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South Branch Kinzua Creek Project

Public Comment Package

Marienville Ranger District
Allegheny National Forest

Wetmore and Hamlin Townships
McKean County, Pennsylvania

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Acronyms and Abbreviations

ANF	Allegheny National Forest
AMFC	Thinning to Accelerate Mature Forest Conditions
BA	Biological Assessment
BE	Biological Evaluation
BO	Biological Opinion
CFR	Code of Federal Regulations
CE	Cumulative Effects
CEX	Categorical Exclusion
CI	Cumulative Impacts
CVE	Cumulative Vegetation Effects
DFC	Desired Future Condition
EA	Environmental Assessment
EIS	Environmental Impact Statement
ELT	Ecological Land Type
EPA	Environmental Protection Agency
FEIS	Final Environmental Impact Statement
FR	Forest Road
GIS	Geographic Information System
HQ-CWF	High Quality Cold Water Fisheries
ID	Interdisciplinary
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
RFSS	Regional Forester's Sensitive Species
ROS	Recreation Opportunity Spectrum
RUMFC	Group Selection to Restore Understory to Mature Forest Condition
SBKC	South Branch Kinzua Creek
SDG	Soil Drainage Group
SL	Sensitivity Level
TSL	Traffic Service Level
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
VQO	Visual Quality Objectives

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):

- Harvest approximately 7.7 million board feet of timber on approximately 1,722 acres of National Forest land within the Marienville Ranger District.
- 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 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 14.2 miles of forest roads including applying limestone surfacing to approximately 0.7 miles of road. This would require expanding three existing stone pits outward (3 acres), expanding one pit downward, and developing one new stone pit (2 acres).

This proposed action implements the 1986 ANF Land and Resource Management Plan or Forest Plan (USDA-FS 1986a), as amended, and the analysis in this public comment package is tiered to the Final Environmental Impact Statement (USDA-FS 1986b) and Record of Decision (USDA-FS 1986c) for the 1986 Forest Plan.

The **project and analysis area** encompasses the National Forest System lands on which management activities are proposed to occur. The project area contains approximately 4,780 acres, which includes 4,754 acres of National Forest land and 26 acres of private land. The project area contains portions of management areas 3.0 and 6.1.

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 future condition in the Forest Plan. This includes establishing regenerating stands, improving stand conditions for optimum tree growth, providing high quality hardwood timber, and improving wildlife habitat **(Need for the Action)**. Many of these stands have interfering understory vegetation that would require reforestation treatments, such as herbicide application or site preparation to facilitate the development of adequate advanced regeneration.

The interdisciplinary team have also considered a no action alternative and developed a second action alternative to address preliminary issues (no new roads, timber management in the South Branch Kinzua Creek valley, dispersal of treatment areas, and increasing uneven-aged management). 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. A summary of the anticipated effects for each alternative is included in Chapter 4.

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

Proposed Activities	Alt 1	Alt 2	Alt 3
Timber Harvest/Vegetation Management (Acres)			
Even-Aged Regeneration Treatments (Total)	**0**	**788**	**647**
Shelterwood Seed Cut	0	477	425
Shelterwood Removal	0	311	222
Even-Aged Intermediate Treatments (Total)	**0**	**884**	**521**
Commercial Thinning	0	780	513
Salvage Thinning	0	8	8
Accelerate Mature Forest Conditions (AMFC)	0	96	0
Uneven-Aged Treatments (Total)	**0**	**594**	**691**
Uneven-Aged Management Prep Cut	0	50	115
Restore Understory Mature Forest Condition (RUMFC)	0	243	230
Group Selection	0	301	346
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 (Acres)			
Site Preparation	0	849	787
Herbicide Application	0	933	871
Fence	0	746	686
Fertilization	0	96	79
Tree Shelter Natural Regeneration	0	112	110
Planting	0	237	228
Release	0	691	647
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
Fence/Tree Shelter Maintenance and Monitor Tree/Shrub Survival (acres)	0	52	52
Monitor Tree Survival (acres)	0	8	8
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	.025
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	14.2	14.2
Limestone Surfacing (miles)	0	0.7	0.7
Number of Stone Pits to be Expanded[1]	0	4	4
Stone Pit Expansion (acres)	0	3	3
Number of Stone Pits to be Developed	0	1	1
Stone Pit Development (acres)	0	2	2
Road Barricade Placement (number of devices)	0	5	5
Other Indicator Measures			
Road Management Changes (percent of open, closed, and restricted roads)			
Open (Forest Plan Standard = 20%)	42	21	22
Restricted (Forest Plan Standard = 20%)	46	61	63
Closed (Forest Plan Standard = 60%)	12	17	16
Road Density (miles of road per square mile)			
MA 3.0 (Forest Plan Standard = 2 to 4 miles)	2.5	2.9	2.9
MA 6.1 (Forest Plan Standard = 1 to 3 miles)	0.7	0.9	0.9
Timber Harvest in the South Branch Kinzua Creek valley			
Acres of vegetation management activities *dropped*	N/A	0	53
Dispersal of Treatments			
Acres dropped for treatment dispersal	N/A	0	267

[1] The stone pit located adjacent to FR186/NS27117 would be expanded downward and not outward, therefore, this pit expansion does not contribute to additional acres of expansion.

Chapter 1: Proposed Action and Purpose and Need

1.1 Introduction, Document Structure, and Public Input Process

The Forest Service has prepared this Public Comment Package 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 assessment process for the South Branch Kinzua Creek (SBKC) Project. This public comment package discloses the proposed action, connected actions, affected environment, issues, design features, mitigations, alternatives to the proposed action, and a summary of the anticipated effects of the proposed action and its alternatives (including no action) if implemented. This document has five 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: Summary of Anticipated Effects: This section provides a summary analysis of the anticipated environmental effects of the proposed action and its alternatives. This analysis is tiered to the Final Environmental Impact Statement (USDA-FS 1986b, FEIS) for the Allegheny National Forest Land and Resource Management Plan (Forest Plan) (USDA-FS, 1986a).
- 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 project planning record 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 1986b) and Record of Decision (ROD) (USDA-FS 1986c) for the 1986 ANF Land and Resource Management Plan (LRMP), as amended.

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 Forest Plan 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 Forest Plan 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 Forest Plan 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 Forest Plan direction. In the Forest Plan, 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 Forest Plan has divided the ANF into management areas (MA), and each MA has particular goals and objectives. The SBKC Project contains portions of MA 3.0 (3,758 acres), MA 6.1 (996 acres) and 26 acres of private land.

1.3 Background

The SBKC project area consists of 4,754 acres of Forest Service land 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 the borough of Kane, Pennsylvania.

Previous projects, which have been conducted in the past 20 years within the SBKC project area, include: South Branch Environmental Assessment (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 are 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 Forest Plan. Management within the project area is intended to meet Forest-wide and MA 3.0 and 6.1 goals and objectives including:

Forest-wide Direction/Goals (USDA-FS 1986a, p 4-2 and 4-3)

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

- Provide for a sustained flow of timber.
- Maintain or increase opportunities for hunting wildlife game species through vegetative manipulation.
- Maintain or increase non-consumptive opportunities for game and non-game species through vegetative manipulation and maintain habitat for all existing native vertebrate species.
- Restore understory to obtain a broader diversity of flora and fauna.

Primary Purpose For MA 3.0 (USDA-FS 1986a, p 4-82)

- Provide a sustained yield of high-quality Allegheny hardwood and oak timber through even-aged management.
- Provide a variety of age or size class habitat diversity from seedling to mature sawtimber of timber types.
- Emphasize deer and turkey in all timber types and squirrel in the oak type.
- Provide a Roaded Natural setting for all types of developed and dispersed recreation opportunities, with an emphasis on motorized recreation activities.

Primary Purpose For MA 6.1 (USDA-FS 1986a, p 4-82)

- Maintain or enhance scenic quality.
- Emphasize a variety of dispersed recreation activities in a Semi-Primitive setting.
- Emphasize wildlife species which require mature or overmature hardwood forests, such as turkey, bear, cavity-nesting birds, and mammals.

1.5 Need for the Action

The Forest Plan describes the desired future condition (DFC) for lands allocated to MAs 3.0 and 6.1. There are several site-specific opportunities for vegetation management

within the project area that would change or enhance present conditions to help achieve the DFC described in the Forest Plan. An opportunity to enhance a resource is defined as a "need."

An interdisciplinary (ID) team of resource specialists has surveyed and evaluated the project area for management possibilities based on an analysis of the project area, comparing existing conditions to desired conditions as outlined in the Forest Plan and determined by land capability.

1.5.1 Need for Change

1.5.1.1 Manage Vegetation for Current Forest Plan Desired Future Condition

(A) There is 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 (USDA-FS, 1986a, pp. 4-82 to 4-96). 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 6.1 (USDA-FS, 1986 a, p. 4-110) 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 (USDA-FS, 1986a, pp. 4-60, 4-65 to 4-67, 4-82, and 4-91).

(B) Within MA 6.1, 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 (USDA-FS, 1986a, pp. 4-110, 4-116, and 4-118).

(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 (USDA-FS, 1986a, pp. 4-82, 4-91, and 4-110).

(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 (USDA-FS, 1986a, pp. 4-82, 4-91, and 4-110).

(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. (USDA-FS, 1998)

(F) There is a need to evaluate illegal ATV use and identify strategies to curtail these uses. The demand for Off-Highway Vehicle (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 timber to meet people's demand for wood products such as furniture, paper, fiber, and construction materials (USDA-FS 1986a, pp. 4-2 to 4-3).

Demand for sawtimber from Allegheny hardwood species remains moderately strong, 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 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 DFC.

Table 2. Proposed Action

Proposed Activities	Total
Timber Harvest/Vegetation Management	
Even-Aged Regeneration Treatments (Total acres)	**788**
Shelterwood Seed Cut (acres)	477
Shelterwood Removal (acres)	311
Even-Aged Intermediate Treatments (Total acres)	**884**
Commercial Thinning (acres)	780
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
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)	849
Herbicide Application (acres)	933
Fence (acres)	746
Fertilization (acres)	96
Tree Shelter Natural Regeneration (acres)	112
Planting (acres)	237
Release (acres)	691
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
Fence/Tree Shelter Maintenance *and* Monitor Tree/Shrub Survival (acres)	52
Monitor Tree Survival (acres)	8
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
Transportation Activities	
Road Construction – new corridor (miles)	0.1
Road Construction – existing corridor (miles)	2.7
Road Decommissioning (miles)	2.1
Road Maintenance (miles)	14.2
Limestone Surfacing (miles)	0.7
Number of Stone Pits to be Expanded[1]	4
Stone Pit Expansion (acres)	3
Number of Stone Pits to be Developed	1
Stone Pit Development (acres)	2
Road Barricade Placement (number of devices)	5

[1] The stone pit located adjacent to FR186/NS27117 would be expanded downward and not outward; therefore, this pit expansion does not contribute to additional acres of expansion.

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 that which would have occurred naturally. 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 regeneration 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, in this project, would create 311 acres (6.5 percent of the SBKC project area) of 0-10 age class over the next decade.

Proposed intermediate harvests include commercial thinning, salvage thinning, and uneven-aged preparation cuts. Commercial thinning is proposed on 780 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 6.1. 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 (USDA-FS 2006b, pp. A-23-25).

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 VanPelt (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 morality (USDA-FS, 2006b, pp. A-23-24).

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 and others 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 2006b, pp. A-24-25).

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 1,722 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. Glyphostate is a non-selective, systemic herbicide with a short-residual life. The Forest Service has safely and effectively utilized herbicides on other National Forests for this same purpose.

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

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" = Accelerated Mature Forest Conditions, "RUMFC" = Restore Understory to Mature Forest Conditions

Comp[1]	Stand	Acres	MA[2]	Harvest Treatments[3]	Reforestation Treatments[4]
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	
811	18	22	6.1	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	6.1	Non-commercial Thinning	
811	33	15	6.1	AMFC	
811	34	6	6.1	AMFC	
811	36	11	6.1	Non-commercial Thinning	
811	37	9	6.1	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	6.1	AMFC	
811	58	19	6.1	RUMFC/Group Selection	SP, H, F, P, R
811	59	28	3.0	Commercial Thinning	
812	5	15	3.0	AMFC	
812	7	10	6.1	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	6.1	AMFC	
812	24	13	6.1	Reforestation Only	SP, H, TS, P, R
812	26	13	6.1	RUMFC/Group Selection	SP, H, F, P, R
812	34	12	3.0	Commercial Thinning	

Comp[1]	Stand	Acres	MA[2]	Harvest Treatments[3]	Reforestation Treatments[4]
812	35	17	6.1	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	
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	6.1	RUMFC/Group Selection	SP, H, F, P, R
813	7	28	6.1	RUMFC/Group Selection	SP, H, F, P, R
813	8	29	6.1	Reforestation Only	SP, H, TS, P, R
813	9	26	6.1	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	6.1	Reforestation Only	SP, H, TS, P, R
813	35	11	6.1	Reforestation Only	SP, H, TS, P, R
813	38	11	6.1	RUMFC/Group Selection	SP, H, F, P, R
813	39	8	6.1	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	6.1	RUMFC/Group Selection	SP, H, F, P, R
813	47	4	6.1	RUMFC/Group Selection	SP, H, F, R
814	1	40	6.1	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

Comp[1]	Stand	Acres	MA[2]	Harvest Treatments[3]	Reforestation Treatments[4]
814	18	32	6.1	Reforestation Only	SP, H, TS, P, R
814	20	18	6.1	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
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	52	12	3.0	Commercial Thinning	
814	53	10	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	33	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 may have succumbed to mortality are proposed for re-planting. Fencing is proposed for both new plantings and for previously planted and fenced sites which may need to be re-fenced due to damage or deterioration. The current condition of existing fencing and survival rates of past planting activities will be assessed 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 pruning of fruit trees, 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	Fence	Monitor Fence Condition and Tree/Shrub Survival	Monitor Tree/Shrub Survival Only	Install Wildlife Structure	Prune Fruit Trees	Opening Maint.
810	**2**	2							
810	**5**		6		3		2	2	
810	**8**	1		1					
810	**10**		2	2	2				
810	**12**	1		1			2		
810	**13**	1		1					
810	**15**	1		1					
810	**17**		3	3	3		2	1	
810	**18**		1	1	1				2
810	**20**	2		2			2		
811	**3**		3	3	3				
811	**4**							1	
811	**6**							4	
811	**9**		4	1	4			4	
811	**30**		4	4	1			4	
811	**35**		1	1	1			1	
811	**47**					2			
811	**49**							1	
811	**52**	3		5			2		6
812	**2**		5	5	5				
812	**17**		1	1	1			6	

Comp/Stand		Plant	Re-Plant	Fence	Monitor Fence Condition and Tree/Shrub Survival	Monitor Tree/Shrub Survival Only	Install Wildlife Structure	Prune Fruit Trees	Opening Maint.
812	**18**		2	2	2				
812	**23**		1	1	1				
812	**24**			1	1				
812	**27**			1	1	1			
812	**43**	2		2					2
813	**1**		2	2	2				
813	**5**		1	1	1			1	
813	**6**		2	2					
813	**8**	5		5					
813	**12**		1	1	1				
813	**18**		1	2	1				
813	**22**	2		2					
813	**32**		1	1	1				
813	**41**		1	1	1				
814	**2**		1	1	1				
814	**3**		1	1	1				
814	**6**	4		2					
814	**8**	2		2					
814	**9**		2	2	2				
814	**17**		2	2	2				
814	**18**		3	3	3				
814	**26**				1	1			
814	**28**	3		3					
814	**29**	3		3					
814	**33**	5		2					
814	**55**	6		6					
814	**59**				1	1			
814	**63**	2		2					
814	**68**	2		2			2		2
814	**69**		1	1	1				
814	**71**	2	2		1	1			
814	**72**		1	1	1				
814	**75**				1	1			
814	**76**				1	1			
814	**80**	2		2			1		2
814	**85**	2		2			1		2

Soil and Water Rehabilitation Activities

Due to the occurrence of illegal all terrain vehicle (ATV) use within the project area, some illegal ATV 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. 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	6.1	1 site	Block illegal ATV trails and rehabilitate sites
813	5	6.1	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 14.2 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. Approximately three acres of stone pit expansion are proposed for the SBKC project area (one additional pit will also be expanded downward rather than outward) and one new pit is proposed for development (2 acres).

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 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	1.0
	FR448	1.0
	FR186	1.0
	FR186/NS27117	Pit will be expanded downward
Pit Development (new)	FR461	2.0
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 the SBKC EA will be to provide the 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 the 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 DFC outlined in the Forest Plan 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 Forest Plan.

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 will be listed in subsequent issues. On September 6, 2006, a pre-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.

For this project, we are requesting public input for both formal scoping and 30-day comment periods at this time. Regulations (36 CFR 215) direct the Forest Service to seek public input at a point in the planning process when a detailed project proposal and preliminary analysis of effects is available. We are at the point in the process where a formal 30-day public comment period is most likely to be meaningful. This public involvement process, authorized under new planning regulations (36 CFR 215, dated June 4, 2003), is designed to provide the public with a concise Public Comment Package for review and provide the opportunity for site specific comments. Site-specific

comments for this project will be considered and may be used to improve project design and mitigations, location of activities, and timing of activities.

1.9 Preliminary Issues Used to Develop Alternatives

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 affected parties (adjacent landowners, subsurface mineral rights estate owners, and other interested parties). Additional issues may be identified during this public comment period and additional alternatives may still be developed.

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 Forest Plan standards and guidelines, or;
- whether they can be resolved by modifying the proposed action.

The ID team separated the issues into two groups: significant and non-significant issues. Significant issues are defined as those directly or indirectly caused by implementing the proposed action. Non-significant issues are identified as those that are 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) 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)…"

The ID team identified three significant issues:

1. **No New Road Construction**
   There is a concern that road construction will negatively affect opportunities of 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

[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).

is also a concern that additional roads will facilitate increased utilization of 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.

Indicator Measure: Acres of uneven-aged management
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 Forest Plan is just one of the environmental documents which provide guidance or information regarding management within the South Branch Kinzua Creek project area. This analysis is also tiered to the following documents:

- *The Understory Vegetative Management Final Environmental Impact Statement (VMEIS) and Record of Decision (USDA-FS, 1991).* This document analyzes the use of herbicides to control interfering understory vegetation.
- *Final Environmental Impact Statement for Threatened and Endangered Species on the Allegheny National Forest (USDA-FS 2000a).* The purpose of this analysis is to address the maintenance and enhancement of habitat on the ANF needed to ensure the continued existence of five T&E species.
- *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 2006a).* This report contains recommendations that may be carried forward in the SBKC, North End, and other projects.
- *Draft Environmental Impact Statement for 2006 Allegheny National Forest Land and Resource Management Plan, Appendix G (USDA-FS 2006c).* This appendix to the 2006 Forest Plan DEIS documents the potential human health effects and probable effects on wildlife terrestrial plants, and aquatic species from using herbicides for vegetation management on the ANF.

Consistency with the Forest Plan 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 conditions 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). In December 1998, the ANF entered into formal consultation with the USDI-FWS with regard to the potential effects of implementation of activities outlined in the Forest Plan on five federally threatened and endangered species. Formal consultation was concluded on June 1, 1999, when the USDI-FWS issued its Biological Opinion (BO) (USDI-FWS, 1999). The Forest Plan has been amended to be fully compliant with the BO. All management activities proposed in the SBKC project are subject to, and will meet, the terms and conditions of the BO. Additionally, the USDI-FWS will be consulted prior to implementation of any activities proposed under the SBKC project.

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 will be reviewed by both of 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 timber harvests and reforestation activities would not be completed at this time, and only routine custodial or maintenance activities would occur in the project area. This alternative would allow ecological processes and conditions to control the development of vegetation within the SBKC project area..

2.1.2 Alternative 2: Proposed Action

Alternative 2 is described in Chapter 1, Section 1.6

2.1.3 Alternative 3:

This alternative responds to preliminary issues raised both internally and from the public. Due to concerns with management activities occurring within relatively remote areas, road construction proposed in Alternative 2 using new corridors and some existing corridors has been dropped in this alternative. Several stands were dropped in this alternative because they can not be accessed using existing roads. Concerns with management activities occurring adjacent to South Branch Kinzua Creek have resulted in some treatments adjacent or near South Branch Kinzua Creek being dropped in this alternative. The dispersal of vegetation treatments is also addressed under this alternative as is the desire for an increase in uneven-aged management activities and a decrease of even-aged management activities. Stands shown in Table 7 have been dropped from Alternative 3 and stands shown in Table 8 have changed silvicultural prescriptions in Alternative 3. For stands that changed silvicultural prescriptions in Alternative 3, reforestation treatments remained the same as those proposed in Alternative 2.

Table 7. Proposed Silvicultural Treatments dropped from 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	17	6	3.0	Non-commercial Thinning	
811	27	6	3.0	AMFC	
811	29	5	6.1	Non-commercial Thinning	
811	33	15	6.1	AMFC	
811	34	6	6.1	AMFC	
811	36	11	6.1	Non-commercial Thinning	
811	37	9	6.1	AMFC	
811	43	11	3.0	AMFC	
811	57	13	6.1	AMFC	
812	5	15	3.0	AMFC	
812	8	4	3.0	AMFC	
812	22	17	6.1	AMFC	
812	26	13	6.1	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	6.1	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	33	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

Table 8. Stands with Changed Silvicultural Prescriptions in Alternative 3

Comp	Stand	Acres	MA	Harvest Treatments	Reforestation Treatments
814	29	11	3.0	UMEA Prep Cut	
814	49	12	3.0	Delayed Group Selection	H, F, P, R
814	50	17	3.0	UEAM Prep Cut	
814	51	15	3.0	UEAM Prep Cut	
814	52	12	3.0	UEAM Prep Cut	
814	53	10	3.0	UEAM Prep Cut	
814	70	16	3.0	Group Selection	H, F, TS, P, R
814	75	13	3.0	Delayed Group Selection	H, F, P, R
814	76	17	3.0	Group Selection	SP, H, Fe, TS, P, R

Wildlife habitat enhancement, NNIS control treatments, and soil and water rehabilitation activities are the same as those proposed in Alternative 2.

All road construction on new corridors (FR 186A) and approximately 0.5 miles of road construction on existing corridors (FR 186A and FR 463Ba) has been dropped in Alternative 3. Road maintenance, limestone surfacing, pit development and expansion, road decommissioning, and gate installation activities are the same as those proposed in Alternative 2.

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 the Forest Plan Forest-wide and MAs 3.0, and 6.1 specific standards and guidelines (USDA-FS 1986a) and the Soil Interim Guidelines (USDA-FS 2001a).

Design Features are highlighted applications of the Forest Plan 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:

- Site-specific areas are not listed where heritage sites occur due to the confidential nature of the information. See Forest Plan pp. 4-10, 4-86, 87, and 4-115 for Management Area direction discussing heritage resources. Appropriate Heritage Resources personnel will be contacted prior to formalizing any sale or implementation contract concerning ground disturbing activities to include any mitigation measures that will be included in contract clauses or agreements to protect heritage sites. Also, in any contract or agreement a statement will reflect the following: If any previously unrecorded sites are found during project implementation, all activity in the area should cease and the appropriate Heritage Resources personnel should be contacted. A Heritage Resource specialist will evaluate the situation and determine the proper course of action (*USDA-FS 1986a, pp. 4-10, 4-86, 87, and 4-115*).

- No herbicide will be applied within 200 feet of the South Branch Kinzua Creek for any vegetative treatment, including 811005, 812007, and 814018.

- No heavy equipment relating to harvest activities will be utilized within 200 feet of South Branch Kinzua Creek. This applies to stand 811005. Any road maintenance activities on FR 186 where it crosses South Branch Kinzua Creek will benefit the stream integrity and water quality. No road activities at this crossing will be done during the fall trout spawning season and the PA Fish and Boat Commission will be notified of all activities concerning the South Branch Kinzua Creek.

- Within 200 feet of the perennial sections of Glad Run, Watermill Run, and Campbell's Mill Run, all heavy equipment related to harvest activity will be restricted. Harvest material may be chained or cabled within this distance. This will apply to portions of stands 811033, 812005, 812022, and 812037. If herbicide is applied, all areas within 200 feet of the perennial sections will be applied with backpack sprayer. This design feature will apply to the following stands; 810041, 812024, 812037, 813032, 814018.

- In treatment areas within MA 6.1 where scattered or groups of blowdown trees have occurred, all trees will be left within the unit to contribute to the coarse woody debris component within the MA.

- In all treatment areas within MA 6.1, all snags (standing dead trees) will be retained unless considered unsafe during operations under OHSA regulations. Retain all trees containing cavities, both standing or down.

- In all treatment areas within MA 6.1, retain all existing shrubs and vines such as juneberry, ironwood, and hophornbeam to maintain the present diversity of soft mast – producing shrubs, and conifers such as hemlock, and white pine for winter cover.

- In all treatment areas within MA 6.1 keep harvesting equipment and herbicide at least 100 feet from intermittent streams, and 50 feet from seeps, and springs.

- Fencing and herbicide will not be accomplished in blocks greater than 40 acres in size at one time. Treatments such as these will occur at intervals so that large blocks of habitat are not isolated for interior species that utilize MA 6.1.

- All pits will be reclaimed and improved for wildlife habitat once they are deemed inactive. Areas will be seeded and planted with native species that will benefit all 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 stands 810005, 810018, 810024 a wildlife biologist will coordinate with the road engineers to protect the aspen component and adjacent managed food plot from disturbance activities. Activities will be done outside the nesting and brood rearing seasons, which is May 1 through September 1 and coordination with a Wildlife biologist will be accomplished.

- 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.

- If a butternut is discovered during implementation, assess the tree to determine whether it has been affected by canker. If it is determined that the tree may be resistant, activities which promote seed germination, including release, seedbed preparation, and fencing are to be implemented.

- Protect unique plant communities in 813002 and 813046 with ¼ to ½ acre reserve areas with no treatment. This design feature should also be implemented during marking activities if unique plant communities are found.

- Protect vernal pools and uncommon water features in 814027, 814050, 814051, 813007, 813008, 813038, 811025, and 810015 with either 100 foot buffer or ¼ to ½ acre reserve areas.

- Protect large rocks, boulders, or outcrops with 50 foot buffer (no treatment buffer zone) in stands 812012, 812067, 812068, 810015, 810028, 810032, 814005, 814052, 814053, 814062, 814064, and 814079. No heavy equipment within 50 feet. Areas may be protected with ¼ to ½ acre reserve areas.

- Protect and/or enhance large boulder fields and rock outcroppings. All treatment areas: If large boulders are encountered while marking any stands, no marking will be permitted within 25 feet of the boulders and skidding restrictions will apply. Protect the integrity of potential wildlife den sites by not impacting rocks larger than 2 feet in diameter in these areas and by not creating excessive soil disturbance near rock outcrops *(USDA-FS 1986a, p. 4-37).*

- Re-use existing skid trails and landings as practicable to minimize new disturbance (*USDA-FS 1986a, p. 4-23*).

- Snowplowing activities on FR 186 will leave a 2-4 inch mat to maintain conditions conducive to snowmobiling (*Timber Sale Contract Clause CT5.33*).

- Fencing will be kept 50 feet from all trails (FR186). This design feature will be used on the following stands: 810043, 812010, 812037, 811055, 811023, 811021, 811056, 811053, and 811005 (*USDA-FS 1986a, p. 4-87*).

- Hauling, road maintenance or felling and skidding activities within 100 feet of the snowmobile trails (FR 186) will not be permitted Friday through Sunday on December 20 to April 1 during the winter activity season when conditions are favorable to snowmobiling. Affected stands include: 810038, 810043, 812010, 812062, 812038, 812037, 810026, 810034, 810006, 811025, 811055, 811023, 811010, 811059, 811056, 811021, 811053, and 811005. At other times, commercial and administrative traffic will run with their lights on during favorable snow conditions (*USDA-FS 1986a, p. 4-95*).

- 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 1986a p. 4-87*).
- 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 1986a, p. 4-87*).
- For FR 186 and South Branch Kinzua Creek, slash shall be pulled back 15 feet from the edge of the road/stream, and for an additional distance of 35 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 1986a, p. 4-87*).
- Operators involved in the extraction of stone from stone pits will work on only one open-face of a pit at a time. Activities will not be initiated on another portion of the pit until the previous face is depleted of stone or that portion of the pit is closed for rehabilitation purposes.
- Slash disposal along entire outside perimeter of the area fence. No slash to remain on or against the fence. No slash to remain in the ATV maintenance trail that is established around the perimeter of the fence. Use existing vehicle access gates to enter fence. The affected stands include: 810013, 810020, 810039, 810040, 810043, 810044; 811-005, 811018, 811019, 811021, 811023, 811045, 811053, 811055, 811056, 811058; 812010, 812014, 812020, 812021, 812035, 812037, 812039, 812066, 812067, 812068; 813002, 813007, 813009, 813014, 813017, 813022, 813023, 813027, 813038, 813039, 813046, 813047, 814014, 814020, 814024, 814027, 814048, 814049, 814066, 814069, 814070, 814071, 814075, 814082, 814084, and 814088.

Mitigation measures are necessary when a specific situation requires Forest Plan standards and guidelines be exceeded to avoid potentially significant effects. A **monitoring plan** for mitigations listed below is found in Appendix A of this document.

- Site preparation and non-commercial release cuts would be conducted outside the period of April 1 to July 15, to avoid possible impacts to nesting songbirds *(Exceeds Forest Plan Standards and Guidelines, p. 4-17).*
- In order to reduce the occurrence of NNIS and minimize the risk of spread into other areas, areas of infestation will be mapped and on sites where infestation has been documented, equipment used in timber harvesting, reforestation, road construction activities will be cleaned prior to the arrival and upon departure of all treatment areas (*USDA-FS 2005b).*
- There will be no skidding and movement of machinery through spring seeps and stream channels. Skid trails and landings will be located away from the head of any seep. Appropriate erosion control methods will be implemented to minimize movement of silt into any seep (*Exceeds Forest Plan Standards and Guidelines, p. 4-24 and 4-31*.

- On Group 2 soils, main skid trails should occupy less than 10 percent of the stand. Existing main skid trails should be used whenever possible to reduce additional impacts (*Exceeds Forest Plan Standards and Guidelines, p. 4-21, 22*).
- For stands where inclusions of wet soils (drainage Group 2 or 3) are found, the following shall apply: 1) All heavy equipment (including feller-bunchers) will be excluded from wet soils inclusions less than 1 acre; 2) Main skid trails should be kept out of wet soil inclusions > 1 acre whenever possible. The stand-level measures identified above will apply where skid trails must be located within wet soil inclusions (*Exceeds Forest Plan Standards and Guidelines, p. 4-21-23*).
- Road drainage outlets will be armored to prevent accelerated erosion on all roads proposed for maintenance (*Exceeds Forest Plan Standards and Guidelines, p. 4-26*).
- Mark for retention scale-free or lightly infested beech, to provide mast and snag recruitment. Healthy beech should have full, healthy crowns, tight smooth bark, and no rot or cavities. They should not exhibit any scale, fungus, crown dieback, tarry spots, or puckered bark (*Burns and Houston, 1987; Mielke and others, 1986*).

2.2 Comparison of Alternatives – Actions and Outputs

Table 9. Comparison of Alternatives to the Desired Future Condition and Present Condition of National Forest System Lands in MA 3.0 Within the SBKC Project Area

Desired Future Condition			Present Condition	In 10 years – 2016		
				Alt. 1	Alt. 2	Alt. 3
Vegetative Management						
Age Class Distribution	0-10 (seedling)	9%[1]	3%	0%	7%	5%
	11-20 (sapling)	9%	3%	3%	3%	3%
	21-50 (pole timber)	-[2]	8%	10%	9%	9%
	51-110 (saw timber)	-[3]	85%	80%	75%	77%
	111+ (old growth)	Min 5%	1%	7%	6%	6%
Wildlife						
0-20 year age class	Not greater than 20-25%		6%	3%	10%	8%
Mast-producing timber (>35 yrs. old)	50% or more		88%	95%	87%	89%
Permanent openings	3-10%		1%	2%[3]	2%[4]	2%[4]
Conifer component[4]	No more than 10% in conifer cover		1%	1%	1%	1%

[1] The Forest Plan does not directly state the DFC for 0-10 or 11-20 age classes as a percent of any given land area. Seedling and sapling percentages given under the DFC are derived from estimated amounts of final harvests planned over the first decade of Forest Plan implementation (Forest-wide).

[2] The Forest Plan does not specify distribution amounts for these age classes in this MA.

[3] Includes potential OGM development and pit expansion.

[4] The percentage reflects stands that are actually typed as conifer. A stand must contain a conifer component of >50 percent to be typed as conifer. However, this percentage does not reflect the conifer component across the South Branch Kinzua Creek project area in this MA as a whole. See chapter 3, wildlife section, for a description of available conifer.

Table 10. Comparison of Alternatives to the DFC and Present Condition of National Forest System Lands in MA 6.1 Within the SBKC Project Area

Desired Future Condition			Present Condition	In 10 years – 2016		
				Alt. 1	Alt. 2	Alt. 3
Vegetative Management						
Age class	111+ (old growth)	Minimum 10%	2%	6%	6%	6%
Wildlife						
Poletimber and sawtimber (>20 yrs old)	Minimum of 70%		97%	97%	97%	97%
Permanent openings and other brood habitat	5-10%		3%	3%[1]	3%[2]	3%[2]
Conifer component[2]	Generally no more than 20% in conifer cover		6%	6%	6%	6%

[1] Includes potential OGM development and pit expansion.

[2] The percentage reflects stands that are actually typed as conifer. A stand must contain a conifer component of >50 percent to be typed as conifer. However, this percentage does not reflect the conifer component across the project area in MA 6.1. See chapter 3, wildlife section, for a description of available conifer.

Table 11. Comparison of Actions and Outcomes by Alternative

Proposed Activity	Alt 1	Alt 2	Alt 3
Timber Harvest (Acres)			
Even-Aged Regeneration Treatments (Total)	**0**	**788**	**647**
Shelterwood Seed Cut	0	477	425
Shelterwood Removal	0	311	222
Even-Aged Intermediate Treatments (Total)	**0**	**884**	**521**
Commercial Thinning	0	780	513
Salvage Thinning	0	8	8
Accelerate Mature Forest Conditions (AMFC)	0	96	0
Uneven-Aged Treatments (Total)	**0**	**594**	**691**
Uneven-Aged Management Prep Cut	0	50	115
Restore Understory Mature Forest Condition (RUMFC)	0	243	230
Group Selection	0	301	346
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 (Acres)			
Site Preparation	0	849	787
Herbicide Application	0	933	871
Fence	0	746	686
Fertilization	0	96	79
Tree Shelter Natural Regeneration	0	112	110
Planting	0	237	228
Release	0	691	647
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
Fence/Tree Shelter Maintenance *and* Monitor Tree/Shrub Survival (acres)	0	52	52
Monitor Tree Survival (acres)	0	8	8
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	.025

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	14.2	14.2
Limestone Surfacing (miles)	0	0.7	0.7
Number of Stone Pits to be Expanded[1]	0	4	4
Stone Pit Expansion (acres)	0	3	3
Number of Stone Pits to be Developed	0	1	1
Stone Pit Development (acres)	0	2	2
Road Barricade Placement (number of devices)	0	5	5
Other Indicator Measures			
Road Management Changes (percent of open, closed, and restricted roads)			
Open (Forest Plan Standard = 20%)	42	21	22
Restricted (Forest Plan Standard = 20%)	46	61	63
Closed (Forest Plan Standard = 60%)	12	18	16
Road Density (miles of road per square mile)			
MA 3.0 (Forest Plan Standard = 2 to 4 miles)	2.2	2.5	2.5
MA 6.1 (Forest Plan Standard = 1 to 3 miles)	1.0	0.9	0.9
Timber Harvest in the South Branch Kinzua Creek Valley			
Acres of vegetation management activities *dropped*	N/A	0	53
Dispersal of Treatments			
Acres *dropped* for treatment dispersal	N/A	0	267

[1] The stone pit located adjacent to FR186/NS27117 would be expanded downward and not outward; therefore, this pit expansion does not contribute to additional acres of expansion.

2.3 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 processes would control the development of vegetation. Routine custodial or maintenance activities would occur within the project area. Road maintenance (deferred) may take place as funding becomes available.

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 harvesting, associated reforestation treatments, and wildlife habitat improvements. Reforestation treatments would control competing vegetation long enough to allow tree seedlings to become established, improving the diversity of 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 four 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, 62 percent restricted, and 17 percent closed within the project area. Road density would increase to 2.9 miles of road per square mile in MA 3.0 and decrease to 0.9 mile/square mile in MA 6.1.

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 this lack of access, 75 acres of vegetation management will be dropped under this alternative.

Dropping 53 acres of treatments (2 stands) is responsive to the significant issue of active vegetation management near South Branch Kinzua Creek.

The significant issue of dropping even-aged management treatments and proposing more uneven-aged management treatments is also responded to under this alternative. Even-aged treatments will decrease by 172 acres while uneven-aged treatments are increased by 123 acres due to either a change in stand prescriptions or dropping stands which were proposed in Alternative 2. It should be noted here that 13 acres of uneven-aged treatment has 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 267 acres of treatments (191 acres in MA 3.0 and 76 acres in MA 6.1) 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 444 acres of treatments have been dropped under this alternative and an additional 123 acres have been proposed for changes in stand prescriptions. Wildlife habitat enhancements, NNIS treatments, and soil and water rehabilitation activities remain unchanged from the proposed action.

Road management classifications would become 22 percent open, 63 percent restricted, and 16 percent closed within the project area. Road densities would be the same as in Alternative 2.

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

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 cultural and historic resources (heritage), 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 and others. 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 and others 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 permit 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 and others 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 and others 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 and others 2005; Bailey and others, personal communication).

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 and others 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 and others 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, such as 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 and others 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 regeneration process. Use of herbicide increases the levels of light and soil resources available to regenerating vegetation. The typical half-life of glyphosate herbicide in soils on the ANF is 4 to 6 weeks (USDA-FS 1986b, p. 4-125). Glyphosate herbicide binds readily to soils and becomes relatively immobile, so there is limited potential for residual effects or effects to soil nutrients. Sulfometuron methyl herbicide is more mobile than glyphosate, but 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 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 "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. Sulfometuron methyl is broken down by water and microorganisms. It can breakdown 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. Principal products of the breakdown of sulfometuron methyl include saccharin, carbon dioxide, and methyl 2-(aminosulfonyl) benzoate.

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 and others 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 and others 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 version 2004.02.18).

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 SPKPA. Stand 814001, which lies 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 lie between Forest Roads 448 and 448F, are overlain by landslide features. Of the other three landslide features which lie within or impinge on the SBKC project area, none of them overlay stands proposed for treatment as part of this project.

Road construction (following both 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 and others 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 and others 1995; Wemple and others 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 and others 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, and others 2000; Hiemenz, personal communication).

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 and others 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 areal 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 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. Results of the monitoring led to the creation and implementation of interim soil guidelines (USDA-FS 2001a) 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 1986a, p. 4-21; 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 12).

Table 12. 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 2004). Therefore, all protected water uses are currently identified as "supported."

The Environmental Protection Agency (EPA) 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 Forest Plan (USDA-FS 1986a, pp. 4-19 and 4-19a) identifies additional water quality criteria and presents management practices that are important for maintaining or improving protected uses.

Perennial flowing streams are to:

1. Have average daily maximum stream temperatures less than or equal to 20 ºC (68 ºF) in streams supporting cold water communities;
2. Provide habitat complexity, channel stability, and pool formation in cold-water streams by managing for recruitment of large woody debris (LWD); and
3. Maintain streamside trees that provide stream bank stability.

Intermittent flowing streams are to:

1. Maintain trees that provide stream bank stability;
2. Manage for leaf litter input; and
3. Manage for input of woody material.

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 24,965 acres. Approximately 66 % 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 mi/mi^2 and Forest Service Roads have a density of 1.0 mi/mi^2. There are 353 recorded oil and gas wells in the subwatershed, some of which are active and inactive.

Introduction to Effects

Streamflow Regime

Studies from several areas of the northeastern U.S., including the Leading Ridge Watershed Research Unit in Pennsylvania, provide an understanding of how forest disturbance influences water yield over time. This research, summarized by Hornbeck and others (1993), identifies three generalizations relative to water yield change. These include the following: 1) Initial water yield increases can occur following forest cutting, with the magnitude being roughly proportional to the percent reduction in basal area; 2) Water yield increases can be prolonged for an undetermined length of time by controlling natural regrowth; otherwise they diminish rapidly to predisturbance levels within three to ten years; and 3) Changes in water yield also respond to changes in species composition.

Reductions in basal area that approach 25 percent were found to have measurable increases in annual water yield by 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). 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. 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 4 years (Lynch and Corbett 1990).

The streamflow regime has likely been modified by the presence of roads and other compacted areas on the landscape. These areas have the potential to affect different parts

of the streamflow regime and have a longer lasting affect where hydraulic connectivity exists between road drainage and the stream network. Wemple and others (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 2006a) identified several road segments as exhibiting connectivity to stream channels because of ditchline 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.

Water Quality

Water quality deals with the physical, chemical, and biological characteristics of water. Knowledge of water quality characteristics helps to evaluate the ability of the water to support protected uses (e.g., aquatics, recreation, etc.). 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.

Maintaining mature streamside vegetation is important to keeping stream temperatures within Forest Plan and DEP standards, which will be accomplished by not allowing harvesting to reduce canopy cover by more than 50 percent in streamside zones within 50 to 100 feet of all stream channels (see mitigation measures). When the streamside vegetation that provides shade to a stream channel is removed, solar radiation is allowed to enter the water and cause warming. As a result of past management practices, the stream channels in the SBKC project area are relatively wide and shallow. Wide, shallow stream channels provide more surface area to capture the direct warming rays of the sun and are therefore more susceptible to water temperature increases via this phenomenon.

Fine sediment quantity within stream channels of the subwatershed is inherently moderate due to the nature of the sandstone bedrock. Therefore, sand sized particles commonly occur in the stream bed and banks of stream channels. The presence of the road network within SBKC project area has increased the amount of fine sediment available to the stream network. Since many road segments are hydrologically connected to the stream network, road derived sediment is being transported into stream channels. Where the amount of sediment exceeds the stream's ability to transport downstream, deposition is occurring in the channel, covering larger substrate and filling the interstitial spaces between rocks that are important for aquatic organism survival. Where deposition is extensive enough, the protected use of aquatic life may be impaired.

Most increases in turbidity and sediment from silvicultural activities are associated with erosion logging roads, skid trails, and log landing sites (Lynch and Corbett 1990, Phillips and others 2000). Research has shown that where BMPs are properly employed, significantly less erosion and sedimentation occur (Phillips and others 2000). A study at Leading Ridge watershed found that Pennsylvania Bureau of Forestry BMPs were very effective in controlling nonpoint source pollution from silvicultural activities (Lynch and Corbett 1990). The increases in turbidity and suspended sediment levels in this study were attributed to exposed soils from wind thrown trees along an intermittent channel. Since the ANF uses a filter strip along intermittent streams and its standards and

guidelines meet or exceed State BMPs, sedimentation from silvicultural activities is expected to be effectively minimized.

The use of herbicide and fertilizer to aid in reforestation is a common practice on the ANF. The potential for herbicide to enter a stream and have an effect on water quality was evaluated during the summer of 2002 over a 17 day period. Herbicide was applied within a harvested unit on the Bradford Ranger District adjacent to Root Run, a perennial stream channel. Forest Plan streamside buffers were implemented between the area of application and the stream, and water samples were taken from the stream following the application of herbicide. No detectable amounts of herbicide (measured as glyphosate, AMPA, and sulfometuron methyl) were found in the water samples collected (Appendix A of Hydrology Report, Project File). Although it is likely that Glyphosate, once applied, moves no more than a few inches off-site and binds tightly to soils, streamside buffers are important to mitigate any drift in the air that may occur during application and filter any runoff that may occur during storm runoff events. The potential for sulfometuron methyl to leach into groundwater depends on soil conditions such as organic matter content, moisture, and soil pH. In dry, acidic soil with high organic matter content, sulfometuron methyl has little potential for movement into ground water. Soils on the ANF are inherently acidic and relatively high in organic matter. It is also important to apply this herbicide during dry soil conditions to avoid increasing its mobility.

The effect of fertilization on water quality was evaluated and documented in the ANF Fiscal Year 1993 Monitoring and Evaluation Report (USDA-FS 1994). For the evaluation, a 150 ft vegetated buffer strip was left between the treated 5-acre harvest unit and the stream. Chemical measurements were made for nitrate-nitrogen and total phosphorous. Nitrate-nitrogen levels were found to remain low over the sample period of three months and well below drinking water standards. Total phosphorous levels were also found to be low. Based on this period of record, there appears to be no detectable change in water nitrate-nitrogen and total phosphorous levels due to the application of fertilizer on the ANF when streams are buffered from the potential effect.

Stream Channel Morphology

Existing channel morphology integrates all past and present disturbances and natural processes, and therefore, is a primary indicator of water resource effects. Channel form at any location is a function of: 1) streamflow; 2) quantity and character of the sediment moving through the location; and 3) character or composition of the materials making up the bed and banks of the channel. A change in one of these variables sets up a series of concurrent changes in the others, resulting in altered stream channel form. Stream reaches generally fall into three categories: (1) energy limited, where stream energy is less than sediment supply, in these cases channel aggradation (deposition) generally occurs as the channel deposits material until a balance is reached; (2) supply limited, where stream energy is greater than sediment supply, in these cases channel erosion (degradation) is likely to occur; and (3) dynamic equilibrium where localized adjustments resulting from (1) and (2) may occur, the system as a whole is stable.

The streams in the SBKC project area have likely experienced changes in channel form as a result of channel erosion from supply limited conditions during and following the period of extensive timber management at the turn of the 20th century. Presently, most stream channels in the analysis area are still experiencing elevated inputs of storm water

runoff and sedimentation, largely from the hydrologically connected road network in the watershed. This has resulted in localized areas of stream bank instability. Overall, the stream network is in stable condition without excessive levels of channel scour or sediment deposition that would further alter channel form, and therefore, the channel network is currently in a state of dynamic equilibrium.

Although the stream network is currently in a stable condition, it appears (from visual estimates) that aquatic habitat diversity is low and not within the desired condition. As a result of the past (turn of the 20th century) management practices of splash damming, channelization, and the logging of streamside trees, stream habitat has been simplified. Splash damming removed stable large wood and boulders from the channel. This allowed channel bed substrate to become mobile and pools to be lost due to absence of structure and filling. Channelization from roads and railroad grades increased flow energy by restricting access to floodplains and created supply limited conditions that led to channel scour and erosion. Logging of streamside vegetation resulted in the loss of LWD recruitment for many years to follow. Thus, the current habitat is largely defined by a high frequency of riffle and glide features, and few pools. Since pool habitat is important for aquatic organism survival and propagation, streams within the analysis area may not fully meet Commonwealth designated protected water uses due to the lack of adequate aquatic habitat in the form of pools. Additionally, current levels of large wood within the stream channel are most likely below the desired condition outlined in the Forest Plan of 75 to 200 pieces of large wood per stream mile. Streamside management concerns were incorporated in the proposals for all alternatives in the SBKC project to help protect and improve aquatic organism habitat by maintaining streamside vegetation and down woody debris that is currently serving or may serve as aquatic habitat.

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 2006a) 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. The Forest Plan provides a density standard for the Forest Service road system for most management areas. Table 11 (in Chapter 2) shows (1) the Forest Plan standards for road densities for forest roads and (2) the existing forest road densities by management areas within the SBKC project area. Current road densities are at or near the levels recommended in the Forest Plan.

Road Management

There are three basic road management strategies on the ANF: Open, Closed, and Restricted. Open roads are forest roads that are opened 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. The Forest Plan provides long-term objectives for road management for the Forest Service road system. Long-term objectives in the Forest Plan are 60 percent closed and 20 percent each for open and restricted. Table 11 (in Chapter 2) shows the breakdown for forest roads by road management objective for the existing condition within the SBKC project area. Currently, the SBKC project area does not meet the long-term objectives in the Forest Plan for road management.

Unroaded Areas

According to the Forest Road Analysis Report (USDA-FS 2003), there are no unroaded areas exceeding 500 acres located entirely within the project boundary. However, two 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 un-fragmented core areas, with some exceptions near the South Branch Kinzua Creek where interspersed natural openings interrupt the canopy forest.

Unroaded areas have been defined as: areas that do not contain classified roads; areas without the presence of a classified road – and of size and configuration sufficient to protect the characteristics associated with their roadless condition; and areas distinct from and not overlapping inventoried roadless areas. “Unroaded areas” 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.

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 [EPA]), 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

According to District records, there are currently 343 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 0.75 acre of land. This translates into approximately 257 acres of NFS lands within the SBKC project area being used for OGM production.

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 2000, 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 and others 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 and others 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).

Although currently managed by state-regulated hunting programs, average deer herd densities in northern Pennsylvania remain well above maximum levels (about 18 deer per

square mile) that permit establishment of desirable advanced regeneration of tree seedlings (Tilghman 1989; Morin and others 2001). 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).

Across the ANF, deer management is guided by the policies of the Pennsylvania Game Commission (PGC). Pellet group counts conducted within the project area from 2004 and 2005 suggest an average overwintering deer density of about 15 deer per square mile. 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. Beginning in 2003, the PGC allowed landowners and land managers concerned about deer impact on forest resources to participate in a Deer Management Assistance Program (DMAP) through which landowners could distribute additional antlerless deer tags to interested hunters in order to reduce deer densities and deer impacts. The ANF participated, forest-wide, in this program from 2003 through 2005, and participation and success have been high.

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 and others 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 and others 2005). Sugar maple has been shown to become more vulnerable to stresses like insect defoliations in soils on upper slopes and plateau tops (Long and others 1997; Horsley and others 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 and others 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 and others 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. Most stands are well stocked, except for areas affected by hardwood decline and mortality. Age classes in the project area are shown in Table 13.

Table 13. Age Class Distribution by MA and Acres

Age Class	Years of Origin	MA 3.0 Acres	MA 6.1 Acres	Total Acres
1-10 years old	1997-2006	155	0	155
11-20 years old	1987-1996	146	0	146
21-30 years old	1977-1986	0	29	29
31-40 years old	1967-1976	255	14	269
41-50 years old	1957-1966	71	23	94
51-60 years old	1947-1956	182	70	252
61-70 years old	1937-1946	651	77	728
71-80 years old	1927-1936	706	281	987
81-90 years old	1917-1926	506	297	803
91-100 years old	1907-1916	779	128	907
101-110 years old	1897-1906	253	35	288
111+ years old	1887-1896	10	20	30
Savannahs & other openings	N/A	32	26	58

Age classes can also be grouped by tree size class. The tree size classes in the project area are shown in Table 14.

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 14. Age and Size Class by Management Area

Age and Size Class	MA 3.0		MA 6.1		Project Area	
	Acres	% of MA	Acres	% of MA	Acres	% of Project Area
0 - 10 (Seedling)	155	4%	0	0%	155	3%
11 - 20 (Sapling)	146	4%	0	0%	146	3%
21 - 50 (Pole)	326	9%	66	7%	392	8%
51 - 101 (Sawtimber)	3,077	82%	888	91%	3,965	85%
111+ (Large Sawtimber)	10	0%	20	2%	30	1%
Total Acres of Forest Cover	3,714	99%	974	97%	4,688	99%
% of Forest Cover of Project Area		78%		21%		99%
Opening	32	1%	26	3%	58	1%
Total	**3,746**		**1,000**		**4,746**	

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. 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 believed to be older than 110 years. Within the SBKC project area, 113 acres in MA 3.0 and 207 acres in MA 6.1, totaling 320 acres, along South Branch Kinzua Creek have been designated as future old growth in a previous NEPA document.

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 monitored and 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 an issue such as habitat fragmentation.

- 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, endangered, and Regional Forester's Sensitive Species (RFSS). At the stand level, 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 and others (1992) developed a wildlife habitat relationships model for New England. Table 15 presents the forest and non-forest community types found in New England that are closely associated with habitat relationships in the project and the number of species associated with each type. The highest levels of species richness observed on the ANF are associated with mature (51 to 110 year age class) hardwood forest communities. Hardwood communities are slightly more abundant than coniferous forest types or communities associated with permanent openings.

Figure 1 displays the forest types and age classes for the stands in the SBKC project area. A breakdown of the habitat (forest types and age class) by MA is located in Chapter 2. All of the vegetation treatments would occur in stands classified as MA 3.0 and 6.1. The proposed timber harvest in MA 6.1 will be implemented to benefit wildlife. A total of 300 acres will be treated in MA 6.1 in the proposed alternative and will include 56 acres of non-commercial thinning, 60 acres of AMFC (Accelerate Mature Forest Conditions), and 184 acres of RUMFC (Restore Understory Mature Forest Conditions)/Group Selection. These treatments are expected to create gaps, create snags, increase coarse woody debris (CWD), increase species diversity and horizontal structure, 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.

An array of silvicultural reforestation treatments (site preparation, herbicide application, fertilization, fencing, planting, and release) is 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 6.1 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 establish favorable forest cover in these stands to provide habitat for a multitude of wildlife species throughout the forest development process. In many of these stands, undesirable vegetation and the effects of long-term deer browsing currently make establishing desirable forest cover relatively impossible to occur on its own.

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 successional forest condition.

Table 15. Species Richness in the SBKC Project Area

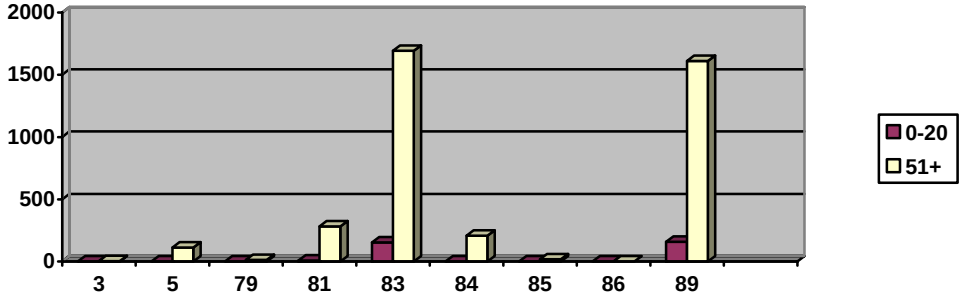
Community		Fauna (number of species)				
	Amount [1]	**Amphibians**	**Reptiles**	**Birds**	**Mammals**	**Total**
Hardwoods						
Seedling (0-10 years)	5%	10	9	95	42	156
Sapling (11-20 years)	2%	17	11	64	37	129
Pole (21-50 years)	9%	17	11	64	37	129
Mature (51-110 years)	82%	18	12	89	44	163
Over mature (111 + years)	1%	0	0	26	14	40
Conifer						
Coniferous Forest [2]	2%	12	7	74	37	130
Non-Forest						
Permanent Openings (Grass/Forbs/Shrub)	1%	2	14	69	25	110

Notes: Species-habitat relationships adapted from DeGraaf, *et al*, 1992

1. Habitat amounts are displayed for federal land in the proposed 4746-acre project area. Numbers are rounded to the nearest whole number for efficiency.
2. 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 occupy an estimated 9% of the project.

Primarily, wildlife habitat in the project consists of two principle hardwood forest age classes. Approximately 82 percent of the project is in hardwood type 51-110 years old. Commercial timber harvests are under consideration in the mature hardwood stands. Approximately nine percent of the project is in the hardwood pole type 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 (see Figure 1). Mast-producing hardwood stands (greater than 35 years old) constitute 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 has 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.

Conifer typed stands (greater than 50 percent stocking of conifer) are classified on two percent of the project area (Table 15). In the SBKC project, 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. GIS data indicates approximately 417 acres (nine percent) of conifer inclusions exist in the project area. Estimates indicate that over the entire project, 132 acres (28 percent of the conifer cover) occurs 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, primarily located along sections of the South Branch Kinzua Creek, Watermill Run, Hubert Run, and Glad Run. In upland terrain, hemlock typically persists on north slopes and across the rolling plateau topography with moderate to poorly drained soils. One three acre white pine stand exists along South Branch Kinzua Creek.

The SBKC project 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, blue beech, yellow poplar, juneberry, and sugar maple. Trace 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. Sporadic apple trees associated with the timber logging 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 find suitable habitat 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 opening habitat, specifically herbaceous openings and pits or openings associated as lowland shrubs. Opening habitat also exists as small inclusions in the project and is associated with roads, pipelines, utility corridors, oil or gas lease developments, log landings, and other forest openings.

The project contains lower slope and bottomland habitat, specifically along SouthBranch Kinzua Creek, Glad Run, Hubert Run, and Watermill Run. A mix of hemlock areas, 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. The South Branch Kinzua Creek, Glad Run, and Watermill Run are classified as High Quality Cold Water Fisheries (HQCWF) by the PA DEP. Hubert Run is designated as a Cold Water Fishery (CWF). All proposed treatments are located within these watersheds. The 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. Fishing access is remote as most is walk-in only with FR 186 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. Proposed treatments within 200 feet of the South Branch Kinzua Creek include four stands, including a non-commercial thin (1), reforestation treatments/underplanting (2), and RUMFC (1). All perennial stream sections will be protected with Forest Plan standards and guidelines or site-specific mitigation measures. In addition to the named streams, several large intermittent streams feed the larger streams. None of the stream sections above are Approved Trout Waters stocked with fish by the PFBC. 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 the major stream-courses.

Intermittent streams in the project are small in size, have seasonal flows and naturally low pH (due to local geology and climate) are usually unable to sustain fish for long periods of time. A variety of silvicultural and wildlife proposed treatments fall adjacent to some sections of intermittent stream-courses. All intermittent stream courses would be protected using Forest Plan standards and guidelines.

According to the 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 mixed (Palustrine Forested) with 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 would be protected with standards and guidelines.

Springs and seeps that do not appear on topographic maps also occur in or near enough to proposed timber harvest or reforestation-only stands to require one or more Forest Plan standards and guidelines or mitigation measures to protect these resources and maintain water quality. These tiny streams not only carry water during periods of elevated precipitation and snow-melt but may also function as moist corridors for indigenous species (salamander) migration and dispersal. Over one hundred seeps have been mapped within the project area. Vernal pools exist in the project area and these seasonally wet areas provide habitat to a variety of amphibians and reptiles.

Additional wildlife habitat features within the SBKC project area include rock outcrops and small surface boulders. Surface boulders 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.

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 field checked in 2006, but surveys showed no nests present. Forest Plan standards and guidelines would protect any nests if found.

During the past few years, white-tailed deer populations have been monitored in South Branch Kinzua Creek watershed. Surveys were conducted within the project boundary and in or immediately adjacent to the proposed treatments. Deer averaged 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 FR 448 portion of the project area. Immediately north of the project area, surveys were conducted in FR 279 area in 2003/2004 with an average of 29 deer per square mile.

Cumulative Effects (CE) Analysis Period and Area

The CE analysis period is 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 24,965 acres including 14,344 acres of Management Area (MA) 3, 2,166 acres of MA 6.1 (National Forest land), plus 8,455 acres of private land. This CE area, public land plus 8 private parcels/sections (within), was selected because these lands include the entire South Branch Kinzua Creek (6^{th} order) watershed 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 of 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 5,972 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. 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 16,510 acres of National Forest land in the CE area, 299 acres are non-forested (opening habitat) and 16,211 acres are forested. Approximately 1,059 acres of this forested habitat is currently in an early successional (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, FR 279, FR 463, and FR 186. 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 all 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 386 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. Recent activities include an additional 10 wells either constructed or will soon be constructed within the project area in the FR 460 for a total of 35 wells in 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 S.B. Kinzua Cr. 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 FR 150 and development located on private property in and around the town of Kane, PA.

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 un-fragmented 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 and others 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.

A quantitative analysis of the landscape distribution of un-fragmented and fragmented core forest habitat was performed using a spatial model. The model was used by the Mount Hood National Forest (USDA-FS 1989b) and adapted and modified for the forested conditions on the ANF. The area of potential 'core' forest habitat is determined by identifying all stands in the project that are more than 50 years old. Stands younger than 50 years are classified as 'other' forest for purposes of the analysis. The spatial relationships of roads, large openings for oil and gas wells, gravel pits, utility corridors, and other permanent openings and the edge effects of the non-forest land uses in relation to stands classified as core and 'other' forest were analyzed using a buffer analysis in GIS.

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. The core values considered optimum are those values beginning with 15 through 20. Based on calculations made by the model there is approximately 872 acres (18%) of the SBKC project area within this range. This model was used to calculate the environmental value of the forested stands relative to their fragmentation. The project file contains the fragmentation analysis and background.

A visual analysis of the landscape distribution of un-fragmented and fragmented core forest habitat in the SBKC project indicates that most areas of fragmented habitat are associated with the stand replacing effects of various final harvests that have occurred in the project area over the last four decades. These areas are located mainly in the western portion on the plateau along FR 463 and FR 448. This degree of fragmentation is due to stand replacing efforts from severe hardwood mortality and other treatments in the last 40-50 years. The model shows major core or linkage areas along Watermill Run (end of FR 460), plateau region near FR 457 across to FR 186 to private, FR 186 near South Branch Kinzua Creek, areas along Hubert Run and upslope, and sections of the South Branch Kinzua Creek. In general the core areas of un-fragmented forest are well distributed and connected to some degree across the landscape, especially in the eastern portion of the project. In addition 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.

A habitat component of un-fragmented forest or maturing forest conditions is CWD and snags. The majority of the hardwood 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. Wildlife surveys registered 448 total snags ranging from 1 to 8 snags per plot on the 74 percent of the area surveyed. There were sixteen plots with at least eight snags. CWD is present on 75 percent of the area surveyed ranging from 0-10 pieces per plot that are 6-18" in diameter. A total of 722 pieces of CWD were recorded. These habitat components serve a wide variety of wildlife species for both food and cover.

Project Level Filter Approach: Management Indicator Species (MIS)

In general, the Management Indicator Species (MIS) approach is used to reduce the complexity of discussing all the wildlife species on the Forest. Management Indicator Species 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. Forest MIS include 13 wildlife and three fish species, representing a variety of habitats, which is useful for monitoring trends in habitat capability across the Forest (USDA-FS 1986a).

Using a variety of techniques, the ANF has been monitoring MIS species and their habitat since 1986. Detailed, forest-wide information on population trends and the availability of suitable habitat can be found in the Annual Forest and Fish and Wildlife Monitoring Reports (1986-present) (USDA-FS 2002b). Table 16 summarizes information on the habitat indicators, requirements, and population trends for each MIS.

Habitat for early successional MIS, such as the American woodcock and ruffed grouse, is found on approximately seven percent of the project area in stands 20 years old or younger. There is no aspen forest type in the project. However, there are occasional mature aspen trees located in some of the drainages and seedling/sapling aspen growth around both permanent and temporary openings. Conifer cover, specifically eastern hemlock occurs on approximately two percent of the project area (hemlock is found in >50 percent of the stand) and as inclusions within hardwood stands on approximately 417 acres (or nine percent) of the project. These conifer trees occur as single trees, small patches, or understory/midstory inclusions within hardwood stands generally along drainages and in scattered locations across poorer drained sections of upland plateau terrain. Some of these inclusions may provide important winter cover for ruffed grouse and stop-over habitat for migrating wood warblers. Wildlife surveys of the project indicate that early successional hardwood habitat and conifer cover presently support white-tailed deer that are hunted heavily by sportsmen. From 2004 and 2005, survey data collected indicates that the project (as a whole) supports on average 14.5 deer per square mile with local variations ranging from 12 to 19 per square mile. Portions of the Glad Run, Watermill Run, Hubert Run, and South Branch Kinzua Creek with their increased conifer component appear to be particularly suitable winter habitat for species like wild turkey and white-tailed deer. Early-successional habitat located on the plateau and near intermittent drainages feeding these larger streams also contributes to suitable winter feeding grounds for these species. Populations immediately to the north of the project

averaged 29 deer per square mile from 2003 to 2004, relying on south facing conifer habitat and a seedling/sapling component.

Abundant habitat is currently found in the project for species that require mature and late-successional deciduous forest types, such as the pileated woodpecker. Approximately 83 percent of the project is currently in stands with an age class greater than 50 years old. In addition, there is a modest distribution of snags and potential den trees in areas of mature hardwoods plus some of the reserve trees and wildlife clumps in the early successional (reforestation-only) stands. Of the areas surveyed, at least one snag and many as eight snags were documented on each transect within approximately 74 percent of the area surveyed. A total of 448 snags were recorded on 261 plots. The snags provide ample foraging and cavity nesting habitat for the yellow-bellied sapsucker. Both woodpeckers have been documented across the project. Mature, largely contiguous tract of forestland near riparian areas along with small openings such as the South Branch Kinzua Creek, Watermill Run, Glad Run, and Hubert Run watersheds provide suitable nesting and foraging habitat for the red-shouldered hawk. This raptor was observed flying over these watersheds of the project during field surveys, but no active nests are currently documented in SBKC project. The last known nesting activity was in 2002.

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 monitoring has not confirmed rattlesnake activity. These areas are located typically on cool north slopes and are well vegetated. Project mitigation measures are recommended to maintain and protect these physical features. Coarse woody debris was recorded on 75 percent of the area surveyed with 722 CWD pieces recorded. 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. More detailed information on habitat suitability for this species can be found in the Biological Evaluation (BE) (Project File).

Suitable nesting and foraging habitat for the great blue heron is limited to the South Branch Kinzua Creek, Glad Run, and Hubert Run watersheds. This species has been observed in the SBKC project area, specifically around the inactive and active beaver dams along the riparian corridor. There are no documented heron nests within the project area.

Species that require a mix of mature conifer and deciduous forest types, such as the hermit thrush, black-throated green warbler, and barred owl, have generally benefited from past management activities that have retained hemlock inclusions across the landscape and increased the density of understory vegetation through thinning of the overstory canopy. Suitable habitat with a conifer component of 9% hemlock inclusions mixed with hardwoods would benefit these species. Areas of core forest habitat and abundant snags in the project have benefited cavity-nesters such as barred owls. All three of these species have been documented within the project.

Eastern hemlock, either as conifer stands or more importantly as inclusions in hardwood stands, on approximately nine percent of the project provides suitable habitat for the

magnolia warbler. This species was documented in the project area during songbird surveys. This species may use edge habitats associated with regenerating stands, intermediate cuts, permanent openings, oil and gas developments, and utility corridors for nesting and foraging habitat.

Habitat for species that require aspen, such as beaver, is located as small inclusions or individual trees primarily along the floodplains and riparian zones of South Branch Kinzua Creek, Glad Run, and Hubert Run. GIS data indicates that aspen does not occur as a pure stand in the SBKC project area. However, beaver activity has been documented on the above mentioned perennial streams. Active dams are located on South Branch Kinzua Creek and Glad Run. Inactive dams are located on Watermill Run and Campbell's Mill Run in addition to the two streams above. Aspen, willows, and other tree species utilized by beavers are generally confined to riparian areas. The project contains only a few intermittent streams and does not possess significant riparian habitat in these areas. Beaver dams have been responsible for creating many of the wetlands found along South Branch Kinzua Creek and its major tributaries.

As previously mentioned, the project contains four perennial streams that are capable of supporting viable brook trout populations. Brook trout were also observed in the perennial portion of Campbell's Mill Run (not labeled on map). No brook trout were observed in the intermittent streams that were surveyed. Field observations failed to observe this species within the boundaries of the proposed commercial harvests. However, these seasonal streams are part of watersheds that are classified as HQCW fisheries or CWF by the PA DEP. As these waterways develop perennial flows, they often contain adequate physical habitat (pools and riffles) and densely shaded forest cover required by this species. Seasonal variations in stream flow typically affect the abundance and distribution of brook trout in the upper reaches of these streams with years of extreme low and high (flood) flows resulting in less use of headwaters habitats.

Suitable habitat for small-mouth bass and walleye are not present in the project. Spawning and foraging habitat for these species is usually found in deeper water environments of large streams, rivers, and the Allegheny Reservoir. However the S.B. Kinzua Cr. watershed has the potential of influencing water quality that could affect the habitat of these species (downstream).

Table 16. Summary of MIS Species Habitats and Population Trends on the ANF

Species	Habitat Indicator/Habitats Used on ANF	Population Trends
American Woodcock	Permanent openings, often in combination with early-successional forest habitat	Monitoring data since 1990 indicate a fluctuating but relatively stable woodcock population within areas of preferred habitat. However, there has been a decline of 2.1%/year in the Eastern Region and 1.8%/year in the central region since 1968. It is widely believed that loss of old field and early-successional forest habitat is the primary cause of such decreases (Woodcock task Force, 2005)
Ruffed grouse	Early-successional or regenerating deciduous forest habitat (usually less than 20 years old) with scattered openings and a conifer component. The aspen forest type is preferred due to the associated high stem density in regenerating stands and the food source provided by mature aspen.	The ANF has been monitoring this species since 1990. Data indicate that ruffed grouse populations on the Forest are cyclic but stable. During the last decade, the distribution and amount of available grouse habitat has increased in some areas due to development of early-successional vegetation through timber harvest, oil and gas development, and the implementation of various wildlife habitat improvement projects.
White-tailed deer	Early-successional or regenerating deciduous forest habitat found along with mature forest. Note: this species generally uses a variety of different forest, grassland, and brushy habitats.	Monitoring data indicate that the size of the deer herd fluctuates both on an annual basis and across different parts of the Forest. Average densities for the SBKC over the period 2004-05 ranged from 12 to 19 deer per square mile (averaging 14.5 - under the density goal of 21 per square mile). Suitable habitat for this species appears to be of sufficient quantity and quality to provide a stable population across the ANF.
Pileated Woodpecker	Old growth or late-successional deciduous forest with large diameter snags. Nesting and breeding habitat may also include stream bottoms and riparian zones with suitable large trees (Christy 1939, Hoyt 1957)	Forest-wide monitoring efforts indicate stable populations across the ANF. This is consistent with statewide information reported in Brauning (1992).
Red-shouldered hawk	Undisturbed mature upland and riparian forests. Preferred foraging habitat includes non-forested habitats and larger floodplains; may also forage over savannahs. This species may tolerate the presence of humans as long as large contiguous tracts of woods, including wetland areas, are available.	Stick nest monitoring shows that red-shouldered hawks are distributed across the ANF, with the largest concentration of nests in the Tionesta, South Branch Tionesta Creek, Spring Creek, and Big Mill Creek watersheds. Although there is concern that this species is declining in Pennsylvania, the ANF contains one of the highest densities of this raptor in the state (Brauning 1992). Based upon the availability of suitable nesting and foraging habitat, forest-wide populations appear to be stable.

Species	Habitat Indicator/Habitats Used on ANF	Population Trends
Great blue heron	Undisturbed old growth or late-successional deciduous forest conditions with large trees suitable for nesting. This species is highly sensitive to human disturbances and nests typically occur in isolated and remote areas. Commonly forages along streams or wetlands and are observed along Tionesta Creek in the ANF, although feeding areas are typically located far from nesting sites (Brauning 1992).	Active nesting areas have been documented at only 13 protected sites on the ANF since 1986. Additionally, many of these locations only contain one or two nests. There is a large heron rookery immediately north of the ANF, in the Quaker Run drainage in New York State and on the Allegheny River. Populations appear to be stable on the ANF. However, possibly due to encroachment from oil and gas activities into the more remote areas of the forest, the total amount of suitable nesting habitat on the ANF may be declining.
Timber rattlesnake	Mature or regenerating deciduous forests with open ground cover containing suitable rock outcroppings for denning and basking. Often seasonally (spring/summer) found on southern exposures or near streams.	Although ANF personnel occasionally observe timber rattlesnakes foraging, basking, or traveling between winter den sites and summer habitat, observations of this species are infrequent and generally restricted to only a few areas of the ANF. There are only a few known den locations on the ANF, and many of the active den locations occur in the oak forest type along the Allegheny River. Suitable habitat exists, but population and reproduction trends are unknown for this species.
Hermit thrush	Mature mixed hardwood-conifer forests. Primarily a forest interior bird, but often occupies edges and small clearings created by disturbances such as logging, drilling, or fires within forested areas. Found in a variety of forest types on the ANF, from sapling/pole stands to more mature stands.	Monitoring conducted at a number of sites across the ANF indicates that the hermit thrush is relatively common and fairly well distributed across forest. There has been little change in the preferred habitat for this species within the project area in the last 20 years and populations and available habitat appears stable.
Black-throated Green Warbler	Mature mixed hardwood-conifer forests. This upper canopy nester prefers mature, mixed hardwood forests for nesting, and forages in both deciduous and coniferous trees in the mid to upper levels of the canopy	Breeding bird surveys and monitoring data indicate that this species is common in mature forest conditions of the ANF. Breeding bird survey data indicates that this species may be increasing statewide (Brauning 1992). Populations and available habitat appear stable.
Barred Owl	Mature mixed hardwood-conifer forests. This species requires large blocks of mature or late-successional forest and is often associated with moist sites containing a conifer component. Perennial stream bottoms and riparian areas often provide preferred nesting habitat for this species, due to the predominance of conifers and a greater number of large diameter trees.	ANF monitoring data from areas of preferred habitat actively managed for timber production indicates that barred owl populations appear to be stable and the frequency of detection of barred owls has remained constant during the analysis period (1991-1998). Barred owl populations and available habitat for this species appears stable or unchanged.

Species	Habitat Indicator/Habitats Used on ANF	Population Trends
Magnolia Warbler	Coniferous forests (regenerating hemlock community). This species is an intermediate-canopy nester. This species often utilizes pure conifer and mixed hardwood-conifer forest types and the full range of successional stages (Brauning 1992). It may also be found in and also uses woodland edges and clearings adjacent to such coniferous habitats.	Breeding bird surveys and other monitoring data indicate that the magnolia warbler is common in areas of suitable habitat on the ANF. There has been little change in the preferred habitat for this species in the project area in the last 10 years and populations and available habitat are relatively unchanged and considered stable.
Yellow-bellied sapsucker	Mature deciduous forest habitat with large cavity trees. This species may also inhabit forested pastures, orchards, forest edges, single-tree selection harvest sites, and shelterwood harvest sites (Brauning 1992).	Breeding bird and other monitoring data indicates that this species is well distributed across the ANF. Available habitat is relatively unchanged and populations are considered stable.
Beaver	Riparian habitat conditions, particularly with an associated aspen forest community.	Most of the larger perennial streams on the ANF either currently support beaver and/or have had past beaver activity. Based on the increased level of beaver activity observed across much of the ANF, forest-wide populations of this species appear to be increasing.
Brook Trout	Good water quality conditions in cold-water streams. Perennial headwater streams with moderate to steep gradients are often suitable spawning habitat.	Monitoring of brook trout has been occurring on the ANF since 1991. Brook trout populations across the ANF appear to fluctuate within a natural range of variability, and extreme high and low flows over the past few years have affected these populations. Similar results have been observed in Pennsylvania on other cold-water trout streams.
Smallmouth bass and walleye	Good water quality conditions in cool-water environments. Both species are found primarily in the Allegheny Reservoir and large river environments. Walleye is currently a demand species and stocked for recreational fisheries purposes.	Although the abundance of both species normally fluctuates annually in response to flow conditions and other environmental factors, both populations appear to be stable.

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 17 displays the status of federally-listed threatened and endangered (T&E) species, as well as Regional Forester Sensitive Species (RFSS), for the ANF. Each species is categorized depending on their known occurrence and available habitat. 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 Assessment (BA) (Project File) and the Biological Evaluation (BE) (Project File).

The SBKC project area is considered occupied habitat for the northern long-eared bat (see BE). Based on the results of field surveys and a search of documentation records, the following species have suitable habitat in the project area but their presence has not been documented (Table 17). Two species, the gilt darter and harpoon clubtail have suitable habitat in the project area and have been documented in the CE area. Two other species, the channel darter and bald eagle, have suitable habitat in the CE area and have been documented downstream outside of the project area. The Midland clubtail has suitable habitat in the CE area but has not been documented. Eight species have no suitable habitat and individuals have not been documented in the project or CE area.

Table 17. Status of Federally Threatened or Endangered 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				
Northern long-eared bat (*Myotis septentrionalis*) 2	Sensitive	**X**		
Indiana bat (*Myotis sodalis*)	Endangered		**X**	
Northern water shrew (*Sorex palustris*)	Sensitive		**X**	
Invertebrates				
Northern Riffleshell (*Epoblasma torulosa rangiana*)	Endangered			**X**
Long-solid mussel (*Fusconaia subrotundra*)	Sensitive			**X**
Clubshell mussel (*Pleurobema clava*)	Endangered			**X**
Green-faced clubtail *(Gomphus viridifrons)*	Sensitive			**X**
Harpoon clubtail (*Gomphus descriptus*)	Sensitive		**X**	
Rapids clubtail (*Gomphus quadricolor*)	Sensitive		**X**	
Mustached clubtail (*Gomphus adelphus*)	Sensitive		**X**	
Midland clubtail (*Gomphus fraternus*)	Sensitive			**X**
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**	

Species	Species Status[1]	Occupied Habitat	Suitable Habitat in the Project but Presence not Documented	No Suitable Habitat in the Project Area
Birds				
Yellow-bellied flycatcher (*Empidonax flaviventris*)	Sensitive		**X**	
Bald eagle (*Haliaeetus leucocephalus*)	Threatened			**X**[4]
Reptiles				
Timber rattlesnake (*Crotalus horridus*)	Sensitive		**X**	
Plants				
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**	
Fishes				
Channel darter (*Percina copelandi*)	Sensitive			**X**[4]
Gilt darter (*Percina evides*)	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**

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. Formerly called Keen's myotis.
3. Formerly called Scudder's clubtail dragonfly.
4. No individuals or suitable habitat are found in the project, however suitable habitat is found in the cumulative effects analysis area and individuals have been documented.

3.2.3 Non-Native Invasive Species

Affected Environment

Historically, most noxious weeds and non-native invasive species (NNIS) were introduced to North America from Europe and/or Asia. Some introductions were accidental and some were intentional (NISPC 2001). Because noxious weeds and invasive plant species pose an increasing threat to all ecosystems (USDA-FS 1998, page 1), the ANF is in the process of developing a comprehensive NNIS management program. NNIS is a plant or animal, including its seeds, eggs, spores, or other biological material that is non-native to the ecosystem under consideration and whose introduction

causes or is likely to cause economic or environmental harm (Region NNIS Framework 2003). The program will encompass collaborative efforts in planning, education, prevention, inventory, mapping, control, monitoring, and research through an integrated resource approach.

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 plants species listed for the Allegheny National Forest, 251 are introduced species (Hays, personal communication 2002, adapted from Rhoads and Klein 1993). While many of these species may never occur in prominence, others may invade sensitive habitats. The Forest Service has compiled a list of invasive plants found in the Eastern Region and ranked them by their degree of invasiveness based on information from States in the Eastern Region.

> Category 1: Highly Invasive - these are all non-native, highly invasive plants that invade natural habitats and replace native species.
>
> Category 2: Moderately Invasive- these are less invasive than Category 1. If these species are significantly replacing native species then they are doing so only in local areas.
>
> Category 3: Widespread non-natives - these are often restricted to disturbed ground and are not especially invasive in undisturbed natural habitats. Most of these species are found throughout much of the Eastern Region.
>
> Category 4: Local concern and monitoring - these are non-native species that occur only locally in the Eastern Region. They are not currently known to be especially invasive but should be monitored in the future. Many of these plants are cultivated species, which occasionally escape.
>
> Category 5: Native Invasives - these are native to North America and have been reported as being invasive in the Eastern Region, or parts thereof. Some of these plants are regionally exotic, having moved in from another part of North America.

The NNIS program is in the process of assessing the 251 introduced species and will utilize the species invasiveness rank and any new information on infestation and invasiveness in order to prioritize species and focus future inventory, monitoring, and control efforts. Assessment and inventory efforts of the ANF are currently focused on the 22 species that are known or believed to occur on the ANF. With the exception of crown vetch, these include Category 1, species listed on the Pennsylvania State Noxious Weed list and two plants of local concern. 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 of 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). However, the level of disturbance it takes to do so varies by plant species, habitat type disturbed, and environmental conditions. In order to assess the presence and/or extent of NNIS, plant surveys were conducted in all 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 of 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 61 sites widely scattered across the project mainly along existing road corridors. Reed canary grass and bull thistle had the most documented sites. 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. The remainder (36 percent) of the infestations are tiny, 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 be affected by the alternatives if they were implemented. The scenery analysis is based upon the Visual Management System (VMS) (USDA-FS, 1974) which is a tool that helps

to meaningfully compare and contrast the existing condition of scenic resources with the future condition. The Forest Service developed VMS to help land managers create and maintain visual diversity and prevent unacceptable alteration of the natural landscape. Two primary indicators are used to measure impacts to scenic resources: (1) changes to the existing landscape character type of the project area, and (2) whether the project area and alternatives meet the Forest Plan Visual Quality Objectives.

Landscape Character Type

Historically and prior to European settlement, the land was a dense climax forest. Tree species included hemlock, beech, white pine, and oak. The Seneca settled along the large rivers. Deer populations were low, and a rich understory of species like hobblebush was present. After European settlement, much of the area was exploited for its rich natural resources. The hillsides were stripped of their forests to support the growing nation. Drilling for oil and natural gas occurred in concentrated areas across the Allegheny Plateau. This period of intense use dramatically affected the landscape character and changed the species composition of the resulting forests. Although the landscape on the ANF has a history of human disturbance, it now appears to be a natural forest after years of growth and management.

Today, the vegetation consists of hardwood species (black cherry, red maple, sugar maple, beech, yellow birch, white ash, and yellow poplar), and native (hemlock, white spruce , and white pine) and non-native conifers (red pine). The topography is made up of forested plateaus bisected by small streams and large rivers. Large sandstone rocks are scattered throughout the area. Numerous oil and gas wells and utility right-of-ways are found in the area.

Visual Quality Objectives (VQOs)

The Forest Plan sets measurable standards or objectives for the visual management of scenic resources by establishing Visual Quality Objectives (VQOs) for each Management Area (MA). As defined in the Forest Plan, VQOs refer to the degree of acceptable alteration of the characteristic landscape (USDA-FS 1986a, A-30). VQOs are determined by analyzing three basic components:

- Variety Class – uniqueness of a landscape relative to what is common;
- Sensitivity Level – concern level of a travelway based on the expectation of viewing scenery and the amount of use;
- Distance Zones – distance and visibility of a landscape from a given travelway.

Variety Classes are assigned according to the "scenic importance of a landscape based on human perceptions of the intrinsic beauty of landform, rockform, waterform and vegetative pattern" (USDA-FS 1986a, p. A-29). Variety Classes may be classified as Class A - Distinctive, Class B - Common, or Class C - Minimal. There is no Class A present in the project area, and there is about equal portions of Class B and Class C.

Sensitivity Levels (SL) are "a measure of people's concern for the scenic quality of the National Forest" (USDA-FS 1974, p. 18). SLs are determined using those locations where visitors are mostly likely to view the environment: travel routes (roads and trails), use areas (campgrounds, visitor centers, etc.) or water bodies (lakes, rivers, etc.).

Sensitivity Levels may be classified as: SL1 - high sensitivity, SL 2 - average sensitivity, and SL 3 - low sensitivity. Within the SBKC project area, SR 321 is the only SL1 view area within the project area. SL 2 view areas include FR 186 which is also part of the Allegheny Snowmobile Loop (ASL) Connector Trail #17 in the winter, and South Branch Kinzua Creek are also SL 2 view areas. Everything else has an SL 3 classification.

Distance Zones divide the landscape into three perspectives: foreground, middleground, and background. Distance zones are determined on a case-by-case basis with foreground usually being measured at a distance of up to a ¼ mile from the observer. Middleground is measured at a distance of ¼ mile to 1 mile. Background is measured at a distance of anything greater than 1 mile. However, even though an area is physically located within ½ mile of a viewpoint, it may not be visible. Hence, areas are also labeled as "seen" or "unseen." Distance zones are determined from SL 1 areas first followed by SL 2 areas. SL 3 areas are not evaluated for distance zones.

The combined values for variety class, sensitivity level, distance zone, and management area results in a prescribed VQO or management goal for the prescription area. The five possible VQOs are Preservation, Retention, Partial Retention, Modification, or Maximum Modification (USDA-FS. 1977, p.5). A VQO of Preservation has the most stringent visual restrictions, and a VQO of Maximum Modification has the least. The information in **Table 18** describes condition of each VQOs found within the SBKCPA.

Table 18. VQO Existing Scenic Conditions

	Desired Condition
Retention (R)	Human activities not visually evident (USDA-FS, 1986a, p. A-23), and only repeat form, line, color, and texture frequently found in the characteristic landscape (USDA-FS, 1974, p. 30).
Partial Retention (PR)	Human activities evident, but remain subordinate to the characteristic landscape (USDA-FS, 1986a, p. A-19), and repeat form, line, color, or texture common to the characteristic landscape (USDA-FS, 1974, p. 32).
Modification (M)	Human activities dominate landscape utilizing natural elements appearing as a natural occurrence in foreground or middleground (USDA-FS, 1986a, p. A-17), and borrow naturally established form, line, color, or texture that it is compatible with natural surroundings (USDA-FS, 1974, p. 34).
Maximum Modification (MM)	Human activities dominate landscape but appear as natural occurrence in background areas (USDA-FS, 1986a, p. A-16), and completely borrow for, line color, and texture (USDA-FS, 1974, p. 36).

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 future 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 ROS is a system for planning and managing recreational settings by distinguishing the varying conditions and qualities in the landscape (Clark and Stankey 1979, p. 1). This distinction helps land managers to provide a diverse range of opportunities and experiences to recreationists. The following indicators help to determine ROS settings (USDA-FS 1982):

- Access (mode of transport used within an area and the service level of roads)
- Remoteness (extent to which individuals perceive themselves removed from the sights and sounds of human activity)
- Visual characteristics (see Scenery Resources Section 3.3.2)
- Site management (the appropriate development level of recreation facilities)
- Visitor management (the degree to which regulations, controls, information, and services are apparent to the visitor)
- Social encounters (the number and type of other recreationists met in the area, along travel ways, or camped within sight or sound)
- Visitor impacts (the effect of visitor use on resources such as soil, vegetation, air, water, and wildlife).

Using these indicators, recreational settings are arranged along a continuum of six ROS classes, progressing from least to greatest development: primitive, semi-primitive non-motorized, semi-primitive motorized, roaded natural, rural, and urban (USDA-FS 1982, p. 5). The ANF Forest Plan, which gives the overall direction, standards, and guidelines for developing recreation across the forest, uses this ROS classification system to manage recreational settings according to management areas (MA). This classification is the desired condition of the MA. On the ANF, ROS classes range from semi-primitive non-motorized to rural.

The SBKC project area is located in roaded natural (MA 3.0) and semi-primitive motorized (MA 6.1) ROS settings. Roaded natural is characterized as predominantly natural-appearing, with moderate sights and sounds of human activities and structures (USDA-FS 1986, p. A-23). Semi-primitive motorized is characterized as having moderately dominant alterations by humans, with strong evidence of permanent roads and/or trails (USDA-FS 1986, A-25). Table 19 describes each setting indicator for the desired condition of the ROS class.

Table 19. Characteristics of Roaded Natural and Semi-Primitive Motorized ROS Classes

	Roaded Natural	Semi-Primitive Motorized
Access	A system of roads and trails permits entry for a variety of management purposes and may be open or closed to specific vehicles or types of uses. The forest is accessible by foot, horseback and motorized vehicles.	The Forest is accessible by foot, horseback, or motor vehicle. Administrative use may be conducted at times using motor vehicles.
Remoteness	Recreation experiences allow affiliation with groups or isolation from sights and sounds of man at different times and places.	The recreational experience provides for a high probability of experiencing isolation, independence, closeness to nature, self-reliance with challenge and risk present.
Site Management	Resource modification and utilization takes place but is harmonized with environment. Moderately developed recreation facilities with user conveniences.	Minimally developed recreation facilities for resource protection.
Visitor Management	Few opportunities for challenge or risk. Obvious control of users.	There are minimal on-site controls and restrictions.
Social Encounters	Visitor interaction is low to moderate.	Visitor interaction is low.
Visitor Impacts	Evidence of other users is prevalent.	There is evidence of other users.

Source: USDA-FS 1985b.

The degree to which the current condition of the project area meets the desired characteristics of the ROS class is a useful indicator of the area's recreational value, and can help inform future management decisions. Using predetermined standards, the existing condition or proposed condition can be said to 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 be Unacceptable (conditions not acceptable under any circumstances). Table 20 identifies the existing conditions for the project area.

Table 20. Existing Conditions by ROS Setting Indicators for Roaded Natural and Semi-Primitive Motorized Classification

Setting Indicators	Desired Characteristics	
	MA 3.0 (Roaded Natural)	MA 6.1 (Semi-Primitive Motorized)
Access	Meets	Meets
Remoteness	Meets	Meets
Site Management	Meets	Meets
Visitor Management	Meets	Meets
Social Encounters	Meets	Meets
Visitor Impacts	Meets	Meets

SBKC Roaded Natural Area: Most of the project area is classified as Roaded Natural. The system of roads and trails in the project area provides full access to the Roaded Natural Area. FR 186 is the main traffic artery through the project site. There are also many other restricted roads (FR 463 and FR 448) that are opened for hunting in the Fall, and gated roads (FR 463) that are open to foot travel. A sense of remoteness is of little relevance in a Roaded Natural area, but 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 slight but noticeable as gated roads and signs are common. However, they tend to harmonize with the natural environment. Signs and other on-site controls are not overly noticeable. Social encounters are high along SR 321, and low along FR 186, FR 163, and FR 448. Dispersed camping, hunting, and fishing along the road system is typically light. Visitor impacts exist throughout the FR 448/463 area as a lot of illegal OHV activity occurs along the pipeline creating soil compaction and vegetation disturbance.

SBKC Semi-Primitive Motorized Area: Access to the area is consistent with a Semi-Primitive Motorized designation. No system roads currently travel through the area, but a few traffic service level (TSL) C roads run just outside the perimeter. A sense of remoteness can be experienced, particularly along South Branch Kinzua Creek. There are no recreational facilities and site development is minimal within the project area. There is also very limited signage making visitor management consistent with the area. Social encounters are low everywhere. Dispersed camping, hunting, and fishing along the road system are typically light. Visitor impacts exist throughout the FR 448/463 area as a lot of illegal OHV activity occurs along the pipeline creating soil compaction and vegetation disturbance.

Recreation Activities and Use Patterns

Not every acre of the ANF receives the same type or amount of use. Areas near campgrounds, trailheads, and trails receive the highest amount of recreational use while areas near large stream corridors or lakes receive a moderate amount of use in the form of dispersed recreation (i.e. camping, fishing, and hunting). General forested areas tend to receive the least amount of use. The recreational areas and activities identified in this section are those that generally receive the greatest attention by recreationists in the project area.

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

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

Motorized Trails: 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 FR 448/463. The OHVs gain access to the forest from private property surrounding the project area. Allegheny Snowmobile Loop (ASL) Connector Trail #17 is also found within the project boundary and use FR 186. 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 do have sufficient snow for 28 days. When snow cover is present, trail use is high, especially on weekends. Although some illegal use does occur, snowmobile use is limited to designated trails only because of safety concerns with mixing vehicular and snowmobile traffic, and because the noise from snowmobiles affects some recreationists who are seeking solitude and remoteness.

Dispersed Camping: There are a few dispersed camping sites found in the project area. Two camping sites are found along FR 186 and another is found at the end of FR 460. 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 all along the forest roads within the project area. There are a number of parking spots located along FR 186, and there are many other suitable parking areas in gravel pits, etc. 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 this is a very popular place to fish. In general, fishing use is heaviest during the first few weeks of spring trout season. No additional roads are opened during fishing season.

High Recreation Use Corridors: A roads or trail is identified as a high recreation use corridor if it has a Sensitivity Level (SL) of 1. SLs are primarily used during the scenery management process, but they are also useful for describing the relative importance that an area or travelway has to recreationists. (For more information about SLs and the scenery management, see section 3.3.2) All major highways, roads with heavy recreational traffic, entrances to developed recreation sites, scenic roads, and all hiking trails have an SL of 1. Within the SBKC project area, SR 321 is the only high recreation use corridor. SR 321 leads to the Longhouse National Scenic Byway and is heavily used for scenic driving.

Special Events or Unique Features: There are no special events or unique features within the SBKC project area.

Other Recreation: A multitude of other recreation pursuits are common in the project area and include mountain biking, walking, firewood cutting, scenic driving, and target shooting.

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. 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 2005c). This law provides new funds to counties receiving payments for National Forest timber sales. It allows counties to receive enhanced payments and designate a percentage of those payments for forest or county projects, in addition to the traditional uses for schools and roads. 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.

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CHAPTER 4: Summary of Anticipated Effects

Soils

Soil Nutrients

- The activities proposed under Alternative 2 would create a greater acreage of new, young stands, which are characterized by a more rapid rate of carbon sequestration, and a concurrent reduction of carbon sequestered on site in living trees, than the activities would under Alternative 3.
- Under Alternative 2, more carbon would remain sequestered in a manufactured product.
- Soil acidification associated with fertilization, especially nitrate-nitrogen fertilizer, has the potential to accelerate the leaching of base cations from the soil profile especially on units located on plateau, shoulder, and backslope positions but stands proposed for fertilization have been carefully evaluated with the goal of keeping this practice to a minimum.
- Past and future timber harvest would remove a potential source of soil organic matter contained in the merchantable portions of the trees although tops, non-merchantable wood, and other types of woody debris would remain on site to decay and serve as a source of organic matter for incorporation into the soil.

Surface Erosion

- Moderate levels of erosion amounting to approximately 0.8 and 0.7 tons per acre are estimated to be generated following the implementation of Alternatives 2 and Alternative 3, respectively. These estimated erosion losses do not include the effects of mitigation measures, and the actual rates of erosion most likely would be lower.
- Work carried out by hand crews, such as tree planting, fence building, and crop tree release cutting, would have relatively little to no erosion production potential. More intense land disturbance, such as disking for opening maintenance, would have the potential for much greater erosion losses.

Soil Compaction

- New road construction, which includes Forest Service and OGM activities, would result in soil compaction within the road corridor. Road reconstruction, maintenance of existing roads, and limestone surfacing would occur within existing corridors, which have been previously compacted.
- Soil compaction from skidding operations will be minimized by keeping skidders to existing and pre-determined skid trails.
- Wet conditions could make even the better drained soils (groups 1 and 2) subject to compaction. Monitoring of soil conditions during management activities would help alleviate compaction on these soils.
- Oil and gas development is expected to continue on both federal and private land within and adjacent to the project area, resulting in an increase in areas with compacted soils.

Wetlands

- Four stands partially overlay or abut a wetland area. These stands are tentatively scheduled to receive one or more of the following treatments: a non-commercial thin, reforestation, and planting with conifers. The effects of these treatments on the affected wetlands are anticipated to be minimal.
- All remaining stands proposed for treatment are at least 200 feet from inventoried wetlands. The effects of these treatments on the affected wetlands are anticipated to be minimal.
- Future developments on private wetlands within or adjacent to the project area may have negative effects on the hydrologic and ecological functioning of these wetlands if Pennsylvania BMPs are not followed during implementation.
- Forest Plan stipulations concerning wetlands make it unlikely that any future Forest Service activities will reduce wetland acreages.

Water Resources

Summary of Effects

- Streams and wetlands will be buffered from activities to prevent from direct and indirect effects. Streamside riparian buffers and wetland buffers 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.
- The SBKC project would create just over one percent additional 0-10 age class in the South Branch Kinzua Creek subwatershed. This will not cause increases in streamflow or changes to the channel characteristics.
- Some proposed activities may occur within riparian corridors in the SBKC project area, including non-commercial thins, reforestation/under-plantings, and RUMFC. Only selected portions of riparian corridors will be treated where improvements to the stand structure will benefit riparian dependant species. None of these treatments are expected to have an adverse effect to the stream and riparian corridor. Heavy equipment operation will follow the mitigation measure and design features to minimize impacts to soils in riparian areas and protect the stream-bank stability. Stream water temperature will be maintained as management will maintain a 50 percent canopy cover.
- 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.
- New road construction has the potential to impact water resources where it is located within 300 feet of streams or 100 feet of wetlands.

    a) Alternatives 1 and 3 do not propose any new road construction.

b) Alternative 2 proposes 0.1 mile of new road construction. This short distance of road construction will not cause water resource impacts.

- Where existing 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.

  a) Alternative 1 does not propose to add any existing road corridor to the FS road system.

  b) Alternative 2 and 3 will have similar effects because both alternatives upgrade existing road corridors to FS standards. Alternative 2 proposes to upgrade 2.7 miles of road corridor and alternative 3 proposes to upgrade 2.2 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.

  a) Alternative 1 will have no beneficial effect on the project area.

  b) 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. Each alternative 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 ROW access points from forest roads would be blocked 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.

Summary of Cumulative Effects

- Based on the implementation of activities in either Alternatives 2 or 3, changes to streamflow or water quality within the SBKC subwatershed are expected to be minimal. Since streamflow increases dissipate 3 to 10 years after a regeneration harvest, reduction in basal area is not expected to exceed 9 percent over any 10 year period. The SBKC project would create just over one percent of additional 0-10 age class. An additional one 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 10 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.

- Road construction or addition of existing roads to the Forest Service system are currently planned or approved for the CE area during the next 20 years. Cumulatively, the amount of road construction, implemented with Forest Plan standards and guidelines and mitigation measures would not have a significant effect to water resources over the next two decades. Road maintenance is expected to have a positive effect on water quality. Road construction by private land owners and OGM development are expected to comply with Commonwealth BMPs which provide guidelines for road construction to minimize effects to water resources.

Transportation

- Under Alternative 1, no changes in road management or road densities would occur.
- Under Alternative 2, road management percentages would become 21 percent open, 61 percent restricted, and 18 percent closed. The road density would increase to 2.5 miles of road per square mile in MA 3.0 and 0.9 mile/square mile in MA 6.1.
- Under Alternative 3, road management percentages and road densities would be similar to the Proposed Action; 22 percent open, 63 percent restricted, and 16 percent closed. Road densities would be the same as those in Alternative 2 - Proposed Action.
- Neither of the unroaded areas that fall within the SBKC project area would be affected by the transportation proposals. The proposed road construction (new corridor) is not located within a quarter mile of the unroaded areas.

Air Quality

- Under Alternative 1, there would be no anticipated changes to air quality of the region.
- 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, but 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 the 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 1991a).
- 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.

Oil, Gas, and Minerals

- The proposed activities under all alternatives would not directly impact oil or gas resources in the project area. Minor, indirect impacts on OGM operations could result from increased traffic on the forest roads. Forest Plan standards and guidelines require the protection of pipelines, power lines, and wells during proposed activities.
- 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 new and existing pits on the ANF. Use of such stone and gravel would result in minor irretrievable loss of this salable (common variety) mineral resource.
- At the current rate of OGM development on the ANF, it is estimated that two new wells per year will be drilled within the SBKC project area. This will result in approximately 40 new wells, 30 acres of openings, and four acres of additional pit expansion within the SBKC project area over the next decade.
- At the present time, future OGM development is anticipated to occur along FR460 and FR461 within the project area and just north of the project area along FR279F and FR279G.

Vegetation

Alternative 1: No Action

DIRECT AND INDIRECT EFFECTS

- No harvest would occur under this alternative, 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.
- No non-commercial treatments would be conducted to enhance growth within young stands within the SBKC project area
- The amount of late-successional habitat would increase from one percent to 26 percent over the next twenty years within the SBKC project area. The amount of potential future old growth would increase from 25 percent to 38 percent of the SBKC project area.

Alternative 2

DIRECT AND INDIRECT EFFECTS

- Harvesting would occur under this alternative. Three hundred eleven acres of early-successional habitat would be created. Intermediate treatments on 1,110 acres would occur to maintain tree growth and vigor within the stands. Uneven-age management through group selection would create vertical structure on 301 acres.
- The amount of late-successional habitat would increase from one percent to 20 percent over the next twenty years within the SBKC project area. The potential

future old growth would increase from 25 percent to 33 percent within the SBKC project area.

Alternative 3

DIRECT AND INDIRECT EFFECTS

- Harvesting would occur under this alternative but to a lesser extend than Alternative 2. Early-successional habitat would be created on 222 acres. Intermediate treatments on 729 acres would occur to maintain tree growth and vigor within the stands. Uneven-aged management through group selection and prep cuts would occur on 461 acres providing for an increase in vertical diversity.
- The amount of late-successional habitat would increase from 1 percent to 22 percent over the next twenty years within the SBKC project area. The potential future old growth would increase from 25 percent to 33 percent within the SBKC project area.

Table 21. Cumulative Vegetation Totals by Treatment for Cumulative Effects (CE) Analysis Area (4,772 acres)

Treatment	Past Treatments 1996-2005 Acres/Percent of CE area	Cumulative Totals (past, present, future) Acres/Percent of CE area		
		Alt 1	Alt 2	Alt 3
Shelterwood Seed/Removal Cut	241	578 (12%)	889 (19%)	805 (17%)
Clearcut	25	25 (<1%)	25 (<1%)	25 (<1%)
Intermediate Thinning	275	612 (13%)	1083 (23%)	1125 (24%)
Salvage Only	64	64 (1%)	72 (2%)	72 (2%)
Single Tree Selection	157	157 (3%)	157 (3%)	157 (3%)
Group Selection	0	300 (6%)	300 (6%)	379 (8%)
Herbicide	103	440 (9%)	752 (16%)	756 (16%)
Fencing/Tree Shelters	281	684 (14%)	910 (19%)	895 (19%)
Site Preparation	216	553 (12%)	826 (17%)	826 (17%)
Fertilization	125	125 (3%)	204 (4%)	204 (4%)
Planting	98	120 (3%)	242 (5%)	244 (5%)
Release	59	396 (8%)	708 (15%)	712 (15%)

Table 22. Age Class Distribution for CE 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%	9%	9%
11-20 years	3%	0%	7%	5%
21-50 years	8%	7%	7%	7%
51-110 years	85%	61%	57%	58%
111+ years	1%	22%	19%	20%

- In Alternatives 2 and 3, 226 (five percent) and 208 (four percent) acres, respectively, of 0-10 year age class would be created in the next decade within the CE area. This compares with an estimated nine percent DFC for MA 3 in the 0-10 year age class and a composite of 18 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 calculated Forest Plan DFC for MA 3. In all alternatives, nine percent of the CE will be 0 to 10 years old by 2026.
- In all alternatives, late successional forest will increase from one percent to 26 percent (this assumes the nine percent in the 0-10 year age class is divided among the 51-110 and 111+ age classes in all alternatives) of the CE 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 76 percent in all alternatives. Regardless of the alternative, there is a similar distribution in age classes in the mature and late-successional forest.
- Under Alternative 1, without the use of herbicides and other reforestation treatments, beech, birch, striped maple, grasses, and ferns would continue to dominate the understory within the CE 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).
- Nine hundred thirty three (933) acres (Alternative 2) and 871 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 in Alternatives 2 and 3 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. After herbicide treatment, a fuller range of plant communities would be expected to occupy the understory (Horsley and others 1994). These would include tree species as well as shrubs, forbs, and wildflowers

that are presently absent, providing seed sources are 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.

Wildlife

Summary of Environmental Consequences

This section summarizes 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 3.2.2.1. Landscape-scale concerns such as cumulative effects or impacts on wildlife and fragmentation of wildlife habitats are discussed primarily in the context of the coarse filter approach.

Environmental Consequences Common to All Action Alternatives

Both action alternatives involve a variety of harvest treatments and road construction activities. Below is a summary of species and feature specific effects due to these practices.

- Intermediate harvests would remove lower quality trees and release healthy trees. 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.
- Gaps in the forest canopy 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 trees and shrubs would due to less competition have the potential to increase mast production.
- Salamanders could experience local population declines in proposed final harvest units proposed and possibly in thinned stands or those receiving selection harvests. In sections of final harvests where sunlight reaches the soil, the surface may become hardened and prevent salamanders from reaching the surface to feed. Effects could be limited by leaving tree tops and other slash scattered through harvest units.
- 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.
- The re-establishment of road corridors (maintenance) 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 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 linear herbaceous openings. Log landings would be re-vegetated and provide temporary herbaceous cover after their use.

- The road construction (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. Soil compaction on roads, skid roads, log landings, and pits could be detrimental for burrowing animals on those specific sites. By creating new edge habitat, road construction may benefit species like deer and eastern towhees. Other effects to wildlife by roads are discussed in the North End Roads Analysis Project (USDA-FS 2006a).
- 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. Some species may become road kill victims 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. Increased access could increase the chance of poaching and collecting of species such as turtles. 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.

Effects by Alternatives

Alternative 1

- 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 successional habitat would be created in the project area. Mature stands not affected by catastrophic mortality, forest decline, or other severe impacts, such as wind storms, would continue to slowly develop into old growth age-classes under Alternative 1. The environmental changes would tend to favor species that use late-successional stages of forest habitat.
- 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. Effects on wildlife from human activities in the project area would remain unchanged. Access and

use of the area would remain at current levels with no anticipated increases in use of the area.

Alternatives 2 and 3

- Proposed shelterwood removals in Alternatives 2 and 3 would create additional early successional habitat. Increases in the abundance of species that use early successional habitats could be expected, 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 harvest treatments.
- 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.
- Affecting seven percent and 10 percent of the SBKC project area, UEAM proposed in Alternative 2 and 3 respectively 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. The effects would be similar in terms of canopy closure for both alternatives.
- No significant wildlife risk from herbicide application (glyphosate and sulfometuron methyl) has been identified from exposure or bioaccumulation of these herbicides.
- The primary impacts of implementation of the understory treatments proposed in Alternatives 2 and 3 would be a short-term alteration of habitat as the densities of ferns, grasses, striped maple, and beech sprouts are reduced in the treated stands. These practices would tend to favor early successional species.
- The long-term effect of herbicide treatments (in conjunction with other activities) would be an increase in structural diversity, vegetative age classes, and wildlife habitat use in the project.
- Manual control of understory vegetation 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 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 striped maple, birch and American beech.
- Activities proposed under Alternatives 2 and 3 to promote regeneration, such as fence construction will have no adverse effects on wildlife habitat. Fencing would temporarily exclude the use of a limited amount of habitat by white-tailed deer and to a lesser degree other large mammals, such as black bear.
- The long-term effect of fertilization treatments would be an increase in structural diversity, vegetative age classes, and wildlife habitat use in the project.

- Site- specifically, the effects of road construction will be slightly less in Alternative 3, because the 0.4 miles of new road construction, including an existing intermittent stream crossing (on private property) would be dropped. However, under Alternative 2, improving and limestoning the intermittent stream crossing will help protect the water quality and aquatic habitat.

Effects of Habitat Fragmentation on Wildlife

A coarse filter approach is used to assess habitat fragmentation in the project. The effects of forest fragmentation from activities proposed in the SBKC project area are expected to be less than those documented in more fragmented landscapes where permanent conversion of forested conditions to non-forested conditions occur.

- Under Alternative 1 (no action), small canopy gaps are expected over time because of natural mortality caused by age or those susceptible to insect and disease. However no significant 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 forested core habitat is affected by the size, shape, and location of treated stands. In general, final harvests that border forest already classified as 'other' non-core forest would result in less reduction of core forest habitat.
- With the implementation of the action alternatives, approximately 86 acres will be removed from optimum forested core habitat. Under Alternatives 2 and 3, the greatest effect to occur from the shelterwood removal harvests is the increase in temporary habitat fragmentation (the juxtaposition of a seedling age class stand with a stand of older mature timber). The proposed final harvests or other reforestation activities in Alternatives 2 and 3 are designed to ensure successful regeneration of a new forest age class and are temporary in nature; therefore the effects will not be significant.
- Other treatment proposals are present 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. Adverse 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.
- There are less treatment proposals and greater dispersal of treatments overall in Alternative 3 than in Alternative 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 calls for a desired condition with a forest, which is a mosaic of predominantly hardwood stands in a variety of age classes and distributed across, and evident in the area (USDA-FS 1986a).
- Important un-fragmented core areas will remain in the Watermill Run riparian corridor, much of the Hubert Run area, and the South Branch Kinzua Creek

riparian area. Fragmentation effects in these areas will be less and similar to the effects stated in Alternative 1.

- Road construction and pit development would result in permanent losses of forest habitat within the SBKC project area. Road construction in the project will fragment previously un-fragmented core area to some degree in the eastern portion of the project near FR 186, but the effects are negligible as most FS roads maintain a degree of overstory and isolation (access would be restricted) and the majority of new construction is located on existing road corridor.
- The current road management network will change under both of the action alternatives with at least 79 percent of the Forest Service roads either closed or restricted to the public up from the current 58 percent. 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.
- 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 and others 1999)

  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 state designated Wilderness Trout Stream from its headwaters to its confluence with Hubert Run.

- There are no road proposals that will negatively affect the Wilderness Trout Stream and its PA state designation within this project.
- Proposals which block illegal ATV activities would help in keeping the stream isolated as well as protect the stream from soil erosion and sedimentation.
- 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.
- Wildlife treatment proposals will enhance the habitat in the area, and will not negatively affect the stream corridor.

  MA 6.1
- A variety of silvicultural treatments are proposed that will increase vertical and horizontal gap phase structure, species diversity, increase CWD, and restore and

accelerate mature forest conditions, which will benefit most forest interior species.

- 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, CWD, and vertical stand structure. 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.
- Areas fenced may temporarily exclude some species that benefit from treatments in MA 6.1.
- With fewer treatments under Alternative 3, a greater degree of isolation will occur in those untreated stands because the effects of noise and disturbance will be less. However, vertical and horizontal stand structure achieved under Alternative 2 will be lacking in those stands.
- No road construction or pit development will take place in MA 6.1 in this project; therefore there will be no effect from those treatments.

Cumulative Effects on Wildlife Habitat

- In summarizing the cumulative effects of the vegetation activities on the CE analysis area as whole, and projecting the timber management activities that could occur on National Forest land and private land, approximately 13% of the CE analysis area would receive a final harvest from 2006 to 2026. The level of intermediate harvests (thinning, selections, etc.) would increase to approximately 48% and 47% of the CE area (Alternatives 2 and 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.
- Based on the age class distribution and acres of non-forest and forested land in the CE analysis area, no substantial increases in permanent opening habitat would occur. Although increases in seedling/sapling (early successional) hardwood habitat is 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 0.4% per year over the analysis period.
- Road construction activities are currently planned or approved for the CE area during the next 20 years. Cumulatively the amount of road construction, implemented with Forest Plan S&Gs and mitigation measures will not have a significant effect over the next two decades. Road maintenance is expected to have a positive effect on water quality.

Cumulative Effects on Habitat Fragmentation

- An examination of the 24,965-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 harvests in the SBKC project reduce optimum core forest habitat.
- 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.
- Although final harvests result in a reduction 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. From a landscape perspective, 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.
- 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 14,000 acres of the CE Area) direction in the Forest Plan calls for a desired condition with a forest which is a mosaic of predominantly hardwood stands in a variety of age classes that will be distributed across and evident in the area (USDA-FS 1986a). While fragmentation effects and edge would be created, no permanent edge effects from timber harvest are anticipated.
- The South Branch Kinzua Creek riparian corridor remains intact as there are no known final harvests in approved or foreseeable future projects, which would affect this important and relatively un-fragmented corridor and its riparian values.
- A review of previously approved and potential projects in the CE area shows that there is no proposed road construction that will affect the Wilderness Trout Stream designation.
- Lease roads from future OGM development have the potential to affect both the size and shape of the un-roaded areas and the South Branch Kinzua Creek.

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 under each of the project alternatives over the next 10-year period.

MIS for Early Successional Habitats

- Under Alternative 1, the amount of early successional 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. Permanent openings will remain relatively unchanged under this alternative.
- These natural changes under Alternative 1 would result in a decrease of available habitat in the project area for MIS that require early successional forest habitat such as the American woodcock, ruffed grouse, and white tailed deer.

- Alternative 1 shows a higher percentage of hard mast production, which is a very important but variable food source for ruffed grouse and deer. However, the importance of beech as a mast-producer has been reduced because beech bark disease has impacted the ANF and project area. Since grouse and deer are generalists with a wide diurnal and seasonal range of movement, the overall density of these two species (in the project) would not likely decrease appreciably.
- Alternative 2 will benefit species using early successional habitat to a greater degree because it has 89 more acres of final harvest than Alternative 3.
- 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.
- Fencing would reduce the negative effects of deer browsing on other desired woody and herbaceous species and ultimately increase cover and soft mast-producing shrubs for wildlife. This activity would benefit American woodcock and ruffed grouse as the newly regenerated stands become established and continue to develop toward small pole size timber.
- The 417 acres of conifer inclusions in the SBKC project area would be maintained.
- White-tailed deer habitat would not be adversely affected by any of the proposed treatments and would likely benefit in the short term from increased production of desirable browse created by the removal harvests. Exclusion of deer from regenerating stands using fencing would occur. This temporary reduction in forage habitat is not substantial when considered in the context of the amount of acreage available.
- From a project perspective, the action alternatives result in increases in early successional habitat over 10 years; but from a landscape scale, a 13% increase in seedling/sapling habitat is anticipated over the next 20 years across the entire CE area (including the project area) under the action alternatives.

MIS for Mature/Late Successional Habitats

- 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. Approximately 4% of the project that is in the 101 to 110 year old (saw-timber) age class would advance to the over-mature age class (111+ years old) in the next 10 years.
- Over the long-term, these conditions would tend to benefit cavity nesting species that often prefer snags larger than 16 inches dbh such as the pileated woodpecker and species that build nests in larger trees such as the red-shouldered hawk and great blue heron. Over a longer-term period (20 to 50 years and beyond), continued decline of the forest overstory due to various forest health factors could reduce available mature and late successional forest habitat in the project.

- Implementation of Alternatives 2 or 3 would result in a 5% or 3%, total reduction in the availability of mature sawtimber and over-mature conditions combined in the project area over the next 10 years. Some stands would also grow into the sawtimber age class during that time. From a landscape scale in the CE area, a decrease in mature forest habitat is projected to be 8% under the action alternatives over the next 20 years.
- Final and intermediate harvests under Alternatives 2 and 3 would remove some of the trees that would otherwise serve as potential snags and den trees due to mortality from diseases, insect infestations and drought.

MIS for Mature Mixed-Conifer Habitats

- Species that require a mix of mature mixed conifer and deciduous forest types such as the hermit thrush, black-throated green warbler and barred owl would be negatively affected in the short-term by the implementation 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 5% or 3% due to final harvests in Alternative 2 or 3, respectively, by the year 2016. During that time period, additional pole size stands would grow into the mature forest age class providing additional habitat.
- Eastern hemlock, either as conifer stands or more importantly as inclusions in hardwood stands provide suitable winter and escape cover. This conifer component is expected to be maintained.
- Over the long term, continued forest decline from insects, disease, etc. could have a slightly negative impact on these birds, (hermit thrush, black-throated green warbler and barred owl) if areas currently in mature forest revert to opening habitat. However, any natural disturbances or management activities that result in an increased density of understory vegetation would generally benefit these species.
- Areas of both mature and core forest habitat would be retained in the project area under Alternatives 2 and 3, which would generally benefit more secretive species such as the barred owl.

MIS for Cavity Nesting Species

- Effects of the project alternatives on cavity nesting MIS, such as the yellow-bellied sapsucker, pileated woodpecker, and barred owl would essentially be the same as discussed previously for MIS in mature/late successional and mature mixed-conifer habitats.

MIS for Regenerating Conifer Habitats

- No effects are anticipated over the next 10 years for species such as the magnolia warbler that require young conifer habitat from the proposed activities. However, negative effects to the conifer component may occur if the hemlock woolly aldegid moves into the area.
- Reforestation treatments proposed under Alternatives 2 and 3 limit deer browsing and create more favorable growing conditions for eastern hemlock in regenerating

hardwood stands, thus providing an opportunity for the establishment of new hemlock inclusions within the project.

MIS for Aspen Habitat

- No effects are anticipated for MIS such as beaver that require aspen forest type as a result of implementing any of the alternatives. There are no pure aspen stands in the project area, but inclusions of aspen exist within some of the riparian corridors.

MIS for Aquatic Habitat

- No significant effects are anticipated for aquatic MIS such as the small mouth bass or walleye, as suitable habitat for these species is not available.
- Blocking of illegal ATV trail stream crossings to prevent or reduce soil erosion will aid in the long-term protection of streams and water quality. Road maintenance activities would help protect water quality in the project and is expected to result in modest benefits for brook trout within the watershed. Road construction activities are expected to have approved engineer road design and implemented with Forest Plan S & Gs, and mitigations to protect water quality wherever roads are hydrologically connected to streams. As a result, no effects are anticipated under any alternative that would adversely affect water quality, reduce the present designation of these streams as high-quality cold water fisheries, or adversely affect brook trout habitat.

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 T & E and RFSS and their habitats, using the fine-filter approach. No designated critical habitat for any federally-listed threatened or endangered species occurs on the ANF; therefore, critical habitat issues are not presented in this project.

Federally-Listed Threatened and Endangered Species

Bald Eagle

- The proposed activities would not alter suitable habitat. Project activities take place a considerable distance from documented nesting, roosting and foraging habitat. The proposed activities are expected to have no effect on the bald eagle in the project area or CE analysis area over the short or long term and would not affect or jeopardize the continued existence of this species.

Indiana Bat

- No effect on the species would occur under Alternative 1 since no timber harvesting or other activities would occur. Completion of Alternatives 2 or 3 could result in the direct mortality of the Indiana bat by timber harvesting if an unknown population exists or incidental take of the species through the loss of suitable roosting habitat in the project area. The potential loss of suitable roosting habitat and incidental taking of Indiana bats would be reduced through implementation of the terms and conditions of the BO, as all of the proposed

timber harvest units would continue to provide roosting and foraging habitat for this species. The activities would not be expected to exceed levels of take identified in the BO and no adverse effects on the Indiana bat would occur beyond those previously disclosed and discussed in the BO (USDI-FWS 1999).

- Habitat for the bat will continue over much of the CE area as approximately 70% of the area will be mature forest cover (>51 years old) in 2026. Future OGM development (private leases) 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 will occur on less than 1% 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 alternatives pose no direct risk to the species. Future federal actions in the CE area pose no significant 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.

Clubshell Mussel and Northern Riffleshell Mussel

- These species have not been documented in the SBKC project or CE analysis area nor is there suitable habitat. As a result, a "no effect" determination is reached for both of these species under any of the alternatives.

Regional Forester Sensitive Species

Northern Long-eared Bat

- No direct or indirect impacts on this species would occur from the implementation of Alternative 1 since no timber harvesting activities would occur. Cumulative impacts (CI) on this species may occur under Alternative 1 over the next 20 years due to a reduction of roosting habitat (loss of potential or existing roost trees) in the CI area through the previously approved or projected timber management projects on federal and private forestland.
- Alternatives 2 or 3 could cause direct impacts on individual bats (mortality or injury) in the project and indirectly impact the species by reducing roost habitat. The terms and conditions of the Biological Opinion issued by the USFWS that maintain suitable levels of habitat for the Indiana bat would reduce or eliminate potential adverse impacts on the northern long-eared bat.

Timber Rattlesnake

- 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.

- Alternative 1 would not impact this species because no forest management activities would occur. Under Alternatives 2 and 3, foraging habitat would be altered with the completion of the shelterwood removals where mature forest habitat is converted to early successional 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 across the forest floor increasing potential foraging sites. Road construction activities and gravel pit expansion and development would convert forest habitat to permanent openings that could provide potential basking habitat.
- Forest management (timber harvests and reforestation activities that use heavy machinery) in the SBKC project, previously approved and future projects on National Forest and private lands, including OGM development, 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 24,965-acre area over a 20-year period may impact foraging individuals but will not cause a trend toward federal listing of this species.

Northern Water Shrew, Yellow-bellied Flycatcher, Butternut, Harpoon Clubtail, Uhler's Sundragon, Midland Clubtail, Ski-tailed Emerald, Maine Snaketail, Zebra Clubtail, Rapids Clubtail, Mustached Clubtail, Gilt Darter, Channel Darter, Mountain Brook Lamprey, Weigand's Sedge, Rough Cotton-grass, Creeping Snowberry, Thread Rush

- 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, with the implementation of Forest Plan S&Gs, 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 National Forest in the CI analysis area would have no impact on these aquatic/riparian-associated species

Long-solid Mussel, Longhead Darter, Spotted Darter, Tippecanoe Darter, Gravel Chub, and Green-faced Clubtail

- No suitable habitat has been documented for these RFSS in the SBKC project area or CI analysis area, therefore no direct, indirect, or cumulative impact would occur for any of these species under any alternative.

Summary

For the one RFSS known to exist in the SBKC project area (northern long-eared bat) and the remaining RFSS species with suitable but unoccupied habitat including those species associated with upland terrain, aquatic, wetland, or riparian habitat in at least one portion of the SBKC project area or 24,965-acre CI analysis area, the "likelihood of persistence" of these species is high under all alternatives. 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.

Non-Native Invasive Species

Environmental Consequences

- **Alternative 1 (No Action)**

  Since there are no 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. Roads and illegal ATV trail corridors will remain the same and 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 and Reforestation Treatments

- 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. 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
- Alternative 3 includes less final harvest; therefore the potential for spread of NNIS will be less than Alternative 2.
- Direct effects of herbicide activity include direct mortality of any NNIS in the site being treated.
- Indirect effects include the possible introduction or spread of NNIS by heavy equipment containing viable seeds or reproductive fragments.
- Fertilization of an area that has NNIS may allow those species to grow and become established at a quicker rate then 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.

Timber Harvest and Reforestation Effect Summary

While timber harvests may create conditions conducive to the establishment of NNIS, effects are not expected to be significant under any action alternative because:

- There are no significant infestations of NNIS in the project area.
- Approximately 15 acres of NNIS control will be implemented along Forest Roads where the NNIS were documented during field surveys.
- 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, minimizing long-term impacts or possible spread of NNIS.

Transportation Activities

- Increases in miles of new road corridor would increase the likelihood of the spread of NNIS species into the forest interior. The same effect would result from pit expansion as permanent openings increase the potential for the spread of NNIS. Road construction effects would be negligible because the majority of the road corridors already exist.
- Approximately 79% of the FS roads will be either restricted or closed to public, thereby reducing vehicle use and the likelihood of the spread of NNIS.

Other Treatments

- Wildlife proposed treatments would increase native and diverse species, thereby aiding in the reduction of NNIS spread.
- Soil and water proposals related to blocking illegal ATV trails, road maintenance, and road management would 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 would reduce the spread of NNIS species.

Effects of Direct Control of NNIS Treatments

Alternative 1

- There is no direct control NNIS treatment proposed under Alternative 1; therefore the effects for NNIS will be the same as listed in Alternative 1 with no harvest treatments. The NNIS along road corridors may expand in certain areas.

Alternative 2 and 3

- There is direct control of approximately 15 acres of NNIS species located primarily near road corridors. Direct elimination of the NNIS will reduce the likelihood of spread of the known NNIS species.

Cumulative Effects

- The potential for spread of NNIS into areas proposed for final 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.
- There are 15 acres of direct control of NNIS 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.
- Road construction has the potential to spread NNIS into new corridors in the Forest. However all 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.

- Future OGM development (conversion of forest to opening) would directly affect approximately <1% of the CE area and not have a substantial impact on NNIS.
- Anticipated effects are not expected to differ significantly 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.

Heritage

- All known heritage resources sites in the SBKC project area would be avoided by all of the proposed activities for all alternatives.
- Future projects would be reviewed for heritage resources to ensure that heritage sites and resources are protected. Project-level activities can be redesigned or dropped to avoid effects to heritage resources. However, heritage resources are subject to impacts beyond the proposed project activities.
- Within the SBKC project area, and in other areas on the ANF, impacts to heritage resources could occur due to a variety of reasons. Illegal ATV riding is occurring in the SBKC project area. ATV riding can affect heritage resources with as little as a single ride over an area or by long-term use and entrenchment of trails. Heritage resources are also subject to damage by natural causes, such as rodent burrowing and windthrow. There are no anticipated cumulative effects to heritage resources from the proposed or foreseeable future activities.

Scenery

Two indicators were used to measure impacts to scenery resources should one of the alternatives of the SBKC project be implemented: (1) changes to the existing landscape character type of the project area, and (2) whether the project area and alternatives meet the Forest Plan Visual Quality Objectives. The following is a summary of impacts (positive or negative) to scenery resources based upon each alternative.

Alternative 1: No Action

- The perceived age class diversity of timber stands would remain the same as any changes in nature to vegetation would be the result of natural stand development or disturbance processes and not vegetation management or reforestation activities.
- Stands with high densities would not have the visual depth or age class diversity, which are characteristics of greater scenic value.
- There would be no other impacts or change from the current condition since no proposed activities would take place.

Alternative 2 or 3: Proposed Action

- Stands seen from visually sensitive roads (SR 321 and FR 186) would have vegetation treatment activity present, but through the design features listed in Chapter 2, impacts are not expected.
- The perceived size of roadside openings along visually sensitive roads (FR 186) would be limited through reserve areas so as to not be so visually obtrusive.

- Stands with high densities would be treated so that the potential to have the visual depth or age class diversity characteristics of greater scenic value is possible.
- An analysis of the age class of timber illustrates that both action alternatives would be consistent with past management and that the majority of the project area would be perceived as mature forest.

Recreation

Two indicators were used to measure impacts to recreation resources should one of the alternatives of the SBKC project be implemented: (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. The following is a summary of impacts (positive or negative) to recreation resources based upon each alternative.

Alternative 1: No Action

- 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 and diversified for the benefit of game species and hunters.
- Recreationists would still have access to the project area as present road maintenance activities would continue.
- There would be no other impacts or change from the current condition since no proposed activities would take place.

Alternative 2 or 3: Proposed Action

- Illegal ATV trails would be blocked and sites rehabilitated and/or planted discouraging illegal ATV activity.
- Allegheny Snowmobile (ASL) Connector Trail #17 would see increased administrative traffic and timber harvest activities adjacent to the trail, but through the design features listed in Chapter 2, impacts are not expected.
- Some hunters would be displaced in the short term by timber harvest activities and fencing, and the resulting slash would make traversing some stands difficult.
- Wildlife habitat would be improved and diversified through vegetation treatments and reforestation activities to the benefit of game species and hunters.
- Some dispersed campsites would be affected by vegetation treatments and/or pit expansion leading to the short-term displacement of some recreationists.
- Access to the project area would be improved through road maintenance activities and transportation proposals.
- An analysis of the age class of timber illustrates that both action alternatives would be consistent with past management and would be compatible with current recreation use.

Economics

Table 23. Economic Summary: Anticipated Costs and Returns

	Alternative 1	Alternative 2	Alternative 3
Costs	$1,045,710	$2,678,681	$2,586,749
Returns to Government	$0	$10,704,972	$8,652,702
Net Return	**(-) 1,045,710**	**$8,026,291**	**$6,065,953**

Human Health and Safety

- The cumulative risk to the forest users from the proposed timber harvest activities and associated reforestation activities is expected to be low because of the use of Forest Plan standards and guidelines and management practices.

- Cumulative effects to human health are not likely to occur because none of the herbicides are persistent in the environment or in the human body (USDA-FS 1986a, Chapter 4, p 21 and Appendix A, Section 5, p 15, Chapter 2, pp 6-8, Chapter 4, pp 1-5).

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MAPS