

An interdisciplinary team of resource specialists has surveyed and evaluated the project area for management possibilities based on an analysis of the project area, comparing the existing condition to the desired condition described in the ANF LRMP, and determined by land capability.

1.5.1 Need for Change

1.5.1.1 Manage Vegetation for Current Forest Plan Desired Condition

(A) There is a need to maintain a diversity of age classes, including early age classes spatially distributed across the landscape in MA 3.0 within the SBKC project area. As existing young classes develop and mature into older age classes, there is a need to maintain a young age class component into the next decade.

(B) There is a need to maintain or enhance seedling, shrub, and herbaceous diversity in the SBKC project area where a legacy of selective browsing by deer has resulted in reduced understory diversity.

(C) There is a need to provide for mature forest conditions and wildlife habitat in MA 2.2 and late-successional habitat as part of the forest-wide landscape approach to providing late-successional habitat.

1.5.1.2 Improve Terrestrial Habitat

(A) Within MA 3.0, there is a need to provide a wide variety of habitat conditions across the landscape to meet the needs of game and non-game wildlife species and maintain or enhance species diversity and abundance within the SBKC project area

(B) Within MA 2.2, there is a need to provide a predominately forested landscape that has an adequate distribution of age classes and habitat diversity to meet the needs of indicator species, game and non-game wildlife species, and species that require isolation.

(C) There is a need to restore the forest shrub component to improve wildlife cover and forage conditions to meet the needs of game and non-game wildlife species.

(D) There is a need to improve understory conditions in forest stands dominated by fern to provide stand structure and cover conditions preferred by game and non-game wildlife species.

(E) There is a need to control the spread of non-native invasive plant species (NNIS) within the SBKC project area as they pose an increasing threat to all ecosystems.

(F) There is a need to evaluate illegal off-highway vehicle (OHV) use and identify strategies to curtail these uses. The demand for OHV trails is high and efforts to educate trail users on riding and land use ethics has not kept pace with the growing number of riders. As a result, OHV use off of legal routes has grown in recent years. Opportunities exist for more education and law enforcement efforts to curb these activities. Methods such as barricades and other closure devices will be explored on illegal routes.

(G) There is a need to maintain current habitat improvements and past investments in wildlife habitat, including nest box structures, fruit tree pruning, opening maintenance, plantings, and fencing.

1.5.1.3 Market Wood Based Products for Local Economies

There is a need to provide a mix of vegetative conditions and quality timber products that contribute to the local and regional economy.

Demand for sawtimber from Allegheny hardwood species remains moderately strong (USDA-FS 2007b, p. 3-387), based on open market prices in the region and the number of bids on past ANF sales. Maintaining a consistent flow of Allegheny hardwood timber serves the demands of the public for wood products. Continued production of this renewable resource also meets statutory authority to provide wood products within the capability of the land and within the Forest Plan (Multiple Use Sustained Yield Act 1960; National Forest Management Act 1976). Satisfying this demand and meeting the objective of a consistent flow of a renewable resource is compatible with and contributes to other Forest Plan objectives, such as forest health, diversity of forest stands, and maintenance and improvement of wildlife habitat.

1.6 Proposed Action

The following activities in Table 2 are proposed to achieve the purpose and need for the SBKC Project and the Forest Plan Desired Condition.

Table 2. Proposed Action

Proposed Activities	Total
Timber Harvest/Vegetation Management	
Even-Aged Regeneration Treatments (Total acres)	**788**
Shelterwood Seed Cut (acres)	477 (251/226)[1]
Shelterwood Removal (acres)	311 (0/311)[1]
Even-Aged Intermediate Treatments (Total acres)	**852**
Commercial Thinning (acres)	748
Salvage Thinning (acres)	8
Accelerate Mature Forest Conditions (AMFC) (acres)	96
Uneven-Aged Treatments (Total acres)	**594**
Uneven-Aged Management Prep Cut (acres)	50
Restore Understory Mature Forest Conditions (RUMFC) (acres)	243
Group Selection (acres)	301 (0/301)[1]
Non-Commercial Treatments (Total acres)	**633**
Non-Commercial Thinning (acres)	84
Crop Tree Management (acres)	393
Crop Tree Release (acres)	156
Reforestation Activities	
Site Preparation (acres)	812
Herbicide Application (acres)	896
Fence (acres)	746
Fertilization (acres)	96
Tree Shelter Natural Regeneration (acres)	75
Planting (acres)	200
Release (acres)	654
Wildlife Habitat Enhancements	
Plant (acres)	53
Re-Plant (acres)	55
Fence (acres)	93
Songbird Nestbox/Bat Roosting Box/Flying Squirrel Box Installation (number of structures)	14
Fruit Tree Pruning (acres)	25
Opening Maintenance (Seed/Disc/Lime/Fertilize) (acres)	16
Non-Native Invasive Plant Species (NNIS) Control	
NNIS Treatments (acres)	15
Soil and Water Restoration Activities	
Rehabilitate and Place Barricades on Illegal ATV trails (number)	3
Planting trees/shrubs adjacent to Hubert Run (acre)	0.25

[1] Parentheses include acreage for both first and second entry for SH Seed Cut, SH Removal, and Group Selection harvest treatments.

Transportation Activities	
Road Construction – new corridor (miles)	0.1
Road Construction – existing corridor (miles)	2.7
Road Decommissioning (miles)	2.1
Road Maintenance (miles)	14.4
Limestone Surfacing (miles)	0.7
Number of Stone Pits to be Expanded	3
Stone Pit Expansion (acres)	6
Number of Stone Pits to be Developed	1
Stone Pit Development (acres)	3
Stone Pit Reclamation (acres)	16
Road Barricade Placement (number of devices)	5

Vegetation Treatments

Past land uses and over 70 years of overbrowsing, as a result of high deer populations, have greatly altered plant diversity and structural conditions from what would have occurred naturally in the SBKC project area. As a result, interfering vegetation such as fern, grass, beech root sprouts, and striped maple dominate understory conditions in both forested and non-forested communities across the SBKC project area.

Even-aged management activities would harvest stands, through one or two entries, and would initiate the growth of a new forest by allowing more sunlight to reach the forest floor. This would be accomplished through removal cuts and shelterwood seed/removal cut sequences in forest stands. To ensure the establishment of tree seedlings, reforestation activities such as fertilization, site preparation for natural regeneration, herbicide application, release, tree shelter installation, fencing, and planting could occur on these sites. Even-aged management prescriptions would create 311 acres (6.5 percent) of 0-10 age class in the project area over the next decade.

Proposed intermediate harvests include commercial thinning, salvage thinning, and uneven-aged preparation cuts. Commercial thinning is proposed on 748 acres to reduce competition for light and nutrients, thus improving the health and vigor of residual trees. Salvage thinning is proposed on 8 acres and uneven-aged preparation cuts, on 50 acres. Non-commercial treatments (thinning, crop tree management, and crop tree release) are proposed on approximately 633 acres of the project area.

Thinning to accelerate mature forest conditions (AMFC) and group selection to restore understory mature forest conditions (RUMFC) are being proposed across the project area, primarily in MA 2.2. Overall, AMFC and RUMFC are being proposed to hasten stand development processes, initiate understory development and create gaps, multiple age classes, multi-layered canopies, irregular canopy cover, larger trees, down woody material, and vertical structure earlier than would occur naturally.

AMFC is an intermediate thinning, which would remove approximately 20 percent of the trees in a stand, and be applied in a non-uniform manner to emulate the heterogeneity present in old growth forests as described by Franklin and van Pelt (2004). This treatment would reduce canopy density to more rapidly develop larger diameter trees with enlarged crowns than would occur naturally over time, as well as introduce more complex structure to the stand as the intensity of thinning would vary. It is designed to mimic

small sized natural disturbances, where cutting would be a surrogate for competition-induced mortality (USDA-FS, 2007b, pp. A-26).

RUMFC would begin with a single tree selection cut to promote the development of a new seedling class and start the transition from an even-aged stand towards an uneven-aged stand. Group selection would generally occur as a follow up to the single tree selection cut. This system of cutting is designed to accelerate the development of selected late-successional and mature forest structural attributes. This would occur once adequate seedlings have developed in 3 to 15 years (Horsley *et al* 1994, p. 220-222). These groups would be located where patches of advanced regeneration develop and range from 0.5 to 3 acres in size depending on forest type, just as they do for standard group selection (USDA-FS 2007b, pp. A-27).

The proposed action will result in an estimated 7.7 MMBF of timber (3.0 MMBF in the first entry, 4.7 MMBF in the second entry) from 2,234 acres, which would take place within the next 10 years. Please see Table 3 for a complete list of proposed silvicultural treatments and reforestation activities.

Approximately 15 acres of non-native invasive species (NNIS) control is being proposed. This would include hand-pulling, hand-cutting, and/or treatment with glyphosate using one of the following methods: backpack foliar spray application, stem injection, or a combination of stump cutting and injection (See Appendix G of the ANF LRMP for herbicide analysis and ANF LRMP pp. 54-59 for standards and guidelines on herbicide use).

Table 3. Proposed Stands and Silvicultural Treatments

Comp[1]	Stand	Acres	MA[2]	Harvest Treatments[3]	Reforestation Treatments[4]
810	1	10	3.0	Crop Tree Release	
810	6	16	3.0	Crop Tree Management	
810	7	11	3.0	Crop Tree Release	
810	9	35	3.0	Commercial Thinning	
810	10	12	3.0	Crop Tree Management	
810	11	15	3.0	Commercial Thinning	
810	12	25	3.0	Crop Tree Management	
810	13	4	3.0	SH[5] Seed Cut/SH Removal	SP, H, F, Fe, R
810	15	35	3.0	Commercial Thinning	
810	16	21	3.0	Commercial Thinning	
810	19	15	3.0	Commercial Thinning	
810	20	24	3.0	SH Seed Cut/SH Removal	SP, H, F, Fe, R
810	24	10	3.0	Commercial Thinning	
810	26	8	3.0	Commercial Thinning	
810	27	4	3.0	Commercial Thinning	
810	28	4	3.0	Commercial Thinning	
810	29	2	3.0	Commercial Thinning	
810	32	10	3.0	Commercial Thinning	
810	33	5	3.0	Crop Tree Release	
810	34	7	3.0	Commercial Thinning	
810	35	6	3.0	Commercial Thinning	
810	36	5	3.0	Crop Tree Management	
810	38	13	3.0	Crop Tree Release	
810	39	9	3.0	SH Seed Cut/SH Removal	SP, H, F, P, R
810	40	15	3.0	SH Seed Cut/SH Removal	SP, H, F, P, R
810	41	5	3.0	Reforestation Only	H, P
810	43	7	3.0	Delayed SH Seed Cut	SP, H, F
810	44	8	3.0	SH Seed Cut/SH Removal	SP, H, F, P, R
811	5	11	3.0	RUMFC/Group Selection	SP, H, F, P, R
811	10	40	3.0	Crop Tree Management	
811	17	6	3.0	Non-commercial Thinning	

[1] "Comp" = Compartment number

[2] MA = Management Area

[3] A slash (/) in the Activity column indicates that this stand is proposed to receive two treatments (1st and 2nd entry) an example of this would be Shelterwood Seed Cut/SH Removal" which is a proposal to perform a Shelterwood Seed Cut in the 1st entry and a Shelterwood Removal in the 2nd entry. Also, Delayed treatments indicate that the treatment will be implemented during the second entry.

[4] "SP" = Site Preparation, "H" = Herbicide, "F" = Fence, "Fe" = Fertilize, "TS" = Tree Shelter, "P" = Plant, "R" = Release.

[5] "SH" = Shelterwood, "UEAM" = Uneven-aged management, "AMFC" = Accelerate Mature Forest Conditions, "RUMFC" = Restore Understory to Mature Forest Conditions

Comp[1]	Stand	Acres	MA[2]	Harvest Treatments[3]	Reforestation Treatments[4]
811	18	22	2.2	RUMFC/Group Selection	SP, H, F, P, R
811	19	34	3.0	Delayed SH Seed Cut	SP, H, F
811	20	21	3.0	Crop Tree Release	
811	21	29	3.0	SH Seed Cut/SH Removal	SP, H, F, P, R
811	23	17	3.0	SH Seed Cut/SH Removal	SP, H, F, P, R
811	24	33	3.0	Commercial Thinning	
811	25	50	3.0	UEAM Prep Cut/Group Selection	SP, H, TS, P, R
811	27	6	3.0	AMFC	
811	29	5	2.2	Non-commercial Thinning	
811	33	15	2.2	AMFC	
811	34	6	2.2	AMFC	
811	36	11	2.2	Non-commercial Thinning	
811	37	9	2.2	AMFC	
811	40	14	3.0	Commercial Thinning	
811	41	13	3.0	Commercial Thinning	
811	43	11	3.0	AMFC	
811	45	15	3.0	RUMFC/Group Selection	SP, H, F, P, R
811	46	9	3.0	Crop Tree Release	
811	53	11	3.0	SH Seed Cut/SH Removal	SP, H, F, P, R
811	54	8	3.0	Salvage Thinning	
811	55	22	3.0	SH Seed Cut/SH Removal	SP, H, F, P, R
811	56	19	3.0	RUMFC/Group Selection	SP, H, F, P, R
811	57	13	2.2	AMFC	
811	58	19	2.2	RUMFC/Group Selection	SP, H, F, P, R
811	59	28	3.0	Commercial Thinning	
812	5	15	3.0	AMFC	
812	7	10	2.2	Reforestation Only	SP, H, TS, P, R
812	8	4	3.0	AMFC	
812	10	22	3.0	Delayed SH Seed Cut	SP, H, F
812	12	6	3.0	Crop Tree Release	
812	13	41	3.0	Commercial Thinning	
812	14	19	3.0	SH Seed Cut/SH Removal	SP, H, F, Fe, P, R
812	21	4	3.0	SH Seed Cut/SH Removal	SP, H, F, Fe, R
812	22	17	2.2	AMFC	
812	26	13	2.2	RUMFC/Group Selection	SP, H, F, P, R
812	34	12	3.0	Commercial Thinning	
812	35	17	2.2	RUMFC/Group Selection	SP, H, F, P, R
812	37	30	3.0	Delayed SH Seed Cut	SP, H, F
812	38	36	3.0	Commercial Thinning	
812	39	11	3.0	SH Seed Cut/SH Removal	SP, H, F, Fe, P, R
812	43	24	3.0	Crop Tree Release	
812	62	17	3.0	Crop Tree Release	

Comp[1]	Stand	Acres	MA[2]	Harvest Treatments[3]	Reforestation Treatments[4]
812	66	12	3.0	Delayed SH Seed Cut	SP, H, F
812	67	9	3.0	Delayed SH Seed Cut	SP, H, F
812	68	16	3.0	Delayed SH Seed Cut	SP, H, F
813	2	8	2.2	RUMFC/Group Selection	SP, H, F, P, R
813	7	28	2.2	RUMFC/Group Selection	SP, H, F, P, R
813	8	29	2.2	Reforestation Only	SP, H, TS, P, R
813	9	26	2.2	RUMFC/Group Selection	SP, H, F, P, R
813	10	7	3.0	Commercial Thinning	
813	11	9	3.0	Commercial Thinning	
813	13	9	3.0	Crop Tree Release	
813	14	16	3.0	Delayed SH Seed Cut	SP, H, F
813	15	14	3.0	Commercial Thinning	
813	16	6	3.0	Reforestation Only	SP, H, TS, P, R
813	17	27	3.0	SH Seed Cut/SH Removal	H, F, P, R
813	18	26	3.0	Commercial Thinning	
813	20	33	3.0	Commercial Thinning	
813	21	27	3.0	Commercial Thinning	
813	22	21	3.0	Delayed SH Seed Cut	SP, H, F
813	23	12	3.0	Delayed SH Seed Cut	SP, H, F
813	24	12	3.0	Commercial Thinning	
813	25	15	3.0	Commercial Thinning	
813	26	19	3.0	Commercial Thinning	
813	27	10	3.0	Delayed SH Seed Cut	SP, H, F
813	28	19	3.0	Commercial Thinning	
813	29	3	3.0	Crop Tree Management	
813	32	3	2.2	Reforestation Only	SP, H, TS, P, R
813	35	11	2.2	Reforestation Only	SP, H, TS, P, R
813	38	11	2.2	RUMFC/Group Selection	SP, H, F, P, R
813	39	8	2.2	RUMFC/Group Selection	SP, H, F, P, R
813	42	8	3.0	Reforestation Only	TS
813	44	11	3.0	Commercial Thinning	
813	46	10	2.2	RUMFC/Group Selection	SP, H, F, P, R
813	47	4	2.2	RUMFC/Group Selection	SP, H, F, R
814	1	40	2.2	Non-commercial Thinning	
814	6	65	3.0	Crop Tree Management	
814	8	36	3.0	Crop Tree Management	
814	14	9	3.0	SH Seed Cut/SH Removal	SP, H, F, R
814	20	18	2.2	RUMFC/Group Selection	SP, H, F, P, R
814	21	12	3.0	Commercial Thinning	
814	22	8	3.0	Commercial Thinning	
814	23	5	3.0	Commercial Thinning	
814	24	17	3.0	SH Seed Cut/SH Removal	SP, H, Fe, R
814	27	18	3.0	Delayed SH Seed Cut	SP, H, F

Comp[1]	Stand	Acres	MA[2]	Harvest Treatments[3]	Reforestation Treatments[4]
814	28	5	3.0	Reforestation Only	SP, H, TS, P, R
814	29	11	3.0	Commercial Thinning	
814	30	20	3.0	Commercial Thinning	
814	32	53	3.0	Crop Tree Management	
814	33	68	3.0	Crop Tree Management	H
814	38	22	3.0	Non-commercial Thinning	
814	39	16	3.0	Crop Tree Release	
814	42	18	3.0	Commercial Thinning	
814	47	8	3.0	Crop Tree Release	
814	48	11	3.0	SH Seed Cut/SH Removal	SP, H, F, P, R
814	49	12	3.0	SH Seed Cut/SH Removal	H, F, P, R
814	50	17	3.0	Commercial Thinning	
814	51	15	3.0	Commercial Thinning	
814	55	20	3.0	Reforestation Only	H, P
814	60	26	3.0	Commercial Thinning	
814	61	17	3.0	Commercial Thinning	
814	62	21	3.0	Commercial Thinning	
814	63	70	3.0	Crop Tree Management	
814	64	23	3.0	Commercial Thinning	
814	66	9	3.0	Delayed SH Removal	SP, H, F, P, R
814	69	8	3.0	Delayed Group Selection	SP, H, F, P, R
814	70	16	3.0	Delayed SH Removal	H, F, TS, P, R
814	71	5	3.0	Delayed SH Removal	SP, H, F, P, R
814	73	7	3.0	Crop Tree Release	
814	74	2	3.0	Reforestation Only	SP, H, TS, P, R
814	75	13	3.0	Delayed SH Removal	H, F, P, R
814	76	17	3.0	Delayed SH Removal	SP, H, Fe, TS, P, R
814	79	14	3.0	Commercial Thinning	
814	82	19	3.0	Delayed SH Seed Cut	SP, H, F
814	84	14	3.0	RUMFC/Group Selection	SP, H, F, P, R
814	86	4	3.0	Reforestation Only	SP, H, P, R
814	88	2	3.0	SH Seed Cut/SH Removal	SP, H, TS, P, R

Wildlife Habitat Enhancements

In order to increase vegetative species diversity and provide forage and cover for wildlife, approximately 53 acres of the SBKC project area are proposed for tree and shrub planting. In addition, 55 acres, which have been planted in the past but have succumbed to mortality, are proposed for re-planting. Fencing is proposed for new plantings and for previously planted and fenced sites, which need to be re-fenced due to damage or deterioration. Monitoring of existing fences and survival of past plantings will occur as part of this project (58 acres).

Stone pit reclamation activities are proposed on 5 pits (16 acres). Dozing, disking, lime application, fertilizing, mowing, and seeding are proposed for these locations after operations in each pit have been completed and the pit is depleted.

Twenty-five acres of fruit tree pruning, 15 acres of non-native invasive plant species control and eradication, and the installation of 14 wildlife habitat structures (bat boxes, songbird nestboxes, and boxes for flying squirrels) are also proposed within the project area. Please see Table 4 for a list of proposed wildlife habitat enhancements proposed in this project.

Table 4. Wildlife Habitat Enhancement Proposed Action

Comp/Stand		Plant	Re-plant existing fences	Fence	Install Wildlife Structure	Prune Fruit Trees	Opening Maint.
810	**2**	2					
810	**5**		6		2	2	
810	**8**	1		1			
810	**10**		2	2			
810	**12**	1		1	2		
810	**13**	1		1			
810	**15**	1		1			
810	**17**		3	3	2	1	
810	**18**		1	1			2
810	**20**	2		2	2		
811	**3**		3	3			
811	**4**					1	
811	**6**					4	
811	**9**		4	1		4	
811	**30**		4	4		4	
811	**35**		1	1		1	
811	**47**						
811	**49**					1	
811	**52**	3		5	2		6
812	**2**		5	5			
812	**17**		1	1		6	
812	**18**		2	2			
812	**23**		1	1			
812	**24**			1			
812	**27**			1			
812	**43**	2		2			2
813	**1**		2	2			
813	**5**		1	1		1	
813	**6**		2	2			
813	**8**	5		5			
813	**12**		1	1			

Comp/Stand		Plant	Re-plant existing fences	Fence	Install Wildlife Structure	Prune Fruit Trees	Opening Maint.
813	**18**		1	2			
813	**22**	2		2			
813	**32**		1	1			
813	**41**		1	1			
814	**2**		1	1			
814	**3**		1	1			
814	**6**	4		2			
814	**8**	2		2			
814	**9**		2	2			
814	**17**		2	2			
814	**18**		3	3			
814	**26**						
814	**28**	3		3			
814	**29**	3		3			
814	**33**	5		2			
814	**55**	6		6			
814	**59**						
814	**63**	2		2			
814	**68**	2		2	2		2
814	**69**		1	1			
814	**71**	2	2				
814	**72**		1	1			
814	**75**						
814	**76**						
814	**80**	2		2	1		2
814	**85**	2		2	1		2

Soil and Water Rehabilitation Activities

Due to the occurrence of illegal OHV use within the project area, some illegal OHV trails have resulted in increased erosion and sedimentation. Three sites are proposed for barricade placement and rehabilitation. Plantings of low growing trees and shrubs are proposed at three sites where a powerline corridor crosses Hubert Run and has only grassed cover. This planting is proposed in order to improve shading for the stream which will reduce in-stream temperatures and increase stability of the streambanks to prevent erosion. These plantings may also reduce the need for herbicides in the long-term by occupying growing space. Plantings along the powerline openings are proposed within 20 feet of both sides of the stream. Please see Table 5 for the stand locations of these activities. Three barricades are proposed for installation on the pipeline adjacent to FR448 and FR463. These barricades would prevent illegal ATV use while allowing OGM personnel access to the pipeline. These barricades would help the rehabilitation efforts needed due to illegal ATV use in the project area.

Table 5. Proposed Soil and Water Rehabilitation Activities

Compartment	Stand	MA	Unit	Proposed Action
812	24	2.2	1 site	Block illegal ATV trails and rehabilitate sites
813	5	2.2	1 site	
813	28	3.0	1 site	
816	11	3.0	0.25 acres	Plantings along/within 20 feet of Hubert Run stream corridor

Note: Three barricades are also proposed for installation in both action alternatives in order to prevent illegal ATV access on the pipeline adjacent to FR448 and FR463. Please see Map 6 for approximate locations.

Transportation Activities

Road construction is being proposed on approximately 2.8 miles within the project area for both short-term and long term management, primarily for vegetative management of National Forest land. Approximately 2.7 miles of road construction would use existing road corridors, such as OGM access roads, old temporary roads, or other unclassified roads. There are approximately 14.4 miles of road maintenance proposed in the SBKC project area. Maintenance is defined as the ongoing upkeep necessary to retain or restore a road to its approved road management objective. It may include a variety of road activities such as roadside brushing, surfacing, culvert replacement, as well as the installation of sediment basin, and surface and ditch armoring. These activities will reduce sediment, maintain or improve water quality, and provide safe driving conditions for the forest user. Limestone surfacing would be used on approximately 0.7 mile of road and would be accomplished to meet fisheries guidelines, which would include road sections within 300 feet of riparian areas and areas where roads cross streams. Three stone pits are being proposed for expansion and one new pit is being proposed for development.

Approximately 2.1 miles of roads will be decommissioned. Decommissioning is defined as activities that result in the stabilization and restoration of unneeded roads to a more natural state. There are five levels of decommissioning. They range from a road being 1) blocked 2) re-vegetated 3) culverts removed 4) unstable fills removed or 5) roadbed is re-contoured.

Table 6. Proposed Transportation Activities

Transportation Activity	Road	Miles
Road Construction (New Corridor)	FR186A	0.1
Road Construction (Existing Corridor)	FR186A	1.2
	FR448A	0.3
	FR448E	0.4
	FR463B	0.1
	NS3757 (FR448Aa)	0.4
	NS13138 (FR448Ab)	0.2
	NS30303 (FR463Ba)	0.2
Road Maintenance	FR186	3.5
	FR186A	0.9
	FR448	2.0
	FR448A	0.6
	FR448B	0.3
	FR448C	0.5
	FR448E	0.4
	FR448F	0.3
	FR460	1.1
	FR461	0.8
	FR463	2.2
	FR463B	0.1
	FR475	1.7
Road Decommissioning	FR463B	0.3
	NS27019	0.3
	NS27021	0.4
	NS27167	<0.1
	NS3757	0.3
	NS45293	0.1
	NS45250	0.1
	NS30303	0.4
	NS45937	0.2
Limestone Surfacing	FR186	0.1
	FR186	0.1
	FR448A	<0.1
	FR448B	0.1
	FR448C	<0.1
	FR463	0.2
	FR463	0.1
	FR463	0.1

Pit Expansion (existing)	FR448 north	1 acre
	FR448 south	2 acres
	FR186 north	3 acres
Pit Development (new)	FR461	3 acres
Pit Reclamation	FR 186 (both pits), FR448 (both pits), FR461	16 acres
New Road Closure Devices	**Road**	**Number/Type of Device**
	FR448C	1 Gate
	FR448E	1 Gate
	FR460	1 Gate
	FR461	1 Gate
	FR186A	1 Gate

1.7 Decision to Be Made

The purpose of this EA will be to provide the Marienville District Ranger, who is the Responsible Official, with sufficient information and analysis to make an informed decision about the SBKC project in response to the purpose and need for action. The district ranger will also consider public input to this EA to decide the following:

1) Are there additional issues and/or alternatives that should be analyzed in detail?
2) Which of the alternatives would best move the SBKC project area toward the desired condition outlined in the ANF LRMP and purpose and need for action?
3) Which of the alternatives best address the significant issues raised during scoping?
4) Would the proposed action and its alternatives pose any significant environmental impact to warrant the need for an environmental impact statement?

This project does not require proposing any amendments to the ANF LRMP.

1.8 Public Involvement

The project proposal was initially listed in the ANF Schedule of Proposed Actions (SOPA) in the third quarter of 2006 (July 1 to September 30) and in subsequent issues. On September 6, 2006, a scoping package was sent to 87 adjacent landowners, subsurface mineral rights estate owners, and other interested parties in order to request any preliminary concerns they may have with the proposed activities associated with this project.

On November 9, 2006, the South Branch Kinzua Creek project public comment package was mailed to 16 individuals who had requested to be kept informed of this project. An additional three letters notifying interested parties that the public comment package was available online were also mailed out on this date. A News Release was sent out via e-mail on November 13, 2006. The legal notice initiating the 30-day comment period was published in the *Kane Republican* (Kane, Pensylvania newspaper) on November 13, 2006. In addition, ten (10) e-mail notifications of the availability of the public comment package on the website were sent to interested parties. One hundred twenty nine (129)

responses to the comment period were received. These responses have been used by the interdisciplinary team to identify issues and guide the analysis.

In between the time that the public comment package was sent to interested parties/adjacent landowners and now, the ANF has completed and analyzed a revised LRMP for the Forest. Because the public comment package requested comments on the SBKC project based on the 1986 ANF LRMP, and this project is now based on the analysis completed for the 2007 ANF LRMP, the Marienville District is initiating another 30-day comment period in order to give the public an opportunity to submit comments relevant to this project based on the revised (2007) LRMP.

1.9 Issues Used to Develop Alternatives

Responses received during the scoping process were analyzed to determine if there were any issues that would affect the proposed action and the range of alternatives to be considered; and

- whether they could be or have been addressed at a higher (Forest, regional, national) level, or;
- whether they can be resolved by applying Forest Plan standards and guidelines, or;
- whether they can be resolved by modifying the proposed action.

The interdisciplinary team separated the issues into two groups: significant and non-significant issues. Significant issues are used to formulate alternatives, prescribe mitigation measures, or analyze environmental effects. Issues are "significant" because of the extent of their geographic distribution, the duration of their effects, or the intensity of interest or resource conflict. Non-significant issues are identified as those:

- outside the scope of the proposed action;
- already decided by law, regulation, Forest Plan, or other higher level decision;
- irrelevant to the decision to be made; or
- conjectural and not supported by scientific or factual evidence.

The Council on Environmental Quality (CEQ) NEPA regulations require this delineation in Sec. 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…"

Preliminary issues were identified by the interdisciplinary team and through informal responses to the pre-scoping letter (which was sent out on September 6, 2006) from potentially interested parties (adjacent landowners, subsurface mineral rights estate owners, and other individuals or organizations). Comments were analyzed to determine if there were any issues that would affect the proposed action and the range of alternatives to be considered; and

- whether they could be or have been addressed at a higher (Forest, regional, national) level, or;
- whether they can be resolved by applying LRMP standards and guidelines, or;
- whether they can be resolved by modifying the proposed action.

No additional significant issues were identified during the public comment period.

The Council on Environmental Quality (CEQ) NEPA regulations require this delineation in Sec. 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…"

The interdisciplinary team identified four significant issues:

1. **No New Road Construction**
   There is a concern that road construction will negatively affect opportunities for solitude and remoteness of some of the more inaccessible locations found within the project area. Due to the remote location of a large section of South Branch Kinzua Creek within the project area (the section of stream between the headwaters and its confluence with Hubert Run is currently designated as a State Wilderness Trout Stream[1] by the Pennsylvania Fish and Boat Commission), there is also a concern that additional roads will facilitate increased public access to this stream, thereby resulting in decreased opportunities for solitude.

   Indicator Measure: Miles of new road construction
   Indicator Measure: Miles of road decommissioning
   Indicator Measure: Road density (miles of road per square mile)
   Indicator Measure: Road management changes (percent of open, closed, and restricted roads).

2. **Active Timber Management in the South Branch Kinzua Creek Valley**
   There is a concern that timber harvest activities occurring in the vicinity of South Branch Kinzua Creek will result in degradation to stream health and negatively affect the trout fishery in this stream.

   Indicator Measure: Acres of timber harvest in the proximity of South Branch Kinzua Creek

3. **Use of Uneven-aged Management**
   Some believe that there are opportunities to perform uneven-aged management throughout the project area in place of even-aged management. An uneven-aged treatment may provide structural diversity and habitat for interior wildlife species. It also comes with greater risk of failure of developing seedlings, includes more entries which increases the opportunity for disturbance to soils, and increases the amount of edge habitat.

   Indicator Measure: Acres of uneven-aged management

[1] Wilderness trout stream management is based upon the provision of a wild trout fishing experience in a remote, natural and unspoiled environment where man's disruptive activities are minimized. Established in 1969, this option was designed to protect and promote native (brook trout) fisheries, the ecological requirements necessary for natural reproduction of trout and wilderness aesthetics. The superior quality of these watersheds is considered an important part of the overall angling experience on wilderness trout streams. Therefore, all stream sections included in this program qualify for the Exceptional Value (EV) special protected water use classification, which represents the highest protection status provided by the Department of Environmental Protection. (Pennsylvania Fish and Boat Commission, 2006).

Indicator Measure: Acres of even-aged management

4. **Dispersal of Treatment Areas**
   There is a concern that some of the vegetation treatments proposed within the SBKC project area may be grouped together too closely.

   Indicator Measure: Acres of dropped treatments due to this concern

1.10 Relationship to Other Documents

The ANF LRMP is one of the environmental documents which provide guidance or information regarding management within the SBKC project area. This analysis is also tiered to the following document:

- ***Vegetation Management on Electric Utility Rights of Way Final Environmental Impact Statement and Record of Decision*** (USDA-FS and Environmental Consultants, Inc. 1997). The purpose of this EIS is to evaluate the appropriateness of using herbicides to manage vegetation and disclose potential environmental impacts of the vegetation treatment alternatives on National Forest System lands on the ANF.

The following documents are incorporated by reference:

- ***The Allegheny National Forest Monitoring and Evaluation Reports from Fiscal Year (FY) 1987 to 2001***. The purpose of monitoring and evaluation is to determine progress in meeting Forest Plan direction. Monitoring and evaluation provides information to determine whether Forest Service programs are meeting the Forest Plan direction, which includes goals and objectives, management prescriptions, and standards and guidelines.
- ***North End Roads Analysis Project Report (***USDA-FS 2006). This report contains recommendations that may be carried forward in the SBKC, North End, and other projects.
- ***Allegheny National Forest: The Year in Review, 2006 (***USDA-FS 2007f). The table located on the last page of this document (First and Second Decade Forest Plan Implementation) displays accomplishments of goals detailed in the LRMP.
- ***Biological Assessment for Threatened and Endangered Species on the ANF*** (USDA-FS 2007e). The ANF completed a consultation process with the US Fish and Wildlife Service (USFWS) for revising the Land and Resource Management Plan. Findings in the Forest Biological Assessment (BA) were concurred by a letter issued by the USFWS in January 2007 (USDI-FWS 2007). The effects of the proposed action evaluated in this EA and other alternatives are based on those discussed in this document.

Consistency with the ANF LRMP applies only to the specific activities described in the action alternatives. Not all desired conditions in the Forest Plan can be achieved with a single on-the-ground action. Often many actions are necessary in order to meet the desired condition identified by management direction.

1.11 Consulting Agencies

The Forest Service works in close cooperation with the U.S. Fish and Wildlife Service (USDI-FWS). The ANF completed a consultation process with the U.S. Fish and Wildlife Service (USFWS) for revising the ANF LRMP. Findings in the Forest Biological Assessment (BA) were concurred by a letter issued by the USFWS in January 2007 (USDI-FWS 2007). The effects of the proposed action and other alternatives evaluated in this report are based on those discussed in the Forest BA.

The Forest Service also consults with the Pennsylvania Historical and Museum Commission (State Historic Preservation Office in Pennsylvania) and the Seneca Nation of Indians Tribal Historic Preservation Office in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended in 1980 and 1992, and the regulations (36 CFR Part 800) of the Advisory Council on Historic Preservation. All management activities proposed in the SBKC project have been reviewed by these agencies for potential impacts to heritage resources.

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CHAPTER 2: Alternatives

2.1 Description of Alternatives to be Analyzed in Detail

2.1.1 Alternative 1: No Action

While this alternative does not meet the purpose and need for action, it does provide a basis for analyzing the effects of not conducting management activities in the project area and comparing the effects with those of the action alternatives. The no action alternative is required by the National Environmental Policy Act (NEPA). The proposed silvicultural treatments, wildlife habitat improvements, road work, soil and water improvements and reforestation activities would not be completed at this time.

2.1.2 Alternative 2: Proposed Action

Alternative 2 is described in Chapter 1, Section 1.6

Changes to Alternative 2: Proposed Action since Public Comment Package

Vegetation treatments in stands 812024, 814018, 814052, and 814053 along with ten acres of stand 814064 have been dropped from both of the action alternatives due to a conflict with other resources. There stands were also dropped from Alternative 3 described below. These changes result in a decrease of 32 acres of commercial thinning and a decrease in 45 acres of reforestation-only treatments from those proposed in the public comment package.

Additional stone pit testing was completed recently on the existing and potential stone pits within the SBKC project area. This resulted in changes in the stone pit expansion and development listed in the proposed action from the public comment package. This includes dropping stone pit FR186 south, which is not going to expanded with this project. No expansion of this pit is anticipated in the foreseeable future because it was planted with wildlife shrubs in the past and because it currently also supports a vigorous clump of immature aspen.

2.1.3 Alternative 3

This alternative was developed from the issues raised and is a modification of Alternative 3 that was proposed in the public comment package. Due to concerns with proposed activities within relatively remote areas, all road construction (0.1 miles) on new corridors (FR186A) and 0.5 miles of road construction on existing corridors (FR186A and FR463Ba) has been dropped in this alternative. Because of this, several stands were dropped from this alternative because they cannot be accessed using existing roads. Concerns with management activities occurring near South Branch Kinzua Creek have resulted in some treatments near South Branch Kinzua Creek also being dropped in this alternative. The dispersal of vegetation treatments is addressed with this alternative by an increase in uneven-aged management with a subsequent decrease of even-aged management as compared with the proposed action. Table 7 shows the stands that have been dropped in Alternative 3.

As mentioned above, this alternative in a modification of Alternative 3 proposed in the public comment package. This alternative now includes an additional 70 acres of even-

aged regeneration treatments and an additional 43 acres of intermediate even-aged treatments that were original proposed for uneven-aged management. Reforestation treatments (site preparation, herbicide application, tree shelter installation, planting, and release) have decreased by 37 acres, and fertilization has increased by 17 acres.

Wildlife habitat enhancement, NNIS control treatments, and soil and water rehabilitation activities are the same as those proposed in Alternative 2. Road maintenance, limestone surfacing, pit development and expansion, road decommissioning, and gate installation activities are the same as those proposed in Alternative 2.

Table 7. Stands with Silvicultural Treatments Included in the Proposed Action but Dropped Under Alternative 3

Comp	Stand	Acres	MA	Harvest Treatments	Reforestation Treatments
810	15	35	3.0	Commercial Thinning	
810	16	21	3.0	Commercial Thinning	
810	19	15	3.0	Commercial Thinning	
810	28	4	3.0	Commercial Thinning	
811	5	11[a]	2.2	RUMFC/Group Selection	SP, H, F, P, R
811	17	6	2.2	Non-commercial Thinning	
811	27	6	2.2	AMFC	
811	29	5	2.2	Non-commercial Thinning	
811	33	15	2.2	AMFC	
811	34	6	2.2	AMFC	
811	36	11	2.2	Non-commercial Thinning	
811	37	9	2.2	AMFC	
811	43	11	2.2	AMFC	
811	57	13	2.2	AMFC	
812	5	15	2.2	AMFC	
812	8	4	2.2	AMFC	
812	22	17	2.2	AMFC	
812	26	13	2.2	RUMFC/Group Selection	SP, H, F, P, R
813	21	27	3.0	Commercial Thinning	
813	24	12	3.0	Commercial Thinning	
814	1	40	2.2	Non-commercial Thinning	
814	14	9	3.0	SH Seed Cut/SH Removal	SP, H, F, R
814	27	18	3.0	Delayed SH Seed Cut	SP, H, F
814	30	20	3.0	Commercial Thinning	
814	38	22	3.0	Non-commercial Thinning	
814	48	11	3.0	SH Seed Cut/SH Removal	SP, H, F, P, R
814	62	21	3.0	Commercial Thinning	
814	64	23	3.0	Commercial Thinning	
814	66	9	3.0	Delayed SH Removal	SP, H, F, P, R
814	79	14	3.0	Commercial Thinning	
814	88	2	3.0	SH Seed Cut/SH Removal	SP, H, TS, P, R

[(a)] Timber harvests on five acres of stand 811005 been dropped in response to concern of vegetation management within close proximity to South Branch Kinzua Creek. Reforestation activities would be implemented on the entire stand, except for riparian buffers.

2.1.4 Design Features and Mitigation Measures Common to All Action Alternatives

The proposed action has been designed to be implemented in accordance with ANF LRMP forest-wide, MA 2.2, and MA 3.0 standards and guidelines (S&G) (USDA-FS 2007a).

Design Features are highlighted applications of the ANF LRMP standards and guidelines. In some cases, the standards and guidelines provide options for how they may be applied. A design feature clarifies, where necessary, how these standards and guidelines may apply to specific actions in the project proposal. Design features for action alternatives include:

Heritage

- Site-specific areas are not listed where heritage sites occur due to the confidential nature of the information. See ANF LRMP (p. 62) for standards and guidelines for heritage resources. Appropriate heritage resources personnel will be contacted prior to formalizing any sale or implementation contract concerning ground disturbing activities to include any design features in contracts or agreements to protect heritage sites. Also, in any contract or agreement, the following statement will be included, as appropriate: If any previously unknown or unrecorded sites are found during project implementation, all activity in the area should cease and the appropriate heritage resources personnel notified. A heritage resource specialist will evaluate the situation and determine the proper course of action (***USDA-FS, 2007a, p. 62***).

Recreation

- Hauling and road maintenance on FR186 (snowmobile trail) will be restricted to times other than weekends or holidays during the winter activity season. **(*USDA-FS. 2007a, p. 60*)**
- Skidding activities will not occur on FR186. **(*USDA-FS. 2007a, p. 60*)**
- Felling or skidding activities within 100 ft. of FR186 (snowmobile trail) will be restricted to times other than weekends or holidays during the winter activity season. **(*USDA-FS. 2007a, p. 60*)**
- All commercial and administrative traffic will travel with their lights on during favorable snowmobile conditions. **(*USDA-FS. 2007a, p. 61*)**
- Snowplowing activities will leave an adequate mat of snow for snowmobiling. **(*USDA-FS. 2007a, p. 61*)**

Wildlife

- In treatment areas within MA 2.2 where scattered or groups of blown-down trees have occurred, all trees will be left within the stand to contribute to the coarse woody debris component within the MA, except for stand 811005 where the removal of blown-down trees is necessary for silvicultural objectives. **(*USDA-FS. 2007a, p.80 & 111*)**
- In all treatment areas within MA 2.2, all snags and den trees will be retained unless considered unsafe during operations under OHSA regulations. **(*USDA-FS. 2007a, p. 80, 81, & 113*)**

- Fencing and herbicide in MA 2.2 will be accomplished in blocks that allow for landscape and wildlife habitat connectivity. These treatments will allow for wildlife travel lanes such as riparian corridors and other continuous areas. Timing of treatment will be coordinated with district biologists to ensure habitat connectivity. ***(USDA-FS, 2007a p. 55* & 112)**
- All pits will be reclaimed and improved for wildlife habitat once they are deemed depleted. Areas will be seeded and planted with native species that will benefit a variety of wildlife. This will reduce the long-term effects of soil erosion as well as contribute to important wildlife habitat. **(*USDA-FS. 2007a, p. 81 & 98*)**
- Maintain the existing conifer component and retain all hemlock and white pine >18" dbh in all treatment areas. **(*USDA-FS. 2007a, p. 65 & 84*)**
- When the pit is expanded in or adjacent to stand 814068, a wildlife biologist will coordinate with the road engineers so that pit expansion activities will be done outside the nesting and brood rearing seasons, which is May 1 through September 1. **(*USDA-FS. 2007a, p. 80*)**
- No herbicide will be applied within 200 feet of the South Branch Kinzua Creek for any vegetative treatment, including stands 811005, 812007, and 814001. **(*USDA-FS. 2007a, p. 75*)**
- No heavy equipment relating to harvest activities will be utilized within 200 feet of South Branch Kinzua Creek. This applies to stand 811005. **(*USDA-FS. 2007a, p. 75*)**

Scenery

- Leave areas of ¼ acre in size shall be located in a natural or random pattern and will be located in the field by landscape architect. Affected stands include: 810043, 812010, 812037, 811023, and 811055 **(*USDA-FS 2007g, pp. 9 and 10*)**.
- Tree marking paint will be applied on the side away from visually sensitive roads (FR 186) and water bodies (South Branch of Kinzua Creek) so paint will not be visible (810043, 812010, 812038, 812037, 810026, 810034, 811025, 811055, 811023, 811059, 811056, 811021, 811053, 811005, and 814001) (***USDA-FS 2007g, pp. 9 and 10***).
- For FR 186 and South Branch Kinzua Creek, slash shall be pulled back 50 feet from the edge of the road/stream, and for an additional distance of 50-100 feet, slash shall be lopped and scattered to a depth of 3 feet (810038, 810043, 812010, 812062, 812038, 812037, 810026, 810034, 810006, 811025, 811055, 811023, 811010, 811059, 811056, 811021, 811053, 811005, and 814001) (***USDA-FS 2007a, pp. 9 and 10***).

2.2 Alternatives Considered But Eliminated From Detailed Study

Several alternatives were considered by the ID team and deciding officer but were eliminated from detailed study for various reasons. The following are those alternatives (the first ten were generated by the public):

1. **Alternatives not connected to logging:** This alternative was considered but eliminated from detailed study because it fails to meet the purpose and need. Timber harvesting is a tool to achieve ANF LRMP goals and objectives. Production of high quality hardwoods is a ANF LRMP goal (USDA FS 2007a. p. 14).
2. **An alternative to manage the area in a manner prescribed in the National Protection and Restoration Act:** This comment refers to pending legislation in the House of Representatives. This legislation is not law and proposes ending commercial logging on National Forest System lands in favor of restoration projects. This alternative was considered but eliminated from detailed study because it fails to meet the purpose and need and direction of the ANF LRMP and is beyond the scope of this project.
3. **An alternative to manage this area for forest interior species must be considered. Projects that reduce the fragmentation of the area should be considered:** This alternative was considered but eliminated from detailed study because it fails to meet the purpose and need of the ANF LRMP. The effects of the proposed alternatives on fragmentation will be analyzed in the EA.
4. **An alternative to minimize the "death and suffering" caused by logging. For example, an alternative of not cutting in the nesting season:** This alternative was considered but eliminated from detailed study because the intent can be achieved by implementing ANF LRMP standards and guidelines, mitigation measures, and/or design features.
5. **An alternative of private lands providing the timber needs to be considered:** This alternative was considered but eliminated from detailed study because it is beyond the scope of this project.
6. **An alternative of using reusable pallets or pallets from recycled plastic needs to be considered:** This alternative was considered but eliminated from detailed study because using pallets is not linked to a consequence of the proposed action and the Forest Service has no authority to regulate the use of pallets. This alternative is beyond the scope of this project.
7. **An alternative of increasing the use of recycled paper also must be considered:** This alternative was considered but eliminated from detailed study because using recycled paper is not linked to a consequence of the proposed action and the Forest Service has no authority to regulate the use of recycled paper. This alternative is beyond the scope of this project.

8. **An alternative that bans exports of hardwood timber needs to be considered:** This alternative was considered but eliminated from detailed study because banning exports is not linked to a consequence of the proposed action and the Forest Service has no authority to regulate exports. This alternative is beyond the scope of this project.
9. **Exclusive Use of Uneven-aged Management:** This alternative was considered but eliminated from detailed study because exclusive use of uneven-aged management would not meet the purpose and need of the project. Both action alternatives do include a blend of uneven-aged management treatments.
10. **"Allegheny Wild" proposal:** This alternative was considered but eliminated from detailed study because it is has already been addressed at a higher level in the FEIS for the 2007 ANF LRMP (USDA-FS, 2007b, p. 2-11 to 2-12).
11. **Alternative 3 from scoping/30-day comment period:** This alternative was considered but eliminated from detailed study because it was not consistent with the revised ANF LRMP (Alternative Cm). Some of the harvest activities proposed under Alternative 3 in the public comment package are not consistent with management area direction in the revised ANF LRMP. This alternative proposed more uneven-aged management in areas that are MA 3.0, which features even-aged management.

2.3 Comparison of Alternatives – Actions and Outputs

Table 8. Comparison of Actions and Outcomes by Alternative

Proposed Activity Timber Harvest (Acres)	Alt 1	Alternative 2		Alternative 3	
		1st entry	2nd entry	1st entry	2nd entry
Even-Aged Regeneration Treatments (Total)	**0**	**788**		**717**	
		251	537	229	488
Shelterwood Seed Cut	0	251	226	229	208
Shelterwood Removal	0	0	311	0	280
Even-Aged Intermediate Treatments (Total)	**0**	**852**		**564**	
Commercial Thinning	0	748		556	
Salvage Thinning	0	8		8	
Thinning to Accelerate Mature Forest Conditions (AMFC)	0	96		0	
Uneven-Aged Treatments (Total)	**0**	**594**		**558**	
Uneven-Aged Management Improvement Cut	0	50		50	
Restore Understory Mature Forest Conditions (RUMFC)	0	243		225	
Group Selection	0	**301**		**283**	
	0	0	301	0	283
Non-Commercial Treatments (Total)	**0**	**633**		**549**	
Non-Commercial Thinning	0	84		0	
Crop Tree Management	0	393		393	
Crop Tree Release	0	156		156	
Volume (MMbf)	0	7.7		6.3	
Reforestation Activities					
Site Preparation	0	812		750	
Herbicide Application	0	896		834	
Fence	0	746		686	
Fertilization	0	96		96	
Tree Shelter Natural Regeneration	0	75		73	
Planting	0	200		191	
Release	0	654		610	

Wildlife Habitat Enhancements			
Plant (acres)	0	53	53
Re-Plant (acres)	0	55	55
Fence (acres)	0	93	93
Songbird Nestbox/Bat Roosting Box/Flying Squirrel Box Installation (number of structures)	0	14	14
Fruit Tree Pruning (acres)	0	25	25
Opening Maintenance Seed/Disc/Lime/Fertilize) (acres)	0	16	16
Non-Native Invasive Plant Species (NNIS) Control			
NNIS Treatments (acres)	0	15	15
Soil and Water Restoration Activities			
Rehabilitate and Place Barricades on Illegal ATV trails (number)	0	3	3
Planting trees/shrubs adjacent to Hubert Run (acre)	0	0.25	0.25
Transportation Activities			
Road Construction – new corridor (miles)	0	0.1	0
Road Construction – existing corridor (miles)	0	2.7	2.2
Road Decommissioning (miles)	0	2.1	2.1
Road Maintenance (miles)	0	14.4	14.4
Limestone Surfacing (miles)	0	0.7	0.7
Number of Stone Pits to be Expanded	0	3	3
Stone Pit Expansion (acres)	0	6	6
Number of Stone Pits to be Developed	0	1	1
Stone Pit Development (acres)	0	3	3
Stone Pit Rehabilitation	0	16	16
Road Barricade Placement (number of devices)	0	5	5

2.4 Comparison of Alternatives – Narrative Summary

Alternative 1: No Action

None of the proposed timber harvests, reforestation activities, wildlife habitat enhancements, soil and water rehabilitation activities, or NNIS treatments would be completed at this time. Age class distribution would remain the essentially the same in the short term. Natural and human-caused (such as the spread of introduced beech bark disease) processes would control the development of vegetation and no action would be taken to move the project area towards the desired condition. Routine custodial or maintenance activities would occur within the project area. Road maintenance (deferred)

may take place as funding becomes available. Road classifications would remain 42 percent Open, 46 percent Restricted, and 12 percent Closed. Road density in the SBKC project area would remain 1.9 miles of forest road per square mile.

Alternative 2: Proposed Action

This alternative would best contribute to the stated purpose and need for action by completing regeneration sequences in stands proposed for treatment. This would create 311 acres of early-successional habitat over the next decade. This alternative would enhance horizontal and vertical diversity throughout the project area through proposed overstory vegetation management, associated reforestation treatments, and wildlife habitat improvements. Reforestation treatments would control competing vegetation long enough to allow tree seedlings to become established, restoring species diversity to the understory. It would also provide high quality hardwood timber through even-aged management, thus providing wood to meet people's demand for wood products and contributing to the economic vitality of local communities. Approximately 7.7 MMBF of timber would be harvested under this alternative. The expansion of three existing pits and developing one new pit, road maintenance activities, road decommissioning, road construction, limestone surfacing, and the installation of gates would occur under this alternative.

Non-native invasive plant species treatments, soil and water rehabilitation activities, and various wildlife habitat enhancements activities are proposed under this alternative.

Road management classifications would become 21 percent open, 61 percent restricted, and 18 percent closed within the project area. Road density in the project area would be 2.2 miles of forest road per square mile.

Alternative 3

The proposals included in this alternative respond to the significant issue of no new roads by dropping 0.1 mile of road construction (new corridor) and dropping 0.5 miles of road construction (existing corridor). Due to the reduction in access, 75 acres of vegetation management (commercial thinning proposed in stands 810015, 810016, 810019, and 810028) have been dropped under this alternative.

Dropping 58 acres of treatments (2½ stands) is responsive to the significant issue of active vegetation management near South Branch Kinzua Creek.

The significant issue of reducing even-aged management treatments is also responded to under this alternative. Even-aged treatments will decrease by 49 acres. It should be noted here that 18 acres of uneven-aged treatment have been dropped in this alternative due to the significant issue concerning vegetation management within the South Branch Kinzua Creek valley.

Dispersing treatments across a broad landscape rather than treating numerous stands located within a continuous block is also addressed under this alternative. This issue is addressed by dropping 257 acres of treatments (139 acres in MA 3.0 and 118 acres in MA 2.2) due to their close proximity to other stands proposed for treatment, thus decreasing the size of several contiguous blocks of proposed treatments.

A total of 439 acres of treatments have been dropped under this alternative. Wildlife habitat enhancements, NNIS treatments, and soil and water rehabilitation activities remain unchanged from the proposed action.

Road management classifications would become 21 percent open, 63 percent restricted, and 16 percent closed within the project area. Road density would drop slightly to 2.1 miles of forest road per square mile

Approximately 6.3 MMbf of timber would be harvested under this alternative.

The type and amount of treatments which are proposed to be dropped under this alternative include 71 acres of even-aged regeneration treatments (shelterwood seed cuts and shelterwood removals), 288 acres of even-aged intermediate treatments (AMFC and commercial thinning), 36 acres of uneven-aged treatments (RUMFC and group selections), and 84 acres of non-commercial treatments (thinning). Regeneration treatments would decrease in the following amounts; 62 acres of site preparation and herbicide application, respectively, 60 acres of fence installation, 2 acres of tree shelter installation, 9 acres of planting, and 44 acres of release.

Dropping these treatments and activities has various effects. However, due to the similarities between both action alternatives, there is not a substantial difference in effects between the two action alternatives. When compared to Alternative 2, some of the more notable differences from implementing this alternative include:

- less early-successional habitat created;
- fragmentation effects would be decreased;
- a greater degree of forested core areas would remain;
- less revenue generated for the U.S. Treasury and less jobs related to harvest activities and processing raw materials into forest products; and
- a less rapid rate of carbon sequestration and the potential for the creation of more down woody debris.

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CHAPTER 3: Affected Environment

This chapter provides a description of the SBKC project area and vicinity. The descriptions and analyses are based on the best available information about the affected environment. The resources described include:

- The physical environment, including the soil resources; water resources, riparian areas, and fisheries; transportation; air quality; and oil, gas and minerals.
- The biological environment, including vegetation, wildlife, and non-native invasive plants.
- The social environment, including heritage resources, scenery, recreation, economics, and human health and safety.

3.1 Physical Environment

This section describes the physical characteristics of the soil; water resources; transportation; air quality; and oil, gas, and mineral resources. While this section is focused on physical resources, it includes a discussion of stream-side (riparian) habitat and fishery resources.

3.1.1 Soil Resources

Soil Nutrients

The soils in the SBKC project area are formed from parent materials of sandstone, shale, conglomerate, clay, and small quantities of coal and limestone (Berg *et al*., 1980; Bureau of Topographic and Geologic Survey, Map 7, 2000). Soils in the ANF are typically lacking in base cations, especially calcium (Ca) and magnesium (Mg), due to the rarity of limestone and dolomite in the area. Acid deposition is prevalent on the ANF, and since soils across the ANF have a low buffering capacity, they are prone to becoming even more acidic. This process further reduces levels of base cations in forest soils on the unglaciated plateau and shoulder slopes (Bailey *et al*., 2004). Soil acidification occurs when negatively charged sulfate and nitrate ions attach to positively charged Ca and Mg ions "pulling" them off the soil particles, which permits them to be leached through the soil profile over time. There are often high concentrations of base cations found at lower slope positions, often near seeps (Bailey *et al*., 2004). This suggests that groundwater movement and the translocation of base cations are important processes, especially for the health of species with high base cation requirements such as sugar maple, basswood and ash trees. In summary, incoming nitrate and sulfate ions accelerate the release of calcium and magnesium, but it is not known whether these ions actually are lost from the site. Some portion is recaptured in the aggrading biomass on the site, but the relative amount is presently unknown. Recent research on ANF sites suggests that on some sites a substantial portion of the base cations may be recaptured; on other sites, significant amounts of base cations may be lost to leaching (Bailey *et al*., 2005). The presence of a fragipan appears to play an important role in the potential loss of calcium and magnesium; fragipans limit root presence below the fragipan resulting in larger losses of base cations than on sites without a fragipan (Bailey et. al., 2005; Scott Bailey, Stephen Horsley, and Robert Long, personal communication, USDA Forest Service, Northeastern Research Station).

On average, about half of the nutrients stored in a tree are contained in the tops (Powers *et al*., 1990). This means that following harvest about half of the nutrients in trees would be left on site to be recycled. Where only the stem wood is removed, as is standard practice on the ANF, nutrient losses tend to be low. Nonetheless, even whole-tree harvesting has not been shown to cause depletion of exchangeable bases in experimental work at Hubbard Brook Experimental Forest in New Hampshire (Johnson *et al*., 1997) and at the Walker Branch Watershed in Tennessee (Johnson and Todd, 1998). Nor was there depletion of soil bases following sawlog harvests at the Coweeta Hydrologic Laboratory in North Carolina (Knoepp and Swank, 1997). Treetops that remain after stem removal, can act as nutrient sinks, releasing nutrients slowly over time. The influences of vegetation management on base cation dynamics on the Allegheny Plateau are, as yet, not fully understood, but scientific research is ongoing and previous research (cited above) indicates that additional base cation depletion did not occur following site changes from timber harvest even more dramatic than those proposed in the SBKC project (Johnson *et al*., 1997; Johnson and Todd, 1998).

Application of fertilizer is planned as a component of this project. In some units, fertilization is proposed as a reforestation treatment under Alternatives 2 and 3. Following fertilization, where the majority of the large overstory trees have been harvested, nitrogen-demanding species (e.g. pin cherry, black cherry, raspberries and blackberries) with shallow roots are positioned to take up excess nitrogen with minimal losses off-site (Marks, 1974, pp. 83-84). Rapid uptake by these plants limits the increase of nitrogen and associated nutrients in the soil, preventing leaching loss. This uptake and utilization of nitrogen indicates that the plants on site can consume added nitrogen in fertilizer, indicating that soils of the ANF are not nitrogen saturated (Peterjohn *et al*., 1996). Concerns have been raised recently over base cation depletion, which can occur when soils are acidified following the application of nitrate-nitrogen fertilizer. The chemical interactions between soil and fertilizer, and especially nitrogen containing fertilizer, are complex, highly variable, and greatly dependent upon soil physical characteristics, bacterial activity in the soil, and plant uptake of the nutrients contained in the fertilizer (Brady and Weil, 2002). The planned use of non-nitrate containing nitrogen fertilizers for this project may very well help reduce the level of soil acidification that occurs. Furthermore, the acreage proposed for nitrate-nitrogen fertilization on the plateau and shoulder landform positions (where base cation loss is a greater concern) has been reduced in the SBKC project area. Due to existing site conditions within the SBKC project area, fertilization, where prescribed, could help facilitate the establishment of regeneration on some of the more difficult sites.

Herbicide, another site preparation technique, is used to remove vegetation that interferes with the establishment of diverse understory vegetation. Use of herbicide increases the levels of light and soil resources available to regenerating vegetation. Two herbicides, glyphosate and sulfometuron methyl, are in common usage on the ANF. Glyphosate herbicide adsorbs readily to soils and becomes relatively immobile immediately after application, so there is limited potential for residual effects or effects to soil nutrients. The behavior of glyphosate residues in soil has been tested in a wide range of environmental conditions, which bracket those found on the ANF. Based on these studies, the soil half-life of glyphosate on the ANF is estimated to be less than 60 days

with half-life in the litter of the forest floor to be less than 30 days. The half-life of glyphosate is shorter than average in silt loam soils and longer than average in sandy soils (USDA-FS, 2007d, pp. G1-42, 43). Glyphosate does not accumulate in the soil, and soil microflora degrades it to aminomethyl phosphonic acid, which is somewhat more stable than glyphosate. The principal end products of glyphosate decomposition are carbon dioxide, water, nitrogen and phosphate.

Sulfometuron methyl herbicide is more mobile than glyphosate, but it has a relatively short half-life in acidic soils, such as those found on the ANF. Sulfometuron methyl is also strongly adsorbed to soil particles at pH 6 and below (acidic conditions) and in soils having high organic matter contents; therefore, little soil mobility is expected (USDA-FS, 2007d, p. G1-106). Nonetheless, it can have some residual effect on soil nutrients and is listed as "inhibitory" for some soil fungi and bacteria. Schreffler and Sharpe (2003) indicate that sulfometuron methyl applied after timber harvest acidifies soil, but the results were not statistically significant. While soil acidification is a concern, no other studies have indicated that sulfometuron methyl has the side effect of soil acidification. Microbial degradation of sulfometuron methyl occurs, but slowly. Non-microbial hydrolysis (a type of chemical decomposition) appears to be an important mechanism in sulfometuron methyl dissipation. Sulfometuron can break down in a few days to several weeks depending on soil and air temperatures, but based on average soil conditions found on the ANF, the half life is expected to be less than 3 weeks (USDA-FS, 2007d, p. G1-106). Principal products of the breakdown of sulfometuron methyl include saccharin, carbon dioxide, and methyl 2-(aminosulfonyl) benzoate.

Both herbicides are formulated to target plant growth, and available studies do not indicate that either glyphosate or sulfometuron methyl affects nutrient cycling in forest soils (e.g. nitrogen mineralization) (USDA-FS, 2007d, pp. G1-44).

Carbon sequestration, which refers to the "storage" of carbon in organic compounds, has become an area of interest due to increasing concerns about the role that atmospheric carbon dioxide plays in global warming. Carbon that is stored in the main stem harvested for timber can remain stable for centuries in a wood product created from the timber. The parts of the main stem not turned into a long-term wood product likely would either be decomposed or burned, both of which would release the carbon back to the atmosphere. Branches and roots left in the stand decompose over time releasing carbon into the soil or the atmosphere. Carbon stored in the soil is extremely stable and is only affected if the soils are highly disturbed (Johnson, 1992; Strong, 1997).

Carbon storage over both the short and long term could be quite different among the management alternatives. The most useful comparison employs the concept of average annual yield. While an old forest would, at some point, contain more carbon than a young forest, the rate of carbon storage would be very low. While trees take up carbon dioxide from the atmosphere during photosynthesis, they also release it through the process of respiration. As trees age, their net carbon storage rate decreases as respiration equals or exceeds photosynthesis. As the rate of carbon storage in the trees decreases, the rate of sequestration in soils increases retaining a net positive storage rate. Over the long-term, while actually containing less carbon at some point, younger, rapidly growing forests are removing carbon from the atmosphere and storing it at a faster rate than older forests. In general, a mixture of older trees with high current carbon storage and younger

trees with rapid carbon accumulation rates provide the best opportunities for carbon storage in trees (Hoover *et al*., 2000).

While fallen branches and slash left after timber harvest are very useful in recycling nutrients and organic matter back to the soil, the main stems of dead trees that have fallen to the ground decompose much slower and provide these same benefits for a much longer time period (Maser and Trappe, 1984). Downed trees and tops are known as down woody debris and exist in all life stages of a forest, but are usually more prevalent in older mature stands. Down woody debris also provides habitat for many species of fungi, bacteria, insects, and animals that in turn provide nutrients, organic matter, and other benefits to the soil (Maser and Trappe, 1984). Down woody debris on the ANF is greatest in stands greater than 110 years of age and stands between 11 and 50 years of age (Morin *et al*. 2001).

Surface Erosion

Erosion of topsoil can have broad and long lasting effects on soil quality. Erosion is a natural process (Dunne and Leopold, 1978, p. 510), but some types of land management can either accelerate the rate or change the type of erosion. Removing trees can open up the forest floor to more direct rainsplash impact and increase decomposition of litter. To this end, removal of forest litter, which increases the impact of rainsplash on bare soil, could make soil easier to erode. Changes in drainage and surface hydrology may increase water flow over an area that can cause accelerated erosion and gully formation. Changes in cover related to this project, and the subsequent erosion potentials are modeled using the Forest Service Disturbed Water Erosion Prediction Project (WEPP) Interface (Hall, 2004).

Soil mass movement is rare on the Allegheny National Forest, typically occurring after large rain events (Eschner and Patric, 1982; Pomeroy, 1981, 1986; Schultz, 1999). The primary areas of concern for future soil mass movement are on historic landslides and colluvial soils formed on a surface geology of shale. In the former situation, historic or newly created landslides may require considerable investment to either revegetate or manage as a resource; while in the latter case, the instability of the contact zone between colluvial soil and shale may predispose the area to a slide. Some vegetation treatments may possibly have a compounding effect on slope stability through tree removal and the resultant decomposition of large holding roots over time. Five landslides are known to have occurred entirely or in part within the northwestern corner of the SBKC project area. Stand 814001, which is located north of the terminus of Forest Road 448, and between this road and a segment of the South Branch Kinzua Creek, is almost entirely overlain by a well-vegetated landslide feature. Also, small portions of stands 814084 and 814033, both of which are located between Forest Roads 448 and 448F, are overlain by landslide features. Of the other three landslide features which are located within or impinge on the SBKC project area, none of them overlay stands proposed for treatment as part of this project.

Road construction (following new and existing corridors) has the potential for erosion and sedimentation. The largest sediment losses occur during road building and before exposed soils are protected by revegetation, surfacing, or erosion control materials. Raw ditchlines and roadbeds continue to be sources of sediment, usually because of either a

lack of maintenance, a level of maintenance inadequate for the amount of road use, excessive ditchline disturbance or poorly timed maintenance relative to storm patterns. Improved design, construction, and maintenance of roads can reduce road-related surface erosion at the scale of individual road segments. Key construction and design factors, which result in reduced rates of erosion, are: road location, particularly layout relative to stream systems, road drainage, surfacing, and cutslope and fillslope treatments. Furthermore, surfacing materials and vegetation measures can be used to reduce the yield of fine sediment from road surfaces (Gucinski, *et al*., 2000).

Road maintenance refers to activities which return a road to its original design level, in order to more fully utilize it to access an area. Road maintenance could cause short-term increases in erosion and sedimentation, but it would typically reduce erosion over the long-term. Road maintenance can include: grading, surfacing or resurfacing with gravel, improving road drainage, and stabilizing back and fill slopes. Grading, while bringing up highly erodible fine soil material, can remove ruts, which if left, would create long flow paths for carrying water that could erode and transport sediment for long distances (Elliot, 2000). Grading can also pull sediment out of drainage ditches along with any vegetation or armoring, which migrated to the ditch, and incorporate these materials back into the roadbed. Removing the ditch vegetation and armoring can cause a short-term increase in erosion from the ditch itself (Swift, 1984, 1988) and erosion of the material pulled from the ditch and reapplied to the roadbed. Improved road drainage would help to avoid concentrated water flows, which could create gullies on steep slopes (Weaver *et al.,* 1995; Wemple *et al*., 1996), while allowing water to flow in proper locations to avoid increasing the hazard of mass wasting. Improved or enhanced road drainage can also help to deposit sediment-laden runoff onto low gradient, well-vegetated areas where sediment can settle out before reaching nearby streams.

Limestone surfacing is good at reducing roadbed erosion from rain impact and heavy vehicle traffic. Generally, the addition of limestone increases the porosity and hydraulic conductivity of the road, which decreases the runoff and associated erosion (Flerchinger and Watts, 1987). Limestone also reduces the formation of ruts and reduces formation of a water flow path within the roadbed (Foltz and Truebe, 1995). Overall, properly sized and applied limestone has been shown to result in reductions in erosion of 79 to 97 percent over unprotected, unsurfaced roadbeds (Swift 1984; Burroughs *et al.,* 1985; Kochenderfer and Helvey, 1987).

Road decommissioning refers to the destruction of an existing road surface and the underlying prism, along with one or more of the following operations: recontouring, culvert removal, mulching and establishment of a vegetative cover, and the installation of water bars (or other water control devices). Road decommissioning is an attempt to recontour and restore the road corridor to a condition similar to what existed on site prior to construction of the road. Care is taken during the decommissioning process to ensure the final result is a stable surface, where the potential for erosion and sedimentation is minimal over the long term. Decommissioning could cause short-term increases in the rates of erosion and sedimentation to rise, but these rates would be expected to return to near base levels for the area once the decommissioned road corridor was fully revegetated. Also, it would be reasonable to expect that a fully revegetated, decommissioned road, when compared to a functioning road, would be less erosive and

contribute less sediment to the watershed in which it lies (Gucinski, *et al*., 2000; personal communication, Richard Hiemenz, Civil Engineer, Allegheny National Forest).

Soil Compaction

Ground-based timber harvest or salvage that utilizes heavy equipment can cause compaction. This compaction can be detrimental, depending on the weight, surface area to which that weight is applied, number of passes, soil texture, soil moisture, and rock content of the soil (Alexander and Poff, 1985; Liechty *et al*., 2002). Soil texture on the ANF ranges from silt loams to sandy loams, which are relatively to somewhat susceptible to compaction, respectively (Brady and Weil, 2002). However, some soils contain a high rock content, which provides some protection from compaction by dispersing the weight of equipment. No even-aged management activities, with the exception of crop tree release treatments, which do not utilize heavy equipment, will occur on poorly drained Group 3 soils, the soil most susceptible to compaction due to poor drainage. Soil compaction is considered detrimental when there is a 10 percent reduction in porosity, which typically equates to a 15 percent increase in bulk density of the soil (USDA-FS, 2005a).

The greater the extent of soils exhibiting increases in detrimental soil compaction, the greater the effect on runoff, infiltration and subsurface water movement (Froehlich, 1975). Compacted soil loses its structure, and it is more susceptible to erosion. Vegetation treatments exhibit varying degrees of associated compaction, assuming ground based machinery is used to harvest the timber. Typically, the more timber removed and the more entries into a unit, the greater the extent of detrimental soil compaction. Though only one pass over a given area is usually taken, heavy equipment used to apply herbicides can also have minor, cumulative impacts on soil compaction. Fencing of a stand creates an approximately 10 foot wide disturbed area that would likely have moderate levels of compaction. The extent and amount of compaction also depends on factors such as whether the soil is frozen or the amount of slash lying on the skid trail.

From soil quality monitoring conducted during the period 1990 to 2000, specialists determined that 10 stands out of 27 monitored exceeded the Forest Plan standard (USDA-FS, 2002). Soil quality monitoring examined the effects of vegetation management on seven categories of detrimental soil disturbance, where the most applicable categories on the ANF are compaction (measured as a 15 percent increase in bulk density), rutting/puddling, displacement, and accelerated erosion. The remaining categories are burned soil, ground cover removal and mass movement. Results of the monitoring led to the creation and implementation of interim soil guidelines (USDA-FS, 2001) to help limit the categories of detrimental soil disturbance to less than 15 percent of a stand's area. These guidelines were later superseded by regional guidelines, which set the upper limit for detrimental soil conditions at 15 percent (of a treated stand's surface area) when measured collectively (USDA-FS, 2005a).

Monitoring from 2002 to early 2005 included 63 stands with 642 transects where data were recorded. There were 36 stands with less than 5 percent detrimental disturbance, an additional 14 stands with less than 10 percent disturbance, an additional 8 stands with less than 15 percent disturbance, and only 5 stands that exceeded the 15 percent area standard (USDA-FS, 2005a, p. 5; USDA-FS 2005b).

Exceeding the 15 percent standard for these 5 stands during the 2002-2005 period, highlighted the need to address soil moisture at the time of harvest (4 of the 5 stands were harvested during months where precipitation was higher than the monthly average). Assessment of soil moisture prior to and periodically throughout the harvest can help to ensure that soil moisture is not at a point where soils are susceptible to compaction. Previously, the ANF relied on soil drainage group data, which was determined during project planning to set the time of year for both the type of activity and equipment allowed.

Wetlands

Areas of wetlands lie within the flood plain of South Branch Kinzua Creek, where the creek both bisects the wetlands and constitutes the northern boundary of the project area. Portions of three stands lie in the floodplain of South Branch Kinzua Creek and are overlain by wetlands. The three stands are: 814001, 814018 and 812007. Additional and scattered areas of wetland lie within the SBKC project area, but these do not overlap any stands proposed for treatment as a part of this project. As in this case, wetlands on the ANF are primarily located on hydric soil map stands, such as Atkins, Cavode, Brinkerton, Buchanan, and Philo silt loams (Churchill and Parrish 1987). While wetlands provide unique, diverse wildlife habitat and pollution filtering capabilities, they are also susceptible to detrimental disturbance by ground-based equipment.

Like wetlands, riparian areas are often prone to detrimental soil disturbance due to wet soil conditions. The riparian influence on soil properties is evident in Philo silt loam and other streamside soil series. Often, though, riparian areas will not influence enough of the soil in an area to show up on the maps. Nonetheless, riparian areas have distinct soil properties and soil drainage characteristics that make them prone to detrimental soil disturbance, which can impact streamside hydrology and sedimentation.

3.1.2 Water Resources, Riparian Areas and Fisheries

This section describes the water resources of the SBKC project area. Watersheds provide the framework for analysis of potential cumulative effects from implementing the SBKC project. This section enumerates and describes water resources of the SBKC project area and enumerates by cumulative effects (CE) areas the conditions of vegetation that would affect potential water flow.

Water Resources

Analysis Area and Description

The analysis area, the SBKC project area, plus transportation proposals outside of the SBKC project area, is entirely contained within the South Branch Kinzua Creek subwatershed (Table 9).

Table 9. Watershed Hierarchy for the SBKC Project Analysis Area.

4th field subbasin	5th field watershed	6th field subwatershed	Major streams
Upper Allegheny River	Kinzua Creek	South Branch Kinzua Creek	South Branch Kinzua Creek
			Hubert Run
			Windfall Run
			Glad Run

The direct and indirect effects of the SBKC project alternatives will be assessed according to their potential impacts on nearby streams. Cumulative watershed effects of the alternatives will be analyzed at the outlet of the 6th field South Branch Kinzua Creek subwatershed. Beyond the subwatershed, it is assumed that the cumulative effects of the proposed activities would be masked, or diluted, to the point that ties with potential site disturbance would not be apparent or measurable.

Protected Water Uses and Criteria Necessary to Protect Each Use

Protected water uses were designated by the Commonwealth of Pennsylvania, Department of Environmental Protection (Commonwealth of Pennsylvania 2001) for all Commonwealth waters, including those within the SBKC project area, and are inclusive of the following: aquatic life, water supply for potable, industrial, livestock, wildlife, and irrigation uses; and the recreational uses of boating, fishing, water contact sports, and esthetics. In addition to these statewide protected water uses, water quality is to be maintained and protected to promote high quality cold-water fish (HQ-CWF) in all tributaries to, and including, South Branch Kinzua Creek (16 miles); and cold water fish (CWF) in Hubert Run and its tributaries (3 miles). The South Branch of Kinzua Creek is designated a Wilderness Trout Stream from its confluence with Hubert Run upstream to its headwaters. Therefore, all streams should be managed in a way that maintains and/or propagates fish species as well as flora and fauna, which are indigenous to a cold-water habitat.

There are no streams within the cumulative effects analysis area listed as “water quality limited” by the DEP as of the latest 303(d) listing of stream channels impaired from meeting Commonwealth water quality standards (Commonwealth of Pennsylvania 2006). Therefore, all protected water uses are currently identified as “supported.”

The Environmental Protection Agency regulations require each state to adopt an antidegradation policy as a component of its water quality standards. The objective of the antidegradation policy is that, as a minimum, existing water uses and level of water quality necessary to protect the existing uses, shall be maintained and protected. The Commonwealth of Pennsylvania (Commonwealth of Pennsylvania 2001) has developed water quality criteria for cold-water fishes that should be applied to all waterbodies within the analysis area to maintain protected uses. General water quality criteria state that, ‘Water may not contain substances attributable to point or a non-point source discharge in concentrations or amounts sufficient to be inimical or harmful to the water uses to be protected…’ The most sensitive protected use in the analysis area is that of aquatic life, specifically cold-water fisheries. Water quality criteria specific to cold-water

fisheries includes; water temperatures that shall not exceed the summer daily average temperature of 19 ºC (66 ºF) and dissolved oxygen concentrations that shall not fall below a minimum daily average of 6.0 mg/l; an instantaneous minimum of 5.0 mg/l, and a minimum of 7.0 mg/l for high-quality cold-water fisheries. However, the aforementioned water temperature criteria applies to receiving water bodies affected by heated point sources, and would not apply to natural forested environments.

The ANF LRMP (USDA-FS 2007a, p. 11 and 14) identifies desired condition and goals for aquatic ecosystems to maintain the protected use of the waters.

- Mature and dead trees in riparian areas are distributed to provide a sustainable supply of large wood to streams (75 to 380 pieces per mile).
- A majority of cold-water streams provide suitable habitat and water quality for aquatic species, including the propagation of brook trout and other headwater stream fishes. This includes having an average daily maximum stream temperatures less than or equal to 20º C (68º F) in streams supporting cold water communities;

Watershed Description

The SBKC project area is located within the Northern Unglaciated Allegheny Plateau section of the Appalachian Plateaus Physiographic Province (McNab and Avers 1994). The area is characterized by broad, rounded uplands that are highly dissected by numerous valleys, with a dendritic pattern of surface drainage. Current geomorphic processes include mass wasting, fluvial erosion, and deposition from transported materials.

The climate of the area is temperate with a mean monthly maximum of 79 ºF (26 ºC) to a mean monthly minimum of 15 ºF (-9 ºC). Precipitation usually occurs evenly throughout the year and averages 46 inches (117 cm) annually. About half of the total has the potential of falling as snow or rain during the colder months of October through April. During this time period, rain-on-snow driven runoff events are common and can create some of the largest streamflow peaks during the year. During the summer months, when some of the greatest monthly precipitation occurs, intense thundershowers can also generate large peak flows.

South Branch Kinzua Creek

The subwatershed is located within the Kinzua Creek watershed and includes a total of 24,969 acres. Approximately 66 percent of those acres (16,510 acres) are managed by the Forest Service. There are 76 miles of mapped perennial stream in the subwatershed. The road density for all jurisdictions averages 4.3 miles per square mile and Forest Service Roads have a density of 1.0 mile per square mile. There are approximately 392 oil and gas wells in the subwatershed, with the status (active or inactive) of most being unknown at this time.

Introduction to Effects

Water Quality

The physical, chemical, and biological characteristics of water are representative of its ability to support protected uses. Water quality in all streams within the analysis area has been determined by the Commonwealth DEP to meet all Commonwealth standards and

all protected uses. Despite this, sedimentation continues to remain a concern in each of the four drainages because of conditions observed where roads and trails are hydrologically connected to streams.

Sedimentation from roads is the principle concern for water quality and aquatic habitat identified in the FEIS for the 2007 LRMP (USDA-FS 2007b) and this will be the primary focus for the water quality section. New road construction within 300 feet of streams is identified as having the greatest potential to change current stream conditions. Existing road corridors within 300 feet of stream that are converted to FS system roads could reduce sedimentation where roads are improved to FS standards. In addition, road use during hauling can also impact water quality and this is addressed in road use plans.

The FEIS for the ANF LRMP (USDA-FS 2007b) provides documentation that demonstrates minimal effects to water temperature, nutrient concentrations, and sediment concentrations from the types of vegetation management and reforestation activities proposed in this project. This is based on standards and guidelines found in the ANF LRMP that will be applied to all Forest Service activities. These standards and guidelines meet or exceed State Best Management Practices (PA-DEP 2005). The Herbicide Risk Assessment, Appendix G of the FEIS for the ANF LRMP, (USDA-FS 2007d) has reviewed effects to groundwater and surface water regarding aquatic life and human health water quality criterion. This assessment has found that the ANF LRMP standards and guidelines will ensure that treatments will protect water quality (USDA-FS 2007b).

The majority of stands proposed for treatment within this project are located away from streams and water resources. Where streams and water resources occur within stands, standards and guidelines will be applied to identify riparian corridors along streams. Riparian corridors will be defined as stated in the ANF LRMP, which will keep the majority of activities more than 50 feet from intermittent streams and 100 feet from perennial streams. Riparian corridors are designed to provide adequate filtering of sediment, fertilizer and herbicide, protect water temperature and allow for the recruitment of large woody debris (LWD) into stream channels.

Water Quantity

Similarly to the water quality section, runoff from roads is the principle concern for water quantity and changes to aquatic habitat as identified in the FEIS for the ANF LRMP (USDA-FS 2007b). New road construction within 300 feet of streams is identified as having the greatest potential to change current stream conditions. Existing road corridors within 300 feet of stream that are converted to Forest Service system roads could reduce water quantity impacts where roads are improved to Forest Service standards and runoff is infiltrated or slowed before it reaches the streams. Maintenance of roads will also correct portions of roads which are contributing increased runoff to streams.

The presence of roads and other compacted areas in watersheds have a high potential to change the streamflow regime where runoff from roads and compacted surfaces drain directly to streams, or are hydrologically connected. Wemple, Jones, and Grant, (1996), found that road segments hydrologically connected to the channel network in Oregon

increase flow routing efficiency that may be observed as increases in peak flows. The North End Roads Analysis (USDA-FS 2006) identified several road segments as exhibiting connectivity to stream channels because of ditchlines that routed water to stream channels. Therefore, it is likely that the streamflow regime has been modified by the presence of the road network and these modifications are likely to appear as increases in peak flow magnitude and decreases in response time. Such changes in the streamflow regime can result in channel modification where channels are susceptible to such influences. Presently, most stream channels in the analysis area are still experiencing elevated inputs of storm water runoff and sedimentation, largely from hydrologically connected road networks.

The FEIS for the ANF LRMP (USDA-FS 2007a) provides documentation that demonstrates minimal effects to water quantity when vegetation management activities are distributed over several watersheds. ANF LRMP standards and guidelines will provide the greatest controls to water quantity by maintaining an intact forest floor and minimizing soil disturbance (Stuart and Edwards, 2006). Effects to water quantity will also be minimized by not harvesting more than 25 percent of the project analysis watersheds. This is based on studies that show reductions in basal area that approach 25 percent were found to have measurable increases in annual water yield (Hornbeck and Kochenderfer, 2000). Annual increases in water yield due to timber removal are largely a result of increases in summer low flow, primarily during the growing season (Megahan and Hornbeck, 2000). The average time until hydrologic recovery of a harvest is between 3 and 10 years (Hornbeck and Kochenderfer, 2000), and streamflow regime recovery in central Pennsylvania takes approximately four years (Lynch and Corbett, 1990). It is assumed that watersheds on the ANF respond to forest disturbance in a similar manner as presented in the preceding studies from across the northeast.

3.1.3 Transportation

Within the SBKC project area there are State, Township, Forest (federal), OGM, and other private roads that have been developed over the past 100 years. Roads provide access for resource management, OGM development, and recreation activities. At the same time, roads can reduce solitude by their use, increase the potential for soil erosion and sedimentation, and increase the effects of fragmentation.

The Forest Service has completed the North End Road Analysis (USDA-FS 2006) that included evaluating all the roads within the SBKC project area for their effects on the ecosystem. There are approximately 2.2 miles of state and township roads, 14.5 miles of Forest Service system roads, and 7.3 miles of OGM and other private roads within the SBKC project area. The roads analysis required evaluation of the entire road system to determine if new road access was needed, if the existing road system was adequate in terms of safety, where improvements are needed to lessen environmental impacts, and if any roads need to be closed or restricted for resource protection.

The affected environment for transportation within the SBKC project area is described in terms of road density and road management. These two items serve as indicators of the consequences of implementing alternatives and reflect the changes of road construction, maintenance, and decommissioning by alternative.

Road Density

Road density is the number of road miles per area of land. This measurement is included as an indicator of effects because the underlying assumption is that as road density increases, both the impacts of the transportation system and cost of maintaining that system increase. Current road densities by management area are cited in Section 2.4 (Comparison of Alternatives – Narrative Summary for Alternative 1).

Road Management

There are three basic road management strategies on the ANF: Open, Closed, and Restricted. Open roads are forest roads that are open year round to public motorized traffic; closed roads are forest roads that are closed year round to public motorized traffic; and restricted roads are forest roads that are open seasonally to provide public motorized use. Under the revised ANF LRMP, the percentage of open/closed/restricted roads is projected to be roughly 33 percent in each category. The breakdown for forest roads by road management objective for the existing condition within the SBKC project area are cited in Section 2.4 (Comparison of Alternatives – Narrative Summary for Alternative 1).

Unroaded Areas

Unroaded area is a term and definition that is no longer applicable. It was originally described in Interim Directive 7710-2001-1 and 7710-2001-2. The direction to address road management activities in inventoried roadless and contiguous unroaded areas was removed from the Forest Service Directive System by Amendment Number 7700-2300-2, effective December 16, 2003, which superseded both ID 7700-2001-1 and 7710-2001-2. The Forest Service Manual no longer includes Chapter 7712.16 through 7712.16d, which described “contiguous unroaded areas”.

As an aside, if the Forest Service still considered management of roads within a contiguous unroaded area, FSM 7712.16, if still in use, would have required that the area be 1,000 acres or more in size. Because of public concerns expressed about the impacts of road construction and timber harvesting on the unroaded areas that were identified in the Forest-Wide Road Analysis, changes in the size of unroaded areas are being examined in this analysis.

According to the Forest-Wide Road Analysis Project (RAP) Report (USDA-FS 2003a), there are no unroaded areas exceeding 500 acres located entirely within the project area. However, two unroaded areas (#63 SB Kinzua E) and (#44 SB Kinzua W) exceeding 500 acres do overlap the project boundary in some northern sections. From these unroaded areas, 203 acres of #44 and 44 acres of #63 lie within the SBKC project area. Portions of these unroaded areas overlap the unfragmented core areas, with some exceptions near the South Branch Kinzua Creek where interspersed natural openings interrupt the forest canopy.

3.1.4 Air Quality

The Clean Air Act established six principle pollutants that act as indicators of air quality in the U.S., including ozone, particulate matter, carbon monoxide, sulfur dioxide, nitrogen dioxide, and lead. The National Ambient Air Quality Standards (NAAQS) were established for each of these criteria pollutants. The NAAQS are the concentrations of

these principle pollutants above which adverse effects on human health may occur. Geographic areas where air pollution levels consistently stay below the NAAQS are designated “attainment” areas. Geographic areas where air pollution levels persistently exceed the NAAQS are designated “non-attainment” areas. If a geographic area was at one point in time designated as a non-attainment area but is now in attainment (with a maintenance plan approved by the Environmental Protection Agency, it is designated as a “maintenance” area.

The project area is located in McKean County, Pennsylvania, which has been listed as a Class II airshed in accordance with the Clean Air Act. Class II airsheds allow moderate deterioration of air quality not to exceed the NAAQS. McKean County has also been designated as an attainment area by the Pennsylvania Department of Environmental Protection (PA DEP) for each of the six principle pollutants. USDA-FS management actions are required to comply with PA DEP regulations that would prevent a violation of standards for the principle pollutants.

3.1.5 Oil, Gas and Minerals (OGM)

According to district records, there are currently 25 OGM wells located within the SBKC project area, although the operating status (active, dormant or plugged) of the majority of these wells is unknown. Each well site (well pad, access road, etc.) occupies approximately 1.3 acres of land. This translates into approximately 32.5 acres (less than one percent) of NFS lands within the SBKC project area that have been developed for OGM production. At least four wells have been plugged within the SBKC project area in the last ten years.

Currently, there are three active stone pits in the SBKC project area totaling approximately 5.9 acres: FR480 north (0.7 acres); FR480 south (0.9 acres) and FR186 north (4.3 acres). The FR480 north and FR480 south pits are located in MA 3.0 while the FR186 pit straddles MA 2.2 (2.2 acres) and MA 3.0 (2.1 acres). The portion of the FR186 north stone pit located in MA 2.2 is proposed for reclamation. There is one inactive pit along FR186 south and one depleted pit along FR461. A potential new stone pit is proposed south of FR461 in MA 3.0.

3.2 Biological Environment

3.2.1 Vegetation

The ANF falls within the Allegheny hardwood forest, a heavily forested region covering almost 16 million acres of the Allegheny Plateau and Appalachian Mountains across parts of Pennsylvania, New York, Maryland, West Virginia, and Ohio (Marquis 1994). Major forest types currently found in the region include Allegheny hardwoods (dominated by black cherry and maples with lesser amounts of white ash and yellow poplar), northern hardwoods (dominated by American beech, sugar maple, yellow birch, and eastern hemlock), mixed upland hardwoods (composed of mixtures of red maple, black cherry, yellow poplar, white ash, basswood, and cucumber magnolia), and oak forest types. Forested conditions occur on approximately 95 percent of the ANF; a majority (78 percent) of these stands are even-aged and greater than 60 years old (USDA-FS 2000b, p. 53). At the landscape scale, Allegheny hardwood, northern hardwood, and mixed upland hardwood types occur predominantly on plateau environments, while the oak type occurs

along major river valleys, and coniferous forests (predominantly eastern hemlock) are found primarily along riparian corridors and on north-facing slopes.

A number of important factors have affected the overall structure and composition of forest resources on the ANF, including natural disturbances, historical land uses and developments, forest health issues, deer browsing, and current land use patterns. The remainder of this section discusses each of these factors as they relate to the vegetation within the project area. The current condition of vegetation resources within the project area is also discussed.

Natural Disturbance Patterns in the Allegheny Hardwood Forest Region

Damaging winds in the form of tornadoes, thunderstorms, and other windstorms are the primary natural disturbances in forests on the Allegheny Plateau (Marquis 1975). Wind regularly affects the forest canopy on a small scale by damaging tree crowns and uprooting individual or small groups of trees. In many cases, certain stands are more prone to windthrow due to terrain factors that funnel winds over a particular landscape position or soil factors (such as shallow or wet soils) that restrict tree-rooting depth. However, more intense winds may also create landscape-level disturbances by blowing down or destroying large groups or entire stands of trees. An example of this was a severe weather event that struck northwestern Pennsylvania during the afternoon of July 21, 2003, and was followed by a second day of severe weather on July 22. Heavy rainfall and high downburst winds caused downed power lines, uprooted trees, and flash floods. The July 21 thunderstorm produced heavy rainfalls and wind gusts of up to approximately 80 miles per hour. An F-1 tornado was confirmed just a few miles east of the Forest boundary and the SBKC project area. Warren, Forest, and McKean Counties were among several counties declared as Federal Disaster Areas. About fifty acres of the project area were affected by the July 2003 storm. Damage to these stands ranged from light (scattered toppling or snapping of single trees), moderate (small clusters of downed trees) and catastrophic (large portions of entire stands blown down and severe damage to limbs and crowns).

During the period from 1993 to 2004, the Allegheny Plateau area, which includes the ANF, experienced 133 thunderstorms and high wind events, an average of 11 high wind events per year. According to the historical record, tornadoes are infrequent, with nineteen days of tornado activity occurring in the last 50 years. There have been a few “tornado events” in the past 20 years where several tornadoes hit on the same day; the most spectacular being on May 31, 1985, when 12 tornadoes were recorded across the four counties containing the ANF (National Climate Data Center 2005). Other events such as ice storms, droughts, and seasons of above average rainfall also affect forests in the region on the landscape scale. Although ice storms may severely damage the overstory canopy by breaking branches, ice glazing also increases the susceptibility of individual trees to windthrow by heavily weighting the tops of individual trees. Factors such as drought, which weakens tree-rooting strength, and excess rainfall, which loosens soils, may also increase the overall susceptibility of stands to windthrow events.

Disease and insect infestations can weaken tree-rooting and bole strength, which also increases the overall susceptibility of trees to windthrow and wind snap events. As trees mature, they naturally become more vulnerable to insect and disease infestations. The

ANF and the stands in the project area are susceptible to native defoliators, such as elm spanworm, cherry scallopshell moth, fall cankerworm, and forest tent caterpillar. They are also susceptible to exotic insects and diseases, including beech bark disease complex, pear thrips, and gypsy moth. Between 1965 and 1985, insects and diseases had a modest impact on the ANF (USDA-FS 1985a). Several substantial insect defoliations have occurred since 1985, and the average level of defoliation appears to have exceeded that which occurred between 1965 and 1985. Elm spanworm defoliation in the project area occurred in 1992, 1993, and 1994. Gypsy moth defoliation occurred within the project area in 1992 and 1993. Beech bark disease complex began appearing within the project in about the mid-1980s. Evidence of pear thrips infestation was observed in the late 70s and early 80s. In the mid-1990s, a portion of the ANF was sprayed with a biological insecticide (*Bacillus thuringiensis or Bt*) to help reduce defoliating insect damage to tree crowns and to help reduce the potential for tree mortality to develop.

Due to the nature of the predominant forest types and normally high humidity and cool climatic conditions, fire is generally not a major natural disturbance factor in the Allegheny hardwoods region. However, severe drought coupled with other disturbances such as insect infestations, disease, or windstorms can create high fuel loads and greatly increase fire risks for ANF forest types. These conditions typically occur every 200 to 300 years or longer (Ruffner and Abrams 2003). Prior to European settlement of the region, Native Americans regularly practiced burning the forest understory on portions of the ANF (particularly along major waterways), which helped maintain oak forest types and associated wildlife habitats. The most intense wildfires in the region were associated with railroad logging practices of the late 1800s and early 1900s, which created large amounts of highly flammable fuels in the form of coniferous slash and other woody debris (Marquis 1975, 1994). Often, these intense wildfires significantly retarded the natural re-growth of forest resources and resulted in conversion of many sites on poor soils to permanent openings or savannahs with sparse tree cover.

The overall effect of these natural disturbances was to maintain, to some extent, a spatially variable and complex mosaic of different forest types and stand ages. Recent research conducted on the ANF suggests that the intensity and frequency of such disturbances varied across landscape gradients (Ruffner and Abrams 2003). Compared to more protected riparian and bottomland sites, uplands and side slopes experience more frequent, intense, and larger scale disturbances (particularly from windstorms) that promoted a patchy and irregular landscape structure composed of multiple cohorts. These factors also promoted the development and persistence of stands dominated by species such as beech, black cherry, red maple, and birch on upland sites, while lower-intensity disturbance regimes favored dominance of forest communities by eastern hemlock.

Historical Influences on Forest Resources

Forests on the ANF have experienced dramatic changes over the past 200 years. Prior to European settlement of the region, mature hemlock-beech and northern hardwood communities dominated the region, with minor amounts of eastern white pine and oak (Ruffner and Abrams 2003). Systematic extraction of forest resources in the region began in the late 1850's with selective utilization of eastern hemlock bark by the tanning industry (Morin *et al* 2001). During the late 1800's, sawmills also used significant quantities of both hardwoods and softwoods for lumber, furniture, and paper products.

Starting in the 1890's and continuing into the 1930's, the demands of these industries were supplemented by the demand of the wood chemical industry for all sizes of trees in the region producing acetic acid, charcoal, wood alcohol, and other distillation products. During this period, harvests often occurred in two phases, with a first phase removing sawtimber for solid wood products and a second cut removing virtually everything else for the chemical wood industry.

As a result of the historically intense use of forest resources, the forest resources found today on the ANF are mostly second (or, in some cases, third) growth stands that began to grow at approximately the same time as acquisition by the Forest Service in the 1930's (Morin *et al*, 2001). Although the overall diversity of tree species in these even-aged forests remained relatively unchanged, the abundance of particular species was significantly different from conditions found prior to the previous era. Eastern hemlock, American beech, and white pine are considerably less abundant, while proportions of early successional species such as black cherry and red maple greatly increased. Sugar maple also became more abundant across the landscape, particularly on upland sites.

Analysis of past disturbances indicates that stands within the project area were historically affected by both selective harvesting of sawtimber and clearcutting for the chemical wood industry prior to establishment of the ANF. Recovery pole-size and sapling-size stands that had been re-cut by the chemical wood industry after the 1936 ice storm regenerated primarily by stump sprouts, which has resulted in stands comprised almost entirely of black cherry, sugar maple, red maple, and beech; many of the trees in these stands now contain multiple stems.

Deer Browsing

The effects of browsing by white-tailed deer have played a more pervasive and ecologically significant role in subsequent development of the forest resources on the ANF. In general, deer can impact the understory dynamics of forest stands both directly, by eliminating palatable species, and indirectly, by promoting the growth of browse-resistant or less-palatable species. Deer selectively browse desirable tree seedlings such as oaks and conifers over less palatable species such as American beech and striped maple (Marquis and Brenneman 1981; Horsley, Stout, and deCalesta, 2003). Browsing impacts are a function of deer density and browse availability. In areas with high deer densities, browse impacts are high on many desirable understory herbaceous species, including native forest wildflowers, such as trilliums, orchids, and Solomon's seal, and shrubs, such as hobblebush (Hough 1965; Frankland and Nelson 2003; Augustine and Frelich 1998).

Deer herd densities were extremely low across the region during the early 1900s due to unregulated hunting and over-harvesting of deer. In many areas, the lack of browse pressure facilitated the initial establishment of new seedlings and forest stands following turn of the century harvesting activities. However, with subsequent protection from unregulated hunting, restocking programs, and abundant food resources created by turn of the century logging activities, the deer population in the region recovered rapidly to the point where serious browse damage was noted to both agricultural crops and forest resources (Marquis 1975).

The long-term impact from prolonged periods of high deer densities has been the loss of desirable understory and midstory vegetation across much of the ANF and the development of "park-like" conditions in many stands. Selective browse pressure has promoted dominance of the herbaceous understory and shrub layers by browse-resistant and unpalatable species such as hay-scented and New York ferns, various grasses and sedges, striped maple, and American beech root suckers. The cumulative effect of browse pressure and intense competition from undesirable vegetation has necessitated costly reforestation approaches on the ANF, such as fencing, applying herbicide, and installing tree shelters to facilitate the regeneration of diverse, desirable tree and shrub species. In many cases, the general lack of advanced regeneration in the forest understory also limits the application of uneven-aged management techniques within forests that normally have a more varied age and size structure, such as the northern hardwoods type (Barrett 1995). Although deer browsing impacts have declined in recent years the understory response lags behind the population drop (deCalesta 2005).

Across the ANF, deer management is guided by the policies of the Pennsylvania Game Commission (PGC). Pellet group counts conducted within the project area in 2004 and 2005 suggest an average overwintering deer density of about 15 deer per square mile. This is within ANF LRMP goals of 10-20 deer per square mile. This is demonstrated by the increasing numbers of wildflowers within the project area. Just to the north of the project area on southern slopes, pellet group counts conducted in 2003 and 2004 suggest an average of 29 deer per square mile.

Forest Health Issues Related to the ANF and Project Area

Several important forest health issues are currently affecting the forest resources of the region. During the past 15 years, a number of native and exotic disturbance agents have become a particular concern for the ANF, including pear thrips, forest tent caterpillars, gypsy moth, fall cankerworm, elm spanworm, beech bark disease complex, maple decline, and ash dieback (Morin *et al* 2001). Since 1985, almost 86 percent of the forest resources of the ANF have experienced at least one defoliation event due to the action of one or more of these stress agents. Severe droughts have also affected the region six times since 1988. In addition, the area is the recipient of some of the highest inputs of acidic deposition (sulfates and nitrates) in the nation. Recent evidence suggests that this has led to the leaching of the nutrients (calcium and magnesium, that are important to some tree species) from forest soils while potentially toxic aluminum and manganese have become more available (Bailey, Horsley, and Long, 2005). Sugar maple has been shown to become more vulnerable to stresses like insect defoliations in soils on upper slopes and plateau tops (Long, Horsley, and Lilja, 1997; Horsley, Stout, and deCalesta, 2003) while black cherry and beech did not show responses across a wide range of these nutrients in a study just east of the ANF (Long, Horsley, and Lilja, 1997). Trees weakened by such stress agents are also highly susceptible to damage or bole breakage by wind and invasion by secondary pathogens, such as shoestring root rot fungus, that can cause tree mortality.

The cumulative effect of such forest health impacts has been the decline, and in some cases, catastrophic mortality of the forest overstory in some locations over the past decade. In addition, the persistence of forest cover at the landscape level may be threatened in areas where deer browsing and competing vegetation have prevented

development of an adequate pool of diverse advanced regeneration and young trees to replace dead trees in the forest overstory. According to recent inventory data across the ANF, the percent mortality of the total standing tree basal area is particularly heavy for species, such as sugar maple (18.2 percent), birch (11.4 percent), white oak (17.4 percent), and aspen (25.8 percent) (Morin *et al* 2001). Mortality of American beech trees larger than 20 inches diameter at breast height (dbh) is also significant (almost 50 percent); however, beech scale (an introduced invasive insect) does infest all sizes of beech and mortality can result. Beech bark disease complex is of particular concern for the ANF because the "killing front" is advancing across the forest from the northeast to southwest and many stands contain a high percentage of American beech. The SBKC project area is within the killing front.

Public and Private Land Uses within the Project Area

Ninety nine percent of the project area is NFS lands. The Federal government acquired much of the ANF in the 1920's through the 1940's. There are 26 acres of private land within the project area. Based on estimates from aerial photographic interpretation, these properties are a mix of hemlock bottomlands (12 acres), mature hardwood forest (10 acres) and a variety of openings (4 acres of agricultural fields, access roads, and residences or recreational camps). Commercial timber management has not been a high priority of these landowners.

Current Conditions of the Vegetation within the Project Area Including Midstory and Understory Vegetation

Experience from research conducted within and outside of the project area helped confirm that controlling competing vegetation and reducing the effects of deer browse are critical to successful establishment and maintenance of desirable tree and shrub species. In addition, control of competing vegetation using herbicides and fencing were often required to promote a diversity of sufficient, advanced regeneration in stands prior to or after overstory removal.

Maturing hardwood forest habitat dominates the project area. Table 10displays the forest type composition of the SBKC project area. Allegheny hardwood and mixed upland hardwood forests dominate both management areas within the project area.

Table 10. SBKC Project Area Forest Type/Management Area

Forest Type	Management Area				Total Project Acres	
	MA 2.2		MA 3.0			
	Acres	% of MA	Acres	% of MA	Acres	% of Project
White Pine	3	<1%	0	0%	3	<1%
Hemlock	76	5%	39	1%	115	2%
Mixed Lowland Hardwood	0	0%	14	<%	14	<1%
Northern Hardwood	145	9%	157	5%	302	6%
Allegheny Hardwood	805	53%	1,485	46%	2,290	48%
Red Maple (dry site)	0	0%	208	7%	208	4%
Sugar Maple	13	1%	5	<1%	18	<1%
American Beech	0	0%	2	<1%	2	< 1%
Mixed Upland Hardwood	459	30%	1,290	40%	1,749	37%
Total Acres of Forested Cover	**1,501**	**98%**	**3,200**	**99%**	**4,701**	**99%**
% Forest Cover of Project Area	**32%**		**67%**		**99%**	
Opening	31	2%	27	3%	58	1%
Total Project Acres by MA	**1,532**		**3,227**		**4,759**	
% of MA in Project Area	**32%**		**68%**		**100%**	

Most stands are well stocked, except for areas affected by hardwood decline and mortality. Age classes in the project area are shown in Table 11.

Table 11. Age Class Distribution by MA and Acres

Age Class	Years of Origin	MA 2.2 Acres	MA 3.0 Acres	Total Acres
1-10 years old	1997-2006	38	117	155
11-20 years old	1987-1996	0	146	146
21-30 years old	1977-1986	29	0	29
31-40 years old	1967-1976	54	215	269
41-50 years old	1957-1966	23	71	94
51-60 years old	1947-1956	97	155	252
61-70 years old	1937-1946	203	525	728
71-80 years old	1927-1936	360	640	1,000
81-90 years old	1917-1926	340	463	803
91-100 years old	1907-1916	279	628	907
101-110 years old	1897-1906	58	230	288
111+ years old	1887-1896	10	10	30
Savannahs & other openings	N/A	31	27	58

Age classes can also be grouped by tree size class. The tree size classes in the project area are shown in Table 12.

It is estimated that 58 acres of the project area are considered non-forest habitat including openings and other forest (cultural) openings. Past vegetation management (timber harvests), road construction, pipeline and utility corridor development have influenced the current forest conditions within the project area.

While many stands are well-stocked, forest health problems, such as beech bark disease and sugar maple decline, have affected a portion of the project area. The beech scale/beech bark disease complex was first observed in the project area in the mid-1980s. Mortality of beech and sugar maple has occurred within the forest overstory in many locations within the project area.

Table 12. Age and Size Class by Management Area

Age and Size Class	MA 2.2		MA 3.0		Project Area	
	Acres	% of MA	Acres	% of MA	Acres	% of Project Area
0 - 10 (Seedling)	38	2%	117	4%	155	3%
11 - 20 (Sapling)	0	0%	146	0%	146	3%
21 - 50 (Pole)	106	7%	286	9%	392	8%
51 - 101 (Sawtimber)	1,337	87%	2,641	82%	3,978	84%
111+ (Large Sawtimber)	20	0%	10	<1%	30	1%
Total Acres of Forest Cover	1,501	98%	3,200	99%	4,701	99%
% of Forest Cover of Project Area		32%		68%		99%
Opening	31	2%	27	1%	58	1%
Total	**1,532**		**3,227**		**4,759**	

Understories within the project area are generally dominated by interfering ferns, grass, beech, and/or striped maple. Some portions of the project area have a high proportion of black birch in the understory. The cover of native wildflowers is generally sparse (less than 10 percent), particularly in areas with heavy fern cover. No occurrences of the federally endangered small-whorled pogonia were documented during field surveys. Dense concentrations of striped maple are often found in the shrub layer. During field surveys of the project stands, dense thickets of beech sprouts (root suckers and stump coppices) also were observed in many locations, particularly in stands where the overstory has declined. These root sprouts and stump coppices are also subject to beech bark disease, as they are genetically the same as the parent beech trees that succumbed to the disease. Advanced regeneration of desirable species, such as black cherry, red maple and yellow poplar, is lacking over much of the project area; however, advanced regeneration has been observed in some stands that had been previously fenced, received site preparation treatments, or received an herbicide application in the past to control competing vegetation. Soils over much of the project area are not well-suited to seed production or regeneration of sugar maple (Horsley, *et al* 2000, Horsley, *et al* 2002). Deer browsing across the project area is currently moderate; however, when fences are installed, improvements in the diversity of seedlings and herbaceous communities are observed, as well as increases in the height growth of seedlings.

Where present, the forest midstory typically consists of striped maple, American beech, sugar maple, and birch. The forest midstory in the project area is generally fully stocked (approximately 61 percent of the project area) with striped maple and American beech

root coppice. Dense fern and grass cover are generally present (approximately 73 percent) throughout the project area. Striped maple, American beech, fern and grass combined act as interfering vegetation on almost the entire (92 percent) SBKC project area.

Currently, 30 acres of forest land within the project area is older than 110 years and considered to be in the late-successional stage.

Appropriateness

There are 36 stands proposed for even-aged regeneration in the SBKC project. Over 90 percent of these stands have forest types dominated by shade-intolerant species and over half of the stands currently have seedlings present that are shade-intolerant. All of the proposed stands are in Management Area 3.0 where there are objectives to create age and structural class diversity. Even-aged treatments are appropriate in the following stands based on forest types dominated by shade-intolerant species, forest health concerns, seed source and management area objectives (see also Appendix A of Forest Plan, USDA-FS. 2007a).

In Alternative 2, the following stands are proposed for even-aged regeneration by the shelterwood seed cut/overstory removal sequence: 810013, 810020, 810039, 810040, 810044, 811021, 811023, 811053, 811055, 812014, 812021, 812039, 813017, 814014, 814024, 814048, 814049, and 814088.

The following stands are proposed for even-aged regeneration by overstory removal: 814066, 814070, 814071, 814075, and 814076.

The following stands are proposed for even-aged regeneration initiation by shelterwood seed cut: 810043, 811019, 812010, 812037, 812066, 812067, 812068, 813014, 813022, 813023, 813027, 814027, and 814082.

Also see Table 10, p. 41 of the SBKC Project Vegetation Report.

In Alternative 3, the following stands are proposed for even-aged regeneration by the shelterwood seed cut/overstory removal sequence: 810013, 810020, 810039, 810040, 810044, 811021, 811023, 811053, 811055, 812014, 812021, 812039, 813017, 814024, and 814049.

The following stands are proposed for even-aged regeneration by overstory removal: 814070, 814075, and 814076.

The following stands are proposed for even-aged regeneration initiation by shelterwood seed cut: 810043, 811019, 812010, 812037, 812066, 812067, 812068, 813014, 813022, 813023, 813027, and 814082.

Also see Table 6, page 18 and Table 10, page 40 of the SBKC Project Vegetation Report (in the project file).

3.2.2 Wildlife

Affected Environment

A description of the affected wildlife resources in the SBKC project and an analysis of impacts on these resources use a three-tiered approach:

- A coarse filter approach is used to identify plant and associated wildlife communities at the landscape scale. This approach assumes that if the species, genetics, functions, and processes are protected at the landscape or community level, then the bulk of the biotic species, both known and unknown would be protected. This approach is applied at the broad scale and will be used to evaluate the cumulative effects (CE) on wildlife resources. This approach will examine current conditions with respect to wildlife habitat.
- A management indicator species (MIS) approach is used to evaluate the present condition of wildlife habitat and to assess changes in available habitats that would occur under each alternative. This approach is applied at the project scale.
- A fine-filter approach is used to evaluate habitats and assess effects on threatened, or endangered, and Regional Forester's Sensitive Species (RFSS). At the stand level (including composition and structure), this approach assesses effects on rare or sensitive communities that may be present such as riparian areas, wetlands, and unique or specialized habitats.

Coarse Filter Approach: Composition and Structure of Wildlife Habitats

The following discussions apply the coarse filter approach to the project area, CE area, and habitat fragmentation.

Project Area

At the landscape scale, the diversity of wildlife present is dependent upon the availability of habitat and the successional stages of various forest and non-forest cover types. Approximately 314 wildlife species (51 mammals, 213 birds, 24 reptiles, and 26 amphibians) are currently found across the ANF in a variety of habitat types. DeGraaf, *et al* (1992) developed a wildlife habitat relationships model for New England. Table 13 presents community types found in New England that are closely associated with habitat relationships in the project area and the number of species associated with each type. In addition, these community types and amounts, and age classes are linked to the early, mid, and late vegetative structural types and their characteristics on the ANF. The fauna species listed in the Table 13 are represented of the structural types and are not a conclusive list for each habitat type. The highest levels of species richness observed on the ANF are associated with mature (51 to 110 year age class) hardwood forest communities in the mid-structural vegetative type.

Table 13. Species Richness and Vegetative Structure in the SBKC

Structural Stage[1]	Community	Amount[2]	Fauna/Total # of species	Estimated tree size (dbh)	Representative Wildlife Species
Early	**Seedling** (0-10 years)	5%	156	<1 inch	Chestnut sided and mourning warbler, ruffed grouse, eastern cottontail, eastern milk snake, veery, snowshoe hare
Early	**Sapling** (11-20 years)	2%	129	1-5 inch	
Mid	**Pole** (21-50 years)	9%	129	5-12 inch	Indigo bunting, black-throated green warbler, scarlet tanager, red-shouldered hawk
Mid	**Mature** (51-110 years)	82%	163	12-20 inch	
Late	**Over-mature** (111+ years)	1%	40	20-99 inch	Blackburnian warbler, hoary bat, bald eagle, fisher, N. flying squirrel, N. goshawk
Early	**Permanent Openings[3]**	1%	110	N/A	Eastern bluebird, song sparrow, common yellowthroat
Mid-Late	**Conifer[4]**	2%	130	5-99 inch	Black-throated blue warbler, yellow-bellied flycatcher

Notes: Species-habitat relationships adapted from DeGraaf, et al, 1992 and USDA-FS 2007b

[1] Vegetative structural stages are described in the 2007 Forest Plan FEIS pp. 3-184 (USDA-FS 2007b)
[2] Habitat amounts (%) are displayed for federal land in the proposed 4746-acre project area. Numbers are rounded to the nearest whole number for efficiency.
[3] Permanent openings are non-forested areas recognized as perennial wildlife herbaceous opening, upland, or lowland shrub areas.
[4] A stand is classified as conifer when evergreen trees occupy 50% or more of a stand's canopy. The amount shown does not include conifer inclusions which together with the stands occupy an estimated 9% of the project.

Figure 1 displays the forest types and age classes for the stands in the entire SBKC project area. Figures 2 and 3 break down the habitat (forest types and age class, respectively) by MA. All of the vegetation treatments would occur in stands classified as

MA 3.0 and 2.2. The proposed timber harvest in MA 2.2 will be implemented to enhance habitat for some species with viability concerns, such as the Indiana bat, northern flying squirrel, black throated blue warbler, and timber rattlesnake, and mimic the heterogeneity that occurs naturally in older forests. These treatments are expected to create gaps, create snags, provide coarse woody debris (CWD), increase species diversity and vertical/horizontal structure (restore understory forest conditions), and provide more rapid growth on standing trees. Canopy gap formation, snags, and coarse woody material on the forest floor are conditions expected to be found in mature forest and these series of treatments using a combination of even-aged and un-even aged management will benefit these areas. The remaining treatments are located in MA 3.0 and will also benefit a wide variety of wildlife species and their habitat by balancing a number of community types with different age and vegetative structure.

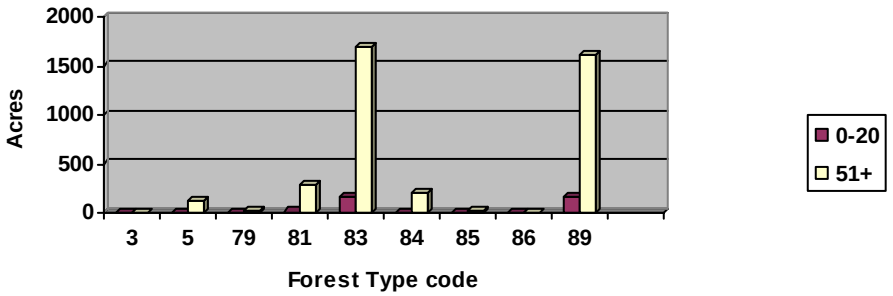
Silvicultural reforestation treatments (site preparation, herbicide application, fertilization, fencing, planting, and release) are proposed to create conditions that would help establish desirable forest cover in the treated stands. In addition, there are reforestation proposals in areas of MA 2.2 including planting conifer that are accomplished separately from the commercial treatments. Not all reforestation activities are planned for each stand, but only a minimum assortment would be implemented to achieve desired results. From a wildlife perspective, it is advantageous to restore understory structure and vegetative diversity in these stands to sustain late-structural habitat for a multitude of wildlife species over the long term. In many of these stands, undesirable vegetation and the effects of long-term deer browsing currently make establishing desirable forest cover relatively unlikely to occur on its own. Some have estimated it will take more than a century for the forests in the eastern United States to mature and develop all the structural complexity and diverse age class distributions they currently lack if left idle (Litvaitis 2003). These processes could take longer given impacts created by the introduced beech bark disease, potential impacts from the introduced hemlock woolly adelgid which disrupt natural succession and stand development processes (USDA-FS 2007b, p. 3-142). There is a growing body of literature on applying silvicultural techniques to accelerate or hasten the development of selected old growth characteristics or components (Jenkins et al. in USDA-FS 2007b, p. 3-143).

Unique plant communities, specialized habitat (raptor nests), sensitive ecosystems (springs and seeps), snags, and coarse woody material (down logs) on the forest floor are conditions that would be protected or maintained at desired levels under the Forest Plan standards and guidelines, as well as site-specific mitigation measures. Highly valued hard-mast trees (oak), soft-mast producing shrubs (witch hazel) and conifer (hemlock) that are minor components of the forest canopy or understory would be reserved and maintained. These components would be encouraged to increase their distribution in the new early structural forest condition

Primarily, wildlife habitat in the project consists of two principle hardwood forest age classes. The majority of the project area (82 percent) is in the mid-structural vegetative stage (51-110 years old) and is characteristic of that vegetative stage. Commercial timber harvests are under consideration in the mature hardwood stands. An additional 9 percent is pole-size (21-50 years old). Non-commercial release is proposed for some of these areas. By far, the dominant forest community types are Allegheny hardwoods and mixed upland hardwoods composed of black cherry, red maple, beech, and sugar maple.

Northern hardwoods, red maple (dry-site), sugar maple, and beech stands comprise approximately 11 percent of the SBKC project area. Mast-producing hardwood stands (greater than 35 years old) occupy approximately 88 percent of the project.

Figure 1. Acres in the Project by Forest Type and Age Class



Codes: 0-20 years (seedling/sapling age class) 51+ years (mature forest age class)

Forest Types: 3= white pine, 5= hemlock, 79= mixed lowland hardwoods, 81=northern hardwoods (sugar maple-beech-birch), 83=Allegheny hardwoods (black cherry-white ash-poplar), 84=red maple (dry site), 85= sugar maple, 86= beech, and 89=mixed upland hardwoods

As discussed in Section 3.2.1, the forest composition and structure of the project has been greatly influenced by past timber harvesting activities. Evidence of the railroad-logging era (1900-1930) including railroad grades, cultural remains, and numerous small openings can be observed along the perennial streams in the affected watersheds. Since 1930, forest composition and structure have been affected by varying types and amounts of vegetation management. Recent declines in forest health due to drought, insect pests, and various complexes of diseases plus catastrophic wind storms have altered many forested stands throughout the region causing higher than normal tree mortality with numerous standing dead trees, trees with cavities available to or made by wildlife, trees with exfoliating bark, and additional coarse woody material on the forest floor.

In addition to the project area, MA 2.2 (1532 acres) and 3.0 (3214 acres) were separated (Figures 2 and 3) to display their present condition. This will aid in measuring the proposal treatments to ensure that the MA objective and goals are being achieved. The same codes used in Figure 1 are used below. As shown below, MA 3.0 possesses more acres in the 0-20 age class and more acres of mixed upland hardwoods than MA 2.2

Figure 2. Acres in MA 2.2 by Forest Type and Age Class

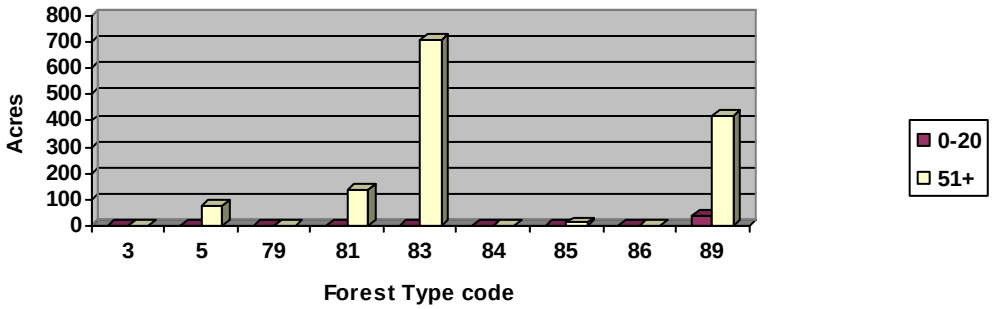
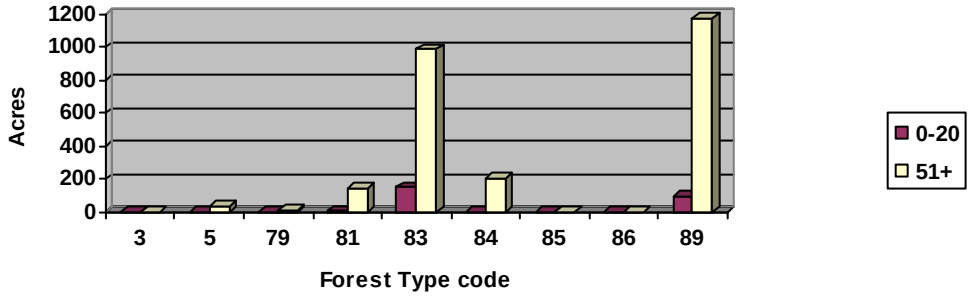


Figure 3. Acres in MA 3.0 by Forest Type and Age Class



Conifer typed stands (> 50 percent stocking of conifer) are classified on 2 percent of the project area (Table 13). In the SBKC project area, the conifer component consists primarily of inclusions of eastern hemlock within the hardwood stands. This habitat occurs as individual trees or small patches. These trees can also be part of the midstory and overstory structure of a stand and occur as widely-scattered components or as dense patches providing thermal cover. Geographic Information System (GIS) data indicates approximately 417 acres (9 percent) of conifer stands and conifer inclusions exist in the project area. Estimates indicate that over the entire project, 132 acres (28 percent of the conifer cover) occur in dense midstory and overstory structure while the remaining acres occur as sparse overstory, mid-story, and understory structure. Hemlock cover is generally associated with perennial and intermittent streams, springs and seeps, and is primarily located along sections of South Branch Kinzua Creek, Watermill Run, Hubert Run, and Glad Run. One three-acre white pine stand exists along South Branch Kinzua Creek.

The SBKC project area is dominated by Allegheny hardwoods and mixed upland hardwoods forest types with modest to dense understory vegetation consisting of American beech, red maple, and striped maple. Field surveys indicate that other trees persisting in this vegetative layer include black cherry, eastern hemlock, black birch, fire cherry, yellow poplar, juneberry, and sugar maple. Lesser amounts of mountain and large leaf holly were noted in rocky areas, low-bush blueberry, hophornbeam, ironwood, mountain ash, gooseberry, and witch hazel in edge habitats, lower benches, and moist spots. Scattered apple trees associated with the railroad logging era at the turn of the 20th

century are located along the major drainages including South Branch Kinzua Creek, Glad Run, and Watermill Run.

Over four dozen common herbaceous plants are documented in the SBKC project area. Survey data indicate that hay-scented fern, New York fern, wood fern, and clubmoss are the dominant ground cover in the forest interior. In addition, field surveys found a variety of bracken fern, bottle brush, violets, Canada mayflower, Indian cucumber root, blackberry, partridge-berry, bindweed, wood sorrel, and twisted stalk to be quite common. A list of plants found during survey work is located in the project file.

Of the 4,746 acre project area (National Forest land), one percent (58 acres) is classified as perennial wildlife opening habitat, specifically herbaceous openings and reclaimed pits, or openings associated with lowland or upland shrub condition. Non-forest habitat also exists in the project and is associated with roads, pipelines, utility corridors, oil or gas lease developments, log landings, and other forest openings, but these are often inclusions in forested stands.

The project contains lower slope and bottomland habitat, specifically along South Branch Kinzua Creek, Glad Run, Hubert Run, and Watermill Run. A mix of hemlock inclusions, riparian corridors, and interspersed openings occur in these areas. These areas often are associated with a greater abundance and diversity of plants and animals. Located primarily on upland plateau, most of the proposed treatment areas are on nearly flat, gently sloped, or rolling terrain.

According to the GIS database, there are over 18 miles of perennial waterways. South Branch Kinzua Creek, Glad Run, and Watermill Run are classified as High Quality Cold Water Fisheries (HQ-CWF) by the PA DEP. Hubert Run is designated as a Cold Water Fishery (CWF). All proposed treatments are located within these watersheds. South Branch Kinzua Creek is also designated as a PA State Wilderness Trout Stream from its headwaters to its confluence with Hubert Run. There are 7.1 miles designated as Wilderness Trout Stream (includes private property) and this stream section makes up the northern boundary of the project area. According to surveys done by the Pennsylvania Fish and Boat Commission (PFBC) native brook and stream-bred brown trout occur in South Branch Kinzua Creek, a small freestone stream, while other stream surveys indicate that native brook trout exist in portions of Hubert Run, Glad Run, and Watermill Run. None of the stream sections above are approved trout waters stocked with fish by the PFBC. Fishing access is remote as most is walk-in only with FR186 being the only direct vehicle access road to South Branch Kinzua Creek. None of the treatments proposed will affect the state criteria for the state designated section of the Wilderness Trout stream. All perennial stream sections will be protected with Forest Plan standards and guidelines or site-specific mitigation measures. Oil and gas activity is considered to be light in the project area with development occurring sporadically on the plateau and is not a major impact on stream-courses.

Intermittent streams also occur in the project area and can provide habitat for aquatic insects. A variety of silvicultural and wildlife proposed treatments fall adjacent to some sections of these streams. All intermittent streams will be protected using Forest Plan standards and guidelines or site specific mitigations.

According to the National Wetland Inventory (NWI), there are approximately 43 acres of wetlands within the SBKC project area. All recognized wetlands by the NWI are located

along the South Branch Kinzua Creek riparian corridor. This area is predominately forested wetland (Palustrine Forested) mixed with both inactive and active beaver dams. A combination of wildlife treatments (including planting, pruning apple trees, installing wildlife structures, and non-commercial thinning) may be located adjacent to these areas. All wetlands will be protected with Forest Plan standards and guidelines or site specific mitigations.

Springs and seeps that occur in or adjacent to proposed timber harvest or reforestation-only stands require one or more Forest-wide Standards and Guidelines or mitigation measures to protect these resources. These areas not only produce water most of the year but may also function as moist corridors for indigenous species (salamander) migration and dispersal. The area surrounding the springs and seeps is also important to plant and animal distributions. Canopy cover needs to be maintained around springs and springs to maintain micro-climate and prevent conversion to grass or fern cover.

Vernal pools exist in the project area and these seasonally wet areas provide breeding and basking habitat to a variety of amphibians and reptiles. In addition to the pools, the surrounding upland forest is important habitat that is used by pool-breeding amphibians during their life cycle. Within this habitat, it is important to maintain forest floors with suitable conditions, such as minimal compaction and rutting, deep litter, coarse woody debris, and canopy shade (Calhoun and deMaynadier 2004). These areas will be protected using Forest Plan standards and guidelines or site specific mitigations measures.

Additional wildlife habitat features within the SBKC project area include rock outcrops and small surface boulders. Surface boulders/rocks were found on 22 percent of the surveyed area. These features are found to be widely scattered along several of the steeper slopes, especially above Hubert Run, South Branch Kinzua Creek, and sections above portions of Glad Run. Some appear to offer large basking surfaces for reptiles, crevices for small mammal dens or roosts, or fissures leading underground. Project mitigations would be used to protect these areas. The majority of the hardwood coarse woody debris (CWD) and snags in the project area are from hardwood mortality from past insect and disease problems (mainly beech bark disease) and previous timber treatments in the area. CWD is present on 75 percent of the area surveyed ranging from 6-18” in diameter. A total of 722 pieces of CWD were recorded on surveyed areas. These habitat components serve a wide variety of wildlife species for both food and cover. In addition wildlife surveys registered 448 total snags on the 74 percent of the area surveyed.

Active raptor nests have not been documented in the project area within the last four years. Three raptor nests were field checked in 2002 and showed signs of some activity. These nests were re-checked in 2006, but surveys showed they were no longer present. Forest Plan standards and guidelines will protect any nests if found.

White-tailed deer populations were monitored in South Branch Kinzua Creek watershed from 2003-2005. Deer pellet counts were conducted within the project boundary and in or immediately adjacent to the proposed treatments. Pellet counts indicate an averaged of 12 deer per square mile in 2004 and 19 per square mile in 2005 for a two year average of 14.5 per square mile in the FR448 portion of the project area. In the project area, the deer population is currently within the ANF LRMP goals of 10-20 deer per square mile and herbaceous and woody plants are beginning to improve in the area. Immediately north of

the project area, surveys were conducted in FR279 area in 2003/2004 with an average of 29 deer per square mile.

Habitat Fragmentation

Habitat fragmentation is generally a process of subdividing a continuous area of habitat into smaller, discontinuous patches, resulting in the loss of original habitat, a reduction in patch size, and spatial isolation of residual areas of habitat. In forested landscapes, habitat fragmentation occurs at several different spatial scales, including direct losses in the amount of continuous forest cover, isolation of habitat types within a forest matrix, and edge effects that reduce the quality of fragmented habitats for plant and animal species (Lindenmayer and Franklin 2002).

In general, the effects of habitat fragmentation can be beneficial to some wildlife species and detrimental to others. For example, habitat fragmentation can benefit species that rely on early successional or edge habitat and can be detrimental to others that rely on larger, contiguous blocks of late successional forested habitat, such as certain neotropical migratory songbirds. Similarly, edge effects can be highly variable at a landscape scale depending on whether the gradient between different habitat types is soft (a 20 year-old regenerating cut) or hard (an agricultural field or urban non-forested land use) next to mature interior forest. Edges can also be permeable and not pose a significant barrier to species travel and dispersal patterns, or form relatively impermeable boundaries that retard species movement and can increase mortality for some groups of wildlife (such as amphibians, reptiles, and some mammals).

Although the effects of habitat loss are often difficult to separate from habitat fragmentation, the amount of remaining unfragmented or "core" forest habitat is one measure that may be used to assess the general conditions of a forested landscape (Lindenmayer and Franklin 2002). A recent nationwide assessment of forest spatial patterns and fragmentation effects at the ecoregion scale found that the Allegheny Highland Forest Ecoregion is approximately 70 percent forested with a mean forest patch size of 90 hectares (or approximately 222 acres) (Heilman *et al* 2002). However, the area of core forest (the amount of remaining interior forest habitat after taking edge effects into consideration using a 90-meter buffer) was only 46.5 percent of the total cover of forest area. At the broad landscape scale, this suggests that the region is moderately fragmented by roads and other non-forest land uses.

The ANF LRMP FEIS discusses changes in habitat patterns on the landscape affecting late structural patch size and habitats with less human disturbance and items that were considered in the spatial design of late structural linkages on pp. 3-191 to 3-194 and 3-226 to 3-230 (USDA-FS 2007b). Items considered help formulate the design and location of MA 2.2 across the forest and eventually in the SBKC project area.

A quantitative analysis of the landscape distribution of unfragmented and fragmented core forest habitat was performed using a spatial model in the SBKC project. The shape and spatial characteristics of the landscape were incorporated into the model and a value was assigned to the forest conditions based on a scale of 0-20. This number reflects the effect of adjacent forest conditions upon the forested core area, where lands with a score of zero have the least amount of core and more fragmentation and lands with a score of 20 have more core area and less fragmentation and effects. Details of this model and core values are located in the project file.

A visual analysis of the forest habitat in the SBKC project indicates that most areas of fragmented habitat (adjacent to FR463 and FR448) are associated with the stand replacing effects of various final harvests that have occurred in the project area over the last four decades. The model shows forested core or linkage areas along Watermill Run, plateau region near FR457 across to FR186 to private land, FR 186 near South Branch Kinzua Creek, areas along Hubert Run and upslope, and sections of South Branch Kinzua Creek. In general the core areas are well distributed and connected to some degree across the landscape, especially in the eastern portion of the project. Forest roads in many of the interior portions, constitute a somewhat permeable edge that is not a significant barrier to the movement of many animal species between patches of core forest habitat. Even though some areas have permanent openings, such as the savanna openings along SBKC, they are still valuable linkages for species that are dependent on these areas with important riparian and savanna habitat values.

In addition to the fragmentation model, the location of SBKC as a Wilderness Trout Stream, the distribution of MA 2.2, and the locations of unroaded areas >500 acres in size that overlap into the project area were relevant to the analysis. According to the Forest-Wide Road Analysis Report (USDA-FS 2003a), there are no unroaded areas > 500 acres located entirely within the project boundary. Two unroaded areas (#63 SB Kinzua E) and (#44 SB Kinzua W) > 500 acres do overlap within the project boundary in some northern sections. From these unroaded areas, 203 acres of #44 and 44 acres of #63 overlap into the SBKC project. A portion of these unroaded areas overlaps the un-fragmented core areas, with some exceptions near South Branch Kinzua Creek where interspersed natural openings interrupt the canopy forest.

Project Level Approach: Management Indicator Species (MIS)

Management indicator species (MIS) are used in concert with other indicators to gauge the effects of management on wildlife habitat in general. MIS are expected to reflect the effects of the alternatives on ecological communities of management interest. In revising the MIS list during the Forest Plan revision process, emphasis has been placed on species that are closely associated with habitats of interest and species that can produce meaningful data about the effects of forest management activities. Forest MIS include four wildlife species and aquatic invertebrates. The selection and rationale for these species are located in the 2007 Forest Plan FEIS on pages 3-194 to 3-195 (USDA-FS 2007b).

In general, the MIS approach is used to reduce the complexity of discussing all the wildlife species on the forest. MIS represent groups of wildlife associated with similar vegetative communities or key habitat components. Evaluating the effects of management practices on these species and their habitat provides an additional basis for ensuring the maintenance of biological diversity.

The monitoring requirements, frequency, and evaluation of the five MIS are discussed in the Forest Plan (USDA-FS 2007a, pp. 37-41). Using a variety of techniques, the ANF has been monitoring the new MIS species and their habitat since 1986, regarding at least some of the aspects of their population or suitable habitat conditions. A forest-wide monitoring strategy is being developed. These new survey techniques and protocols for these species will be established to monitor the effects of future forest management activities.

Forest-wide MIS habitat status and trends, preferred habitat, threats, and management emphasis are discussed in the Forest Plan FEIS (USDA-FS 2007b, pp. 3-196 to 3-204). Table 14 summarizes information on the habitat represented, requirements, and present condition habitat in the project and population trends for each MIS.

Table 14. Summary of MIS Species Habitats and Population Trends on the ANF

Species	Habitat Represented on ANF	Project Habitat & Population Trends
Timber Rattlesnake	Remote and connected deciduous forests with minimal human disturbance	No den sites are known to occur in the project area. Foraging habitat is available. Eight known den sites occur on the ANF with the potential for ½ dozen more (that were historically known to exist).
Northern Goshawk	Mid to Late structural mixed deciduous/conifer forest	Approximately 83 percent of the project area has suitable habitat. None of the 12 active nesting territories on the ANF occur in the project area. ANF has had relatively stable goshawk populations the last 15 years.
Cerulean Warbler	Mid to Late structural oak forests with some canopy gaps	There is no documented habitat or known species occurrence within the project area. It is estimated that the ANF could support between 500 and 1500 pairs of cerulean warblers (Stoleson *per. comm.* 2005).
Aquatic Invertebrate Diversity and Relative Abundance	Aquatic habitat including stream water quality and physical habitat	Suitable habitat for aquatic insects exists on all waterways within the project area. Recently completed surveys on named streams on the ANF by the DEP indicate that all streams with the exception of three provide suitable aquatic habitat (USDA-FS 2007b, pp. 3-28, 3-204).
Mourning Warbler	Early structural habitat	Approximately 7 percent of the project area supports suitable habitat. Stoleson *pers. comm.* 2006 estimates that the ANF by 2060 could support between 3,000 and 9,000 pairs based on providing preferred habitat.

The following is a brief description of the MIS habitat within the SBKC project area as related to present habitat condition:

Timber Rattlesnake

This snake typically occupies deciduous forests and on the ANF and in the SBKC these forests are a mix of conifer and various hardwoods, interspersed with openings. The two major habitat indicators are dens and basking areas. Den sites typically consist of rocky

crevices, outcrops or rocky slopes that are most often located on southern exposures that occur near forested openings. Dens are often located in somewhat remote areas, which add an additional level of species viability protection. Basking habitat consists of open forest edges, meadows, open shrub land edges and exposed rock outcrops. Areas near den sites, such as rocky ledges, boulder fields, or talus slopes on a southern exposure make excellent basking areas for temperature regulation for the snake. Suitable foraging habitat for the timber rattlesnake is abundant across the project, but no verified sightings of this species have been made in the South Branch Kinzua Creek watershed. There are scattered rock outcrops and boulders that could serve as potential den sites and basking areas for this species, however no rattlesnake activity has been confirmed and these areas are located typically on cool north slopes and are well vegetated. Snakes use CWD as both foraging and cover areas. Coarse woody debris was recorded on 75 percent of the area surveyed. Foraging habitat, in the form of hardwood forest with an ample supply of coarse woody material on the forest floor, riparian areas, and a variety of small openings are available throughout the project.

Northern Goshawk

This hawk presides mainly in mid to late structural mixed deciduous /conifer forest habitat. Goshawks typically select nesting territories that avoid high use roads and often in areas that are more remote. Lower standard roads are commonly found in close proximity to nest sites indicating the species preference for isolation and sensitivity to disturbance. In the SBKC, abundant habitat is currently found for species that require mature and late-successional deciduous forest types. Approximately 83 percent of the project is currently in stands with an age class > 50 years old. Conifer cover, specifically eastern hemlock stands occurs on approximately two percent of the project area and together with conifer inclusions within hardwood stands make up approximately 417 acres or 9 percent of the project. Mature, largely contiguous tracts of forestland near riparian areas along with small openings in the South Branch Kinzua Creek watershed (including tributaries), provide suitable nesting and foraging habitat for the goshawk. None of the 12 nesting territories that have been known to be active on the ANF in the last five years occurs within the project area. This raptor has not been documented or observed in the project during field surveys. More detailed information on habitat suitability for this species can be found in the BE (Project File).

Cerulean Warbler

On the ANF, this warbler has only been documented in an oak component (oak forest type or in upland hardwood forest that contained an oak component) or in riverine habitat. As a result, preferred habitat is restricted primarily to these two communities. In the SBKC project area there are no oak forest types nor is there an oak component in any of the hardwood stands. The South Branch Kinzua Creek is a small watershed and lacks the physical characteristics of a large riverine habitat system. No cerulean warblers have been documented in field surveys in the project area.

Aquatic Invertebrates

Commonly referred to as aquatic insects, this group of invertebrates occur in streams or bodies of water where water quality and habitat conditions are considered suitable. Depending on the group of aquatic invertebrates, some prefer flowing water over rocky cobble-size substrate, while others prefer slow, backwater areas or pools in streams. The

focus on the ANF will be in flowing water of streams. In the project area, South Branch Kinzua Creek, Glad Run, and Watermill Run, are HQ-CWF as designated by the DEP and Hubert Run is classified as a CWF. These designations support that water quality and physical habitat is present to support biomass and aquatic diversity in some form or abundance. In addition, the SBKC project includes intermittent streams, seeps, springs, vernal pools, and wetlands that can provide suitable habitat to aquatic insects. Field surveys on stretches of the above streams have observed different groups of some aquatic insects.

Mourning Warbler

On the ANF this warbler depends on shrubs and dense woody vegetation and is an indicator of early structural habitat (0-20 year old seedling/sapling stands) and because they utilize small gaps as well as large disturbed areas, they can serve as an indicator to assist in monitoring the effects of even age management and uneven age management. Within the SBKC project a variety of forested age classes are distributed across the area. Approximately 7 percent of the project area exists in early structural habitat (<20 years old) therefore habitat for this warbler is present. During field surveys, mourning warblers have not been documented in the project area. During PA breeding bird atlas surveys (2004 to 2008) the mourning warbler has been documented within the project area (Fedak pers. comm. 2007).

Fine-Filter Approach: Federally Threatened or Endangered, and Regional Forester Sensitive Species

Habitat for rare species is an important consideration when assessing potential impacts to biological diversity. Table 15 displays the status of federally-listed threatened or endangered (T&E) or Candidate species (2), as well as Regional Forester Sensitive Species (RFSS), for the ANF. Each species is categorized depending on their known occurrence and available habitat. The Eastern Region RFSS list was updated November 8, 2006 and the USFWS has delisted the bald eagle, effective August 8, 2007, therefore, as a result, there are now 61 RFSS species for the ANF. Detailed information on the life history (including habitat needs), known locations of occurrence, and other limiting factors for each species are documented in the Biological Evaluation for the Forest Plan (USDA-FS 2007e), project level Biological Assessment (BA) for federal T&E species, and the Biological Evaluation (BE), which analyzes the RFSS species (Project File).

The South Branch Kinzua Creek project area contains no occupied habitat for any of the T&E and RFSS species listed for the ANF. Based on the results of field surveys and a search of documentation records, forty species listed in Table 15 have suitable habitat in the project area but their presence has not been documented. Three species, the gilt darter, ocellated darner, and harpoon clubtail have suitable habitat in the project area but have not been documented there. These three species have been documented within the Cumulative Effects/Impact (CE/CI) area. Three other species, the channel darter, osprey, and bald eagle have suitable habitat in the (CE/CI) area and have been documented or observed there, but have not been documented in the project area. The midland clubtail and burbot have suitable habitat in the CI area but have not been documented. Twenty species have no suitable habitat in the project or CE/CI area and have not been documented in the project or CE/CI area.

Table 15. Status of Federally Threatened, Endangered, Candidate, and Regional Forester Sensitive Species for the SBKC Project

Species	Species Status[1]	Occupied Habitat	Suitable Habitat in the Project but Presence not Documented	No Suitable Habitat in the Project Area
Mammals				
Indiana bat (*Myotis sodalis*)	Endangered		**X**	
Northern flying squirrel *(Glaucomys sabrinus)*	Sensitive		**X**	
Mollusks				
Northern Riffleshell (*Epoblasma torulosa rangiana*)	Endangered			**X**
Long-solid mussel (*Fusconaia subrotundra*)	Sensitive			**X**
Clubshell mussel (*Pleurobema clava*)	Endangered			**X**
Creek heelsplitter *(Lasmigona compressa)*	Sensitive		X	
Rabbitsfoot *(Quadrula cylindrica)*	Sensitive			**X**
Rainbow mussel (*Villosa iris*)	Sensitive			**X**
Rayed-bean (*Villosa fabalis*)***	Sensitive			**X**
Round pigtoe *(Pleurobema sintoxia)*	Sensitive			**X**
Snuffbox *(Epioblasma triquetra)*	Sensitive			**X**
Threeridge (*Amblema plicata*)	Sensitive			**X**
White heelsplitter (*Lasmigona complanata*)	Sensitive			**X**
Sheepnose *(Plethobasus cyphyus)****	Sensitive			**X**
Wabash pigtoe (*Fusconaia flava)*	Sensitive			**X**
Invertebrates				
Green-faced clubtail *(Gomphus viridifrons)*	Sensitive			**X**
Harpoon clubtail (*Gomphus descriptus*) [2]	Sensitive		**X**	
Rapids clubtail (*Gomphus quadricolor*)	Sensitive		**X**	
Mustached clubtail (*Gomphus adelphus*)	Sensitive		**X**	
Midland clubtail (*Gomphus fraternus*)	Sensitive			**X**[5]
Ski-tailed emerald (*Somatochlora elongata*)	Sensitive		**X**	
Uhler's sundragon (*Helocordulia uhleri*)	Sensitive		**X**	
Maine snaketail (*Ophiogomphus mainensis*)	Sensitive		**X**	
Zebra clubtail (*Stylurus scudderi*)[3]	Sensitive		**X**	
Ocellated darner *(Boyeria grafiana)* [2]	Sensitive		**X**	
Resolute damsel *(Coenagrion resolutum)*	Sensitive			**X**
Birds				
Yellow-bellied flycatcher (*Empidonax flaviventris*)	Sensitive		**X**	
Bald eagle (*Haliaeetus leucocephalus*)	Sensitive			**X**[4]
Osprey *(Pandion haliaetus)*	Sensitive			**X**[4]
Northern goshawk *(Accipter gentili)*	Sensitive		**X**	
Reptiles				
Timber rattlesnake (*Crotalus horridus*)	Sensitive		**X**	
Wood turtle (*Clemmys insculpta*)	Sensitive		**X**	

Species	Species Status[1]	Occupied Habitat	Suitable Habitat in the Project but Presence not Documented	No Suitable Habitat in the Project Area
Plants				
Northeastern bulrush (*scirpus ancistrochaetus*)	Endangered		**X**	
Butternut (*Juglans cinerea*)	Sensitive		**X**	
Creeping snowberry (*Gaultheria hispidula*)	Sensitive		**X**	
Rough cotton-grass (*Eriophorum tenellum*)	Sensitive		**X**	
Small whorled pogonia (*Isotria medeoloides*)	Threatened		**X**	
Thread rush (*Juncus filiformis*)	Sensitive		**X**	
Wiegand's sedge (*Carex wiegandii*)	Sensitive		**X**	
Hooker's orchid *(Platanthera hookeri)*	Sensitive		**X**	
American fever-few *(Parthenium integrifolium)*	Sensitive		**X**	
Bartram shadbush *(Amelanchier bartramiana)*	Sensitive		**X**	
Sweet-scented Indian-plantain (*Hasteolasuaveolens*)	Sensitive		**X**	
Mountain wood fern (*Dryopteris campyloptera*)	Sensitive		**X**	
White trout-lily (*Erythronium albidum*)	Sensitive		**X**	
American ginseng (*Panax quinquefolius*)	Sensitive		**X**	
Checkered rattlesnake plantain (*Goodyera tesselata*)	Sensitive		**X**	
Canada yew (*Taxus canadensis*)	Sensitive		**X**	
Boreal bog sedge (*Carex magellanica spp.Irrigua*)	Sensitive		**X**	
Kidney-leaved twayblade (*Listera smallii*)	Sensitive		**X**	
Bristly Black Currant (*Ribes lacustre*)	Sensitive		**X**	
Swamp Red Currant (*Ribes triste*)	Sensitive		**X**	
Stalked Bulrush (*Scirpus pedicellatus*)	Sensitive		**X**	
Mountain starwort (*Stellaria borealis spp. Borealis*)	Sensitive		**X**	
Queen-of-the-prairie (*Filipendula rubra*)	Sensitive		**X**	
Fishes				
Channel darter (*Percina copelandi*)	Sensitive			**X**[4]
Gilt darter (*Percina evides*) [2]	Sensitive		**X**	
Gravel chub (*Erimystax x-punctata*)	Sensitive			**X**
Longhead darter (*Percina macrocephala*)	Sensitive			**X**
Mountain brook lamprey (*Ichthyomyzon greeleyi*)	Sensitive		**X**	
Spotted darter (*Etheostoma maculatum*)	Sensitive			**X**
Tippecanoe darter (*Etheostoma tippecanoe*)	Sensitive			**X**
Bluebreast darter (*Etheostoma camurum*)	Sensitive		**X**	

Species	Species Status[1]	Occupied Habitat	Suitable Habitat in the Project but Presence not Documented	No Suitable Habitat in the Project Area
Burbot (*Lota lota*)	Sensitive			**X**[5]
Mountain madtom *(Noturus eleutherus)*	Sensitive			**X**
Northern madtom (*Noturus stigmosus*)	Sensitive			**X**

Notes:

1. Endangered: Listed as a Federally Endangered Species; Threatened: Listed as a Federally Threatened Species; Sensitive: Listed as a Regional Foresters Sensitive Species for the ANF by Region 9 USDA-FS.
2. Suitable habitat exists in the Project area and individuals have been documented in CE/CI area outside of the project
3. Formerly called Scudder's clubtail dragonfly.
4. No individuals or suitable habitat are found in the project area, however suitable habitat is found in the cumulative effects/impact analysis area and individuals have been documented.
5. Suitable habitat exists in the CI area, but individuals have not been documented.

*** These species are currently Candidate Species. In the future these species are expected to be fully evaluated for listing by the US Fish and Wildlife Service.

3.2.3 Non-Native Invasive Species

Affected Environment

Historically, most noxious weeds (legal authority listing State and/or Federal) and non-native invasive species (NNIS) were introduced to North America from Europe and/or Asia. Because noxious weeds and invasive plant species pose an increasing threat to all ecosystems (USDA-FS 1998a, p.1), the ANF is continually developing, enhancing and implmenting a comprehensive NNIS management program, which includes invasive plant prevention, early detection of new species, treatment, and monitoring.

Executive Order 13112 (1999) defines alien (non-native) species as "with respect to a particular ecosystem, any species including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem" (USDA-FS 2007b). Invasive species is defined as "an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health" (USDA-FS 2007b).

Many factors may influence the ability of a particular species to become established into new areas and the extent to which a particular species becomes established. Biological, physical, and environmental barriers affect plant invasions. Of the approximately 1,200 vascular plants species listed for the ANF, 251 are introduced species (Hays, personal communication 2002, adapted from Rhoads and Klein 1993). A subset of those species is considered invasive plant species of concern.

Currently there are 30 species that occur within the ANF proclamation boundary that are identified as invasive plants of concerns. These species are the focus of current inventory and control efforts. Of these species, 17 are considered highly invasive; with the potential to invade natural habitats and replace native species. These include species that are well known for seriously disrupting the plant species composition of forested and/or

riparian communities and include such species as garlic mustard (*Alliaria petiolata*) and Japanese knotweed (*Fallopia japonica* formerly known as *Polygonum cuspidatum*). Thirteen species are considered less invasive than those, and include native and non-native plants. Many of these are found primarily in disturbed areas, openings, or along roadsides, in areas ranging from full sun to partial shade and include such species as Bull thistle (*Cirsium vulgaris*) and multiflora rose (*Rosa multiflora*). In addition there are six species listed on the ANF Early Detection list, which includes species not detected on the ANF but are known to occur nearby. These include leafy spurge (*Euphorbia esula*) (USDA-FS 2007b).

All focus species were surveyed for on the SBKC project and a complete list can be found in the project file. While identification of these species is an emphasis of the program, this list does not preclude other species from being inventoried and will be updated as new information becomes available.

Present Condition

The potential for introduction and/or spread of NNIS species depend on many factors. Disturbances may facilitate plant invasion by overcoming physical and environmental barriers (Parendes and Jones 2000, p. 65). In order to assess the presence and/or extent of NNIS, plant surveys were conducted in proposed timber harvests or reforestation treatments and along road corridors in the project. A total of seven NNIS species were recorded during 2004-2006 field surveys in the project. These included: Canada thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), multiflora rose (*Rosa multiflora*), crown vetch (*Coronilla varia*), Tatarian honeysuckle (*Lonicera tatarica*), Japanese barberry (*Berberis thunbergii*), and reed canary grass (*Pharlaris arundinacea*). Survey summaries and maps of documented infestations can be found in the project file.

Field surveys identified seven NNIS species at 64 sites widely scattered across the project mainly along existing road corridors. Reed canary grass and bull thistle were documented the most. Most sites contained 1- 20 plants, but reed canary grass, Canada thistle, and crown vetch had locations with plant numbers ranging from 20-200 plants. No moderate or high intensity areas in size and density were noted. Thirty-nine of the infestations are classified as low intensity where loosely scattered clumps are often found on one or both sides of the road for distances of 100 feet (more or less). However, the non-native species are not effectively invading forested areas. Approximately 36 percent of the infestations are small, widely scattered and occur only near roads. These infestations are classified as ‘trace’ populations where a lone plant was observed, or plants are very few in number, or scattered, and/or are distributed across a very small area or site (occupying a few square feet). This is not surprising considering the predominantly forested condition of the project area, which creates site conditions less conducive to the growing of shade intolerant species, which describes most NNIS. Other physical, environmental, or biological dispersal barriers may exist that are preventing infestations from spreading.

3.3 Social Environment

3.3.1 Heritage

Affected Environment

The affected environment for heritage resources considers prehistoric and historic cultural resources. Humans have occupied what is now Pennsylvania for over 10,000

years. There are both prehistoric and historic sites located in the project vicinity. The history of this area indicates substantial industrial uses, including logging. In the 1930s, the Civilian Conservation Corps (CCC) was active in the project vicinity.

3.3.2 Scenery

Introduction

This section describes the scenic component of the SBKC project area that would potentially be affected by the alternatives if they are implemented. The scenery analysis is based upon the Scenery Management System (SMS) as described in USDA Forest Service Agriculture Handbook 701, Landscape Aesthetics: A Handbook for Scenery Management, 12/1995**.** This tool was developed by the Forest Service for the management and monitoring of viewsheds and updates the previous Visual Management System (USDA-FS, 1974). Use of this system is helpful to describe the effects of alternatives on the existing scenic condition and mitigation for those effects to achieve the desired scenic condition in forest landscapes.

The Forest Service developed SMS to help land managers create and maintain visual diversity and prevent unacceptable alteration of the natural landscape. The primary indicators used to measure impacts to scenic resources are: (1) that the existing landscape character will remain intact and (2) treatments will meet or exceed scenery integrity levels (SIL) as shown on the SIL map.

Landscape Character Type

Prior to European settlement, the vegetation of the area was a dense, late successional forest with species such as hemlock, beech, white pine, and oak. The Seneca settled along the large rivers. Deer populations were low, and the understory was rich with species such as hobblebush. After European settlement, much of the area was exploited for its rich natural resources. The hillsides were stripped of their forests to support the building industry of a growing nation. Across the Allegheny Plateau, high density developments were concentrated for drilling oil and natural gas. This period of intense use dramatically affected the landscape character by changing the species composition of the resulting forests. After years of growth and management, the landscape character has moved from one of human disturbance to that of a natural appearing forest.

Today, the vegetation consists of hardwood species (black cherry, red maple, sugar maple, beech, yellow birch, white ash, and yellow poplar), with pockets of conifers, both native (hemlock, white spruce , and white pine) and non-native (red pine). The eroded forested plateau is bisected by the drainage of small streams and large rivers. Large sandstone rocks are scattered along the cliffs surrounding these valleys. Land use patterns include numerous oil and gas wells and linear clearings for utility rights-of-way.

Scenic Integrity Levels (SILs)

The Forest Plan sets measurable standards or objectives for the management of scenic resources by establishing SIL across the forest landscape. As defined in the ANF LRMP FEIS, SILs refer to the degree of acceptable alteration to meet or exceed in the characteristic landscape (USDA-FS 2007b, p. 3-371). Scenic classes establish the importance or value of a landscape by analyzing three basic inventory components:

- Scenic Attractiveness (SA): the scenic importance of a landscape based on human perceptions of the intrinsic beauty of landform, waterform, vegetative pattern, and land use and cultural features (USDA-FS 1995, p. 1-16).
- Concern Level (CL): the expectation of viewing scenery and the amount of use on a given travelway.
- Distance Zones: visibility of a landscape from a given travelway.

Scenic Attractiveness (SA) may vary over time but if not manipulated, the change is very slow and not detectable for several planning cycles. The three classifications for SA are: Class A, Distinctive; Class B, Typical; or Class C, Indistinctive. Since the project area has equal portions of Class B and Class C, and no Class A, the project area is more typical of the forest landscapes on the ANF.

Concern Levels (CLs) are a measure of the degree of public importance placed on landscapes viewed from travelways and use areas (USDA-FS 1995, p. 4-8). They are located in areas where visitors are mostly likely to view the scenery: along travel routes, or from use areas or water bodies. CL's are classified as follows:

- CL1 - high interest in scenery,
- CL 2 – moderate interest in scenery,
- CL 3 - low interest in scenery.

The SBKC project area has three corridors of scenic concern. SR 321 is the only CL1 travelway within the project area. CL 2 travelways include FR186, Connector Trail #17 of the Allegheny Snowmobile Loop (ASL), and the South Branch Kinzua Creek. Other roads are classified CL 3.

Distance Zones divide the landscape into three perspectives: foreground, middleground, and background. The foreground is 0 to ¼ mile from the observer, middleground is one-quarter mile to 3 miles and background is a distance greater than 3 miles. An area may be located within one-quarter mile of a viewpoint, yet may not be visible from a given travelway.

The four SILs found on the Forest SIL map were developed from Scenic Classes to meet or exceed scenic integrity standards on the ANF. They include Very High, High, Moderate, and Low SILs. Six SILs are described in **Table 16** (USDA-1995, p. 2-4). Very Low and Unacceptably Low are used to define existing scenic conditions rather than desired levels for scenery. The SBKC project area is represented by High, Moderate and Low SILs with the highest concentration of treatments in the Moderate and Low SILs. Project file GIS inventory data (for the Forest Plan FEIS, USDA-FS. 2007b) shows the existing Scenic Integrity of the area is Moderate.

Table 16. Scenic Integrity Levels

Scenic Integrity Level Classification	Scenic Integrity Level Definition
Very High Scenic Integrity	Unaltered – The valued landscape character is intact with only subtle, if any, deviations. The existing landscape character and sense of place is expressed at the highest possible level.
High Scenic Integrity	Appears unaltered – The valued landscape character appears intact. Deviations may be present, but are not evident because they repeat the form, line, color, texture, and pattern common to the landscape character so completely and at the appropriate scale.
Moderate Scenic Integrity	Appears slightly altered – The valued landscape character appears slightly altered. Noticeable deviations must remain visually subordinate to the landscape being viewed.
Low Scenic Integrity	Appears altered – Deviations from the valued landscape character may begin to dominate the landscape being viewed, but they should borrow valued attributes such as size, shape, edge effect and pattern of natural openings, vegetative type changes, or architectural styles that may occur elsewhere.
Very Low Scenic Integrity	Appears heavily altered – The valued landscape character appears heavily altered. Deviations may strongly dominate the valued landscape character. They may not borrow from valued attributes such as size, shape, edge effect, pattern, and scale of natural openings, vegetative type changes, or architectural styles within or outside the landscape being viewed. However, deviations should be shaped and blended with the natural terrain (landforms) so that elements such as unnatural edges, roads, landings, and structures do not dominate the composition. This is not a desirable management objective for scenery.
Unacceptably Low	Appears extremely altered – The valued landscape character being viewed appears extremely altered. Deviations are extremely dominant and borrow little if any form, line, color, texture, pattern, or scale from the landscape character. Landscapes at this level of integrity need rehabilitation. This level should only be used to inventory existing integrity or for monitoring. It must not be used as a management objective.

3.3.3 Recreation

Introduction

This section describes the recreational component of the SBKC project area that would be affected by the alternatives if they were implemented. The recreation analysis is based upon the Recreation Opportunity Spectrum (ROS) which is a tool that will help to meaningfully compare and contrast the existing condition of recreation resources with the desired condition. Two primary indicators are used to measure impacts to recreation resources: (1) whether the alternatives are consistent with ROS settings, and (2) changes to recreation activities and use patterns in the project area.

Recreation Opportunity Spectrum (ROS)

The Forest Service uses the Recreation Opportunity Spectrum (ROS) for planning and managing recreational settings by distinguishing the varying conditions and qualities in the landscape (Clark and Stankey, 1979, p. 1). The Forest Service uses the Recreation Opportunity Spectrum (ROS) as an inventory tool that results in a description and mapped record of current on-the-ground setting conditions that describes different recreation settings, opportunities and experiences that are available on a given area. A recreation opportunity setting includes features provided by nature or management. Nationally, recreation settings vary from primitive to rural and urban settings. In 2004, an ROS inventory based on a national ROS mapping protocol was conducted for application in the ANF and the 2007 LRMP. Factors that determine the ROS class for an area include: remoteness (including distance from roads and settlements), degree of naturalness (level of human modification to the landscape), social setting (number of encounters with other people within a typical day), and managerial setting (degree of visitor controls). ROS is also used to set management direction to reflect "desired" ROS conditions. ROS desired conditions are typically set for land and resource management plans with the understanding that management activities may result in a change to a current inventoried setting (USDA-FS. 2007b, pp. 3-298 & 3-299).

Forest users can participate in a wide range of experience within a variety of settings. The setting, activities, and opportunities for experiences have been arranged along a continuum or spectrum divided into six classes: Primitive, Semi-Primitive (motorized and non-motorized), Roaded Natural, Roaded Modified, Rural, and Urban (USDA-FS. 1985b). On the Allegheny National Forest, a majority of ROS classes range from semi-primitive non-motorized (where there are few or subtle modifications by humans with a large probability of isolation from human sights or sounds) to rural (where sights and sounds of humans are prevalent and the landscape has been considerably altered by human works). Table 17 identifies the existing condition for the percent of the project area that falls into MA 2.2 and 3.0. When setting indicators move from "meets" to "inconsistent" or "unacceptable", the conditions do not meet the ROS objectives.

Table 17. Existing Condition of ROS Classes

Setting Indicators	Desired Characteristics	
	MA 3.0 (Roaded Natural)	MA 2.2 (Roaded Natural)
Percent of Project Area	67% (3,216 acres)	32% (1,532 acres)
Access	Meets	Meets
Remoteness	Meets	Meets
Site Management	Meets	Meets
Visitor Management	Meets	Meets
Social Encounters	Meets	Meets
Visitor Impacts	Meets	Meets

The LRMP (USDA-FS. 2007a, p. 26) specifies that the desired future conditions of MA 2.2 and 3.0 meet the ROS class of Roaded Natural, (RN). Characteristics of RN include: a) alterations of the landscape are evident, but natural characteristics remain dominant; b) a mostly natural appearing environment as viewed from sensitive roads and trails; c) interaction between users is of moderate importance; d) there is opportunity to affiliate with other users in developed sites, but with some chance for privacy; e) self-reliance on outdoor skills is of only moderate importance; f) little probability of experiencing challenge and risk; and g) access and travel is with conventional motorized vehicles.

As indicated in Table 17, presently the project area meets the ROS classes of RN in all setting indicators of access, remoteness, site and visitor management, social encounters and visitor impacts.

Areas of Concentrated Recreation/Visitor Use

State Route (SR) 321 forms the western boundary of the project area. There are no developed recreational facilites along this stretch of SR 321 but it is not uncommon to have visitors park on the side of the road to hunt or access nearby streams for fishing. Social encounters have the potential to be high along SR 321. FR186 is the main traffic artery through the project site. There are also other restricted roads (FR463 and FR448) that are opened for hunting in the fall, and a gated road (FR463) that is open to foot travel. A sense of remoteness is attainable in much of the general forest area, along the numerous creeks, and behind many of the gated roads. There are no recreational facilities, and site development is minimal within the project area. Visitor management is light and consists mainly of gated roads and associated informational signing. Gates and signs tend to blend with the surrounding area and may be generally unnoticeable to passersby on the main roads. Social encounters are low along FR186, FR463, and FR448. Dispersed camping, hunting, and fishing along the road system is typically light. Visitor impacts exist throughout the FR448/463 area as illegal OHV activity occurs along the pipeline, creating soil compaction and vegetation disturbance.

Concern Levels - Although Concern Levels are primarily used in achieving scenery integrity levels, (SIL); they are also useful in identifying high recreation use areas. The visual concern levels of the project area vary depending on the concentration of forest visitors that have a concern for visual quality from a given area. Sensitivity or concern of the landscape is classed and mapped as High (Concern Level 1 – CL1), Moderate (Concern Level 2 – CL2), and Low (Concern Level 3 – CL3). CL1 areas are defined as

all major travel ways – including highways, roads with heavy recreational traffic, scenic roads, pedestrian trails and major waterways. SR 321 is the only CL1 travelway within the project area. CL 2 travelways include FR186, Connector Trail #17 of the Allegheny Snowmobile Loop (ASL), and the South Branch Kinzua Creek. Other roads are classified CL 3.

Developed Recreation

There are no developed recreation facilities in the SBKC project area.

Special Events or Unique Features:

There are no special events or unique features within the SBKC project area.

Trails

Hiking Trails: There are no hiking trails in the SBKC project area.

Motorized Trails: Allegheny Snowmobile Loop (ASL) Connector Trail #17 uses FR186 to connect the ASL to the borough of Kane for snowmobile riders to purchase gas, supplies, or other amenities. In most instances in this area, snow is short-lived or too scant to provide quality snowmobile trail riding. Deep snow that lasts the whole season is present, on average, only once every 8-10 years. On average, snowmobiling activities have sufficient snow for 28 days. When snow cover is present, trail use is high, especially on weekends. Most use is on the designated trail, however, some illegal use occurs off the designated trail on other Forest or oil-gas roads, transmission lines, or cross-country.

All Off-Highway Vehicle (OHV) use is restricted to designated trails throughout the ANF. The SBKC project area does not have any designated OHV trails located within its boundaries. Illegal OHV activity occurs throughout the project area particularly at the pipeline along FR448/463.

Illegal motorized vehicle use in the South Branch Kinzua Creek Area is primarily from private property surrounding the project area, although there may be occasional illegal users from outside the local area. Illegal users are generally attempting to access the legal trail system from camp or home without trailering their vehicles to a trailhead, are looking for new areas to ride, or are accessing favorite places that are not along the designated trails.

Dispersed Camping

There are a few dispersed camping sites found in the project area. Two camping sites are found along FR186 and another is found at the end of FR460. Most of the dispersed camping in the project area occurs in connection with the fall hunting season and takes place in the gravel pits.

Hunting and Fishing

Hunting in the SBKC project area is heaviest during deer season, but relatively low at other times of the year. Turkey, deer, grouse and other game are all hunted, and the opening day of rifle deer season receives the heaviest use. Many of the SBKC project area roads are restricted and only opened during the fall hunting season. Hunters park along the forest roads within the project area, and there are many other user-created

parking areas in gravel pits, near pipeline crossings, or in open areas maintained for wildlife food. There are no disabled hunter roads located within or adjacent to the SBKC project area.

Fishing opportunities are available within the project area. The Pennsylvania Fish and Boat Commission stocks South Branch Kinzua Creek with trout and there are small populations of native trout and other species in South Branch Kinzua Creek and its tributaries. In general, fishing use is heaviest during the first few weeks of spring trout season. No roads are opened specifically for fishing season.

3.3.4 Economics

Jobs and income in McKean, Warren, Forest, and Elk Counties are affected by activities on the ANF through direct employment as well as products and services that are generated from activities on the NFS lands. Timber sale receipts generated from the ANF are payable to the U.S. Treasury. Oil and gas development within the project area affects the local economy through private employment and income generation, since subsurface rights are reserved and outstanding.

The main non-priced services include recreation opportunities, such as camping, hunting, fishing, boating, hiking, and wildlife viewing. Non-local recreation users of the ANF contribute to the local economy as they pass through or stay overnight in the local communities. Timber sale receipts generated from the ANF are payable to the U.S. Treasury. In 2005, McKean County elected to receive funds from Title I and III of the Secure Rural Schools and Community Self-Determination Act of 2000 (USDA-FS 2005d). This law provides funds to counties in lieu of receiving payments for National Forest timber sales. It allows counties to receive enhanced payments and designate a percentage of those payments of forest or county projects, in addition to the traditional uses for schools and roads.

For the future, there remains uncertainty as to whether or not the Secure Rural Schools Act will be renewed or whether the level of payments will continue. No identified environmental justice areas or communities are in the region, although low-income and minority citizens live in the region.

3.3.5 Human Health and Safety

Humans use most of the forested areas covered in this analysis. Most of that use is scattered, intermittent, and of short duration. The types of human uses or activities include camping, hiking, hunting, fishing, wildlife observation, timber harvesting, reforestation activities, and oil and gas extraction activity. The following discussion summarizes, from a human health and safety standpoint, the existing condition of the areas proposed for treatment.

Portions of the project area contain dead or dying trees. Over time, those dead and dying trees would deteriorate and become vulnerable to wind stress or other natural forces that could cause them to fall. Dead, dying and falling trees are a natural part of the life cycle of the forest. ANF users should be aware of and expect an increasing level of risk associated with this natural process. Dead trees along roadways may lean toward the road opening and fall in that direction; may fall after vibration or turbulent air resulting from passing traffic; or may fall toward roadways during windstorms, depending upon the direction of the prevailing wind at the time. Once on the road surface, fallen trees can

also be a hazard to fast moving traffic. Workers or volunteers who stop to remove them are also at risk.

There are other inherent risks people would encounter when using the ANF. The dense understories of herbaceous woody plants that develop in pockets under partial canopies can also create safety hazards. The vegetation section of this document describes the condition of the understory vegetation within the treatment areas. The dense herbaceous cover in many areas conceals downed logs, rocks, holes, and other tripping and bruising risks. Blackberry bushes can scratch, tear clothing and cause an allergic reaction in some people. Dense beech saplings have small dead twigs and sharp buds that can cause eye injury.

OGM development and extraction activities are occurring within the project area. Developers range from large companies to independent operators, various subcontractors, and field workers engaged in drilling, construction, well completion, and well tending. All of the OGM developments within the project area are privately owned and operated under reserved or outstanding rights, where the government owns the surface rights only. These areas contain access roads, electric lines and oil or gas pipelines and machinery that are either buried or above ground, including pump jacks, collection tanks, and other miscellaneous equipment. People working at or traveling to these OGM sites and the associated equipment are exposed to these types of hazards and from falling dead and declining trees, or blown down trees.

CHAPTER 4: Environmental Consequences and Cumulative Effects

This chapter describes and analyzes the environmental consequences and the cumulative effects (CE) that would result from implementing the alternatives. The descriptions and analyses are based on the best available information about the resources in the affected environment. The effects are described and analyzed on the following resources:

- The physical environment, including the ecological and watershed settings; soil resources; water resources, riparian areas, and fisheries; transportation; air quality; and oil, gas, and minerals.
- The biological environment, including vegetation, wildlife, and NNIS.
- The social environment, including heritage resources, scenery, recreation, economics, and human health and safety.

CE were also analyzed for each resource under each alternative. CE have two associated scales: geographic (location) and temporal (time).

The analysis found in the ANF LRMP FEIS (USDA-FS 2007b) is incorporated in this section of the SBKC EA:

- OGM; pp. 3-3 to 3-7
- Soils; pp. 3-7 to 3-21
- Hydrology; pp. 3-22 to 3-51
- Air Quality; pp. 3-52 to 3-63
- Transportation; pp. 3-64 to 3-74
- Vegetation; pp. 3-77 to 3-179
- Wildlife and NNIS; pp. 3-179 to 3-295
- Recreation; pp. 3-296 to 3-328
- Scenery; pp. 3-370 to 3-380
- Heritage; pp. 3-380 to 3-384
- Economics; pp. 3-399 to 3-419
- Human Health and Safety; pp. 3-419 to 3-443

4.1 Physical Environment

The direct, indirect, and cumulative effects to soil quality; water resources and riparian areas; transportation; air quality; and oil, gas, and mineral resources are described in the following sections.

4.1.1 Soils

Cumulative Effects Bounds

The cumulative effects analysis area for the soils resource will be the boundary of the SBKC project area. Cumulative effects on soils are such that they are typically a result of multiple disturbances on the same site. Road work may occur on an ongoing basis immediately outside the SBKC project area, and this work would mostly be maintenance performed by one or more of the following entities: Forest Service, Pennsylvania Department of Transportation, local

townships in McKean County; or oil and gas operators. Additional roads could be decommissioned in this area as well. The aforementioned activities are not likely to affect soils within the SBKC project area.

The temporal scale used to evaluate the cumulative effects on the soils resource will be 10 years prior and 20 years into the future for the SBKC project area activities. Thus, a 30-year time frame will be analyzed. Detrimental effects from soil compaction related to a single event are not expected to persist for a period of time beyond 5 years. Given that, some effects may be analyzed at a longer time scale, such as 20 years into the future to better show the true, long-term effect on the s oils resource, for soil nutrient changes with acid deposition. Please note that erosion losses were estimated for treatments occurring over a 20 year period (see Appendix A of the Soils Specialist Report [project file]).

A search of timber sale and stand treatment records for the SBKC project area revealed that timber harvest and reforestation treatments occurred on approximately 1,600 acres during 1997 – 2006 (see Table 20). Stands may have received more than one treatment and the acreage of every treatment is included in this cumulative total. The past timber harvests shown in Table 20 for the period 1997 to 2006 were all completed by December 2002. Soil disturbance from these timber harvests would have revegetated by now and soil erosion rates would have returned to natural erosion rates for this area. Some reforestation treatments have occurred since 2002, and the effects of these treatments are included in the cumulative effects discussion for each soil resource area, where appropriate. In most instances, the effects of reforestation treatments on soil resources are negligible as demonstrated in Tables 2 and 3 of the soils specialist report (in the project file).

Soil Nutrients

Alternative 1 (no action)

Direct and Indirect Effects

Under this alternative, no merchantable wood would be removed, and no reforestation treatments would occur. Carbon sequestration would be highly variable within the SBKC project area depending upon the age classes of the vegetation within the stands. For instance, in stands where more mature trees grew, the rate of carbon sequestration would be the lowest among all alternatives, especially if regeneration was slow to develop and grew poorly. Likewise, carbon storage would be directly related to the volume of carbon stored in living trees, with the amount in storage decreasing as dead trees decayed. Decreases in carbon storage would be offset to a degree by the amount of carbon residing in the various components of the forest floor (litter and decomposing organic layers resting on the mineral soil surface) and that which is incorporated into the mineral soil. Stands characterized by younger, more vigorously growing trees would demonstrate a higher rate of carbon sequestration.

Cumulative Effects

Without future vegetation management, trees would mature, and down woody debris would accumulate over time and decay, slowly releasing more carbon into the atmosphere and the soil. Assuming that the older stands regenerated adequately, they, along with the stands comprised of relatively young and vigorously growing trees, would increase the rate of carbon sequestration. Please refer to the Vegetation Section for an analysis of factors affecting regeneration within the project area.

Although the Clean Air Act has been responsible for overall reductions of sulfur concentrations in the air, acid deposition could continue to increase the amount of nitrogen and sulfur in the soil. These increases would lead to continued leaching of calcium and magnesium through the soil profile. This leaching would be combined with the lack of limestone and dolomite in the dominant geology on the ANF, so replenishment of these nutrients would be limited. Additionally, living trees remove these nutrients from the soil and sometimes store large quantities of the nutrients in organic material depending on the species. Past and future timber harvest has and would continue to remove some of this organic material and the associated nutrients from a site. Approximately one half of all nutrients stored in trees reside in the tops, which are normally left on site in a harvest operation. The merchantable portions, which would not be salvaged in this alternative, would remain behind as well, resulting in the greatest amounts of nutrients left on site of any alternative.

Alternatives 2 and 3

Direct and Indirect Effects

Both alternatives propose nearly the same categories of silvicultural and reforestation treatments, although, Alternative 2 would treat more acres than Alternative 3 overall. Wildlife treatments would be the same for both alternatives. Both glyphosate and sulfometuron methyl herbicides would be prescribed as on the ground conditions dictate. Glyphosate binds readily to soil and becomes relatively immobile, so there is limited potential for residual effects to soil nutrients or soil biota. Sulfometuron methyl herbicide has a relatively rapid half-life in acidic soils such as those found on the ANF. Sulfometuron methyl is also strongly adsorbed to soil particles at low pH (acidic conditions) and at high organic matter contents; therefore, little soil mobility is expected. Nonetheless, it can have some residual effect on soil nutrients and is listed as being "inhibitory" for the growth and development of soil fungi and bacteria. Glyphosate and sulfometuron methyl herbicides would be prescribed as conditions dictate on the ground.

Alternatives 2 and 3 contain proposals to fertilize 96 ac., each. Recently voiced concerns over leaching losses of base cations associated with the use of nitrate-nitrogen fertilizers has led to a limitation on the use of this form of nitrogen. Since the concern over base cation loss is greatest on the plateau and shoulder landform positions, nitrogen application in units occupying these positions has been evaluated more carefully prior to prescribing fertilization. Please see p. 4 for a more complete discussion of the effect of nitrogen application on the soil resources.

When compared to Alternative 3, Alternative 2 proposes to create a greater acreage of new, young stands, which can have a more rapid rate of carbon sequestration. Also, under Alternative 2, which would harvest the greater volume of timber, more carbon would remain "stored" in a wood product for a longer period of time. Down woody debris would continue to accrue under both alternatives, with Alternative 3 providing the greater amount of this resource into the future.

Cumulative Effects

Carbon sequestration may help to lower the carbon dioxide levels in the atmosphere thereby reducing the effects of global climate change. Alternative 2 sequesters a greater amount of carbon in wood products and provides for the most new, young forest, which can sequester carbon at a more rapid rate.

When base cations are lost through ongoing leaching without being replaced from other sources, the resulting situation could lead to soil health and forest health concerns. Alternatives 2 and 3

propose to fertilize 96 acres, each. Soil acidification associated with fertilization has the potential to accelerate the leaching of base cations from the soil profile especially on units located on plateau, shoulder, and backslope positions. The larger amount of wood fiber removed in Alternative 2 would probably not lead to a significant reduction of base cations when compared to Alternative 3, because approximately one half of the nutrients reside in a tree's upper portions and branches, both of which would be left behind in any salvage or other harvest operation (Johnson et. al., 1997).

Numerous parcels of privately owned land lie within or adjacent to the cumulative effects area for the project. Carbon sequestration on private land would be affected similarly by the processes discussed in the previous paragraphs, and presumably would have no relationship with carbon sequestration on land within the South Branch of Kinzua Creek Project's cumulative effects area. Conceivably, where private land lies upstream or upslope from SBKC project area stands, nutrients lost from private land could migrate to the SBKC project area, where they would be incorporated into the biota or leached from the system as discussed in the soil nutrients section in Chapter 3.

Although the Clean Air Act has been responsible for overall reductions of sulfur concentrations in the air, acid deposition could continue to increase the amount of nitrogen and sulfur in the soil. These increases would lead to continued leaching of calcium and magnesium through the soil profile. This leaching would be combined with the lack of limestone and dolomite in the dominant geology on the ANF, so replenishment of these nutrients would be limited. Additionally, living trees remove these nutrients from the soil and sometimes store large quantities of the nutrients in organic material depending on the species. Past and future timber harvest has and would continue to remove some of this organic material and the associated nutrients from a site. Approximately one half of all nutrients stored in trees reside in the tops, which are normally left on site in a harvest operation.

Surface Erosion

Alternative 1 (no action)

Direct and Indirect Effects

In Alternative 1, mitigation measures prescribed for any previously approved projects will keep erosion and sedimentation to a minimum. No timber management or salvage activities are proposed as part of the SBKC project.

Cumulative Effects

The minimal erosion from previous activities could combine with erosion from roads, trails, OGM developments, and unrelated activities on private land that may not receive the degree of mitigation as those occurring on the ANF. Conceivably, soil erosion could be similar or even greater than that occurring under the action alternatives, because road maintenance would not be done in Alternative 1.

Alternatives 2 and 3

Direct and Indirect Effects

Soil disturbance and exposure to erosion associated with vegetation and wildlife management activities proposed in Alternatives 2 and 3 would cause moderate to low amounts of erosion.

The erosion prediction model (Disturbed Water Erosion Prediction Project) does not take into account mitigation measures implemented prior to, during, and after vegetation management activities have concluded, that would reduce or possibly eliminate potential erosion. Given the reduction in erosion, which can be assumed to occur with mitigation measures, the difference in erosion potential between each of the action alternatives and Alternative 1 would be much less than modeled and likely be minimal. Included in this project is a proposal to maintain and manage wildlife openings, which would require agricultural practices, i.e., discing to prepare the soil for seeding and to control competing on site vegetation, the seeding of an appropriate plant mix for wildlife, and the application of lime and fertilizer. Discing would remove most of the existing cover prior to seed bed preparation and seeding, increasing the potential for soil erosion to occur. On relatively bare sites like this, the degree of erosion would be a function of percent surface cover, percent slope, length of slope, soil texture and rainfall. Consequently, erosion losses have the potential to be higher than those associated with other types of treatment. However, soil erosion losses would be lessened by the quick establishment of the seeding mixture, and greatly influenced by the amount and timing of rainfall occurring during the establishment phase.

Site preparation, tree shelter installation, tree and shrub planting, and release activities employed as part of the reforestation and wildlife components of this project would have minimal effects on the soil resource because, for the most part, these activities are carried out by work crews using hand held equipment. Any plant material cut in the course of these activities, as well as that already lying on the ground, would be left in place on the site, adding to and maintaining a layer of cover to protect against soil erosion. Area fencing, which relies on motorized vehicles for the initial construction and future maintenance of the fence, would require an approximately 10 foot wide access trail around the perimeter of the fence. Woody debris and vegetative cover growing on the trail would suppress soil erosion from these sites. Additionally, if soil erosion was noted during fence inspection and maintenance visits, water bars or other erosion control methods would be employed to alleviate the problem.

Alternatives 2 and 3 both propose 14.4 miles of road maintenance, and 2.8 and 2.2 miles of road construction, respectively, and both alternatives propose 0.7 mile of limestone resurfacing (please refer to Table 18). If implemented, these actions would help minimize the effects of erosion and sediment deposition associated with the future operation of the treated roads. Short term erosion and sedimentation occurring during and immediately after the maintenance activities would be minimized through the standard engineering mitigation measures associated with this activity. Also, under Alternatives 2 and 3, three pits and would be expanded by a total of 6 acres. Pit expansion would conform to the standard mitigation measures for such activity.

Table 18. Road Work Proposed in the South Branch Kinzua Creek Project for Each Alternative.

Proposed Activities	Alt. 1	Alt. 2	Alt. 3
Transportation Activities	**Units in miles**		
Road Construction – New Corridor	0	0.1	0
Road Construction – Existing Corridor	0	2.7	2.2
Road Maintenance	0	14.4	14.4
Decommissioning Roads	0	2.1	2.1
Limestone Surfacing	0	0.7	0.7
Pit expansion (number/acres)	0	3/6	3/6
New Pit Development (number/acres)	0	1/3	1/3

Cumulative Effects

Past timber harvests and associated reforestation treatments have occurred on approximately 1,600 acres during 1997 – 2006 (see Table 20). Stands may have received more than one treatment and the acreage of every treatment is included in this cumulative total. These past timber harvests were all completed by December 2002. Soil disturbance from these timber harvests would have revegetated by now and soil erosion rates would have returned to natural erosion rates for this area. Some associated reforestation treatments have occurred since 2002; however, the effects of these reforestation treatments on soil erosion rates are negligible due to implementation of standards and guidelines, mitigation measures, and design features.

Private land lies within the SBKC project area and abuts it at several locations. Timber harvest and salvage activities on these private holdings, could employ mitigation measures differing greatly in their efficiency at preventing or reducing erosion. Approximately 26 acres of privately owned land lie in the southwest corner of the cumulative effects area, and the majority of these acres are forested. It is conceivable all 26 acres could receive either an intermediate cut or a final harvest or a combination of the two over the next 10 or 20 years. Obviously, where mitigation measures are ineffective, cumulative erosion losses could be greater.

Road construction and use on both National Forest System land and lands held under other jurisdictions, including activity by oil and gas lessees, can cause high rates of erosion and sedimentation. Standards and guidelines used by the Forest Service and Best Management Practices (BMPs) created by the Pennsylvania Department of Environmental Protection help to minimize the erosion created by road construction and maintenance and the volume and type of traffic these roads support.

Currently, approximately 25 wells are located within the CE area (1 well per 190 acres). At the current rate of development, it is anticipated that an additional 96 wells could be drilled over the next 20 years across the cumulative effects area. Future development at

this scale would result in an estimated 124 acres of non-forest habitat and an additional eight acres of pit expansion to provide the stone for the developments.

Soil Compaction

Alternative 1 (no action)

Direct and Indirect Effects

Previously approved activities and previously accomplished vegetation management, wildlife management, and recreation activities may have caused detrimental soil compaction. Soil quality monitoring has not shown any major violations of the USDA, Forest Service's Region 9 soil quality monitoring guidelines. As expected, Alternative 1 would create the least soil compaction of the three alternatives.

Cumulative Effects

Past and potential future activities within the SBKC project cumulative effects area could cause soil disturbance, but recent soil quality monitoring indicates that the potential for this is low. If expansion of oil and gas activities such as road building and well pad construction occur, this activity could create areas of long-term detrimental soil compaction unless rigorous construction and mitigation standards are applied. Soil compaction created by roads (forest roads, municipal roads, and lessee roads) and any other administrative facility (buildings, parking lots, designated trails, etc.) is not included in the ANF LRMP standards for detrimental soil disturbance.

Alternatives 2 and 3

Direct and Indirect Effects

The largest acreages of vegetation treatment, and therefore the highest potential for detrimental compaction, are proposed under Alternatives 2 and 3, respectively. Recent monitoring results indicate that potential compaction and other physical and detrimental soil disturbances under either alternative would not exceed 15 percent of any stand. Existing mitigation measures and guidelines would limit the amount and extent of detrimental disturbance from vegetation management activities (USDA-FS, 2005b).

New road construction would result in new areas of highly compacted soils. Adhering to the appropriate mitigation measures and guidelines for the construction and maintenance of these features would ensure that the affected surface area would be no larger than necessary to construct these features to the appropriate design standard.

Road reconstruction, maintenance, and limestone resurfacing activities could conceivably result in some compaction, but it would occur on already highly compacted and preexisting road surfaces. Over the long term, road maintenance would prove beneficial at reducing soil erosion as explained in the Surface Erosion section of this document. Removal of stone from the proposed new and expanded pits would remove soil and unconsolidated stone down to bedrock, but the greatest area of soil affected by this activity would be limited to the area directly overlaying the stone to be removed. Once the usable stone was depleted, the site would be recontoured with the previously stockpiled soil and revegetated.

Herbicide, fertilization, and fencing treatments using heavy equipment have the potential for greater soil compaction, but even these treatments, when applied with the standard mitigations, would most likely cause a minimal adverse impact to the soil resources. Herbicide is applied by a sprayer in swaths 50 to 60 feet wide, and granular fertilizer is applied similarly in swaths which are up to 100 feet wide, minimizing the number of passes a machine would make for each type of application, with a concurrent reduction in the potential for soil compaction. Fence building and maintenance activities have a potential for compaction and erosion in a roughly 10 foot wide zone along the perimeter of the fence used as a travel way to access the fence with mechanized equipment. However, the effects of these factors are minimal, because the travel way is often vegetated or covered with slash and larger pieces of debris, which acts as a cover to minimize rainsplash erosion and possibly soil compaction. Soil compaction is further minimized by keeping the use of mechanized equipment to a minimum through the use of hand tools or portable gas powered augers, which are commonly employed for planting jobs. Tree shelter installation would cause minimal soil compaction due to the localized nature of this task.

Please refer to Table 8 to note the differences in the acreages proposed for each type of treatment under the action alternatives. Overall, the greatest potential soil compaction is possible under Alternative 2.

Cumulative Effects

Soil quality monitoring from 1990 to 2000 determined that 10 stands out of 27 monitored exceeded the Forest Plan standard (USDA-FS, 2002). Soil quality monitoring examined the effects of vegetation management on seven categories of detrimental soil disturbance, where the most applicable categories to the ANF are compaction (measured as a 15 percent increase in bulk density), rutting, puddling, displacement, and accelerated erosion. Results of the monitoring led to the creation and implementation of interim soil guidelines (USDA-FS, 2001) to help limit the categories of detrimental soil disturbance to less than 15 percent of a stand's area.

Monitoring from 2002 to early 2005 included 63 stands with 642 transects where data were recorded. There were 36 stands with less than 5 percent detrimental disturbance, an additional 14 stands with less than 10 percent disturbance, an additional 8 stands with less than 15 percent disturbance, and only 5 stands that exceeded the 15 percent area standard (USDA-FS, 2005a; USDA-FS, 2005b).

Exceeding the 15 percent standard for these 5 stands during the 2002-2005 period, highlighted the need to address soil moisture at the time of harvest (at least 4 of the 5 stands were harvested during months where precipitation was higher than the monthly average). Assessment of soil moisture prior to and periodically throughout the harvest can help to ensure that soil moisture in not at a level where soils are susceptible to compaction. Previously, the ANF relied on soil drainage group data determined during project planning to set the time of year for both the type of activity and equipment allowed. It was decided that these stands would not receive any specialized treatment, i.e., scarification, deep tillage, etc., to reduce the degree of compaction in order to avoid any detrimental effects associated with the treatments.

A possible explanation for the 5 stands exceeding the 15 percent standard, may relate to heavy rainfall causing wet soil conditions during the 2004 operating season. Wet soil conditions make even Groups 1 and 2 soils susceptible to compaction, since all soils are characterized by a moisture content at which compaction is optimum for a specific soil texture. Soil disturbance on all soils, especially Groups 1 and 2 soils, can be dealt with through cooperation between operators/contractors and resource administrators while mechanized activities are underway.

The results of the 2004 soil quality monitoring highlight a need to more closely monitor site conditions during harvest activities on all soil drainage classes to ensure that detrimental soil disturbance, namely detrimental compaction, stays below 15 percent. Nonetheless, the results do indicate that successive vegetation management activities can be done without causing detrimental soil disturbance in excess of the ANF LRMP standard. Consequently, the risk of cumulative compaction in the SBKC project area is low with the recommended timber harvest monitoring to ensure continued compliance with these standards. Remediation efforts may be employed if a stand displays soil compaction in excess of the standard. This is especially true in stands receiving a second entry treatment, which could increase the chance for compaction to occur.

It is reasonable to foresee that oil and gas development across the analysis area would continue, resulting in additional areas with long-term compaction due to road and well pad construction. Commercial, as well as residential, developments and private timber management activities adjacent to the SBKC project area analysis area are likely to occur within the next ten years. These activities, and any associated road building and maintenance, could add to the extent of the compacted soils.

Wetlands

Alternative 1 (no action)

Direct and Indirect Effects

No activities are proposed in this alternative, and there are no previously approved activities within 100 feet of a nationally inventoried wetland (NWI). Therefore, there are no direct or indirect effects to wetlands with this alternative.

Cumulative Effects

Please refer to the cumulative effects section for Alternatives 2 and 3, which is equally applicable to Alternative 1.

Alternatives 2 and 3

Direct and Indirect Effects

A wetland inventory map for the SBKC project area indicates that four proposed stands partially overlay or abut inventoried wetlands. The three stands that partially overlay wetlands, along with their proposed treatment in parentheses, are: the northwestern corners of stands 814001 (non- commercial thin) and 814018 (reforestation) and the northern tip of stand 812007 (reforestation/planting conifer). Stand 813035 (reforestation/planting conifer) abuts a wetland. All remaining stands proposed for treatment are at least 200 feet from inventoried wetlands. Implementation of these

proposed treatments is expected to have little or no effect on the soil and hydrologic resources of the area; consequently, potential effects on these wetlands are virtually zero.

Cumulative Effects

The only area of privately owned wetland within or immediately adjacent to the SBKC project cumulative effects area occurs on private land (accessed by traveling north of Kane on State Route 321), which is located to the west of stand 814001 in Warrant 262, Wetmore Township., McKean County. Recent aerial photography indicates that no development exists on these wetlands. Any future development and associated land use activities could have negative effects on the hydrologic and ecological functioning of a wetland.

When considering wetlands occurring on NFS lands, the ANF LRMP stipulates that wetland protection is a priority and encroachment is only to be considered if there are no alternatives. Therefore, it can be assumed that reasonably foreseeable future Forest Service activities will not reduce wetland acres. Also, it is assumed that the quality of these wetlands will be retained through proper resource planning and avoidance of the wetlands when implementing stand treatments.

Other Disclosures

Monitoring

The action alternatives (2 and 3) would require soil quality monitoring in a sample of treated stands following Forest protocols. Pre-harvest and post-harvest monitoring for soil quality indicators would be carried out in accordance with current regional direction (USDA-FS, 2005a). Also, other ground disturbing activities would be monitored following regional direction (USDA-FS, 2005a). All monitoring data would be used to assess the need for adaptation of activities, to assess the effectiveness of soil conservation practices, and to assess the need for corrective action where detrimental soil disturbances exceeded standards.

4.1.2 Water Resources and Riparian Areas

Cumulative watershed effects (CWE) will be analyzed at the outlet of the South Branch Kinzua Creek 6th field subwatershed. Beyond the subwatershed it is assumed that the cumulative effects of the proposed activities would be masked, or diluted, to the point that ties with potential site disturbance would not be apparent or measurable. The time frame for cumulative watershed effects, unless otherwise specified for a given activity or effect of activities, begins ten years prior in 1997, extends through the proposed implementation of the SBKC project and ends ten years after the last proposed activity in 2026. This timeframe for CWE analysis is intended to include any previous effects of management and natural activities cumulatively with current, proposed and reasonably foreseeable future activities.

Environmental Consequences will be summarized based on the effects discussion. Finally, consistency of alternatives with Commonwealth and Forest Plan standards is presented at the end of this section, along with monitoring recommendations.

Summary of Effects

- Forest Plan standards and guidelines provide direction that will minimize and prevent direct and indirect effects to streams and wetlands. Overall, activities will be limited or avoided around streams and wetlands. Riparian corridors and wetland management zones are designed to provide adequate filtering of sediment, fertilizer and herbicide, protect water temperature and allow for the recruitment of LWD into stream channels and wetlands (USDA-FS 2007b).
    - Implementation of shelterwood removals in Alternatives 2 and 3 would create additional regenerating forest habitat (1 to 10-year age class) on 7 percent to 6 percent (respectively) of the 4,788 acre SBKC project area by the year 2016. There are 103 acres or 2 percent of the project slated for reforestation-only treatments. Similar to Alternative 1, these stands of early successional hardwood forest would progress toward young pole-size hardwood habitat with a more diversified and desirable mix of tree species. Affecting 7 percent of the SBKC project area, the 50 acres of UEAM prep cut, 243 acre of RUMFC/Group selection, and 58 acres of Group selection acres of selection harvest proposed would have minimal affects to streamflow in terms of overstory canopy, as there will be a slight reduction in the present canopy closure to provide growing space. However, the watershed will benefit from improved stand structure with a variety of more desirable trees and woody shrubs in these areas.
    - Under Alternatives 2 and 3, herbicide applications are proposed on 896 and 834 acres or 19 percent and 18 percent of the project respectively. However, the long-term effect of herbicide treatments (in conjunction with other activities) would be an increase in vertical and horizontal diversity, vegetative age classes, and wildlife habitat use in the project.
    - Fertilization proposed under Alternatives 2 and 3 totals 96 acres, respectively, or up to 2 percent of the project area. Not all treatments prescribed for fertilization will be accomplished at one time.
- The SBKC project will contribute just over 1 percent to the increase in forest in the 0-10 age class in the SBKC subwatershed. This will not cause increases in streamflow or changes to the channel characteristics.
- Some UEAM may occur within riparian corridors in the SBKC project area, including non-commercial thins, reforestation/under-plantings, and RUMFC. The 2007 Plan objective states: “Apply site-specific prescriptions to restore compositional and/or structural diversity of riparian corridors on 50 to 100 acres annually during the plan period”. The proposed non-commercial treatments would meet the intent of this objective. The non-commercial treatments are proposed to promote tree growth, restore forest cover, and promote future large wood delivery, which would benefit riparian dependant resources. None of these treatments are expected to have an adverse effect to the stream and riparian corridor as Forest Plan Standards and Guidelines will be followed to protect riparian resources and water quality.
- The silvicultural treatments within 200 feet of South Branch Kinzua Creek are not expected to have an adverse effect to the stream and riparian corridor. None of

these treatments will include any heavy equipment operation within 200 feet of the stream; therefore there will be no effect to the stream-bank stability. Stream water temperature will be maintained as management to overstory trees will be negligible and a vegetative buffer will be maintained. Under-planting or reforestation of trees will maintain water temperature over the long term as trees grow into the overstory.

- Alternative 2 proposes 0.1 mile of new road construction. Although 600 feet of this road will be within 300 feet of a stream due to a single stream crossing, this road will cause minimal water resource impacts because Forest Plan Standards and Guidelines will be followed. No new road construction is proposed under Alternative 1 or Alternative 3.
- Where road corridors are upgraded to Forest Service standards, it is likely that the length of road hydrologically connected to streams and the amount of erosion and sedimentation will be decreased.
    - Alternative 1 does not propose to add any existing road corridor to the Forest Service road system.
    - Alternatives 2 and 3 will have similar effects because both alternatives upgrade existing road corridors to Forest Service standards. Alternative 2 proposes to upgrade 2.7 miles of road corridor and Alternative 3 proposes to upgrade 2.4 miles, so there is potential for more improvements in road condition in Alternative 2.
- Road maintenance and road decommissioning will improve water quality and streamflow regime by decreasing the length of road hydrologically connected to the streams. Limestone surfacing will be placed on roads within 300 feet of streams to minimize the movement of sediment into streams from hauling on roads and erosion of pit run surfacing.
    - Alternative 1 will have no beneficial effect on the project area.
    - Alternative 2 and 3 will have similar effects because both propose to decommission 2.1 miles of road and apply limestone on 0.7 miles. Alternative 2 proposes slightly more road maintenance than Alternative 3, so there is potential for more improvements in road condition.
- Many of the road segments that are proposed for improvements or decommissioning currently pose a high risk of negatively impacting streamflows due to their close proximity to stream courses. Alternative 2 and 3 would result in an overall reduction in the road networks hydrologic connectivity and thus benefit the subwatershed's streamflow regime and water quality.
- In Alternatives 2 and 3, three pipeline rights-of-way access points from road would be blocked off to prevent illegal ATV use from causing damage to riparian areas.
- In Alternatives 2 and 3, 300 feet of streambank along Hubert Run will be planted with low growing shrubs or bushes to stabilize the streambank and provide shading.

Cumulative Effects

The same cumulative effects boundary was used for water resources as wildlife. Therefore, the wildlife section can be referenced for more detail on activities and assumptions used within the South Branch Kinzua Creek subwatershed.

Based on the implementation of timber harvest activities in either Alternatives 2 or 3 in combination with approved and future Forest Service and private activities, cumulative effects to water quality and water quantity within the MMPA are expected to be minimal. LRMP standards and guidelines are designed to minimize effects to water resources (USDA-FS 2007b) and meet or exceed Pennsylvania BMPs.

Based on GIS data and district records, timber harvest approved or completed in the CE analysis area include 684 acres of final harvest (overstory removals, shelterwood removals, and two-aged removals) and a minimum of 723 acres of intermediate harvests (thinning, salvage, single-tree selection, shelterwood, and group selection) associated with past projects from 1997 to 2006 on federal land. These include portions of projects such as the East Side EIS and Trails End Re-Entry EA. In addition to these projects the North End project is scheduled to begin within the next three years within the CE area and timber harvests are proposed for this project this decade. However, the potential cumulative effect on streamflow is limited.

Table 19 summarizes the cumulative effects of the silvicultural activities on the CE analysis area as whole. This table displays the age class distribution and acres of non-forest and forested land expected to be found at the end of the analysis period (2026) under each alternative.

Table 19. Cumulative Distribution of Habitat for the 24,969-acre Cumulative Effects Analysis Area 2006-2026

Habitat Condition	2006 Present Condition	2026 Alternative 1 No Action	2026 Alternative 2	2026 Alternative 3
Permanent Opening (percent of the CE analysis area)	10%	13%[1]	13%[1]	13%[1]
Seedling/sapling Habitat (1-20 years)	5%	18%[2]	19%	19%
Mature Forest Habitat – 51+ years (percent of the CE analysis area)	78%	71%	69%	69%

1. Percentages reflect cumulative totals of potential OGM development including wells, roads, and gravel pit expansion for new lease roads. Within the last four years, these numbers have not been realized. These openings, due to their size, are often inclusions in forest stands. Increases in opening habitat from pit expansion associated with proposed road activities in Alternatives 2 and 3 amounts to less than 1/10 of a percent.
2. Percentage reflects cumulative totals of previously approved and anticipated final harvests outside the SBKC but within the CE analysis area including projected final harvests on private land.

Increases in streamflow are expected when more than 25 percent of the Basal Area is converted from forest land greater than 10 years old to seedlings from 0 to 10 years old. As shown in Table 19, forest in age class 0 to 20 will increase from 5 percent in 2006 to 19 percent in Alternatives 2 and 3 in 2026. Since streamflow increases dissipate after 3 to 10 years, reduction in basal area is not expected to exceed 9.5 percent over any 10 year period. The SBKC project will contribute just over 1 percent to the increase in forest in the 0-20 age class. An additional 3 percent of the forested watershed will be converted to openings in the next 20 years within this subwatershed. Since vegetation management activities or other opening creations will not reduce basal area more than 12.5 percent in any 10 year period, there should be no measurable cumulative effects on the subwatershed's streamflow regime resulting from the proposed Forest Service activities. Future projects that were not considered in this analysis will likely be implemented after the effects of the previously approved reductions have faded.

Almost eight percent of the openings shown in Table 19 are located on private land. Based on estimates from GIS data and aerial photographs, the eight parcels/sections of private land are a mosaic of 5,972 acres of mature forest, 240 acres of early successional or scrub/pole forest and 1,973 acres of opening habitat including active agricultural land, roads, utility corridors, old fields, and openings containing small businesses, camps, and permanent residences. A portion of the town of Kane, PA (264 acres) also comprises opening habitat. When these large openings were converted from forest cover, there may have been some increase in streamflow within this watershed. Most likely, this effect would have been observable only on smaller watersheds and currently streams have adjusted to this change in streamflow and are stable.

Implementation of either action alternative would reduce the hydrologic connectivity of the road network through road maintenance and improvements to existing road corridors. This would result in a cumulative beneficial streamflow and water quality effect on the South Branch Kinzua Creek subwatershed. Additionally, both alternatives propose decommissioning approximately 2.1 miles of idle road segments. This would reduce the impervious area in the SBKC project area, reduce the effects on the streamflow regime, reduce elevated peak flows, and change the timing of peak flows.

New Forest Service road construction or reconstruction is currently planned or approved for the CE area during the next 10 years. The East Side EIS approved approximately 2.9 miles of new road construction, 3.4 miles of road reconstruction, and 0.87 miles of road decommission within the CE area. The North End RAP identified approximately up to 4.4 miles of new road construction that could occur in the CE area for potential resource management. Other future road activities are unknown at this time. The bulk of this construction will be greater than 300 feet from any stream and the guidelines and BMPs would be followed to limit sediment during and after reconstruction. These activities will be planned to avoid negative effects to water resources or improve existing problems.

The level of OGM development in the CE area is considered to be low to moderate with 392 wells throughout SB Kinzua Creek subwatershed. Based on Forest-wide trends and the present well density and disturibution, OGM development may impact approximately 648 acres (wells, pits, and roads) or up to three percent of the CE area over the next 20 years. This development may result in impacts to water quality with additional road and well pad construction. Pennsylvania BMP's set guidelines for road and well pad

construction for OGM developers to control erosion and sedimentation. In addition to the BMPs, oil and gas operators will be expected to meet the design criteria of the LRMP on their developments, unless it prevents reasonable access (USDA-FS 2007b, pp. 50). As soil and water problems are identified, the Forest Service would work with OGM operators and PA DEP to control erosion from roads and protect water quality. Soil and water problems on non-system roads are expected to diminish where these roads are added to the Forest Service road system.

Private timber activities in the subwatershed are expected within the next ten years and may add to current negative impacts on water quality where new roads are constructed near stream channels and streamside areas are harvested. Adherence of Commonwealth Best Management Practices for road construction and timber harvesting will minimize effects to water resources.

Consistency with Commonwealth and Forest Plan Standards

The Commonwealth's antidegradation policy requires that at a minimum, existing water uses and level of water quality necessary to protect the existing uses shall be maintained and protected. Streams within the SB Kinzua Creek analysis area are not listed as "water quality limited" by the Pennsylvania DEP as of the latest 303(d) (Commonwealth of Pennsylvania 2006) listing of stream channels impaired from meeting Commonwealth water quality standards. The stream channels identified in this analysis are currently in a state of stable (dynamic) equilibrium, but may not fully support the designated protected use of "aquatic life." The 2007 Forest Plan (USDA-FS 2007a, p. 11) desired condition states that "mature and dead trees in riparian areas are distributed to provide a sustainable supply of large wood to streams (75 to 380 pieces per stream mile)". This is not being met in many of the streams, and each of the action alternatives would help meet this desired condition through non-commercial treatments in riparian areas.

Each of the proposed action alternatives would reduce the negative impacts to aquatic life, currently occurring in the subwatershed, by moderating the streamflow and sediment regimes. Therefore, any of the action alternatives would meet the intent of the antidegradation policy, and Commonwealth and Forest Plan water quality standards and guidelines.

Any Other Disclosures

Monitoring

It is recommended that monitoring occur on at least 10 percent of the streams within 200 feet of harvest units for the purpose of validating the effectiveness of proposed streamside buffers as filter strips to protect water quality and the streamflow regime.

4.1.3 Transportation

This section discusses potential direct and indirect effects of the alternatives on the transportation system within the SBKC project area and the North End RAP area. The analysis includes an assessment of the direct and indirect effects on the transportation system within the SBKC project area, as well as potential cumulative effects on past, present, and future foreseeable activities on the transportation system within the North End RAP area.

Road Density

Direct and Indirect Effects

Road densities (Forest System roads) within the SBKC project area would range from 1.9 miles/square mile in Alternative 1 to 2.2 miles per square mile in Alternative 2 and 2.1 miles per square mile in Alternative 3. The calculated road densities for Alternatives 2 and 3 include the proposed decommissioning or FR463B.

Road Management

Direct and Indirect Effects

There would be not road management changes under Alternative 1. Alternatives 2 and 3 propose changing FR448, FR448A, FR460 and FR461 from open to restricted. The percentages for open, restricted, and closed roads in the SBKC project area are cited in Chapter 2.4 (Comparison of Alternatives – Narrative Summary) by alternative. Under the ANF LRMP, the percentage of open/closed/restricted roads is projected to be roughly 33 percent in each category (USDA-FS 2007b, p.3-73). ANF current road travel management is 36 percent open, 30 percent restricted, and 34 percent closed (USDA-FS 2007b, p.3-69). In Alternatives 2 and 3, the overall percentage of open roads decreases while the percentage of restricted and closed roads increases. Overall, the amount of proposed road construction (new or existing corridor) would minimally change the amount of open, restricted, and closed roads within the SBKC project area.

Alternatives 2 and 3 propose installing new gates along FR186A, FR448C, FR448E, FR460 and FR461 to implement the proposed road management classifications as shown in Table 6.

Unroaded Areas (greater than 500 acres)

Direct and Indirect Effects

Alternatives 2 and 3 would increase the size of the South Branch Kinzua West Unroaded Area #44, as identified in the Forest-Wide Roads Analysis report. This is due to the proposed decommissioning of FR463B. The size of the South Branch Kinzua East Unroaded Area # 63 would not change since road construction (new corridor) or road decommissioning is not being proposed in this unroaded area.

Cumulative Effects

The CE analysis area for the transportation resources is the North End Roads Analysis Process (RAP) area, which includes the SBKC project area, potential haul routes, and transportation proposals. This area is bounded on the north by FR122 and FR150, the south by US Route 6, the west by State Route (SR) 321 and on the east by US Route 219 and US Route 6. The time period for cumulative effects would be 10 years into the past and 20 years into the future, which provides an overall view of the incremental impacts of transportation management, vegetation management and oil and gas management activities in combination with project proposals and foreseeable future activities.

The current Forest Service system road density within the North End RAP area is approximately 2.3 miles per square mile (USDA-F 2006, p.15). The North End RAP projected up to 4.4 miles of road construction within the CE analysis area. This would

result in a Forest Service system road density of approximately 2.4 miles per square mile within the CE analysis area if all of this potential road construction occurred. The North End and Upper Kinzua projects are being developed and included portions of the CE analysis area. Potential road construction has not been identified for these projects yet.

The Forest Service road system in the North End RAP area currently has 52 percent of the forest system roads classified as Open, 34 percent as Restricted, and 14 percent as Closed. The action alternatives reduce the percentage of open roads and increase the percentages of restricted and closed roads within the SBKC project area. Potential road management changes for North End or Upper Kinzua projects have not been identified yet. Therefore; foreseeable future road management changes within the CE analysis area are unknown at this time.

Alternatives 1, 2 and 3 would not change the size of the South Branch Kinzua East Unroaded Area #63 in the SBKC project area. Under Alternatives 2 and 3, South Branch Kinzua West Unroaded Area #44 would increase in size due to the decommissioning of FR463B. Future changes in the size of the unroaded areas could result from OGM development or by constructing new roads identified in the North End RAP. One known foreseeable future action, the proposed extension of FR460 to provide access to private mineral rights, would decrease the size of the South Branch Kinzua East Unroaded Area #63. Other future road construction that may affect unroaded areas is unknown and can not be mapped.

4.1.4 Air Quality

Under Alternative 1, there would be no anticipated change to air quality of the region and it would remain in the condition presented in Section 3.1.4 Air Quality. Under Alternatives 2 and 3, the localized project sites would experience direct and indirect short-term minor impacts on ambient air quality from exhaust emissions, dispersion of fugitive dust and pesticide spray draft. Emissions from mechanical equipment (including trucks, skidders, and chain saws) entering, working in and exiting project sites would contribute to these impacts. Emissions from such equipment would include nitrogen oxides (NO_x), volatile organic compounds (VOC), carbon monoxide (CO), and sulfur dioxide (SO_2) from the exhaust of internal-combustion engines. Potential emissions of fugitive dust (Particulate $Matter_{10}$ (PM) and $PM_{2.5}$ emissions) involve: (1) emissions when land is disturbed by proposed activities, and (2) tailpipe emissions from vehicles. During the proposed operations, fugitive dust might be generated when soil is disturbed during clearing, grading, trenching, backfilling, and movement of vehicles. Fugitive dust would also be generated by minor wind erosion of the disturbed areas. Pesticide (glyphosate and/or sulfometuron methyl) application at the ground level (versus aerial spray) by foliar spray would cause a minimal amount of spray drift on site when applied according to label directions for the herbicide products.

All of these impacts would be negligible under all alternatives because the proposed activities would be restricted to short periods of time and would diminish after operations end. Air quality permits would not be required for proposed activities and any impacts associated with the proposed activities would not cause a change in current attainment of NAAQS. Localized air quality would not be adverse to personnel involved in application of pesticides nor to people off-site (USDA-FS 2007d).

Cumulative Effects

Because air pollution is regional in nature and has the potential to disperse beyond the project boundaries, emissions from mechanical equipment and pesticide must be evaluated in the context of regional pollution loads and current air quality monitoring data. In the vicinity of the SBKC project area, these air quality control regions are identified as individual counties. For this reason, the scope of the air quality analysis will include McKean County, the air quality control region where the SBKC project is located. The time period for cumulative effects would be 10 years into the past and 20 years into the future.

Proposed activities, timber harvesting and road construction, in the SBKC project area are the same type of activities that have occurred within McKean County within the past 10 years. Since the areas has remained as an attainment area over that time period and longer, the cumulative sum of all temporary, localized impacts would not affect the region's current attainment of NAAQS. Additionally, cumulative impacts with other regional activities, including oil, gas and coal fired plants in the region, would not affect or change the region's current attainment of NAAQS.

4.1.5 Oil, Gas, and Minerals

Coordination of vegetation and OGM development on the ANNF has been effectively demonstrated over the past decades. Direct and indirect effects are described below. An effect that is common to all alternatives includes the use of stone and gravel for road construction and maintenance. This material would be obtained from existing pits or developing new pits on the ANF. Use of such stone and gravel would result in an irretrievable loss of this salable (common variety) mineral resource.

Alternative 1: No Action

Direct and Indirect Effects

There would be no additional effects to oil, gas, and mineral resources.

Alternatives 2 and 3

Direct and Indirect Effects

Direct and indirect effects would be small, short-term, and local. Minor, indirect impacts on OGM operations could result from increased traffic on the forest roads during the period that proposed activities would occur. ANF LRMP standards and guidelines require the protection of pipelines, power lines, and wells during proposed activities, which would minimize impacts on the OGM infrastructure. Additionally, any logging debris resulting from the proposed activities would be removed from any OGM site or development.

The proposed activities would directly impact mineral resources in the project area. Stone and gravel for proposed road construction and maintenance would be obtained from existing and/or new stone pits within the SBKC project area. An estimated three to four acres of pit expansion and/or development are needed for the activities proposed in Alternatives 2 and 3. Under both action alternatives, approximately 16 acres of stone pits would be reclaimed following depletion and/or use. The portion of FR186 north pit in MA 2.2 would be reclaimed with implementation of either action alternative.

Cumulative Effects

The CE analysis area for OGM resources, including stone pits, is the SBKC project area. The CE area was chosen because the land within the project boundary shares common vegetation types, wildlife habitats, drainage patterns, climate, geology, disturbance regimes, access, and past historic uses as well as future impacts. The time period that will be considered for cumulative effects will be ten years prior to this project (1997) and twenty years into the future (2026). This time period provides an overall view of the incremental impact of vegetation management and oil and gas management activities in combination with current project proposals. Predicting the level of future activities is difficult; however, federal activities will continue to be subject to the NEPA process.

Within the past ten years, OGM activities within the SBKC project area have included the plugging of four wells and expansion of the FR186 stone pit for OGM development north of the project area. At the current rate of OGM development on the ANF, it is estimated that 4.8 wells per year could be developed within the project area. This would result in approximately 96 new wells, 24 miles of new access roads, and eight acres of pit expansion and/or development over the next decade. This level of OGM development would affect 2.6 percent of the CE analysis area and result in the creation of 124 acres of non-forested habitat. However, this rate of development has not been realized within the CE analysis area in the past.

Through continued cooperative efforts and implementation of ANF LRMP standards and guidelines, design features, and Pennsylvania BMPs, no substantial cumulative effects to OGM resources are anticipated from the proposed or foreseeable future activities. In 2005, five wells were proposed along and off the end of FR460. However, to date these wells have not been developed. Recently, two test wells have been proposed within the SBKC project area in Warrants 3131 and 3132.

There are four potentially usable or expandable stone pits within the SBKC project area. Pit expansion is proposed for three pits in both action alternatives. One site (off of FR461) has been identified for development in both action alternatives. Another potential site was identified off of FR463 in MA 2.2; however, new pit development is not allowed in MA 2.2. Including potential OGM development, proposed pit development and expansion within the SBKC project area is projected to be about seven to eight acres over the next ten years, which represents about 0.2 percent of the SBKC project area. Recent stone pit testing has identified that the three active stone pits and one new stone pit could be expanded or developed for a total of approximately nine ten acres of stone. The need for additional stone beyond the proposed pit expansion or development would require additional environmental analysis. There is concern about the quantity, quality, and access to stone in the future. Consequently, alternate (off-forest) sources for stone and gravel may be needed or investigated in the future. Limestone surfacing would be procured from private sources outside of the ANF.

4.2 Biological Environment

4.2.1 Vegetation

This section discusses potential direct and indirect effects of the alternatives on forest vegetation within the SBKC project area. The analysis includes an assessment of the direct and indirect effects on the vegetation within the SBKC project area, as well as

potential cumulative effects on past, present, and future foreseeable activities on the composition and health of the forest vegetation across the landscape. Site specific outcomes were determined for forested stands in the project area (see South Branch Kinzua Creek Vegetation Report in the project file) and are summarized in the following sections.

The rationale for applying silvicultural treatments on the ANF is based largely on research conducted on the Allegheny Plateau by the Northeastern Research Station. Much of this research is documented in *Prescribing Silvicultural Treatments in Hardwoods Stands of the Alleghenies* (Revised) (Marquis, Ernst, and Stout, 1992) and *Quantitative Silviculture for Hardwood Forests in the Alleghenies* (Marquis 1994). Additional rationale for the application of silvicultural treatments on the ANF is found in Appendix A to the Forest Plan (USDA-FS 2007a). When silvicultural treatments are applied in stands that meet specified criteria, predictable results or outcomes can be achieved. These predictable results underlie the following discussion on the direct and indirect effects of the silvicultural treatments.

Alternative 1: No Action

Direct and Indirect Effects

Since no harvest would occur under Alternative 1, any changes in vegetation would be the result of natural stand development or disturbance processes. No new early successional habitat would be created except for that caused by natural processes or potential future management in another project. As stands mature, the amount of late successional habitat would increase from 0 percent to 23 percent over the next two decades within the project area. It is estimated that interfering vegetation (fern, grass, American beech, and striped maple) would be present over most of the project area within 20 years, preventing many seeds from germinating and becoming established. Shade tolerant trees and shrubs, such as American beech, black birch, and striped maple, grasses, and ferns would probably continue to dominate the understory over time. Horizontal diversity, or patchiness across the landscape, would decline, unless natural disturbances and/or future management create new age classes. Beech, birch, and striped maple would grow into the midstory and contribute towards vertical diversity (canopy depth).

Due to a legacy of selective browsing by deer on the ANF, advance regeneration is usually absent and lacks diversity of species (Tilghman 1989; Jones, deCalesta, and Chunko, 1993; de Calesta 1994; Redding 1995; de Calesta 1998; Horsley, Stout, and deCalesta, 2003). Considering the low palability of beech by deer, it is anticipated that many areas would regenerate to beech without any intervention thus increasing the susceptibility of the SBKC area to beech bark disease. When black birch becomes established in quantity, it can withstand moderate to high deer browsing. Black birch is also tolerant of shade and grows rapidly in partial or full sunlight but few birch live longer than 60 years on the ANF (Morin et al. 2006).

Alternative 2: Proposed Action

As stands mature, the amount of late successional habitat would increase from 0 percent to 22 percent over the next two decades. This alternative would create approximately 311 acres of early successional habitat; the largest amount (7 percent of the project area)

of any of the alternatives. This alternative proposes the following reforestation treatments: 812 acres of site preparation, 896 acres of herbicide application, 200 acres of planting, 96 acres of fertilization, 75 acres of tree shelters, and 746 acres of fence installation. Reforestation treatments would control competing vegetation long enough to allow tree seedlings to become established and exclude deer browsing impacts. Where fencing is proposed in treated stands, the understory species diversity will improve.

This alternative also contributes the most toward the need to provide a mix of vegetative conditions and quality timber products that contribute to the local and regional economy. Approximately 7.7 Million Board Feet (MMBF) of timber would be harvested under this alternative in two entries.

Alternative 3:

Alternative 3 excludes harvest in areas that would need a new road corridor to access the stands. This alternative reduces the acres of reforestation treatments compared with Alternative 2. The amount of reforestation activity in this alternative is as follows: 750 acres of site preparation, 834 acres of herbicide application, 191 acres of planting, 96 acres of fertilization, 73 acres of tree shelters, and 686 acres of fence installation.

By proposing less harvesting than Alternative 2, this alternative would create a smaller amount of early successional habitat (280 acres or 6 percent of the project area). This alternative would also have the same amount of late successional habitat as the No Action alternative in 20 years. Reforestation treatments would control competing vegetation long enough to allow tree seedlings to become established, improving the diversity of the understory species in treated stands.

Approximately 6.3 MMBF of timber would be harvested in two entries under this alternative as compared to the 7.7 MMBF proposed under Alternative 2.

Vegetation Cumulative Effects

Cumulative effects are impacts that result from the incremental effects of the proposed action when added to past, present, and reasonably foreseeable future actions, regardless of land ownership. A timeframe of 10 years (1997-2006) into the past was used as it would incorporate completed and ongoing activities from past projects. A timeframe of 20 years (2007-2026) into the future was used to allow for all proposed and reasonably foreseeable related future activities to be completed and resulting vegetation changes to occur. The cumulative vegetation effects (CVE) analysis area for this project encompasses the South Branch of Kinzua Creek Project Area. Enlarging the geographic scope to include National Forest System lands outside the CVE analysis area could dilute the potential cumulative effects because adjoining areas have similar (MA 3.0) or less management intensity levels (MA 2.2, and private lands) than those lands within the CVE area. The cumulative effects on vegetation are discussed in terms of the cumulative effects of treatment amounts, age class (early successional and late successional stages), and understory and midstory vegetation.

There are 26 acres of private land within the CVE area. Based on estimates from aerial photographic interpretation, these properties are a mix of hemlock forest (16 acres), and a variety of openings (10 acres of utility rights-of-way, access roads, and residences or recreational camps). Based on observations over the past 25 years, residences and

recreation are the primary uses of these parcels. Commercial timber management has not been a high priority of these landowners.

Cumulative Effects from Harvest Treatments

Previously approved vegetation management activities within the CVE area, which have not been completed yet, would occur in all alternatives.

To contribute towards Forest Plan goals and objectives for MA 3.0 and MA 2.2 in the second decade (2017 to 2026), additional silvicultural final regeneration treatments are expected to occur on 10 to 12 percent (or 323 to 387 acres) of MA 3.0 and on 2 to 4 percent (31 to 61 acres) of MA 2.2 in the South Branch of Kinzua Creek Project CVE area. This would include associated reforestation treatments.

Table 20 summarizes treatments that have occurred or are anticipated to occur within the CVE area. Forest accomplishment records have been reviewed to determine the level of activity that has occurred within the CVE in the past decade. It should be noted that multiple treatments might have occurred on any given acre. For example, a stand may have received a shelterwood seed cut, followed by an herbicide application, site preparation for natural regeneration, and then the final harvest (once adequate seedlings are established). Therefore, the information presented in Table 20 represents the total acres of treatment, not the actual physical number of acres that may have received one or more treatments.

The projected total even-aged final harvest activity comes from this project and potential future harvests from private and Forest Service lands. The projected range of final harvest is 13 percent for all of the alternatives for the 30 year CVE period. Therefore, a large portion (87 percent) of the analysis area is not anticipated to be regenerated during the CVE analysis time period.

Table 20. Cumulative Vegetation Totals by Treatment for Cumulative Vegetation Effects (CVE) Analysis Area (4,772 acres)

Treatment	Past Treatments 1997-2006 Acres/Percent of CVE area	Cumulative Totals (past, present, future) Acres/Percent of CVE area		
		Alt 1	Alt 2	Alt 3
Even-aged Final Harvest	194	641(13%)	641(13%)	641(13%)
Shelterwood Seed	72	519(11%)	549(12%)	519(11%)
Intermediate Thinning	275	550(11%)	1404(29%)	1106(23%)
Salvage Thinning	64	64(1%)	72(2%)	72(2%)
Single Tree Selection	157	450(9%)	450(9%)	437(9%)
Group Selection	0	293(6%)	301(6%)	288(6%)
Herbicide	103	843(18%)	999(21%)	947(20%)
Fencing/Tree Shelters	281	894(19%)	1111(23%)	923(19%)
Site Preparation	154	1021(21%)	1093(23%)	1041(22%)
Fertilization	125	250(5%)	346(7%)	346(7%)
Planting	98	196(4%)	396(8%)	387(8%)
Release	59	799(17%)	849(18%)	836(18%)

Cumulative Effects for Early Age Classes and Late Successional Forest

Table 21 displays the present age class distribution found within the CVE area and forecasts the distribution that would occur in twenty years (in year 2026) under the different alternatives. There are minor differences in age class distribution anticipated between the alternatives. Age class changes in Alternative 2 and 3 are a result of the treatments proposed in this and future projects. Changes in Alternative 1 are a result of treatments anticipated through future projects on private and Forest Service lands.

Table 21. Age Class Distribution for CVE Analysis Area

Age Class	Present Condition Year 2006	Alt 1 Year 2026	Alt 2 Year 2026	Alt 3 Year 2026
Openings	1%	1%	1%	1%
0-10 years	3%	9%	6%	7%
11-20 years	3%	0%	7%	6%
21-50 years	8%	6%	6%	6%
51-110 years	84%	61%	58%	57%
111+ years	1%	23%	22%	23%

In Alternatives 2 and 3, 334 (seven percent) and 286 (six percent) acres, respectively, of early successional age class would be created in the next decade within the CVE area. This compares with an estimated six percent DFC for MA 3 in the 0-10 year age class and a composite of 12 percent in 0-20 year age class. The cumulative effects of Alternative 2 and 3, in combination with other actions, are predicted to increase the early successional habitat towards the goals and objectives of the Forest Plan for MA 3. In all alternatives, 6 percent of the CVE will be 0 to 10 years old by 2026. The acres calculated for this age class is 6 percent of the MA 3.0 acres within the project area.

In all alternatives, late successional forest will increase from one percent to 22 percent (this assumes the 6 percent in the 0-10 year age class comes from the 51 to 110 and 111+ age class in all alternatives in relative proportions as are being proposed) of the CVE area by 2026. In the long term, areas managed for late successional forest and old growth will continue to be influenced by the legacy of deer browsing impacts, introduced and native forest insects, and natural disturbances over time. Mature (>50 years old) forest habitat will be at least 80 percent in all alternatives. Regardless of the alternative, there is a similar distribution in age classes in the mature and late successional forest.

Cumulative Effects to Understory and Midstory Vegetation

The principle effects of past and proposed vegetative management activity are most easily seen in changes related to species diversity and structure. Diversity is defined as the distribution and abundance of different plant and animal communities and species within an area. Structure is defined in terms of horizontal as well as vertical vegetative components, such as herbaceous, understory, midstory, and overstory layers (vertical) as well as how these layers are distributed across the landscape (horizontal). The following summary of anticipated cumulative effects takes into account what has happened and what can reasonably be expected to take place in the CVE area.

Many of the regeneration prescriptions include the application of herbicide. The primary objective of its use is to create conditions favorable for seedling development and growth.

This will increase seedlings height so final harvests can occur and stands will have successfully regenerated. Without the use of herbicides and other reforestation treatments, beech, birch, striped maple, grasses, and ferns would continue to dominate the understory within the CVE area. These areas will likely be dominated by beech, striped maple, and birch, with pockets of other tree species developing where they are protected from deer browsing. Current encroachment of fern, grass, striped maple and beech brush in the understory would inhibit growth of seedlings and continue to spread where canopy gaps occur. If deer densities return to a high level, there could be a decrease in plant species in the long term (> 50 years).

Potential impacts from controlling interfering plants with herbicides have been examined in detail in Appendix G of the FEIS for the LRMP (USDA-FS, 2007d). The information presented in Appendix G was considered in the site-specific analysis completed for this project.

Within the past 10 years, herbicide(s) have been applied on 103 acres of the CVE area. The no action alternative would result in the application of no herbicides in the first decade and approximately 430 acres due to future projects. In all alternatives, the diversity of the understory will be increased wherever herbicides, site preparation, fencing, and/or other reforestation treatments are implemented.

An additional 896 acres (Alternative 2) and 834 acres (Alternative 3) of herbicide application are proposed to occur through implementation of this project. Alternatives 2 and 3 would encourage more horizontal structure. Even-aged regeneration activities (311 and 280 acres in Alternatives 2 and 3 respectively) would create early-successional habitat that would otherwise be lacking within the project area, except for what might be created through larger scale natural disturbances. The herbicide application proposed in Alternatives 2 and 3 would reduce the amount of fern, grass, striped maple, and beech brush. After herbicide treatment, a fuller range of plant communities would be expected to occupy the understory (Horsley *et al* 1994). These would include tree species as well as shrubs, forbs, and wildflowers that are presently absent, providing seed sources are located nearby. Fencing in both alternatives would contribute to maintaining plant diversity within specific stands since deer browsing is discouraged, which is a leading factor in the loss of diversity.

4.2.2 Wildlife

Environmental Consequences

The depth of this analysis is dictated by the specific activities being considered in each alternative, our monitoring and survey efforts, and our experience in mitigating potential impacts. Many of the environmental effects are common to all alternatives or have been previously discussed in the Forest Plan FEIS (USDA-FS 2007b) and Forest BE (USDA-FS 2007e) of management activities for the ANF.

The effects analysis is based on review of literature and scientific knowledge concerning the effects of timber harvest and road construction on habitat structure, mast production, and disturbance to wildlife. This section discusses the potential effects on wildlife and wildlife habitats expected to occur under each SBKC project alternative. The analysis follows the three-tiered strategy outlined in Section 3.2.2 to examine potential impacts on

a) wildlife habitat at the landscape scale (coarse filter approach), b) MIS and their habitats (project area filter), and c) federally-threatened and endangered species and RFSS (fine filter approach). Landscape-scale concerns such as cumulative effects or impacts on wildlife are discussed primarily in the context of the coarse filter approach.

Coarse Filter Approach: Effects on the Composition and Structure of Wildlife Habitats

Direct and Indirect Effects

Wildlife habitats in forested environments are dynamic and typically change over time and space in response to both small and large scale disturbances, as well as natural processes of succession and stand development. As discussed in Section 3.2.2, approximately 314 wildlife species are known to use the various age classes and vegetative structural of wildlife habitats present on the ANF Table 13. Although forest management activities would influence the relative abundance and composition of fauna communities in particular habitats, the greatest overall diversity of wildlife is generally associated with seedling habitat (early structural) and mature (mid structural) forest types. At a landscape scale, this suggests that high levels of species richness can be maintained by providing for a variety of age classes and forest habitat types across the SBKC project area.

The stand-level effects of even-aged management on wildlife are often species-specific and vary greatly over both time and space. For example, during natural succession in northern hardwood forest types, species diversity is typically high in naturally regenerating stands due to the rapid growth of the shrub and herbaceous layers following disturbances (DeGraaf *et al*. 1992). Diversity then declines through intermediate stages of stand development (pole timber 21 to 50 years old) and increases to maximum values during later-successional stages (mature sawtimber and old growth).

For certain groups of bird, amphibian, and reptile species that are highly sensitive to changes in habitat structure, overstory removals favor early successional species over species that prefer or require mature forest conditions. Some mature forest wildlife may be displaced for up to 50 years or until mature forest conditions are re-established. However, patterns of bird abundance following stand regeneration events are generally short-lived (less than 10 to 15 years) and fluctuate in response to changes in the vegetative community over time (Table 22). The retention of wildlife reserve trees (snags and potential den trees) within even-aged regeneration units mimic the patchiness and effects of natural disturbance patterns and ensures that species present following regeneration harvests should be similar to those that occupy the regeneration stage under natural succession (DeGraaf *et al*. 1992). Breeding bird densities in regenerating stands in managed forests are typically greater than densities in mid-successional (intermediate age pole timber) stands and approach or exceed densities in mature stands (Thompson *et al.* 1993).

Table 22. Songbird Patterns of Habitat Use Following Regeneration Harvests on the ANF

Species	Years Following Regeneration Harvests[1]		
	First Appearance	Becomes Common	Declining Abundance
Eastern bluebird	1	1	2
Northern flicker	1	1	7-10
Winter wren	1	1	2
Swainson's thrush	2	4	15
Chestnut-sided warbler	2	4	10
Mourning warbler	2	5	7-10
Common yellowthroat	2	6	10
American goldfinch	2	6	7-10
Cedar waxwing	2	4	7-10
Veery	3	6 +	n/a[3]
Black and white warbler	3	4 +	15
Rose-breasted grosbeak	3	15 +	n/a[3]
Canada warbler	5	15 +	n/a[3]
Ruffed grouse	10	15 +	n/a[3]
Wood thrush	10	15 +	n/a[3]
Ovenbird	5 -10[2]	15 +	n/a[3]
Black-throated blue warbler	5 – 10[2]	15 +	n/a[3]
Black-throated green warbler	5 - 10[2]	15 +	n/a[3]

Notes:
[1]Based on northern hardwoods forest types Although most of the regeneration harvests on the ANF are done in stands defined as the Allegheny Hardwoods type, bird species utilization of seedling/sapling stands is a primarily a function of stand structure and stem densities and not the presence or absence of certain tree species.
[2]Breeding bird data on the ANF indicates these species first appear 5-10 years after the stand receives a removal cut.
[3]Present in the stand throughout remainder of rotation.

Similarly, timber harvesting in Pennsylvania has been found to temporarily increase the abundance and diversity of snakes and decrease the abundance of salamander species (Ross *et al*. 2000). These patterns appear to be related primarily to changes in microclimatic conditions resulting from removal of the forest overstory and the retention of reserve trees (living) and coarse woody material in harvested stands. The environmental effects of even-aged harvests may influence habitat use by some management-sensitive plethodontid salamanders for distances of 25 to 30 meters into the surrounding un-harvested forest matrix (Demaynadier and Hunter 1998). However, species such as red spotted newts and the American toad appear to be more tolerant of recently harvested conditions. Ross *et al*. (2000) found frogs and toads to be less

sensitive to harvesting intensity; the presence of these species was generally correlated with the presence of temporary and permanent pools of water within stands.

Environmental Consequences Common to All Action Alternatives

Both action alternatives involve harvest such as thinning, selection, and shelterwood removal and transportation treatments. Species and feature specific effects due to these harvest practices would be the same in both action alternatives.

Intermediate harvests such as thinning and selection harvest would remove lower quality trees and release healthy trees, including mast producing trees such as cherries and maples. Wildlife species requiring closed canopy forest may be affected by the thinning in the short term, as these would create gaps in the forest canopy. However, gaps may allow understory vegetation to flourish from the temporary increase of sunlight reaching the forest floor. This vegetation would provide increased structural diversity that could attract songbirds such as the hooded warbler and nesting wild turkeys. Avian predators that prefer a more open understory may have reduced hunting success in the dense understory vegetation. Some mast producing trees would be removed, but residual mast producing species of trees and shrubs, due to less competition, would have the potential to increase mast production. The effects from thinning harvests to tree-nesting species or species requiring cavities would be minimized by Standards and Guidelines in the Forest Plan that call for the retention of snags and den trees in cutting units (USDA-FS 2007a pp.80-82).

Salamanders could experience local population declines in the regeneration harvest units proposed and possibly in thinned or those stands receiving selection harvest. In sections of final harvests where sunlight reaches the soil, the surface may become hardened which prevents salamanders from reaching the surface to feed. Effects could be limited by leaving tree tops and other slash scattered through harvest units. Pauley (1997) has noted that in West Virginia, red-backed salamanders would return to pre-clear-cut populations within 22 years. Populations of mountain dusky salamanders would return and would be abundant, but would not equal pre-clear-cut populations as quickly as the red-backed salamanders.

The skid roads needed to remove timber from the conventional harvest units may provide travel lanes for some species, such as deer and bear. Skid roads may also temporarily isolate some small species such as salamanders that are associated with leaf litter and other forest floor organic matter, since their movements may be restricted by areas of bare soil.

Both action alternatives include miles of road improvements, including new road construction, maintenance (including limestone surfacing), decommission, and pit expansion or development. No new road construction will occur in MA 2.2. In general, road maintenance of existing roads would have minor effects on wildlife. Road maintenance could result in the removal of tree limbs, vines, saplings, and other vegetation that have encroached onto the roadways in the last several years. Maintenance may also require additional surfacing material to be applied such as pit run stone or limestone. The re-establishment of the road corridor may benefit certain bat species that forage in linear openings. Road maintenance could also remove any herbaceous vegetation that has grown on the road surface. Species such as deer, turkeys, grouse, cottontails, and songbirds would lose forage/forbs and other preferred plant species that

occur on some of the corridors. However, these resources should still be available on the roadsides and in other open areas. Roads that are prescribed for decommissioning would provide this feature of linear herbaceous openings. Log landings would provide temporary herbaceous cover after the period of use, since the landings would be re-vegetated after use.

The new road construction on sections that would occur outside of the existing road beds (new corridor) would result in the removal of linear strips of trees, other woody and herbaceous vegetation, topsoil, leaf litter and other organic material used by wildlife. Soil and ground disturbance from road construction and pit development could directly affect ground-nesting species by destroying ground nests and burrows, with possible loss of adults and young (salamanders, rabbits, mice, chipmunks, and ground-nesting birds such as juncos and ovenbirds). Soil compaction on roads, skid roads, log landings, and pits could be detrimental for burrowing animals on those specific sites, but adjacent to the roads and landings would be largely unaffected. By creating new edge habitat, road construction may benefit species like deer and eastern towhees (*Pipilo erythrophthalmus*). Other effects to wildlife by roads are discussed in the North End Roads Analysis Project (USDA-FS 2006).

Most of the species in the generalist associations, such as deer, are considered to be tolerant of human disturbance to some degree. However, some species such as bears and turkeys are believed to be sensitive to disturbance, particularly during critical life stages like nesting, denning, and brood rearing. Short-term direct and indirect disturbance to wildlife may occur during project implementation from (1) physical harm or mortality of individual animals from equipment use, tree felling and skidding; (2) disturbance or destruction of nesting and roosting sites, cover vegetation, or food sources; (3) noise disturbance from equipment use and vehicle traffic; (4) visual disturbance from increased human activities in the area; and (5) soil disturbance and compaction during road construction and skidding. Mortality due to vehicle collisions may occur due to the increase in vehicular traffic in the project area during implementation.

Long-term disturbance could occur after project completion if new roads or road improvements facilitate human access into the area. Besides the above mentioned effects, increased access could increase the chance of poaching and collecting of a variety of species such as turtles. Sources of additional disturbance due to improved access would also include increased foot travel, bicycle travel, and unauthorized motor vehicle use (i.e. ATV's). Noise from equipment and other human activity could cause some species, such as bears, bobcats, and turkeys, to change their normal activity patterns to avoid some locations. In order to reduce these long-term effects, all roads constructed will be closed or restricted to public traffic and usage will be minimal and areas of known illegal ATV activity will be closed or blocked off.

Wildlife tree and shrub planting, maintenance of existing planting sites, seeding, pruning fruit trees, and placing nest box structures do not have an adverse effect on wildlife and the effects are usually beneficial for increasing wildlife food and cover in both the short and long-term. Many of the above activities are implemented to provide a diversity of tree and woody shrub soft and hard mast which is lacking in many stands within the SBKC project area. Some of the proposed activities will create direct and indirect effects during implementation. Temporary disturbance and noise from machinery would occur during implementation of the above activities. The effects will be short duration and will

be far outweighed by the long term beneficial effects to wildlife habitat and the species utilizing that habitat.

Effects by Alternatives

Alternative 1

Table 23 presents the short-term (2006 to 2016) projected landscape level changes in wildlife habitat resulting from implementation of the different alternatives. In general, the effects of wildlife habitat are proportional to the amount of final harvests proposed in each alternative and the subsequent age class distributions. Timber harvests will not occur under Alternative 1 (no action); consequently, no additional (managed) early structural forest habitat would be created in the SBKC project area. Mature stands not affected by catastrophic mortality, forest decline, or severe impacts from wind storms would continue to slowly develop into older age-classes under Alternative 1. The environmental changes would tend to favor species that use later-successional stages of forest habitat. Stands prescribed for un-even aged management (UEAM) in Alternative 2 and 3 will continue to progress similar to the mature stands above. On the reforestation-only portions of the project, the seedling/sapling age stands would progress toward young pole-size hardwood habitat, but with a lack of diversity. As a result, species that use early successional habitats would tend to decrease in abundance across the project area. The amount of wildlife habitat in conifer cover and permanent openings would remain essentially unchanged. Hemlock woolly aldegid (HWA) could limit or reduce the amount hemlock component in the project area if it arrives in the area under all alternatives. Effects on wildlife from human activities in the project area would remain relatively unchanged. Access and use of the area would remain at current levels with no expectation of any increased use of the area.

Alternatives 2 and 3

Implementation of shelterwood removals in Alternatives 2 and 3 would create additional regenerating forest habitat (1–10 year age class) on 7 percent to 6 percent (respectively) of the SBKC project area by the year 2016. In addition there are 103 acres or 2 percent of the project area slated for reforestation-only treatments. Similar to Alternative 1, these existing stands of early successional hardwood forest would eventually progress toward young pole-size hardwood habitat but with a more diversified and desirable mix of tree species. Affecting 7 percent of the SBKC project area, the 50 acres of UEAM prep cut, 243 acre of RUMFC & Group selection, and 58 acres of additional Group selection harvest proposed in Alternative 2 would not substantially change wildlife habitat in terms of overstory canopy, as there will be a slight reduction in the present canopy closure to provide growing space for developing seedlings. However, wildlife habitat will benefit from increased vertical stand structure with a variety of more desirable trees and woody shrubs in these areas as a result of management. Slightly less UEAM is proposed under Alternative 3. The effects would be similar in terms of canopy closure for both alternatives.

Ultimately, the removal harvests and reforestation activities would ensure the establishment of a new age-class of forest of desirable trees and shrubs. Increases in the abundance of species that use early structural habitats could be expected under Alternatives 2 and 3, with a lesser amount of change observed under Alternative 3. For these alternatives, local decreases in abundance and habitat use for species that prefer

mature and late-successional forests could be expected in removal harvests over this planning period. In summary, roughly 7 percent under Alternative 2 and 6 percent under Alternative 3 of the SBKC project area would be in early successional forest habitat (by 2016). Areas prescribed for UEAM will establish an all age class regime in single aged stands. Vertical stand structure and ages classes will be established by using RUMFC and Group Selection methods.

Adequate refuges (untreated areas) should still exist in close proximity of the removal harvests to allow for re-colonization of species using mature forest conditions as the regenerating hardwood stands mature over the next 50 years. Mitigation measures listed in Chapter 2 for sensitive wildlife species and habitat, project design features protecting sensitive or unique habitats such as rock outcrops, spring/seep complexes, den sites, shrub and conifer inclusions, and Forest-wide S&G's would be implemented under each alternative. An adequate supply of snags and potential den trees would be retained in treated areas to provide continued habitat for those species that nest in cavities, forage or nest on or in dead and dying trees, and rely on coarse woody material on the forest floor.

Table 23. Current and Projected Distribution of Wildlife Habitat in the SBKC Project Area by Alternative (2006-2016)

Habitat Type	**Current Condition[1]**	**Alt 1**	**Alt 2**	**Alt 3**
Seedling (0-10 years)	5%	0%	7%	6%
Sapling (11-20 years)	2%	5%	5%	5%
Pole (21- 50 years)	9%	9%	9%	9%
Sawtimber (51-110 years)	82%	80%	74%	75%
Over mature (111+ years)	1%	5%	5%	5%
Mast-producing timber (>35 yrs. old)[2]	88%	92%	86%	86%
Permanent openings[3]	1%	1%	1%	1%
Conifer cover[4]	2%	2%	2%	2%

1. Expressed as a percentage of the 4,746 acres of federal land in the project. Numbers are rounded and may not add up to 100% and are reflective of the base year 2006.
2. This percentage of mast-producing timber (>35 year old) applies to trees such as oak, beech, black cherry, birch, and maples.
3. Permanent openings are defined as perennial wildlife herbaceous openings, or upland and lowland shrubs defined as forest types 97, 98, & 99 in the forest database. The percentage displayed here is based on the acres within the project area. Openings such as these make up a portion of the non-forest habitat. Other non-forest habitat such as wells and roads are usually inclusions in forested stands.
4. Classified conifer stands have a conifer component greater than 50 percent. There are some stands in SBKC classified as such. However, up to 9% of the project area supports understory or inclusions of hemlock. These inclusions are expected to be maintained through the life of the project (by 2016) regardless of the alternative selected.

Under Alternatives 2 and 3, herbicide applications are proposed on 896 and 834 acres or 19 percent and 18 percent of the project respectively. In addition, spot herbicide may be used on up to 15 acres for NNIS control for both alternatives. The effects of herbicide application (glyphosate and sulfometuron methyl) on wildlife species and habitat on the ANF have been fully evaluated in Appendix G of the Forest Plan FEIS (USDA-FS 2007d). The primary impacts of implementation of the understory treatments proposed in Alternatives 2 and 3 would be a short-term alteration of habitat (2 to 3 years) as the densities of ferns, grasses, striped maple, and beech sprouts are reduced in the treated stands. These practices would tend to favor early structural species. However, the long-term effect of herbicide treatments (in conjunction with other activities) would be an increase in vertical and horizontal structural diversity, vegetative age classes, and wildlife habitat use in the project. Forest-wide S&Gs (USDA-FS 2007a, pp.54-59), mitigation measures, and design features to protect water quality and sensitive resources (seeps, springs, wetland inclusions, conifer inclusions, and any unique plant communities) would be implemented during the herbicide applications to minimize the potential for any adverse impacts to wildlife resources or habitats.

Mechanical (manual) control of understory vegetation (site preparation and release cuts) would result in short-term alteration of wildlife habitats under Alternatives 2 and 3 to promote the development of a new age class of forest. The effects of cutting undesirable competing woody vegetation (trees and shrubs) will temporarily reduce the vertical and horizontal structure of these vegetative layers in the treated stands. However, this effect would generally last only a few years and not have a significant impact on wildlife, since the treatments would focus on a few species (primarily striped maple, birch and American beech). Other valuable mast-producing shrubs and small trees, such as serviceberry, witch-hazel, viburnums, ironwood, and dogwood would be retained in the treatment areas for wildlife. Trees such as maples, cherries, ash, cucumber, and sugar maple will be maintained to provide future canopy and mast for wildlife. In addition, Forest Plan S&Gs (USDA-FS 2007a, p.80) will be followed to protect nesting songbirds.

Activities proposed under Alternatives 2 and 3 to promote regeneration, such as fence construction will have no adverse effects on wildlife habitat. Although fencing would temporarily exclude the use of a limited amount of habitat (686 to 746 acres or up to 16 percent of the SBKC) by white-tailed deer and to a lesser degree other large mammals, such as black bear, the long-term effect would be to promote a more diverse and productive forest understory environment and new age class of forest regeneration in the project. Fencing will only be used if regeneration is being severely browsed by deer and not all treatment will be fenced at one time; therefore not all of the 16 percent may be accomplished in the long-term. Fertilization proposed under Alternatives 2 and 3 totals 96 acres or up to 2 percent of the project area. Not all treatments prescribed for fertilization will be accomplished at one time. The long-term effect of fertilization treatments (in conjunction with other activities) would be an increase in vertical and horizontal diversity, vegetative age classes (structure), and wildlife habitat use in the project. Reforestation planting and placing tree shelters would accomplish the same long-term effects in regards to habitat diversity.

Road construction is proposed on 0.1 miles of new corridor and 2.7 miles of existing corridor, road maintenance is proposed on 14.4 miles, road decommission on 2.1 miles, and limestone surfacing on 0.7 miles under Alternative 2. Under Alternative 3, the new

road construction is slated to occur on 2.4 miles of existing corridor only with the miles of other road activities remaining relatively the same as Alternative 2. Pit expansion is proposed on three existing pits (6 acres) with new pit development in one area (3 acres) under both action alternatives. Effects of road construction and pits are described in the Environmental Consequences Common to All Action Alternatives above. Site-specifically, the effects of road construction will be slightly less in Alternative 3, because the 0.4 miles of new road construction and a subsequent existing intermittent stream crossing (on private property) is no longer considered. However, under Alternative 2, a combination of Forest Plan S&Gs and limestoning the intermittent stream crossing (on private property) will help protect water quality and contribute to long-term benefits for the aquatic habitat in this area. Site-specifically, some pit proposals occur in areas where past wildlife habitat improvement projects have occurred or components of aspen are located. In order to reduce both short and long-term effects of all pits the following design features will be implemented:

- *All pits will be reclaimed and improved for wildlife habitat once they are deemed depleted. Areas will be seeded and planted with native species that will benefit a variety of wildlife. This will reduce the long-term effects of soil erosion as well as contribute to important wildlife habitat.*
- *When the pit is expanded in or adjacent to stand 814068, a wildlife biologist will coordinate with the road engineers so that pit expansion activities will be done outside the nesting and brood rearing seasons, which is May 1 through September 1.*

Effects of Habitat Fragmentation on Wildlife

While effects of forest fragmentation from activities proposed in the SBKC project area are expected to be less than those documented in more fragmented landscapes (i.e., where permanent conversion of forested conditions to non-forested conditions occur), effects such as increased predation, competition, introduction of non-native plant species and isolation of less mobile species may occur.

Because timber harvest activities will change stand structure and thus forest core value and its associated function, each proposed final harvest unit was overlaid using GIS on the existing forested core areas and an ecological cost was calculated for each unit. Cells that fell within the harvest units were ordered by their degree of effect, or "ecological cost" on a scale of 1 to 10. The final harvest units with the higher number indicate a higher ecological cost to the forested cores areas. For example, if a final harvest unit were to occur in the center of a somewhat remote forested core area, the resulting fragmentation has the potential to have more of an effect than if the unit occurred on the edge of a 20 year old stand (early structural habitat). Conversely and spatially, if it occurs in the center of the core area, linkage may still be maintained to provide habitat for some species and therefore potential effects may be minimized. In addition, as a young forest ages it slowly contributes to core habitat once again. Forested stands that are now 30-40 years of age in twenty years will once again be contributing to forest core or corridor linkages to a greater degree.

Under Alternative 1 (no treatments), small canopy gaps are expected over time because of natural mortality caused by age or those susceptible to insect and disease. However no

major increased edge or fragmentation effects, including disturbance can be expected under this alternative because the anticipated gaps will be small and localized.

Under Alternatives 2 and 3, fragmentation of core habitat is affected by the size (perimeter), shape, and location of treated stands. In general, removal harvests that border forest already classified as 'other' non-core forest would result in less reduction of core forest habitat. The final harvest stands with the highest ecological costs (values 9 and 10) were looked at individually. According to the fragmentation model four final harvest stands (totally 49 acres) proposed in both Alternatives 2 and 3 for final harvest have the highest ecological cost value of "10". One other stand (12 acres) with an ecological cost of "10" will receive an initial shelterwood treatment this decade as a part of both action alternatives. A spatial review of these stands shows that they reduce core habitat and linkages to varying degrees. Due to their shape and size, connectivity and cores areas remain in and adjacent to these areas. However potential effects to species that utilize large interior forest areas may occur. Displacement and disturbance to species that utilize core areas would increase in this area. These effects may be reduced or diluted because of the 10 year time period between final harvest and the establishment of more core forest areas as other stands age by 2026.

Spatially, a combination of other final harvest units were analyzed whose ecological cost was "9". Three additional final harvests (37 acres) and two delayed shelterwood seed cuts (33 acres) received this value. Similar to above, core areas and linkages will be reduced in these areas, but to a lesser degree than above.

Other treatment proposals (thinning, selection, or reforestation treatments) are present both in and adjacent to the varying degree of core forest habitat. These treatments will have fragmentation effects, but not to the degree that a final harvest treatment situated in core habitat would have. Potential effects such as increased predation, competition, introduction of non-native plant species and isolation of less mobile species may occur as short term effects. Noise from machinery, disturbance from vehicles, and gaps created in both the understory and overstory from treatments will affect habitat and species to a degree based on their mobility and home range. These effects are described throughout various sections of this effects analysis.

Unfragmented core areas will remain in the Watermill Run riparian corridor and upslope, much of the Hubert Run area, and the South Branch Kinzua Creek riparian area. It is important to note that some areas where permanent openings occur, such as those in the SBKC riparian corridor, are important to species utilizing these un-fragmented areas. Fragmentation effects in these areas will be less and similar to the effects stated in Alternative 1.

The project area currently contains a low to moderate amount of Forest Service roads and a relatively low number of gravel pits, utility corridors, active oil and gas wells, and permanent openings. Roads are adjacent to most of the proposed treatment areas. Roads and pits account for the vast majority of "hard" edge effects currently affecting core and the non-core forest types in the SBKC project. Road construction (0.1 mile on new corridor) and pit development or expansion (9 acres) would result in permanent losses of forest habitat within the SBKC. Road construction in the project will fragment previously un-fragmented core area to a very small degree in the eastern portion of the project near FR186, but the effects are negligible as most FS roads maintain a degree of overstory and

isolation (access will be restricted) and the majority of new construction is located on existing road corridor. The current road management network will change under both the action alternatives with at least 79 percent of the Forest Service roads either closed or restricted to the public. This is an increase from the current status of 58 percent as a result of the proposals. This will decrease the amount of vehicular access and maintain more isolation in some core forest habitat. Because pit development affects a very limited area in existing pits, this change in land-use is not considered (significant) in this fragmentation analysis. Based on the projected acres affected by future OGM development for the SBKC project, additional oil and gas wells (plus pit development to build new lease roads) may affect approximately 134 acres within the project area over the next two decades. This development has not been realized in the last four years. The majority of these well openings, due to size, become inclusions in a forested stand. Because this is not a substantial amount and the spatial locations of these developments are unknown, this minor impact to the forested environment is not considered in this habitat fragmentation analysis.

In reviewing both Alternative 2 and 3, based on the high ecological costs of treatments that are valued at 9 or 10 (the highest ecological costs), there is no major difference between alternatives. Since the high ecological cost of final harvest treatments in relation to the forested core area are the same, the fragmentation effects at the landscape level in the highest core value areas are relatively the same for both alternatives. There are less treatment proposals and greater dispersal of treatments overall in Alternative 3 than in Alternative 2 (see Chapter 2); therefore effects of fragmentation, especially noise and disturbance would be less. The effects of fragmentation are not significant. MA 3.0 direction in the Forest Plan emphasizes even-age management to provide a forest that is a mix of predominantly shade intolerant and mid tolerant hardwood stands of various ages and associated understories. Vegetative treatments are directed to balancing age class distribution (USDA-FS 2007a). No final harvests will occur in MA 2.2; therefore overall forest canopy will remain relatively intact and contribute to future late structural habitat. With the implementation of the action alternatives, approximately 86 acres (ecological cost of 9 or 10) will be removed from optimum forested core habitat. A greater degree of forest core areas would remain and important linkages would be unaffected to a greater degree. Alternative 3, with less silvicultural treatments, a greater dispersal of treatments, and less new road construction proposed overall than Alternative 2 will have less fragmentation effects than Alternative 2. Under Alternatives 2 and 3, the greatest effect to occur from the shelterwood removal harvests (final harvest) is the increase in temporary habitat fragmentation (the juxtaposition of a seedling age class stand with a stand of older mature timber). These treatments are designed to ensure successful regeneration of a new age class of forest and are temporary in nature.

Increases in fragmentation could result in minor habitat losses in regenerating stands for forest-interior species such as the veery, ovenbird, wood thrush, and black-throated green warblers, and certain amphibians such as red-backed salamanders and northern dusky salamanders (Ross, et.al. 2000, Demaynadier and Hunter 1998, and DeGraaf, et.al. 1992). Other species such as red-tailed hawks and small snakes (such as the northern redbelly and eastern garter snakes) may benefit from these changes in wildlife habitat. Although populations of most forest interior species respond negatively when habitat cover drops below 20 to 30 percent of the landscape, sharp thresholds in landscape characteristics

generally do not exist for most species (in particular, bird species) (Lindenmayer and Franklin 2002; Villard, et.al. 1999)

Landscape context is an important determinant in the overall significance of edge effects and habitat fragmentation. Studies suggest that in un-fragmented forest landscapes, edge effects resulting from small-scale timber harvesting may not significantly increase rates of nest predation for neotropical migratory birds (Annand and Thompson 1997; Thompson et.al. 1993). In addition, even-aged (removal) harvests in extensively forested landscapes do not appear to increase parasitism by brown-headed cowbirds or affect avian nest success or abundance for forest interior species, such as the veery, wood thrush, rose-breasted grosbeak, Acadian flycatcher, or red-eyed vireo (Duguay, et.al. 2001). Given the heavily forested nature of the project and the ANF as a whole, the proposed silvicultural treatments are not expected to result in detrimental impacts to neotropical migratory birds or other sensitive forest-interior species.

Wilderness Trout Stream – The South Branch Kinzua Creek is a PA state designated Wilderness Trout Stream from its headwaters to its confluence with Hubert Run. In order to comply with the PA classification, there should be no more than one stream crossing every two stream miles on open roads and no open roads should parallel the stream within 1/4 mile. There are no road proposals that will affect the Wilderness Trout Stream and its PA state designation within this project. FR460 and FR461, roads that have been traditionally open to the public year round, will be gated and restricted seasonally, thereby, contributing to the continued character of the stream corridor. Proposals which block illegal ATV activity would also aid in maintaining the character of the stream as well as protect water quality from soil erosion. Proposed treatments within 200 feet of South Branch Kinzua Creek in Alternative 2 include portions of one non-commercial thin, one reforestation/under-planting, and one RUMFC treatment. It should be noted that these entire stands will not be treated. In Alternative 3, the non-commercial thin and RUMFC treatment within 200 feet would not occur. Only selected portions of the stands will be treated where the vertical and horizontal stand structure will benefit as a whole. None of these treatments are expected to have an adverse effect to the stream and riparian corridor. None of these treatments will include any heavy equipment operation within 200 feet of the stream; therefore there will be no effect to the stream-bank stability. Stream water temperature will be maintained as management to overstory trees will be negligible and a vegetative buffer will be maintained. Under-planting or reforestation of trees will maintain water temperature over the long term as trees grow into the overstory. Wildlife treatment proposals such as planting native trees and shrubs, fencing, and wildlife structure placement will enhance the wildlife habitat in the area, but will not affect the stream corridor or water quality in the SBKC. The following design features will be implemented to insure that an adequate vegetation buffer and water quality is maintained within 200 feet of the stream:

- *No herbicide will be applied within 200 feet of the S.B. Kinzua Creek for any vegetative treatment, including stands 811005, 812007, and 814001.*
- *No heavy equipment relating to harvest activities will be utilized within 200 feet of S.B. Kinzua Creek. This applies to stand 811005.*

Unroaded Areas > 500 acres - One of the two portions of the unroaded areas (>500 acres) that overlap into the SBKC project area will be affected by the transportation

proposals. With the decommissioning of FR463B, unroaded areas #44 (SB Kinzua W) would slightly increase in size (about 41 acres) and change shape slightly. The new road construction (new corridor) is not located within a quarter mile of the unroaded areas (> 500 acres) that overlap into the project area, therefore the size and shape of these areas will remain the same as a result of the new road construction in the SBKC project area. Treatments do occur in the unroaded areas, but harvest activity will be accomplished with the existing road systems. These two areas are not part of the eight unroaded areas that are believed to be the highest quality remote areas on the ANF (USDA-FS 2007b, p. 3-194) Wildlife habitat values in these areas will be protected using Forest Plan S&G (USDA-FS 2007a pp. 80-89).

MA 2.2 – The SBKC project area contains approximately 1,532 acres of MA 2.2. The majority of this area is located within the SBKC, Watermill, and Glad Run riparian corridors and the adjacent side-hill and some plateau tops. This management area emphasizes older, late structural forests that link relatively large areas of older forests across the landscape. Vegetation management is directed to restoring late structural forest conditions with emphasis on sustaining forest structure and forest continuity (USDA-FS 2007a, p.26). A variety of silvicultural treatments are proposed that will increase vertical and horizontal gap phase structure, species diversity, increase coarse woody debris, and restore and accelerate mature forest conditions which will benefit most forest interior species. Under Alternative 2, approximately 243 acres of RUMFC/Group Selection, 8 acres of delayed group selection, 96 acres of accelerate mature forest conditions (AMFC), and 62 acres of non-commercial thinning will be accomplished in selected stands in MA 2.2. See the vegetation section for a complete description of these treatments. Approximately 27 percent of the MA will be managed using these treatments. The RUMFC is a selective treatment that will select stands with little or no diversity and apply a treatment that stimulates seedlings. A follow up treatment (Group selection) will be implemented only in the areas where seedlings develop in small group sizes (½ - 3 acres) to release these seedlings. Pockets of these groups will be distributed across the stand in order to create gaps in the canopy and vertical structure on the ground.

Currently there are 38 acres (2 percent) of early structural habitat (0-20 year old) in MA 2.2 and with the exception of these small groups that trend will continue under the action alternatives. Non-commercial thins and AMFC are scheduled to release around existing diverse tree species, create snags, and increase the growth and vigor on selected trees to emulate old growth conditions such as large trees, coarse woody debris, and vertical stand structure. In all these treatments, much of the overstory will be maintained in order to achieve contiguous forest canopy cover and maintain the degree of isolation that species in this MA require, therefore, acres in MA 2.2 by forest type and age class (Figure 2) will remain relatively unchanged with the exception of forested stand age class, which will get older. Species with viability concerns, such as the Indian bat (creation of gaps and snags), northern flying squirrel (larger trees), timber rattlesnake (CWD), and the black-throated blue warbler (restoring understory conditions) are some of the species that would benefit.

In order to facilitate species diversity and structure, a variety of reforestation treatments including site preparation, herbicide, fencing, planting, releasing, and tree sheltering natural trees were proposed. It should be noted that the entire stand will not be treated. Care will be taken by selectively treating portions of the stands where habitat can be

established to benefit the overall stand structure. Fencing treatments will be done if needed to achieve desired stand structure. Areas fenced may exclude in the short term (approximately 3-10 years) some species that benefit from treatments in MA 2.2. Alternative 3 includes 225 acres of RUMFC and 8 acres of Group Selection but does not include non-commercial thins or AMFC treatments. Under Alternative 3, a greater degree of isolation/remoteness will occur in those stands not treated because the effects of noise and disturbance will be less. The effects to those stands not treated would be the same as in Alternative 1. That is, vertical and horizontal stand structure achieved under Alternative 2 will be lacking in those stands.

No road construction or pit expansion would take place in MA 2.2 with this project. The portion of one active pit in MA 2.2 would be reclaimed with a wildlife seed mixture; therefore, there will be no effect from these treatments in MA 2.2. The following design features (three) would be implemented in all treatments in MA 2.2 to ensure that values for this MA are retained, maintained or increased:

- *In treatment areas within MA 2.2 where scattered or groups of blown-down trees have occurred, all trees will be left within the stand to contribute to the coarse woody debris component within the MA, except for stand 811005 where the removal of blown-down trees is necessary for silvicultural objectives.*
- *In all treatment areas within MA 2.2, all snags and den trees will be retained unless considered unsafe during operations under OHSA regulations. Retain all trees containing cavities, both standing or down.*
- *Fencing and herbicide in MA 2.2 will be accomplished in blocks that allow for landscape and wildlife habitat connectivity. These treatments will allow for wildlife travel lanes such as riparian corridors and other continuous areas. Timing of treatment will be coordinated with district biologists to ensure habitat connectivity.*

Cumulative Effects (CE) Analysis Period and Area

The CE analysis period is defined as a reasonable length of time in which environmental changes have happened and are likely to happen again. These changes must be somewhat measurable and will encompass both the past, present, and foreseeable future (at least short-term). For changes in forest vegetation, the analysis period spans that time from when the last significant alterations in habitat have occurred to the time it will take to complete the proposed actions. For the SBKC project, the analysis period encompasses the last 10 years (1996) when early successional habitat was established to 2026 when reforestation activities are likely to be completed plus estimates of activities anticipated in a future planning period.

The CE analysis area encompasses 24,969 acres including 10,857 acres of MA 3.0, 5,644 acres of MA 2.2 plus 8,468 acres of private land. This CE area, National Forest Service administered land plus eight private parcels/sections (within), was selected because these lands include the entire S.B. Kinzua Cr. (6^{th} order) subwatershed that shares natural disturbances and stresses, insect infestations such as elm spanworm and gypsy moth, repeated drought, and tree disease complexes including sugar maple decline and beech bark disease that have adversely affected forest health and wildlife habitat. In addition, federal and private land within the CE area share common vegetation types, wildlife

habitats, drainage patterns, climate, geology, disturbance regimes, access, and cultural uses as well as potential future impacts.

- The CE boundary follows the watershed boundary and encompasses the smaller Glad Run, Hubert Run, and Watermill Run watersheds. It also includes small watersheds and streams near SR 321 that flow directly into the S.B. Kinzua Cr. These additional small watersheds include Mudlick Run, Fivemile Run, and Threemile Run. The CE boundary encompasses a portion of the town of Kane, PA (264 acres).

The CE area is approximately eleven times larger than the total acres of proposed commercial treatments in Alternative 2. Some of the CE area represent changes in MAs (reflecting different goals and objectives), plus varying levels of human usage, disturbance, and habitat fragmentation.

Based on estimates from GIS data and aerial photographs, the 8 parcels/sections of private land are a mosaic of 5,991 acres of mature forest, 240 acres of early successional or scrub/pole forest and 1,973 acres of opening habitat including active agricultural land, roads, utility corridors, old fields, and openings containing small businesses, camps, and permanent residences. A portion of the town of Kane, PA (264 acres) also comprises opening habitat. For the most part, private forestland supports trees that are mature. An estimate of how many intermediate harvests have occurred on these private parcels is difficult to determine from aerial photographs since the forest canopy appears to vary widely in density and crown diameter.

Of the 16,501 acres of National Forest land in the CE area, 299 acres are non-forested (opening habitat) and 16,202 acres are forested. Approximately 1,059 acres of this forested habitat is currently in an early structural (seedling/sapling, 0-20 years) condition. Past vegetation management (timber harvests), road construction, and oil and gas development have contributed to the current condition of wildlife habitats on these lands.

Within the CE area, there are approximately 41.5 miles of Forest Service system roads, 85.5 miles of non-system/unknown roads, and 30.6 miles of municipal roads (includes SR 321) which could cause vehicle associated disturbance and provide unlimited access into the environments available to wildlife. Many of these roads are not open to public motorized use, therefore disturbance would be limited and associated with those who utilize the road for administrative use or privately owned roads. Main roads accessing the CE area include SR 321, FR279, FR463, and FR186. There are approximately 92 miles of closed road (6.7 miles under Forest Service jurisdiction with the rest being lease roads) and 18.4 miles of restricted road (all Forest Service) traversing the CE area. These roads provide limited vehicle access and relatively easy “on-foot” access to various types of habitat. Gates, barriers, or signs restrict public use on these roads. There are 47 miles of open roads (includes all jurisdictions) that facilitate vehicle-associated disturbance and provide unlimited access into environments available to wildlife.

Wildlife habitat across public and private land in the CE area has been moderately affected by the development of approximately 392 oil and gas wells (plus their access roads and service lines) over the last century. According to GIS and current information, 25 of these wells are located with the project area. The majority of the wells and the highest degree of development are located on both private property and public land along

the South Branch Kinzua Creek near SR 321 outside of the project area but inside the cumulative effects area. Other areas of moderate development include the northeastern portion of the CE area near FR150 and development located on private property in and around the town of Kane, PA.

Cumulative Effects on Wildlife Habitat

The cumulative effects area is the entire South Branch Kinzua Creek watershed. Cumulative effects (CE) on wildlife habitat can occur as a result of changes in the spatial patterns of land uses or cover types and changes in land use intensity across a landscape. As discussed in Section 3.2.2, the CE analysis area is composed of 16,501 acres of public land and 8,468 acres of private property that combined is predominantly forested (90 percent) with what appears to be hardwood forest types similar to the SBKC project area.

In the CE area, approximately 5,991 acres of forested land on private property appear to be mature (51> years old). Using aerial photography it was difficult to determine the amount of intermediate harvests that have occurred on these private parcels. Using aerial photographs, it is estimated that approximately 240 acres of private property support early structural (seedling/sapling) habitat.

Projections of estimated activities on private forestland are based on research data taken from landowners across Pennsylvania, where 52 percent of these owners expect to commercially manage their timber over the next decade. Of those who will initiate management activities, 12 percent of the land will receive final harvests and 40 percent will receive an intermediate cut (C. Nowak, pers. comm.). Projecting out to 2026 and assuming all parcels have similar commercial opportunities, it is estimated that 748 acres will receive a final harvest and 2,492 acres would receive an intermediate harvest.

Based on GIS data and district records, timber harvest approved or completed in the CE analysis area include 684 acres of final harvest (overstory removals, shelterwood removals, and two-aged removals) and a minimum of 723 acres of intermediate harvests (thinning, salvage, single-tree selection, shelterwood, and group selection) associated with past projects from 1997 to 2006 on federal land. These include portions of projects such as the East Side EIS and Trails End Re-entry EA. In addition to these projects the North End project is scheduled to begin within the next three years within the CE area and timber harvests are proposed for that project this decade.

Chapter 2 lists the proposed silvicultural treatments for the SBKC project. Based on Forest Plan projections formulated from anticipated outputs found in Management Areas 3 and 2.2 (the MAs encompassing the SBKC project area) and average estimates from the original previously approved Gladwater and Trails End EA's, estimates of future timber harvests in ANF land from 2016 through 2026 can be made as approximately 8 percent of the CE analysis area is expected to receive a final harvest and 24 percent would receive an intermediate harvest per decade.

The mineral rights on public and private forestland are owned by private individuals or companies. Projected to the year 2026, these mineral leases may clear trees (removal harvest) from up to approximately 648 acres within the CE analysis area. An additional 52 acres may be cleared for pit expansion to obtain material to build new lease roads. These numbers are considered the maximum based on the average future projection of the high quarter and historic trends (USDA-FS 2007b, pp 2-59 to 60). It should be noted

that some of the development may not occur or potential stone used may come from outside the cumulative effects area. Some areas such as the town of Kane, PA will not see such development, while other areas where light to moderate development is currently occurring may see this type of expansion. Even with this development, new non-forest habitat in the CE area is expected to occur on up to three percent over the next two decades (Table 25). There are no other foreseeable substantial changes in land usages anticipated on private lands within CE area over the next two decades. Table 24 summarizes the cumulative effects of the silvicultural activities on the CE analysis area as whole. Projecting that timber management activities occur on National Forest land as well as private land, approximately 14 percent of the CE analysis area (both Alternative 2 and 3) would receive a final harvest from 2006 to 2026. This would increase the number of final harvests over levels conducted during the past 10 years. The level of intermediate harvests (thinning, selections, etc.) would increase to approximately 41 percent and 40 percent of the CE area (Alternatives 2 or 3 respectively) over the same 20 year period. However, these increases are not considered to have an adverse impact on wildlife in the CE area, since the majority of intermediate harvests would occur on federal land and appropriate Forest-wide S&Gs would be applied in these areas. All other federal actions either in this decade or the second decade will be analyzed on a project by project basis.

There is some Forest Service road construction and reconstruction currently planned or approved for the CE area during the next 20 years. The East Side EIS approved approximately 2.9 miles of road construction, 3.4 miles of road reconstruction, and 0.87 miles of road decommission within the CE area. The North End RAP identified approximately up to 4.4 miles of road construction that could occur in the CE area for potential resource management. The locations in the North End RAP are not site-specifically known at this time. These future road activities would be analyzed in the future. Under Alternatives 2 and 3, the existing road network will receive maintenance to adequately support future management activities from 2006 to 2016. New road construction will occur on 2.8 miles (0.1 new corridor and 2.7 existing corridor) in Alternative 2. The amount of road construction in Alternative 3 is less. Cumulatively this amount of road construction, coupled with Forest Plan S&Gs (USDA-FS 2007a, pp. 96-97) and design features will not have a substantial effect over the next two decades. Locations of road work are analyzed site specifically and S&Gs are applied to reduce the potential effects to soil, water, and wildlife habitats. Forest Service roads are expected to continue to function at their present traffic service levels. Road maintenance would continue to occur across the CE analysis area on an as-needed basis (depending on funding and safety concerns). These activities will have no adverse effect on sensitive, critical, or specialized wildlife habitat.

Table 24. Past, Present and Future Timber Harvests Projected for the Cumulative Effects Analysis Area 1997-2026

Timber Harvest Activity	1997-2006 Present Condition	2007 – 2026 Alternative 1	2007 – 2026 Alternative 2	2007 – 2026 Alternative 3
Final Harvest (percent of the CE analysis area)	3%	13%[1]	14%	14%
Intermediate Harvest (percent of the CE analysis area)	3%	34%[1]	41%	40%

1. Percentages reflect cumulative totals of past (previously approved 1997 – 2006) plus projected future treatments anticipated in the 24,969-acre CE analysis area including private land.

Table 25. Cumulative Distribution of Habitat for the 24,969 acre Cumulative Effects Analysis Area 2006-2026

Habitat Condition	2006 Present Condition	2026 Alternative 1 No Action	2026 Alternative 2	2026 Alternative 3
Non-Forest Habitat (percent of the CE analysis area)	10%	13%[1]	13%[1]	13%[1]
Seedling/sapling Habitat (0-20 years)	5%	18%[2]	19%	19%
Mature Forest Habitat – 51+ years (percent of the CE analysis area)	78%	71%	69%	69%

1. Percentages reflect cumulative totals of potential OGM development including wells, roads, and gravel pit expansion for new lease roads. Within the last four years, these numbers have not been realized. These openings due to their size are often inclusions in forested stands. Increases in opening habitat from pit expansion associated with proposed road activities in Alternatives 2 and 3 amounts to less than 1/10 of a percent.
2. Percentage reflects cumulative totals of previously approved and anticipated final harvests outside the SBKC but within the CE analysis area including projected final harvests on private land.

Based on the age class distribution and acres of non-forest and forested land in the CE analysis area, Table 25 displays the amount of primary habitats expected to be found at the end of the analysis period (2026) under each alternative. A small increase in non-forest habitat could occur if the OGM development continues at its current trend. These numbers are considered the maximum based on the average future projection of the high quarter and historic trends (USDA-FS 2007b, pp 2-59 to 60). This level of development has not been realized within the CE area in the last four years. A minor amount of forest habitat is expected to be converted into non-forest habitat, but the majority of these areas will remain opening inclusions within forested stands. Although increases in seedling/sapling (early structural) hardwood habitat are anticipated, these increases are not substantial especially considering the change would occur over a 20 year period. Decreases in mature forest habitat are anticipated and amount to <0.5 percent per year over the analysis period.

No unusual or unexpected developments are anticipated or projected for private land in the CE analysis area. It must be noted that future activities on private property are based on state-wide trends and remain somewhat speculative at any time.

Cumulative Effects on Habitat Fragmentation

An examination of the 24,969-acre CE analysis area finds that the effects of final harvests in both Alternatives 2 and 3 of the SBKC project on wildlife habitat produce various levels of habitat fragmentation. Because of their position on the landscape and in core forest habitat or forest core linkages, seven final harvest units (86 acres) reduce core forest habitat (highest ecological values 9 and 10). In addition, three other treatments (delayed shelterwood seed cuts) and subsequent shelterwood removals (45 acres) in the second decade (2016 to 2026) combined with final harvests above reduce core habitat further. Some of the effects of fragmentation in time are offset or diluted as stands in the 30-50 year old age class grow and contribute to core forest once again. In 2026, current pole size forest habitat (30-50 year old stands) of approximately 394 acres in the SBKC project area would begin to replace some of the core habitat that received a final harvest treatment and would begin providing some core values in the project area.

The increases in seedling/sapling habitat and decreases in mature forest habitat displayed on Table 24 equate to increases in 'other' non-core forest habitat often times at the expense of mature core habitat. These cumulative effects are the result of the final harvests in the SBKC project plus the previously approved projects and future projects (projected) on federal or private land across the CE area. Although final harvests result in a deduction in core forest habitat, the decreases in core habitat (under the action alternatives) are not substantial when considered across the CE analysis area over the next 20 years. A visual analysis of the CE area shows that forested core areas exist across the landscape. Forested core areas with values from 15 through 20, currently occupy approximately 5,734 acres (23 percent) of the CE area. From a landscape perspective, an examination of the various sections of the CE area finds that although there are reductions in core forest habitat as a result of the SBKC and other projects, relatively large core areas still remain and are linked with other core forest habitat. By 2026, within the CE area, approximately 1,231 acres of the current poles size forest habitat (30-50 year old stands) would begin to replace some of the core habitat that received final harvest treatments in previously approved and future projects and would begin providing some core values in the both project and CE analysis area. Regardless of the alternative selected, core habitat will be retained and continue to provide linkages, connectivity and travel corridors to core areas outside of the project area and within the CE area. MA 3.0 (at least 10,800 acres of the CE Area) direction in the Forest Plan emphasizes even-age management to provide a forest that is a mix of predominantly shade intolerant and mid-tolerant hardwood stands of various ages and associated under stories. Vegetative treatments are directed to balancing age class distribution (USDA-FS 2007a, p.26). While fragmentation effects and edge would be created, no permanent edge effects from timber harvest are anticipated.

The riparian corridor along South Branch Kinzua Creek would remain intact as there are no known final harvest treatments in previously approved or foreseeable future projects which would affect this important and relatively un-fragmented corridor and its riparian values.

Based on GIS and current data, there are 392 wells in the CE analysis area, but some of these wells are inactive or their status is unknown (229). The level of lease development in the CE area is considered to be low to moderate with higher levels of activity found near the South Branch Kinzua Creek adjacent to SR 321, near Kane, PA, and in the northeast portion of the CE area along FR186. Most new development is occurring in these areas. Other areas where new development is occurring include areas near FR279/FR587. Based on Forest-wide trends and the present well density and distribution, OGM development may impact approximately 700 acres (wells, pits, and roads) or up to three percent of the CE area over the next 20 years. At the present time, OGM development is expected to have little effect on habitat fragmentation in the CE area as most permanent openings related to OGM are inclusions in forested stands.

A review of previously approved and potential projects in the CE area shows that there is no proposed road construction or change in road management that will affect the Wilderness Trout Stream designation. Any projected road construction is to occur on the plateau or away from this stream. All previous treatments in the East Side EIS and the Trails End Re-entry EA are a considerable distance from S. B. Kinzua Creek, so the degree of remoteness is expected to continue throughout the CE period. Potential treatments for the North End project are not yet confirmed on the ground and the potential effects to the stream or size and shape of the unroaded areas by that project or any other project will be analyzed in the future. Lease roads from future OGM development have the potential to affect both the size and shape of the unroaded areas and the SBKC. One recent OGM project (Case 493) has proposed the extension of FR460 by 800 feet. This will slightly decrease the size and change the shape of unroaded areas #63 to a small degree (approximately 15 acres). There are no other site specific OGM proposals in the SBKC project area known at this time that may affect the unroaded areas >500 acres in the project area or CE area.

According to GIS, there are approximately 5,644 acres of MA 2.2 located within the CE area. A review of the recently approved East Side EIS and Trails End Re-entry EA show there were 38 acres of two-age harvests within MA 2.2 within the CE area. Potential treatments for the North End project are preliminary and have not been analyzed yet. Other future projects are not yet confirmed on the ground, but there is the potential for treatments to be proposed in the current MA 2.2 and would be accomplished following Forest Plan direction for that MA, that is, treatments would benefit wildlife habitat and late structural components and would be analyzed in the future.

Project Level Filter Approach: Effects on the Composition and Structure of MIS Wildlife Habitats

This section assesses potential effects on wildlife habitats associated with MIS for the ANF. Table 23 identifies projected changes in the amounts of habitat available to support MIS under each of the project alternatives over the next 10 to 20 year period.

Mourning Warbler - MIS for Early Structural Habitats

Under Alternative 1 (no action), no timber harvesting activities will occur in the SBKC project. The amount of early structural forest habitat (stand age classes 0 to 20 years) would decrease over the next 10 years as existing seedling and sapling stands continue to mature (Table 23). These natural changes under Alternative 1 would tend to decrease available habitat in the project area for the warbler that requires early structural forest

habitat. Over a longer period, some patchy natural tree regeneration may occur as a result of continued decline of the forest canopy in unhealthy or stressed forest stands. Without direct intervention to control competing vegetation and deer browsing; this regeneration will generally consist of lower quality habitat composed of American beech, striped maple, and birch. Permanent openings will remain relatively unchanged under this alternative with the exception of any future OGM activities that may occur.

Under Alternatives 2 and 3, the amount of early structural habitat in the project area is proportional to the amount of final harvests proposed in each alternative (Table 23). Alternative 2 will benefit species using early structural habitat to a greater degree because it has 31 more acres of final harvest than Alternative 3. Site preparation, herbicide application, fertilization, planting, non-commercial release cuts, and fencing proposed in these action alternatives will help to regenerate fully-stocked stands of diverse tree composition and shrub species in the harvested areas. Although the understory cover of herbaceous and woody vegetation would be temporarily reduced during the first two seasons following herbicide applications, these effects will be temporary and would result in improvements in the structure and diversity of understory vegetation over the long term. UEAM will create multi-age structure in areas to benefit the warbler.

Mourning warbler habitat would not be adversely affected by any of the proposed treatments and would likely benefit in the short term from increases in early structural habitat. Reforestation treatments are proposed to aid the stand in developing vertical structure composed of a diversity of tree species. Nesting habitat in existing early structural stands is protected from reforestation methods of site preparation and release with seasonal restrictions (USDA-FS 2007a, p. 80) From a project perspective, the action alternatives result in increases in early structural habitat over 10 years; but from a landscape scale, a modest 14 percent increase in seedling/sapling habitat is anticipated over the next 20 years across the entire CE area (including the project area) under Alternatives 2 and 3 respectively (see Table 25).

Timber Rattlesnake - MIS for Deciduous and Remote Habitat

Under Alternative 1 (no action), available habitat for species requiring mature and late successional forest types would remain essentially unchanged in the short-term as stands in the project area continue to slowly mature. Unroaded areas > 500 acres and remote habitat related to MA 2.2 and core/forested habitat will remain relatively unchanged. Approximately 4 percent of the project area that is in the 101 to 110 year old (saw-timber) age class would advance to the over-mature age class (111+ years old) classification in the next 10 years; with some recruitment of pole-size stands into the sawtimber age class (51-110 years), the total amount of sawtimber (51-110 years) in the project area would decrease during this same period (Table 23). Ample snags, den trees, and CWD would be available in the SBKC project from continued decline of the forest canopy in unhealthy stands and from the deaths of individual trees in healthy maturing stands.

Implementation of Alternatives 2 and 3 would result in a 4 percent and 3 percent reduction, respectively, in the availability of mature sawtimber and over mature conditions combined in the project area over the next 10 years (see Table 23). The size and shape of the unroaded areas > 500 acres would increase as some roads are decommissioned. Although there will be a decrease in forested core habitat/linkages in

these alternatives and some stands in MA 2.2 will be treated, remote and undisturbed areas will remain in the project area to provide habitat for the snake. Over the longer term and across a landscape scale, harvesting activities would help maintain a mosaic of forest habitat types and age classes that approximate natural disturbance regimes for the Allegheny Plateau (Ruffner and Abrams 2003). Examining the 24,969-acre CE area, the decrease in mature forest habitat (51+ years) is projected to be approximately 9 percent under both Alternative 2 and 3 over the next 20 years. In addition, the proposed treatments in the SBKC project and future federal projects would maintain continuous forest habitat by improving forest health conditions.

Final and intermediate harvests under Alternatives 2 and 3 would remove some of the trees that would otherwise serve as potential down woody debris due to mortality from forest decline factors (diseases, insect infestations and drought). However, S&Gs (USDA-FS 2007a, p.80) would ensure that an adequate supply of branches, tree tops, snags and potential coarse woody debris are retained in harvested stands and will continue to contribute to this habitat component.

The timber rattlesnake uses mature or regenerating deciduous forest containing suitable rock outcroppings for denning and basking. The proposed timber harvest units would increase early structural foraging habitat for this species. Rock outcrops and boulders are found in or near proposed harvest areas in the project. Potential rattlesnake den and basking sites are maintained and protected on the ANF and if a known den/basking site is discovered Forest-wide S&G's will be implemented (USDA-FS 2007a p.87). Rock features/outcroppings, specifically located in several stands in the SBKC project area, would be protected and maintained through the implementation of Forest Plan S&Gs (USDA-FS 2007a, p. 80) under Alternatives 2 and 3.

Northern Goshawk - MIS for Mid to Late Structural Mixed Deciduous/Conifer Habitats

Under Alternative 1, mid to late structural habitat is expected to increase, as no final harvest would occur. From a project perspective, species that require a mix of mature mixed conifer and deciduous forest types such as the Northern Goshawk would be negatively affected in the short-term by the completion of the action alternatives. This effect is not due to a change in the current conifer component, but is the result of reducing the mature forest component in the project area by 4 percent or 3 percent due to final harvests in Alternative 2 or 3 respectively by the year 2016. During that time period additional pole size stands will grow into the mature forest age class providing additional habitat. Under all alternatives there will be at least approximately 79 percent of the project area in a mid structural/mature age class which maintains suitable nesting habitat.

Eastern hemlock, either as pure stands (50 percent or greater stocking) or more importantly as inclusions in hardwood stands, on approximately 9 percent of the project provides suitable nesting, winter, and escape habitat cover. These components are not specifically proposed for harvest under Alternatives 2 and 3. Unless the presence of hemlock inclusions in treatment stands is entirely contrary to the site-specific silvicultural objectives, these inclusions would be retained during sale preparation and harvest operations. However, negative effects to the conifer may occur if the hemlock woolly aldegid moves into the area. Over the long term, continued forest decline from insects,

disease, etc. could have a slightly negative impact on these birds if areas currently in mature forest revert to opening habitat.

Areas of both mature and core forest habitat would be retained in the project area under Alternatives 2 and 3 (see Table 23) which would generally benefit more secretive species such as the northern goshawk. No active territories exist in the project area; therefore no adverse direct effects such as nest disturbance are anticipated. However, in the event an active nest for this species is discovered, Forest Plan S&Gs will be implemented to protect (USDA-FS 2007a p. 84-85) the area.

From a landscape scale, a decrease in mature forest habitat is projected to be 9 percent under the action alternatives over the next 20 years in the CE area. In addition some pole-size stands will begin to enter the mature forest habitat age class. Core areas of mature forest habitat would continue to be evaluated and managed in future projects in accordance with management area direction. A review of high impact areas (wells >33/square mile) and road density (>6.2 miles/square mile) used in the Forest Plan Biological Evaluation (USDA-FS 2007e, pp. 133-148) shows there are no areas with this density within the SBKC project area. In the CE area there are approximately 574 acres (high impact area) located on and immediately adjacent to private property near SR 321. Goshawks would avoid this area, as they prefer unroaded areas or roads that are use infrequently (USDA-FS 2007b, p. 3-196). Future actions may be initiated in an effort to control insect pests, specifically the hemlock wooly adelgid that is presently threatening the eastern hemlock across much of eastern PA. Conifer planting is slated to occur in the project area to supplement the existing component.

Cerulean Warbler - MIS for Mid to Late Structural Oak Forests

Because suitable habitat does not exist in the project area, there are no effects from project treatments or alternatives on the Cerulean Warbler. Deciduous forests (>51+ years old) will remain on approximately 79 percent of the project area and 69 percent of the CE area, therefore forested habitat would remain for migrants. There are no oak-type stands (>50 percent of the basal area in oak) in the CE area, but individual oak trees have been documented in the CE area.

Aquatic Invertebrate Diversity - MIS for Aquatic Habitat

No significant effects are anticipated to aquatic invertebrate habitat. As discussed in Section 3.3.2, suitable habitat for these insects is prevalent in most waterways in the project area. The perennial sections of streams (South Branch Kinzua Creek, Hubert Run, Glad Run, and Watermill Run) are sufficiently buffered from proposed timber harvesting, reforestation, and road activity treatment areas. Forest-wide S&Gs (USDA-FS 2007b pp. 74-79) would adequately protect water quality and prevent disturbances to riparian and aquatic habitats. Surveys by Cummins in 1993 showed that functional groups of aquatic insects existed to some degree in unnamed tributaries flowing into the South Branch within the CE area north of the project area. Forest-wide S&Gs would also be implemented to maintain the environment and water quality of intermittent (seasonal) streams, springs, seeps, and vernal pools from the effects of vegetation and road management.

Blocking of illegal ATV trail stream crossings to prevent or reduce soil erosion will also aid in the long-term protection of streams and water quality. Road maintenance,

decommissioning, and limestone surfacing under Alternatives 2 and 3 would help protect water quality and aquatic habitat in the project area and is expected to result in modest benefits to streams within the watershed. Road construction and reconstruction activities will have approved engineer road designs, Forest Plan S&Gs (USDA-FS 2007a, pp. 95-99) identified and implemented, and any site-specific mitigations measures implemented to protect water quality wherever the road prism is hydrologically connected to streams. Future projects in the CE area will be analyzed on an individual basis and will follow all pertinent Forest Plan S&Gs related to the protection of water resources. Private OGM development is expected to follow PA DEP regulations and Forest Plan S&Gs related to OGM are in place to protect forest resources (USDA-FS 2007a, pp. 90 -92). Private landowners are encouraged to implement best management practices (BMPs) (USDA-FS 2007b, pp. 3-275- 277) to minimize effects to water quality and aquatic invertebrates within the CE area.

As a result of the various protection measures mentioned, aquatic invertebrate diversity and relative abundance is not expected to be adversely affected from the proposed activities. Likewise, water quality would be protected and the present high-quality cold water fisheries designation would be maintained.

Fine-Filter Approach: Effects on Federally Threatened or Endangered, and Regional Forester Sensitive Species

This section presents a brief summary of the potential effects of the proposed SBKC project alternatives on threatened, endangered, and sensitive species and their habitats, using the fine-filter approach. The analysis concluded that no designated critical habitat for any federally-listed threatened or endangered species occurs in the SBKC project area; therefore, critical habitat issues are not presented in this project. The Biological Assessment (BA) in the project file contains additional detail of the potential effects of each of the proposed activities on federally listed species. Detailed information on the life history and distribution of each species on the ANF is provided in the Forest Plan Biological Evaluation (USDA-FS 2007e). Chapter 2 of this EA contains project-specific design features for compliance with the ANF LRMP.

Federally-Listed Threatened or Endangered Species

The following sections present potential effects of the alternatives on five federally listed threatened or endangered species, including the Indiana bat, small whorled pogonia, northeastern bulrush, clubshell mussel, and northern riffleshell mussel.

Indiana Bat

In spite of several seasons of surveying, the Indiana bat has not been documented in the SBKC project area or the 24,969 acre CE analysis area. No effect on the species would occur under Alternative 1 since no timber harvesting or other activities would occur. A "may affect, not likely to adversely affect" determination was made for the Indiana bat for both the action alternatives (Alternatives 2 & 3). The rationale for this determination is documented in the BA for this project. The potential loss of suitable roosting habitat and would be reduced through implementation of Forest Plan S&Gs (USDA-FS 2007a pp. 81-82). S&Gs also exist to protect known and newly-discovered Indiana bat roost trees on the ANF. All of the proposed timber harvest units would continue to provide some form of roosting and foraging habitat for this species. Approximately 79 percent of the project area will retain mature (>51 years old) forest cover. Previously approved

projects in the CE area also contain S&Gs and any future federal action will implement the appropriate S&Gs. Habitat in the CE area will be maintained as more than 69 percent of the area will be mature forest cover (>51 years old) in 2026, therefore habitat for the bat will continue over much of the CE area. Future OGM development (private) could result in direct mortality of the bat if an unknown population exists and the conversion of forest habitat to permanent openings will result in the loss of suitable roosting habitat within the CE area. The amount of OGM activity projected over the next twenty years may occur on up to 3 percent of the CE area.

Small Whorled Pogonia

This rare orchid has not been found during field surveys in the SBKC project area, the CE analysis area, or on the ANF. Therefore, the activities in the alternatives pose no direct risk to the species. Except for the 9 acres of gravel pit expansion and development and road construction associated with Alternatives 2 and 3, potential suitable is not converted to non-forest habitat. An estimated 4 acres of pit expansion for a previously approved project, a potential 2.2 acres expansion for a future project, and a projected 700 acres of potential well, road, and pit expansion associated with future private OGM developments may convert forest habitat to non-forest habitat. The OGM projections are based on the average of the historic trends and high quarter in the Forest Plan (USDA-FS 2007b, pp. 2-59 to 60) and have not been realized in the last four years in the CE area. This amount of change and reduction of potential suitable habitat is not substantial, especially considering that these changes would occur over the next 20 years and across the 24,969 acre CE area. Future federal actions in the CE area pose no substantial long-term effect and no substantial land use changes are anticipated on private land in the CE area. Suitable forested habitat is expected to remain readily available and growing conditions may improve over the analysis period with continuing efforts to reduce and maintain the white-tailed deer at levels in-line with the carrying capacity of the land. A "no effect" determination is reached for this species regardless of the selected alternative. The Forest Plan provides direction for the protection of this orchid and other unique plant communities (USDA-FS 2007a p.84).

Northeastern Bulrush

This wetland plant species has not been found during field surveys in the SBKC project area or during a forest-wide wetland plant survey conducted by the Western Pennsylvania Conservancy. Due to the absence of documented occurrence of this species in the project area and on the ANF and considering that Forest Plan S&Gs (USDA-FS 2007a pp.74-79) would be implemented to protect wetland plants and suitable habitat, a "no effect" determination was reached for the northeastern bulrush under all the alternatives. The SBKC in combination with other past, present, and foreseeable future activities within the CE area will not jeopardize the continued existence of this species.

Clubshell Mussel and Northern Riffleshell Mussel

These species have not been documented in the SBKC project area or CE analysis area. In addition, suitable habitat has not been identified for the clubshell mussel or the northern riffleshell mussel in the project or CE area. Proposed activities are a considerable distance away from the portion of the ANF (referred to as the 13 percent Area) that drains directly into the Allegheny River (where suitable habitat occurs and effects could occur) downstream of the Allegheny Reservoir. Previously approved or future projects in the CE area are generally positioned in upland locations and all federal

activities on the ANF provide protection for water resources regardless of their size or quality (USDA-FS 2007a pp. 74-79). As a result, a "no effect" determination is reached on either of these species under any of the alternatives.

Regional Forester Sensitive Species

The BE determined that the proposed activities would have no impacts that would lead to federal listing for any of the 61 RFSS on the ANF. These include the two candidate species that will be fully evaluated in the future by USFWS. Table 15 lists the species and their status within the project area. No species were considered to have occupied habitat within the project area. However there are few species that have been documented or observed within the CI (Cumulative Impact) analysis area. A summary of the effects of species using similar habitat are grouped and presented together.

Timber Rattlesnake

The timber rattlesnake is a RFSS species with suitable (unoccupied) habitat in the project area. Foraging individuals (official sightings) and confirmed winter dens or basking sites have not been documented in the SBKC project area or CI analysis area. There is a chance that migrating or foraging individuals (especially males) may use portions of the project at least for limited periods of time. Forest management activities using heavy machinery (timber harvesting, herbicide application, fence construction, road construction, etc.) could harm or harass foraging individuals if the activities occur during the species' active period should individuals move into the project area.

Regarding potential habitat, field records indicate rock outcrops and boulders are found in or near proposed harvest units. Some of these surface features may provide suitable den or basking habitat, but rattlesnake use of these specific features has not been confirmed. The presence of rocks and boulders increases the likelihood that rattlesnakes may frequent the project area. These features, specifically located in several stands in the SBKC project area would be protected and maintained through the implementation of Forest Plan S&Gs (USDA-FS 2007a, p. 80) under Alternatives 2 and 3. In the event a den/basking site is discovered it would be protected using Forest Plan S&Gs (USDA-FS 2007a p. 87).

Alternative 1 would not impact this species because no forest management activities would occur. Under Alternatives 2 and 3, suitable unoccupied foraging habitat would be altered with the completion of the shelterwood removals where mature forest habitat is converted to early structural habitat. The remaining intermediate harvests would partially open the forest canopy. All harvests in the project would leave a substantial amount of coarse woody material (un-merchantable debris) across the forest floor increasing potential foraging sites. Road construction activities and gravel pit expansion and development would convert forest habitat to openings that could provide potential basking habitat.

Commercial forest management (timber harvests, reforestation activities, and road construction that use heavy machinery) in the SBKC project, previously approved and future projects on National Forest and private lands in the CI analysis area create a risk that foraging rattlesnakes could be harmed or harassed if activities occur during the species' active period. However, distributing the risk and considering the impacts to habitat across selected stands over the 24,969 acre area over a 20-year period may impact foraging individuals but will not cause a trend toward federal listing of this species. If

foraging individuals, winter den sites or basking areas are discovered during implementation of any alternative or in the other anticipated project, forest-wide S&Gs (USDA-FS 2007a, p. 87) would be implemented to protect this species. Efforts will continue to educate Forest-users about the biological benefits of this reptile to reduce the potential of harming rattlesnakes during chance encounters with commercial operators and the general public.

Northern Flying Squirrel

The northern flying squirrel has suitable but unoccupied habitat within the SBKC project and CI analysis area. With 2 percent of the project area typed as conifer stands and up to 9 percent of mixed conifer/hardwood stands (conifer occurs in the understory, midstory, and overstory), suitable habitat is present. Under Alternative 1, no activities will take place and as a result there will be no impact to this species or its habitat. Under Alternatives 2 and 3, timber harvest may alter suitable habitat, but "no impact" to individuals is expected. With the implementation of Forest Plan S&Gs (USDA-FS 2007a p. 84) and the placement and monitoring of six squirrel nest boxes, habitat will be maintained and enhanced under Alternative 2 and 3. In addition the following design features would be followed to enhance habitat:

- *Maintain the existing conifer component and retain all hemlock and white pine >18" dbh in all treatment areas.*

Providing nest boxes would also provide opportunities for monitoring, which may yield information on species requirements. As a result, none of the alternatives are expected to cause a trend toward federal listing for this species. Within the CI area, OGM activity that results in converting forest habitat to openings and HWA (if reaches the ANF) pose the greatest risk species. However, OGM is expected to occur on less than three percent of the CI area. All past and future federal actions involving vegetation management and road construction have the potential to alter habitat, but Forest Plan S&Gs favor conifer species and conifer/deciduous forest will remain relatively intact.

Bald Eagle

There are no occurrence records of this species in the project area and there is no documented nesting, roosting, or foraging area(s) found in the project area. There are documented foraging areas within the CI analysis area. The eagle has been seen foraging at the mouth of S.B. Kinzua Creek near the Allegheny Reservoir, approximately five miles from the SBKC project boundary. The proposed timber harvests and reforestation activities would not alter suitable habitat. Project activities take place a considerable distance from documented nesting, roosting and foraging habitat. Substantial buffer zones of mature hardwood forest and significant changes in topography exist between the proposed treatment areas and eagle habitat in the CI area. The proposed activities are expected to have no impact on the bald eagle in the project area or CI analysis area. The availability of bald eagle habitat would not change across the ANF with the completion of the project. The effects of the SBKC project in conjunction with other approved or proposed federal projects and anticipated activities on private forestland in the CI area would not impact this species. Effects to water quality will be minimized or mitigated with Forest Plan S&Gs (USDA-FS 2007a pp. 74-79). All Forest Plan S&Gs (USDA-FS 2007a p. 82-83) for the bald eagle will be followed in the event eagle use within the area is discovered. As a result the determination under the alternatives is "no impact" for the bald eagle.

Northern Goshawk

There are no documented nest sites of this species within the project area. None of the 12 nesting territories that have been known to be active on the ANF in the last five years is located in the project area. Because the SBKC project area is predominately forested with a mixture of age classes the entire project is considered suitable habitat. Under Alternative 1 there are no activities proposed, so no impact will occur. Under the action alternatives, suitable habitat would be altered, but forest habitat would still predominately make up approximately 79 percent of the project area and 69 percent of the CI area, consequently the area will continue to provide suitable nesting/post fledging habitat over the long term. In addition Forest Plan S&Gs (USDA-FS 2007a pp. 84-85) will be implemented to protect any goshawk nest site found during implementation. As a result the proposals in SBKC will not cause a trend toward federal listing of the species.

Butternut, Hooker's Orchid, Mountain Wood Fern, Canada Yew, American Ginsing, Bristly Black Currant, American Fever-Few, Checkered Rattlesnake Plantain, Bartram Shadbush, White Trout Lily, Red Currant, and Mountain Starwort

These RFSS are characterized as either upland plants associated with a forested environment or suitable habitat may consist of openings, roadsides, savannahs, or riparian areas. Habitat for plants ranges from very dry (xeric) to mesic/hydric conditions. These species all have suitable habitat within the SBKC project area, but no individuals have been documented within the project or CI area. Under Alternative 1, there are no proposed treatments, therefore no impacts are anticipated. Under Alternatives 2 and 3, suitable habitat may be altered for those species in an upland setting or along roadside openings because of vegetation and road management: but over the long term, suitable habitat is expected to return to these areas as the forest grows and matures. Except for the acres of OGM, pit expansion and road construction, no permanent loss in forested habitat is anticipated in the project area and across the CI analysis area. Plants associated with mesic/hydric conditions tied to riparian areas have forest-wide S&Gs that protect these habitat types. If any of these RFSS plant species are discovered during implementation, Forest Plan S&Gs (USDA-FS 2007a pp. 80-89) and mitigation measures in the Forest BE (USDA-FS 2007e, p. 260) will be implemented to protect these and other unique plant communities. Therefore, the alternatives will have no impact on individuals and will not cause a trend toward federal listing for these species.

Yellow-bellied Flycatcher, Osprey, Wood Turtle, Harpoon Clubtail, Uhler's Sundragon, Midland Clubtail, Ski-tailed Emerald, Maine Snaketail, Zebra Clubtail, Rapids Clubtail, Mustached Clubtail, Ocellated Darner, Creek Heelsplitter, Gilt Darter, Channel Darter, Bluebreast Darter, Mountain Brook Lamprey, Burbot, Weigand's Sedge, Rough Cotton-grass, Creeping Snowberry, Thread Rush, Sweet-scented Indian-plantain, Stalked Bulrush, Kidney-Leaved Twayblade, Boreal Bog Sedge, and Queen of the Prairie

These RFSS are associated with aquatic, wetlands, riparian, floodplains, sphagnum swamps, and saturated spring habitats. These RFSS plants are closely tied to very wet conditions (hydric). Old railroad grades located in bottomlands may provide nesting habitat for wood turtles. The primary threats to these species include degradation of water quality, major changes in vegetation that could influence water quality, pollution, and sedimentation. These species have either suitable habitat in the SBKC project area or

have been documented within the CI area, or have suitable habitat in the CI area. Occurrence records indicate that at least one portion of the CI analysis area contains habitat where the species has been found and/or that suitable habitat for the species exists in the CI analysis area.

No timber harvesting or reforestation activities would occur under Alternative 1; as a result, there would be no impact to these species or their habitat. Under Alternatives 2 and 3, implementation of Forest Plan S&Gs (USDA-FS 2007a pp.86-87), special consideration given to riparian areas (USDA-FS 2007a pp. 74-79), and mitigation measures and design features regarding the protection of aquatic environments (streams regardless of their size and classification), the SBKC project and any future forest management projects on federal land in the CI analysis area would have no impact on these aquatic/riparian-associated species. In addition, there is a plethora of laws and regulations protecting streams and wetlands in Pennsylvania under the jurisdiction of various governmental agencies and private landowners are encouraged to follow BMPs (USDA-FS 2007b, pp. 3-275-277).

Currently, OGM developments occur at low to moderate levels across the SBKC project area and the CI area. Future impacts are not projected to be substantial as these developments may occur on up to three percent of the CI area over the next 20 years. Each of these developments must follow a State approved Erosion and Sedimentation Plan to safeguard the waters of the Commonwealth of PA. The SBKC project in combination with future forest management activity on federal or private land in the CI area is not expected to impact these species or cause a trend toward federal listing.

Long-solid Mussel, Rabbitsfoot, Rainbow Mussel, Rayed-bean, Round Pigtoe, Snuffbox, Threeridge, White heelsplitter, Sheepnose, Wabash Pigtoe, Green-faced Clubtail, Resolute Damsel, Longhead Darter, Spotted Darter, Tippecanoe Darter, Gravel Chub, Mountain Madtom, and Northern Madtom

As discussed in the BE, no suitable habitat has been documented for these RFSS, which include the two federal Candidate Species (Rayed-bean and Sheepnose), in the SBKC project area or CI analysis area. As a result, no direct, indirect, or cumulative impact would occur for any of these species under any alternative. Regardless of the alternative selected for the SBKC project, its associated activities will not cause a trend toward federal listing of these species.

Summary

For the RFSS which have either suitable but unoccupied habitat in the project area, or suitable unoccupied or occupied habitat including those species associated with upland terrain, aquatic, wetland, or riparian habitat in at least one portion of the SBKC project area or 24,969 acre CI analysis area, the “likelihood of persistence” of these species is high under all alternatives. Some habitat may be altered, but not to the detriment of any species or at a level that causes a trend toward federal listing of the species. In other words, the likelihood that known populations of these sensitive species will continue to live and reproduce in the area throughout the life of the project is high.

4.2.3 Non-Native Invasive Species

Environmental Consequences

This section describes the environmental consequences of the various alternatives considered for the SBKC project. Potential direct, indirect and cumulative impacts of each alternative are addressed below.

Direct and Indirect Effects on Noxious Weeds/Invasive Plants by Alternative

NNIS Treatments

The vast majority of the occurrences of NNIS in the project area consists of 'trace' or 'low intensity' infestations of scattered individuals or small, widely distributed communities. Approximately 15 acres of invasive weed control is prescribed for the project area mainly along roads. Proposed treatments include manual/mechanical cutting or digging and/or foliar and/or cut stem herbicide application. Additional areas of infestation may be documented as treatments are implemented and will be treated as appropriate following Forest Plan direction. Other methods designed to reduce the spread of NNIS include following Forest Plan S&Gs (USDA-FS 2007a p.53) which will be considered and/or implemented as appropriate.

Alternative 1 (No Action)

Since there are no new federal activities proposed under Alternative 1 (no action), there will be no direct effects related to NNIS. Over the long-term, it is anticipated that small canopy gaps will continue to occur as natural tree mortality takes place. Where mortality occurs and openings form in the forest canopy, increasing amounts of sunlight reach the forest floor and the risk of invasion and spread of shade intolerant NNIS may increase. Shade tolerant NNIS may invade or spread if seed sources and dispersal vectors are available and adequate. Roads and illegal ATV trail corridors will remain the same and may continue to act as vectors that aid in the spread of NNIS. No (direct control) NNIS treatment or mitigation measure to minimize the spread of invasive plants would occur under this alternative.

Alternatives 2 and 3

Effects of Timber Harvest

Any activities that cause disturbance and/or significantly open-up the forest canopy have the potential to facilitate the introduction and spread of NNIS. As a result, final harvests proposed under Alternatives 2 and 3 are expected to create conditions conducive to the spread of NNIS. Thirteen of the 23 stands (57 percent) proposed for shelterwood or overstory removal harvests under Alternative 2 have documented NNIS near the treatment areas. Due to the documentation of a seed source, these stands presently pose the greatest risk to NNIS spread due to implementation of vegetation management activities. Treatments are proposed for direct control of NNIS under these action alternatives.

Removal harvests are proposed on 311 acres and 280 acres under Alternatives 2 and 3 respectively. These treatments involve removing most of the existing overstory which will improve growing conditions for shade intolerant NNIS. The increase in light and disturbance from these treatments may increase the risk of spread of NNIS that presently exist near the treatment areas. However, the temporary nature of the openings that are created by the removal harvests are expected to have a short-term effect. This is

supported by on-Forest monitoring, which shows that in 10 years, herbaceous and shrubby vegetation are overtopped by hardwood trees and begin to disappear from the stand. By the time the stand is 15 years old, the forest canopy has closed and the site no longer provides desirable growing conditions for shade intolerant vegetation. With Alternative 3 there will be less final harvest so the potential for spread of NNIS will be less than Alternative 2. Because NNIS presently exist near stands proposed for harvest, it is possible that logging equipment used on these sites could serve to facilitate spread of existing NNIS by carrying seeds or reproductive fragments into other areas. In order to reduce the possibility of indirect spread off-site, Forest Plan S&Gs (USDA-FS 2007a p. 53) and/or timber sale contract provision for equipment cleaning will be implemented.

Timber Harvest Effect Summary
While timber harvests may create conditions conducive to the establishment of NNIS, based on the analysis presented above and the following rationale, effects are not expected to be significant under any action alternative:

- There are no significant infestations of NNIS in the project area and approximately 15 acres of NNIS weed control will be implemented mainly along Forest Service roads.
- Proposed harvest and reforestation treatment units that result in conditions conducive to establishment of NNIS are very widely scattered and the openings created by these treatments are temporary (very short-term), minimizing long-term impacts or possible spread of NNIS.
- Implementation of Forest Plan S&Gs (USDA-FS 2007a, p. 53) will minimize or reduce dispersal from existing NNIS infestations.
- Approximately 43 percent and 42 percent of the stands proposed for final harvests under Alternatives 2 and 3 (respectively) do not have a documented NNIS seed source nearby and the risk of spread into these sites is considered low.

Effects of Reforestation Treatments

Alternative 1: No Action
Because there are no reforestation treatments proposed under this alternative, there will be no direct or indirect effects related to NNIS under this alternative. However, areas in Alternative 1 where reforestation treatments are planned in Alternative 2 and 3 may be more conducive to a higher rate of spread because there will be no efforts to reforest these stands. No (direct control) NNIS treatment would occur under this alternative.

Alternatives 2 and 3
Any activities that increase light and/or cause disturbance to the forest floor have the potential to increase the spread of NNIS. This risk is greatest in stands that have a documented NNIS seed source (infestation) in close proximity to the treatment area. Areas proposed for treatment that do not have an established NNIS seed source are not expected to result in any significant direct or indirect effects related to NNIS. The following discussion describes the effects of proposed reforestation work in stands that have a NNIS seed source in or near proposed treatments. Treatments are proposed for direct control of NNIS under these action alternatives.

Site Preparation for Natural Regeneration
Stands proposed for site preparation that are near a documented NNIS infestation pose the greatest risk for spread and site preparation is proposed in treatment areas on 812 acres and 750 acres under Alternatives 2 and 3 respectively. Many of the stands proposed for site preparation have NNIS nearby.

Site preparation involves the cutting of mid-story beech, striped maple, and other poorly formed or damaged stems. Although this treatment will not result in any disturbance to the forest floor, the treatment will permit increased amounts of light to reach the forest floor by greatly reducing mid-story vegetation, and may improve growing conditions for shade intolerant or mid-tolerant NNIS. This effect will be short-term in nature however, because effects of timber harvest on the site will result in the rapid development of desirable tree seedlings, and within 10 years, site conditions will no longer be conducive to the spread of NNIS. This type of work is accomplished using small handheld equipment such as chainsaws or brush trimmers. As a result, there are no significant direct or indirect effects to NNIS resulting from site preparation treatments proposed under any action alternative.

Fence Construction
There are 746 acres and 686 acres of fence construction proposed in the action Alternatives 2 and 3 (respectively), and many of these treatments are near a documented NNIS infestation. To reduce the potential introduction of NNIS, Forest Plan S&Gs regarding heavy equipment will be followed. With implementation of these guidelines, there is no significant direct or indirect effect to NNIS resulting from fence construction proposed under any action alternative.

Herbicide Application
Herbicide application is being proposed in Alternatives 2 and 3 on 896 acres and 834 acres respectively. Many of these stands have documented NNIS species or are adjacent to roads that have documented NNIS. Direct effects of this activity include direct mortality of any NNIS in the site being treated. Indirect effects include the possible introduction or spread by equipment containing viable seeds or reproductive fragments. In order to reduce the possibility of indirect seed dispersal, implementation of Forest Plan S&Gs will be followed and there is no significant indirect effect to NNIS resulting from proposed herbicide application anticipated under any action alternative.

Non-commercial Release
Non-commercial release cuts are proposed for 654 acres and 610 acres under Alternatives 2 and 3 respectively. Release treatments are conducted (several years) following a final harvest to maintain species diversity and involves the cutting of mid-story beech or striped maple, as well as poorly formed or severely damaged stems. Direct effects include increases in light availability and possible spread of NNIS in the canopy gaps created by the release treatment. However, advanced hardwood regeneration will remain at an adequate level on each site and vegetative competition and shade from sapling and young pole size trees remaining following the release treatment are expected to prevent the establishment of any NNIS. This type of work is accomplished using small handheld equipment such as chainsaws or brush trimmers. As a result, there are no significant direct or indirect effects of this treatment anticipated under any action alternative.

Fertilization
There are approximately 96 acres of fertilization under Alternative 2 and 3. Stands proposed for fertilization that are near a documented NNIS infestation pose the greatest risk for spread. Fertilization of an area that has NNIS may allow those species to grow and become established at a quicker rate than if no fertilizer is applied. Indirectly, fertilization will allow natural regeneration to grow and become established at a quicker rate which shortens the time in which NNIS may become established. Other indirect effects include the possible introduction or spread by equipment containing viable seeds or reproductive fragments. Following Forest Plan standards and guidelines will reduce this potential for spread.

Crop Tree Release or Management
These treatments are scheduled for timber stands that are typically 30 to 50 years old. These stands will be treated with mechanical site prep tools to release around a selected tree within the stand. This treatment will ensure that a diversity of trees and shrubs exist in the stand and will not be overtopped by undesirable tree species such as black birch, striped maple, and pin cherry. This treatment will have the same effects to NNIS as non-commercial release treatments. As a result, there are no significant direct or indirect effects of this treatment anticipated under any action alternative.

Transportation Activities
Approximately 0.1 miles of road construction on new corridor and 2.7 miles on existing corridor (Alt. 2) is proposed for the SBKC project. To facilitate these transportation activities, pit expansion/development are proposed on 9 acres in the SBKC project area. Increases in miles of new road corridor will increase the likelihood of the spread of NNIS species into the forest interior. The same effect will result from pit expansion as openings increase the potential for the spread of NNIS. Road construction effects will be negligible because the majority of the road corridors already exist. All roads constructed will be closed or restricted to the public which will aid in reducing the spread of NNIS as the number of vehicles using the road will be low. The total amount of FS roads open to the public in the project area will be reduced from 42 percent to 21 percent under Alternative 2. Approximately 79 percent of the FS roads will be either restricted or closed to public in both Alternatives 2 and 3, thereby reducing vehicle use and the likelihood of the spread of NNIS. Also, in order to reduce the likelihood of NNIS spread, all transportation activities that utilize heavy road construction equipment will follow Forest Plan standards and guidelines.

Other Treatments
Wildlife proposed treatments such as planting and fencing would increase native and diverse species; thereby aiding in the reduction of NNIS spread. Soil and water proposals related to blocking illegal ATV trails, and correcting road related problems will have a minor but beneficial effect on NNIS as vehicle access is reduced. Decreasing the number of vectors (method of spread) along road, stream, and utility corridors will reduce the spread of NNIS species into the before-mentioned corridors.

Effects of Direct Control of NNIS Treatments
Alternatives 1
There is no direct NNIS control treatments proposed under alternative 1. The NNIS along road corridors are likely to expand in areas where additional sunlight has made it conducive to proliferate.

Alternative 2 and 3

There is direct control of approximately 15 acres of NNIS species located primarily along road corridors. Effective treatment of NNIS often require multiple techniques (manual, mechanical, and chemical) during the growing season and/or over many growing seasons. The direct effect of treatment is the mortality of NNIS. Indirect effects of treatment include the potential for introduction and/or spread by equipment containing viable seeds or reproductive fragments. Prevention measures such as equipment cleaning will be implemented when moving equipment.

Cumulative Effects

Cumulative effects (CE) were analyzed by identifying and evaluating direct and indirect effects of management activities on National Forest land that, when considered cumulatively over time and in combination with effects of actions on private land, may result in significant effects to NNIS. The CE analysis period is a reasonable length of time in which environmental changes have happened and are likely to occur again. These changes must be measurable and will encompass past, present, and the reasonably foreseeable future. Based on the analysis presented under direct and indirect effects, activities most likely to result in cumulative effects from Forest Service management activities include timber harvest and transportation activities. The analysis period encompasses 10 years prior to this project and 20 years into the future. See rationale for CE area and time period in Section 3.2.2.

The NNIS CE analysis area is the South Branch Kinzua Creek watershed and includes the 16,501 acres of National Forest land, including the project area, plus eight parcels or portions of private land totaling 8,468 acres. The CE analysis area encompasses 24,969 acres that presently supports approximately over 2,536 acres of opening habitat (with approximately 88 percent associated with private land) and approximately 22,433 acres in forest cover (with approximately 72 percent under Forest Service jurisdiction).

Maturing hardwood forest habitat dominates the CE area. Using GIS and current age class distribution data, it is estimated that 5 percent of the CE analysis area is seedling/sapling habitat (1-20 years old), 10 percent is in openings, and approximately 78 percent is maturing forest habitat (51+ years). Those stands having received a final harvest within the last 20 years now support early structural forest habitat. Based on the cumulative vegetation totals by treatment(s) for cumulative vegetation effects, within the last 10 years, approximately 3 percent of the federal lands in the CE area have received some type of intermediate harvest. Over the next two decades regarding private forestland in the CE area, it is estimated that 748 acres will receive a final harvest and 2,492 acres will receive an intermediate harvest.

By 2016, within the SBKC project area, a total of 311 acres of final harvest would be completed under Alternative 2 and 280 acres under Alternative 3. Approximately 1,923 acres and 1,559 acres of commercial intermediate harvest would occur under Alternatives 2 and 3 respectively. On some of these acres there may be more than one entry. Trees would also be removed from up to 5 acres for gravel pit expansion under Alternatives 2 or 3, respectively, to complete road maintenance. In addition to the SBKC project, previously approved projects on National Forest land in the CE area include portions of the previously approved East Side EIS, Trails End Re-entry EA, and Blacksnake EA (no treatments within CE border). It is estimated that these approved harvests within the CE area, the SBKC project (the proposed alternative), and projected timber harvests from

future projects, including the North End project and those occurring on private land, within the CE analysis area combined, would result in 3,499 acres (14 percent of the CE area) of final harvest and 10,261 acres of intermediate harvest (41 percent of the CE area). The potential for spread of NNIS into areas proposed for final harvests or intermediate harvests are short-term in nature, due to rapid development of woody vegetation on the site, which generally provide too much shade for intolerant NNIS to become established. As a result, stands 10 years of age or less are considered to be the most susceptible to infestation.

There are 15 acres of direct control of NNIS proposed in the SBKC project. This coupled with the 2 acres of direct NNIS control within the previously approved Trails End Re-entry EA (portions within the CE area) aids in reducing the number and chance of spread of NNIS within the CE area.

New road construction is anticipated in the CE analysis area. The East Side FEIS approved approximately 2.9 miles of new construction and 3.4 miles of road reconstruction within the CE area and the North End RAP projected up to 4.4 miles of road construction within the CE area. Proposed road construction on existing corridors in the SBKC project area which was generated from the North End RAP includes construction on FR448Aa, FR448Ab, and FR186A. Most transportation investments have been made during the previous entries into the area (1986-2006). No major shifts in vehicle access are expected, although some roads will be moving from the "open" status to "restricted use" i.e. they will be opened seasonally for hunting season in the CE area. Roads will likely continue to function at their present traffic service levels during the next two decades in most of the CE area. Up to 14.4 miles of road maintenance including spot stoning and drainage improvements would occur in the SBKC (action alternatives). The effect of road maintenance in the CE area is expected to be insignificant. Road maintenance needs are assessed annually across the ANF. Maintenance would occur on an as-needed basis (depending on funding) to ensure public safety and is expected to have minimal effect on NNIS. Prevention measures such as equipment cleaning will be implemented. New road construction corridors have the potential to spread NNIS into new corridors. However all new road construction activities within the project and CE areas will be closed or restricted to public traffic, thereby reducing the potential for the spread of NNIS. Road decommissioning will occur on approximately 3.0 miles of both non-system and system roads in the CE area and will aid in the reduction of spread of NNIS as road use is eliminated and bare soils are reclaimed.

Based on GIS and current data, there are 392 wells in the CE analysis area that have been developed across the CE analysis area over the last century. The mineral rights on public and private land in the CE area are owned by private individuals or companies. Based on historic Forest-wide trends and recent development, it is estimated that 498 additional wells may be developed over the next two decades. Using an average of 1.3 acres of impact per well (road and well pad) these leases may clear up to 648 acres of forestland within the CE area. An additional 52 acres may be cleared for pit expansion to obtain material to build new lease roads. This rate of development has not been realized in the CE area in the last 10 years.

A direct effect of oil and gas well development on NNIS is the permanent alteration of habitat, mainly the loss of forest habitat and creation of opening and edge habitat that could provide suitable habitat for most NNIS. However, considering the size of the CE

area and based on the level of activity that is projected, OGM development may directly affect approximately 3 percent of the CE area, and not have a substantial impact on NNIS. In addition, areas of disturbance (such as well sites) are typically re-vegetated or stabilized readily reducing the potential for establishment of NNIS, and they usually occur as inclusions in forested stands.

Within the CE area on private lands near the town of Kane there are residential and agricultural areas that contain concentrated areas of NNIS species. State Highway 321, with its moderate amount of vehicular traffic, acts as a vector in spreading NNIS along its corridor, especially in areas of non-forest cover. NNIS that are shade intolerant are not likely to spread into the interior of the forest in substantial numbers. Efforts to educate forest users and homeowners are underway through federal and state programs as well as local county governments in order to reduce the number and spread of NNIS species on private property. With these efforts, including education, treatments and S&Gs and the heavy forest canopy component in the interior of the CE area, the NNIS on private land are unlikely to have a substantial cumulative effect related to the spread of NNIS in the project.

Based on the above analysis, anticipated effects are not expected to differ substantially from those described under direct and indirect effects. There are no substantial cumulative effects related to the introduction or spread of NNIS anticipated under any action alternative:

- There are presently no documented large infestations of NNIS in the SBKC project or the CE analysis area on federal land and surveys show when infestations do occur, they are generally small, low density, and scattered.
- Approximately 17 acres of NNIS weed control will be implemented within the CE area.
- The openings created by harvest treatments are temporary in nature, thus minimizing long-term impacts and the possible spread of shade intolerant NNIS.
- Standards and Guidelines to reduce the spread of NNIS will be followed (USDA-FS 2007a p. 53)
- Presently, approximately 85 percent of the CE analysis area consists of forested stands >20 years of age and has a relatively low potential for the spread or introduction of most shade intolerant NNIS. Forested stands on federal land of all ages will remain on most (>95%) of the project area.
- Road maintenance will occur across the CE area on an as-needed basis (depending on safety issues and funding) and is expected to have minimal effect on NNIS. Prevention measures such as equipment cleaning will be implemented.
- Efforts are being made to educate forest users and private landowners to recognize NNIS and reduce the spread of these species.

4.3 Social Environment

4.3.1 Heritage

Heritage resources within the SBKC project area comprise short-term prehistoric occupation sites and historic era sites related to logging, oil and gas development, and homesteads. Such sites are most likely to satisfy significance criterion D for the National Register of Historic Places eligibility.

Section 106 of the National Historic Preservation Act (NHPA), as amended, requires State and Federal agencies to avoid degradation or destruction of sites eligible for the National Register. Until evaluated, recorded sites must be managed as though they have been determined eligible. At this time, heritage resources identified in the SBKC project area will be avoided.

Alternative 1: No Action

Direct and Indirect Effects

No proposed activities would occur; therefore, there would be no effects since there would be no change to heritage resources form the proposed activities.

Alternatives 2 and 3

Direct and Indirect Effects

Neither action alternative would affect heritage resources since heritage resources would be avoided through project design or the use of buffers. Standards, guidelines, mitigation measures, and design features have been successfully applied on the ANF for many years. Upon completion of timber harvests, skid trails are routinely blocked with “slash” or otherwise made impassible to vehicular traffic, effectively reducing access to heritage sites.

Cumulative Effects

The CE analysis area for heritage resources is the SBKC project area. The CE area was chosen because the land within the project boundary shares common vegetation types, wildlife habitats, drainage patterns, climate, geology, disturbance regimes, access, and past historic uses as well as future impacts. The CE time period is from 1997 to 2026, which accounts for incremental impacts from recent past activities and implementation of the proposed and foreseeable future management activities.

Heritage resources and sites within the SBKC project area would be avoided under all alternatives. Future projects would be reviewed for heritage resources to ensure that heritage resources and sites are protected. Future project-level activities would be designed to avoid or mitigate effects to heritage resources.

However, heritage resources are subject to impacts beyond the proposed project activities. Impacts to heritage resources could occur due to a variety of reasons, such as illegal OHV riding. They are also subject to damage from natural causes, such as wind throw or rodent burrowing. There are no anticipated cumulative effects to heritage resources from the proposed or foreseeable future activities in any alternative.

4.3.2 Scenery

Scope of Analysis

This section will disclose the impacts to scenery within the SBKC project area that would potentially result from implementing the proposed alternatives and associated activities described in Chapter 2. Direct and indirect effects to scenery include the federal land administered by the ANF. Land management activities directed by the LRMP have the potential to create long- or short-term disturbances that impact the scenic condition. The analysis of cumulative impacts to scenery include the private and state land within the watershed and adjacent to the project boundary. Effects will be displayed over a 30-year time period between 1997, ten years prior to this project and 2026, twenty years into the future. The years capture the effects of past proposed and future foreseeable vegetation management, new trends in recreation, and oil and gas production.

Introduction

Scenic resources are affected when management activities alter the appearance of the forest landscape. Effects of forest management can be either short- or long-term. Short term impacts are those impacts that may remain on the landscape for up to ten years. These impacts include treatments that pull slash back from the road corridors and lop and scatter it to break down and decompose into the forest soils. Tools used to regenerate species such as herbicide also have effects on the scenery. Impacts of herbicide treatment are most apparent in the foreground views adjacent to a road corridor. The understory vegetation turns brown and dies, contrasting with green vegetation in untreated areas during the late summer. This contrast diminishes during fall and winter and recovers in the following spring. These effects are considered temporary impacts that are reduced during the first year and are no longer evident within three years of implementation.

Other temporary impacts, found to last no longer than one year following a management activity (i.e. soil disturbances), include grading and seeding sites (log landings) that have been disturbed. Temporary impacts also include the bright yellow treatment notification signs for herbicide that face the road and are posted for 30 days (Hoffman and Palmer, 1996, p.8).

Long-term impacts are those that remain on the landscape after ten years. These impacts to the forest landscape may occur from activities such as even-aged harvests and wildlife openings, and the road building and pit exploration associated with these activities.

Effects of Implementing Alternative 1: No Action

If Alternative 1 is implemented, no proposed reforestation activities will take place and there will be no change in the current condition of the scenery.

Landscape Character Type

The existing landscape character likely remains intact since changes in vegetation are the result of the natural development or disturbance process. Areas needing reforestation treatments remain untreated and stands with high densities may lack age class diversity.

Scenic Integrity Levels (SILs)

Implementing Alternative 1 would result in no effect to the project area's capacity to meet or exceed mapped SILs. The existing condition would remain, and the visual quality of the landscape would not change due to management activities.

Effects of Implementing Alternative 2 or 3: Proposed Action

Effects of Alternatives 2 or 3 are represented by the reforestation activities described in Chapter 2. The impacts of harvest treatments on scenery may be short- or long-term. A description of the impacts to the landscape character follows.

Landscape Character

All vegetation management activities may affect the natural appearing forest; however, with scenery mitigation the existing character would remain intact. The timber treatments that have long-term impacts are grouped in four treatment categories from most impacting to least: 1) final harvest, 2) partial harvest, 3) intermediate harvest, and 4) reforestation.

Final harvest treatments proposed in the SBKC project include overstory cuts, shelterwood removals, and two-age removals. These treatments may create diversity and improve the scenic integrity in the long term; however, without mitigation they do not meet SILs. Final harvest treatments remove large sections of the canopy allowing the sunlight to reach the ground and stimulate new seedling growth. Management is apparent when the canopy is reduced causing the area to lose its mature forest character. Impacts to scenery are most apparent when these stands are located adjacent to CL1 or CL2 travelways, and SILs will not be met without mitigation or alternate treatments.

Soil disturbance during and immediately after even-age final harvesting operations also has a great impact on the scenery. Most areas will revegetate, however, heavily impacted areas such as log landings or skid trails, may need grading and seeding to restore the natural landscape. One growing season reestablishes the green floor and will blend and soften the contrast of these impacts, and within three years of project completion, the forest plan guidelines for meeting SILs will be met.

Partial harvest treatments proposed in the SBKC project include the following vegetative management activities: shelterwood seed cut, two-aged shelterwood cut, and salvage treatment. Since the natural forest structure and a thinned canopy remain, impacts to scenery are reduced. Removing dead, damaged, or diseased trees improves stand health and the scenic condition. Visual impacts are most evident in the foreground (USDA-FS, 1977, p. 15). The degree of visual impact depends upon the stand character and number and frequency of entries, and speed of travel of the viewer. Most of the activities associated with partial harvesting methods meet or exceed a Moderate SIL; however, mitigation measures may be implemented to set the stage for final treatments.

Intermediate harvest treatments include the following: commercial and salvage thinning, uneven aged management (UEAM), and AMFC. Impacts to scenery are minimal, and require little to no mitigation to maintain a Moderate SIL.

Reforestation treatments improve the ability of a stand to reach maturity and benefit long-term scenic goals. Reforestation includes activities such as site preparation, herbicide application, release, fencing, planting, and fertilizing. Site preparation activities, either through chemical or mechanical means, remove vegetation hindering seedling development reducing the competing understory of grass and fern and midstory of beech, birch, and striped maple. Impacts from site preparation are most noticeable immediately after treatment when the vegetation dies back. Within one to three years, the new growth of seedlings and other herbaceous vegetation recover.

Planting establishes screening and provides variety to the setting when insufficient seedlings are present. Crop tree releases are accomplished with a chainsaw to thin competing vegetation leaving the most desirable trees. Fencing protects seedlings from browsing deer. After 7 to 10 years, when the tree seedlings are established, the fencing is removed. Impacts of fencing and clearing of the stand perimeter are noticeable in foreground areas; however, in most cases, the dull galvanized wire fences blend into the landscape.

Scenic Integrity Levels (SILs)
Treatments will meet or exceed the SILs shown on the SIL map (located in Project File) with mitigation (USDA-FS, 1977, USDA-FS, 2007d). The treatment mitigations associated with implementing Alternatives 2 or 3 are represented in **Table 26**. Stands listed are those both adjacent or within view of a CL2 travelway with a High or Moderate SIL requiring mitigation to meet SILs. Mitigation measures repeat the form, line, color, and texture of the natural landscape to minimize impacts and to meet or exceed the mapped SILs.

Table 26. Scenery Design Features

Comp/ Stand	Buffer Zone	Landings[1]	Slash	CL	SIL	View Facility	Treatment	Meets SIL[2]
810-043	Y	Y	Y	2	M	FR186	2nd SW	Yes
811-005	Y	Y	Y	2	M	FR186	RUMFC	Yes
811-021	Y	Y	Y	2	M	FR186	SW	Yes
811-023	Y	Y	Y	2	M	FR186	SW	Yes
811-025	Y	Y	Y	2	M	FR186	UEAM Prep	Yes
811-053	Y	Y	Y	2	M	FR186	SW	Yes
811-055	Y	Y	Y	2	M	FR186	SW	Yes
811-056	Y	Y	Y	2	M	FR186	RUMFC	Yes
812-039	Y	Y	Y	2	M	FR186	SW	Yes
812-010	Y	Y	Y	2	M	FR186	2nd SW	Yes
812-037	Y	Y	Y	2	M	FR186	2nd SW	Yes
813-002	Y	Y	Y	2	M	SBKC	RUMFC	Yes

[1] No new landings will be developed along FR186.
[2]-Design feature is needed to meet SILs.

High SIL Areas
SR 321 is the major CL1 travelway of scenic concern in the project area. This High SIL corridor leads into the Longhouse Scenic Byway and is one of the primary access routes to the ANF from the south. Treatments in the area are few and have minimal impact on scenery and no impact on the immediate foreground.

Moderate SIL Areas
Limited timber activity is prescribed in the Moderate SIL area of South Branch Kinzua Creek (CL 2). No commercial treatments are proposed immediately adjacent to the stream; however, a few stands will be treated within the viewshed. Both alternatives propose RUMFC treatments characterized by small openings with a remaining tree

canopy. AMFC treatments proposed in Alternative 2 are similar to a thinning and would meet SILs without mitigation.

Other Moderate SIL areas are located along FR186 (CL 2) and the road crossing of Glad Run (Class B). Most of the treatments prescribed are thinnings which would meet the SIL. Stand 812-037, a proposed 30-acre shelterwood, is located immediately adjacent to the road. Mitigation needed to lessen the large size of the roadside opening and meet the SIL include: a buffer to create leave areas to minimize the impact of the removed canopy, and paint, slash, and fencing mitigations to reduce the impact of marking, logging and reforestation activities. The Moderate SIL will be met with these mitigation measures.

Additional treatment areas are proposed along the FR186 segment of the Allegheny Snowmobile Loop (ASL) trail. The proximity to the trail requires mitigation to meet SILs. Two bordering proposed shelterwood stands (811056 and 811023) create an opening of 36 acres adjacent to the road. Designing leave areas of one quarter acre and scattering them in a natural manner will reduce the perceived size of roadside openings and minimize the impact of the removed canopy. Other mitigation includes buffering the fencing from the trails for safety and scenic concerns. Applying these measures will mitigate scenic impacts of the treatments listed in Table 26, and will meet a Moderate SIL. Other timber treatments are proposed within Moderate SIL areas, but these stands are not apparent from CL2 view areas and additional mitigation would not be required to meet or exceed SILs.

Low SIL Areas
Most of the Low SILs are in unseen areas of the ANF, or along roads that have a low concern level for scenery. All proposed treatment units would meet the Low SIL.

Cumulative Impacts

The cumulative impacts analysis boundary for scenery resources is the SBKC project area. The CE area was chosen because the land within the project boundary shares common vegetation types, wildlife habitats, drainage patterns, climate, geology, disturbance regimes, access, and past historic uses as well as future impacts. The time period that will be considered for cumulative effects will be ten years prior to this project (1997) and twenty years into the future (2026). This time period provides an overall view of the incremental impact of vegetation management and oil and gas management activities in combination with current project proposals. Predicting the level of future activities is difficult; however, federal activities will continue to be subject to the NEPA process. Forest Plan standards and guidelines will continue to provide direction in decision making to protect the land and recreation investments from impacts in the future.

Scenery will continue to meet or exceed forest SILs by design, modification, or mitigation and visual monitoring will continue to be conducted on a five year interval to ensure practices meet Forest Plan guidelines. Past monitoring has demonstrated a 99 percent success rate in meeting scenery standards and achieving desired conditions (USDA-FS, 1998b, p. 60); and the expectation is for this to continue.

Vegetation Management Activities

Overstory removal has a major effect on scenic integrity. An analysis of the age of timber stands within the project area illustrates the impact of overstory removal on scenery. New harvest treatments take on a managed appearance; however, older harvest treatments develop a more natural appearance. **Table 21** and Section 4.3.3 describe the

age class of timber by acres and percent for the cumulative effects analysis boundary. This section also describes the cumulative effects of timber management on scenery and recreation resources. In summary, no cumulative effects to scenery are anticipated as a result of the proposed alternatives.

Oil and Gas Management Activities

Another cumulative effect on scenic integrity is OGM (Oil, Gas, and Mineral) development. Mineral owners have the right to access National Forest System lands to develop their mineral rights. The ANF attempts to negotiate to the greatest extent possible with individual developers to manage and protect the surface resources while allowing the development of the mineral rights. There are currently 25 existing (active or dormant) wells within the project boundary. The number of wells across the ANF has increased dramatically over the past ten years and it is anticipated that over the next twenty years, the number of new wells and accompanying roads will continue to increase. OGM development can change at any time and is based on economics, technology, supply, and demand. Expanding OGM development effects scenic integrity by altering the form, line, color, and texture of the existing landscape and changing the landscape character and scenery in significant ways.

4.3.3 Recreation

Introduction

This section will disclose the reasonably foreseeable impacts (environmental consequences) to recreation resources within the SBKC project that would result from implementing the proposed alternatives and associated activities described in Chapter 2. Direct, indirect, and cumulative impacts will all be discussed, and all resource impacts from a single alternative will appear directly under the discussion of that alternative. As mentioned, the recreation analysis is based upon the Recreation Opportunity Spectrum (ROS) and utilizes two primary indicators for measuring impacts: (1) whether the alternatives are consistent with Recreation Opportunity Spectrum (ROS) settings, and (2) changes to recreation activities and use patterns in the project area.

Effects of Implementing Alternative 1: No Action

If Alternative 1 were implemented, there would be no change from the current condition of the recreation resources since no proposed activities would take place. The impacts of this Alternative will serve as the baseline for which to compare the impacts of Alternatives 2 and 3.

Recreation Opportunity Spectrum (ROS)

Under Alternative 1 (No Action) all ROS indicator settings including access, remoteness, site management, visitor management, social encounters and visitor impacts would remain the same as the existing condition. Therefore, ROS objectives would be met in MA 3.0 and 2.2. Illegal ATV activity would continue throughout the project area limiting one’s sense of remoteness, increasing the number of social encounters, and amplifying visitor impacts to the area. Wildlife habitat would remain the same and not be improved for the benefit of game species and hunters. If this alternative were implemented, road maintenance would still continue on all major roads and trails.

Recreation Activities and Use Patterns
Implementing Alternative 1 would result in no effect on recreation activities and use patterns within the project area. A change in recreation activities would not be anticipated under this alternative.

Effects of Implementing Alternative 2 or 3: Action Alternatives

If either Alternative 2 or 3 were selected, proposed activities described in Chapter 2 would be implemented and their recreation impacts are described in this section. Harvest activities are expected to occur over a 2-3 year period.

Recreation Opportunity Spectrum (ROS)
For comparative purposes, the effects from implementing any of the three alternatives upon the project area's current ROS classification as Roaded Natural is shown in Table 27 and described here. Table 27 compares the alternatives based upon ROS setting indicators. The values listed under Alternative 1 are the same as those given in the description of the existing condition found in Section 3.3.3 and Table 28, because this is the no action alternative. Existing and/or proposed conditions are categorized as to how they contribute to the ROS classification of Roaded Natural. These indicators are; Exceed (conditions exceeding the norm); Meet (normal conditions expected to be found in the setting); be Inconsistent (conditions incompatible with the standard, but which may be necessary to meet other management objectives); or Unacceptable (conditions not acceptable under any circumstances).

Table 27. Comparison of Alternatives by Roaded Natural ROS Setting Indicators

Setting Indicators	Alternative 1		Alternative 2		Alternative 3	
	MA 2.2	**MA 3.0**	**MA 2.2**	**MA 3.0**	**MA 2.2**	**MA 3.0**
Access	Meets	Meets	Meets	Meets	Meets	Meets
Remoteness	Meets	Meets	Meets	Meets	Meets	Meets
Site Management	Meets	Meets	Meets	Meets	Meets	Meets
Visitor Management	Meets	Meets	Meets	Meets	Meets	Meets
Social Encounters	Meets	Meets	Meets	Meets	Meets	Meets
Visitor Impacts	Meets	Meets	Meets	Meets	Meets	Meets

Note: ROS – Recreation Opportunity Spectrum

In terms of recreational impacts, Alternatives 2 and 3 are similar enough that they will be discussed together.

MA 2.2: A number of commercial and non-commercial vegetation treatments are proposed in MA 2.2 under Alternative 2, but are dropped under Alternative 3. Proposed AMFC treatments accelerate mature forest conditions through thinning, and proposed RUMFC treatments are similar to shelterwood treatments and restore understory. No transportation activities are proposed in MA 2.2 under either alternative. Hence, access to the area will remain the same under either alternative and meet ROS guidelines. A sense of naturalness will still be obtainable, though at times lessened as a result of noise from timber harvest activities. Site development is minimal in this area and would not change under either alternative. Resource modification would take place during reforestation activities, but an effort to harmonize modifications with the environment would be made by following standards and guidelines in the Forest Plan. Visitor

management would become more apparent as illegal OHV trails would be obliterated and barricaded. Social encounters may also temporarily increase due to timber harvest operations in the project area because some displacement would occur. The impact of reforestation activities might send some users into other areas, but the number of displaced recreationists would be limited as most areas in the project area receive low to moderate use. Thus, no change to the values of the Roaded Natural ROS setting indicators is expected.

MA 3.0: Most of the vegetation treatments are proposed within MA 3.0. It would also see 2.8 miles of road construction on existing or new corridors under Alternative 2, 2.2 miles under Alternative 3, and 2.1 miles of road decommissioning under either action alternative. Proposed road maintenance activities such as limestone surfacing, grading, etc. would occur on project area roads to continue to ensure a safe and adequate transportation system for members of the public and to implement management activities. Precautions would be implemented to ensure public safety during peak transportation periods of timber hauling, particularly for FR186. Proposed activities would improve access to the area. In terms of naturalness, the increased noise and traffic from harvest activities would not be considered excessive for a Roaded Natural area as frequent "sights and sounds of man" are common in these areas. Because there are no recreational facilities existing or proposed within the project area, there would be no impact to site development under either alternative. Visitor management would become more apparent as illegal OHV trails would be obliterated and barricaded. This is consistent with the Roaded Natural Classification, as noticeable on-site rehabilitation and mitigations are consistent with this classification. Social encounters may also temporarily increase due to timber harvest operations in MA 3.0 because some displacement would occur. The impact of reforestation activities might send some users into other areas, but the number of displaced recreationists would be limited as most areas in the project area receive low to moderate use. Visitor impacts are expected to be reduced in those areas where impacts from illegal OHV activity took place, and continue to be light elsewhere. Thus, no change to the values of the Roaded Natural ROS setting indicators is expected.

Recreation Activities and Use Patterns

In general, the reforestation activities proposed in Alternatives 2 or 3 would have a limited effect on recreation activities and use patterns in the project area. Some recreation activities (camping, hunting, or hiking) may see a decrease in use as a result of proposed activities, but others may actually increase (i.e., bird watching or hunting for species that are dependent on early successional habitat). Field observation shows that many recreationists who are affected by timber harvesting and road maintenance activities will simply move to another location and resume their recreation experience, often within a few miles.

Road maintenance activities would generally improve the roads and permit better access to ANF lands across the project area. Driving for pleasure is a very popular activity on the ANF, especially during the spring and also during the fall due to the change in color of foliage and various hunting seasons. Both alternatives propose the expansion of four existing pits to supply gravel for road maintenance activities, and the development of 1 new pit. Gravel pits are popular places for camping, target shooting, or parking vehicles for other dispersed activities such as hunting, berry picking, etc. Some forest visitors may be impacted in the short term by the expansion of these pits.

The effect of herbicide on recreation use may be a displacement of forest visitors to adjacent areas of the forest for their recreational activity for one or two months after treatment depending on one's personal preference.

Developed Recreation: Since there are no developed recreation facilities in the SBKC project area, there would be no impacts from implementing Alternative 2 or 3.

Hiking Trails: Since there are no hiking trails in the SBKC project area, there would be no impacts from implementing Alt. 2 or Alt. 3.

Motorized Trails: Under the proposed action, the placement of numerous barricades is proposed along the illegal OHV trails in an effort to curtail the use. Rehabilitation of the area is also proposed to help improve soil and water impacts. Allegheny Snowmobile Loop (ASL) Connector Trail #17 (FR186) has numerous vegetation treatments proposed along its corridor under both alternatives. Both commercial and non-commercial treatments are proposed, many of which would take place immediately adjacent to the trail. Without design features, vegetation treatment proposals would impact the trail. Design features would include restricting hauling, road maintenance, felling, or skidding activities within 100 ft. of the snowmobile trails to times other than weekends or holidays during the winter activity season when the trail gets the most use. All commercial and administrative traffic would also be required to travel with their lights on during favorable snowmobile conditions. Snowplowing would need to be restricted to leave an adequate mat of snow for snowmobiling. With these design features, impacts to the ASL trail are not expected.

Dispersed Camping: Some of the dispersed sites would be affected by vegetation treatments and/or pit expansion. Under Alternative 2, vegetation treatments are proposed along FR186 and at the end of FR460 where dispersed sites are located. However, these sites are not heavily used, and what use they do receive typically occurs during hunting season. The result would be some short term displacement of campers and hunters. Pit expansion affecting dispersed camping is still proposed under Alternative 3. No vegetation treatments included in Alternative 3 are expected to result in a displacement of camping.

Hunting and Fishing: Hunters would be slightly impacted by project activities proposed in Alternatives 2 or 3. Hunters would be displaced in the short term by timber harvest activities themselves, but in the long term, treatments would add some variety to habitats found along the roads and, in general, forest activities attracting more species. In treatment areas where a final harvest is proposed, hunting would improve for species dependent upon early successional habitat. However, the resulting slash may make it more difficult for persons with limited mobility to move through these stands and to hunt or retrieve game. The vegetation treatments would improve the diversity of wildlife habitat with benefits to both game species and hunters. Road access and those areas open for the fall hunting season would not be impacted by this project. Once the activities were completed, fencing would also have an impact on hunters, as it would impede mobility through the forest. As a result, some hunters would be displaced to adjacent areas until the fences were taken down (approximately 10 years). However, there is a small group of hunters who like to hunt within fences. The majority of the reforestation treatment areas propose fencing. Fishing opportunities along South Branch Kinzua Creek would not be impacted by either Alternative 2 or 3. Water quality and aquatic habitat

would be protected through mitigation methods and standards and guidelines as outlined in the Forest Plan (please see Hydrology Section). Access to fishing areas would remain the same after project implementation.

High Recreation Use Corridors: State Route 321 would receive limited impacts as a result of project proposals under Alternatives 2 or 3. SR 321 would have some visual impacts as a result of vegetation management proposals, but use of the highway itself would not be affected. As outlined in the visual resources section, a few design features would be implemented for visual impacts.

Special Events or Unique Features: Since there are no developed recreation facilities in the SBKC project area, there would be no impacts from implementing Alternative 2 or 3.

Other Recreation: No impacts are expected to any other forms of recreation that take place in the project area including mountain biking, walking, firewood cutting, scenic driving, and target shooting.

Cumulative Impacts

The cumulative impacts analysis boundary for recreation resources is the SBKC project area. The CE area was chosen because the land within the project boundary shares common vegetation types, wildlife habitats, drainage patterns, climate, geology, disturbance regimes, access, and past historic uses as well as future impacts. The time period that will be considered for cumulative effects will be ten years prior to this project (1997) and twenty years into the future (2026). This time period provides an overall view of the incremental impact of recreation, vegetation management, and oil and gas management activities in combination with current project proposals. It is difficult to predict exactly where or what activities will occur in the future, but it is important to remember that any future federal activity would also go through the NEPA process to ensure that recreation investments and users are protected.

Recreation Activities

In the past ten years, no recreation projects were completed within the cumulative impacts boundary. At the current time, no recreation projects are planned within the cumulative impacts boundary.

The demand for and interest in recreation changes over a period of time and space. It is important to consider how recreation may or may not change within the cumulative impacts boundary and within the before mentioned time frame. The following projections are made concerning recreation activity in the northern assessment regions of the U.S. from 1995 to 2050 based upon the primary recreation activities taking place: hiking will increase 31 percent, snowmobiling will increase 22 percent, off-road driving will increase 9 percent, dispersed camping will decrease 16 percent, hunting will decrease 1 percent, fishing will increase 27 percent, and sight-seeing will increase 50 percent (Bowker, English, and Cordell, 1999). As these projections show, the demand for most primary recreation activities will increase in the near future as will the U.S. population. However, the amount of public land available for recreation is not projected to increase proportionally. In fact, because of budget constraints some areas of public land are actually being closed to public use. The result is that more and more users are concentrated onto fewer and fewer acres of public land. People recreating on the ANF may find the forest more crowded in the future. If recreationists are willing to travel,

areas of solitude and naturalness should still be possible. Therefore, cumulative impacts to recreational activities and/or use patterns are not expected for any of the alternatives.

In 2003, Forest Service Chief Dale Bosworth identified unmanaged outdoor recreation as one of four major threats to National Forests at the present time. Unmanaged recreation does exist in the SBKC project area in the form of illegal OHV use and both action alternatives address this issue.

Vegetation Management Activities

The age of stands within the cumulative impacts boundary was compiled to illustrate how well recreationists would be able to use the area, should the alternative be implemented. Claims are often made that timber harvest has reduced recreation opportunities on the ANF. However, the effects of timber management on recreation do not accumulate over time. Even though new harvest treatments (<20 years of age) are more difficult for recreationists to use because fencing is impeding access, slash is abundant, and sapling or briar growth is very thick, recreationists are able to utilize most stands in young forest (21-50 years of age) or mature forest (51< years of age).

Table 28 shows the age classes of timber for each alternative within the cumulative impacts boundary. The existing condition in 2006 is compared with the likely future condition of each Alternative in 2026. This comparison will illustrate how much timber management is apparent to recreationists, as well as their ability to use that area.

Table 28. Age Classes of Timber for Each Alternative

Year	Alternative	Age Class	0-10	11-20	21-50	51-110	111+	Other
2006	Existing Condition	Acres	155	146	392	3,965	30	58
		% SBKCPA	3	3	8	85	1	1
2026	Alt. 1	% SBKCPA	0	0	7	66	26	1
	Alt. 2	% SBKCPA	5	7	7	61	20	1
	Alt. 3	% SBKCPA	4	5	7	61	22	1

Table 28 shows that 6 percent of the project area is in the seedling/sapling stage (0-20 years) which results in a forest condition that is difficult for recreationists to use. The majority of the project area currently appears to be mature forest (>51 years of age) or savannah and is traversable by recreationists. Ecological old growth is not currently present in the project area, nor will it be within the next 20 years. If no action was taken (Alternative 1) and the existing conditions were allowed to continue growing uninterrupted, one-quarter of the project area would grow into late structural habitat (USDA-FS, 2007b, p. 3-185) in 20 years. Under Alternatives 2 or 3, at least 20 percent of the project area would do the same. The greatest difference between the existing condition and the alternatives is that in Alternative 2, the amount of newly cut forest will double from 6 percent to 12 percent, and in Alternative 3 to 9 percent. This is the age class of timber that recreationists find difficult to use. However, this is a short-term impact, and the numbers are still fairly consistent with past management. Each of the three alternatives would be compatible with current recreation use.

Oil and Gas Management Activities

An additional cumulative effect to recreation is OGM development. Mineral owners have the right to access National Forest system lands to develop their mineral estates. The ANF's management objective, as defined by the courts, is to negotiate to the greatest extent possible with individual developers to manage and protect the surface resources while allowing the development of their mineral rights. There are currently 25 existing (active or dormant) wells within the project boundary. The number of wells across the ANF has increased dramatically over the past ten years and it is anticipated that over the next twenty years, the number of new wells and accompanying roads will continue to increase in the cumulative impacts areas.

The development of OGM can change at any time and is based on economics, technology, supply, and demand. The effects of expanding OGM development on recreation would be a loss of solitude (machinery noise and vehicle traffic), easier access (additional road miles), a more modified environment (additional roads and wells), and a reduction in visual quality. These effects do accumulate over time and may result in further concentrating recreation use on areas of public land that have not been developed for oil and gas extraction. Field observations show that intensively developed OGM fields do not receive the same density of recreational use, as do undeveloped areas in the same MA.

4.3.4 Economics

Alternative 1: No Action

Direct and Indirect Effects

With the implementation of Alternative 1, none of the proposed activities would be carried out. Therefore, there would be no monetary implementation costs other than the normal custodial/stewardship costs associated with managing a national forest. There also would be no monetary return to the federal treasury.

Alternatives 2 and 3

Direct and Indirect Effects

Under Alternatives 2 and 3, timber sales would provide an economic benefit. In the short term, income and jobs would be produced through harvest and subsequent reforestation projects. Timber management activities would improve the diversity of tree species, foster the establishment of species which are intolerant to moderately intolerant of shade, ensure a continuing supply of mast producing species, and provide for a sustained yield of high-quality hardwoods. While there would be costs to the government associated with the implementation of these alternatives, the costs would be offset by the returns to the national treasury (timber returns and increased tax base from new jobs) and to the local economy (new jobs and associated spending). Table 29 shows a general summary of the net cash flow comparison of priced activities proposed in each alternative for relative comparison. It should not be considered actual yields or losses, nor does it attempt to analyze all resource values. We recognize that many of the values generated by the various alternatives (both positive and negative) involve goods and services that are not priced in the marketplace and are thus not represented in this comparison. These goods and services involve such things as habitat for native species, birding, fishing, hunting, hiking, snowmobiling, scenic beauty, and high quality water. The effects each alternative has on these types of non-priced goods and services are found elsewhere within this chapter under other resource headings.

In considering the effects on recreation activities in the project area, it is recognized that the proposed management activities could negatively affect some recreationists in their use of the land scheduled for treatment. A full description of these impacts is presented in Section 4.3.3. Based on the short-term impacts to recreational resources and the potentially beneficial impacts that would result from the proposed activities (enhanced wildlife habitat supporting hunting, viewing wildlife species, berry picking, etc.), the balance of these effects would indicate no significant effect on recreation income or related jobs.

As shown in Table 29, a direct effect of Alternatives 2 and 3 would be the return of varying amounts of revenue to the U.S. Treasury and the creation of jobs related to the harvest and processing of the raw materials into forest products.

Table 29. Economic Analysis of Costs/Returns to U.S. Government

	Alternative 1	Alternative 2	Alternative 3
Total Costs[1]	$1,045,710	$2,678,681	$2,586,749
Total Returns[2]	$0	$10,704,972	$8,652,702
Net Cash Flow[3]	**(-) $1,045,710**	**$8,026,291**	**$6,065,953**

[1] Total costs represent the cost to the US Government from implementing activities such as road maintenance, herbicide application, fence installation, site preparation, research, and sale planning/administration.

[2] Total returns represent the revenues generated from the harvest of timber on USFS lands.

[3] Net cash flow is calculated by: (Total Return – Total Cost)

Environmental justice involves fair treatment and meaningful involvement of all people, regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental policies and projects. The effects of Alternatives 2 and 3 would be positive on both minority and low-income populations. Timber harvesting has the potential to create or support industry and jobs in the region. Alternative 1 would not provide the benefits mentioned above, as this alternative does not include harvest proposals. As documented in the recreation section of this chapter, there would be no loss of recreation or tourism opportunities in the project area as a result of the proposed activities under any alternative.

Cumulative Effects

The CE analysis area for economics includes the four counties in which the ANF is located as the people in these counties would likely be most affected by the activities on the ANF including the SBCK project. The time period that will be considered for cumulative effects will be ten years prior to this project (1997) and twenty years into the future (2026). This time period provides an overall view of the incremental impact of vegetation management activities in combination with current project proposals.

According to the FY 2006 Timber Sale Information Reporting System, the present value of timber sold from the forest is $19.5 million (includes sawtimber and pulpwood). In

FY 2006, the ANF sold 24.7 MMbf of timber and the average value of sawtimber sold was $1,082 per thousand board feet (Mbf). The program provided approximately $6.5 million ($12.66/acre) in tax revenues to local government through Title I and III monies and payments in lieu of taxes.

Activities proposed under Alternatives 2 and 3 would be expected to impact the local economy through the creation of local jobs for contractors, who purchase timber, and primary and secondary wood processors who hire local people to harvest, haul, and process the timber. A multiplier effect occurs when any of these forest products workers spend money for goods and services at local businesses and service providers. Local employment also supports the needs of people coming into the area to hunt, fish, and enjoy other recreation activities.

In summary, the action alternatives, which include timber harvesting, would contribute to a continuous flow of forest products from the ANF during the period of this cumulative effects analysis. This flow of forest products from the ANF has been a source of jobs and income and would be expected to provide the same benefits into the future. The effects of obtaining the economic benefits from timber harvest do not exclude other forest uses that provide priced and non-priced benefits (for example camping and bird watching). In contrast, if Alternative 1 was selected, no harvest activities would occur and associated economic benefits would not be realized.

4.3.5 Human Health and Safety

This section discloses the reasonably foreseeable impacts to human health and safety that could result from implementing the proposed activities described in the alternatives.

The risk to forest visitors of falling trees always exists in a forest setting, where high winds and wet, shallow soils can cause healthy, live trees to topple. Some dead trees are purposely left standing for wildlife, and these trees also pose a risk of falling. Additional trees may die naturally after harvest operations are completed.

The risk to the public from the proposed activities would be considered low in all alternatives.

Alternative 1: No Action

Direct and Indirect Effects

The existing conditions would not be affected.

Alternatives 2 and 3

Direct and Indirect Effects

Direct and indirect risks to human health and safety would result from the proposed activities. However, harvest areas would be marked, loggers would be present at the site when activity is occurring, and the activity would be noisy, all of which would provide ample warning to anyone nearby. The risk for loggers would increase as the level of harvest increases. This risk would be mitigated by following standard safety practices of the industry, to include traffic safety signs.

Loggers and OGM developers would be notified of planned activities. Close coordination with them, careful operation of logging equipment, and identification of facilities to be protected would minimize impacts on mineral developments with negligible risks to associated personnel.

Herbicides have been used to control interfering vegetation on selected sites within the project area since 1989. No adverse effects on human health and safety have been reported as a result of herbicide treatment within the project area. Most of the areas proposed for treatment in the current project would be treated with a combination of glyphosate and sulfometuron methyl. Potential impacts from controlling interfering plants with herbicides have been examined in detail in Appendix G of the FEIS for the LRMP (USDA-FS, 2007d).

Public contact with the pesticides or residues is expected to be minimal. Spraying notification signs would be posted along roads or trails or at other locations where there is easy access to a treatment area. They would alert people that these areas have been or would be treated so they can stay out of the area. Adjacent landowners would also be notified of the proposed spray activity under all alternatives, and signs would be posted so people would have the opportunity to avoid the areas. However, even if someone does contact pesticide residue or the spray mist in a treatment area, the risk to human health would be negligible (USDA-FS, 2007d).

The amount of proposed herbicide spraying under Alternatives 2 and 3 is 896 acres and 834 acres, respectively. Vegetation and environmental conditions on areas proposed for herbicide use are within the range of conditions considered in the ANF FEIS for Understory Vegetation Management. Appendix G of the FEIS for the LRMP (USDA-FS, 2007d) states that the risks to workers from the proposed use of glyphosate and sulfometuron methyl are negligible.

Water testing conducted in 1987 and 1988 on the ANF showed no detectable levels of herbicide downstream from treatment areas (USDA-FS 1991, p. 4-4). More recent monitoring work of herbicide treatments in 1999 conducted on powerline rights-of-way has shown the same results. In 1999, water samples collected downstream from a rights-of-way treatment contained no detectable herbicide with buffer strips as narrow as 13 feet for cut stem treatment (with glyphosate) or 58 feet for low volume foliar treatment (USDA-FS 2000b).

The effect of herbicide on water quality was evaluated in 2002. A stream on the Bradford Ranger District was monitored adjacent to a 15-acre forested stand from August 7-24, 2002, when the herbicide was applied. Laboratory analysis of the water samples did not detect the presence of glyphosate, aminomethylphosphoric acid, or sulfometuron methyl. Consequently, water quality and beneficial uses were protected. Based on the effectiveness of these ANF LRMP standards and guidelines, water quality would be maintained at a level that supports the propagation of fish and other aquatic species. No impacts are expected to water quality of domestic or public water supplies within the project areas or near sites proposed for herbicide treatment.

One potential effect of vegetation treatments would be to the people involved in resource activities associated with equipment to rupture oil and gas pipelines caused by operating skidders or vehicles containing the spray equipment in areas where pipelines and power lines occur.

Cumulative Effects

The CE analysis area for human health and safety includes the SBKC project area. The CE area was chosen because the land within the project boundary shares common vegetation types, wildlife habitats, drainage patterns, climate, geology, disturbance

regimes, access, and past historic uses as well as future impacts. The time period that will be considered for cumulative effects will be ten years prior to this project (1997) and twenty years into the future (2026). This time period provides an overall view of the incremental impact of vegetation management and oil and gas management activities in combination with current project proposals.

The cumulative risk to forest users from the proposed activities is low because of the use of ANF LRMP standards and guidelines and management practices. Cumulative effects to human health are not likely to occur because none of the herbicides persist in the environment or human body (USDA-FS 2007d).

CHAPTER 5: LIST OF CONTRIBUTORS

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MAPS

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