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Allegheny
National Forest

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Allegheny National Forest

Land and Resource Management Plan

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Cover photo: Allegheny River Islands, R Hokans, photographer

Land and Resource Management Plan

Allegheny National Forest

January 2007

Elk, Forest, McKean, and Warren Counties, Pennsylvania

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Allegheny black swallowtail; photo courtesy of US Forest Service

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List of Acronyms

ADA	Americans with Disabilities Act
AI	active ingredient
ANF	Allegheny National Forest
AMS	Analysis of the Management Situation
ASQ	allowable sale quantity
ATV	all-terrain vehicle
BA	biological assessment
BO	Biological Opinion
CMAI	Culmination of Mean Annual Increment
CUA	concentrated use area
DBH	diameter at breast height
DEIS	Draft Environmental Impact Statement
EA	Environmental Assessment
EIS	Environmental Impact Statement
ELT	ecological land type
ESA	Endangered Species Act
EUA	equestrian use area
FEIS	Final Environmental Impact Statement
FMA	Forest Management Act
FS	Forest Service
FSH	Forest Service Handbook
FSM	Forest Service Manual
GIS	geographic information system
HWA	hemlock wooly adelgid
IPM	integrated pest management
IUA	intensive use area
KEF	Kane Experimental Forest
LEED	Leadership in Energy and Environmental Design
MA	management area
MIST	Minimum Impact Suppression Tactics
MMBF	million board feet equivalent
MMCF	million cubic feet
MVUM	Motorized Vehicle Use Map
NCNST	North Country National Scenic Trail
NEPA	National Environmental Policy Act
NFMA	National Forest Management Act
NFS	National Forest System
NNIS	non-native invasive species
NNL	National Natural Landmark
NPS	National Park Service
NRA	National Recreation Area
OGM	oil, gas, and mineral
OHM	off-highway motorcycle
OML	operational maintenance level
PA-DEP	Pennsylvania Department of Environmental Protection
PADCNR	Pennsylvania Department of Conservation and Natural Resources
RFSS	Regional Forester's Sensitive Species
RNA	research natural area
ROD	Record of Decision
ROS	recreation opportunity spectrum
RUMFC	restore understory mature forest conditions
RV	recreational vehicle
SFP	special forest product
SHPO	State Historic Preservation Officer
SIL	Scenic Integrity Levels
SMS	Scenery Management System
SNI	Seneca Nation of Indians
TES	threatened, endangered and sensitive
THPO	Tribal Historic Preservation Officer
TSL	Traffic Service Level
USDA	United States Department of Agriculture
USDI	United States Department of Interior
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
WFU	wildland fire use
WSA	wilderness study area
WSR	Wild and Scenic River

Rimrock Autumn Original; Photo courtesy of
G Porter, US Forest Service

Introduction to the Forest Plan

The Land and Resource Management Plan (LRMP or Forest Plan) for the Allegheny National Forest (ANF) provides a strategic focus in its organization of different Forest Plan decisions. This Forest Plan is applicable for a period that begins with the signing of the Record of Decision (ROD) and continues for 10 to 15 years. It is modeled on the national effort to develop a new prototype for forest plans consisting of four major parts:

- **Vision** of what the future intentions are for the ANF
- **Strategy** of how the ANF will be managed to achieve this vision
- **Design criteria** to ensure consistent implementation of the Forest Plan with the vision and strategy
- **Management area direction** describes the forest management within specific areas of the ANF

This format is a departure from previous outlines of Forest Plans in its emphasis upon vision and strategy rather than detailed direction to govern project-planning activities. The format of the Forest Plan also clearly distinguishes the nature and implementation of each decision.

Decisions of a Forest Plan

The decisions made by a Forest Plan are described in the regulations for the implementation of the National Forest Management Act (NFMA) (36 CFR Part 219 of 9/30/1982). The six decisions previously identified by the ANF include the following:

1. Desired condition of the ANF describes a future condition that is the long-term goal of the Forest Plan. It is not identified for any specific time. The description identifies desired ANF uses, ecological conditions, and ANF infrastructure. Activities conducted during implementation contribute to the achievement of this desired condition.
2. Goals and objectives are aspirations for the future. Goals are similar to desired conditions in that they identify a future condition or accomplishment to be achieved. Goals are generally written in broad general terms. Activities conducted during implementation contribute to the achievement of goals. Objectives are concise, usually time specific, statements of measurable planned results. Objectives are written to define actions or conditions to be achieved during the period the Forest Plan is in place. To achieve the objectives of the Forest Plan, more specific project planning occurs during the Forest Plan period (10- to 15-year period after the Record of Decision).
3. Suitability is a basic description of what uses and resource management activities are appropriate within which types of land allocations. Generally, ANF areas are considered suitable for all uses and management activities appropriate for national forests, unless indicated otherwise. Suitability determinations in the Forest Plan identify lands as not suitable or suitable, subject to the design criteria of the plan.
4. Standards and guidelines provide technical information and direction guiding the uses and activities of the ANF. Standards and guidelines are sideboards that impose limitations on activities or uses for reasons of environmental protection, public safety, and risk reduction, or to achieve a desired condition or objective. Together thy may be referenced as design criteria.
5. Management Areas (MAs) and Special Designations are spatially identified areas within the ANF. These areas are assigned sets of Forest Plan decisions, especially suitable uses, standards, and guidelines. Each MA also has its contribution to the desired condition. Within the broader set of management areas are special designations that are established at a national level either through legislation (congressional designations) or through administrative actions (administrative designations). The Forest Plan also makes recommendations for the establishment of these types of special designations.

6. Monitoring and Evaluation Requirements are identified in the monitoring plan of this Forest Plan and outlines key elements that will be monitored as implementation of the Forest Plan progresses. Monitoring is part of an adaptive management process that evaluates the current performance of Forest Plan implementation against the desired conditions, goals, and objectives identified by the Forest Plan. It also evaluates whether the implementation of standards and guidelines are producing the desired results.

Forest Plan decisions are grouped into two basic types:

1. **Decisions** express an aspiration (desired conditions, goals, and objectives) and form the basis for projects, activities, and uses intended for the Forest Plan period. Achievement of these decisions is not entirely within the control of the ANF. A variety of circumstances including budgets, unanticipated major events (e.g. a windthrow event), litigation, and other situations may inhibit or prevent the ANF from achieving these aspirations. Nonetheless, these decisions outline the major results intended for forest management during the Forest Plan period.
2. **Requirements** limit or guide ANF uses or activities (suitability, standards, and guidelines) that are expected to occur during the Forest Plan period. Compliance with these requirements is generally expected during the course of implementation. Suitability determinations and standards shall be complied within all applicable situations, unless a Forest Plan amendment has been specifically prepared to exempt a project. Compliance with applicable guidelines is also generally expected, but situations are anticipated when compliance may not be feasible or desirable. In these situations, the record for the project must provide documentation as to the rationale for deviating from any guideline.

Management area delineations are primarily an organizing method to link certain areas of the ANF with applicable Forest Plan direction. A recommendation for special area designation is a specific kind of Forest Plan decision. Maps of Management Areas, Intensive Use Areas and Equestrian Use Areas are plan decisions. The Forest plan also refers to a number of other maps (e.g. Scenic Integrity Levels) that are included in the CD accompanying the Forest Plan. These maps may also provide information for implementation of the plan. These maps are dynamic and will be routinely updated by ANF staff without making any change to the plan itself.

The monitoring plan is a unique Forest Plan decision that identifies key questions where additional information can provide for adjusting management direction. The monitoring plan in this Forest Plan and a subsequent monitoring guide combine to identify these questions, the methods to collect data, and the periods for evaluation.

The desired condition and goals are described in the **Vision** section of the Forest Plan. The objectives, suitability, management area framework, and monitoring requirements are described in the **Strategy** section of the Forest Plan. The forestwide standards and guidelines are described in the **Forest-wide Design Criteria** section of the Forest Plan. Contribution to desired conditions, suitability, standards, and guidelines are in the **Management Area Direction** section. A change to any of these decisions must be preceded by a Forest Plan amendment. See "Changes to the Forest Plan" section.

Other Elements of the Forest Plan

The Forest Plan also contains additional material that is not specifically a plan decision but is provided to clarify the relationship of the plan decisions to the likely outcomes that would occur from implementation. This includes:

- The **Vision** section where there is a description of the forest niche.
- The **Strategy** section where there are estimates of activities, outputs, and conditions; a summary description of management areas; and details of monitoring items.

Since these elements of the Forest Plan are not plan decisions, they may be changed at any time without a plan amendment. The ANF will publish or post a correction statement or other appropriate notification if the material in any of these sections should change.

Other Sources of Management Direction for the ANF

The Forest Plan is not the only source of direction for the management of the ANF. The National Forest Management Act (FMA) of 1976 and its accompanying regulations provide the basis for creating, revising, and amending forest plans. The National Environmental Policy Act (NEPA) describes the process for evaluating Federal activities that have environmental impacts. Many other laws and regulations apply to the management of the national forests. These laws are generally not repeated or referenced in the language of the Forest Plan, unless there is an issue that merits a reference to the direction of the law. Material related to the law may also be included if the Forest Plan contains a specific method of meeting the requirements in the law.

A set of implemented regulations apply to the ANF. Again, these regulations are generally not repeated in the language of the Forest Plan.

The Forest Plan also does not incorporate or cite standard operating procedures for resource management. The Forest Service maintains a substantial set of Forest Service Manuals (FSM) and Forest Service Handbooks (FSH) that provide direction on the general operating procedures that apply to national forest management. Manual and Handbook direction is generally not repeated in the language of the Forest Plan, unless there is an issue that merits a reference to the appropriate FSM or FSH section. Four-digit file designation codes that correspond to associated FSM or FSH sections appear in the Forest Plan for further reference.

Guiding Future Projects, Program Plans, and Assessments

During implementation, management activities affecting the ANF need to be consistent with the Forest Plan. This consistency is achieved in the following ways:

Management activities are developed specifically to achieve the desired conditions, goals, or objectives of the Forest Plan. To the extent practicable, documentation for such projects should identify the elements of the desired conditions, goals, or objectives to be achieved by the project. It should not be expected that all projects or activities would contribute to all desired conditions, goals, or objectives, but rather to a limited subset. It should also be recognized that some projects designed to contribute to some desired conditions, goals or objectives may have consequences considered adverse to the achievement of other desired conditions, goals, or objectives. In this situation, the responsible official for the project needs to identify and disclose these effects in the project documentation and make a decision that balances these considerations.

There are also project activities that are necessary but are not specifically related to one of these elements of the Forest Plan (e.g. routine road maintenance, facility maintenance, etc.). Such projects should be briefly evaluated to assess if they conflict or impede contribution to the desired conditions, goals, or objectives.

In the implementation of the Forest Plan, projects are expected to comply with suitability and standards and guidelines direction contained in the Forest-wide Design Criteria or Management Area Direction sections of the Forest Plan. Early in the project planning process, the applicable standards and guidelines and suitability considerations should be identified. To ensure compliance with the Forest Plan, each project should document consistency with these standards and guidelines.

Transition in the Implementation of the Forest Plan

The Forest Plan is used as a direction source for future projects, plans, and assessments. It is not expected that this new direction be used to revaluate or change decisions that have been made under the previously existing Forest Plan. A smooth and gradual transition to the new Forest Plan is anticipated, rather than one that forces an immediate reexamination or modification of all contracts, projects, permits, and other activities that are already in progress. As new project decisions, contracts, permits, renewals, and other activities are considered, conformance to the new plan direction as described in the previous section is expected.

Other Documents Related to the Forest Plan

A number of other documents have contributed to the development of this Forest Plan and its related Environmental Impact Statement. Here is a brief listing and summary:

- The current Forest Plan and its amendments were reviewed as an initial base for writing the Forest Plan. This was particularly true for the fundamental structure of management areas and standards and guidelines. Much of this material continues in the Forest Plan, although in some cases it may be reformatted, modified, or otherwise adjusted to incorporate new information into the new concepts of what a forest plan is designed to accomplish. Other material from the current Forest Plan was not carried forward in the interest of creating a strategic focus in the Forest Plan and reducing the level of unnecessary or ambiguous detail.
- Three assessments done by ANF staff have also contributed. These include the Roads Analysis Report (USDA-FS 2003) and the Ecological Context of the ANF (USDA-FS 2005):

    1. The Roads Analysis(USDA-FS 2003) was primarily used to identify the current road system as a baseline for understanding the implications of any of the alternatives considered and the final plan on the road system. It was also used to identify areas greater than 500 acres that are more than one-quarter mile away from authorized roads. These areas have particular value for certain wildlife species as disclosed in the Final Environmental Impact Statement (FEIS).
    2. The Ecological Context of the ANF (USDA-FE 2005) provided a body of information describing the ecological relationships of the forest. These include a natural history of the ANF, the major floral and faunal species present, the relative abundance or scarcity of these species, and major stressors or threats to ecological integrity. Information in the document contributed to the design of the alternatives, the analysis in the FEIS, and several of the plan decisions presented in this document.
    3. The Analysis of the Management Situation (AMS) of the ANF describes the results of the AMS, which focuses on key revision issues and resource areas. A summary of the AMS is contained in Appendix B of this Forest Plan.

- A Biological Opinion prepared by the U.S. Fish and Wildlife Service will be used to ensure that the final Forest Plan is consistent in meeting requirements to protect and contribute to the recovery of threatened and endangered species. This Biological Opinion will be prepared subsequent to this Forest Plan and FEIS.

Transition to the New Planning Rule

On January 5, 2005, the Department of Agriculture published a final rule for National Forest System Land Management Planning (36 CFR Part 219). This new planning regulation allows plan revisions initiated prior to January 5, 2005 to be completed with the planning regulations in place prior to November 9, 2000. This planning rule set is commonly called the 1982 Planning Rule. The decision of the regional forester was to complete this Forest Plan in accordance with the 1982 Planning Rule, rather than change the planning process already underway to comply with the newer planning rule.

Each unit of the National Forest System is expected to transition to the new planning rule for both amendments and revisions upon the establishment of an Environmental Management System or by January 7, 2008, whichever comes first. After the completion of the plan revision, it is expected that the ANF will focus future efforts on the establishment of an Environmental Management System in an effort to shorten this transition period. Until that time, the Forest Plan is governed by the 1982 Planning Rule with two exceptions:

1. Monitoring of management indicator species may be based on the consideration of habitat for those species unless the Forest Plan specifically requires population monitoring. Site-specific monitoring

for these species in a proposed project or activity area is not required by the regulation, but may be an element in the Forest Plan at the discretion of the responsible official (36 CFR 219.14f).

2. The objective process identified in the new planning rule may be used in lieu of the previous appeal process to resolve objections to plan revisions and amendments. This is not applicable if the amendment is being approved with a site-specific project (36 CFR 219.14e).

Changes to the Forest Plan

A change to the Forest Plan requires either administrative correction or amendment. The following summarizes circumstances that warrant corrections or amendments to the Forest Plan:

Administrative Corrections are minor changes to the Forest Plan that do not substantively affect the management direction or create additional environmental consequences. These minor changes include the following:

- Elements of the Forest Plan that are not plan decisions as described in the previous section, "Other Elements of the Forest Plan."
- Corrections and updates of data published in the Forest Plan and minor changes to maps of management areas, equestrian use areas, and intensive use areas.
- Changes in projections of timber management activities expected to occur during the plan period.
- Minor text changes such as typographical errors, clarification of explanatory text, etc.

An administrative correction must be initially published as a proposed correction either on the ANF internet page or in a local newspaper of record. The proposed correction must identify the language or map to be corrected, the proposed correction, and the reason for the correction. The public will have an opportunity to comment on the proposed correction within a 30-day period following publication. After reviewing the comments received, the final correction may be similarly published and the Forest Plan corrected.

Site-specific Forest Plan Amendments occur to allow specific projects or other activities to deviate from certain Forest Plan direction. These amendments occur only for a specific area or a specific project. They do not lead to changes in Forest Plan language, and if changes are made to management area map layers, they are made only for the area affected. Such amendments are usually proposed with appropriate NEPA analysis for the site-specific project proposal. The procedures for processing a site-specific plan amendment are outlined in the applicable planning regulation.

Regular Forest Plan Amendments change the text and language of the Forest Plan decisions identified in the earlier section, "Decisions of a forest plan," and any other changes that cannot be addressed through administrative corrections or site-specific plan amendments. The procedures for addressing a regular plan amendment are outlined in the applicable planning regulation.

Organization and Format of the Forest Plan Document

Beyond this introduction, this planning document is organized in the following four-part format with several appendices. Each part contains important introductory material that should be reviewed to understand the context of the plan direction. The following summarizes the content of each part, with plan decisions highlighted in **boldface**:

Part 1 – Vision, contains an introduction to the section, the forest niche statement, the **desired condition** of the ANF, and additional **goals** of the ANF.

Part 2 – Strategy, contains an introduction to the section, **objectives**, an estimate of management activities and funding, the **allowable sale quantity**, **special designations**, a summary of **management areas**, **suitable uses and activities**, and a **monitoring strategy.**

Part 3 – Forest-wide Design Criteria, contains an introduction to the section and forestwide **standards and guidelines.**

Part 4 – Management Area Direction includes the contribution to the desired condition, objectives, suitable uses and activities, and **standards and guidelines** specific to each **management area.**

Appendix A contains the rationale for choice of vegetation management practices (the Vegetation Management Silvicultural Guides for ANF Forest Types).

Appendix B contains a summary of the Analysis of the Management Situation.

Appendix C contains the Recreation Opportunity Spectrum (ROS) Descriptions and Development Level Table.

Appendix D contains a table listing species with viability concerns.

See the Glossary and Literature Citation sections of the Final Environmental Impact Statement for this type of information.

Photo courtesy of US Forest Service

Part 1—Vision

This part of the Forest Plan identifies the long-term desired conditions and goals for the ANF. It describes the environmental conditions and ecological, social, and economic functions desired of the ANF in the future. Most of the material in this part is descriptive and is not a Forest Plan decision. The only two Forest Plan decisions are the **desired condition** statement and the identification of Forest Plan **goals**.

It begins with the *Forest Niche Statement*. This statement explains the role of the ANF within the larger context of the Commonwealth of Pennsylvania and the Eastern United States. The Forest Niche statement is background information and does not represent a plan decision.

The *Desired Condition Statement* describes a future condition that is the long-term goal of the Forest Plan. Activities conducted during Forest Plan implementation are expected to contribute to the achievement of the desired condition. As a major focus for the activities to be implemented during the plan period, the desired condition is a forest plan decision.

The *Forest Plan Goals* is a listing of goals for the management of the ANF. These goals are similar to the desired condition in identifying a basis for management activities during the plan period. They are organized by associated Forest Service file codes. They are a plan decision.

Forest Niche Statement

The Allegheny Plateau was once a vast forest dominated by eastern hemlock and American beech growing on ridge tops and mammoth white pine and oak growing along the slopes and bottoms of the Allegheny River valley. The Allegheny Plateau was profoundly transformed by industrialization and consequent unregulated logging beginning in the early 1800s when the first European settlers reached the area and continuing into the 1900s with the advent of the wood chemical industry. The once vast forest of the Allegheny Plateau was almost completely removed, leaving barren, brush covered hillsides as far as the eye could see. By 1900, deer and their predators were almost completely eliminated due to unregulated hunting and loss of habitat.

The Weeks Act, passed by Congress in 1911, allowed the Federal Government to buy land in Eastern United States for the establishment of national forests. The Allegheny National Forest was established in 1923. The land was so depleted of large trees that many residents jokingly called it the "Allegheny brush patch." Some worried the forest would never recover, but a healthy, diverse forest started to grow. The Forest Service began to manage the land and brought new concepts in forest management to the Allegheny Plateau – multiple benefits and sustainability. By the 1940s, the forest began to take on an appearance of a healthy maturing forest and the Forest Service gradually resumed timber harvesting under strict, research-based guidelines to ensure sustainability for future generations.

The ANF Niche

The ANF fulfills many ecological and social functions and continues to evolve as an important component of the Commonwealth of Pennsylvania. From the high points and ridgelines of the Allegheny Plateau to the river bottoms and stream valleys below, the ANF provides unique opportunities for watershed protection, plant and animal habitats, cultural history, recreation, wood products and research, not only today but for generations to come.

A Vital Watershed

As a result of industrialization and widespread unregulated logging of the Allegheny Plateau, many rivers and streams were threatened with intense pollution and channel instability. President Calvin Coolidge recognized the importance of watershed health and established the ANF with the aim of restoring and protecting the Allegheny River watershed. Since that time, conservation efforts to protect and restore the Allegheny River watershed led to a remarkable recovery of the Allegheny and Clarion rivers. This recovery resulted in their designation as wild and

scenic rivers for having outstanding scenic, natural, recreational, scientific, historic, ecological and fisheries resource values. Protection of the Allegheny River watershed is one of the most important conservation efforts in the Commonwealth and the region. The ANF is uniquely positioned to help contribute to continued watershed conservation efforts.

A Home to Native Plants and Animals

The ANF supports a rich diversity of plants and animals and is part of the Allegheny High Plateau Ecoregion of Pennsylvania. This ecoregion has been described by the Pennsylvania Department of Conservation and Natural Resources as "having the highest stream quality for the state with the largest block of core forest state-wide." The region hosts critically important concentrations of forest wildlife. Included are two important bird areas that focus on quality habitat for the yellow-bellied flycatcher (endangered species in Pennsylvania) and a host of woods warblers and an important mammal area that recognizes the quality of habitats for river otters, fishers, and northern flying squirrels. While early structural habitat declined across Pennsylvania and the region, the ANF has maintained this community on approximately 8 percent of the forest for the past 20 years. The forest habitats and river systems of the Allegheny provide refuge for an abundance of game species creating outstanding opportunities for hunting and fishing. Approximately 4,000 acres of remnant, original forest remains. Although this makes up less than 1 percent of the total ANF acreage, it comprises approximately 12 percent of the total old growth forest in Pennsylvania, and is the largest contiguous old growth beech-hemlock forest in the Northern United States.

A Place to Play

The ANF provides 108 miles of premier all-terrain vehicle/off-highway motorcycle trail riding opportunities, one of the most extensive systems within the Commonwealth of Pennsylvania. The ANF is also a premier destination for equestrians, as Pennsylvania has the fifth largest number of avid recreational riders in the United States. Water-based recreation opportunities abound on the popular 8,000-acre Allegheny Reservoir and along the Wild and Scenic Allegheny and Clarion rivers. The Allegheny Reservoir offers outstanding scenery along its vast undeveloped shoreline and wooded uplands. Many easily accessible opportunities exist for developed or remote dispersed recreation across a lush forested landscape and within special areas, including federally designated wilderness areas, National Recreation and Scenic Areas. A rich heritage, ranging from early settlement by native peoples to the lumber and oil era, contributes to the interpretive and educational values that distinctively enhance the recreation opportunities on the ANF.

Working Woodland

The ANF is managed to sustain or improve forest ecosystem health and provide sustainable supplies of high quality timber and other forest products to present and future generations. Sustainable forest management includes a range of reforestation activities designed to help ensure adequate tree seedlings develop where deer herbivory and interfering plants limit their establishment or survival. Allegheny hardwood stands include black cherry, yellow poplar, white ash, and a wide variety of other species and represent the most economically valuable forest type in the eastern United States. The exceptional quality of the black cherry and other hardwoods found here makes it highly valued throughout the world for fine furniture and veneers. Millions of board feet of timber are harvested from the ANF annually, providing jobs for people involved in making a variety of wood products and furniture. For many rural communities, forest industries are key to the economy and cultural heritage.

The ANF lies in the heart of Pennsylvania's oil and gas region, only 40 miles from the site of the first oil well in the United States. Much of the Commonwealth's crude oil production comes from mineral rights owned by private individuals within the forest boundary each with an estimated 8,000 active wells. Because of its high paraffin content, Pennsylvania crude is one of the best lubricating oils in the world. The oil heritage plays a unique role in the settlement of the East and in history.

Research and Experimental Forest

Since the 1920s, the Forest Service has conducted research on and around the ANF. The Northern Research Station's Warren Forestry Sciences Laboratory, located in Irvine, PA, performs high quality basic and applied research on the forested ecosystems of the Allegheny Plateau and adjacent regions, with an emphasis on underlying principles to increase the applicability of results across the widest possible region. Its aim is to develop enhanced ecosystem management methods that incorporate new science and encourage ecologically sustainable forest and vegetation management. To accomplish this mission, research is carried out across the ANF with three areas having special significance. The 4,000-acre Tionesta Scenic and Research Natural Areas contain one of the largest old growth remnants in the East. Research on the 1,737-acre Kane Experimental Forest focuses on understanding and managing forest ecosystems of the Allegheny Plateau region. The 220-acre Hearts Content Scenic Area is a National Natural Landmark recognized for its old growth and scenic qualities. It has been studied since the 1920s. As a research base for forest experimental study, the ANF is a proving ground for forestry practices and demonstration areas of what has been determined to be the best management of woodlands.

Desired Condition

The desired condition of the ANF describes the ultimate nature of the ANF aspired to in this Forest Plan. It describes a succinct, yet comprehensive, set of attributes related to the use of the forest, the conditions of the ecosystem and the intended infrastructure of the forest. Although the word "future" is often associated with the desired condition, there is no specific time associated with the description. If the desired conditions exist today, the Forest Plan and its implementation will seek to conserve them. If the desired conditions do not currently exist, then implementation of the Forest Plan will seek to create them. To create greater immediacy, the description is written in the present tense as if the desired condition was the present condition. Where comparative references are made to today or the past, they are indications of changes in the forest anticipated in the desired condition. Movement towards the achievement of this condition is a primary reason for forest management activities.

Use of the Forest

As the only National Forest in Pennsylvania and a day's drive away for one-third of the nation's population, the ANF is a popular destination for a variety of recreational activities. People visiting the ANF find a variety of recreational opportunities ranging from developed settings to more remote settings offering solitude, risk, and challenge. The ability of the ANF to meet the demand for these activities contributes to the tourist industry within the four counties.

Developed campgrounds and other facilities provide locations for overnight visitors who seek recreation opportunities with a certain degree of comfort. These facilities can be found in certain locations along the Allegheny Reservoir, the Allegheny River, and other locations of the ANF accessible by road.

The "Big Woods" character of the ANF provides a setting for hiking, backpacking, or camping with opportunities for solitude in wilderness areas, national recreation areas, and remote recreation areas. A system of hiking and multiple use trails provide these opportunities. The North Country National Scenic Trail provides an outstanding opportunity for long distance trail hikers. A snowmobile trail system that features loops and connectors to local communities provides motorized winter recreation. Premier all-terrain vehicle (ATV) trail riding opportunities are provided on designated trail systems within designated intensive use areas (IUAs). Equestrian use is featured in equestrian use areas (EUAs) and is available in other parts of the forest.

Hunting activity is a seasonal pastime on the forest, especially for deer in the fall season. Deer hunting provides not only recreation activity but also sustenance for local families and is also important in managing the forest to achieve diversity in the forest understory. Hunting opportunities for black bear, wild turkeys, squirrels, ruffed grouse, waterfowl, and other game species are also featured activities that provide some sustenance to the local population.

Scenic driving and boating is also popular. Forest vegetation is managed so that areas seen from main highways, trails, streams, and developed recreation sites maintain a mostly natural appearance. This includes views of the

Allegheny Reservoir that represent some of the most dramatic scenery of the ANF. Scenic vistas are found along major travel routes.

The Allegheny Reservoir and the Allegheny and Clarion rivers provide extensive water-based recreation opportunities and settings. The Allegheny Reservoir continues to provide angling opportunities for a variety of game fish and in sufficient quality and quantity to sustain numerous fishing tournaments throughout each year. Habitat for panfish continues to be enhanced. Easily accessible and remote angling opportunities are also provided along the extensive stream system encompassed by the ANF.

Visitors can find opportunities to explore, enjoy, and learn about the ANF's rich natural and cultural heritage at areas such as Tionesta Scenic Area, Hearts Content Scenic Area, and Buckaloons Historic Area. Other heritage resources are identified and if deemed eligible as historic properties, they have been nominated and included in the National Register of Historic Places.

Sustainable timber harvest is a featured use of the ANF. The forest regularly offers for sale a mix of high value hardwoods, such as black cherry and oak, along with other tree species, such as red maple, beech, yellow poplar, and birch. Vegetation management activities are designed to lead to a variety of desired ecosystem conditions. Sustainable timber harvest serves as a model for practice on other forest lands. Timber harvest supports local logging and related forest product processing, sustaining local jobs and income and providing valuable products to the national economy. Revenues from either timber sales or the continuation of the Secure Rural Schools Act provide financial support to local schools, township roads, and county activities. Biomass and special forest products also contribute benefits to the community.

The ANF also provides quality water to a variety of users within the four-county area and sustains quality water in the Allegheny River and Clarion River systems for a variety of downstream users. Specifically, the forest provides water to the municipalities of Ridgway and Bradford, as well as a variety of users who obtain their water directly from sources originating on the ANF. This water is a vital contribution to the health of local populations and a basic infrastructure need within the four counties.

The ANF cooperates in the exploration and development of subsurface oil and gas resources owned by private parties. Work continues with private parties to ensure that surface development associated with subsurface oil and gas extraction causes the least amount of impact. When oil and gas developments are no longer in use, they are plugged, facilities are removed, and roads are restored to a vegetated condition. Oil and gas extraction provides a basis for refinery processing and other economic activities that are important to the economic vitality of the four counties and provide important products to the national economy.

Ecosystem Conditions

The dominant disturbance processes affecting forest vegetation on the ANF are timber harvest activities, oil and gas development, major storm events and impacts from forest insects and diseases. Although insects and diseases have led to major defoliations and death of trees on the ANF, the increased diversity of vegetative conditions has improved the resiliency of the forest and reduced the levels of these impacts. Both human, and in rare instances, lightning caused wildland fires occur across the landscape. However, intense stand replacement wildland fires are infrequent. Prescribed fire, in addition to mechanical methods, is used to reduce hazardous fuels, maintain and enhance warm season grasses, improve wildlife habitats, and benefit landscapes where advanced oak regeneration is present. In many situations, major wind events or other disturbances that leave large swaths of down trees are followed by a management response to restore forest vegetation and remove salvageable timber.

The dominant forest types on the ANF continue to be upland and Allegheny hardwoods, primarily consisting of black cherry, red maple, black birch, tulip poplar, and ash. The northern hardwood forest type persists, although reduced by the loss of mature American beech due to beech bark disease and the anticipated loss of eastern hemlock due to hemlock woolly adelgid. American beech exhibiting resistance to the disease persists. Eastern hemlock trees (at least a genetic source) also persist and other conifer species are present on the ANF to replace the important ecological role hemlock currently provides, such as thermal cover and stream shade. Tree species sensitive to site nutrients (or high base cation demanding species), such as sugar maple, white ash and basswood,

are emphasized and conserved in better-suited locations (i.e., lower slope positions). Oak is maintained primarily in older forests and regenerated through the use of silvicultural practices and prescribed burning. Tree and shrub species that occur as minor components are also retained. The desired mix of forest types is 33 to 47 percent in upland hardwoods, 21 to 28 percent in Allegheny hardwoods, 15 to 17 percent in oak, 12 to 16 percent in northern hardwoods, 1 to 2 percent in hemlock, 1 to 3 percent in conifer, and 1 percent in aspen.

A diversity of vegetative structural stages and age classes exist across the landscape within the context of multiple use management. Instead of the current even-aged forest dominated by 90 to 110 year old second growth, forested areas range from third-growth early structural stages to late structural stages that have developed from the existing 90 to 110 year second growth or remnants of the original old-growth forest. Early structural stages created by timber harvest or natural disturbance comprise 8 to 10 percent of the forested landscape. Late structural stages located primarily in specially designated areas, remote recreation areas and landscape linkages comprise 28 to 35 percent of the forested landscape. The balance of the forest is distributed in mid structural stages.

Restoration of understory vegetation and vertical diversity is occurring within the forested stands of the ANF. Understory vegetation has transitioned from areas dominated by fern, beech brush and striped maple to stands with multiple vegetative layers characterized by a diverse overstory, woody midstory and a well developed understory of shrubs, herbaceous plants and tree seedlings. This enhances the resiliency of ANF ecosystems as this understory vegetation and advanced regeneration can replace large overstory trees as they mature and eventually die. Deer are maintained within the range of 10 to 20 deer per square mile consistent with this desired condition for vertical diversity and restoration of understory vegetation. Snags are present throughout the forest. Large down wood is present to meet the needs of several wildlife species. Native shrubs provide soft mast, cover, and vertical structure for wildlife. Conifers are well distributed to provide wildlife cover.

The ANF contains both vertical and horizontal vegetative diversity. A diverse understory of vascular plants, woody shrubs, and tree seedlings and a midstory of saplings and an overstory of large mature trees, provide a complete vertical structure that supports a variety of mammals, birds, reptiles, and amphibians. Large blocks of contiguous forest provide habitat for raptors, timber rattlesnakes, northern flying squirrels, and wood turtles. Maintained openings and early structural habitat created through timber harvest add important habitat components to horizontal diversity.

The Hickory Creek/Tionesta Creek Important Mammal Area sustains featured species including fishers, river otters, northern water shrews, snowshoe hares, northern long-eared bats, silver-haired bats, and northern flying squirrels. The ANF also maintains approximately 13,000 acres that have been identified by Pennsylvania as Important Bird Areas including the Tionesta Scenic and Research Natural Areas and portions of the East Hickory Creek watershed emphasizing habitat for yellow-bellied flycatchers and cerulean warblers. Bald eagles and ospreys continue to find suitable nesting and feeding sites along the shores of the Allegheny Reservoir and Allegheny River. Habitat conditions sustain species of viability concern and threatened and endangered species.

Aquatic and riparian ecosystems are primarily free flowing and connected with some impoundments for recreation and wildlife. Wetlands remain intact and properly functioning. Stream habitats consist of 35 to 65 percent pool and slow-water habitat with the balance in faster moving water. Stream bottoms are composed of appropriate mixes of boulders, gravel, sand, silt, and clay for their location on the landscape. A multi-layered forest canopy is present in most riparian areas, to provide shade, stable stream banks, leaf litter, and large woody material. Mature and dead trees in riparian areas are distributed to provide a sustainable supply of large wood to streams (75 to 380 pieces per stream mile). Riparian dependent vegetation and animals and their habitats, such as seeps, springs, vernal ponds, and other unique areas, are conserved. Riparian areas serve as landscape connectors, and provide recreation users with a natural-appearing landscape. A majority of cold-water streams provide suitable habitat and water quality for aquatic species, including the propagation of brook trout and other headwater stream fishes. Wilderness Trout Streams and Remote Trout Streams emphasize natural forest conditions immediately upslope of these streams, while existing Class A Wild Trout Streams maintain their level of productivity with additional streams added to this classification over time. Allegheny River flows are maintained at levels necessary to support viable populations of freshwater mussels, fish, and other aquatic species,

including Federal and state-listed species, those on the Regional Forester's sensitive species list (RFSS), and those fish identified as hosts for young mussels. Streams and rivers also provide suitable habitat for game species and aquatic species with viability concerns.

Water levels in the Allegheny Reservoir remain relatively stable year-round at 1,328 feet mean above sea level to support aquatic vegetation growth, and increase fish habitat, including large bay areas. Erosion in the drawdown zone of the Allegheny Reservoir has been stabilized around areas of sensitive cultural sites. This would also allow artificial fish habitat structures placed in shallow water to provide year-round benefits. Fishing facilities, such as Elijah and Webbs Ferry piers and the bank-fishing trails at Elijah and Wolf Run Marina may be used for an extended period.

Air, soil and water resources provide for watershed health, public health and safety, long-term soil productivity and ecosystem sustainability. Air pollution is limited, which enables conservation of aquatic biota, vegetation, water quality, and soil nutrients. The rate of soil base cation depletion is slowed from current levels and soil nutrients are conserved. Species susceptible to damage from ozone continue to receive low levels of damage and maintain growth rates. Recreation use, vegetation management, oil and gas development and other activities are within levels capable of conserving soil and water quality.

Infrastructure

Compared to today, the ANF has a slightly expanded land base with fewer gaps of non-national forestlands in a more consolidated ownership pattern. The ANF has greater subsurface ownership today, especially in specially designated areas. Within the ANF proclamation boundary, isolated tracts with high values for recreation or plant and animal communities have been added to the land base.

The ANF retains an extensive road system. This system is needed primarily for oil and gas extraction, vegetation management, recreation and public access. Other uses of the ANF road system include access to private inholdings, electronic sites, and utility corridors. Roads that are not needed for these uses or that are in part of the forest designated for unroaded conditions have been decommissioned. Decommissioned roads have been converted to trails or restored to natural conditions with forest vegetation.

The road system created by the Commonwealth and townships forms the arterial road system of the ANF. Collector and local roads provide additional access to specific locations. Management of the forest road system is approximately equal thirds in an open condition, a restricted condition, and a closed condition.

Most facilities appear to be blended with the natural setting of the forest and historic structures are often adapted for current uses. Plants native to northwestern Pennsylvania encompass the settings of ANF facilities. An adequate, but not excessive, number of signs provide information, direction, and interpretation.

Forest Plan Goals

This section contains a list of identified goals for the management of the ANF under the Forest Plan. Goals are general statements indicating a desired condition or type of accomplishment sought during the period of the Forest Plan. Goals provide a general direction for plan activity, but do not provide yardsticks for measurable results. They do provide a basis for management activities during the plan period (10 to 15 year period after the Record of Decision). They are organized by associated Forest Service file codes. Goals are a plan decision.

1920 Land and Resource Management Planning

Keep the Forest Plan of the ANF up to date by implementing the monitoring strategy, publishing evaluation results, and processing appropriate plan amendments.

2070 Biological Diversity

Strive to preserve natural patterns of genetic variation in native species by avoiding the loss of genetically unique populations due to edge-of-range effects, isolated populations, or threats from non-native invasive species (plants, animals, insects, and diseases).

2080 Noxious Weeds

Develop and implement a proactive, integrated noxious weed and invasive plant management program to conserve forest resources in a manner that presents the least hazard to humans and maintains or restores forest resources.

2300 Recreation

Provide a diverse range of high quality, sustainable recreation opportunities consistent with public demand and resource capability emphasizing locally popular recreation places and those important to the tourism industry.

Cooperate with the Commonwealth in the promotion and development of recreation opportunities associated with the Pennsylvania Wilds program.

2320 Wilderness

Manage designated wilderness areas to meet national standards.

Increase public information and education contacts to improve appreciation of wilderness values and increase understanding of ways to minimize effects of user visits.

2350 Trails

Emphasize the development of a mapped, marked, and maintained trail system to minimize user conflicts, impacts to natural resources, respond to changing social needs, and increase access and linkages to communities, forest recreation sites, and special features.

Manage the trail system to support a wide variety of recreation opportunities and settings.

Curtail unauthorized cross-country motorized travel and increase the quality and quantity of motorized trail riding opportunities.

Utilize a collaborative working group approach to assist in the determination of snowmobile trail system priorities including trailheads, additional connections to communities and state trail systems, and the development of loop trails where feasible.

Manage the North Country National Scenic Trail to ensure a consistent appearance, a high standard of quality and a basic level of safety along a diverse range of settings and vegetative conditions.

2360 Heritage

Emphasize the protection of historic properties, progression towards completion of the forestwide heritage resources inventory, and evaluation of heritage resources.

Protect and appropriately manage important heritage resources, coordinate inventory and evaluation procedures and subsequent management actions with the Pennsylvania State Historic Preservation Office and the Seneca Nation of Indians Tribal Historic Preservation Office.

Provide opportunities for appropriate use and interpretation of heritage resources.

2380 Scenery

Maintain or enhance the quality of scenic resources including viewsheds, vistas, overlooks, and special features.

2400 Vegetation

Provide a diversity of vegetation patterns across the landscape that represents well distributed habitats, a range of forest age classes and vegetative stages, a variety of healthy functioning vegetation layers, moderate to well-stocked forest cover, and the variety of vegetation species or forest types necessary to achieve multiple resource objectives and sustain ecosystem health.

Continue to implement and monitor a range of silvicultural and reforestation practices in order to be responsive to emerging issues and regenerate stands to a diversity of tree seedlings of good quality, form and health.

Continue cooperating with research to provide sites for study and demonstration of sustainable ecosystem management.

Reintroduce fire into fire-adapted oak ecosystems to conserve regional biodiversity and sustain ecosystem structure and function.

Manage vegetation to provide high quality, hardwood sawtimber from land suitable for harvest at a sustainable level to meet multiple resource objectives.

Use forest management activities to demonstrate sustainable silvicultural practices and land stewardship that could be used in forests on private lands.

Work collaboratively with special forest product collectors to ensure harvest levels are ecologically sustainable. Explore opportunities for habitat restoration/enhancement and/or establishment of species in suitable unoccupied habitat.

Pursue restoration of native species, such as American chestnut, butternut, and American beech as genetically disease-resistant stock that is physiologically appropriate to the Allegheny Plateau becomes available.

2500 Watershed and Air

Maintain, restore, or improve soil quality, productivity, and function. Manage soil disturbances from management activities such that they do not result in long-term loss of inherent soil quality and function.

Maintain or restore watersheds and their associated stream and groundwater processes, channel stability, riparian resources, and aquatic habitats to a functional condition. Provide quality, quantity, and duration of stream flow to maintain levels that support desired aquatic species or the most restrictive beneficial use.

Provide riparian areas that have dynamic, multi-age and multi-layered vegetative communities that promote floodplain structure, stream channel stability; aquatic diversity and natural recruitment of large woody debris and other sources of organics. Provide riparian areas that are occupied by vegetation that provide habitat for riparian dependent species.

Cooperate with regulatory authorities to reduce adverse effects of air pollutants and atmospheric deposition on forest ecosystems.

2600 Wildlife, Fish and Sensitive Plant Habitat

Maintain and enhance the distribution and diversity of plant and animal species by providing a diversity of high quality habitats across the landscape.

Contribute to the conservation and enhancement of habitat integrity for species with viability concerns by protecting specific habitat elements crucial to the long-term sustainability of species. Provide nesting sites, breeding areas, and young-rearing habitat relatively free from human disturbance for species with viability concerns.

In the spatial distribution of habitats, provide habitat connectivity, interior habitat, and remote habitat.

Provide habitat for game species to make opportunities available for quality hunting and fishing experiences while promoting the management of game species that sustains healthy forest understories.

Develop and maintain mast-producing species on a variety of sites including lowlands, mid slopes and ridge tops. Maintain a diversity of understory and overstory mast-producing species.

In the oak type, habitat management should be directed to sustaining oak mast crops and large den trees in the long term through a combination of thinning, release, prescribed fire, and regeneration treatments.

Conserve and enhance native plant diversity, abundance, and distribution across the ANF. Explore opportunities for habitat restoration/enhancement and/or establishment of species in suitable unoccupied habitat.

Collaborate with the Pennsylvania Game Commission to reduce impacts associated with the removal of young goshawks from the nest for falconry purposes.

2800 Minerals and Geology

Encourage, facilitate, and administer the orderly exploration, development, and production of mineral resources.

Reasonably protect surface values and mitigate impacts caused by oil, gas, and mineral (OGM) operations by working cooperatively with OGM operators and Commonwealth and Federal regulatory agencies.

3400 Forest Pest Management

Emphasize integrated pest management methods to prevent or minimize pest problems by using the most current science and available control methods. Methods include silvicultural treatments, maintenance of species diversity, pesticide application, and introduction of insect predators or parasites.

Provide for safe, effective, and selective pesticide, insecticide, and herbicide use on the ANF when needed as part of an integrated pest management strategy.

5100 Fire

Firefighter and public safety will be the first priority in every fire management activity.

Manage wildland fire to protect property and resources while maintaining ecosystem benefits.

Reduce hazardous fuel loading in wildland urban interface and intermix areas and intensive OGM development areas to reduce risks associated with potential wildland fires.

Use fire where appropriate to sustain and restore forest and non-forest vegetation communities (see 2400 Vegetation Plan Goals).

5400 Land Ownership

Acquire surface and subsurface ownership rights from willing sellers within the ANF proclaimed boundary where it benefits the long-term management of the ANF.

Collaborate with county and local governments to ensure that land adjustments benefit both Federal and local interests.

7300 Administrative Facilities

Design and maintain facilities to incorporate the principles of sustainability, reflect their place within the natural and cultural landscape, and provide optimal service to customers and cooperators.

Implement the Facilities Master Plan.

Improve the safety and economy of Forest Service facilities and operations and provide greater security for the public and employees.

7700 Transportation System

Forest infrastructure, including facilities and transportation systems, will provide a safe, efficient, and economical system that is responsive to public and administrative needs; having minimal adverse effects on ecological processes and ecosystem health, diversity, and productivity; and is in balance with needed management actions.

Photo courtesy of R Hokans, US Forest Service

Part 2—Strategy

This part of the Forest Plan identifies the strategy to be used by the ANF to achieve the desired conditions and goals identified in Part 1. It identifies the specific objectives for the plan period, the system of management areas, suitable uses and activities, and a monitoring strategy for the Forest Plan. Most of the sections in this part are Forest Plan decisions although there is descriptive material.

The first section identifies the **Forest Plan objectives**. Objectives provide a more specific framework and focus for management activities to implement the Forest Plan. Forest Plan objectives are short, concise statements of either planned actions or desired conditions for accomplishment over a specific time frame, usually the plan period. The objectives are measurable statements. As measurable statements, it will be possible to determine at any point during or at the conclusion of the plan period, the extent to which the objective has been met. This determination is a major component of the forest monitoring strategy outlined later in this chapter. These objectives are a Forest Plan decision.

The second section contains a table identifying estimated levels of management activities and funding from the current situation to full implementation. This estimate of management activities and funding is not a Forest Plan decision.

The third section identifies the **allowable sale quantity** for the first and second decades. The allowable sale quantity is a Forest Plan decision.

The fourth section describes **special designations and management areas**. These are identified areas of the forest with sets of management direction specific to each area. Special Designations are areas that have a national designation that may be initiated or recommended by the Forest Plan, but are established through another specific process. Once established, these areas cannot be changed in future forest plans without repeating that process. The other management areas in the Forest Plan may be modified by Forest Plan amendment or revision at a future date. In this section, a basic description is provided for each management area and a table displays the acreage of the forest allocated to each management area. Part 4 contains all of the plan decisions that are specific to individual management areas including a description of each management area's contribution to the Desired Condition, a listing of any plan objectives, suitable uses and activities, and standards and guidelines.

The fifth section identifies **suitable uses and activities** that may occur on the ANF under the Forest Plan. In this section, there is a general listing of uses and activities with direction as to where they are suitable and allowed and where they are not suitable and not allowed. Many of the uses and activities are organized by the management areas or other identified areas to indicate this suitability. Not all uses and activities may be identified in this section. Uses or activities that are considered suitable in this section may be restricted by forestwide design criteria in Part 3 or by management area design criteria in Part 4. Suitability is a forest plan decision.

The sixth and final section of this part of the Forest Plan is the description of the monitoring requirements or more commonly called the **monitoring strategy** or plan. In this section, the key questions to be addressed through forest plan monitoring are identified along with some information about the ways in which information will be collected. The ANF expects to publish a more detailed Monitoring Guide that will identify specific information about monitoring protocols. A key element of the monitoring strategy is the periodic evaluation of the plan and the publication of evaluation results. The Monitoring Requirements section is a Forest Plan decision.

Forest Plan Objectives

These plan objectives provide a more specific framework and focus for management activities to implement the Forest Plan. Forest Plan objectives are short, concise statements of either planned actions or desired conditions for accomplishment over a specific time frame, usually the plan period. The objectives are measurable statements. As measurable statements, it will be possible to determine at any point during or at the conclusion of the plan period, the extent to which the objective has been met. This determination is a major component of the forest monitoring

strategy outlined later in this chapter. These plan objectives are a Forest Plan decision. The objectives are organized by associated Forest Service filing codes.

Forest Plan objectives express an aspiration for accomplishment and form the basis for projects, activities, and use during the plan period. Achievement of these objectives is not entirely within the control of the ANF. A variety of circumstances, such as budget constraints, unanticipated events (e.g. insect infestation, fires, etc.), litigation, and other events outside the forest boundary may inhibit or prevent the ANF from accomplishing these objectives.

Most plan objectives identify expected accomplishments on an annual basis during the life of the Forest Plan. Some may identify a condition to be present at the end of the plan period. In some instances, other time periods are identified.

1920 Land and Resource Management Planning

Complete a management plan for the area surrounding the Allegheny Reservoir including that portion of the National Recreation Area.

2080 Noxious Weeds

Collaborate with agencies/entities to establish seed and mulch mixes appropriate to limit introduction and spread of invasive species for use on the ANF.

Complete 300 to 600 acres of invasive plant treatment annually.

2300 Recreation

Increase the number of inventoried dispersed sites and concentrated use areas (CUAs) managed to standard to reduce health, safety, and resource impacts caused by unmanaged recreation use in the general forest area. Provide ancillary support facilities, such as parking areas and toilets, as needed, to protect resources and the environment.

Manage for desired ROS settings across the ANF as indicated in each management area's desired condition description.

2320 Wilderness

Manage designated wilderness areas to meet or exceed the minimum level of stewardship described in the 2006 Chief's 10-year Wilderness Stewardship Challenge.

2350 Trails

For all trails, establish trail classes, permitted uses, construction, reconstruction, and maintenance priorities.

Facilitate regular grooming of the designated snowmobile trail system if Commonwealth funding is available.

Evaluate ANF road systems to identify which roads are suitable for snowmobile use utilizing the Travel Management Process.

Utilize partnerships with snowmobile clubs, local communities, state agencies, and private landowners to provide snowmobile trail system connectors across private lands to Tionesta, Ridgway, Sheffield, and Bradford.

Inventory and assess user developed equestrian trail systems within EUAs. Incorporate appropriate trail segments and make connections to create designated trail systems where feasible. Eliminate trail systems or segments where resource standards cannot be met.

2360 Heritage

Reduce the backlog of heritage sites that require formal eligibility evaluation for the National Register of Historic Places.

Develop management plans for the long-term preservation of heritage resources that are either listed on, or eligible for, the National Register of Historic Places.

Work with appropriate representatives of the Seneca Nation of Indians (SNI) to develop a confidential inventory of culturally sensitive sites.

2380 Scenery

Maintain or exceed Scenic Integrity Levels (SILs) as seen from Concern Level 1 and 2 travel routes and use areas.

Maintain existing scenic vistas and construct five additional vistas.

2400 Vegetation

Maintain 70 percent forest cover across the ANF.

Provide a diversity of age and structural classes across the ANF landscape, including early structural, late structural and multi-age forested conditions, to achieve desired future conditions (refer to Table 1).

Table 1. Desired Ranges for Structural Stage Distribution (percentage of ANF)

Forest Plan Implementation Decade	By 2020	By 2060
Early Structural (dominant tree layer <5 inches DBH)	8%	10%
Mid Structural (dominant tree layer 5-20 inches DBH)	72%	48%
Late Structural (dominant tree layer >20 inches DBH)	10%	28%

Maintain or create age class diversity on lands suitable for timber management to provide for sustainable forest ecosystems and high quality hardwood timber products by annually treating an estimated 1,400 to 1,800 acres using even-aged regeneration methods and 300 to 700 acres using uneven-aged methods.

Conduct pre-commercial thinning or release in regenerated stands to maintain species diversity, favor desired species, and improve health, vigor, and growth on 500 to 2,500 acres annually.

Use prescribed fire on 75 to 400 acres annually during the plan period to enhance ecosystem resiliency, conserve fire-adapted plant and animal biodiversity, and maintain and restore mixed oak ecosystems.

In MAs 1.0, 2.1, and 3.0, utilize salvage sales to achieve multiple use objectives and recover timber value within two years of an event that kills or damages trees, such as an insect infestation, disease, ice, wind, fire, or other catastrophic event.

Maintain or enhance the existing aspen component with an emphasis on regenerating decadent clones and/or stands greater than two acres.

Provide an oak component (greater than 15 basal area per acre [BA])) on 15 to 20 percent of the ANF.

Provide a conifer component (greater than 15 BA per acre) on a minimum of 10 percent of the ANF.

Manage permanent grass and shrub openings on a minimum of two percent of the ANF. Favor native shrubs and herbaceous species.

Maintain moderate to well-stocked stands (relative density) on more than 90 percent of the forest lands on the ANF.

2500 Watershed and Air

Complete 10 to 50 acres of soil and water restoration projects annually.

Apply site-specific prescriptions to restore compositional and/or structural diversity of riparian corridors on 50 to 100 acres annually during the plan period.

2600 Wildlife, Fish and Sensitive Plant Habitat

Enhance wildlife habitat on 1,200 to 1,600 acres each year to provide desired cover and forage conditions.

Manage cerulean warbler breeding habitat:

- Provide open canopy conditions necessary to increase the distribution of breeding territories.
- Increase the amount and distribution of white oak.
- Increase the oak component on sites that contain between 10 and 30 BA of oak.

Manage white-tailed deer populations to sustain herbaceous and woody species diversity across the landscape (10 to 20 deer per square mile).

Complete 30 to 40 acres of fish habitat improvement where habitat is lacking in reservoirs/impoundments, annually.

Complete one to two miles of stream restoration or enhancement for native and desired non-native species where suitable aquatic habitat is lacking, annually.

Species with Viability Concerns

Manage the following to ensure a stable or increasing population trend for species with viability concerns:

- Active great blue heron colonies.
- Occupied northern flying squirrel nesting sites.
- Known locations of plant species with viability concerns.
- Suitable nesting habitat for yellow-bellied flycatcher.
- Active northern goshawk hawk territories.
- Active red-shouldered hawk territories.
- Known and historic den locations for the timber rattlesnake.
- Occupied osprey nesting sites.

Contribute to the recovery objectives for federally threatened, endangered and candidate species by:

- Preventing the introduction of zebra mussels into the Allegheny Reservoir and Allegheny River from Forest Service boat launch sites. Assist other agencies in developing and implementing contingency plans and protocols for zebra mussel control and/or native mussel species protection in the event of zebra mussel incursion.
- Providing optimum and suitable vegetative habitat for Indiana bats on a minimum of 30 percent of the ANF.
- Maintaining or increasing productivity of bald eagles on the ANF (measured by the number of chicks that successfully fledge).

2800 Minerals and Geology

Establish a formal, multi-agency working group, including representatives from the ANF, Pennsylvania Department of Environmental Protection (PA-DEP), and other state and Federal agencies, to coordinate policies and processes regarding the management of oil and gas resources and infrastructure on the ANF.

Establish and maintain an inventory of all oil and gas development on the ANF.

Identify areas of resource concern associated with oil and gas development. Collaborate with OGM operators to resolve concerns with long term mitigations and/or site restoration.

3400 Forest Pest Management

Improve the overall health and sustainability of ANF forest ecosystems by reducing understory dominance of native invasive species, such as beech brush, ferns, grass, and striped maple, and non-native invasive species (NNIS) on 3,000 to 6,200 acres annually. Do this through direct treatments: site preparation, herbicide application, scarification, mechanical treatment, or fencing to encourage greater species diversity with a wider variety of herbaceous and woody plants or tree seedlings. (Accomplishment of this objective is evaluated based on the sum of these different treatments.)

5100 Fire

A wildland fire use plan for managing naturally ignited fires within specific management areas will be developed, implemented, and incorporated into the ANF *Fire Management Plan*.

The ANF will apply prescribed fire and mechanical treatments for hazardous fuel reduction on 100 to 600 acres annually.

5400 Land Ownership

Work with partners to acquire subsurface ownership of lands in MAs 5.1, 5.2, 7.1, 7.2, 8.1, 8.2, 8.3, 8.4, 8.5, and 8.6.

7300 Administrative Facilities

Complete an average of 10 percent of the deferred maintenance items annually as identified in the Facility Master Plan.

Eliminate unnecessary facilities identified in the Facilities Master Plan.

7700 Transportation System

On an annual basis, maintenance activities will occur on a minimum of 150 miles of passenger car roads, operational maintenance level (OML) 3 to 5, and a minimum of 100 miles of high clearance vehicle roads, OML 2.

Evaluate road benefits and risks and decommission 2 miles of roads that are no longer needed, annually.

Surface an additional 5 miles of roads with limestone to minimize sediment delivery to streams, annually.

Estimated Forest Activities

Table 2 displays estimates of annual activities anticipated under full implementation during the first and second decades of plan implementation. These tables include estimates only. The activities shown in Table 2 and Table 3 are not plan decisions and should not be confused with plan objectives. These estimates are neither minimums nor limitations.

Table 2. Projected Management Activity Levels in the Selected Alternative (Average Annual Amount, First and Second Decades)

Management Activity	Projected Level	
	First Decade	Second Decade
Recreation Activities		
Motorized Trail Construction (Mi)	4	4
Non-motorized Trail Construction (Mi)	5	5
Dispersed Site Enhancement in CUAs (each)	1	1
Construction/Reconstruction of Developed Facilities (each)	2	1

Management Activity	Projected Level	
	First Decade	Second Decade
Wilderness Areas Managed to Standard (each)	4	4
Prescribed Burning by Resource Objective (Ac)		
Silviculture/Reforestation	104	99
Wildlife	300	300
Hazardous Fuels Reduction	250	250
Reforestation Activities (Ac)		
Scarification for Oak	104	99
Release for Species Diversity	1,727	2,271
Site Preparation	1,992	1,658
Pre-commercial Thinning	80	297
Full Planting Tree Seedlings	0	43
Fencing	1,701	1,429
Fertilization	215	228
Herbicide Treatments by Resource Objective (Ac)		
Reforestation	2,368	1,631
Wildlife	105	105
Non-native Invasive Species	110	110
Fuels, NNIS, Wildlife, Fish and Stream Activities		
Mechanical Hazard Fuel Treatments (Ac)	350	350
NNIS Manual/Mechanical Treatment (Ac)	500	500
WL Opening Creation (Ac)	15	15
Wildlife Enhancements (Ac)	1,600	1,600
Stream Restoration (Mi)	2	2
Fish Habitat Structures (Ac)	32	32
Transportation Activities		
Road Construction Existing Corridor (Mi)	13	13
Road Construction New Corridor (Mi)	5	5
Road Reconstruction (Mi)	100	100
Road Decommissioning (System) (Mi)	2	2
Area Cleared for Gravel Pits (Ac)	5	5

Table 3 displays estimates of timber harvest activities by management area during the first and second decades of plan implementation. This table displays the acreage of projected timber harvest treatments that could occur under full implementation of the plan. In this table, the amounts shown are projected total levels of treatment activity for the first and second decade of the plan (not annual).

The sum of treatment activity does not equate into the total acreage of projected timber harvest. It should be understood that the ANF predominantly uses the shelterwood system of harvest that requires two harvest entries (a shelterwood seed cut and a shelterwood removal cut) on the same area to complete the regeneration sequence. As a result, in this table an acre with a shelterwood seed cut in the first decade will usually have an overstory removal projected for the second decade (i.e., the acre is counted twice). Acres thinned in the first decade may also be followed by a shelterwood seed cut in the second decade. An uneven-aged regeneration harvest in the first decade will also often be followed by another uneven-aged harvest in the second decade.

Table 3. Probable Timber Harvest Management Practices by Management Area (rounded to nearest 100 acres) – first and second Decades

Management Area	Acres First Decade	Acres Second Decade
Intermediate Thinning		
MA 2.2	200	200
MA 3.0	9,400	8,000
MA 6.1	400	1,800
Total Intermediate Thinning	10,000	10,000
Shelterwood Seed Cut		
MA 1.0	300	600
MA 2.2	400	400
MA 3.0	17,400	15,800
MA 6.1	300	300
Total Shelterwood Seed Cut	18,400	17,100
Acres of Even-aged Regeneration Harvest (Shelterwood Removal Cut and/or Clearcut)		
MA 1.0	300	700
MA 2.2	200	600
MA 3.0	16,900	15,100
MA 6.1	100	300
Total Even-aged Regeneration Harvest	17,500	16,700
Acres of Uneven-aged Regeneration Harvest		
MA 2.1	500	500
MA 2.2	6,200	2,700
Total Uneven-aged Regeneration Harvest	6,700	3,200

Allowable Sale Quantity

One key decision of the Forest Plan is the identification of the allowable sale quantity of timber. The allowable sale quantity of timber (ASQ) is the maximum amount of timber that can be harvested from the ANF from lands that are suitable for timber production. This volume is scheduled for harvest and considered sustainable on a long term basis. Although the ASQ is identified as an annual average quantity for each decade of the plan, the amount produced in any one year may be either below or above the identified ASQ as long as the totals for the decade are not exceeded.

The ASQ is measured in cubic feet, although conversions are produced for board feet. Table 4 identifies the ASQ in the cubic volume measure and the board foot equivalent. Only the cubic volume is the controlling measure for evaluating compliance with the requirement not to exceed the ASQ in the plan period.

Table 4. Measures of Allowable Sale Quantity (Annual Average Quantity)

Allowable Sale Quantity (ASQ)	Decade 1	Decade 2
Million Cubic Feet (MMCF)	8.9	8.9
Million Board Feet Equivalent (MMBF)	54.1	54.1

Special Designations and Management Areas

Management areas are identified areas of the forest with sets of management direction specific to each area. There are two types, management areas and management areas with special designations. Special designations are areas that have a national designation or are recommended by the Forest Plan. These special designations are established through another specific process. Once established, these areas cannot be changed in future forest plans without repeating that process.

Special Designations

There are two types of special designations: legislatively or congressionally designated areas and administratively designated areas.

Congressionally designated areas are areas of the forest established by an Act of Congress that created the areas and provided direction for their management. Typical congressionally designated areas in the National Forest System include wilderness areas, national recreation areas, and wild and scenic rivers. Prior to this plan revision, the ANF has the following congressionally designated areas:

- Two wilderness areas: Hickory Creek Wilderness, 9,337 acres, and the Allegheny Islands Wilderness, 368 acres (MA 5.1).
- Two Wild and Scenic Rivers: the Allegheny River and the Clarion River (MA 8.1).
- The Allegheny National Recreation Area, 20,502 acres (MA 8.2).

In addition, the ANF has a congressionally designated National Scenic Trail, the North Country National Scenic Trail (NCNST). A congressionally designated authorized study river in Jefferson County is just outside the ANF boundary. This river is not addressed in this Forest Plan.

In the Forest Plan for the ANF, 2 additional areas (Chestnut Ridge and Minister Valley) comprising 12,379 acres are recommended for wilderness study. These areas will be managed according to direction in MA 5.2 until a more detailed wilderness study is completed. Upon the completion of that study, if the decision is made to recommend these areas for wilderness designation, they will remain in MA 5.2. If the decision is made not to proceed with recommendation for wilderness designation, these areas will remain in MA 5.2, until a plan amendment allocates them to other management areas.

The Forest Plan for the ANF does not recommend any changes to its Wild and Scenic River designations nor to its National Recreation Area.

Administratively Designated Areas within the National Forest System include Research Natural Areas, Special Interest Areas, National Landmarks, and Experimental Forests. The ANF presently has the following administratively established areas:

- A Research Natural Area at Tionesta, 2,111 acres (MA 8.5).
- Two Scenic Areas (components of the Special Interest Areas) at Hearts Content and Tionesta, 2,115 acres (MA 8.3).
- Two National Landmarks at Tionesta and Hearts Content. (Note: these overlap with the existing Scenic Area designations.)
- The Kane Experimental Forest, 1,737 acres (MA 8.6).

In the Forest Plan for the ANF, the following recommendations are being made to this set of administratively designated areas:

- Add Buckaloons Historic Area (306 acres in MA 8.4) to the set of nationally designated historic areas.
- Expand the Kane Experimental Forest by 1,726 acres (MA 8.6)

Management Area Descriptions

Table 5 displays the management areas and associated acreages of the Forest Plan. The table has the reference number for the management area, a short, descriptive title for the area, and a listing of the acres of the area.

Table 5. Management Areas Designations and Acreage

Management Area Designations	Acres
MA 1.0 – Early Structural Habitat	7,937
MA 2.1 – Uneven-aged Management	2,837
MA 2.2 – Late Structural Linkages	121,176
MA 3.0 – Even-aged Management	287,380
MA 5.1 – Designated Wilderness Areas	8,979
MA 5.2 – Wilderness Study Areas	12,379
MA 6.1 – Late Structural Habitat	16,421
MA 6.3 – Buzzard Swamp Wildlife Management Area	1,122
MA 7.1 – Developed Recreation Areas	1,772
MA 7.2 – Remote Recreation Areas	9,074
MA 8.1 – Wild and Scenic River Corridor	9,250
MA 8.2 – National Recreation Area*	20,152
MA 8.3 – Scenic Area	2,115
MA 8.4 – Historic Area	306
MA 8.5 – Research Natural Area	2,111
MA 8.6 – Kane Experimental Forest	3,463

The location of these management areas is identified in the management area map for the Forest Plan.

The following is a brief description that highlights the primary purposes of each management area and the management activities that are expected to occur in the area. These descriptions should not be regarded as a plan decision. Part of this document contains plan decisions specific to each management area.

MA 1.0 – Early Structural Habitat

This management area provides early structural habitat for a variety of game and non-game wildlife species, especially ruffed grouse. Vegetation management emphasizes a young forest of hardwood stands with interspersed conifers and openings suitable for a variety of wildlife species. Timber harvesting, reforestation activities, and wildlife habitat improvement is intensive. Trails and facilities support a Roaded Natural Recreational Opportunity Spectrum (ROS) setting. Road construction and maintenance occur in this management area.

MA 2.1 – Uneven-aged Management

This management area emphasizes a continuous high crown canopy consisting of primarily shade tolerant and intermediate vegetation with interspersed small temporary openings and associated plant and animal species. Uneven-aged vegetation management provides a continuous forested scene that promotes shade and mid-tolerant species and produces quality sawtimber. Harvesting includes frequent and repeated treatments to achieve management objectives. Wildlife management emphasizes species associated with shade tolerant vegetation, primarily songbirds and cavity-nesting birds and mammals. This management area provides limited opportunities for dispersed recreation, motorized recreation, hunting, and fishing in a Roaded Natural ROS setting. Forest Service roads are generally closed or restricted to public traffic, except for certain seasonal openings.

MA 2.2 – Late Structural Linkages

This management area emphasizes older, late structural forests that link relatively large areas of older forests (core areas) across the landscape. Vegetation management is directed to restoring late structural forest conditions with an emphasis on sustaining forest structure and forest continuity. Management emphasizes species with viability concerns, remote and interior species with high sensitivity to disturbance, and protection of unique micro and macro habitats (e.g. rock/boulder outcroppings and seasonal nesting and cover habitat). This management area provides a variety of opportunities for recreation in a Roaded Natural setting. Most existing roads are closed or restricted in this management area, and new Forest Service road construction will be limited to existing road corridors. Trails and facilities support a Roaded Natural ROS setting, and new motorized trails will be minimized. Facilities such as trailheads and parking areas will be located on the periphery of the management area.

MA 3.0 – Even-aged Management

This management area emphasizes even-aged management to provide a forest that is a mix of predominantly shade intolerant and mid-tolerant hardwood stands of various ages and associated understories, and habitat for a diversity of plant and animal species. It provides for a sustained yield of high-value species and high-quality timber products that contribute to the local and regional economy. Vegetative treatments are directed to balancing age class distribution in MA 3.0. Wildlife management emphasizes early structural species, including white-tailed deer in all forest types, and squirrel in oak forest types. Specialized habitats and inclusions within the management area receive treatments to benefit game and non-game species, and certain species with viability concerns. Trails and facilities support a Roaded Natural ROS setting. Road construction and maintenance occur in this management area.

MA 5.1 – Designated Wilderness Areas

This management area is managed for protection of congressionally designated wilderness areas. Management emphasizes the maintenance of wilderness values consistent with the Wilderness Act of 1964 and subsequent legislation. This management area provides outstanding opportunities for unconfined recreation, including exploration, solitude, risk, and challenge in a Semi-primitive Non-roaded ROS setting. Vegetation changes are

left primarily to forces of nature. The area exists without roads or facilities, but trails are present in the management area. No new Forest Service roads will be built in this management area.

MA 5.2 – Wilderness Study areas

This management area is managed for the protection of wilderness study areas (WSAs). Management emphasizes the maintenance of wilderness values consistent potential future designation as wilderness. This management area provides outstanding opportunities for unconfined recreation, including exploration, solitude, risk, and challenge in a Semi-primitive Non-roaded ROS setting. Vegetation changes are left primarily to forces of nature. The ANF will not construct new roads or facilities in these areas. The area may continue to maintain any existing roads or facilities, as long as there are no further development that would compromise possible wilderness designation.

MA 6.1 – Late Structural Habitat

This management area is managed for conserving wildlife habitat, especially mature hardwood forests (e.g. for turkey, bear, and cavity-nesting birds and mammals). Vegetation treatments, primarily even-aged, are directed to meeting the primary purpose with an emphasis on sustaining forest structure and continuity to benefit small and non-game species, and species with viability concerns. This management area provides a variety of dispersed recreation activities in a Roaded Natural ROS setting. Most existing ANF roads are closed or restricted. New road construction is limited. Facilities to support recreation will be placed on the periphery of the management area.

MA 6.3 – Buzzard Swamp Wildlife Management Area

This management area, the Buzzard Swamp Wildlife Management Area, is managed for wildlife habitat improvement and maintenance through a cooperative agreement with the Pennsylvania Game Commission. It is intensively managed for high populations of wildlife species, especially waterfowl, furbearers, and warm water fish. Vegetation management emphasizes habitat improvement and includes treatments such as planting, fertilizing and mowing of food plots, shrub planting, and tree pruning. This management area provides a variety of dispersed recreation activities, including hunting, fishing, and wildlife observation, in a Roaded Natural ROS setting. Trail and roads occur within this management area.

MA 7.1 – Developed Recreation Areas

This management area is managed for large-scale developed recreation areas in a rural setting. This management area is primarily used in the summer months and often provides a destination for visitors to use as a staging area for participating in other day use activities on the ANF (e.g. ATV riding, boating, fishing, hunting, sight seeing, driving for pleasure, horseback riding, biking, and hiking). Vegetation management is limited and is used primarily to support recreational and scenic objectives. Road and facilities development for recreation are featured here, including road and trail construction and maintenance, campgrounds, sanitation facilities, water systems, utility hookups, picnic areas, boat launches, and covered group sites and shelters.

MA 7.2 – Remote Recreation Areas

This management area is managed for recreation and wildlife habitat in relatively large, undeveloped areas that are primarily unroaded. Recreational activities in both summer and winter are non-motorized. Vegetation management is primarily limited to supporting recreational and wildlife management objectives. Unless needed for recreational use or to meet existing private rights, existing roads will be decommissioned or converted to trails. There will be no additional Forest Service roads. Small-scale facility construction to support non-motorized recreation may occur. Management of these areas provides a Semi-primitive Non-motorized ROS class.

MA 8.1 – Wild and Scenic River Corridor

This management area is managed to protect Congressionally designated Wild and Scenic River (WSR) corridors. Vegetation management focuses on protecting and enhancing the outstandingly remarkable values that led to WSR designation. Wildlife management in this management area emphasizes habitat enhancement for threatened

and endangered species such as the bald eagle and freshwater mussels. Roads will be limited to those needed for public access, service, or maintenance.

Both recreational and scenic river segments with some differences in management emphasis are in this management area. Scenic segments maintain very high scenic integrity. Recreational opportunities are provided in a Roaded Natural ROS setting (along scenic river segments) and a Rural ROS setting (along recreational river segments) settings. Along the recreational river segments, recreational facilities including Level 4 facilities may be present.

These classifications as defined by the Wild and Scenic Rivers Act are:

Scenic River – Rivers, or sections of rivers, free of impoundments with shorelines or watersheds and still largely primitive and shorelines largely undeveloped but accessible in places by roads.

Recreational River – Rivers or sections of rivers that are readily accessible by road or railroad that may have some development along their shorelines and that may have undergone some impoundments or diversions in the past.

Table 6. Classification, river mileage and outstandingly remarkable values for the designated Scenic and Recreational River segments

Classification	Segment Miles	Segment Description	Outstandingly Remarkable Values
Allegheny River			
Recreational	7.1	Kinzua Dam to Route 6 Bridge at Warren	Scenic, ecological, recreational, cultural
Recreational	47.8	Buckaloons Campground to Alcorn Island (by Oil City)	Scenic, ecological, recreational, cultural
Recreational	31.7	Franklin (south end) to Emlenton (at refinery)	Scenic, ecological, recreational, cultural
Total	**86.6**		
Clarion River			
Scenic	8.0	Portland Mills to Irwin Run	Scenic
Scenic	9.1	Cooksburg to the Piney Dam Backwater	Scenic
Recreational	34.7	Remaining Segments from Ridgway to Allegheny River Confluence	Recreational
Total	**51.8**		

MA 8.2 – National Recreation Area

This management area is managed for protection of the Allegheny National Recreation Area (NRA), established by the Pennsylvania Wilderness Act of 1984 (Public Law 98-585). The primary emphasis is to provide outdoor recreation opportunities in a relatively large expanse of predominantly natural landscapes. Vegetation management is limited and emphasizes maintenance of the natural, undeveloped character of these areas while providing high quality scenic and recreational opportunities for the public. Recreation trails and facilities are

constructed and maintained to the appropriate development level associated with a Semi-primitive Non-motorized ROS setting. No new Forest Service roads will be built in this management area.

MA 8.3 – Scenic Area

This management area is managed for protection and maintenance of two administratively designated scenic areas on the ANF: Tionesta and Hearts Content. Both areas are on the National Registry of Natural Landmarks in recognition of their significant ecological and historical values, and specifically because they each contain some of the last "old growth" remnant forests in Pennsylvania. Vegetation management activities are limited and focus on maintaining the natural, undeveloped character of these areas while providing high quality scenic and recreational opportunities for the public. Trails systems are designed and maintained to be in harmony with the environment. Recreation opportunities are provided in a Roaded Natural ROS setting. No new Forest Service roads will be constructed, but existing roads may remain.

MA 8.4 – Historic Area

This management area is managed for protection, maintenance, and interpretation of the Buckaloons Heritage Area as an administratively designated special interest area. Buckaloons contains a significant concentration of historic and prehistoric sites, which hold heritage, research, education, interpretation, and tourism values. Vegetation management is limited to activities consistent with this emphasis. Recreational opportunities are provided in a Roaded Natural ROS setting. Facilities may be provided or enhanced for public use or resource protection. Construction of new roads and facilities may occur for recreation and interpretation purposes.

MA 8.5 – Research Natural Area

This management area is managed for preservation and protection of ecologically significant natural features, high quality representative ecosystems, and unique areas of the administratively designated Tionesta Research Natural Area (RNA).The Tionesta RNA is on the National Registry of Natural Landmarks in recognition of its significant ecological and historical values. In particular, it has been characterized as the "largest virgin forest in the hemlock-white pine/northern hardwoods region of North America." Having never been logged, this area represents one of the only remaining patches of the original six million acre forest that once covered the Allegheny Plateau.

The emphasis in this management area is to maintain unmodified conditions for research, study, observation, monitoring, and educational activities. Vegetation management will be limited but may occur to protect against defoliation and disease. Wildlife activities are primarily non-manipulative research activities. Construction of new roads, trails, and facilities will be prohibited, and recreational use will be limited.

MA 8.6 – Kane Experimental Forest

This management area is managed for research on the administratively designated Kane Experimental Forest (KEF). Most management activities are appropriate for this area as long as they are developed as part of research projects. This management area may also provide some production of wood products and wildlife habitat conservation. Dispersed recreation opportunities will be available in a Roaded Natural ROS setting. Trails and facilities may be constructed, but new Forest Service road construction will be limited. Leadership for the selection and evaluation of projects in the KEF is provided by the Northern Research Station in cooperation with the ANF.

Suitable Uses and Activities

One of the key decisions of forest plans is to determine what uses and management activities are appropriate in what parts of the forest. This section describes these uses and activities and provides general information as to where they are suitable on the forest. Many of the uses and activities are organized by management area to indicate this suitability. Others may be organized around another identified spatial area. Not all uses and activities

are identified in this section. The fact that a use or activity is not specifically mentioned should not be interpreted to mean that it is unsuitable. The ANF is available for any of the multiple uses and activities appropriate on national forests unless indicated otherwise.

The general distinction between a use and a management activity is as follows:

- A use is generally either a recreational activity or a commercial activity conducted by other private businesses or individuals using ANF land or resources.
- A management activity is an activity conducted by the ANF or its contractors for purposes of resource or infrastructure improvement.

A specific use or activity that is designated as unsuitable within an area of the ANF may not occur without a Forest Plan amendment. An exception to this is an activity occurring along an area boundary. In this situation, a correction may be used to adjust the boundary as described in the Introduction to the Forest Plan section, "Changes to the Forest Plan."

A use or activity identified as suitable for a particular area does not permit the unlimited or unrestricted occurrence of the use or activity. In many cases, the use or activity is limited or restricted by either forestwide or management area standards and guidelines that appear in the Forest-wide Design Criteria or Management Area Direction sections. The use or activity may also be limited by direction in the Forest Service directive system or through standard operating procedures. Further consultation is needed beyond this section to determine applicable direction that may limit or restrict the use or activity.

The identification of an area as suitable for a use or activity does not mean that the use or activity may occur unconditionally. The use or activity must be designed to comply with standards and guidelines and other applicable management direction. A site-specific analysis is often required before the use or activity may occur.

Recreation

Lands suitable for different recreation activities are expected to provide a broad array of recreation opportunities across the ANF. The suitability statements describe common recreation and trail activities as suitable (allowed) or unsuitable (prohibited). The activities and uses are only allowed in areas identified as suitable for that use or activity.

Individual trails within management areas may be suitable for a single use or multiple uses that may include "shared-use" or "limited-use." The suitability of existing trails or trail segments for multiple uses will be determined on a case-by-case basis dependent on site-specific conditions (usually tread and surface conditions). Existing and new trails may need to be reconstructed or constructed to accommodate single- and/or multi-uses dependent on project level planning and design. The suitability statements below describe suitability for common trail activities.

Snowmobile and ATV/OHM trail development is:

- Suitable in management areas identified in Table 7 for snowmobiling or ATV/OHM use.
- ATV/OHM trails are suitable only within intensive use areas (IUAs).

Snowmobile and ATV/OHM use is:

- Unsuitable cross-country or off trail.
- Unsuitable on North Country National Scenic Trail.
- Unsuitable on Black Cherry and Tracy Ridge National Recreation Trails.
- Unsuitable in management areas identified in Table 7.
- Unsuitable outside Intensive Use Areas (ATV/OHM only).

- Suitable only on designated routes (trails/roads) to be depicted on Motorized Vehicle Use Map (expected July 2008) consistent with Table 7.

Bicycle trail development is:

- Suitable in management areas identified in Table 7 for bicycling.

Bicycle use is:

- Unsuitable cross-country or off trail.
- Unsuitable on North Country National Scenic Trail.
- Unsuitable in management areas identified in Table 7.
- Unsuitable on Black Cherry and Tracy Ridge National Recreation Trails.
- Suitable on designated routes (trails/roads) not signed closed to this use, dependant upon management area direction in Table 7.

Equestrian trail development is:

- Suitable in management areas identified in Table 7 for Equestrian Trail/Routes.
- Suitable within Equestrian Use Areas (EUAs).

Equestrian use is:

- Unsuitable cross-country within EUAs.
- Unsuitable on North Country National Scenic Trail.
- Unsuitable in management areas identified in Table 7.
- Unsuitable on Black Cherry and Tracy Ridge National Recreation Trails.
- Unsuitable on Morrison and Minister areas hiking trails.
- Suitable in management areas (outside of EUAs) identified in Table 7 for cross-country riding, dependant upon management area direction.
- Suitable on routes (trails/roads) not signed closed to this use, consistent with Table 7 and management area direction.

Hiking/Cross-country Skiing/Backpacking trail development and use is suitable on all areas of the forest except that new trails are not suitable in MA 8.5 Research Natural Area.

Interpretive trail development (installation of outdoor panels and other displays) is:

- Suitable in management areas identified in Table 7 for interpretive trails.
- Suitable on the North Country National Scenic Trail.
- Suitable on Black Cherry and Tracy Ridge National Recreation Trails.

Table 7. Suitable Uses and Activities for Trails

Suitable = S and Unsuitable = U

Use or Activity	Management Area															
	1.0	2.1	2.2	3.0	5.1	5.2	6.1	6.3	7.1	7.2	8.1	8.2	8.3	8.4	8.5	8.6
Interpretive Trails	S	S	S	S	U	U	S	S	S	S	S	S	S	S	U	S
Snowmobiling, ATV/OHM, and Bicycling (unsuitable cross-country)																
Snowmobiling	S	S	S	S	U	U	S	U	S	U	S	U	U	U	U	U
ATV/OHM (in IUAs only)	S	S	S	S	U	U	S	U	U	U	U	U	U	U	U	U
Bicycling	S	S	S	S	U	U	S	S	S	S	S	S	U	S	U	U
Equestrian Use																
On Trails/Routes	S	S	S	S	S	S	S	S	S	S	S	S	U	S	U	U
Cross-country	S	S	S	S	U	U	S	U	S	U	S	S	U	S	U	U

The following management activities and uses are generally allowed in all management areas:

- hunting
- fishing
- conservation education
- wheelchair use

Driving for pleasure is also suitable across all management areas for passenger cars on Maintenance Level 3, 4 or 5 National Forest System roads and for high clearance vehicles on Maintenance Level 2 NFS Roads that are identified for motorized use on a Motorized Vehicle Use Map. Table 8 displays suitability by management area for other common recreational uses and activities.

Table 8. Other Recreation Uses and Activities

Suitable = S and Unsuitable = U

Use or Activity	Management Area															
	1.0	2.1	2.2	3.0	5.1	5.2	6.1	6.3	7.1	7.2	8.1	8.2	8.3	8.4	8.5	8.6
Dispersed Camping	S	S	S	S	S	S	S	S	U	S	S	S	U*	U	U	U*
Developed Camping	S	S	S	S	U	S	S	S	S	S	S	S	S	S	U	U
Vista Management	S	S	S	S	U	U	S	S	S	S	S	S	S	S	U	U

* Indicates situations where the use or activity is suitable only in very narrowly defined situations.

Vegetation

Suitability for Timber Production

One of the key decisions to be made during a plan revision is an identification of lands considered suitable or unsuitable for timber production. The first step in identifying land suitable for timber production is to identify the forest and non-forest lands. The following categories of lands are then subtracted from the forest lands to determine those lands considered tentatively suitable for timber production:

1. Forest lands withdrawn from timber production by Congress, the Secretary of Agriculture, or the Chief of the Forest Service;
2. Forest lands not capable of producing industrial wood;
3. Forest lands that cannot be regenerated with new trees within five years of a regeneration harvest;
4. Forest lands where technology is not available to ensure timber production without irreversible resource damage to soil productivity or watershed conditions; and
5. Forest lands for which there is insufficient information to make a determination.

These categories are summarized in Table 9. There are 443,117 acres of forest lands on the ANF. A total of 34,558 acres have been withdrawn, with 408,559 remaining available for timber production. Of the land available for timber production, 19,962 acres are not suitable based on categories 2 through 5 listed above, resulting in a total of 388,597 acres tentatively suitable for timber production.

The second part of this process is to determine which lands are suitable for scheduled timber production, based on management area designations and land use allocations that further define appropriateness for scheduled timber production. Of the forest lands tentatively suitable for timber production, a total of 32,469 acres were classified as forest land not appropriate for timber production. A net 355,818 acres of forest lands on the ANF is considered suitable for timber production, consisting of tentatively suitable forested lands in MAs 1.0, 2.1, 2.2, 3.0 and 6.1. Lands suitable for timber production are expected to provide for scheduled timber harvest and contribute to the allowable sale quantity (ASQ). Lands considered unsuitable in Table 9 may still have unscheduled timber harvest that does not contribute to the ASQ, subject to management area design criteria.

Table 9. Lands Tentatively Suitable for Timber Production

Category	Sub-category	Acres
Total ANF Land		516,843
Water	N/A	11,169
Non-forested Land	Shrub or Grass Openings	16,056
	Developed for Other Uses[1]	26,135
Total Non-forested Land		53,360
Total Forest Land		463,483
Forest Land Withdrawn from Timber Production	Hickory Creek and Allegheny Island Wilderness (MA 5.1)	8,641
	Allegheny National Recreation Area (MA 8.2)	20,009
	Allegheny National Recreation Area (MA 7.1)	183
	Tionesta Scenic Area (MA 8.3)	1,894
	Tionesta Research Natural Area (MA 8.5)	2,080
	Hearts Content Scenic Area (MA 8.3)	107
	Kane Experimental Forest (MA 8.6)	1,622
Total Forest Land Withdrawn from Timber Production		34,536
Forest Land Available		428,947
Forest Land Not Capable of Producing Crops of Industrial Wood	N/A	0
Forest Land Physically Not Suitable	Irreversible damage likely to occur	0
	Not restockable within 5 years	20,520
Forest Land Inadequate Information	N/A	0
Forest Land Physically Not Suitable		20,520
Tentatively Suitable Forest Land		408,427
Forest Land Not Appropriate for Timber Production	MA 5.2 Wilderness Study Areas	11,577
	MA 6.3 Buzzard Swamp	479
	MA 7.1 Developed Recreation Areas	280
	MA 7.2 Remote Recreation Areas	8,417
	MA 8.1 Wild and Scenic River Corridor	5,662
	MA 8.4 Historic Area	172
	MA 8.6 Experimental Forest Expansion	1,530
	Corridor Along Wilderness, Remote, and Class A Wild Trout Streams[2]	1,255
Total Forest Land Not Appropriate for Timber Production		**29,372**
Land Unsuitable For Timber Production		**137,788**
Total Suitable Forest Land (MA 1.0, 2.1, 2.2, 3.0, and 6.1)[3]		379,055

[1] Includes rights-of-way, Forest Service roads and roads under other ownership, oil and gas clearings, stone pits, and administrative sites.

[2] Includes the area within 200 feet of Wilderness, Remote, and Class A Wild Trout Streams as defined in the forestwide standards for 2500 Watershed and Air.

[3] These suitable lands are both tentatively suitable and appropriate for timber production.

Suitability for Timber Harvest Activity

Table 10 describes the general suitability of management areas for different timber harvest activities. It identifies whether or not the management area is suitable for each type of harvest purpose and method defined below.

Timber Production: The management area is expected to provide for scheduled timber harvest and contribute to the ASQ. Note that the lands suitable for timber production are limited to those that are tentatively suitable for timber production as described in Table 10.

Harvest for Other Resources: The management area is suitable for timber harvest for other resource purposes to address recreation and scenery management activities, user safety, plant and animal habitat enhancements, forest health, or catastrophic events such as wind or ice storms. Vegetation management is generally infrequent and appropriate as described in management area direction. If the lands are classified unsuitable for timber production, this volume does not contribute to the ASQ and is unscheduled.

Salvage and Sanitation Harvest: The management area is suitable for salvage harvest of salvageable trees killed or likely to die as a result of wind, ice, fire, insect, disease or other mortality events. Salvage harvests can have intermediate or regeneration objectives, and be single-, two-, or multi-aged depending on stand characteristics and management area direction. Sanitation harvest is an intermediate harvest that is an early response to pending fuel, pest, disease or other forest health problems. If the management area is unsuitable for timber production, this volume does not contribute to ASQ and is unscheduled.

Table 10. Suitability of Management Areas for Timber Harvest Activities

S = The harvest activity, along with associated reforestation treatments, is suitable and subject to forestwide and management area objectives and design criteria.

U = The harvest activity is not suitable for this management area.

Timber Harvest Activity	Management Area															
	1.0	2.1	2.2	3.0	5.1	5.2	6.1	6.3	7.1	7.2	8.1	8.2	8.3	8.4	8.5	8.6
Timber Production	S	S	S	S	U	U	S	U	U	U	U	U	U	U	U	U
Harvest for Other Resource Purposes	S	S	S	S	U	U	S	S	S	S	S	S	U	S	U	S
Salvage/Sanitation Harvest	S	S	S	S	U	U	S	S	S	S	S	U	U	S	U	S

Suitability for Pesticide or Herbicide Use

Herbicide for Reforestation: Herbicide use for reforestation or restoration purposes is permitted in all management areas that are suitable for timber production.

Herbicide for Restoration: Herbicide use is permitted in all management areas that are suitable for other harvest or salvage harvest, as necessary for restoration purposes.

Herbicides to treat NNIS: Herbicide use is permitted in all management areas to treat native and non-native invasive species.

Pesticide Use: Pesticides, including chemical and biological controls, are permitted in all management areas when needed as part of an Integrated Pest Management strategy to reduce defoliation, control NNIS, or address other forest health threats.

For more information see: Appendix C - Roadless Area Inventory/Wilderness Evaluation.

ANF Road System

This section describes what portions of the forest are suitable for different Forest Service road management activities. The primary activities associated with Forest Service road management are:

- Reconstruction and maintenance of existing roads.
- Construction, reconstruction, and maintenance of new roads.
- Development or expansion of rock or borrow pits for construction materials.

Table 11. Suitability of Forest Service Road Management Activity

S = Suitable and U = Unsuitable

Road Management Activity	Management Area															
	1.0	2.1	2.2	3.0	5.1	5.2	6.1	6.3	7.1	7.2	8.1	8.2	8.3	8.4	8.5	8.6
Existing Forest Service Road Reconstruction/ Maintenance	S	S	S	S	U	S*	S	S	S	S*	S	S*	S	S	U	S
New Road Construction	S	S	S*	S	U	U	S	S	S	U	S	U	U	S	U	S
Pit Development or Expansion	S	S	S*	S	U	U	S	S	U	U	U	U	U	U	U	U

* Indicates situations where the use or activity is generally unsuitable except in very narrowly defined situations.

Where road activities or uses are suitable, they are often subject to specific design criteria contained in Part 3 – Forest-wide Design Criteria or Part 4 – Management Area Direction. This should be consulted before concluding that these road activities are a suitable use.

Note that road construction, reconstruction and maintenance may occur on any part of the forest if needed for access to private subsurface mineral rights.

Road decommissioning is a suitable activity throughout the ANF.

Roads or designated trails may be temporarily, seasonally, or permanently closed to motorized public use if there is a need to:

- Prevent unacceptable resource damage.
- Meet wildlife objectives such as protecting species with viability concerns or wildlife during critical periods of the year.
- Prevent conflicts with the recreational opportunities established for the area.
- Protect property or public safety during resource management activities.
- Reduce the need for additional maintenance associated with damage to the roadbed and/or surface that might occur during adverse weather or seasonal conditions.

Other Management Activity

Generally, other uses and activities appropriate to national forests are allowed throughout the ANF but subject to the limitations identified in the introduction to this suitability section. Table 12 indicates activities where suitability varies by management area. The table identifies the use or activity and indicates whether it is considered suitable or unsuitable in the management area. A brief description of each follows.

Table 12. Suitability of Other Activities

Suitable = S and Unsuitable = U

Activity	Management Area														
	1.0	2.1	2.2	3.0	5.1	5.2	6.1	6.3	7.1	7.2	8.1	8.2	8.3	8.4	8.5
Gathering of Special Forest Products															
Commercial	S	S	S	S	U	U	S	S	U	U	S	U	U	U	U
Personal	S	S	S	S	U	U	S	S	S	S	S	S	U	U	U
Firewood Collection	S	S	S	S	U	U	S	U	U	U	S	U	U	U	U
Special Use Permits															
New Communication Towers	S	S	U	S	U	U	U	U	S	U	U	U	U	U	U
New Road Rights of Way, Pipelines and Utility Lines	S	S	S	S	U	U	S	U	U	U	S	U	U	U	U
Fire Activities															
Wildland Fire Use	S	S	S	S	S	S	S	S	U	S	S	S	U	U	S
Prescribed Fire	S	S	S	S	U	U	S	S	S	S	S	S	S	S	U

Gathering of special forest products (personal or commercial collection) includes the taking or permitting the taking of special forest products such as plants or plant material. Experimental propagation areas are suitable only in areas suitable for commercial collection of special forest products. Firewood collection includes both personal collection and commercial collection of firewood.

Special use permits may be issued by the ANF for communication towers, including cell towers, road rights-of-way, pipelines and utility lines. All existing and established permitted uses of this type will remain suitable and may be renewed during the plan period. All new applications for these uses on the ANF will be governed by the indications of suitability in Table 12. This suitability direction cannot be used to eliminate road, pipeline or utility access to areas where private rights would be infringed upon.

Private oil and gas development is a suitable use on all parts of the ANF where subsurface oil and gas rights are privately owned.

Construction of towers to house wind generators/turbines is not a suitable use on the ANF.

Fire activities include wildland fire use, which allows the use of wildland fire to create desired vegetative conditions. Prescribed fire is the intentional ignition and management of fire to achieve desired vegetative conditions.

Monitoring

Monitoring and evaluation are separate, sequential activities required by the National Forest Management Act (NFMA). Monitoring is the collection of data by observation or measurement. Evaluation is the analysis and interpretation of monitoring data. The purpose of monitoring and evaluation is to determine whether or not Forest Plan implementation complies with Forest Plan direction, and whether or not the application of Forest Plan

standards and guidelines is meeting Forest Plan goals and objectives. The results of monitoring and evaluation can ultimately lead to change in Forest Plan management direction.

The monitoring strategy is designed to assess whether Forest Plan goals and objectives are being met. The monitoring and evaluation program for the Forest Plan consists of the following elements:

- A monitoring and evaluation interdisciplinary team with the responsibility of producing a monitoring guide using the information listed in Tables 13, 14, and 15, coordinating and supervising monitoring activities, evaluating the collected information, and producing annual monitoring and evaluation reports.
- A monitoring guide that identifies the specific methods for data collection and how the data is stored, responsibilities for management of monitoring information, and the schedule of monitoring and evaluation activities during the plan period. The guide will be completed in fiscal year 2007. It will identify cooperators and their specific roles with respect to particular monitoring items.
- An annual monitoring program of work will be developed consistent with the monitoring guide. It will include the identification of the work expected for the upcoming fiscal year and the distribution of funds to implement the monitoring strategy.
- An annual monitoring and evaluation report that briefly summarizes the monitoring activities conducted, the evaluation of those items monitored annually or during that year, and recommendations of remedial actions, will be produced and distributed to the public.
- A five-year monitoring and evaluation report is similar to the annual monitoring and evaluation report and replaces it every fifth year. This report is a comprehensive evaluation of all monitoring items. It supports the management review of the plan to address the question of whether or not there is a need to change any of the plan components.

An annual monitoring and evaluation report will be prepared that summarizes the results of items listed for annual evaluation in Tables 13, 14, and 15. A comprehensive evaluation will be produced every five years covering all items. Based on the results of the annual or five-year evaluations, the monitoring and evaluation interdisciplinary team will recommend Forest Plan amendments, revisions, or other changes in management direction to the Forest Supervisor.

The monitoring report may provide summaries of data collected, but is primarily written to display evaluation of the data, conclusions, and recommendations. Comparison of subsequent monitoring and evaluation reports provide a means to track management effectiveness from year-to-year and to show the changes that have been made or still need to be made.

Forest Plan Monitoring Requirements

The basic monitoring and evaluation requirements for the Forest Plan can be grouped into the following three categories:

- Table 13 – Minimum Legal Required Monitoring Items – as defined in NFMA at 36 CFR 219.
- Table 14 – Achievement of Forest Plan Objectives – pertaining to the level of accomplishment of objectives contained in Part 2.
- Table 15 – Strategic Monitoring Information – these are strategic in nature to gain additional information. Data collection and evaluation will address these questions in the 5 year comprehensive report.

The elements of the three tables are described below:

Column 1 – Contains a description of the monitoring item. In Table 13, it is a required item from the 1982 Forest Planning regulations (36 CFR 219). In Table 14, it is a Forest Plan objective from Part 2 in this document. In Table 15, it is a resource area.

Column 2 – Contains a specific monitoring question. It is written to provide managers and interested publics with answers about how the forest plan is being implemented. The scope of the questions provide information on the level of accomplishment, the effectiveness of standards and guidelines, the status of changing resource conditions, and the underlying science supporting resource decisions and the effects of our actions.

Column 3 – Monitoring Frequency specifies how often the data will be collected.

Column 4 – Evaluation Frequency specifies how often the item will be reported. The evaluation provides an interpretation of the data collected, often using comparisons to past levels and trends.

Column 5 – Precision/Reliability utilizes the following definitions for the two symbols used:

Class A employs methods appropriate for modeling or quantitative measurement. Results have a high degree of repeatability, reliability, accuracy, and precision.

Class B employs methods based on project records, personal communications, ocular estimates, informal visitor surveys, and similar types of assessments. Reliability, accuracy, and precision are lower than Class A methods, but the methods still provide valuable information.

Research Needs

Research items listed in Table 16 are used to develop new information pertinent to the Desired Condition and are not a Forest Plan decision.

Table 13. Minimum Legally Required Monitoring Items

Action, effect or resource to be managed	Monitoring Question	Monitoring Frequency	Evaluation Frequency	Precision/ Reliability
Lands are adequately restocked within five years of regeneration harvest (36 CFR 219.12(k)5(i)) and (36 CFR 219.27 (c)(3))	Have lands been adequately restocked within five years of regeneration harvest?	Annual	Annual	A
Determine if lands not suited for timber production have become suited (36 CFR 219.12(k)5(ii))	Have lands that are not suited for timber production become suited?	10 years	10 years	A
Maximum opening size from even-aged management and the need for change (36 CFR 219.12(k)5(iii)) and (36 CFR 219.27 (d)(2))	What is the maximum size opening from even-aged management? Is there a need to change the standard?	Annual	5 years	A/B
Ensure destructive insects and diseases do not increase to potentially damaging levels following management activities (36 CFR 219.12(k)5(iv))	Have destructive insects and diseases increased to potentially damaging levels after management activities?	Annual	Annual	B
Population trends of the five Management Indicator Species (36 CFR 219.19(a)(6))	What are the population trends of cerulean warbler, northern goshawk, timber rattlesnake, aquatic invertebrates, and mourning warbler?	Annual	5 years	B

Action, effect or resource to be managed	Monitoring Question	Monitoring Frequency	Evaluation Frequency	Precision/ Reliability
Cerulean Warbler	What activities have occurred within the oak forest community? How many acres of suitable habitat exist?	Annual	5 years	B
	Where has this species been documented? What is the ANF population estimate?	Annual	5 years	B
	What is the relationship between trends in habitat and populations?	Not Applicable	5 years	B
Northern Goshawk	How many northern goshawk nesting territories exist on the ANF and of these, how many are occupied? How many young are produced?	Annual	5 years	B
	What management activities have occurred within known goshawk nesting territories and how have these altered habitat conditions?	Annual	5 years	B
	What is the relationship between trends in habitat and populations?	Not Applicable	5 years	B
Timber Rattlesnake	How many rattlesnake dens are known to occur on the ANF? Of the known dens, how many are active and what is the number, size and sex of snakes in occupied dens? What is the estimated number of snakes using the den?	Annual	5 years	B
	What activities have affected timber rattlesnakes and their habitat?	Annual	5 years	B
	What is the relationship between trends in habitat and populations?	Not Applicable	5 years	B

Action, effect or resource to be managed	Monitoring Question	Monitoring Frequency	Evaluation Frequency	Precision/ Reliability
Aquatic Invertebrates	Is aquatic invertebrate diversity and abundance being sustained on the ANF?	Annual	5 years	B
	What is the relationship between trends in habitat and populations?	Not Applicable	5 years	B
Mourning Warbler	Where has this species been documented? What is the ANF population estimate?	3 years	3 years	B
	How have activities affected suitable habitat? How many acres of suitable habitat exist?	3 years	3 years	B
	What is the relationship between trends in habitat and populations?	Not Applicable	5 years	B
Effects to lands and communities adjacent to or near the national forest and effects to the ANF from land managed by government entities (36 CFR 219.7(f))	What are the economic effects of national forest management actions to lands and forests near the national forest and what effects to national forest lands occur from land managed by other government entities?	Annual for payments; 5 years for other items	5 years	B
Comparison of projected and actual outputs and services (36 CFR 219.12(k)(1))	How do actual outputs and services compare to those projected?	Annual	Annual	A
Prescriptions and effects (36 CFR 219.12(k)(2))	How have prescriptions and effects been measured?	Annual	Annual	A/B
Comparison of actual and estimated costs (36 CFR 219.12(k)(3))	What are actual costs in comparison to estimated costs?	5 years	5 years	A
Effects of Management Practices (36 CFR 219.11(d))	To what extent have standards and guidelines been applied?	Annual	Annual	A/B

Table 14. Achievement of Forest Plan Objectives

Forest Plan Objective	Monitoring Question	Monitoring Frequency	Evaluation Frequency	Precision/ Reliability
1920 Land and Resource Management Planning				
Complete a management plan for the area surrounding the Allegheny Reservoir including that portion of the National Recreation Area.	Has a management plan been created for the area surrounding the Allegheny Reservoir including that portion of the National Recreation Area?	Annual	5 years	A
2080 Noxious Weeds				
Collaborate with other agencies/entities to establish seed and mulch mixes appropriate to limit introduction and spread of invasive species for use on the ANF.	Have seed and mulch mixes been established for the ANF that will limit the spread of invasive species?	5 years	5 years	A
Complete invasive plant treatments to lessen their impact on native plant communities on 300 to 600 acres, annually.	How many acres of invasive plant treatment have occurred?	Annual	5 years	A
2300 Recreation				
Increase the number of inventoried dispersed sites and concentrated use areas (CUAs) managed to standard to reduce health, safety, and resource impacts caused by unmanaged recreation use in the general forest area. Provide ancillary support facilities, such as parking areas and toilets, as needed, to protect resources and the environment.	Are dispersed sites and CUAs being managed to prevent resource damage?	Annual	3 years	B
Manage for desired ROS settings as indicated in each management area's desired condition description.	Are desired ROS settings being achieved?	5 years	5 years	B

Forest Plan Objective	Monitoring Question	Monitoring Frequency	Evaluation Frequency	Precision/ Reliability
2350 Trails				
For all trails, establish trail classes, permitted uses, construction, reconstruction, and maintenance priorities.	Have trail classes and permitted uses been established? How many miles of trail (per trail type) have been constructed or reconstructed? Have maintenance and construction priorities been established? Are trails constructed and maintained to standard? Have limited use trails been converted to sustainable multiple use trails based on compatible uses and resource constraints?	Annual	5 years	A
Evaluate ANF road systems to identify which roads are suitable for snowmobile use utilizing the Travel Management Process.	Are roads and trails designated for snowmobile use marked and signed?	Annual	Annual	B
Facilitate regular grooming of the designated snowmobile trail system if Commonwealth funding is available.	To what degree has the ANF contributed to snowmobile grooming?	Annual	Annual	B
Inventory and assess equestrian user developed trail systems within EUAs. Incorporate appropriate trail segments and make connections to create designated trail systems where feasible. Eliminate trail systems or segments where resource standards cannot be met.	Have equestrian trails been designed and developed for equestrian use?	Annual	3 years	B
Utilize partnerships with snowmobile clubs, local communities, State agencies, and private landowners to provide snowmobile system connectors across private lands to Tionesta, Ridgway, Sheffield, and Bradford.	What connectors have been developed?	Annual	Annual	A

Forest Plan Objective	Monitoring Question	Monitoring Frequency	Evaluation Frequency	Precision/ Reliability
2320 Wilderness Areas				
Manage designated wilderness areas to meet the minimum level of stewardship described in the 2006 Chief's 10-year Wilderness Stewardship Challenge.	Are the following stewardship elements being addressed: fire, noxious/invasive plants, air quality, education, recreation use impacts, outfitter/guides, opportunities for solitude, or primitive and unconfined recreation? Are wilderness areas being managed to standard?	2 years	5 years	B
2360 Heritage				
Develop management plans for the long-term preservation of heritage resources that are either listed on or eligible for the National Register of Historic Places.	How many management plans have been completed?	Annual	5 years	A/B
Reduce the backlog of heritage sites that require evaluation and nomination to the National Register of Historic Places.	How many evaluations have been completed? How many heritage resources have been nominated?	Annual	5 years	A
Work with appropriate representatives of the Seneca Nation of Indians (SNI) to develop a confidential inventory of culturally sensitive sites.	Has an inventory of SNI culturally sensitive sites been established?	Annual	5 years	A
2380 Scenery				
Maintain or exceed adopted Scenic Integrity Levels (SILs) as seen from Concern Level 1 and 2 travel routes and use areas.	Are we meeting or exceeding SILs?	5 years	5 years	B
Maintain existing scenic vistas and construct five additional vistas.	Are scenic vistas being maintained? How many additional vistas have been constructed?	5 years	5 years	A

Forest Plan Objective	Monitoring Question	Monitoring Frequency	Evaluation Frequency	Precision/ Reliability
2400 Vegetation				
Provide vegetative diversity across the landscape by providing a diversity of age classes, including late structural and multi-age conditions, to achieve desired future conditions.	How does the diversity of age classes and structural conditions compare to plan objectives?	Annual	5 years	A/B
Maintain or create age class diversity on lands suitable for timber management to provide for sustainable forest ecosystems and high quality hardwood timber products by treating an estimated 1,400 to 1,800 acres using even-aged regeneration methods and treating 300 to 700 acres using uneven-aged methods, annually.	How many acres of even-aged regeneration harvest and uneven-aged harvest have occurred?	Annual	Annual	A
Conduct pre-commercial thinning or release in regenerated stands to maintain species diversity, favor desired species, and improve health, vigor, and growth on 500 to 2,500 acres, annually.	How many acres have been treated with pre-commercial thinning or release?	Annual	5 years	A
Use prescribed fire to enhance ecosystem resiliency, conserve fire-adapted plant and animal biodiversity, and maintain and restore mixed oak ecosystems on 75 to 400 acres, annually.	How many acres have been treated with prescribed fire?	Annual	5 years	A
In MAs 1.0, 2.1, and 3.0, utilize salvage sales to achieve multiple use objectives and recover timber value within two years of an event that kills or damages trees, such as insect infestation, disease, ice, wind, fire, or other catastrophic event.	How many acres in MA 1.0, 2.1, or 3.0 sustained damage from insects, disease, ice, wind, fire, or catastrophic event? How many acres were salvaged within 2 years of the event?	Annual	5 years	A/B
Provide a conifer component of greater than 15 basal area per acre on a minimum of 10 percent of the ANF.	What percent of the ANF has a conifer component (>15 basal area per acre)?	Annual	5 years	A
Provide an oak component greater than 15 total basal area per acre on 15 to 20 percent of the ANF.	What percent of the ANF has an oak component (>15 basal area per acre)?	Annual	5 years	A/B
Maintain 70 percent forest cover on the ANF.	What is the percent of forest cover on the ANF?	5 years	5 years	A

Forest Plan Objective	Monitoring Question	Monitoring Frequency	Evaluation Frequency	Precision/ Reliability
Manage permanent grass and shrub openings on a minimum of 2 percent of the ANF, favoring native shrubs and herbaceous species.	What percent of the ANF is in permanent grass or shrub openings?	5 years	5 years	A
Maintain moderate to well-stocked stands (relative density) on more than 90 percent of the forest lands on the ANF.	What percent of ANF forest lands contain moderate to well-stocked stands?	5 years	5 years	A
2500 Watershed and Air				
Complete soil and water restoration projects on 10 to 50 acres, annually.	How many acres of soil and water restoration projects have been accomplished?	Annual	5 years	A
Apply site-specific prescriptions to restore compositional and/or structural diversity of riparian corridors on 50 to 100 acres, annually.	How many riparian acres have been treated to improve vegetative diversity?	Annual	5 years	A
	Have prescriptions improved riparian conditions for the benefit of riparian dependent resources?	Annual	5 years	B
2600 Wildlife, Fish and Sensitive Plant Habitat				
Enhance terrestrial wildlife habitat to provide desired cover and forage conditions on 1,200 to 1,600 acres, annually.	How many and what type of terrestrial habitat enhancements have been implemented?	Annual	Annual	A
Manage white-tailed deer populations at 10 to 20 deer per square mile to sustain herbaceous and woody species diversity across the landscape.	What is the deer density across the landscape?	Annual	5 years	B
Complete fish habitat improvement where habitat is lacking in reservoirs/impoundments on 30 to 40 acres, annually.	How many acres of fish habitat improvements have been implemented?	Annual	5 years	A
Complete stream restoration or enhancement for native and desired non-native species where suitable aquatic habitat is lacking on 1 to 2 miles, annually.	How many miles of stream restoration or enhancement have been completed?	Annual	5 years	A
Forest Plan objectives related to species with viability concerns. See Table 13 for cerulean warbler, northern goshawk, and timber rattlesnake monitoring items.				

Forest Plan Objective	Monitoring Question	Monitoring Frequency	Evaluation Frequency	Precision/ Reliability
Manage active great blue heron colonies to ensure a stable or increasing population trend.	How many colonies are known to be active? How many active nests are there? How many colonies have become abandoned?	Annual	5 years	A/B
Manage occupied northern flying squirrel nesting sites to ensure a stable or increasing population trend.	How many northern flying squirrel nest sites are known to exist? How many are occupied?	Annual	5 years	B
Manage known locations of plant species with viability concerns to ensure a stable or increasing population trend.	How many locations of plant species with viability concerns are known on the ANF?	Annual	5 years	A/B
Manage suitable nesting habitat for yellow-bellied flycatchers to ensure a stable or increasing population trend.	How much potential habitat of the yellow-bellied flycatcher is occupied?	5 years	5 years	B
Manage active red-shouldered hawk territories to ensure a stable or increasing population trend.	How many red-shouldered hawk active territories are known to exist?	Annual	5 years	B
Manage occupied osprey nesting sites to ensure a stable or increasing population trend.	What is the status of known nests? How many young are produced?	Annual	5 years	A/B
2600 Wildlife, Fish and Sensitive Plant Habitat (continued)				
Forest Plan objectives related to federally threatened, endangered and candidate species.				
Prevent the introduction of zebra mussels into the Allegheny Reservoir and the Allegheny River from Forest Service boat launch sites.	Are zebra mussels in the Allegheny Reservoir? What is the risk of zebra mussel introduction from Forest Service boat launches?	Annual	Annual	B
Provide optimum and suitable vegetative habitat for Indiana bats on a minimum of 30 percent of the ANF.	How many acres of suitable and optimum Indiana bat habitat occur on the ANF?	5 years	5 years	B
Maintain or increase productivity of bald eagles on the ANF.	What is the status of known bald eagle nests on the ANF? How many young are produced?	Annual	Annual	A/B

Forest Plan Objective	Monitoring Question	Monitoring Frequency	Evaluation Frequency	Precision/ Reliability
2800 Minerals and Geology				
Establish a formal, multi-agency working group, including representatives from the ANF, PA-DEP, and other state and Federal agencies, to coordinate policies and processes regarding the management of oil and gas resources and infrastructure on the ANF.	Has a working group been established?	Annual	5 years	A
Establish and maintain an inventory of all oil and gas development on the ANF.	Has an inventory of all oil and gas development been established and is it being maintained?	Annual	5 years	A
Identify areas of resource concern associated with oil and gas development. Collaborate with OGM operators to resolve concerns with long term mitigations and/or site restoration.	How many existing oil and gas developments have resource concerns? How many resource concerns associated with existing oil and gas development have been resolved?	Annual	5 years	B
3400 Forest Pest Management				
Improve the overall health and sustainability of ANF forest ecosystems by reducing understory dominance of native invasive species, such as beech brush, ferns, grass, and striped maple, and non-native invasive species (NNIS) to encourage greater species diversity of herbaceous, shrub, or tree seedlings on 3,000 to 6,200 acres, annually (through direct treatment, such as site preparation, herbicide application, scarification, and fencing).	How many acres have been treated to increase plant species diversity (with site preparation, herbicide application, and fencing)?	Annual	Annual	A

Forest Plan Objective	Monitoring Question	Monitoring Frequency	Evaluation Frequency	Precision/ Reliability
5100 Fire				
A wildland fire use plan for managing naturally ignited fires within specific management areas will be developed, implemented, and incorporated into the ANF Fire Management Plan.	Has the ANF prepared a wildland fire use plan to manage naturally ignited fires?	Annual	when completed	A
The ANF will apply prescribed fire and mechanical treatments for hazardous fuel reduction on 100 to 600 acres annually.	How many acres of hazardous fuels reduction treatments have occurred?	Annual	5 years	A
5400 Land Ownership				
Work with partners to acquire subsurface ownership of lands in MA's 5.1, 5.2, 7.1, 8.1, 8.2, 8.3, 8.4, and 8.5 and withdraw these lands from future mineral development.	Have subsurface rights been acquired in these management areas? To what extent have these rights been withdrawn?	Annual	5 years	A
7700 Transportation System				
Road maintenance activities to protect investments, minimize environmental effects, and provide public safety will occur on a minimum of 150 miles of passenger car roads (OML 3 to 5) and a minimum of 100 miles of high clearance vehicle (OML 2) roads, annually.	How many miles of road maintenance have been accomplished?	Annual	5 years	A
Evaluate road benefits and risks and decommission 2 miles of roads that are no longer needed, annually.	How many miles of road have been decommissioned?	Annual	5 years	A
Surface an additional 5 miles of roads with limestone to minimize sediment delivery to streams, annually.	How many miles of road have been surfaced with limestone?	Annual	5 years	A

Table 15. Strategic Monitoring Information

Resource Area	Monitoring Question	Monitoring Frequency	Evaluation Frequency	Precision/ Reliability
Noxious Weeds	How effective have herbicide and manual NNIS controls been at eliminating targeted species?	Annual	5 years	A/B
Recreation	Is resource damage from equestrian use occurring outside of EUAs?	Annual	3 years	B
Vegetation	For EAM and UEAM, characterize stocking, species composition, seedling establishment time, treatment cost, effectiveness of reforestation treatments to obtain species diversity and sustain forest type, particularly with regard to the various opening sizes under UEAM. What are the structural and compositional vegetation characteristics within stands and at the landscape scale? What refinements need to be made to silvicultural practices?	Annual	5 years	A/B
	What is the forest composition (overstory and understory) in areas actively managed, as well as in areas with little active vegetation management?	Annual	5 years	A
	What are significant changes in forest health? What threats to forest health are present?	Annual	5 years	A/B
	How effective are herbicide design criteria in protecting water? To what extent are herbicides drifting into buffer areas? Are water quality protection criteria being met?	2-5 years	5 years	A/B
Watershed and Air	What is the status of water quality on the ANF?	Annual	5 years	A/B
Soil	Is detrimental soil disturbance exceeding regional thresholds?	Annual	5 years	A

Resource Area	Monitoring Question	Monitoring Frequency	Evaluation Frequency	Precision/ Reliability
Wildlife, Fish and Sensitive Plant Habitat	Are bald eagle conservation measures being implemented? What management activities are occurring within suitable nesting, foraging and roosting habitat?	Annual	Annual	A/B
	Are conservation measures for the Indiana bat being implemented?	Annual	Annual	A/B
	Does the Indiana bat occur on the ANF? What is the age, sex, and reproductive rate of bats captured? What is the estimated population?	Annual	3 years	A
	Are conservation measures for the clubshell and northern riffleshell mussels being implemented?	Annual	Annual	A/B
	What is the amount and distribution of high quality remote and interior habitat across the landscape? How much late structural/old growth habitat is provided?	5 years	5 years	B
	What is the level of standing and downed woody debris across the landscape?	5 years	5 years	A/B
	How is understory plant species diversity changing across the landscape?	5 years	5 years	A/B
	Are project mitigation measures effectively reducing impacts to existing locations of plant species with viability concerns?	Annual	5 years	A/B
	If federally listed plants have been identified, what conservation measures are being implemented?	Annual	Annual	A
Minerals and Geology	To what extent are new oil and gas developments meeting Forest Plan design criteria?	Annual	5 years	A/B

Table 16. Research Questions

Resource Area	Research Question
Soil	To what extent is soil acidification affecting the physical, chemical, and biological processes and functions?
Wildlife	What is the impact of the hemlock woolly adelgid to wildlife on the ANF, specifically, impacts to Northern flying squirrels, impacts to species that utilize hemlock for thermal cover (deer, turkeys, grouse), and species that utilize hemlock for nesting (Blackburnian warblers, Swainson's thrush)? Which conifer species should be planted in place of hemlock to meet the needs of wildlife?
	What are the direct impacts of roads to rattlesnakes, wood and box turtles, amphibians and other less mobile species? At what landscape threshold of road density and/or traffic level do species declines begin to occur?
	Quantify the benefits of the landscape linkages to specific wildlife species in terms of (1) facilitating genetic interchange between sub-populations, (2) facilitating movement of less mobile species, and (3) enhancing species resiliency. At what level of activity (road building, timber harvesting, trail construction, oil and gas development and stone pit development) do the above 3 benefits begin to decline? What is the optimal corridor width for specific wildlife species?
	Given the current distribution of early structural habitats across the ANF, are any wildlife species declining because these habitats are not better connected?
	At what deer density is vegetative diversity and hunter satisfaction optimized?
Vegetation	What integrated pest management activities, including silviculture treatments, will help sustain healthy hemlock in the face of the expected hemlock wooly adelgid infestation?
	How can greater success be achieved in developing sugar maple seedlings or retaining existing healthy sugar maples, in order to sustain this species on appropriate sites on the ANF?
	How can we sustain healthy American beech? What activities will successfully regenerate beech seedlings that are resistant to the disease complex in the long term?
	What are the most economical and biologically feasible methods for: ▪ sustaining a diversity of tree species and forested conditions under even-aged management? ▪ ensuring diverse tree species develop and remain competitive in young stands? ▪ regenerating oak?
	What preventative/remedial strategies are available to respond to gypsy moth, cherry scallopshell moth, and emerald ash borer outbreaks and cherry red rot, ash die-back, and sudden oak death diseases?
	Investigate when the Allegheny hardwood forest type can be expected to substantially decline based on the following criteria: seed production, value, prevalence of internal defect, and tree mortality.

Part 3—Design Criteria

This part of the Forest Plan describes the design criteria that will guide the design and implementation of suitable uses and management activities. It consists solely of standards and guidelines. Standards and guidelines are sideboards that impose limitations on activities or uses for reasons of environmental protection, public safety, risk reduction or to achieve a desired condition or objective. These standards and guidelines apply to all project decisions made once the plan is in effect.

The forestwide standards and guidelines are organized by associated Forest Service file codes. Standards and guidelines apply to all indicated situations across the ANF.

Although both standards and guidelines are requirements that limit or guide the forest uses or activities, compliance with a standard is to be interpreted differently than compliance with a guideline. Standards are required in all applicable situations, unless a plan amendment has been specifically prepared to exempt a project from the standard. Compliance with applicable guidelines is also generally expected, but situations are anticipated when compliance may not be feasible or desirable. In these situations, the record for the project must provide documentation as to the rationale for deviating from any guideline.

In some situations the application of a standard or guideline must be determined in a field context by responsible ANF staff. In this context standards should be interpreted as must-do requirements. Guidelines should be followed except where circumstances in the field prescribe that adjustment is needed. ANF field staff should document the rationale for deviation from a guideline.

2070 Biological Diversity Guidelines

Seeding should be limited to areas where erosion and sedimentation are a concern and allow natural revegetation on other areas. Specific revegetation needs for wildlife habitat enhancement activities, such as a wildlife opening construction, should be considered.

After ground-disturbing activities and after appropriate site preparation (e.g. raking, soil testing, soil amendments, etc.), native or desired non-native species should be planted where natural revegetation is sparse or unlikely to occur.

After site assessment, consider the following when selecting the composition of seed mixes:

- Native species with local genotypes.
- Native species with non-local genotypes.
- Desirable (non-invasive) non-native species. A cover crop such as winter wheat may be needed to stabilize an area during adverse weather.

Mulch materials with the least likelihood of introducing unwanted vegetation should be used.

2080 Noxious Weeds

Activities that may contribute to the introduction, establishment, or spread of either noxious or invasive plant species should be designed to include measures to reduce impacts as well as treatment and/or monitoring requirements. To determine the appropriate measures, consult resources such as the “Forest Service Guide to Noxious Weed Prevention Practices.”

Special use permits and contracts for activities conducted on the ANF should include appropriate clauses for the prevention and/or treatment of invasive plant species.

Transportation Systems

Noxious weed/invasive plant surveys and/or treatment should be conducted on roads prior to decommissioning.

Land Acquisition and Disposal

Conduct noxious weed/invasive plant surveys on lands considered for acquisition or disposal. As a condition of land adjustment decisions, the Forest Service may require the proponent to treat noxious weeds/invasive plants on lands prior to acquisition.

2100 Environmental Management – Pesticide Use

Pesticide Application (includes herbicides and insecticides)

Standards

Use only pesticides registered by the Environmental Protection Agency in full accordance with the Federal Insecticide, Fungicide, Rodenticide Act, as amended, and Forest Service handbook and manual direction, except as otherwise provided for in regulations, orders, or permits issued by the EPA.

A qualified Forest Service Pesticide Applicator will be onsite during pesticide application to ensure compliance with applicable standards and guidelines.

Pesticide application personnel must have easy access to emergency decontamination, first aid kits, and appropriate spill cleanup materials whenever they are using or transporting pesticides.

Project personnel will follow all EPA and Commonwealth approved pesticide application regulations.

Only trained personnel as described in Forest Service Manual 2154.1 shall recommend, use, or supervise the use of pesticides.

Guidelines

Minimize the concentration and dosage of pesticides by using proper formulations, application techniques, and timing.

In cases of major defoliations, aerial applications of insecticides approved for aquatic use are permitted.

Notification

Standards

Landowners adjacent to treatment areas will be notified prior to pesticide application. Residents occupying dwellings on adjacent private land will be notified 3 to 4 weeks before spraying begins and again, if requested by a landowner, 24 hours before treatment begins. Individuals (such as loggers, woodcutters, OGM operators, contractors, berry pickers, etc.) known to be using a proposed treatment area shall be notified before treatment begins.

Mixing and Container Disposal

Standards

Application equipment, empty pesticide containers, and clothing worn during treatment shall not be cleaned in open water or close to wells.

Human Exposure

Guidelines

To minimize human exposure to pesticides, schedule treatment in high visitor use areas during low use periods or when the areas are temporarily closed and signed.

Herbicide Surveys of Treatment Areas

Standards

Forest Service inspectors will survey the area prior to treatment to identify special concerns and/or areas to avoid during herbicide treatment.

Before treating an area with herbicide, a survey will be completed to determine the presence of species with viability concerns. If any species with viability concerns are located within treatment areas, adequate measures will be taken to conserve them.

Guidelines

Stocking surveys should be done to assess interfering vegetation and tree seedling development prior to treatment and to monitor seedling development following treatment in all areas proposed for herbicide application. These surveys should identify the need for and monitor the effectiveness of the treatment.

The presence of nesting raptors (bald eagle, osprey, red-shouldered hawk, and northern goshawk) and great blue herons within one-quarter mile (1,320 feet) of the treatment area should be determined. If nesting raptors or herons are present, mechanical herbicide treatment and any mechanized travel within one-quarter mile of each nest location should be restricted or delayed until after young birds have fledged (normally after July 31).

Herbicide Application

Guidelines

Treatment area boundaries should be marked with flagging and/or paint, including the boundaries of buffer areas where treatment and/or equipment entry are not permitted.

To minimize the need for re-treatment, foliar herbicide application should not occur when rain is anticipated within four hours at the treatment site.

To minimize the need for re-treatment, do not use cut stump, injection, or cut and fill herbicide application or methods during heavy sap flow (March through May).

In areas managed using an even-aged silvicultural system, the contiguous area of broadcast herbicide application within one operating season should generally not be significantly larger than the maximum final harvest size for each management area as specified in the Forest Plan (i.e., 40 acres for MA 3.0 and 20 acres for MA 6.1). Exceptions include treatments responding to overstory mortality, blowdown, or catastrophic damage, or treatments designed to achieve wildlife structural or habitat objectives, and landscape restoration goals.

Unless identified otherwise through environmental analysis, seeded roads, landings, or pits within treatment areas should not be treated with herbicides.

Broadcast herbicide treatment for reforestation purposes with glyphosate or sulfometuron methyl should not begin on the ANF until after the Fourth of July weekend. Areas having ferns and grass as the target species should be treated after the Fourth of July weekend. Areas containing striped maple and beech as the target species should be treated after August 1 for best effectiveness.

Certain areas should receive special consideration and may not be treated until September 1. Such areas include, but are not limited to, those where numerous desired tree seedlings are present and where sulfometuron methyl will adequately control the competing vegetation. Late season herbicide application generally causes minimal damage to desired seedlings.

During injection and cut and frill herbicide treatment, glyphosate should not be used to treat competing stump sprouts originating from the same stump as desired trees, or to control competing trees within 5 feet of trees of the same species left standing as desired trees.

Cut stump herbicide treatments should not be applied within 30 feet of the stem of a healthy beech tree greater than 8 inches DBH that exhibits signs of resistance to the beech bark disease complex and is designated as a residual tree to retain.

For cut surface treatments, herbicide should be applied at concentrations equal to or less than 50 percent of the maximum concentration permitted by the label, through proper application technique and timing.

In order to minimize quantity of herbicide applied, only the outer 2 inches of the cut stump surface should be treated on stumps larger than 6 inches diameter.

To minimize the need for retreatment, glyphosate should be applied to the cut stump immediately (within 1 hour) following cutting of the stem during cut stump treatment.

Application Rates

Guidelines

Glyphosate and sulfometuron methyl should be used at the following typical and maximum (shown in parentheses) application rates of active ingredient (AI) to achieve vegetation management program objectives.

Table 17. Typical and maximum application rates for sulfometuron methyl

Application	Sustaining Forest Cover/Forest Products and Improvements	Developing/Maintaining Wildlife Habitat/Visual Improvements	Treat/Control Invasive Species
	Typical (Maximum) pounds/acre AI		
Mechanical – foliar (air blast sprayer)	0.09 (0.19)	0.09 (0.19)	0.09 (0.19)
Manual – ground (backpack)	0.09 (0.19)	0.09 (0.19)	0.09 (0.19)
Cut surface	0 (0)	0 (0)	0 (0)

Table 18. Typical and maximum application rates for glyphosate

Application	Sustaining Forest Cover/Forest Products and Improvements	Developing/Maintaining Wildlife Habitat/Visual Improvements	Treat/Control Invasive Species
	Typical (Maximum) pounds/acre AI		
Mechanical – foliar (air blast sprayer)	1.0 (2.0)	1.0 (2.0)	1.0 (2.0)
Manual – ground (backpack)	1.0 (2.0)	1.0 (2.0)	2.0 (4.0)
Cut surface	2.0 (3.0)	2.0 (3.0)	1.0 (2.0)

Notification

Standards

Signs will be placed along the perimeter of treatment areas where these areas are adjacent to roads, trails, recreation areas, administrative sites, or at any other location where the public can be expected to enter the treatment area. These signs will state which pesticide was used, a short message about how the herbicide works

and who can be contacted for more information. These signs will be posted before herbicide treatment and for at least 30 days following treatment.

Qualified Forest Service personnel will be at each treatment site during herbicide application to caution visitors to stay away from the equipment and crew and to respond to their questions and concerns.

Buffers – Glyphosate

Standards

For broadcast foliar mechanical (airblast) application, the following buffers and application procedures shall be observed to provide water quality protection:

- Glyphosate shall not be applied to surface waters.
- Glyphosate shall not be applied within 25 feet of each side of perennial streams, impoundments, seeps, springs, or intermittent streams with flowing water the day of spraying.
- Glyphosate shall not be applied within 25 feet of wet areas (standing water), including vernal ponds, with no defined outlet.
- Glyphosate shall not be applied within 10 feet of each side of dry intermittent streams, dry springs, and dry seeps.
- Airblast shall be directed away from the buffer area when mechanical applications are made within 75 feet of the edge of the buffer.

For directed foliar backpack and for cut surface application methods, the following buffers and application procedures shall be observed to provide water quality protection:

- Glyphosate shall not be applied to surface waters.
- Glyphosate shall not be applied within 10 feet of standing or flowing water.
- Within 10 feet of a dry intermittent stream course, dry springs, and dry seeps, only the cut surface herbicide treatment technique shall be used with glyphosate.
- Glyphosate shall not be applied to cut stems in the stream channel.

Buffers – Sulfometuron Methyl

Standards

For broadcast foliar mechanical (airblast) application, the following buffers and application procedures shall be observed to provide water quality protection.

For an application rate of 0.09 pounds/acre AI:

- Sulfometuron methyl shall not be applied to surface waters.
- Sulfometuron methyl shall not be applied within 25 feet of each side of perennial streams, impoundments, seeps, springs, or intermittent streams with flowing water the day of spraying.
- Sulfometuron methyl shall not be applied within 25 feet of wet areas (standing water), including vernal ponds, with no defined outlet.
- Sulfometuron methyl shall not be applied within 10 feet of each side of dry intermittent streams, dry seeps, and dry springs.
- Airblast shall be directed away from the buffer area when applications are made within 75 feet of the edge of the buffer.

For an application rate of 0.19 pounds/acre AI:

- Sulfometuron methyl shall not be applied to surface waters.
- Sulfometuron methyl shall not be applied within 50 feet of each side of perennial streams, impoundments, seeps, springs, or intermittent streams with flowing water the day of spraying.
- Sulfometuron methyl shall not be applied within 50 feet of wet areas (standing water), including vernal ponds, with no defined outlet.
- Sulfometuron methyl shall not be applied within 25 feet of each side of dry intermittent streams, dry springs, and dry seeps.
- Airblast shall be directed away from the buffer area when mechanical applications are made within 100 feet of the edge of the buffer.

For the directed foliar backpack application method involving the use of sulfometuron methyl (0.09 or 0.19 pounds/acre), the following buffers and tactics shall be used to provide water quality protection:

- Sulfometuron methyl shall not be applied to surface waters.
- Sulfometuron methyl shall not be applied within 10 feet (0.09 pounds/acre) or 25 feet (0.19 pounds/acre) of standing or flowing water.
- Sulfometuron methyl shall not be applied within 10 feet (0.09 pounds/acre) or 25 feet (0.19 pounds/acre) of dry intermittent stream courses, dry springs, or dry seeps.

Buffers

Guidelines

Buffer areas should be adjusted, based upon field conditions, at the time of spraying, in order to account for conditions that are moister or drier than when an application area was delineated.

Buffer areas should be delineated along roadside ditches and cut banks where runoff into a stream or soil erosion could occur. Specific buffer widths will be determined during the site-specific analysis for specific treatment proposals.

Herbicide Drift

Standards

The perimeter of treatment areas will be treated in such a way as to minimize drift outside the designated treatment area, particularly where sensitive areas such as private lands or buffer areas exist adjacent to treatment areas.

Guidelines

In order to minimize possible spraying of non-target vegetation when using mechanical broadcast application methods, do not apply herbicides if the wind speed exceeds 10 mph in open areas or 4 mph under the canopy in the treatment area.

Human Exposure

Guidelines

Certain areas slated for September treatment will receive special consideration and should not be treated over the Labor Day weekend (Friday through Monday). Such areas include but are not limited to those where seedlings are present and where sulfometuron methyl will adequately control the competing vegetation, those subject to a large amount of summer public use, and areas having occupied residences within 1,000 feet.

Manually applied foliar herbicides should not be applied to vegetation taller than the shoulder height of the application personnel.

Application Methods

Guidelines

Manual methods of herbicide application should be used where a more selective treatment is desired and in riparian or other sensitive areas.

Areas requiring small spot treatments for plantings should generally be done with manual equipment.

Mixing and Cleaning Water

Guidelines

Mixing and cleaning water should come from a domestic water supply and be transported in separate, labeled containers. Under special circumstances, permission to draft water from another approved water source may be granted.

Power Line Maintenance

Standards

Power line rights-of-way crossing National Forest administered land shall be managed in an environmentally sensitive fashion to provide safe, reliable, and efficient service to consumers. Management of vegetation shall follow the standards and guidelines established for Alternative 2 in the FEIS for Vegetation Management on Electric Utility Rights-of-Way, as described on pages II-16 through II-25, along with associated Management Requirements and Constraints described in Chapter V of the FEIS (USDA-FS 1997). As new information becomes available, other herbicides and/or treatment techniques may be considered for use following appropriate environmental analysis.

2300 Recreation

Developed Recreation

Standards

Locate, design, construct and manage facilities consistent with the assigned management area Recreation Opportunity Spectrum development level (refer to ROS and Development Levels Table in Appendix C) and adopted Scenic Integrity Level.

Guidelines

When the three-year average of any campground occupancy is less than 40 percent during the normal operating season, reassess the Recreation Facilities Master Plan and determine whether to decommission or alter use of the facility.

ANF developed sites should be operated and maintained to National Quality Standards for recreation sites.

Dispersed Recreation

Standards

Manage dispersed sites and concentrated use areas consistent with the appropriate ROS development level (see ROS and Development Levels Table in Appendix C) and the adopted Scenic Integrity Level.

Concentrated use areas (CUAs) and dispersed site improvements shall be consistent with the ROS development level appropriate for the management area and the adopted Scenic Integrity Level.

Permissible length of stay is 14 consecutive days.

Close, rehabilitate or restrict use of dispersed sites or otherwise mitigate impacts when one of the following is present:

- Site occupancy does not meet the appropriate ROS development level or the adopted Scenic Integrity Level.
- Documented social use conflicts exist.
- Unacceptable environmental damage is occurring.
- Human use has reached an unsafe level around the site.
- For potential impact to known heritage sites, reference the Programmatic Agreement.

Guidelines

If use exceeds the area capacity for a given ROS class, consider implementing the following management actions to address the effects to the recreation setting:

- Inform the public and restore or rehabilitate the area.
- Regulate use.
- Restrict the number of users.
- Close the site.

Recreational Residences

Standards

Recreation residences in established areas shall remain until said areas are converted to an alternative use. No year-round occupancy will be permitted. Only changes or maintenance improvements that address health, safety, or structural integrity will be permitted to existing structures. No new additions or new outbuildings/structures will be authorized.

2350 Trails

Standards

Manage National Forest System trails consistent with the appropriate ROS development level.

Log skidding and road construction shall not cross trail corridors except at designated crossing sites or unless the trail is already located on a road.

Bicycle travel cross-country or on user-developed trails is prohibited except in an emergency that requires cross-country travel to protect public health or safety.

System trails shall be restricted seasonally or under certain weather conditions as needed for safety, to prevent resource damage, or to meet specific management objectives.

Manage all nationally designated trails for their intended purpose.

Guidelines

Construction and maintenance specifications should be guided by the Forest Service's "National Trail Management Classes."

Multiple-use trails should be designed and managed for the primary recreation use.

Clearly indicate through consistent signing the appropriate modes of travel at each trailhead.

Unless a trail is constructed for interpreting heritage resources, plan the location of new trails so that known heritage sites are not readily visible from the trail corridor.

National Forest System trails should be operated and maintained to National Quality Standards for trails.

North Country National Scenic Trail

Standards

Cooperatively manage the North Country National Scenic Trail with the National Park Service and the North Country Trail Association per the 2005 Memorandum of Understanding (as amended) for foot travel only.

Signing and posting of the North Country National Scenic Trail shall be consistent with Forest Service Sign and Poster Guidelines, Chapter 5 Trail Signing (EM-7100-15) which includes direction for marking National Scenic Trails within wilderness and wilderness study areas.

Avoid new road crossings. Where road crossings are essential, maintain and provide for continued use of the trail for foot travel by maintaining tread integrity at roadside.

Guidelines

Management of the North Country National Scenic Trail should be consistent with the "North Country Trail Comprehensive Plan for Management and Use" (USDI National Park Service, 1982 as amended) and "North Country National Scenic Trail – A Handbook for Trail Design, Construction, and Maintenance" (USDI National Park Service, 1996 as amended and/or updated).

The North Country National Scenic Trail should be constructed and maintained according to the desired ROS setting for each management area that it passes through and managed to a high SIL (see 2380 Scenery standards and guidelines for additional information).

Temporary openings resulting from management activities should not exceed 300 linear feet along the trail.

No slash resulting from management activities should be left within 25 feet of the center line of the trail.

No fencing should be constructed within 25 feet of the center line of the trail.

All-terrain Vehicle/Off-highway Motorcycle (ATV/OHM) Trails

Standards

Unlicensed ATVs/OHMs are permitted only on designated trails.

All new ATV/OHM trail construction and construction of support facilities, such as trailheads, parking, or dispersed camping areas, is limited to IUAs. Please reference IUA maps.

ATV/OHM trails will be constructed and maintained to limit erosion or impacts to natural resources. Temporary rerouting on a case-by-case basis will be allowed to facilitate other resource activities.

Snowmobile Trails

Guidelines

Only designated National Forest System trails should be groomed through the Forest Service contract.

Equestrian Trails

Standards

Eliminate open (cross-country) riding where unacceptable cultural or natural resource damage occurs, and evaluate whether an area should be designated as an EUA.

Guidelines

Corralling and overnight tethering of pack animals should not occur within 100 feet of stream courses or lakes. Existing corral sites may remain providing impacts to soil, vegetation, and water quality and stream channels are mitigated. Existing wildlife openings should not be used for tethering horses and pack animals or for overnight camping by equestrian groups.

2360 Heritage

Standards

Utilize the "Programmatic Agreement among the USDA Forest Service, Allegheny National Forest, the Pennsylvania State Historic Preservation Officer, and the Advisory Council on Historic Preservation regarding the process for compliance with section 106 of the National Historic Preservation Act for undertakings on the Allegheny National Forest of the Northeast Region of the USDA Forest Service" for information on survey, evaluation, protection, interpretation, and mitigation for the heritage resource program.

Consult directly with appropriate representatives of the Seneca Nation of Indians (SNI) before making a decision on any activities within the vicinity of inventoried sites culturally sensitive to the SNI.

Curate the ANF's heritage resource collections according to Federal standards. All non-private materials recovered from NFS land will remain the property of the Federal government.

Guidelines

Human remains and any associated objects should remain in place when they are discovered through project work, natural forces, or vandalism. Subsequent actions should be conducted in accordance with direction found in the above mentioned programmatic agreement.

2360 Tionesta Research Natural Area

Standards

The ANF recognizes the ecological value of the Tionesta RNA. Any proposed activity adjacent to or within 300 feet of the boundary will be evaluated at the project level to ensure that the proposed activity is consistent with these values.

2380 Scenery

Standards

The Scenery Management System (SMS), as described in USDA Forest Service Agriculture Handbook 701, Landscape Aesthetics: A Handbook for Scenery Management, 12/1995, shall be used for the management and monitoring of scenery.

The Scenic Integrity Level (SIL) map identifies the Scenic Integrity Levels of the ANF (see Table 19). The Scenic Class and Management Area information in Table 20 (Scenic Integrity Level Assignments) was used to determine the SILs identified on the map. The SIL map shall be used as a reference in project planning.

Table 19. Scenic Integrity Level Descriptions

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

Table 20. Scenic Integrity Level Assignments

Scenic Class	MAs 5.1, 5.2, 8.1 (Scenic Segment), and 8.5	All Other MAs
	SIL	SIL
Scenic Class 1	Very High	High
Scenic Class 2	Very High	Moderate
Scenic Class 3	Very High	Low
Scenic Class 4	Very High	Low
Scenic Class 5	Very High	Low
Scenic Class 6	Very High	Low
Scenic Class 7	Very High	Low

Guidelines

Project activities should meet or exceed the SILs identified in the SIL map. For management activities to meet or exceed SILs, the technical principles and guidelines outlined in the following should be consulted:

- The "Allegheny National Forest's Scenery Implementation Guide."
- The National Forest Landscape Management Handbook series specifically for utilities, roads, timber, and recreation (see FSM 2380.61 for current publications).

SILs may be adjusted may be adjusted on a short-term basis due to site specific circumstances. Very Low is minimum SIL for any forest area. An area with Unacceptably Low Scenic Integrity may be assigned a short-term designation of rehabilitation or a lower SIL during project planning.

Achievement of SILs should be met within three years of project completion.

Evaluation of SILs should be based upon areas seen from identified travel routes and use areas.

To avoid uniformity and unnatural appearance, vegetative openings should be irregular and vary in size and shape. It may be desirable to provide a gradual transition between openings and densely forested lands for a more natural appearing landscape.

2400 Vegetation

Silvicultural/Harvest Systems

Decisions about specific harvest methods and silvicultural systems will be made at the project level. The following sections of the standards and guidelines are to be applied in the consideration of the appropriate harvest method and silvicultural system. Also, see Appendix A for additional information on the rationale for the selection of harvest methods and silvicultural systems.

Guidelines

Select the most appropriate silvicultural system for an area that complies with the detailed scientific silvicultural guidelines for the dominant forest types found on the ANF, best fulfills the management area objectives over time, responds to forest health concerns, considers the silvics of tree species present, and achieves multiple resource objectives. The guidelines developed for dominant forest types found on the ANF, as well as references for ANF forest types that also occur in the broader Eastern United States, aid in analyzing stand conditions and prescribing appropriate silvicultural treatments in the local forest types. Refer to Appendix A for further information.

Seasonal restrictions on vegetation management activities may be imposed to protect or manage featured plant or animal species, to provide recreational opportunities, or to protect soil and water resources.

In all harvest systems and forest types, retain a component of healthy trees of species, which are minor components of a stand, particularly mast producers.

In timber harvest units, retain low-growing, flowering, and fruiting trees and shrubs unless their presence would preclude adequate regeneration of the desired tree species. Retain wild grape areas unless it interferes with the establishment and growth of desirable tree seedling regeneration or unless they are causing significant damage to overstory vegetation. Where necessary to remove low growing, flowering, fruiting trees or wild grape, ensure a component is retained within the stand and on the landscape.

In intermediate cuttings and the first entry of a regeneration sequence (e.g. a shelterwood seed cut or transition cut) retain good quality seed trees of diverse species representative of the existing stand and desired in the next stand. Preserve seed sources of scarce species, and strive for uniform spacing among residuals whenever possible.

Retain hemlock and white pine in stands, particularly in winter ranges, where it provides habitat for species with viability concerns, or where it is a minor component on the landscape. Where desirable to regenerate a forested stand, and it is necessary to remove hemlock or white pine, ensure a component is retained within the stand (>15 feet of basal area/acre) and on the landscape.

To provide thermal cover and habitat diversity, maintain a rhododendron, white pine and mountain laurel component in harvest units where they currently occur.

If a butternut tree is found, the tree will be assessed to determine whether it has been affected by the butternut canker disease. If it is determined that the tree may be resistant, activities, which promote seed production and germination such as release, seedbed preparation and fencing should be identified and implemented.

Harvest practices should be consistent with management area direction as well as Table 21, which identifies the harvest cutting methods that are silviculturally preferred for each management area.

Photo courtesy of US Forest Service

Table 21. Harvest Cutting Methods on the ANF by Forest Type and Management Area

<table>
<tr><th>MA</th><th>Aspen</th><th>Allegheny Hardwoods</th><th>Upland Hardwoods</th><th>Northern Hardwoods</th><th>Oak</th><th>Conifer[1]</th><th>Hemlock</th></tr>
<tr><td>2.1</td><td rowspan="3">Clearcut</td><td colspan="5">Single Tree and Group Selection</td></tr>
<tr><td>2.2</td><td colspan="3">Intermediate Thinning, Single Tree and Group Selection, Two-aged Harvest</td><td>Intermediate Thinning, Shelterwood/ Removal Cut, Two-aged Harvest</td><td>Intermediate Thinning, Shelterwood/ Removal Cut, Two-aged Harvest, Single Tree and Group Selection</td><td>Single Tree and Group Selection</td></tr>
<tr><td>1.0, 3.0</td><td colspan="5">Intermediate Thinning, Shelterwood/Removal Cut, Clearcut[2,3]</td><td>Single Tree and Group Selection, Intermediate Thinning, Shelterwood/ Removal Cut</td></tr>
<tr><td>5.1, 5.2, 8.3, 8.5</td><td colspan="7">Natural succession, no timber harvest</td></tr>
<tr><td>7.1, 7.2, 8.1, 8.2, 8.4</td><td colspan="7">Natural succession, with silvicultural and salvage activities in response to forest health threats, decline, and mortality or other non-timber objectives</td></tr>
<tr><td>6.1, 6.3, 8.6</td><td colspan="7">Even-aged or uneven-aged silvicultural system may be used, preference determined by management area objective and silvics of species</td></tr>
</table>

[1] The conifer forest type primarily consists of red pine plantations.

[2] In these forest types, single tree or group selection may be appropriate in riparian zones and where necessary to meet Scenic Integrity Levels. Single tree selection should only be applied in areas with greater than 35 basal area per acre of shade-tolerant species to serve as a seed source (Marquis et al. 1992, p. 57). In some cases two-aged harvesting may be appropriate to meet wildlife objectives or Scenic Integrity Levels.

[3] Clearcut is appropriate only where it is determined to be the optimal regeneration method. Refer to Appendix A and clearcutting standards under even-aged management direction for additional details.

Steep Slopes

Guidelines

Slopes greater than 40 percent are not suited for scheduled timber harvest. In salvage situations, on slopes greater than 40 percent, full suspension yarding or winching should be used.

Fuels

Guidelines

To reduce the risk of fuel loading, trees should be directionally felled away from well pads, pipelines, power lines, roads, private property, and recreational facilities.

Even-aged Management

Intermediate Treatments

Guidelines

Commercial thinnings may be appropriate in stands or portions of stands that have a stocking level of more than 80 percent and generally should not occur within 10 years of a scheduled regeneration cut.

Pre-commercial thinning or release may be appropriate in those stands that contain good quality stems that are being overtopped by poor quality trees or undesirable species. In order to maximize benefits from pre-commercial thinning, including releasing less abundant species, complete the work when the stand is 15 to 40 years old. Complete release when the stand is 5 to 20 years old.

Rotation Age

Standards

The minimum rotation age corresponds with the point at which the stand has exceeded 95 percent of Culmination of Mean Annual Increment (CMAI) of growth. The minimum rotation age is based upon second growth stands that are likely to be available for regeneration or final harvest in the plan period.

Final harvest for the corresponding forest types shall not begin earlier than the age shown in Table 22. The following exceptions apply to accomplish other resource objectives such as wildlife habitat, forest health, or catastrophic events:

- To regenerate areas for experimental or research purposes.
- To salvage stands and regenerate impacted by insects, disease or catastrophic damage from wind, ice, fire, etc., or to stop the spread of an insect or disease outbreak.
- To improve the condition of stands which have a high risk of dying within the next 10 years or which are sparsely stocked and will be unable to utilize the site within ten years.
- To provide early structural habitat for wildlife.
- MA 1.0, which is managed to feature early structural habitat.

When stands are thinned, the regeneration harvest sequence shall not begin for a minimum period of ten years after the completion of the thin.

Table 22. Minimum Rotation Ages for Final Harvest

Forest Type	Minimum Rotation Age (years)
Allegheny Hardwoods	60
Upland Hardwoods	70
Oaks	70
Northern Hardwoods	60
Aspen	*
Hemlock	60
Conifer	50

***** Rotation ages in aspen stands are set to accomplish landscape, habitat and wildlife objectives for a young aspen component, not timber harvest objectives.

Clearcutting

Standards

Clearcutting shall only be used when it is determined to be the optimum method of regeneration to achieve the following resource objectives (Refer to Appendix A for further detail):

- Salvage stands impacted by insects, disease or catastrophic damage from wind, ice, fire, etc., or to stop the spread of an insect or disease outbreak.
- Improve the condition of stands which have a high risk of dying within the next 10 years or which are sparsely stocked and will be unable to fully utilize the site within 10 years.
- Regenerate stands that are intolerant of shade.
- Regenerate areas with adequate advanced tree seedlings that can be regenerated through one entry rather than two.
- To provide early structural habitat for wildlife.
- To regenerate aspen.

Temporary Openings Created by the Application of Even-aged Silviculture

Standards

Except for permanent openings and areas with catastrophic damage from wind, ice, fire, insects/disease, etc. use the appropriate mix of regeneration treatments by forest type to ensure regenerated stands are adequately stocked with the desired species mix within five years of final harvest, single tree, or group selection. A final harvest is defined here as a clearcut, shelterwood removal cut, or two-aged harvest.

The maximum size temporary opening created by even-aged management shall be 40 acres except for:

- On an individual sale basis after 60 days public notice and review by the regional forester.
- As a result of natural catastrophic condition, such as fire, insect and disease, or windstorm.
- In management areas that specify a smaller size.

Temporary openings shall be separated by a manageable stand. The minimum spacing between temporary openings shall be 300 feet.

A temporary opening shall no longer be considered an opening when the height of dominant and co-dominant vegetation in the opening has reached 15 feet tall and has been certified as restocked.

Even-aged treatments must retain residual trees, snags and down material identified in 2600 Wildlife, Fish and Sensitive Plant Habitat standards and guidelines.

Uneven-aged Management

Guidelines

The age of the first entry (transition cut) under an uneven-aged system should normally be 60 years.

The minimum stand size to be managed normally will be 10 acres.

Single tree selection should only be applied where more than 35 square feet per acre (basal area or BA) of healthy, shade tolerant species (sugar maple, American beech, eastern hemlock, chestnut oak, and white oak) are present in the stand prior to harvest.

Unless management area or multiple use objectives dictate, single tree selection should not be applied in oak (more than 30 BA of northern red oak), Allegheny hardwoods, aspen, or red pine stands.

Group selection, including for the purposes of restoring mature forest understory conditions, is appropriate with varying group sizes as specified:

- Upland hardwoods: Generally 1 to 3 acres.
- Northern hardwoods: one-half to 2 acres.
- Hemlock: one-half to 2 acres.
- Allegheny hardwoods: 2 to 3 acres.
- Oak hardwood: one acre (chestnut and white oaks) to three acres (northern red oaks).

Every commercial selection cut in the stand should include appropriate reforestation practices to develop a new seedling age class with that entry.

Reforestation

Natural Regeneration

Standards

The primary means of regenerating hardwood forest types shall be through natural regeneration. Make final harvests, single tree or group selection harvests only from those sites where adequate restocking through natural regeneration of desired trees within five years is highly probable. A final harvest is defined here as a clearcut, shelterwood removal cut, or two-aged harvest.

Stocking surveys will be completed in all regeneration harvests to monitor seedling development and determine the need for reforestation treatments such as site preparation, herbicide application, fencing, fertilization, planting, and release.

Guidelines

After a shelterwood seed cut or other regeneration treatment, site evaluation should occur to prescribe and schedule other activities and/or final harvests at the earliest appropriate time, in order to produce a diversity of well established seedlings and minimize the potential for regeneration failures.

Prioritize regeneration harvests to occur where advanced regeneration is present, and at risk, due to shade or competition.

Final removal cuts on rocky sites or on poorly drained soils should occur when seedlings are very well established (generally greater than six inches tall except for oak species, which should be tall enough to be competitive with other species) in order to minimize potential seedling desiccation or mortality.

Artificial Regeneration

Standards

Artificial regeneration shall be limited to fill-in planting to supplement natural regeneration abundance and diversity. In some cases, full planting may be necessary where natural regeneration methods have failed, or where extensive overstory tree mortality has occurred due to factors such as windthrow or insect and disease activity.

Stocking surveys shall be used to assess the need for supplemental planting.

Guidelines

Species planted should be those best suited to the existing forest type and site conditions. Utilize disease resistant and improved stock when available. Soil drainage and planting stock availability may influence species choice.

Shade-intolerant species (such as northern red oak, black cherry, and yellow poplar) should not be planted where the relative density of overstory trees exceeds 40 percent.

Hardwood seedlings should be at least two-year-old stock.

Where full planting is desirable to convert a non-forested area to forested, 436 seedlings/acre (10 feet by 10 feet spacing) for hardwoods, and 908 seedlings/acre (six feet by eight feet spacing) for conifer are optimal numbers.

Site Preparation

Chainsaw or Manual Site Preparation

Guidelines

Site preparation will occur where woody vegetation such as beech, striped maple, red maple, birch, pin cherry, or other hardwoods interfere with the establishment and growth of a diversity of desirable tree seedlings.

Site preparation should occur in reserve areas only when necessary to meet specific resource objectives, such as, but not limited to, riparian and wildlife, or to conserve species with viability concerns. Site preparation may occur in reserve areas to remove midstory and understory woody vegetation in order to promote desirable seedling regeneration, develop structure, or promote a desired understory response.

Scarification

Guidelines

If mechanical scarification is prescribed to encourage oak seedling development, it should be scheduled to occur in the fall (early October to November) during good acorn crop years.

Prescribed Burning

Standards

Prescribed burning shall not occur until at least 180 days have elapsed since herbicide application.

Guidelines

Prescribed burning to reduce woody interfering vegetation and promote oak seedling growth should occur following the shelterwood seed cut, once sufficient established oak regeneration is present (>one-quarter inch root collar diameter or >6 inches tall) and interfering woody vegetation has had time to become established. Oak seedlings with a root collar diameter less than one-quarter inch or less than 6 inches tall are considered “new” and less likely to re-sprout following burning than established oak seedlings.

In areas planned for prescribed burning, avoid concentrating slash around reserve and seed trees, oil and gas facilities, and other features. Use methods such as directional felling away from these features or pulling slash back.

Prescribed burning to promote oak composition should be a hot (>3 foot flame length) fire that occurs when leaf expansion of targeted interfering vegetation is susceptible to injury or mortality from burning.

Herbicide Application

Standards

Herbicides will be used where appropriate to carry out silvicultural prescriptions as indicated in site-specific project Environmental Assessments (EAs) or Environmental Impact Statements (EISs). In addition, any new methods of stand regeneration can be considered when deemed safe, economical, and biologically feasible.

Refer to the 2100 Environmental Management – Pesticide Use section for herbicide application standards and guidelines.

Fencing

Guidelines

Fencing should be used in stands with a diverse seed source, where a diversity of seedlings exists or has the potential to develop, or where the potential for natural regeneration failure exists.

Fencing should be used in all forest types where needed to limit browsing damage to tree species preferred by deer (e.g. oaks, white pine, aspen, sugar maple, yellow poplar, cucumber, and ash) or maintain species diversity. Consider pre-fencing (prior to initial regeneration harvest, such as the shelterwood seed cut) areas dominated by tree species that are slower to become established.

Planted hardwood and softwood seedlings should be protected from deer browsing by using tree shelters or fences.

Fences should be maintained and fence removal should be scheduled only after the risk of significant animal damage has passed and stand has been certified as established. In some instances fences may be removed or cut open to allow some browsing of tree species, such as birch and pin cherry, that are dominating regenerating stands and reducing species diversity.

Ground clearing width during fence construction should be minimized to only that necessary to allow passage of fence maintenance equipment around the perimeter of fences.

In order to minimize ground disturbance, use hand clearing methods to clear the area along the fence perimeter within 50 feet of an intermittent or perennial stream.

Fertilization

Guidelines

Nitrogen and phosphorus fertilizer should be used primarily on the Allegheny hardwood forest type, where the predominance of seedlings is black cherry, or the potential for regeneration failure exists.

To help maintain soil nutrient (base cation) status, broadcast application of nitrogen based fertilizer on plateau, shoulder and upper backslope landforms should be avoided.

During fertilization projects, a buffer strip of 50 feet should be maintained along streams with flowing water.

Forest Products/Special Forest Products

Special Forest Products

Standards

A permit is required for commercial collection of special forest products.

Guidelines

Collection of special forest products may be authorized provided it is consistent with management area emphasis and will not threaten or diminish the character or purpose for which the management area was designated. Requests should be evaluated for compliance with applicable authorities and sustainability analyses.

Wood Utilization

Standards

Wood utilization standards in Table 23 will apply to all timber sold or otherwise disposed of.

Table 23. Wood Utilization Standards

Product Type	Minimum Tree Specifications[1]	Minimum Piece Specifications		
	DBH (inches)	Length[2] (feet)	Diameter Inside Bark at Small End (inches)	Percent of Gross Measure
Hardwood Sawlogs[3]	11.0	8	9.6	40%
Softwood Sawlogs	9.0	8	7.6	40%
Hardwood Pulpwood	6.0	8	5.0	70% sound[4] and reasonably straight[5]
Aspen Pulpwood	6.0	8	5.0	
Softwood Pulpwood	5.0	8	4.0	

[1] A minimum tree must include at least one piece that meets minimum specifications.

[2] Plus trim allowance on sawtimber.

[3] Trees meeting Tree and Piece specifications of 11.0 inches DBH are considered sawlogs.

[4] Seventy percent applied to rot, voids, and char. Mechanical type defects, such as sweep, crook, spider heart, and ring shake, shall not be considered.

[5] Reasonably straight: When the true center line of a minimum length piece does not deviate more than one-half the inside diameter of the small end, plus one inch from a straight line drawn between the centers of the ends of the piece.

Oil and Gas Activity Coordination

Guidelines

Pipelines, electric lines, utility lines, and wells in the treatment areas should be located and flagged where necessary so contractors' equipment can avoid damage to these structures.

2500 Watershed and Air

Soil

For direction to control detrimental soil disturbance refer to FSH 2509.18 – Soil Management.

Standards

Disturbed soils dedicated to growing vegetation shall be stabilized by seeding, mulching, or constructing structural measures as soon as possible after project completion or prior to periods of inactivity. The intent is to minimize the time that soil is exposed on disturbed sites or retained in impaired condition.

Guidelines

The Forest should limit the use of heavy equipment, such as dozers, excavators, tractors, and skidders, on soil types that include the following soil/site area conditions:

- Slopes Greater Than 40 percent – Heavy equipment use on these slopes should be avoided. When salvage harvests are needed on these slopes, full suspension yarding or winching should be used.
- Soils Susceptible to Landslides (GIS file: colluvial_slides) – Heavy equipment use on slopes greater than 15 percent with soils susceptible to mass movement when loaded, excavated, or wet should occur when soils are dry. During periods of freeze-thaw and for one to multiple days following significant rainfall events, these activities should involve mitigation measures to prevent landslides. If the risk of landslides during these periods of concern cannot be mitigated, then activities should be prohibited.

- Soils Commonly Wet At/Or Near The Surface During A Considerable Part Of The Year or Soils Highly Susceptible To Compaction (Group 3 Soils) – Heavy equipment use should be prohibited or mitigated when soils are saturated or during freeze-thaw cycles. Aspect may play a role in determining the ability to safely operate on these soil types.

Vegetation

Standards

Equipment operation, except in emergency operations, will only occur when soils are capable of supporting equipment without incurring detrimental compaction, puddling or rutting in excess of regional standards (Forest Service Handbook 2509.18 – Soil Management).

Guidelines

The grade of skid trails should not exceed 20 percent, except that lengths up to 200 feet may pitch to 35 percent when sufficient cross-drainage is provided.

Avoid the use of bench skid trails and temporary roads that cut into the slope. Where used, bench skid trails and temporary roads should be restored to the approximate original contour after final harvest. Natural drainage pattern should be restored after each entry.

After use, temporary roads, skid trails and landings not intended for future use should be permanently closed, restored, and erosion-controlled.

Landings intended for additional use after harvest should be designed to accommodate the future use while minimizing erosion and runoff.

To maintain soil nutrients, avoid whole tree harvesting and leave slash from harvest operations where felled. Slash may be used to reduce compaction by driving over the slash in the skid trails, but all slash should remain in the unit and should not be hauled to the landing. (Refer to 2380 Scenery standards and guidelines.)

Construction Activities

Guidelines

Topsoil should be salvaged from an area prior to construction of buildings and borrow pits for use during subsequent landscaping and reclamation. Stockpiled materials should have erosion control, such as mulch, applied as soon as possible after disturbance. Prior to use of the soil material for reclamation, soil chemistry tests should be done to assess the quality of the soil and needs for fertilization or liming.

Road and Trails

Guidelines

Construction of roads and trails should be avoided on poorly drained soils. Additionally, avoid poorly drained soils for construction of landings, camping areas, picnic areas, vault toilets, and septic systems. If roads, trails, or facilities must be constructed on poorly drained soil, provide for mitigations to minimize impacts.

Road construction should be avoided on colluvial soils formed on shale due to the high hazard of landslides.

The grade of permanent and temporary roads should normally be between 2 and 8 percent, with grades up to 15 percent acceptable for short pitches up to 200 feet when sufficient stabilization is provided.

Wildland and prescribed fire

Guidelines

After control of a wildland fire or completion of a prescribed burn, erosion, sedimentation and runoff mitigations should be implemented on fire lines and other disturbed areas.

Utilities

Guidelines

Pipelines, gas lines, or electric lines (transmitting less than 34.5 kV) should be buried at a minimum depth of 3 feet to protect from damage and freezing. Exceptions may be made if site conditions warrant, such as bedrock requiring blasting.

All Water Resources

Standards

The appropriate state or Federal permits will be acquired for the discharge of dredged or fill material into a waterway, its 100-year floodplain, or any lake, pond, reservoir, or wetlands following Commonwealth Regulations and Section 404 of the Clean Water Act.

Support the most protective water use designation merited by the biological and chemical characteristics of a stream basin as defined by Pennsylvania Department of Environmental Protection 25 Pa. Code, Chapter 93, Water Quality Standards Regulations.

Guidelines

Maintain watershed health and water quality by following guidelines contained in the current versions of "Timber Harvest Operations Field Guide for Waterways, Wetlands, and Erosion Control" and "Erosion and Sediment Pollution Control Program Manual," Department of Environmental Protection, Commonwealth of Pennsylvania.

Firewood should not be collected from streams, wetlands, springs, seeps, or vernal ponds.

Streams and wetlands should be kept free of logging debris, sawdust, equipment, oil, and other materials or obstructions. Leaving tops and limbs or adding large wood may be prescribed for improvement to stream diversity, aquatic or amphibian habitat, and floodplain structure.

Riparian Corridor

Standards

During project-level planning and implementation, identify riparian corridors, defined on the basis of soils, vegetation and hydrology (surface and ground water), that will maintain the ecological functions and values associated with the riparian area. Riparian corridors will vary by water feature, and at a minimum will be defined following the fixed width distances in Table 24. For stream channels, riparian corridor widths shall be applied to both sides of the channel, measured from the top of the channel bank. For perennial water bodies, the distance is measured from the high water mark of each bank.

When management activities occur in the riparian corridor, special attention will be given to soils, hydrology, and riparian dependent resources.

Table 24. Fixed-width Distances for the Identification of the Riparian Corridor

Water Features	Distance from each bank or ordinary high water mark, measured as slope distance
Allegheny River	Minimum of 300 feet
Wilderness Trout Streams, Remote Trout Streams, or Class A Trout Streams[1]	Minimum of 200 feet or 50 feet plus 4 feet for every 1 percent of slope, whichever is greater.
Perennial streams and other perennial water bodies	Minimum of 100 feet or 50 feet plus 4 feet for every 1 percent of slope, whichever is greater.
Intermittent streams and mapped wetlands – water does not need to be present on the surface at the time of inventory	Minimum of 50 feet plus 2 feet for every 1 percent of slope.

[1] For the current listing of streams classified as Class A Trout Streams, reference the Pennsylvania Fish and Boat Commission website.

In addition to standards and guidelines for water resources, activities within riparian corridors in the "13 Percent Area" will comply with direction under the 2600 Wildlife, Fish, and Sensitive Plant Habitat section for northern riffleshell and clubshell.

In addition to standards and guidelines for all perennial streams, land-disturbing activities within the riparian corridor of the Allegheny River will comply with MA 8.1 direction.

Guidelines

The area within 200 feet of Wilderness Trout Streams, Remote Trout Streams, and Class A Trout Streams should be restricted from vegetation management unless there is a need to allow activities for the maintenance or improvement of riparian health, such as the treatment of invasive species.

Vegetation management within the riparian corridor should meet plan objectives for 2500 Watershed and Air. These activities should avoid downstream effects to stream temperature so that the stream's protected uses are maintained.

Trees should not be removed within 10 feet of stream channel banks except for road construction or road and trail maintenance.

Skidding or cable yarding should not cross stream channels unless full suspension or a crossing structure is used.

To avoid rutting within riparian corridors, heavy equipment operation should utilize low ground pressure (less than 15 psi contact pressure with zero inches of penetration) or occur during proper site conditions (dry or frozen).

Heavy equipment should not be operated within 10 feet of intermittent streams or within 50 feet of perennial streams except for facility, trail, and road maintenance, stream crossing construction or stream restoration.

Avoid construction of new facilities, roads, oil and gas developments, motorized trails, landings and buildings within the riparian corridor (see Table 24).

Where new or existing permanent roads are within 300 feet of perennial and intermittent streams, a high quality, non-erosive surfacing material, binding material, or other suitable material should be used to control sediment delivery.

Where new or existing motorized trails are likely to cause or are causing sedimentation of perennial and intermittent streams, a high quality, non-erosive surfacing material, binding material, or other suitable material or methods should be used to control sediment delivery.

Roads and trails should be designed and constructed to avoid directing surface runoff into streams.

Control erosion and effectively manage water flow on and adjacent to roads and trails by providing frequent roadside and outlet ditches, ditch checks, and cross-drainage as determined by soils, road grade, length of slope draining to road, and impacts of other upslope roads.

Energy dissipaters should be used where needed to prevent gully formation on discharge slopes.

Both permanent and temporary crossings by new roads, motorized trails, and skid trails over perennial or intermittent streams should be limited to essential crossings. When permanent or temporary crossings of perennial or intermittent streams are needed, bridges, bottomless arches, or culverts should be utilized to maintain fish and aquatic passage, stream channel structure, erosion control, bank stability, and stream gradient.

Newly constructed or reconstructed road and trail crossings of streams should be designed and built to minimize erosion. A high quality, non-erosive surfacing material, binding material, or other suitable material should be used to control sediment delivery where vegetative cover is either inappropriate or expected to be inadequate for effective erosion control. Pit run sandstone is only appropriate for stream crossings as a subgrade material. Solid surfaces will be used in the construction or reconstruction of bridge decks on unpaved roads.

Permanent stream crossing structures should be designed and constructed to withstand a minimum of a 50-year storm event and should not constrict the channel width.

Temporary stream crossings should be constructed to accommodate at least the bank full flow.

Stream crossings for non-motorized trails should be located at sites with stable stream banks and streambeds.

On streams containing reproducing wild trout, the construction or replacement of stream crossings should be accomplished between January 1 and September 30 to avoid impacts to spawning trout.

Woody material naturally occurring in streams should only be removed when the material is degrading fish habitat in the stream section, or when damage is likely to infrastructures such as bridges and culverts or private property. When a river is impassible due to woody debris, remove only the portion necessary for safe passage of boats. The need for removal is determined on a case-by-case basis.

The drafting of water from a stream should maintain existing uses such as fish and aquatic life, including threatened and endangered species and their habitat.

Wilderness Trout Streams (Pennsylvania classification)

Standards

The following streams, listed in Table 25, shall be managed to conform to Wilderness Trout Stream criteria according to Pennsylvania Fish and Boat Commission Policy No. 400-17-69.

Table 25. Wilderness Trout Streams

Wilderness Trout Stream	Location
Arnot Run	Warren County
Crane Run	McKean and Elk Counties
East Hickory Creek	above its confluence with Middle Hickory Creek, Warren County
Four Mile Run	Forest County
Wildcat Run	Warren County
South Branch Kinzua Creek	from its headwaters downstream to the confluence with Hubert Run, McKean County

For these Wilderness Trout Streams, the following apply:

- No more than one stream crossing every two stream miles on open roads shall be permitted.
- No open roads shall parallel the stream within one-quarter of a mile.
- ATV/OHM (motorized) trails shall not occur within the area that drains into any designated stream.

Remote Trout Streams (ANF classification)

Guidelines

Stream crossings on these four Remote Trout Steams, listed in Table 26, should not occur, nor should open roads or ATV/OHM (motorized) trails parallel the streams within one-quarter of a mile.

Table 26. Remote Trout Streams

Remote Trout Stream	Location
East Fork Run	Forest, Warren, and McKean Counties
Morrison Run	McKean County
Pell Run	Warren County
Tracy Run	Warren and McKean Counties

Wetlands, including Springs, Seeps and Vernal Pools

Standards

Wetlands[1], including seeps[2], springs[3], and vernal pools[4], that may be affected by a project will be identified during project planning or implementation.

A **Wetland Management Zone** will be established around wetlands that may be affected by a project. In this zone, limited activities will occur as defined in the guidelines for the protection of wetlands and plants and animals that utilize them. The zone for wetlands including springs and seeps is **100 feet** and the zone for vernal pools is **200 feet**. The distance is measured from the high water mark of the wetland perimeter.

[1] Wetlands – Those areas that are inundated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, seeps, springs, vernal pools, and other similar areas.

[2] Seeps – Broad, shallow, slow-moving flow that occurs where groundwater emerges on strongly sloping to steep side slopes and low slope colluvial landforms. Characterized by silty, sandy, or stony beds, saturated soils, and plants adapted to wet soils. These are one of the first areas in the spring where vegetation emerges. Seeps provide year round habitat for a variety of plant and animal species, including amphibians and invertebrates. During the winter months as the groundwater melts or reduces snow cover, seeps are important foraging areas for wild turkeys, deer, and other wildlife.

[3] Springs – Small to large defined flow from a clearly defined opening in the ground where the water table intercepts the groundwater.

[4] Vernal pools – Naturally occurring or constructed small pools or depressions that are inundated for a period of time each year, primarily late fall through spring, as a result of a combination of snowmelt, precipitation and high water tables. These pools dry up for a period of time, generally during the summer and early fall. Vernal pools are free of fish and the pool basin is utilized breeding habitat for pool-dependent amphibians and invertebrates. Vernal pools are not puddles or pools formed from ruts in roads or skid trails. Indicators during the summer or fall

when they are dry include blackened or compressed leaf litter, buttressed tree trunks, and water marked tree trunks.

Guidelines

Trees should not be removed within 25 feet of wetlands, including springs or seeps. From 25 feet to 100 feet, maintain at least an average of 50 percent canopy cover.

Trees should not be cut within 100 feet of the high water mark of vernal pool. From 100 to 200 to feet from the vernal pool, maintain at least an average of 50 percent canopy cover to protect amphibian habitat.

Trees should be felled away from wetlands. Logs should not be skidded through the no-cut buffers.

Heavy equipment operation should be excluded within 25 feet of wetlands and within 100 feet of vernal pools except for facility, trail and road maintenance or wetland restoration.

To avoid rutting, heavy equipment use should utilize low ground pressure (less than 15 psi contact pressure with zero inches of penetration) or occur during proper site conditions (dry or frozen) within 25 to 100 feet of these wetlands and within 100 to 200 feet of vernal pools.

Construction of new facilities, roads, oil and gas developments, motorized trails, landings, and buildings should occur outside of the wetland management zone. When wetlands can not be avoided, impacts to wetland ecology should be minimized following these guidelines:

- Roads and trails should be designed and constructed to avoid directing surface runoff into wetlands.
- Crossings should be located at the narrowest point of the wetlands and should not constrict flow or cause channelization of wetlands.
- All fills in wetlands should be constructed of free draining granular material.
- Roads should be constructed upslope of wetlands, seeps or springs at a distance sufficient to avoid disturbing the subsurface flow. When roads must pass below springs or seeps, they should pass at a point where the flow goes below ground or where a defined channel permits the least damage.

Where new or existing permanent roads or motorized trails are likely to cause or are causing sedimentation of wetlands, a high quality, non-erosive surfacing material, binding material, or other suitable material should be used to control sediment delivery.

Table 27. Overview of Guidelines for the Wetland Management Zones

Water Features	Wetlands, Including Springs and Seeps	Vernal Pools
	Distance is measured from the wetland perimeter or high water mark.	
Wetland Management Zone No new construction. Travel and maintenance permitted on existing roads and trails.	0 to 100 feet	0 to 200 feet
Excluded Activities No heavy equipment use or removal of vegetation except for maintenance or wetland restoration.	0 to 25 feet	0 to 100 feet
Limited Management Retain at least an average of 50 percent canopy cover.	25 to 100 feet	100 to 200 feet
Heavy Equipment Limitations Utilize low ground pressure or occur during proper site conditions to avoid rutting.	25 to 100 feet	100 to 200 feet

Municipal Watersheds

Guidelines

Project activities that have the potential to affect the municipal water supply should be coordinated with the water district or municipality served.

Construction of roads and motorized trails across perennial and intermittent streams in municipal watersheds should be avoided.

Aquatic Habitat

Reservoir/Impoundments

Guidelines

The placement of fish habitat improvement structures in impoundments should not interfere with concentrated boat traffic areas.

Existing impoundments should be managed to maintain fish and wildlife habitat and recreation benefits.

Rivers and Streams

Guidelines

Habitat restoration/enhancement projects should only occur where water quality is suitable for the propagation of aquatic species.

Habitat should not be artificially improved on the four long term monitoring streams listed in Table 28.

Table 28. Long Term Monitoring Streams

Stream	Ranger District	Tributary to
Blood Run	Marienville	Tionesta Creek
Buck Lick Run	Bradford	Chappel Fork
Mead Run	Bradford	Tionesta Creek
Slide Run	Marienville	Big Mill Creek

Protected trout stocking areas on streams within the ANF should be maintained and comply with Pennsylvania Fish and Boat Commission's policy and directives.

The application of lime or other buffering agents to streams or impoundments should only occur where water quality is acidic and native and/or desired non-native species would benefit.

Air

Guidelines

Management activities, including permitted activities, which would degrade air quality below National and Pennsylvania Ambient Air Quality Standards, should be prohibited.

2600 Wildlife, Fish and Sensitive Plant Habitat

Note: Design criteria for aquatic and riparian habitats is described in the previous section (2500 Watershed and Air).

Habitat and Species Diversity

Guidelines

In areas of partial or final timber harvest, scattered tree tops and branches (slash) should be left where felled throughout the stand. A minimum of one 12 inch or greater DBH log (minimum of 8 feet long) per acre should be left in final harvest units.

In all timber harvest units, one-quarter acre within each 5 acres of harvest should be set aside as reserve areas. Layout of reserve areas should emphasize the following: vernal ponds, wet depressions, unique plant communities, rock complexes, den trees, snags, conifers, mast-producing species, and tree or shrub species that are a minor component of the stand.

In all harvest units the following snags should be retained per acre where available: 3 snags greater than 18 inches in diameter, 3 snags between 10 and 18 inches in diameter, and 3 snags less than 10 inches in diameter.

Where they occur, up to five den trees per acre greater than 20 inches DBH should be retained. Den trees exhibit at least one noticeable cavity. Trees with the largest cavity receive the highest retention priority.

A set of currently identified and mapped potential old growth areas should be maintained. These areas may be reevaluated and adjusted during project planning.

Local roads should be closed to vehicular traffic to mitigate impacts to turkey brood habitat areas from May 1 to September 1.

Vegetation management should provide habitat for cavity-nesting birds and mammals as well as songbirds.

Re-introduction of native animal and plant species should occur only after the suitability of the habitat has been assessed and coordination with the appropriate Commonwealth agencies has occurred. For most re-introduction efforts, the appropriate Commonwealth agency will be the lead agency.

Site preparation, cleaning and weeding treatments that remove saplings from forested stands should occur outside the songbird nesting season (April 1 to June 30).

New roads, trails, recreation facilities, pits, and other developments should be located to avoid key deer and turkey winter ranges and brood rearing habitat as shown on district maps.

Species with Viability Concerns:

To conserve key habitat components, new roads, trails, recreation facilities, pits and other developments should be located to avoid occupied habitat of species with viability concerns including rock ledges and outcroppings, large boulder areas, bat hibernacula and historic rattlesnake dens.

Specialized habitats and inclusions should receive treatments to specifically benefit game and non-game species, species with viability concerns or unique ecological communities. Examples include creation of basking areas for rattlesnakes and increasing vertical structure and understory diversity for songbirds

Impacts from timber harvest and reforestation treatments to species with viability concerns should be avoided or mitigated through the use of seasonal limitations and other measures.

Existing motorized trails and Forest Service roads should be managed to mitigate impacts to species with viability concerns. Where impacts cannot be avoided, an evaluation will be completed to assess impacts and determine if management changes are necessary.

Direct impacts to less mobile species (e.g. reptiles, amphibians, and small mammals) may be mitigated through trail relocation.

Indirect impacts (e.g. noise disturbance) should first be monitored to determine the severity of impact. Possible mitigation may include seasonal trail closure or relocation.

Impacts from new trail construction to habitat features for species that are sensitive to human disturbance, such as great blue heron colonies, rattlesnake dens, goshawk nests, wood turtle nesting sites, and others, should be mitigated. Specific buffer zone distances are provided for several species (refer to Table 29 immediately following this section). New trails should be designed to avoid or mitigate impacts to species with viability concerns.

Construction of new developed recreation facilities should not adversely impact habitat for species with viability concerns.

Grasslands and Managed Openings

Guidelines

Since many high priority grassland nesting songbirds can raise two or more broods in a single season, maintenance activities in large grasslands greater than 75 acres should be limited to outside the nesting season (April 15 to September 15) unless the site has been surveyed and it is determined that species with viability concerns are not nesting.

Existing grasslands greater than 75 acres in size should be maintained.

On grasslands greater than 75 acres in size, implement a rotational disturbance regime where fire is the preferred management tool. Other practices should be considered for maintenance.

Constructed wildlife openings and grasslands in upland forest areas should be maintained to provide brood rearing habitat for wild turkeys, ruffed grouse, and species with viability concerns.

Mowing or prescribed burning of permanent wildlife openings smaller than 75 acres should not occur between May 15 and June 30.

Large utility corridors should be managed to increase the shrub structure within the right-of-way.

Permanent openings adjacent to large utility corridors should be developed to promote connectivity of early structural habitat.

Existing “old field” habitat should be maintained and upland shrub/forb communities should be developed to meet the needs of the golden-winged warbler and other declining shrub nesting species.

Some openings should be managed to provide late fall mast (fruit producing shrubs) for turkeys while others should provide grass and forb areas for brood rearing.

Known woodcock singing grounds, breeding areas, and migration stopover sites should be managed to sustain shrubs, small openings and other woodcock habitat features.

Federal Threatened and Endangered Species

Indiana Bat

Standards

Retain all shagbark hickory.

In all harvest units where available, retain at least 9 snags per acre greater than 10 inches DBH. These snags should have some bark remaining and should not pose a safety hazard to sawyers or the public.

For partial/intermediate harvests (e.g. thinnings, shelterwood seed/prep, selection cuts) in healthy stands (stands where volume being removed is predominantly healthy, living trees), retain canopy closure at 50 percent or greater.

All known roost trees on the ANF will be protected until such time as they no longer serve as a roost (e.g. loss of exfoliating bark or cavities, blown down, or decay). In the event that it becomes absolutely necessary to remove a known Indiana bat roost tree, such a removal will be conducted through consultation with the USFWS, during the time period when the bats are likely to be in hibernation (October 15 to March 31). Known roost trees identified as immediate threats to public safety may, however, be removed at any time following consultation with the USFWS.

For all timber harvests – retain at least three live trees per acre ≥20 inches DBH (or largest DBH available) of preferred roost tree species (e.g. oaks; hickories; red, silver, and sugar maple; American and slippery elm; black locust; green and white ash; eastern cottonwood). Where possible, these trees should be located in areas of the stand where the thick regeneration that occurs after a final harvest will not shade or obstruct flight to the tree – for example, in a riparian or wetland buffer, along the edge of a harvest, or in the one-quarter acre retained clumps. Retain an additional 6 live trees greater than 10 inches DBH per acre.

Guidelines

If occupied Indiana bat maternity roost trees are discovered, protect them from physical disturbance until they naturally fall to the ground. Designate an area of use based on site conditions, radio-tracking or other survey information, and best available information regarding maternity habitat needs. Minimize human disturbance in the foraging and roosting areas of the maternity colony until the colony has left the maternity area for hibernation. The character of the site should be maintained or enhanced year-round by: 1) maintaining an adequate number of snags, including known roost trees; 2) maintaining large live trees to provide future roosting opportunities; and 3) maintaining optimal roosting and small canopy gaps to provide a continual source of foraging habitat (USDI FWS 2005).

Within the area of use (known or likely foraging and roosting) determined for each maternity colony, conduct prescribed burning only during the hibernation season.

If occupied Indiana bat male roost trees are discovered during the summer season, protect them from physical disturbance by designating a 75-foot radius buffer zone around the tree(s). Within the buffer zone, no ground disturbing activity, prescribed fire, or timber harvest should occur. The buffer zone should remain in place until the roost tree naturally falls to the ground.

Protect known male roost trees from physical disturbance until they naturally fall to the ground.

Remove hazard trees between October 15 and April 1 whenever possible.

Demolition or removal of buildings or other manmade structures that harbor bats should not occur between April 15 and August 15. During this period, pups, juveniles, and pregnant or lactating females are present. Building demolition and removal will occur while bats are not present on the ANF and likely hibernating. Prior to demolishing a building that bats have used, install a bat box (or boxes) nearby to provide an alternate roost when they return. If public safety is threatened and the building must be removed while bats are present, a bat expert should examine the building to determine if Indiana bats are present. A bat box should be installed nearby before buildings that harbor bats are removed. If Indiana bats are present, the Forest Service will consult with the Fish and Wildlife Service.

Bald Eagle

Standards

Year-round, ground-disturbing activities that may disturb eagles or alter habitat such as timber harvest, land clearing, Federal oil and gas development, road construction and maintenance, trail construction and wildlife habitat improvement work shall be prohibited within a zone extending at least 660 feet from an eagle nest. In

some cases a larger buffer zone may be necessary and the final buffer will be determined on a case-by-case basis by a wildlife biologist. This prohibition does not apply to the implementation of measures that are necessary to protect or monitor the active nest such as signing or installation of predator guards, although such activities will be done in a manner that avoids adverse effects.

Recreational activities within 660 feet of active bald eagle nests will be avoided. This buffer will be established and maintained through the use of buoys, signs, road closures or other appropriate measures when necessary. If monitoring indicates a larger buffer is necessary to avoid adverse effects to a particular nesting pair, the Forest Service will establish and maintain a larger buffer. If monitoring results for a particular nesting pair indicate that use of a smaller buffer will result in no adverse effects, a smaller buffer may be established following consultation with the Fish and Wildlife Service, and continued monitoring to ensure the buffer is protective.

From January 15 to July 31 of each year, restrict management activities that result in disturbance to nesting birds within approximately 1,320 feet of each active nest location. Examples of management activities that should be restricted include road and trail construction and maintenance, timber cutting and hauling and Federal oil and gas development. Forest Service aircraft will avoid low level flights near active nests.

A burn plan will be prepared prior to implementation of any prescribed rugning with primary bald eagle habitat and will included smoke considerations or mitigation measures to reduce smoke related impacts to the bald eagle.

Local roads will be closed to public use where active nests are located on a case-by-case basis.

A 660-foot nest buffer will remain in place for five years after a nest has been declared abandoned.

When non-Federal activities (e.g. oil and gas development) are proposed within 1,320 feet of active bald eagle nests, the Forest Service will notify the developer of the presence of the eagle nest and the need to contact the USFWS. Concurrently the Forest Service will notify the USFWS of the project.

Any power lines will be installed in a manner consistent with the Avian Protection Plan Guidelines, including submission of a site-specific plan that will identify and reduce hazards to the bald eagle (USDI-FWS 2005a).

The Forest Service shall continue its efforts to identify and protect bald eagle roosting (winter and summer roosts) and foraging areas on the ANF. Federal activities that may result in the incidental take of roosting eagles or degradation of roosting habitat shall be avoided within 1,320 feet of known roost sites.

Guidelines

On the side slopes surrounding the Allegheny Reservoir, Allegheny River, Tionesta Creek, Clarion River, Kinzua Creek, and Salmon Creek, scattered white pine and other trees with potential for use as nesting or roosting trees should be maintained. Consider not only trees that are super canopy trees but also trees that may provide nesting or roosting sites in the future, such that a sustainable supply will be available. In an effort to maintain suitable unoccupied habitat, federal activities that may result in the degradation of roosting or nesting habitat should be avoided within 300 feet of the Allegheny Reservoir, Allegheny River, and Tionesta Creek.

Northern Riffleshell and Clubshell

In addition to complying with the standards and guidelines contained primarily in the 2500 Watershed and Air section to protect the northern riffleshell and clubshell, the following more restrictive standards and guidelines apply to the 65,489 acres of ANF lands that drain directly into the unimpounded section of the Allegheny River between Kinzua Dam and Tionesta Dam. This area (commonly called the “13 Percent Area”) of the ANF is of the most concern to these endangered mussels. Reference the 13 Percent Area map.

Standards

Proposed management activities shall be planned, evaluated, and implemented consistent with measures developed to protect the clubshell and northern riffleshell including those recognized to maintain, improve, or enhance their habitat. These measures include, but are not limited to, implementing standards and guidelines found in the ANF Land and Resource Management Plan.

Any roads or motorized trails constructed or reconstructed within 300 feet of a perennial or intermittent stream, shall use a high quality surfacing material to minimize sediment delivery. In the event that this cannot be achieved, notify USFWS.

Guidelines

Within riparian corridors identified in Table 24, timber harvesting activities should not occur.

Within riparian corridors identified in Table 24, herbicides should only be used for management activities necessary to control invasive exotic plant species.

Small Whorled Pogonia and Northeastern Bulrush

Standards

If plants or populations are found, temporarily halt any activities that may cause impact within 300 feet of the area of influence surrounding plants and/or populations. The area of influence includes suitable occupied habitat as well as the area appropriate to conserve populations and their habitat. Consideration of site characteristics, such as aspect; landform; overstory, midstory and understory shading; site topography; forest cover; and hydrological features will be used to determine this area of influence. Consult with the USFWS to determine and implement appropriate site-specific conservation measures before resuming activities.

Guidelines

Prior to ground disturbing activities or vegetation management activities, sites should be evaluated or surveyed for habitat for small whorled pogonia or northeastern bulrush to determine habitat suitability and/or occupancy.

Refine and implement the small whorled pogonia survey strategy where appropriate.

Species with Viability Concerns

Bats

Guidelines

Demolition or removal of buildings or other manmade structures that harbor bats should occur while bats are hibernating. If public safety is threatened and the building must be removed while bats are present, a bat expert should examine the building to determine if Indiana bats are present. A bat box should be installed nearby before buildings that harbor bats are removed.

Northern Flying Squirrel

Guidelines

Where the northern flying squirrel is documented, maintain >50 percent of the individual riparian conifer ecological land type (ELT) polygon in mature hardwoods and conifer and retain all conifer >18 inches DBH.

Birds

Northern Goshawk

Standards

Active Nests:

Active nests include nests where an adult bird has been observed during that nesting season, or a nest that contains greenery or other signs of activity and is within one-quarter mile of an adult bird that has displayed territorial or other signs of breeding behavior. Nests will be considered active for five years following the last year of documented activity.

Active Territory:

An area that contains one or more documented goshawk nests and includes nesting, foraging, and post-fledgling habitat. Territories will be considered active for five years following the last year of documented activity.

Nesting Season:

April 1 to July 31.

The following standards will be implemented within all active territories:

- A minimum of 70 percent of the territory shall be maintained as mid to late structural habitat.
- No new permanent openings greater than 4 acres in size shall be created.
- Seasonally restrict or close local roads during the nesting season.
- Only those management activities with minimal human disturbance, such as occasional pedestrian use, shall be permitted during the nesting season.

The following standards will be implemented within 660 feet of all active nests:

- Timber harvest shall not be permitted.
- New road or trail construction or activities that modify the landscape shall not be permitted.

The following standards will be implemented between 660 feet and 1,320 feet of all active nests:

- Timber harvest activities shall not occur during the nesting season.
- A minimum of 70 percent of the territory shall be maintained as mid to late structural habitat.

The following standards will be implemented within 1,320 feet of all active nests:

- New road or trail construction shall not be permitted.

The following standards will be implemented between 1,320 feet and 2,640 feet of all active nests:

- New road or trail construction shall not occur during the nesting season.
- Final harvest treatments or activities that modify the landscape shall not occur during the nesting season.

Red-shouldered Hawk

Standards

Active Nests:

Active nests include nests where an adult bird has been observed during that nesting season or a nest that contains greenery or other signs of activity and is within 1,320 feet of an adult bird that has displayed territorial or other signs of breeding behavior.

The following standards will be implemented within 330 feet of all active nests:

- No timber harvest, road and trail construction or other human disturbance that could result in modification of the landscape at any time of year shall be allowed.
- Seasonally restrict (refer to Table 29 immediately following this section) or close Forest Service local roads.

The following standards will be implemented between 330 feet and 660 feet of all active nests:

- No final harvest treatments, road construction, or other human disturbance that could result in modification of the landscape at any time of year shall be allowed.
- Seasonally restrict (refer to Table 29 immediately following this section) or close Forest Service local roads.

- Partial harvests shall occur only outside the nesting season.

The following standards will be implemented between 660 feet and 1,320 feet of all active nests:

- Seasonally restrict (refer to Table 29 immediately following this section) or close local roads.
- Partial and final timber harvests shall occur only outside the nesting season.
- Only those management activities with minimal human disturbance shall be permitted during the nesting season.
- Small to medium size (3 to 10 acres) openings are important habitat components and development shall be allowed.
- Stand structure and composition of the area should be maintained over time and 70 percent of the area shall be maintained as mid to late structural forest.

Great Blue Heron

Guidelines

Active Nests:

Active nests are defined as nests where an adult bird has been observed during that nesting season.

The following guidelines should be implemented within 330 feet of all active nests:

- No timber harvest, road and trail construction or other human disturbance that could result in modification of the landscape at any time of year should be allowed.
- Seasonally restrict (refer to Table 29 immediately following this section) or close Forest Service local roads.

The following guidelines should be implemented between 330 and 660 feet of all active nests:

- No final harvest treatments, road construction, or other human disturbance that could result in modification of the landscape at any time of year should be allowed.
- Seasonally restrict (refer to Table 29 immediately following this section) or close Forest Service local roads.
- Partial harvests should occur outside the nesting season.

The following guidelines should be implemented between 660 feet and 1,320 feet of all active nests:

- Seasonally restrict (refer to Table 29 immediately following this section) or close local roads.
- Partial and final timber harvests should occur outside the nesting season.
- Only those management activities with minimal human disturbance should be permitted during the nesting season.

Osprey

Guidelines

Management activities during the nesting season (April 1 to August 15) that may result in substantial adverse impacts to nesting birds should be restricted.

Nesting platforms for ospreys should be constructed where nest trees are lacking but habitat is otherwise appropriate.

Yellow-bellied Flycatcher

Guidelines

Habitat integrity of areas of at least one and one-half acres containing all of the following conditions should be maintained: presence of water or saturated soils, a substantial conifer component, dense undergrowth, especially sphagnum moss. The integrity of the habitat is maintained when these habitat components are intact and ecological processes are functioning.

Adaptive management strategies should be developed to promote the development of understory conifer, as well as reduce the potential effects of the hemlock wooly adelgid.

Reptiles and Amphibians

Eastern Box Turtle

Guidelines

Where box turtles or nests are documented, habitat integrity should be maintained by restricting management activities that may result in substantial adverse habitat disturbance (e.g. road and trail construction and timber harvest) within 10 acres of home ranges.

Wood Turtle

Guidelines

Where wood turtles or nests are documented, habitat integrity should be maintained by restricting management activities that may result in substantial adverse habitat disturbance (e.g. road and trail construction and timber harvest) by reducing significant changes in the landscape within 15 acres of home range.

Timber Rattlesnake

Guidelines

Known den sites and basking areas should be protected with a 450-foot buffer zone. Within this zone, new trails, roads, and log landings should be prohibited. Protect the integrity of the den site by not moving rocks larger than two feet in diameter and by not creating excessive soil compaction.

Timber harvest may be permitted within the buffer between November 1 and March 31.

Jefferson Salamander, Four-toed Salamander, Coal Skink

Guidelines

Surface disturbing activities should be prohibited within 100 feet of documented occurrences of Jefferson salamander or four-toed salamander.

In habitat where coal skinks are documented, habitat integrity should be maintained by avoiding disturbance to rubble or boulder fields.

Table 29. Summary of Wildlife Seasons and Buffer Distances (refer to narrative for details)

Species	Season	Buffer Distance	Restricted Activity
Indiana bat	*April 1 to November 14*	*Not applicable*	*Removal of known roost tree*
bald eagle	*January 15 to July 31*	*1,320 feet from nest*	*Road and trail construction, timber harvest*
great blue heron	*Year-round*	*330 feet from nest*	*Timber harvest, road and trail construction*
	Year-round	*330 to 660 feet from nest*	*Final harvest treatments and activities that alter the landscape*
	March 1 to August 31	*330 to 1,320 feet from nest*	*Timber harvest, road and trail construction, restrict/close roads*
northern goshawk	*Year-round*	*660 feet from nest*	*Timber harvest*
	April 1 to July 31	*660 to 1,320 feet from nest*	*Timber harvest*
	Year-round	*1,320 feet from nest*	*New road or trail construction, final harvest activities, and activities that modify the landscape*
	April 1 to July 31	*1,320 to 2,640 feet from nest*	*New road or trail construction, final harvest activities, and activities that modify the landscape*
	Year-round	*Within all active territories*	*Restrict/close roads*
red-shouldered hawk	*Year-round*	*330 feet from nest*	*Timber harvest, road and trail construction*
	Year-round	*330 to 660 feet from nest*	*Final harvest treatments and activities that alter the landscape*
	March 1 to August 31	*320 to 1,320 feet from nest*	*All timber harvest, road and trail construction, restrict/close roads*
neotropical migrant song birds	*April 1 to June 30*	*Within the stand*	*Site prep, cleaning, weeding*
grassland song birds	*May 15 to June 30*	*Grasslands <75 acres*	*Mowing, prescribed fire*
	April 15 to September 15	*Grasslands >75 acres*	*Mowing, prescribed fire*
timber rattlesnake	*Year-round*	*450 feet from den*	*Road and trail construction, log landings, and pits*
	April 1 to October 31	*450 feet from den*	*Timber harvest*
osprey	*April 1 to August 15*	*50 feet from nest*	*No public access*
	April 1 to August 15	*660 feet from nest*	*No management that could cause nest abandonment*

Plants

Species with Viability Concerns

Guidelines

Collection of Regional Forester's Sensitive Species plants should be allowed only for research or scientific purposes or in designated propagation areas.

Prior to ground disturbing activities or vegetation management activities, sites should be evaluated or surveyed for habitat for plants with viability concerns (see Appendix D for species list) to determine habitat suitability and/or occupancy.

Management actions should avoid plant species with viability concerns and their associated habitat unless management is necessary to maintain, enhance, or restore that habitat. Conservation and/or management activities should be determined on a site specific basis.

2700 Special Uses

Communication Towers and Utilities

Forest-wide Design Criteria

Standards

Communication towers constructed on the ANF shall not be built with guy-wire support.

Communication towers and utility corridors shall not be constructed in areas assigned to very high scenic integrity level.

Guidelines

Avoid placement of utilities such as cell towers on public land. If alternate sites on private land are not available and public lands provide the only reasonable option for utility location, the following guidelines apply:

Priority should be placed on using existing rights of way, corridors, or structures, before constructing new structures or clearings.

All new utility lines should be buried.

To reduce light pollution, avoid constructing communication towers that exceed the height, which requires warning lights.

Techniques should be used to reduce the impact of communication towers and utility corridors on scenery, including:

- Avoid locating new cell towers and rights of way clearings in areas with High Scenic Integrity Levels. If no other locations are feasible, minimize scenic impact of cell towers by using camouflage materials or paints.
- Tower bases should be screened by native vegetation.
- Utility corridor maintenance agreements should allow for some re-growth of vegetation.
- Maintenance and replacement of high voltage transmission lines should use polymer insulators, non-reflective wire and acid washed towers or flat color paint (i.e., three parts black to two parts meadow green).

2800 Minerals and Geology

Oil and Gas Development

Standards

Land management decisions must not preclude the ability of private mineral owners to make reasonable use of the surface, as determined in consideration of deed provisions as well as Commonwealth and Federal law. Reasonable surface use for the development and operation of subsurface rights will be evaluated based on the design criteria and other direction of this plan.

Similarly, Forest Service administration of outstanding and reserved mineral rights will also be in accordance with deed provisions as well as Commonwealth and Federal law. The Pennsylvania Department of Environmental Protection, Bureau of Oil and Gas Management, is the Commonwealth's regulatory agency for private mineral development.

As soon as practicable, OGM operators shall provide information to the ANF regarding planned development.

At least 60 days prior to any proposed development, the mineral operator must provide the Forest Service written notification of planned activities. The advanced notification will contain the following:

- Proof of Right to Exercise Mineral Rights – The developer will demonstrate the right to develop the mineral estate by providing a copy of the deed, lease, or farm-out agreements.
- Designated Field Representative – The OGM operator will provide the name, address, and phone number of a designated field representative. The representative will be familiar with all phases of the project.
- Map of the Planned Development – A map will be provided showing locations and dimensions of all facilities. These facilities include well sites, roads, tank batteries, utility and collection lines, storage areas for equipment and supplies, generators, compressors, meters, and other facilities necessary for production or operation.
- Plan of Operation – The Plan of Operation will include a schedule of construction and drilling activities. This schedule will include the beginning and ending dates for timber harvest, road, well site, and other construction, and the drilling, hydrofracturing, and completion of wells. The Plan of Operation will also identify intended use of forest roads, trails, and other facilities.
- Erosion and Sedimentation Control Plan – A site-specific plan to minimize erosion and prevent sedimentation of streams will be developed by the operator and must be in accordance with the Pennsylvania Department of Environmental Protection (PA-DEP) Oil and Gas Operators Manual. The ANF will collaborate with the OGM operator on the development of the erosion and sedimentation plan.

The OGM operator will implement and maintain their submitted Soil Erosion and Sedimentation Control Plan and Spill Prevention Plan.

Occupancy permits will be required for access to minerals reserved after 1937.

Special use permits will be required for construction of all off-lease area improvements such as pipelines and road constructions and forest road use. Special use permits will be required for off-lease use of trails and other Forest Service facilities (such as parking lots) associated with the development. Forest road use permits will be required for use of Forest Service jurisdiction roads.

The OGM operator or developer will be responsible for the repair or replacement of ANF surface improvements such as fencing, snowmobile and other trails, recreation facilities including parking areas, trailheads, or other facilities impacted by development or operations.

Produced fluids must be handled and disposed of according to Commonwealth of Pennsylvania Oil and Gas Act in accordance with the Clean Streams Law as described in Pennsylvania Oil and Gas Operators Manual.

Follow the Water Quality Anti-degradation Implementation Guidance (PA-DEP) for erosion and sediment pollution control as a guide to help minimize erosion potential from operations.

During the review of the Plan of Operation, if known occurrences of federally listed, proposed, threatened, or endangered species are located in the vicinity of proposed mineral developments, this will be documented in a letter to the operator and copied to the USFWS Field Office in State College, Pennsylvania. The responsibility to comply with the Endangered Species Act will rest with the operator. The letter will direct the operator to contact the Fish and Wildlife Service to resolve issues related to threatened and endangered species prior to proceeding with any tree cutting or earth disturbance.

Surface disturbing activities (i.e., road locations, well pads, etc.) will be negotiated between the ANF and the OGM operator prior to marking timber for removal. All merchantable timber will be marked by the Forest Service. Timber will be paid for prior to cutting.

Road surfacing will be accomplished with stone obtained from pits designated by the Forest Service or with commercially available stone.

Roads constructed for OGM development shall meet Forest Service standards for local roads (reference Forest Service Manual and Handbook section 7700 – Transportation System).

Use of ATV/OHMs by the OGM operator will occur by permit only on roads and pipelines authorized in writing by the ANF for such operational access. Cross-country or off trail use of ATV/OHMs by OGM operators is not permitted.

Disturbed areas must be stabilized within 30 days following construction and successfully revegetated within 60 days following construction, or within 60 days of the beginning of the first growing season following construction that occurs in late fall or winter. Revegetation is achieved when there is 70 percent coverage of perennial vegetation.

No long term equipment storage such as unused storage tanks, vehicles, machinery, pipeline, or other staging materials is allowed. Litter or trash shall be promptly removed.

The OGM operator will demonstrate compliance with the Antiquities Act and the Archeological Resources Protection Act during development and operation of oil and gas leases. The ANF will provide information to OGM operators regarding these legal requirements.

Upon request, the OGM operator will provide copies of Commonwealth approved drilling permits before surface disturbing activities occur.

Abandoned well sites and roads shall be restored and stabilized. Associated pump houses, storage facilities, pipelines, and related development equipment will be removed unless agreed upon with the ANF to be historically significant.

Surface disturbing OGM development activities shall not commence until the ANF has issued a notice to proceed to the OGM operator.

Guidelines

Pipelines and electric lines (transmitting less than 34.5 kV) should be buried at a minimum depth of 3 feet and marked for easy identification. When the pipeline cannot be reasonably buried, it may be run over the surface for short distances. When the electric line cannot be buried it will be suspended at least 10 feet above the ground and when crossing the road, the line will be at least 16 feet above the road.

New power lines associated with oil and gas facilities should be located along roads, as opposed to cross-country routes where they will interfere with surface resource management.

All clearings (i.e., for roads, pipelines, well pads) should be limited to the minimum size necessary to safely conduct operations.

Well sites should be vegetatively screened from Concern Level 1 and 2 travel routes and use areas and private property. Earth tone colors should be used for painting pump jacks and storage tanks.

Unless adverse resource impacts would occur, reconstruction of existing or abandoned roads is generally preferred over the construction of new roads for private oil and gas development. The number of roads needed to access a development area will be limited to the minimal amount needed. Avoid unnecessary parallel road construction where possible and utilize single road systems for access.

Cuttings from well drilling should be buried within the well pad site when permitted by PA-DEP waiver.

Intake pipes used to siphon water from streams should be screened in order to protect aquatic species.

Road construction waste materials (i.e., stumps, large rocks, etc.) should be disposed of in an approved location.

ANF may request a suspension of construction activities during the spring thaw or during exceptionally wet weather.

The ANF may request timing limitations on the hours or days of the week of construction and operation in order to reduce impacts to recreation users or sensitive wildlife habitat during important breeding or over-wintering periods.

After use, the OGM operator should close gates on ANF and other OGM roads that were opened to allow authorized road usage.

OGM tank hatches should be locked.

The OGM operator should maintain the integrity of existing fencing (e.g. reconstructing sections, or installing necessary gates).

Where OGM developments exist within fences, the OGM operator should keep the gates closed when not tending to their facilities.

The number of access roads entering Concern Level 1 and 2 travel routes should be minimized.

Native soil should be removed and stockpiled prior to starting ground disturbing activities. This soil should be spread on disturbed areas.

Reclamation measures should meet the identified SILs as soon as practicable and should correspond to the surrounding landscape character, including revegetation and grading to match the natural landform/contour.

To snowplow mixed use designated snowmobile roads, the snowplow should be equipped with adequate shoes to protect the road surface and to leave a snow mat (3 inches or more). Once the road is frozen, a snow mat should be maintained by the operator as long as weather permits.

During icy conditions sanding may be used on mixed use roads. Where possible, the snowplow operator should leave an unsanded corridor for snowmobiles on the treated road segment.

Federal Mineral Leasing

Standards

No Federal mineral activities shall be conducted in areas withdrawn or management areas identified as not available for mineral leasing. Other management areas have stipulations for no surface occupancy. All areas available for mineral leasing within 1,300 feet of the Allegheny Reservoir have stipulations for no surface occupancy.

Federal mineral leasing outside of the above named areas will be designed, constructed, and operated in a manner that is compatible with the surface resource objectives of the management area.

Federal oil/gas lease operations are managed by the Bureau of Land Management in cooperation with the surface management agency. Standards for Federal leases are contained in the Bureau of Land Management "Surface Operating Standards for Oil and Gas Exploration and Development Gold Book."

3400 Forest Pest Management

Standards

Insect and disease control are allowed to protect health and safety, adjacent land values, and heritage assets. Integrated Pest Management methods shall be used to minimize or prevent the development of pest problems.

Detection and Reporting

Guidelines

The need for pest control should be assessed by cooperating with Forest Health Protection to complete annual insect and disease detection surveys of the ANF.

Integrated Pest Management training covering existing and new threats to forest health, including detecting insect or disease activity and identification of plant pests, should be provided for field personnel.

Site Nutrients

Guidelines

The need for insect control should be promptly evaluated where species sensitive to site nutrients (high base cation-demanding species) occur on lower quality sites (summit, shoulder, upper backslope) where multiple stressors are occurring (e.g. drought) and where it appears defoliation will occur.

Species sensitive to site nutrients (high base cation-demanding species), such as sugar maple, ash, or basswood, on nutrient-poor sites (e.g. summit, shoulder, upper backslope) should not be favored. Favor these species on nutrient-rich sites (e.g. lower and bottom slopes).

Red Pine

Guidelines

Red pine stands on the ANF should be maintained as a conifer component. Thinning red pine stands can help improve tree health and vigor, making them less susceptible to beetle damage.

Where recent insect activity is evident, salvage cutting to reduce bark beetle buildup in slash, tops and downed stems of storm damaged pine should occur as soon as is reasonably feasible and slash disposal guidelines should be applied.

In salvage harvests and green partial harvests that occur in red pine stands where recent insect activity is evident, the following guidelines should be implemented to prevent additional insect infestations and/or reduce fire danger:

- Limit harvest activities to August through January if possible.
- Avoid piling fresh slash next to standing residual trees.
- Keep landings clean; do not allow decking of material for more than 2 weeks.
- Completely remove merchantable material within 2 weeks of felling.
- Ensure good utilization of material.

Any one of the following slash disposal methods should be used to address insect infestation:

- Remove tops and associated slash greater than 3 inches in diameter from the stand

- Pile and burn tops and associated slash.
- Chip slash and tops.
- Break slash down to pieces no more than 8 feet long to promote rapid decay of material.
- Pile slash and tops and cover with plastic for several months during the insect activity period.

Tree Diseases

Beech Bark Disease Complex

Guidelines

Recognize the difference between the advancing and killing front of beech bark disease. During management activities, the most current science and methods should be applied with the overall intent of increasing the component of beech that is resistant to the disease complex.

Beech bark scale now occurs across the entire ANF. In threatened stands prescribed for harvest activity in the advancing front, identify susceptible American beech trees and designate them for removal during harvest activity. Favor leaving those beech trees that have characteristics indicating they may be resistant to beech bark disease complex.

Where the beech bark disease killing front is well established, retain healthy, scale-free, or lightly infested beech to provide mast and to retain potential disease-resistant trees. Healthy beech should have full, healthy crowns, tight smooth bark, and no rot or cavities. They should not exhibit any scale (or only have light scale present), fungus, crown dieback, tarry spots, or puckered bark.

Forest Insects

Hemlock Woolly Adelgid

Guidelines

At such time the hemlock wooly adelgid (HWA) is discovered on the ANF, a strategy should be developed based on the most current treatment options available at that time, infestation levels, and prioritization of treatment areas.

Other conifer species currently present on the ANF, including white pine and red pine, should be maintained or enhanced.

If strategies or techniques provide limited success in controlling or mitigating effects of HWA, ANF personnel should investigate providing an alternative conifer species that would continue to provide some of the important ecosystem functions and services presently provided by eastern hemlock.

4000 Research

Standards

Proposals for new research outside the Research Natural Area or the Kane Experimental Forest require a research study plan and must be approved by the forest supervisor.

Guidelines

Researchers should limit long term research markings to those necessary for the study.

Researchers should locate research activities away from trails, facilities and other places with human activity that may affect research results or increase the potential for damage to research activities.

Copies of research results/reports should be provided to the ANF at appropriate times during research and upon completion.

5100 Fire

Standards

All ignitions must receive an appropriate suppression or Wildland Fire Use (WFU) response according to the ANF *Fire Management Plan* and WFU implementation criteria must be described in the ANF *Fire Management Plan* before wildland fire is managed under WFU. Wildland fires that do not meet the established criteria will be managed using the full range of suppression options available to confine, contain, and control.

Guidelines

Fire suppression and prescribed fire impacts should employ suppression techniques based on safety, minimal potential loss of or damage to resources, and cost effectiveness. Consult the *Interagency Standards for Fire and Fire Aviation Operations* for Minimum Impact Suppression Tactics (MIST).

Delivery of chemical foam, retardant, additives, or gray water to surface water should be avoided.

The best available smoke management practices should be used in prescribed fire design and implementation to avoid or mitigate adverse effects on public health and safety.

7300 Administrative Facilities

Standards

Facilities shall be designed, constructed, and maintained in accordance with the U.S. Green Building Council's LEED (Leadership in Energy and Environmental Design) guidelines. At a minimum, new facilities shall meet the silver standard.

"The Built Environment Image Guide" (FS710 December 2001) should be used to develop consistent architectural styles and signage for recreation or administrative facilities to ensure rehabilitated or new facilities are built with quality materials that conform to the setting and support the Forest Service national identity and image.

Before existing buildings and other manmade structures are structurally modified or demolished, they will be surveyed for bats. If significant bat roosting is found, maintain these structures or provide alternate roosts suitable for the species and colony size prior to building modification or destruction.

Facilities acquired by land donation, exchange or purchase shall not be retained unless they serve a definite future purpose and funding is available for their maintenance.

All facilities shall be managed according to the Facilities Master Plan.

Guidelines

Design night lighting to minimize light pollution. Limit continuous or dusk-to-dawn lighting at facilities. Where feasible, utilize low emitting directional lighting sources to minimize light pollution on night sky viewing. Exceptions for continuous lighting may be made for the lighting of towers or lines to facilitate flight safety, and staffed, around-the-clock operations.

When landscaping administrative sites, utilize native plants with local genotypes to the extent feasible.

7700 Transportation System

Resource Coordination

Standards

Forest roads are managed in one of three classes: Open, Restricted, or Closed. Open roads are generally open for public use. Restricted roads are generally closed to public use, but may be open to public use during certain

periods or events. Closed roads are closed to public use and may only be reopened to such use with a specific notice. Roads may be closed at any time as described in the suitability section of Part 2.

The ANF travel routes (GIS layer: travel_route) and INFRA database are intended to reflect implementation of project level transportation decisions. As decisions concerning road use and management are made thru travel management planning and NEPA analysis, they will be reflected in these databases. Open and restricted roads in these databases will be reflected on the Motorized Vehicle Use Map (MVUM). The initial publication of the MVUM for the ANF is scheduled for July 2008 and annually thereafter.

Transportation system closure devices shall be managed in accordance with the travel management plan. Gates or barricades that need to be opened or removed to provide passage for authorized uses shall be returned to their original status following said use.

Unless stated otherwise, any road standard or guideline shall apply only to Forest Service roads.

Guidelines

Forest Service scenic byways and travel routes to campgrounds and other major recreation use areas that are listed and mapped as Concern Level 1 roads should be designed and managed to Traffic Service Level (TSL) A or B. These roads will highlight outstanding roadside scenic features.

Roads mapped as Concern Level 2 roads should be designed and managed to TSL B or C standards.

Road reconstruction should follow the existing corridor alignments.

Road design should meet the minimum standards appropriate to the purpose of the road and to fit the land characteristics.

Roads should be relocated to enhance resource management or improve user safety, utility, and resource protection. Decommission and restore old roadbeds as soon as possible after road relocation has been completed.

To snowplow mixed use designated snowmobile roads, the snowplow should be equipped with adequate shoes to protect the road surface and to leave a snow mat (3 inches or more). Once the road is frozen, a snow mat should be maintained by the operator as long as weather permits.

During icy conditions sanding may be used on mixed use roads. Where possible, the snowplow operator should leave an unsanded corridor for snowmobiles on the treated road segment.

Construction

Standards

During project level travel management analysis identify the minimum road system required. This shall be the minimum system needed for the identified project purpose consistent with the Forest Plan and other direction.

When planning the road system, if the management area objectives and the environmental constraints can be met, take advantage of existing non-system road corridors in order to minimize additional land clearing.

Roads are designed and constructed to the standard necessary to provide access and manage resources according to management prescription desired conditions and public safety.

Apply the level of maintenance needed to protect the investment, facilitate resource management, and provide for user safety.

All new and reconstructed roads shall blend into the landscape to the extent practical.

Minimize clearing widths by utilizing cut, fill, and back slope grades that are the steepest permissible for the standard and use of the road, safety, soil conditions, and the height of the cut.

Final shaping and grading of shoulders, back slopes and ditch slopes shall be rough in appearance on TSL D roads. Back slopes and fill slopes may also be covered with loose woody debris.

Where natural revegetation is unlikely, or sedimentation and erosion are concerns, plant native or desirable non-native species immediately after construction or reconstruction.

Guidelines

Highlight outstanding roadside visual features with turnouts and vistas.

Incorporate aesthetic modifications into the design of bridges, guardrails, major culverts, outlet ditches, and other drainage control devices.

New roads built to access land for vegetation management should be primarily operational maintenance level (OML) 2 or temporary and not intended for public motorized use. All newly constructed OML 2 roads will be effectively closed to motorized road and recreation vehicles following their use unless they are needed for other management objectives.

The grade of permanent and temporary roads should normally be between 2 and 8 percent, with grades up to 15 percent acceptable for short pitches up to 200 feet when sufficient stabilization is provided.

Reconstruction

Standards

Maintenance, reconstruction to a higher standard, or relocation of existing roads shall be allowed to reduce environmental damage, to improve user safety, or where agreed, to be turned over to a township.

Guidelines

Road reconstruction should generally follow the existing corridor alignments, but where necessary roads have problems such as resource management or user safety, they should be relocated.

Maintenance

Standards

Maintenance, reconstruction to a higher standard, or relocation of an existing road is allowed to reduce environmental damage, to reduce long term costs, or to improve user safety.

Apply the appropriate level of maintenance needed to protect the investment, facilitate resource management, protect other resources, and provide for user safety.

Guidelines

On existing OML 1 roads, an effective barrier should be installed as needed to prevent use by highway licensed vehicles and ATVs/OHMs.

Use

Standards

On all lands except designated travelways, motorized use with wheeled or tracked vehicles is restricted unless the Forest Motorized Vehicle Use Map (MVUM) or a Forest Order indicates that such use is specifically allowed.

Newly constructed roads are assumed closed to public use unless the following conditions are met:

- Use is compatible with the recreation opportunity for the area.
- Public safety is provided.
- Road serves an identified public need.
- The area accessed by the road and associated uses can be managed in accordance with management area and forestwide direction.

Guidelines

When the road surface is not frozen, close roads designated "winter haul only" to all motor vehicle traffic.

Manage motorized use by seasonal restrictions if:

- Use causes unacceptable damage to soil and water resources due to weather or seasonal conditions.
- Use causes unacceptable wildlife conflict or habitat degradation.
- Use causes unsafe conditions due to weather.
- The road or trail serves a seasonal public or administrative need.
- The area accessed had seasonal need for protection or nonuse.
- Competing uses create conflicts.

Roads accessing timber harvest areas should be left open to the public for firewood cutting until the bulk of accessible wood is removed, unless precluded by other resource or management area objectives.

Decommissioning

Standards

Unauthorized roads shall be designated a National Forest System road or trail or decommissioned.

Roads that are no longer needed shall be decommissioned.

Decommission all temporary roads upon completion of authorized use.

Guidelines

Road decommissioning should render a road inaccessible to all motorized traffic. Effectively preventing motorized vehicles from gaining access to any portion of a decommissioned road may involve obstructing access at several points along the road. Roads identified for decommissioning may receive one or more of the following levels of landscape restoration:

- Blocking the entrance to a road to all motorized traffic, including all-terrain vehicles.
- Removing road improvements such as signs and gates from the landscape.
- Restoring vegetation and installing water bars.
- Removing culverts and the fills associated with them, removing road surfacing (if salvageable) and scattering slash on the roadbed. Removed fill will be reused or disposed of in a way that will not restrict flow or contaminate surface water.
- Reestablishing former drainage patterns, stabilizing slopes, removing unstable fills, pulling back road shoulders.
- Completely eliminating the roadbed by restoring natural contours, wetlands, watercourses and slopes.

Pit Management

Standards

Implement erosion and sedimentation control measures while using a pit. Promptly following use, reclaim any areas where quality material has been exhausted. For areas where quality material remains, document the remains and then slope the open face and revegetate.

Develop a pit plan that details development, expansion potential, and restoration of the pit area before developing or expanding a pit. Consider expanding a pit down by blasting, ripping, or other means before expanding a pit out.

Guidelines

In pit planning, reserve the best pit material for use on Forest Service roads.

Logging Access (Landings and Skid Trails)

Temporary roads and skid trails may be restricted in other areas in accordance with section 2500 Watershed and Air standards and guidelines.

Guidelines

Skid trails should be rendered inaccessible and restored. This process may be delayed if roads and skid trails need to be utilized for post-sale rehabilitation treatments.

The following guidelines apply to location of roads, landings, and skidding of logs:

- Access logging operations from local or collector roads wherever possible.
- When the only logging operation access is via a gravel or paved road, the access road should have a gravel surface for the first 100 feet, except when the ground is frozen.
- Locate landings a minimum of 100 feet from a collector road. Landings should not be located within the road template of an arterial or town road (including the ditch line and back slope). Landing location exceptions can be obtained with written permission from the road management agency.
- Skidding should not occur on roads open to the public.
- Some terrain and soil types may allow average skidding distances of as much as one-half mile. Consult current research information on economic harvesting and skidding techniques before determining a maximum skid distance in a given terrain and soil type.
- Avoid skidding across or on recreation trails. If trails are crossed or used for skidding, the surfacing and integrity of the trail must be maintained or restored.
- Avoid skidding through reserve areas.

Temporary roads should be constructed in locations that minimize resource damage.

Temporary roads are generally not intended for public use, but short term public use may be allowed if needed to meet management objectives.

Photo courtesy of US Forest Service

Part 4—Management Area Direction

This part of the Forest Plan contains the plan decisions that are applicable to specific management areas. For each management area there is a description of how the area contributes to the desired future condition of the ANF, including a brief description of the desired condition of the management area itself. If the area has specific plan objectives that apply only to this management area, these are identified. A listing of the uses and activities that are suitable or unsuitable in the management area is provided based on the suitable uses and activities section contained in Part 2. Finally, the design criteria or standards and guidelines that apply only to the specific management area are presented. These are organized by associated Forest Service file codes. Forest-wide design criteria apply to all management areas. In the event of a perceived conflict in direction between forestwide design criteria and management area design criteria, the most restrictive standard or guideline applies.

For a more complete understanding of the interpretation of desired conditions, objectives, suitable uses and activities, standards and guidelines, consult the introduction to the Forest Plan and the introductory sections describing that material in Parts 1, 2, and 3.

Photo courtesy of R Hokans, US Forest Service

Management Area 1.0 – Early Structural Habitat

Contribution to Desired Condition

This area's primary contribution to the desired condition of the ANF (See Part 1 – Vision) is in the provision of early structural habitat to sustain species associated with early structural conditions especially ruffed grouse. Most of the acreage should be managed to favor native grasses, forbs, vines, and shrubs. Permanent openings and grasslands in upland forest areas occupy up to three percent of the area.

The forest areas managed under this prescription contain predominantly shade intolerant species such as aspen stands. Even-aged timber stands in a balanced variety of age (from zero to 50 years of age) and structural stages (early structural to mid structural stages) are evident. A variety of inclusions, such as conifers, openings, seeded roads, and savannah-type areas, are also present. Coniferous cover occupies two to five percent of the areas, distributed in small stands between early structural and mid structural conditions.

The area provides a roaded natural setting for all types of dispersed recreation opportunities. Recreation opportunities include hunting, fishing, viewing wildlife, hiking, cross-country skiing, and viewing scenery.

State, township, and Forest Service administered arterial and collector roads are located within this management area. Special uses, utility corridors, road rights-of-way, and intensive oil and gas development may dominate the landscape at specific sites.

Objectives

Maintain 10 to 20 percent of the area in the zero to 10 age class in each decade.

Maintain or increase the current aspen component.

Table 30. MA 1.0 Suitability Summary

S = Suitable and U = Unsuitable

Use or Activity	Suitability
Timber Harvest	
Timber Production	S
Harvest for Other Resource Purposes	S
Salvage/Sanitation Harvest	S
Road Management	
Existing Forest Service Road Reconstruction or Maintenance	S
New Road Construction	S
Pit Development or Expansion	S
Gathering of Special Forest Products	
Commercial	S
Personal	S
Firewood Collection	S
Special Use Permits	
New Communication Towers	U
New Road Rights of Way, Pipelines, and Utility Lines	S
Fire Activities	
Wildland Fire Use	S
Prescribed Fire	S

Table 31. MA 1.0 Recreation Suitability Summary

S = Suitable and U = Unsuitable

Trail Use or Activity	Suitability
Interpretive Trails	S
Snowmobiling	S
ATV/OHM (in IUAs only)	S
Bicycling	S
Equestrian Use	
On Trails/Routes	S
Cross-country	S
Other Recreational Use or Activity	
Dispersed Camping	S
Developed Camping	S
Vista Management	S

MA 1.0 – Design Criteria

2300 Recreation

Standards

Recreation trails and other developments shall be constructed and maintained to the appropriate development level associated with a Roaded Natural ROS class.

2400 Vegetation

Silvicultural Systems

Standards

Even-aged vegetation management shall be used throughout this management area except where it is desirable to maintain continuous high forest cover in riparian areas, on wet soils, to meet Scenic Integrity Levels, or to achieve specific plant and animal objectives. In these situations, uneven-aged management may be appropriate.

Guidelines

Treatment of forested stands should occur on a 40 to 50 year rotation emphasizing aspen species where practical. These shorter rotations are needed for the enhancement of wildlife species dependent on younger forests.

Maximum acreage to be regenerated every 10 years should be 25 percent of the management area and layout should be on a grid pattern to increase grouse activity centers.

Forest stands to be managed as aspen stands should require a minimum aspen stocking of 20 square feet basal area or 10 healthy mature trees per acre to assure successful regeneration.

Regeneration cutting of aspen should be done during the dormant season.

Large down wood should be left throughout the area to provide drumming logs for ruffed grouse.

Pulpwood

Guidelines

Pulpwood on commercial timber sales should be marked or designated and sold as merchantable material, and require that it be paid for, cut, and removed except:

- In periods of poor pulpwood markets, pulpwood may be felled and left on site with concurrence from both the silviculturist and sale administrator.
- When using helicopter or aerial harvesting systems and it is not economically viable to remove pulpwood.
- When acceptable under the prescription as determined by the silviculturist.
- When needed to address soil nutrient concerns.
- When necessary to meet downed wood needs for species with viability concerns.

2600 Wildlife, Fish and Sensitive Plant Habitat

Guidelines

Created permanent openings should be one-half to one acre in size, and distribution should be one-tenth to one-fifth of a mile apart.

Habitat should be managed to emphasize ruffed grouse and other species associated with early structural stages of vegetation.

2800 Minerals and Geology

Guidelines

Special emphasis should be given to identifying and implementing measures to reduce adverse impacts on the resource objectives of this management area. Mitigation measures may include gating roads, vegetative screening of facilities, and wildlife habitat enhancement projects.

7700 Transportation Systems

Guidelines

Roads affecting important brood habitat areas should be closed during the brood rearing season (May 1 to September 1), except for two years following timber sales. Roads may be left open to permit firewood collection.

Local roads, Traffic Service Level D, should be opened during the antlerless deer season to provide hunter access if necessary to regulate the deer herd and if road conditions are suitable.

Local roads should be designed and managed to TSL C or D.

Management Area 2.1 – Uneven-aged Management

Contribution to Desired Condition

This area contributes to the desired condition (See Part 1 – Vision) in the provision of within-stand vegetative structural diversity that favors tree, shrub, and plant species that thrive in an uneven-aged forest. Each managed stand consists of trees of different ages and heights. Inclusions of unmanaged areas will also exist. Tree sizes range from seedlings to mature. Wildlife habitat management emphasizes mature structural stages (forest ages) and complex vertical structure. A diverse ground layer (herbaceous plants and tree seedlings) and shrub layer, mixed with an array of trees from sapling through large, old trees often with a deciduous and conifer mix, provide habitat for a diversity of species, such as warblers, thrushes, raptors, bats, and small mammals.

The area consists of a forest of uneven-aged northern or upland hardwood stands with inclusions of conifer, shrub, and herbaceous openings. Species composition varies, but shade tolerant and mid-tolerant species will be dominant. The area contains mostly large trees with small inclusions of seedlings and saplings.

Vegetation management activities provide some timber products that contribute to the local and regional economy.

Managed vegetation in this area helps provide the “Big Woods” character that exists today. This management area contributes to providing limited opportunities for dispersed recreation, motorized recreation, hunting, and fishing. Timber harvest and reforestation activities and oil and gas activities will be readily apparent.

State, township, and Forest Service administered collector and local roads are located within this management area. Forest Service roads are generally closed or restricted to public traffic. Special uses, utility corridors, road rights-of-way, and intensive oil and gas development may dominate the landscape at specific sites.

Objectives

Enhance vertical structural diversity on lands suitable for timber management by applying uneven-aged management on an estimated 500 to 750 acres within the first decade of plan implementation.

Table 32. MA 2.1 Suitability Summary

S = Suitable and U = Unsuitable

Use or Activity	Suitability
Timber Harvest	
Timber Production	S
Harvest for Other Resource Purposes	S
Salvage/Sanitation Harvest	S
Road Management	
Existing Forest Service Road Reconstruction or Maintenance	S
New Road Construction	S
Pit Development or Expansion	S
Gathering of Special Forest Products	
Commercial	S
Personal	S
Firewood Collection	S
Special Use Permits	
Communication Towers	S
Road Rights of Way, Pipelines, and Utility Lines	S
Fire Activities	
Wildland Fire Use	S
Prescribed Fire	S

Table 33. MA 2.1 Recreation Suitability Summary

S = Suitable and U = Unsuitable

Trail Use or Activity	Suitability
Interpretive Trails	S
Snowmobiling	S
ATV/OHM (in IUAs only)	S
Bicycling	S
Equestrian Use	
On Trails/Routes	S
Cross-country	S
Other Recreational Use or Activity	
Dispersed Camping	S
Developed Camping	S
Vista Management	S

MA 2.1 – Design Criteria

2300 Recreation

Standards

Recreation trails and other developments shall be constructed and maintained to the appropriate development level associated with a Roaded Natural ROS class.

2400 Vegetation

Silvicultural Systems

Standards

Uneven-aged forest vegetation management will be used throughout this management area except where it is desirable to provide habitat for species that utilize early structural habitats, to maintain shorter-lived shade-intolerant forest types such as aspen, or to enhance scenic variety and views in areas with High Scenic Integrity Levels. In these situations, even-aged management may be appropriate.

Harvest Methods

Guidelines

Removal of defective trees with conks and cankers should be emphasized, except when needed to meet wildlife objectives.

Pulpwood

Guidelines

Pulpwood on commercial timber sales should be marked or designated and sold as merchantable material, and require that it be paid for, cut, and removed except:

- In periods of poor pulpwood markets, pulpwood may be felled and left on site with concurrence from both the silviculturist and sale administrator.
- When using helicopter or aerial harvesting systems and it is not economically viable to remove pulpwood.
- When acceptable under the prescription as determined by the silviculturist.
- When needed to address soil nutrient concerns.
- When necessary to meet downed wood needs for species with viability concerns.

7700 Transportation Systems

Standards

Local roads will be designed and managed to TSL D and will be restricted to public traffic, except for certain seasonal openings.

Management Area 2.2 – Late Structural Linkages

Contribution to Desired Condition

This management area contributes to the desired condition (See Part 1 – Vision) by providing predominantly late structural forest habitat that follows the major river valleys with linkages across the plateau and connects with other management areas that also provide late structural habitat. Characteristics of late structural forests, such as large woody debris, snags, multi-layered forest canopy with gaps, large diameter trees, a diverse understory, and a conifer component, provide habitat for a diversity of plant and animal species. A continuous high forest canopy dominates with scattered herbaceous, shrub, and conifer inclusions. Species with viability concerns that utilize late structural forests or that thrive in remote or interior forests are emphasized. As the amount of human related activity increases forestwide, this management area should facilitate wildlife movement and promote genetic flow between core areas.

This area provides a Roaded Natural ROS class. High quality scenery associated with older forests is abundant. The terrain of the river valleys of older forests and their linkages remains undeveloped contributing to the natural appearing landscape. In parts of the management area, ATV/OHM and snowmobile use may occur. Other areas are managed primarily for hiking and other non-motorized uses. Existing trails are well maintained and new trails are constructed to provide a wide range of trail opportunities. Hunting, fishing, and nature viewing are common recreational activities.

State, township, and Forest Service administered arterial and collector roads are located within this management area. Special uses, utility corridors, road rights-of-way, and intensive oil and gas development may be present in some parts of this management area. Local Forest Service roads are either restricted or closed to vehicular use.

Objectives

Maintain mid to late structural habitat on over 85 percent of the forested area.

Provide early structural habitat (zero to 20 years old) in the oak forest type on 4 to 6 percent of the management area.

Provide early structural habitat in non-oak forest types on 2 to 4 percent of the management area.

Table 34. MA 2.2 Suitability Summary

S = Suitable and U = Unsuitable

Use or Activity	Suitability
Timber Harvest	
Timber Production	S
Harvest for Other Resource Purposes	S
Salvage/Sanitation Harvest	S
Road Management	
Existing Forest Service Road Reconstruction or Maintenance	S
New Road Construction	S*
Pit Development or Expansion	S*
Gathering of Special Forest Products	
Commercial	S
Personal	S
Firewood Collection	S
Special Use Permits	
New Communication Towers	S
New Road Rights of Way, Pipelines, and Utility Lines	S
Fire Activities	
Wildland Fire Use	S
Prescribed Fire	S

* Indicates situations where the use or activity is suitable only in very narrowly defined situations.

Table 35. MA 2.2 Recreation Suitability Summary

S = Suitable and U = Unsuitable

Trail Use or Activity	Suitability
Interpretive Trails	**S**
Snowmobiling	**S**
ATV/OHM (in IUAs only)	**S**
Bicycling	**S**
Equestrian Use	
On Trails/Routes	**S**
Cross-country	**S**
Other Recreational Use or Activity	
Dispersed Camping	**S**
Developed Camping	**S**
Vista Management	**S**

MA 2.2 – Design Criteria

2300 Recreation

Standards

Recreation trails and other developments shall be constructed and maintained to the appropriate development level associated with a Roaded Natural ROS class.

Guidelines

New access facilities such as trailheads and parking areas should be located on the periphery of the management area.

2350 Trails

Guidelines

The addition of new motorized trails should be minimized. Design new trail segments to minimize impacts to the corridor.

2400 Vegetation

Guidelines

Vegetation management emphasizes providing complex late structural forest conditions and maintaining mast-producing species such as oaks. Prescriptions to sustain or accelerate development of late structural forest characteristics, restore understory forest conditions, enhance habitat for species with viability concerns, enhance mast production, and retain mature overstories should be implemented in a variety of forest types, particularly where opportunities to restore understory structure and vegetative diversity exist. These prescriptions should be variable in the intensity as applied to mimic the heterogeneity that occurs naturally in older forest ecosystems.

Group selection cuts on an extended rotation (restore understory mature forest conditions) should occur to hasten stand development processes, initiate understory development, and develop more complex stand structure. Group selection cuts should range from one-half to three acres, depending on the forest type, and should simulate gap phase dynamics by creating gaps in the forest canopy to develop multiple age classes, multi-layered canopies, irregular canopy cover, larger trees, down woody material, and complex vertical structure.

In some areas, two-aged harvests may be desirable to achieve the desired condition of the management area.

In oak and white pine forest types, shelterwood seed cuts and removal cuts may occur in areas up to 20 acres in size where the objective is to enhance oak seedling development, sustain oak or white pine forest types, and/or enhance mast production. These treatments should not compromise connectivity by completely bisecting the corridor and should not adversely impact habitat for species with viability concerns.

Intermediate thinnings to accelerate mature forest conditions may occur as well to promote more rapid diameter growth and enhance mast production for wildlife.

In the aspen forest types, even-aged regeneration harvests may occur in areas up to 20 acres in size to provide an early structural component in the corridor and maintain these shorter-lived shade-intolerant forest types. These treatments should not compromise connectivity by completely bisecting the corridor and should not adversely impact habitat for species with viability concerns.

2600 Wildlife, Fish and Sensitive Plant Habitat

Guidelines

Existing wildlife openings should continue to be maintained. New openings should only be constructed when needed to enhance the habitat of a species with viability concerns (e.g. rattlesnake basking area) and should be less than three acres in size.

Habitat that meets special requirements necessary to maintain viable populations of those species requiring isolation and those sensitive to disturbance should be provided.

2800 Minerals and Geology

Guidelines

Special emphasis should be given to identifying and implementing measures to reduce adverse impacts on the resource objectives of this management area. Mitigation measures may include gating and closing of roads, locating tank batteries outside the management area, and locating facilities where the effects on wildlife habitat enhancement projects will be minimized.

7700 Transportation Systems

Standards

New road construction shall occur only

- On existing road corridors.
- When needed to access non-Federal lands.
- To access lands outside of this management area where no other road access is feasible.

New roads shall be designed and managed to TSL D and will be restricted or closed when not in use.

Guidelines

Existing local roads should be closed or restricted with the exception of those needed to provide access to non-Federal land or other non-Federal ownership such as State Game Lands or other parts of the ANF.

New pits should not be developed within this management area. Existing pits larger than 2 acres should be reclaimed.

Culverts and underpasses of sufficient size for the affected species should be considered where wildlife mortality occurs on a regular or seasonal basis.

Management Area 3.0 – Even-aged Management

Contribution to Desired Condition

This area contributes to the desired condition (See Part 1 – Vision) by providing a mix of vegetative conditions and quality timber products that contribute to the local and regional economy. Each forest stand generally consists of trees of approximately the same age and height, with a mosaic of stand ages present across the landscape. Tree sizes range from seedlings to large diameters.

Areas managed under this prescription result in a forest of Allegheny, upland, or oak hardwood stands with inclusions of conifer, shrub, and herbaceous openings. Northern hardwoods are also represented but are decreasing primarily due to exotic insects and site limitations. This management area consists of primarily early and mid structural stages, with some late structural inclusions (primarily in riparian areas or near key wildlife habitats). Dense understories found in early structural habitats provide food and hiding cover for deer and bears, and nesting cover for turkeys and grouse. A variety of structural stages (forest ages) are present, particularly early structural stages for many game and non-game species, such as mourning warblers, yellow-breasted chats, ruffed grouse, turkeys, and snowshoe hares.

Primarily road-based recreation opportunities are available throughout this management area, and even-aged silvicultural activities are evident on the landscape. Extensive road development provides access to a variety of features for dispersed recreation. A range of recreation opportunities in a roaded natural setting are provided in this management area. Both motorized and non-motorized recreation opportunities are provided.

State, township, and Forest Service administered collector and local roads are located within this management area. Some Forest Service local roads are open to public use, while others are restricted or closed. Special uses, utility corridors, road rights-of-way, and intensive oil and gas development may dominate the landscape at specific sites.

Objectives

Maintain or create age and structural class diversity on lands suitable for timber management. Provide high quality hardwood timber products by regenerating an estimated 1,200 to 1,800 acres annually using even-aged management within the first and second decades of plan implementation, in order to maintain 8 to 10 percent of the MA in early structural habitat (0 to 20 years old) over time.

In order to regulate stand densities and produce high quality hardwoods, thin approximately 800 to 1,000 acres annually within the first and second decades of plan implementation. This does not include unanticipated salvage thinning to address forest health concerns.

Pre-commercially thin or release 500 to 2,000 acres annually to:

- Maintain or enhance tree species diversity.
- Remove poorly formed or defective trees that compete with the growth and development of desired trees.
- Remove trees overtopping species that are less abundant in the stand that may not survive without release.
- Maintain or create high quality early structural habitat for game species and other wildlife. Create a diversity of wildlife habitats and habitat features including a diversity of structural classes and both forest and non-forest habitats.

Table 36. MA 3.0 Suitability Summary

S = Suitable and U = Unsuitable

Use or Activity	Suitability
Timber Harvest	
Timber Production	S
Harvest for Other Resource Purposes	S
Salvage/Sanitation Harvest	S
Road Management	
Existing Forest Service Road Reconstruction or Maintenance	S
New Road Construction	S
Pit Development or Expansion	S
Gathering of Special Forest Products	
Commercial	S
Personal	S
Firewood Collection	S
Special Use Permits	
New Communication Towers	S
New Road Rights of Way, Pipelines, and Utility Lines	S
Fire Activities	
Wildland Fire Use	S
Prescribed Fire	S

Table 37. MA 3.0 Recreation Suitability Summary

S = Suitable and U = Unsuitable

Trail Use or Activity	Suitability
Interpretive Trails	S
Snowmobiling	S
ATV/OHM (in IUAs only)	S
Bicycling	S
Equestrian Use	
On Trails/Routes	S
Cross-country	S
Other Recreational Use or Activity	
Dispersed Camping	S
Developed Camping	S
Vista Management	S

MA 3.0 – Design Criteria

2300 Recreation

Standards

Recreation trails and other developments shall be constructed and maintained to the appropriate development level associated with a Roaded Natural ROS class.

2400 Vegetation

Silvicultural Systems

Standards

Even-aged vegetation management shall be used throughout this management area except where it is desirable to maintain continuous high forest cover in riparian areas, on wet soils, to meet Scenic Integrity Levels, or to achieve specific plant and animal objectives. In these situations, uneven-aged management may be appropriate.

Harvest Methods

Guidelines

Removal of defective trees with conks and cankers should be emphasized, except as needed to meet wildlife objectives.

Salvage

Guidelines

Salvage of timber will be a priority in this management area in response to decline, mortality, windthrow, blowdown or other factors.

Pulpwood

Guidelines

Pulpwood on commercial timber sales should be marked or designated and sold as merchantable material, and require that it be paid for, cut, and removed except:

- In periods of poor pulpwood markets, pulpwood may be felled and left on site with concurrence from both the silviculturist and sale administrator.
- When using helicopter or aerial harvesting systems and it is not economically viable to remove pulpwood.
- When acceptable under the prescription as determined by the silviculturist.
- When needed to address soil nutrient concerns.
- When necessary to meet downed wood needs for species with viability concerns.

2600 Wildlife, Fish and Sensitive Plant Habitat

Standards

A set of currently identified and mapped potential old growth areas shall be maintained. These areas may be reevaluated and adjusted during project planning.

7700 Transportation Systems

Standards

Local roads will be designed and managed to TSL C or D. This decision will be tied to the specific area and resources being accessed. TSL D roads will be restricted or closed when not needed. TSL C roads will be open to public traffic, except for certain seasonal restrictions to achieve wildlife objectives.

Management Area 5.1 – Designated Wilderness Areas

Contribution to Desired Condition

This area contributes to the desired condition (See Part 1 – Vision) with congressionally designated wilderness areas to preserve the natural evolving forest landscape. They provide a relatively undisturbed landscape important for biological diversity and the long-term survival of many species at risk. They serve as bulwarks against the spread of invasive plant species and offer reference areas for study and research. These areas provide sources of clean water. In the long-term, these areas consist of late structural habitat that is comprised of mostly hardwood forest types. Early structural forest is also provided where natural processes such as wind disturbances or ice storms have created openings for re-growth of the forest floor. The Allegheny Islands consist of old river-bottom trees, such as willow, sycamore, and silver maple. In some areas understory brush and downfall is thick and dense.

Wilderness areas also provide visitors with outstanding opportunities for semi-primitive, unconfined types of recreation, including exploration, solitude, risk, and challenge. Management of the area provides a Semi-primitive Non-motorized ROS class. There is little evidence of human development with the exception of trails, trail blazes, and limited trail signing. Older features of human development are recovering their natural appearance. Individual rustic campsites may be noted but will not dominate the landscape. Scenic integrity is very high throughout the areas. Managerial controls, such as signing, are kept to a minimum and used as necessary to protect ecological and social values.

Objectives

Complete Wildland Fire Management Plans for each designated wilderness area.

Table 38. MA 5.1 Suitability Summary

S = Suitable and U = Unsuitable

Use or Activity	Suitability
Timber Harvest	
Timber Production	U
Harvest for Other Resource Purposes	U
Salvage/Sanitation Harvest	U
Road Management	
Existing Forest Service Road Reconstruction or Maintenance	**U**
New Road Construction	U
Pit Development or Expansion	U
Gathering of Special Forest Products	
Commercial	U
Personal	U
Firewood Collection	U
Special Use Permits	
New Communication Towers	U
New Road Rights of Way, Pipelines, and Utility Lines	U
Fire Activities	
Wildland Fire Use	S
Prescribed Fire	U

Table 39. MA 5.1 Recreation Suitability Summary

S = Suitable and U = Unsuitable

Trail Use or Activity	Suitability
Interpretive Trails	U
Snowmobiling	U
ATV/OHM (in IUAs only)	U
Bicycling	U
Equestrian Use	
On Trails/Routes	S
Cross-country	U
Other Recreational Use or Activity	
Dispersed Camping	S
Developed Camping	U
Vista Management	U

MA 5.1 – Design Criteria

2300 Recreation

Standards

Wilderness Areas will be managed to comply with a desired Semi-primitive Non-motorized ROS class.

Storing equipment/materials shall be prohibited in this management area.

A minimum tools analysis shall be completed before undertaking any project in designated wilderness areas.

In designated wilderness, use of motorized equipment or mechanical transport shall be prohibited, except for fire suppression and in situations that threaten the health and safety of visitors, both with forest supervisor approval.

Guidelines

Appropriate uses for Semi-primitive Non-motorized opportunities and settings may include, but are not limited to hiking, backpacking, camping, nature study, climbing, horseback riding, fishing, hunting, and cross-country skiing and snow shoeing. Certain uses may be limited in some areas to protect soil and water resources and to minimize conflicts among users.

Group sizes should not exceed ten people.

Numbers of users may be limited to provide opportunities for solitude and low to moderate contact with other groups or individuals.

Visitor use may be managed by informing visitors of alternative opportunities outside of wilderness, restricting access to wilderness, limiting length of stay, limiting group size, and/or instituting a permit system.

Restoration efforts should be site-specific and small in scale, such as rehabilitating campsites or other sites impacted by recreation.

The minimum tool concept should be used to guide management actions.

Whenever practical, campsites should be managed in ways to make them as unrecognizable as possible. Only minimal physical changes and structure should exist at most sites, such as simple rock fire rings.

2350 Trails

Guidelines

Trails may be added or eliminated to protect wilderness values.

Trails should be constructed, relocated, and maintained to a minimum standard necessary for protection of the soil, water, vegetation, scenic quality, user safety, and long term maintenance. A range of trail maintenance levels can occur, depending on the amount of trail use and needed resource protection measures. Emphasize trails that appear to be part of the wilderness environment and not an intrusion upon it.

Cairns, limited scree walls, blazing, and directional arrow signs may be used only when the trail tread is not easily discernible, for resource protection, or to mitigate unusual or extraordinary public safety hazard.

2360 Heritage

Guidelines

Preservation, maintenance, and research related to significant cultural resources may be undertaken on a case-by-case basis, under condition that such activity is consistent with maintaining the character of the wilderness area.

2400 Vegetation

Standards

Vegetation shall be treated only to rehabilitate trails and recreation use sites, to protect public health and safety, adjacent land values or treat non-native species as necessary to maintain wilderness values. Revegetation activities must use native vegetation.

Guidelines

Trees may be cut or removed under emergency conditions (such as for fire, insect or disease control) when necessary to prevent unacceptable damage to adjacent lands and resources.

2500 Watershed and Air

Standards

Limit watershed improvement to correcting problems caused by human influence and natural disasters that threaten downstream health and safety consistent with desired condition in designated wilderness areas.

2600 Wildlife, Fish and Sensitive Plant Habitat

Standards

Wildlife habitat enhancement projects shall be prohibited in designated wilderness. Habitat shall be a result of natural processes.

Guidelines

Native plants, wildlife, and fish species may be restocked in designated wilderness to restore native populations that have been eliminated or reduced by human influence.

2700 Special Uses

Recreation Special Uses

Standards

Special use permits for organized recreation events, such as, but not limited to, bike, foot, boat, equestrian, and/or snowmobile races or events, fishing contests and/or adventure games shall be prohibited.

Permits for recreation facilities shall be prohibited.

Caching by outfitter and guides shall be prohibited.

Guidelines

Future development of use zones through the Limits of Acceptable Change (LAC) process may restrict outfitter/guide use or not allow use to increase beyond a level within established standards.

Outfitter/guide permits should not disperse use from high- to low-use areas.

Non-recreation Special Uses

Standards

Permits for non-recreational special uses shall not be issued.

2800 Minerals and Geology

Standards

All Federal minerals (including oil and gas) shall not be available for leasing and shall be withdrawn from mineral production within this management area.

3400 Forest Health

Standards

Integrated pest management is allowed in Wilderness Areas only to protect public health and safety, forest health, adjacent land values, and Wilderness Area attributes. Integrated Pest Management methods, including insect, disease, and non-native invasive species control, shall be used to minimize or prevent the development of pest or non-native vegetation problems. Where pest problems are unavoidable, a solution that provides the most beneficial method based on objectives, effectiveness, safety, environmental protection, and cost shall be selected.

Regional Forester approval must be obtained for all pesticide applications in Wilderness Areas.

Guidelines

Non-native invasive species may be suppressed where native ecological communities or threatened, endangered, or sensitive species are threatened by their presence.

4000 Research

Standards

Research and monitoring devices may be installed and operated in wilderness only when the desired information is essential and cannot be obtained from a location outside of wilderness. The device must be the minimum tool necessary to accomplish the objectives.

7300 Administrative Facilities

Standards

New facilities shall not be constructed in designated wilderness.

Guidelines

An existing facility determined eligible for the National Register of Historic Places may be retained if this is the only way to adequately preserve and protect its historical or cultural significance. Other facilities should be removed.

Management Area 5.2 – Wilderness Study Area

Contribution to Desired Condition

This area contributes to the desired condition (See Part 1 – Vision) by retaining an area for possible future wilderness designation to preserve the natural evolving forest landscape. These wilderness study areas provide a relatively undisturbed landscape important for biological diversity and the long-term survival of many species at risk. They serve as bulwarks against the spread of invasive plant species and offer reference areas for study and research. These areas provide sources of clean water. In the long-term, these areas consist of late structural habitat that is comprised of mostly hardwood forest types. Early structural forest is also provided where natural processes such as wind disturbances or ice storms have created openings for re-growth of the forest floor.

The areas provide visitors with outstanding opportunities for semi-primitive, unconfined types of recreation, including exploration, solitude, risk, and challenge. Management of the area provides a Semi-primitive Non-motorized ROS class. Evidence of human development is limited to those that exist today or are consistent with designated wilderness. Older features of human development are recovering their natural appearance. Individual rustic campsites may be noted but will not dominate the landscape. Scenic integrity is very high throughout the areas. Managerial controls, such as signing, are kept to a minimum and used as necessary to protect ecological and social values.

Objectives

Complete studies for Wilderness Study Areas.

Table 40. MA 5.2 Suitability Summary

S = Suitable and U = Unsuitable

Use or Activity	Suitability
Timber Harvest	
Timber Production	U
Harvest for Other Resource Purposes	U
Salvage/Sanitation Harvest	U
Road Management	
Existing Forest Service Road Reconstruction or Maintenance	S
New Road Construction	U
Pit Development or Expansion	U
Gathering of Special Forest Products	
Commercial	U
Personal	U
Firewood Collection	U
Special Use Permits	
New Communication Towers	U
New Road Rights of Way, Pipelines, and Utility Lines	U
Fire Activities	
Wildland Fire Use	S
Prescribed Fire	U

Table 41. MA 5.2 Recreation Suitability Summary

S = Suitable and U = Unsuitable

Trail Use or Activity	Suitability
Interpretive Trails	U
Snowmobiling	U
ATV/OHM (in IUAs only)	U
Bicycling	U
Equestrian Use	
On Trails/Routes	S
Cross-country	U
Other Recreational Use or Activity	
Dispersed Camping	S
Developed Camping	S
Vista Management	U

MA 5.2 – Design Criteria

2300 Recreation

Standards

Wilderness Study Areas will be managed to comply with a desired Semi-primitive Non-motorized ROS class.

Storing equipment/materials shall be prohibited in this management area.

Use of motorized equipment or mechanical transport shall be prohibited except on existing classified roads, for fire suppression or in situations that threaten the health and safety of visitors, both with forest supervisor approval.

Management actions shall not change the existing recreation opportunities toward more developed recreation opportunities.

Guidelines

Appropriate uses for Semi-primitive Non-motorized opportunities and settings may include, but are not limited to hiking, backpacking, camping, nature study, climbing, horseback riding, fishing, hunting, and cross-country skiing and snow shoeing. Certain uses may be limited in some areas to protect soil and water resources and to minimize conflicts among users.

Restoration efforts should be site-specific and small in scale, such as rehabilitating campsites or other sites impacted by recreation.

Developed Recreation

Standards

New developed recreation sites shall not be constructed. Existing developed recreation sites may be maintained to their current standard. Maintenance activities shall not exceed the current development scale or size. Mechanized and motorized equipment may be used to maintain these sites.

Dispersed Recreation

Guidelines

Existing dispersed roadside recreation sites that occur along roads that form boundaries of this MA may continue unless resource damage is occurring. If damage is occurring, these sites should be closed and rehabilitated.

Interior dispersed campsites should be rehabilitated and managed in ways to make them as unrecognizable as possible. Only minimal physical changes and structure should exist at most sites, such as simple rock fire rings.

2350 Trails

Standards

Heavy equipment such as bull dozers and dump trucks shall not be used for trail construction, relocation, or maintenance.

Guidelines

Trails may be added or eliminated to protect wilderness values.

Trails should be constructed, relocated, and maintained to a minimum standard necessary for protection of the soil, water, vegetation, scenic quality, user safety, and long term maintenance. A range of trail maintenance levels can occur, depending on the amount of trail use and needed resource protection measures. Emphasize trails that appear to be part of the wilderness environment and not an intrusion upon it.

Cairns, limited scree walls, blazing, and directional arrow signs may be used only when the trail tread is not easily discernible, for resource protection, or to mitigate unusual or extraordinary public safety hazard.

2360 Heritage

Guidelines

Preservation, maintenance, and research related to significant cultural resources may be undertaken on a case-by-case basis, under condition that such activity is consistent with maintaining the character of the wilderness.

2400 Vegetation

Standards

Vegetation shall be treated only to rehabilitate trails and recreation use sites, to protect public health and safety, adjacent land values and forest health or treat non-native species as necessary to maintain wilderness values. Revegetation activities must use native vegetation.

Guidelines

Trees may be cut or removed under emergency conditions, such as for fire, insect or disease control, when necessary to prevent unacceptable damage to adjacent lands and resources.

2500 Watershed and Air

Standards

Limit watershed improvement to correcting problems caused by human influence and natural disasters that threaten downstream health and safety consistent with desired condition in designated wilderness areas.

2600 Wildlife, Fish and Sensitive Plant Habitat

Standards

New wildlife habitat enhancement projects can only occur where they:

Are needed for ecosystem restoration or TES or RFSS wildlife species habitat needs.

Can be built and maintained without road construction or reconstruction.

Are consistent with the Semi primitive Non-motorized recreation setting and a very high scenic integrity level. Existing fish and wildlife habitat projects may continue in wilderness study areas provided that wilderness values are preserved.

Existing wildlife openings shall not be expanded, but existing openings may be maintained.

No new recreational fishing impoundments are allowed.

Materials for fish habitat improvement shall be from on-site sources and be designed to blend in with the surrounding environment. Log structures shall be one log high. No concrete or gabions are allowed.

Guidelines

Native plants, wildlife, and fish species may be restocked in designated wilderness to restore native populations that have been eliminated or reduced by human influence.

2700 Special Uses

Recreation Special Uses

Standards

Special use permits for organized recreation events, such as, but not limited to, bike, foot, boat, equestrian, and/or snowmobile races or events, fishing contests and/or adventure games shall be prohibited.

Permits for recreation facilities shall be prohibited.

Caching by outfitter and guides shall be prohibited.

Guidelines

Future development of use zones through the Limits of Acceptable Change (LAC) process may restrict outfitter/guide use or not allow use to increase beyond a level within established standards.

Outfitter/guide permits should not disperse use from high- to low-use areas.

Non-recreation Special Uses

Standards

Permits for non-recreational special uses shall not be issued.

2800 Minerals and Geology

Standards

All Federal minerals (including oil and gas) shall not be available for leasing.

3400 Forest Health

Standards

Integrated Pest Management methods, including insect, disease, and non-native invasive species control, shall be used to minimize or prevent the development of pest or non-native vegetation problems. Where pest problems are unavoidable, a solution that provides the most beneficial method based on objectives, effectiveness, safety, environmental protection, and cost shall be selected.

4000 Research

Standards

Permanent research markings that are visible to visitors shall be prohibited.

New research projects that would not be permitted under wilderness designation shall be prohibited.

7300 Administrative Facilities

Standards

New facilities shall not be constructed.

7700 Transportation Systems

Guidelines

Existing roads in wilderness study areas may continue to be maintained with no increase in maintenance level.

Management Area 6.1 – Late Structural Habitat

Contribution to Desired Condition

This area contributes to the desired condition (See Part 1 – Vision) by providing large areas that will progress to late structural forest conditions. Characteristics of late structural forests, such as large, down wood, snags, multi-layered forest canopy with gaps, large diameter trees, a diverse understory, and a conifer component, will provide habitat for a diversity of plant and animal species. A continuous high forest canopy will dominate with scattered herbaceous, shrub, and conifer inclusions. In portions of the area, small stands of hardwoods in a variety of age classes will be evident from implementing timber practices to benefit plant and animal species.

A variety of game and non-game wildlife species that are characteristic of mature forested habitat including squirrel in the oak type and non-game birds in all vegetation types are present. Thermal cover will be dispersed and when vegetation composition goals are achieved, there will generally be 15 to 20 percent conifer cover. Rhododendron and mountain laurel will be provided in selected areas to provide additional thermal cover and habitat diversity.

This area provides a Roaded Natural ROS class. Recreational opportunities include dispersed activities, such as cross-country skiing, backpacking, hiking, fishing, and hunting. In parts of the management area, ATV/OHM and snowmobile use may occur. The terrain of these mature forest settings ranges from ridgetops to forested wetlands and savannas that contribute to the natural appearing landscape.

Roads are generally very limited within this management area and most local roads are closed or restricted to public use. Special uses, utility corridors, road rights-of-way, and intensive oil and gas development may be present in some places within this MA.

Objectives

Provide late structural habitat (>20 inches DBH) on more than 50 percent of the management area.

Maintain and create structural class diversity to provide 6 to 7 percent early structural habitat.

Table 42. MA 6.1 Suitability Summary

S = Suitable and U = Unsuitable

Use or Activity	Suitability
Timber Harvest	
Timber Production	S
Harvest for Other Resource Purposes	S
Salvage/Sanitation Harvest	S
Road Management	
Existing Forest Service Road Reconstruction or Maintenance	S
New Road Construction	S
Pit Development or Expansion	S
Gathering of Special Forest Products	
Commercial	S
Personal	S
Firewood Collection	S
Special Use Permits	
New Communication Towers	U
New Road Rights of Way, Pipelines, and Utility Lines	S
Fire Activities	
Wildland Fire Use	S
Prescribed Fire	S

Table 43. MA 6.1 Recreation Suitability Summary

S = Suitable and U = Unsuitable

Trail Use or Activity	Suitability
Interpretive Trails	S
Snowmobiling	S
ATV/OHM (in IUAs only)	S
Bicycling	S
Equestrian Use	
On Trails/Routes	S
Cross-country	S
Other Recreational Use or Activity	
Dispersed Camping	S
Developed Camping	S
Vista Management	S

MA 6.1 – Design Criteria

2300 Recreation

Standards

Recreation trails and other developments shall be constructed and maintained to the appropriate development level associated with a Roaded Natural ROS class.

Guidelines

New access facilities such as trailheads and parking areas should be located on the periphery of the management area.

2400 Vegetation

Guidelines

Regeneration cuttings should be small and well distributed. Early structural habitat (zero to 20 years old) should comprise a maximum of 6 percent of the forested acreage per 5,000 acres.

To provide early structural vegetation and maintain shade-intolerant forest types, use even-aged forest management on a longer rotation.

In order to maintain continuous forest canopies, and to retain shade tolerant forest types that are not declining and not threatened by non-native insects and diseases, use uneven-aged forest management.

2600 Wildlife, Fish and Sensitive Plant Habitat

Guidelines

Habitat that meets special requirements necessary to maintain viable populations of those species requiring isolation and those sensitive to disturbance should be provided.

2800 Minerals and Geology

Guidelines

Special emphasis will be given to identifying and implementing measures to reduce adverse impacts on the resource objectives of this management area. Mitigation measures may include gating roads, vegetative screening of facilities, wildlife habitat enhancement projects, and moving proposed road locations to avoid impacts to habitat for certain species with viability concerns.

7700 Transportation Systems

Standards

The current road system will remain in place. New roads will be designed and managed to TSL D and will be restricted or closed when not needed.

Guidelines

Existing roads should be gated, with the exception of those needed to provide access to non-Federal lands, such as private in-holdings or State Game Lands.

Existing pits may be expanded but should not exceed 2 acres.

Management Area 6.3 – Buzzard Swamp Wildlife Management Area

Contribution to Desired Condition

This area contributes to the desired condition (See Part 1 – Vision) by providing open bodies of water, wetland vegetation and species dependent on aquatic, wetland, and riparian habitat. Large managed openings with scattered trees will be maintained on the drier sites, with small interspersed inclusions of aspen, other hardwoods, conifers, and/or shrubs. A portion of the area is managed as a waterfowl propagation area in cooperation with the Pennsylvania Game Commission. A variety of game and non-game wildlife species that are characteristic of open and/or wetland areas including: deer, shorebirds, woodchucks, non-game birds, raptors, reptiles, and amphibians are present.

Recreational opportunities will generally be associated with the wildlife resources and may include hiking, wildlife photography, wildlife observation and identification, fishing, trapping, hunting, and camping. Management of this area provides a Roaded Natural ROS class. The unique riparian setting provides a unique scenic landscape value relative to other parts of the ANF.

Roads are generally very limited within this management area to those that support recreation or wildlife enhancement projects

Objectives

Retain the existing savannah and grassland acreage. However, small areas can be planted with shrubs and conifers to increase wildlife habitat diversity and additional potholes can be provided in suitable locations.

Maintain existing and provide additional artificial nesting structures for wood ducks, bats, Canada geese, American kestrels, bluebirds, tree swallows, and other songbirds.

Table 44. MA 6.3 Suitability Summary

S = Suitable and U = Unsuitable

Use or Activity	Suitability
Timber Harvest	
Timber Production	U
Harvest for Other Resource Purposes	S
Salvage/Sanitation Harvest	S
Road Management	
Existing Forest Service Road Reconstruction or Maintenance	S
New Road Construction	S
Pit Development or Expansion	S
Gathering of Special Forest Products	
Commercial	S
Personal	S
Firewood Collection	U
Special Use Permits	
New Communication Towers	U
New Road Rights of Way, Pipelines, and Utility Lines	U
Fire Activities	
Wildland Fire Use	S
Prescribed Fire	S

Table 45. MA 6.3 Recreation Suitability Summary

S = Suitable and U = Unsuitable

Trail Use or Activity	Suitability
Interpretive Trails	S
Snowmobiling	U
ATV/OHM (in IUAs only)	U
Bicycling	S
Equestrian Use	
On Trails/Routes	S
Cross-country	U
Other Recreational Use or Activity	
Dispersed Camping	S
Developed Camping	S
Vista Management	S

MA 6.3 – Design Criteria

2300 Recreation

Standards

Recreation trails and other developments shall be constructed and maintained to the appropriate development level associated with a Roaded Natural ROS class. The roads necessary for wildlife habitat management make the recreation setting a motorized class even though the public will not be operating vehicles in these areas.

Interpretation

Guidelines

At trailheads into the management area, personal contact, brochure racks, and bulletin boards should be utilized to interpret the environment and inform users about proper use of the area.

2360 Heritage

Guidelines

Interpretation of cultural resources should be compatible with recreation opportunities and the natural character of the area.

2400 Vegetation

Guidelines

Silvicultural systems may be designed and used to benefit plant and animal species, recreation, scenery, user safety, forest health, or respond to catastrophic events such as wind or ice storms.

Even-aged or uneven-aged management is acceptable, depending on management objectives and forest types involved. The choice of system should be based on individual site analysis in conjunction with landscape level objectives.

2600 Wildlife, Fish and Sensitive Plant Habitat

Guidelines

Manage permanent openings and grasslands in upland forest areas to meet needs of waterfowl, songbirds, raptors, bats, and species with viability concerns.

Provide special habitat requirements necessary to maintain viable populations of those species that require isolation (e.g. great blue herons).

Maintain the existing wetland impoundments, potholes, and adjacent wildlife openings in cooperation with the Pennsylvania Game Commission. Use appropriate seed mixtures to meet the management objectives for the area.

Drawdowns will be utilized to enhance waterfowl habitat in selected impoundments. Specific drawdown dates, depth, and frequency will be based on field surveys to determine desired management needs for each impoundment.

2700 Special Uses

Recreation Special Uses

Standards

Special use permits for organized recreation events, such as, but not limited to, bike, foot, boat, equestrian, and/or snowmobile races or events, fishing contests and/or adventure games shall be prohibited.

2800 Minerals and Geology

Guidelines

Special emphasis will be given to identifying and implementing measures to reduce adverse impacts on the resource objectives of this management area. Mitigation measures may include gating and closing roads, locating tank batteries outside the management area, and locating facilities to minimize their effect on wildlife habitat enhancement projects.

7700 Transportation Systems

Guidelines

State, township, and Forest Service administered arterial and collector roads may form, or be adjacent to, but not within, the boundary of this management area. Forest Service local roads, TSL D, will be closed to all public traffic, except for certain seasonal exceptions for wildlife habitat management purposes.

Local roads will be designed and managed to TSL D. These local roads should be closed to public vehicle traffic.

Management Area 7.1 – Developed Recreation Areas

Contribution to Desired Condition

This management area contributes to the desired condition (See Part 1 – Vision) by providing large-scale recreation sites and services that are typically highly developed. Recreation facilities and sites are of high quality, meet accessibility standards, and are economical to operate. These areas are often park-like with an overstory of mature trees and very little understory vegetation. Amenities include showers, electrical hook-ups, and flush toilets as well as highly developed interpretive displays and kiosks. Recreation user fees are collected at these sites. Reservations may be accepted at some sites. These areas are designed to blend with the landscape and complement other existing developed sites. Scenery is managed to provide a natural appearing landscape and exceptional views of the surrounding environment. These recreation development areas are advertised and marketed to increase tourism.

Developed recreation areas facilitate access and use of significant scenic attractions of the ANF, such as the Allegheny Reservoir, Allegheny River, and Twin Lakes. Recreation facilities and structures provide access to nearby attractions for other opportunities, such as boating, swimming, fishing, hunting, and hiking. Large vehicles, such as RVs, motor homes and trucks with trailers, are accommodated at these facilities. Opportunities for social gathering and interaction between users are high.

Trailheads and short trails which feature outdoor interpretive panels or provide access to scenic attractions may be included in these large developed areas. Disruption by noise and traffic is common at parking areas, entrance roads, and service roads. Management of the area provides a Rural ROS class and facilities are development level 4 or 5.

Table 46. MA 7.1 Suitability Summary

S = Suitable and U = Unsuitable

Use or Activity	Suitability
Timber Harvest	
Timber Production	U
Harvest for Other Resource Purposes	S
Salvage/Sanitation Harvest	S
Road Management	
Existing Forest Service Road Reconstruction or Maintenance	S
New Road Construction	S
Pit Development or Expansion	U
Gathering of Special Forest Products	
Commercial	U
Personal	S
Firewood Collection	U
Special Use Permits	
New Communication Towers	U
New Road Rights of Way, Pipelines, and Utility Lines	U
Fire Activities	
Wildland Fire Use	U
Prescribed Fire	S

Table 47. MA 7.1 Recreation Suitability Summary

S = Suitable and U = Unsuitable

Trail Use or Activity	Suitability
Interpretive Trails	S
Snowmobiling	S
ATV/OHM (in IUAs only)	U
Bicycling	S
Equestrian Use	
On Trails/Routes	S
Cross-country	U
Other Recreational Use or Activity	
Dispersed Camping	U
Developed Camping	S
Vista Management	S

MA 7.1 – Design Criteria

2300 Recreation

Standards

Recreation facilities and trails shall be constructed and maintained according to a Rural ROS class. Development level 4 or higher recreational facilities are allowed in Rural ROS class areas only.

Guidelines

Sites are generally gated and closed for the winter, unless specifically designed and managed for winter use.

2400 Vegetation

Standards

Timber harvest associated with forest vegetation management shall be limited to address recreation and scenery management activities, user safety, wildlife concerns, forest health, or catastrophic events such as wind or ice storms. Changes resulting from vegetation management activities shall be kept as naturally appearing as possible. Vegetation management is generally infrequent and may take place for any of the following reasons:

- To improve habitat for species with viability concerns; restore terrestrial or aquatic ecosystem composition and structural characteristics; or maintain existing unique or important wildlife features or plant communities.
- Maintenance and/or expansion of existing facilities, trails, vistas, and overlooks.
- Conservation, research, and/or interpretive purposes on or around heritage sites.
- Appropriate administrative use.
- Timber salvage and associated reforestation techniques.
- The cutting, sale, or removal of timber is incidental to the implementation of another suitable management activity (e.g. removal of timber for trail construction).

Even-aged or uneven-aged management is acceptable, depending on management objectives and forest types involved. The choice of system should be based on individual site analysis in conjunction with landscape level objectives and the desired condition for this MA.

2800 Minerals and Geology

Standards

Surface occupancy of OGM development equipment is not allowed on Federal oil and gas leases within this management area.

Federal minerals (including oil and gas) shall not be available for leasing and shall be withdrawn from mineral production within this management area.

Guidelines

Active wells should be fenced for visitor safety.

5100 Fire

Standards

Prescribed fire shall be prohibited during the peak summer use season.

7700 Transportation System

Standards

Roads shall be limited to those needed for public access and use of the site or for service and maintenance of the area.

A transportation system will be planned as an integral part of the recreation development, and be designed and constructed to safely and comfortably accommodate both specialized recreation vehicles and associated service vehicles.

Guidelines

Roads in certain areas of the developed sites may be closed to allow for recreation site rehabilitation.

Management Area 7.2 – Remote Recreation Areas

Contribution to Desired Condition

This management area contributes to the desired condition (See Part 1 – Vision) by providing for non-motorized summer and winter recreation opportunities. Opportunities for remote, back country recreation, such as hiking, camping, hunting, fishing, mountain biking and horseback riding, are provided in a natural or natural appearing setting with moderate to high degrees of solitude available. Rustic, walk-in camping areas and/or shelters are provided for overnight use and enjoyment as well as for resource and site protection. Management of the Remote Recreation Areas provides a Semi-primitive Non-motorized ROS class.

Trails are maintained and constructed to accommodate and sustain compatible multiple uses. Trails are challenging and blend with the natural environment. Wildlife and nature viewing opportunities are abundant. High quality scenery is provided within a relatively unmodified landscape. Vistas and overlooks are provided along trails to enhance views of significant features and attractions. Disruption by management activities is minimal and does not reduce the recreation experience, scenic value or habitat quality and function of the ecosystem.

Remote recreation areas provide habitat conditions for wildlife species that are sensitive to human disturbance and for species that use mature forest or late structural habitat. Changes in vegetation will predominantly be the result of natural processes. The area is predominately without roads but some existing roads may persist.

Objectives

Within 5 years, decommission existing roads, except those needed to access non-Federal lands or valid existing mineral rights, or for continued recreation access. Revegetate or convert decommissioned roads to non-motorized trails.

Table 48. MA 7.2 Suitability Summary

S = Suitable and U = Unsuitable

Use or Activity	Suitability
Timber Harvest	
Timber Production	U
Harvest for Other Resource Purposes	S
Salvage/Sanitation Harvest	S
Road Management	
Existing Forest Service Road Reconstruction or Maintenance	S*
New Road Construction	U
Pit Development or Expansion	U
Gathering of Special Forest Products	
Commercial	U
Personal	S
Firewood Collection	U
Special Use Permits	
New Communication Towers	U
New Road Rights of Way, Pipelines, and Utility Lines	U
Fire Activities	
Wildland Fire Use	S
Prescribed Fire	S

* Indicates situations where the use or activity is suitable only in very narrowly defined situations.

Table 49. MA 7.2 Recreation Suitability Summary

S = Suitable and U = Unsuitable

Trail Use or Activity	Suitability
Interpretive Trails	S
Snowmobiling	U
ATV/OHM (in IUAs only)	U
Bicycling	S
Equestrian Use	
On Trails/Routes	S
Cross-country	U
Other Recreational Use or Activity	
Dispersed Camping	S
Developed Camping	S
Vista Management	S

MA 7.2 – Design Criteria

2300 Recreation

Standards

Recreation trails and other developments such as walk-in camping areas, shelters, and toilets are constructed and maintained to the appropriate development level associated with a Semi-primitive Non-motorized ROS class.

No new developed recreation facilities shall be allowed.

Guidelines

New access facilities such as trailheads and parking areas should be located on the periphery of the area.

Walk-in camping areas may be developed for resource protection and/or user convenience.

Walk-in camping areas should contain no more than three sites per camping areas. Campsites should not be constructed within sight distance of one another. Walk-in camping areas and individual campsites within walk-in camping areas should be located far enough apart to ensure a remote camping experience. Where feasible, incorporate walk-in camping areas along developed trail systems, at least 300 feet from the trail.

2350 Trails

Guidelines

The use of horses and mountain bicycles is permitted only on designated trails.

Both multiple-use and single-use trail designations may occur.

Motorized, mechanized equipment may be used for trail construction and maintenance.

2400 Vegetation

Standards

Timber harvest associated with forest vegetation management shall be limited to address recreation and scenery management activities, user safety, wildlife concerns, forest health, or catastrophic events such as wind or ice storms. Changes resulting from vegetation management activities shall be kept as naturally appearing as possible. Vegetation management is generally infrequent and may take place for any of the following reasons:

- To improve habitat for species with viability concerns; restore terrestrial or aquatic ecosystem composition and structural characteristics; or maintain existing unique or important wildlife features or plant communities.
- Maintenance and/or expansion of existing facilities, trails, vistas, and overlooks.
- Conservation, research, and/or interpretive purposes on or around heritage sites.
- Appropriate administrative use.
- Timber salvage and associated reforestation techniques.
- The cutting, sale, or removal of timber is incidental to the implementation of another suitable management activity (e.g. removal of timber for trail construction).

Even-aged or uneven-aged management is acceptable, depending on management objectives and forest types involved. The choice of system should be based on individual site analysis in conjunction with landscape level objectives and the desired condition for this MA.

For salvage harvest, utilize only existing roads for timber haul. Trails and decommissioned roads may not be used for timber haul. Where existing roads do not provide adequate access, utilize aerial harvest methods. Salvage

harvest and associated reforestation activities are allowed within these areas as long as the Remote Recreation and Semi-primitive Non-motorized ROS desired condition is maintained.

Guidelines

Fencing should be limited to within one-quarter mile of exterior roads.

2600 Wildlife, Fish and Sensitive Plant Habitat

Guidelines

Existing constructed openings should be maintained. No new constructed wildlife openings are permitted unless needed for species with viability concerns.

2700 Special Uses

Recreation Special Uses

Standards

Special use permits for organized recreation events, such as, but not limited to, bike, foot, boat, equestrian, and/or snowmobile races or events, fishing contests and/or adventure games shall be prohibited.

Guidelines

Recreation special use permits should be denied when social or resource conditions exceed the desired ROS class or if crowding or overuse could negatively affect natural resources or specific experiences.

Outfitter/guide permits should not allow activity to disperse use from high- to low-use areas.

Group size may be limited to provide for safety and resource protection or to minimize the impact of large groups on others. Utilize the Limits of Acceptable Change process to determine group size or other needed restrictions.

Non-Recreation Special Uses

Guidelines

New utilities should be placed underground.

Reconstruction, upgrading, or maintenance of existing utility lines, pipelines, and facilities should be designed and implemented to be as compatible as possible with Scenic Integrity Levels and the Desired Condition of the area.

2800 Minerals and Geology

Standards

Surface occupancy of OGM development equipment is not allowed on Federal oil and gas leases within this management area.

Guidelines

Tank batteries should be located outside of or on the edge of the remote recreation area where possible. Where lease configuration and technology permit, tanks and separators should be located on one site in the development.

5100 Fire

Standards

Wildfire shall be suppressed.

Guidelines

Utilize low impact techniques for suppression activities.

Prescribed fire may be used to help restore or maintain fire-dependent ecosystems.

7700 Transportation Systems

Standards

New road construction shall be limited to that required for designated special uses or by law to provide access to non-Federal land or valid existing mineral rights.

Existing roads shall be closed and used as trails except for those required for designated special uses or by law to provide access to non-Federal land or valid existing mineral rights or roads that are used to access existing recreation sites such as Hearts Content.

Guidelines

Existing roads, except for those identified in the standard above, should be decommissioned. The decommissioned roads may be converted to designated trails.

Motorized heavy equipment may be used for decommissioning roads or converting roads to trails.

Management Area 8.1 – Wild and Scenic River Corridor

Contribution to Desired Condition

This management area contributes to the desired condition (See Part 1 – Vision) by providing Recreational and Scenic River segments with outstanding water-based recreational opportunities, such as boating, swimming, fishing, hunting, sightseeing and hiking. They are free of hydroelectric water development projects and dams or diversions. Some segments provide key habitat for endangered aquatic species including the federally listed northern riffleshell and the clubshell mussels. The wetlands and riparian (stream-side) corridors of these rivers provide an important transition from the terrestrial to the aquatic environment. These areas provide unique habitat for a wide variety of plants and animals. The wetlands and riparian corridors are healthy, vegetated and stable stream-sides that provide aquatic and terrestrial habitat, erosion control, forage, late season stream flow, and improved water quality.

Vegetation is influenced by both natural processes and humans. The density of open Forest Service roads remains near the current level or less. Commonwealth and township roads occasionally bridge the rivers. All management activities within the corridor are compatible with the outstandingly remarkable values for the river.

Scenic Segments

Scenic river segments generally contain long stretches of shorelines that are largely primitive and undeveloped. Access is provided by roads in some places, however, long, conspicuous and well-traveled roads do not closely parallel the riverbank. The landscape character is “natural appearing” with a very high scenic integrity level. A wide variety of recreational activities takes place. Recreation facilities are provided primarily for visitor safety, access and to protect river resources. Facilities include parking areas, trailheads, rustic campgrounds, interpretive kiosks, signage, rest rooms, and trails including bike, horse and hiking/backpacking/cross-country skiing. Facilities are understated in appearance and designed to complement the natural environment in scale, character, line, form, and color.

Management of the scenic river segments provides a Roaded Natural ROS class. The sights and sounds of human activities are present; however, they do not dominate the area. Encounters with others may be higher on weekends, but few encounters are expected mid-week, off-season, or away from trails. Existing fields or openings for wildlife are present and maintained. The river corridor contains a variety of riparian, shade tolerant and intermediate species in the understory with mostly mid to late structural forest dominating the overstory.

Recreational Segments

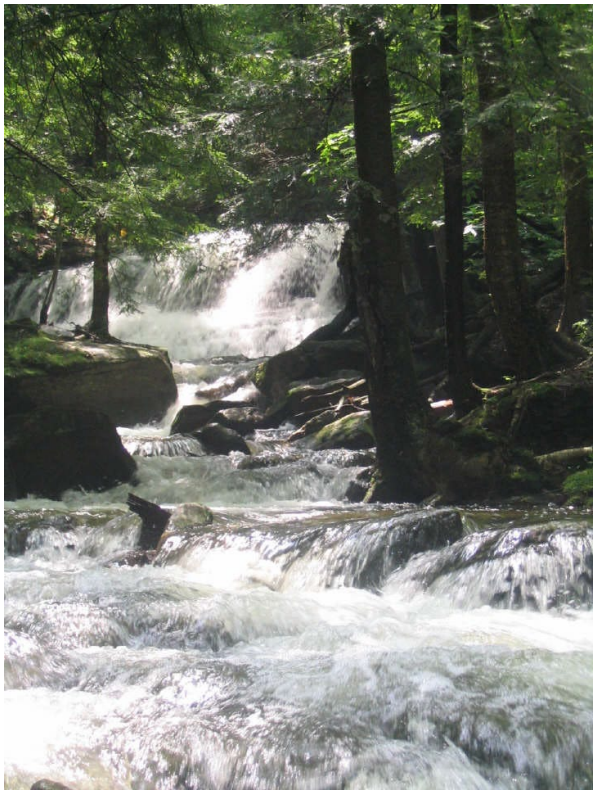
Recreational river segments range from natural appearing to transitional-mixed use. There may be substantial evidence of human activity and development along the shores of these river segments. On adjoining private lands, modern residential development, commercial structures, and a full range of agricultural and forestry uses may be evident. On National Forest System lands, visitors enjoy a natural-appearing setting with a range of recreational developments. Utility transmission corridors, communication facilities, and/or signs of mineral development, and private residences off ANF lands may be observed. Roads and road noise may dominate the setting and recreational experience in some locations.

The recreational river corridor provides outstanding opportunities for people to enjoy a wide variety of river oriented recreation opportunities in an attractive setting. The river is readily accessible by roads and may be accessed by railroads, as well. Transportation facilities parallel the river for long stretches.

Management of the recreational river segments provides a Rural ROS class. The sights and sounds of other visitors are evident, and opportunities to encounter other visitors are moderate to high. Visitors

seeking solitude may find it difficult to achieve, particularly in peak use seasons. Trails and facilities may be highly developed, including hardened trails for a high level of accessibility of persons of all abilities.

These river segments, including portions of private lands, provide for a diversity of habitats with ANF lands providing late structural conditions and private lands providing for early and mid structural conditions. These conditions support a wide variety of species that favor, or are tolerant of, habitat edges and human disturbances.



Logan Falls, photo courtesy of G Porter, US Forest Service

Table 50. MA 8.1 Suitability Summary

S = Suitable and U = Unsuitable

Use or Activity	Suitability
Timber Harvest	
Timber Production	U
Harvest for Other Resource Purposes	S
Salvage/Sanitation Harvest	S
Road Management	
Existing Forest Service Road Reconstruction or Maintenance	S
New Road Construction	S
Pit Development or Expansion	U
Gathering of Special Forest Products	
Commercial	S
Personal	S
Firewood Collection	S
Special Use Permits	
New Communication Towers	U
New Road Rights of Way, Pipelines, and Utility Lines	S
Fire Activities	
Wildland Fire Use	S
Prescribed Fire	S

Table 51. MA 8.1 Recreation Suitability Summary

S = Suitable and U = Unsuitable

Trail Use or Activity	Suitability
Interpretive Trails	S
Snowmobiling	S
ATV/OHM (in IUAs only)	U
Bicycling	S
Equestrian Use	
On Trails/Routes	S
Cross-country	S
Other Recreational Use or Activity	
Dispersed Camping	S
Developed Camping	S
Vista Management	S

MA 8.1 – Design Criteria

Both Scenic and Recreational River Segments

2300 Recreation

Standards

Manage the Allegheny River corridor consistent with this Forest Plan and the Comprehensive River Management Plan. In the case of conflicting management direction, this Forest Plan shall take precedence.

Where Wild and Scenic Rivers overlap with wilderness, national recreation area, or other management areas, the most restrictive standards and guidelines will apply.

Consult with the USFWS regarding the proposed installation and operation of any new access sites (e.g. recreational boating) to be authorized, funded, or constructed by the Forest Service on the Allegheny River.

2400 Vegetation

Standards

Timber harvest associated with forest vegetation management shall be limited to address recreation and scenery management activities, user safety, wildlife concerns, forest health, or catastrophic events such as wind or ice storms. Changes resulting from vegetation management activities shall be kept as naturally appearing as possible. Vegetation management is generally infrequent and may take place for any of the following reasons:

- To improve habitat for species with viability concerns; restore terrestrial or aquatic ecosystem composition and structural characteristics; or maintain existing unique or important wildlife features or plant communities.
- Maintenance and/or expansion of existing facilities, trails, vistas, and overlooks.
- Conservation, research, and/or interpretive purposes on or around heritage sites.
- Appropriate administrative use.
- Timber salvage and associated reforestation techniques.
- The cutting, sale, or removal of timber is incidental to the implementation of another suitable management activity (e.g. removal of timber for trail construction).

Even-aged or uneven-aged management is acceptable, depending on management objectives and forest types involved. The choice of system should be based on individual site analysis in conjunction with landscape level objectives and the desired condition for this MA.

For salvage harvest, utilize existing roads. Where existing roads do not provide adequate access, utilize aerial harvest methods. Salvage harvest and associated reforestation activities are allowed within these areas as long as the immediate river environment, water quality, scenic, fish, wildlife, plants or other outstandingly remarkable values for which the river was designated is protected.

2800 Minerals and Geology

Guidelines

All Federal minerals (including oil and gas) shall not be available for leasing.

Tank batteries should be located outside of the river corridor where possible. Where lease configuration and technology permit, tanks and separators should be located on one site in the development.

7700 Transportation System

Standards

Roads shall be limited to those needed for public access and use of the site or for service and maintenance of the area.

Roads shall not be constructed on islands in the rivers.

New road construction shall be limited to that required for designated special uses or by law to provide access to non-Federal land or valid existing mineral rights.

A transportation system will be planned as an integral part of the recreation development, and be designed and constructed to safely and comfortably accommodate both specialized recreation vehicles and associated service vehicles.

Mitigate or decommission roads that are causing environmental damage, degrading outstandingly remarkable values, or to manage visitor use and access.

Scenic River Segments Only

2300 Recreation

Standards

Recreation trails and other developments shall be constructed and maintained to the appropriate development level associated with a Roaded Natural ROS class.

Guidelines

New recreation facilities including campgrounds, picnic areas, day use sites, parking areas, toilets and other such features should be screened from the river.

2360 Heritage

Guidelines

Archaeological excavations should be permitted only when they will not alter the scenic integrity of the area. Excavation sites should be restored to natural conditions.

2400 Vegetation

Guidelines

Vistas and permanent or temporary openings created by vegetation management activities should be no larger than one-half acre.

5100 Fire

Standards

Wildfire shall be suppressed.

Guidelines

Utilize low impact techniques for suppression activities.

Prescribed fire may be used to help restore or maintain fire dependent ecosystems.

Recreational River Segments Only

2300 Recreation

Standards

Recreation trails and other developments shall be constructed and maintained to the appropriate development level associated with a Rural ROS class.

Construction of new, large scale development level 4 or higher recreational facilities shall be allowed.

7700 Transportation System

Standards

A transportation system will be planned as an integral part of the recreation development, and be designed and constructed to safely and comfortably accommodate both specialized recreation vehicles and associated service vehicles.

Photo courtesy of US Forest Service

Management Area 8.2 – National Recreation Area

Contribution to Desired Condition

This management area contributes to the desired condition (See Part 1 – Vision) by providing large expanses of mostly natural, undisturbed forest. The NRA offers outstanding high quality scenery and recreation experiences for a variety of users. These recreation opportunities help to support the needs of local people and businesses.

The Allegheny NRA provides a continuous forest canopy dominated by mature to old forest, which includes primarily hardwoods, intermixed with some conifers. Changes in vegetation are predominantly the result of natural processes. The NRA provides habitat conditions for wildlife species that are sensitive to human disturbance, as well as species that require large blocks of mature forest habitat. Large mast-producing oak trees provide fall and winter food for turkey and deer, as well as other species. Insects/disease and/or invasive plant species are controlled in order to provide a healthy, sustainable forest ecosystem. Vegetative alterations are very small in size and number, are widely dispersed and visually subordinate.

A range of recreational opportunities are provided in a predominantly roadless setting. These opportunities include foot and other non-motorized means of transport, such as skis, snowshoes, horses and bikes, as well as motorized and non-motorized boating on the Allegheny Reservoir. A number of trails pass through the NRA including the North Country National Scenic Trail (NCNST) and the Tracy Ridge National Recreation Trails. The NCNST provides opportunities for long distance hiking and backpacking.

Some recreational facilities are provided to enhance the visitor's experience. Low level developments such as boat-to campgrounds, small dispersed campsites, or rustic Adirondack shelters are present. A natural appearing landscape with trails and facilities that harmonize with the natural environment is provided. The Tracy Ridge, Allegheny Front and Cornplanter land units provide a Semi-primitive Non-motorized ROS class, while the Allegheny Reservoir unit provides a Semi-primitive Motorized ROS class.

The development of privately owned oil, gas, and mineral resources does not compromise the recreational, scenic, cultural, and other natural values of the area.

Table 52. MA 8.2 Suitability Summary

S = Suitable and U = Unsuitable

Use or Activity	Suitability
Timber Harvest	
Timber Production	U
Harvest for Other Resource Purposes	S
Salvage/Sanitation Harvest	U
Road Management	
Existing Forest Service Road Reconstruction or Maintenance	S*
New Road Construction	U
Pit Development or Expansion	U
Gathering of Special Forest Products	
Commercial	U
Personal	S
Firewood Collection	U
Special Use Permits	
New Communication Towers	U
New Road Rights of Way, Pipelines, and Utility Lines	U
Fire Activities	
Wildland Fire Use	S
Prescribed Fire	S

* Indicates situations where the use or activity is suitable only in very narrowly defined situations.

Table 53. MA 8.2 Recreation Suitability Summary

S = Suitable and U = Unsuitable

Trail Use or Activity	Suitability
Interpretive Trails	S
Snowmobiling	U
ATV/OHM (in IUAs only)	U
Bicycling	S
Equestrian Use	
On Trails/Routes	S
Cross-country	S
Other Recreational Use or Activity	
Dispersed Camping	S
Developed Camping	S
Vista Management	S

MA 8.2 – Design Criteria

2300 Recreation

Standards

Recreation planning for the NRA shall be consistent with the desired Semi-primitive Non-motorized ROS class.

Recreation trails and other developments shall be constructed and maintained to the appropriate development level associated with a Semi-primitive Non-motorized ROS class.

New facilities, such as small dispersed camping areas or Adirondack shelters and huts, shall not be located where they can be seen from the Allegheny Reservoir or the Allegheny River or from trail corridors of a designated trail system.

Dispersed campsites or shelters shall not be located within sight distance of one another or shall be at least 500 feet apart.

Guidelines

Walk-in camping areas may be developed for resource protection and/or user convenience.

Walk-in camping areas should contain no more than three sites per camping areas. Campsites should not be constructed within sight distance of one another. Walk-in camping areas and individual campsites within walk-in camping areas should be located far enough apart to ensure a remote camping experience. Where feasible, incorporate walk-in camping areas along developed trail systems, at least 300 feet from the trail.

2350 Trails

Standards

Motorized and mechanized equipment such as ATVs, chainsaws and small-track trail construction machines (such as a small skid steer machine or mini excavator) may be used for trail and/or facility construction and maintenance. Trails and old roads shall not be reconstructed to any greater than 50 inches wide.

When small heavy equipment (such as mini excavators) is used to traverse the NRA on trails or old roads to perform non-routine maintenance at the boat-to campgrounds, avoid or mitigate impacts to trails or other resources.

Guidelines

Existing hiking trails may be converted to accommodate non-motorized multiple uses, such as horses, mountain bikes and cross-country skiing.

Both multiple-use and single-use trail designations may occur.

2400 Vegetation

Standards

Timber harvest associated with forest vegetation management shall be limited to address recreation and scenery management activities, user safety, wildlife concerns, or forest health. Changes resulting from vegetation management activities shall be kept as naturally appearing as possible. Vegetation management is generally infrequent and may take place for any of the following reasons:

- To improve habitat for species with viability concerns; restore terrestrial or aquatic ecosystem composition and structural characteristics; or maintain existing unique or important wildlife features or plant communities.
- Maintenance and/or expansion of existing facilities, trails, vistas, and overlooks.

- Conservation, research, and/or interpretive purposes on or around heritage sites.
- Appropriate administrative use.
- The cutting, sale, or removal of timber is incidental to the implementation of another suitable management activity (e.g. removal of timber for trail construction).

Even-aged or uneven-aged management is acceptable, depending on management objectives and forest types involved. The choice of system should be based on individual site analysis in conjunction with landscape level objectives and the desired condition for this MA.

2600 Wildlife, Fish and Sensitive Plant Habitat

Guidelines

New permanent openings should be prohibited. Existing wildlife openings should be maintained.

2700 Special Uses

Recreation Special Uses

Standards

Special use permits for organized recreation events, such as, but not limited to, bike, foot, boat, equestrian, and/or snowmobile races or events, fishing contests and/or adventure games shall be prohibited except on the Allegheny Reservoir.

Special use permits allowing motorized vehicles to transport people within the area shall be prohibited except on the Allegheny Reservoir.

Guidelines

Recreation special use permits should be denied when social or resource conditions warrant (i.e., if crowding or overuse negatively affects natural resources or a specific experiences).

Outfitter/guide permits should not disperse use from high- to low-use areas.

Group size may be limited when necessary to provide for safety and resource protection or to minimize the impact of large groups on others.

Reconstruction, upgrading, or maintenance of existing utility lines, pipelines, and facilities should be designed and implemented to be as compatible as possible with recreation resource values.

2800 Minerals and Geology

Standards

Federal minerals (including oil and gas) shall not be available for leasing and shall be withdrawn from mineral production within this management area.

Guidelines

Tank batteries should be located outside of the NRA where possible. Tanks and separators should be located on one site in the development. Tank hatches should be locked.

5100 Fire

Standards

Wildfire shall be suppressed.

Guidelines

Utilize low impact techniques for suppression activities.

Prescribed fire may be used to help restore or maintain fire dependent ecosystems.

7700 Transportation Systems

Standards

Existing roads shall be closed and used as trails except for those required for designated special uses or by law to provide access to non-Federal land (Roper Hollow road) or valid existing mineral rights.

Guidelines

When compatible with NRA resource values, heavy equipment may be used to convert existing road corridors to trails or decommission roads that are causing resource concerns.

Management Area 8.3 – Scenic Area

Contribution to Desired Condition

These areas contribute to the desired condition (See Part 1 – Vision) by providing a remnant of the late structural forest that once covered the Allegheny Plateau. They serve as a primary scenic attraction and recreation destination for visitors seeking eastern old growth forests and associated large, beautiful trees. These areas contain a mixture of older hardwoods and conifers whose natural cycle of growth and mortality has not been disturbed by logging. Other disturbances, such as beech bark disease and wind events are evident.

These areas are characterized by a predominance of old growth as well as mid and late structural forests composed of hardwoods and conifers. The old growth provides aesthetic and spiritual values as well as habitat for a number of plants and animal species that tend not to occur in younger forests. These areas provide dense tree canopies and the physical structure for nesting, hiding, and plant growth provided by standing and down dead trees, thick bark, complex crown structures, heavy branches, and undisturbed duff and litter layers. These older forests also provide for stream protection and input of large down wood that creates more complex aquatic habitat, shading of stream waters to keep them cool, and filters for sediments.

A natural, forested appearance shaped by natural processes is retained. A limited road system is present to provide recreational access. Facilities and interpretive displays are present for the visitor. Trail systems provide a pathway for the user to experience these older forests. Recreation impacts are managed to support the natural condition of the landscape. Management of this area provides a desired Roaded Natural ROS class.

Table 54. MA 8.3 Suitability Summary

S = Suitable and U = Unsuitable

Use or Activity	Suitability
Timber Harvest	
Timber Production	U
Harvest for Other Resource Purposes	U
Salvage/Sanitation Harvest	U
Road Management	
Existing Forest Service Road Reconstruction or Maintenance	S
New Road Construction	U
Pit Development or Expansion	U
Gathering of Special Forest Products	
Commercial	U
Personal	U
Firewood Collection	U
Special Use Permits	
New Communication Towers	U
New Road Rights of Way, Pipelines, and Utility Lines	U
Fire Activities	
Wildland Fire Use	U
Prescribed Fire	S

Table 55. MA 8.3 Recreation Suitability Summary

S = Suitable and U = Unsuitable

Trail Use or Activity	Suitability
Interpretive Trails	S
Snowmobiling	U
ATV/OHM (in IUAs only)	U
Bicycling	U
Equestrian Use	
On Trails/Routes	U
Cross-country	U
Other Recreational Use or Activity	
Dispersed Camping	U*
Developed Camping	S
Vista Management	S

* Indicates situations where the use or activity is suitable only in very narrowly defined situations.

MA 8.3 – Design Criteria

2300 Recreation

Standards

Recreation trails and other developments shall be constructed and maintained to the appropriate development level associated with a Roaded Natural ROS class.

Overnight camping and campfires are prohibited in Hearts Content Scenic Area.

Recreational use that threatens or interferes with the objectives or purposes for which the Scenic Area was established shall be prohibited.

Developed facilities may be provided or enhanced for public use of the area or for resource protection.

2360 Heritage

Guidelines

Archaeological excavations should be permitted only when they will not alter the scenic integrity of the area, natural contour, or diminish its purpose in the long term.

2400 Vegetation

Standards

Changes resulting from vegetation management activities shall be kept as naturally appearing as possible. Vegetation management is generally infrequent and may take place for any of the following reasons:

- Maintenance and/or expansion of existing facilities, trails, vistas, and overlooks.
- For treatment for non-native invasive species.
- Appropriate administrative use.
- Habitat enhancement for select plant species with viability concerns.
- The cutting, sale, or removal of timber is incidental to the implementation of another suitable management activity (e.g. removal of timber for trail construction).
- Removal of hazard trees.

2700 Special Use

Recreation Special Uses

Standards

Recreation special uses, including outfitting and guiding, are prohibited.

Non-Recreation Special Uses

Standards

Both commercial and non-commercial recreation special use activities shall be prohibited.

Guidelines

Expansion of existing facilities and corridors for utility lines and pipelines should be minimized.

Special use permits may be permitted for low impact, non-consumptive research or educational activities, or when mandated by law or agreement. Phase out existing special use permits when feasible.

2800 Minerals and Geology

Standards

Federal minerals (including oil and gas) shall not be available for leasing and shall be withdrawn from mineral production within this management area.

Guidelines

Tank batteries should be located outside of the scenic area where possible. Tanks and separators will be located on one site in the development. Tank hatches will be locked.

5100 Fire

Standards

Wildfire shall be suppressed.

Guidelines

Utilize low impact techniques for suppression activities.

Prescribed fire may be used to help restore or maintain fire dependent ecosystems.

Management Area 8.4 – Historic Area

Contribution to Desired Condition

This area contributes to the desired condition (See Part 1 – Vision) by providing opportunities to understand the prehistoric and historic human role influencing the landscapes of the ANF in the Buckaloons Historic Area. Human manipulation of the environment has created a mosaic of many tree and plant species important for human uses along with archaeological evidence of that use. The area offers visitors many opportunities to learn about this cultural heritage.

Soft vegetation cover of grasses will be maintained in the fallow fields to protect the archaeological resources beneath the plow zone. Within the former fields of the Irvine Estate, early successional and wetland plant species are present. Existing tree cover is retained and progresses towards older forest conditions. These large grasslands and wetlands provide small game hunting opportunities.

Recreation experiences come in a variety of forms including interpretation and educational tours, as well as volunteer opportunities to assist with research and special events. Recreational experiences are consistent with a Roaded Natural ROS class. As a nationally designated historic area, the Buckaloons Historic Area contributes to rural community viability through heritage tourism and the involvement of local partners in a manner sensitive to traditional cultures.

Facilities and roads are present to provide public access, but are configured to protect important archaeological resources.

Objectives

Complete analysis and report of the archaeological studies undertaken under the Memorandum of Agreement among the Allegheny National Forest, the Pennsylvania State Historic Preservation Officer, and the Brokenstraw Valley Area Authority.

Complete National Register of Historic Places nomination for the area as an historic district.

Sufficiently mark historic foundation and locations of specific interest using standard signs so that users can locate and learn about the history and prehistory of the area.

Provide large grassland habitats for small game species (pheasants, woodcock, and rabbits) and species with viability concerns such as Henslow’s sparrow.

Table 56. MA 8.4 Suitability Summary

S = Suitable and U = Unsuitable

Use or Activity	Suitability
Timber Harvest	
Timber Production	U
Harvest for Other Resource Purposes	S
Salvage/Sanitation Harvest	S
Road Management	
Existing Forest Service Road Reconstruction or Maintenance	S
New Road Construction	S
Pit Development or Expansion	U
Gathering of Special Forest Products	
Commercial	U
Personal	U
Firewood Collection	U
Special Use Permits	
New Communication Towers	U
New Road Rights of Way, Pipelines, and Utility Lines	U
Fire Activities	
Wildland Fire Use	U
Prescribed Fire	S

Table 57. MA 8.4 Recreation Suitability Summary

S = Suitable and U = Unsuitable

Trail Use or Activity	Suitability
Interpretive Trails	S
Snowmobiling	U
ATV/OHM (in IUAs only)	U
Bicycling	S
Equestrian Use	
On Trails/Routes	S
Cross-country	S
Other Recreational Use or Activity	
Dispersed Camping	U
Developed Camping	S
Vista Management	S

MA 8.4 – Design Criteria

2300 Recreation

Standards

Recreation trails and other developments shall be constructed and maintained to the appropriate development level associated with a Roaded Natural ROS class.

Developed Recreation

Guidelines

Developed facilities may be provided or enhanced for public use of the area or for resource protection.

2360 Heritage

Standards

Ensure that prehistoric, historic archaeological sites and values are studied, preserved, and protected in accordance with heritage resource regulations. Provide for interpretation and enjoyment of these sites, along with provisions for developed and dispersed recreation and protection of scenic integrity.

Coordinate with the Pennsylvania Historical and Museum Commission (i.e., the Pennsylvania State Historic Preservation Office, or SHPO), the Seneca Nation of Indians Tribal Historic Preservation Officer, or THPO, other interested Native American tribes or groups, the Warren County Historical Society and its nearby museum (i.e., the Clinton E. Wilder Museum) in Irvine, and other interested organizations and individuals along with the Pennsylvania Game Commission to ensure the protection and enhancement of the heritage, wildlife and recreation values of this area.

Guidelines

Manage the area to provide the opportunity for recreational activities oriented to understanding and appreciating the area for its heritage and ecological values.

Hunting should be managed to minimize impacts to heritage resources and public visitation to the historic area.

Continue archaeological research in the area where appropriate to meet goals and objectives as well as future compliance needs.

Seek protection and access to prehistoric and historic sites through available means such as scenic easements or cooperative agreements.

Manage visual resource to enhance visual appeal and to rehabilitate historic landscapes that do not meet adopted Scenic Integrity Levels.

2400 Vegetation

Standards

Timber harvest associated with forest vegetation management shall be limited to address heritage, recreation and scenery management activities, user safety, wildlife concerns, forest health, or catastrophic events such as wind or ice storms. Changes resulting from vegetation management activities shall be kept as naturally appearing as possible. Vegetation management is generally infrequent and may take place for any of the following reasons:

- To improve habitat for species with viability concerns; restore terrestrial or aquatic ecosystem composition and structural characteristics; or maintain existing unique or important wildlife features or plant communities.
- Maintenance and/or expansion of existing facilities, trails, vistas, and overlooks.
- Conservation, research, and/or interpretive purposes on or around heritage sites.

- Appropriate administrative use.
- Timber salvage and associated reforestation techniques.
- To protect heritage resources from tree root damage.

Even-aged or uneven-aged management is acceptable, depending on management objectives and forest types involved. The choice of system should be based on individual site analysis in conjunction with landscape level objectives.

Guidelines

Historic vegetation should be maintained around the foundation and associated outbuildings of the former Irvine Estate, so long as that vegetation is not invasive and does not have the potential to impact other areas.

The Irvine Estate historic landscape that does not meet adopted Scenic Integrity Levels should be rehabilitated.

2600 Wildlife, Fish and Sensitive Plant Habitat

Guidelines

Plant and animal habitat enhancement (e.g. pheasants, rabbits, woodcock, waterfowl, etc.) activities should not interfere with archaeological resource protection and public interpretation of the historic and archaeological resources.

Warm and cool season grasses should be planted to enhance habitat for small game species and Henslow's sparrows.

2800 Minerals and Geology

Standards

All Federal minerals (including oil and gas) shall not be available for leasing.

7700 Transportation Systems

Standards

Construction of new roads and other facilities shall be allowed for recreation/interpretation facilities and for administrative or designated special uses, or required by law to provide access to non-Federal land or valid mineral rights.

Management Area 8.5 – Research Natural Area

Contribution to Desired Condition

This area contributes to the desired condition (See Part 1 – Vision) by providing an area whose evolutionary processes are natural. It provides the necessary reference areas or benchmarks for comparison with similar, more intensively managed areas. The purposes of Research Natural Areas include serving as reference areas for the study of natural ecological processes, including disturbance, serving as baseline areas for measuring long term ecological changes, serving as control areas for comparing results from manipulative research, and monitoring effects of resource management techniques and practices. Unmodified conditions are maintained while conducting research, study, observation, monitoring, and educational activities. Disturbances such as beech bark disease and wind events are evident.

It is one of the largest remnants of the beech-hemlock forest that covered as much as 6 million acres of the region in the late 1700s. As a National Natural Landmark, Tionesta RNA helps illustrate the geological and ecological history of the Eastern United States and strengthen the public's appreciation of America's natural processes.

The Tionesta RNA contains large hemlock and beech trees that are more than 300 years old, as well as young forests regenerated from windthrow events in recent decades. These trees provide dense tree canopies, standing and down dead trees, thick bark, complex crown structures, heavy branches, and undisturbed duff and litter layers. This older forest also provides for stream protection and input of large down wood that creates more complex aquatic habitat, shading of stream waters to keep them cool, and filters for sediments. The area also includes younger forest developing after windthrow and overstory mortality, with pit and mound topography, exposed mineral soil, and high quantities of down woody material. This diversity provides habitat for a variety of native plant, animal, and fungal species.

It provides an old growth setting for dispersed recreation, with high aesthetic and spiritual values. Only low density dispersed recreation activities occur to protect the values of the RNA. No roads or developed recreation facilities are provided. This area provides a Roaded Natural ROS class.

Table 58. MA 8.5 Suitability Summary

S = Suitable and U = Unsuitable

Use or Activity	Suitability
Timber Harvest	
Timber Production	U
Harvest for Other Resource Purposes	U
Salvage/Sanitation Harvest	U
Road Management	
Existing Forest Service Road Reconstruction or Maintenance	U
New Road Construction	U
Pit Development or Expansion	U
Gathering of Special Forest Products	
Commercial	U
Personal	U
Firewood Collection	U
Special Use Permits	
New Communication Towers	U
New Road Rights of Way, Pipelines, and Utility Lines	U
Fire Activities	
Wildland Fire Use	S
Prescribed Fire	U

Table 59. MA 8.5 Recreation Suitability Summary

S = Suitable and U = Unsuitable

Trail Use or Activity	Suitability
Interpretive Trails	U
Snowmobiling	U
ATV/OHM (in IUAs only)	U
Bicycling	U
Equestrian Use	
On Trails/Routes	U
Cross-country	U
Other Recreational Use or Activity	
Dispersed Camping	U
Developed Camping	U
Vista Management	U

MA 8.5 – Design Criteria

2300 Recreation

Standards

Recreational use that threatens or interferes with the resource objectives of the RNA shall be prohibited.

Recreation facility and trail development shall be prohibited; however, existing trails that traverse the RNA may be maintained.

Protect the integrity of research studies from recreational disturbance by limiting recreational use on the RNA.

2360 Heritage

Guidelines

Archaeological excavations may be permitted only when they will not alter the long term ecological integrity of the RNA or diminish its purposes.

2400 Vegetation

Standards

Vegetation management shall be permitted only when needed to maintain or restore the unique feature(s) or vegetation type(s) for which the RNA was established or to control non-native species. Management processes shall approximate the vegetation and processes that govern natural recession.

2600 Wildlife, Fish and Sensitive Plant Habitat

Guidelines

Management for plant and animal habitat, including TES species, should be permitted only when species or habitat would be lost or degraded without treatment, or require restoration to move the area toward a more natural condition.

2700 Special Use

Recreation Special Uses

Standards

Both commercial and non-commercial recreation special use activities shall be prohibited.

Non-Recreation Special Uses

Guidelines

No additional structures should be permitted unless needed to meet RNA objectives.

New special use permits should only be issued for research or educational activities.

2800 Minerals and Geology

Standards

Federal minerals (including oil and gas) shall not be available for leasing and shall be withdrawn from mineral production within this management area.

4000 Research

Standards

Proposals for research in the RNA shall be reviewed by the Northern Research Station project leader and approved by the Forest Supervisor.

5100 Fire

Standards

Wildfire shall be suppressed.

Guidelines

Utilize low impact techniques for suppression activities.

Prescribed fire may be used to help restore or maintain fire dependent ecosystems.

7700 Transportation Systems

Standards

Construction of new permanent roads or motorized trails shall be prohibited unless required for administrative or designated special uses, or required by law to provide access to non-Federal land or valid mineral rights.

Roads that are constructed for outstanding rights or the development of approved oil and gas and other Federal mineral operations shall be built to the minimum standard needed to protect other resources, and will normally be decommissioned and rehabilitated at the conclusion of operations.

Management Area 8.6 – Kane Experimental Forest

Contribution to Desired Condition

This area contributes to the desired condition (See Part 1 – Vision) primarily through development of knowledge about the Allegheny ecosystem and its management. Research projects generally relate to sustainable forest management problems and opportunities in the northeast. This research program includes both long-term and short-term experiments, and research that is manipulative as well as observational in nature. The research program addresses research needs of a wide variety of clients. Ongoing, long-term research is continued and opportunities for new research and education are fostered on the experimental forest.

KEF includes a range of vegetative types from open fields to older timber stands along with a range of forest types and structural stages found on the ANF. The area provides dispersed recreation opportunities in a roaded natural recreation setting. Roads and other facilities supportive of the research are present on the KEF.

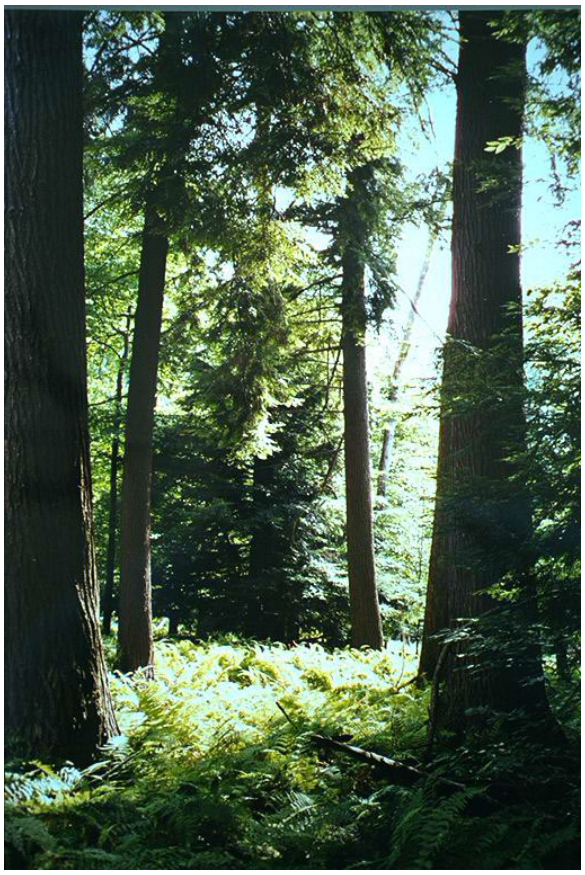


Photo courtesy of US Forest Service

Table 60. MA 8.6 Suitability Summary

S = Suitable and U = Unsuitable

Use or Activity	Suitability
Timber Harvest	
Timber Production	U
Harvest for Other Resource Purposes	S
Salvage/Sanitation Harvest	S
Road Management	
Existing Forest Service Road Reconstruction or Maintenance	S
New Road Construction	S
Pit Development or Expansion	U
Gathering of Special Forest Products	
Commercial	U
Personal	S
Firewood Collection	U
Special Use Permits	
New Communication Towers	U
New Road Rights of Way, Pipelines, and Utility Lines	U
Fire Activities	
Wildland Fire Use	S
Prescribed Fire	S

Table 61. MA 8.6 Recreation Suitability Summary

S = Suitable and U = Unsuitable

Trail Use or Activity	Suitability
Interpretive Trails	S
Snowmobiling	U
ATV/OHM (in IUAs only)	U
Bicycling	U
Equestrian Use	
On Trails/Routes	U
Cross-country	U
Other Recreational Use or Activity	
Dispersed Camping	U*
Developed Camping	U
Vista Management	U

* Indicates situations where the use or activity is suitable only in very narrowly defined situations.

MA 8.6 – Design Criteria

2300 Recreation

Standards

Recreation trails and other developments shall be constructed and maintained to the appropriate development level associated with a Roaded Natural ROS class.

No overnight camping shall be permitted on the KEF, except at the following three existing primitive campsites:

- An opening in a red pine plantation near the intersection of FR 138 and FR 123 (compartment 16).
- Along FR 123 on a curve near the intersection with the National Fuel Gas pipeline right-of-way along an abandoned trail (compartment 5).
- Along Ackerman Run near its intersection with FR 123 (at the boundary of compartments 20 and 22).

No campfires shall be permitted outside of administrative sites on the KEF or the primitive campsites listed above.

Only ATV/OHM use approved for administrative purposes is permitted on the KEF; no recreational ATV/OHM use is permitted.

2360 Heritage

Standards

Undertakings with regard to cultural resources, including maintenance of historic headquarters structures, on the KEF must be coordinated with the Marienville Ranger District.

2400 Vegetation

Standards

Commercial sale of timber may only occur in this area to address one of the following situations:

- In conjunction with a research, experimental, monitoring, or demonstration/educational site design
- To respond to forest health issues or catastrophic events such as wind or ice storms
- To complete overstory removals in the expanded portion of this MA, that had initial seed cuts done prior to the implementation of this plan

Guidelines

Application of all vegetation management activities within the KEF is appropriate, as long as the application is reviewed by the project leader of the Northeast Research Station in Irvine, PA.

2700 Special Use

Recreation Special Uses

Standards

Both commercial and non-commercial recreation special use activities shall be prohibited.

Non-Recreation Special Uses

Guidelines

New special use permits should only be issued for research, experimental, monitoring, or demonstration/educational activities.

2800 Minerals and Geology

Standards

Surface occupancy of OGM development equipment is not allowed on Federal oil and gas leases within this management area.

Guidelines

Tank batteries should be located outside of or on the edge of the remote recreation area where possible. Where lease configuration and technology permit, tanks and separators should be located on one site in the development.

4000 Research

Standards

The Northern Research Station will be responsible for scientific and demonstration/education use of the Kane Experimental Forest.

7300 Administrative Facilities

Guidelines

Permanent structures may be developed with the approval of both the forest supervisor and the Northeast Research Station project leader only if necessary for support of the KEF mission of research, experimentation, and public education.

Appendix A—Rationale for Choice of Vegetation Management Practices

Introduction

The Land and Resource Management Plan (LRMP) specifies desired conditions; goals and objectives; and suitability and design criteria for various activities, including forest vegetation management and silvicultural activities that may occur on the Allegheny National Forest (ANF). Silvicultural practices and reforestation treatments are used to manage forest vegetation on the ANF in order to achieve a variety of desired conditions and goals and objectives, as guided by specific management area direction. These include maintaining forest health and growth rates of trees; creating areas of young forest; accelerating development of large trees and vertical structure; balancing forest age class distribution; enhancing wildlife habitat; responding to forest health threats; restoring forest structure in areas impacted by deer browsing; providing forested settings for outdoor recreation; and sustaining healthy, diverse forest ecosystems at a landscape scale.

The National Forest Management Act of 1976 (Section 6(g)(3),(e)(iv) and (f)(i)) (NFMA) and the resulting Secretary's 1982 Regulations (36 CFR 219.15) require that vegetation management practices be chosen that are appropriate to meet the objectives and requirements of a land and resource management plan. This appendix to the LRMP presents the rationale for the vegetation management practices, including silvicultural practices and reforestation treatments, recommended in order to meet resource management objectives set forth in individual management area direction for the various vegetation types on the ANF.

In those cases where recent literature or other sections of the LRMP or Final Environmental Impact Statement adequately describe practices, this appendix will refer the reader to the appropriate documents and sections, but the information will not be repeated.

This appendix also includes site, herbicide, application rate, and method selection criteria for several vegetation management objectives that might utilize herbicides, including:

- Silvicultural Treatments
- Wildlife Habitat Enhancement
- Heritage Site Conservation, Vista Development and Maintenance, Electric Fence Maintenance
- Non-native Invasive Species (NNIS) Treatment

Tree Seedling Establishment

Regeneration of tree species found on the ANF is determined by a number of factors, including seed supply periodicity, seedbank or seedling bank viability, seed dissemination, seedbed conditions, shade tolerance, light (including interfering vegetation), seed predation, insects and diseases, and site limitations. The silvicultural requirements for regenerating the Allegheny hardwood type (primarily black cherry) are well understood. However, we have less experience in regenerating upland hardwood, northern hardwood, and oak forest types throughout the range of existing site conditions and in the face of changing deer impact. Seedlings of other species (red maple, sugar maple, hemlock, oak, etc.) take much longer to develop than black cherry, birch, and aspen, perhaps as long as 8 to 15 years. Oak seedlings can take up to 20 years to become established and competitive with other species. Selective browsing by white-tailed deer, dense interfering plants, forest health challenges (especially those caused by exotic insects and diseases), and erratic seed production all play a role in limiting seedling development.

Deer browsing impacts are the most important factor affecting understory vegetation development in Pennsylvania since the 1920s (Latham et al. 2005). In recent years, browsing intensity has decreased on the ANF

as a result of implementation of new deer management options created by the Pennsylvania Game Commission, but understory response lags behind the deer population drop (deCalesta 2005). If current programs remain in effect, it is possible that one of the most important challenges to regeneration success on the ANF will be eased during the implementation period for this plan, but it is also possible that deer impacts will return to historic and challenging levels. Regardless of future deer impacts, interfering understories that are well established as a result of the legacy of deer browsing will still need to be treated to encourage establishment of a diversity of tree seedlings and herbaceous vegetation. A future with reduced deer impact may reduce the need for fencing and may reduce some of the barriers to successful implementation of uneven-aged silviculture.

Regeneration guidelines on the ANF call for at least 70 percent of understory plots to be stocked with an adequate number of advanced seedlings (Horsley et al. 1994, pp. 220-222, Bjorkbom and Walters, 1986). Regeneration is considered successfully established when it meets guidelines described by Horsley et al. (1994, pp. 222-223). In order to ensure abundant and diverse seedling regeneration on the ANF, a number of intensive treatments are applied where needed, including:

- Ensuring retention of diverse seed trees.
- Controlling deer browsing impacts through fencing, and concentrating removal harvests within a small geographical area.
- Providing adequate light to the forest floor through removal of overstory trees.
- Removing low shade and interfering vegetation.
- Controlling forest floor disturbance.
- Waiting for seedling establishment, as many species take 8 to 20 years to become established.
- Releasing less common or unique tree species in order to better maintain seedling abundance and species diversity in regenerating areas.

Results with even-aged regeneration on the ANF have been quite good (96% adequately stocked with tree seedlings in 2001) (USDA FS 1998, pp. 17-18 and 86, Table 16, USDA FS, 2002, pp. 21-23). Conversely, uncertainty with tree seedling regeneration has been associated with uneven-aged management on the ANF during the 1986 Forest Plan period (USDA FS 1998, pp. 18 and 86; USDA FS 2001d pp.16, 17, 76, 77; USDA FS 2002, p. 23; Stout 1994, pp. 333-334). In addition, substantial concerns exist about the use of uneven-aged management that features strictly shade-tolerant species, such as beech, sugar maple and hemlock, which all presently face serious forest health threats. However new standards and guidelines have been incorporated into the LRMP for the use of uneven-aged management to reduce the uncertainty and forest health concerns associated with uneven-aged management on the ANF, and increase its long-term successfulness. These guidelines include allowing for larger opening sizes with the intent of regenerating a greater diversity of tree species with greater shade-tolerance ranges, including shade-intolerant (e.g. black cherry, yellow poplar, ash, northern red oak) and mid-tolerant (e.g. red maple, birch, cucumber) species, than would occur under former standards for uneven-aged management.

The LRMP incorporates an adaptive management approach, especially with regard to conditions that we expect to change such as deer impact on the ANF, implementing uneven-aged silvicultural prescriptions, potential invasions by exotic species, and management in forest types whose local silvicultural requirements are less well known than those of the Allegheny hardwood type. Adaptive management is a “type of forest land management in which, as an ongoing process, the monitoring of results of management decisions… is used to modify the management approach,” as defined by the Society of American Foresters (1994). We use adaptive management to help develop these solutions when sufficient information is already available, but some uncertainty exists, or when we understand that key conditions may be changing during the management period.

Integrated Pest Management Practices

Though it is difficult to predict the degree of impact to forest health from stressors, particularly the cyclical populations of defoliating insects, droughts, and introduced exotic forest pests, it is likely that some form of chemical (e.g. insecticides), biological (e.g. introduced predators that feed on exotic insects) and/or cultural (vegetation manipulation) treatments will be necessary on the ANF. Pesticide treatments such as application of *Bacillus thuringiensis* (Bt) reduce defoliations from various forest pests. Systemic treatments, such as the selective use of imidacloprid or other appropriate insecticide may be necessary to conserve individual eastern hemlock trees infested with the hemlock woolly adelgid (*Adelges tsugae*) (HWA) (Ward et al. 2004). Existing factors affecting the health of trees on the ANF in the past two decades include the BBD complex and sugar maple decline. Looming threats to forest health on the ANF include HWA, emerald ash borer, sudden oak death, and Asian long-horn beetle.

Silviculture is an important part of an integrated pest management (IPM) program, and can be a valuable tool in the prevention, mitigation, and restoration of forest ecosystems threatened by introduced forest pests that are responsible for reducing biodiversity, compromising ecological integrity, disrupting ecosystem dynamics, and displacing native species (Waring and O'Hara 2005). As summarized by Waring and O'Hara, in the early arrival and establishment phases of a pest invasion, silviculture may focus on operations that attempt to eradicate or substantially limit the range of the pest. Effective silvicultural tools for eradication include stand manipulation and biological and chemical control. During the spread phase, silviculture is focused on preventing further spread by altering stand structures and tree species composition to non-host species, and improving tree vigor. In some cases, regeneration to healthy and resistant species is necessary.

Beech Bark Disease Complex

The introduced BBD complex results in significant beech mortality, with an understory response of increased beech root sprouting, and an increase in the amount of susceptible beech stems in affected areas, potentially leading to a second BBD complex outbreak of more serious impact than the first (Otrofsky and McCormack 1986). In order to retain a component of American beech that is resistant to the BBD complex, efforts will be made to identify and retain beech trees that are immune or resistant to the disease complex as suggested by Burns and Houston (1987) and Mielke et al. (1986). At the same time, beech that are susceptible to the complex will be removed to provide growing space for either resistant beech or other tree species. Following a period of time for beech root sprouts to develop, foliar glyphosate treatments are applied to reduce the abundance of beech sprouts. This creates growing space for diverse tree seedling regeneration, including resistant beech sprouts and seedlings that will develop around resistant beech trees retained in harvest treatment areas. These resistant beech seedlings and sprouts can then develop with little competition from stems of susceptible beech trees. Long term studies in New Hampshire have found that management directed toward removing poor beech trees over a period of decades can produce areas where stand level health is significantly improved, the effects of the BBD complex are reduced, and the basal area of beech trees resistant to the disease complex is increased (Leak 2006). ANF foresters will continue to cooperate with researchers from the Northern Research Station to study methods of regenerating a beech component that is resistant to the BBD complex.

Hemlock Woolly Adelgid

This introduced insect has been steadily progressing across the Eastern United States, and is anticipated to arrive on the ANF within the plan period. Ongoing monitoring activities for the insect will continue on the ANF, with a focus on areas of greatest potential for introduction. ANF foresters will continue to cooperate with researchers from the Northern Research Station and Northern Area State and Private Forestry personnel to evaluate potential silvicultural treatments that may help mitigate impacts from this introduced insect. Researchers throughout the Eastern United States are continuing to evaluate new biological, chemical, and cultural controls for the HWA. At such time the HWA is discovered on the ANF, a strategy will be developed based on the most current treatment options available at that time, infestation levels, and prioritization of treatment areas. In some cases, it may be necessary to replace hemlock with other conifers to maintain some of the ecosystem services provided by

hemlock. In the interim, other conifers currently present on the ANF, including white pine and red pine, will generally be maintained or enhanced.

Sugar Maple Decline

Foresters in northern Pennsylvania began noticing a decline in sugar maple health in the 1980s. Trees located on the plateau and upper slopes of unglaciated sites had the highest mortality levels. Recent local research conducted across the northern tier of Pennsylvania and the southern tier of New York indicates unglaciated upper slope sites and the plateau top are sensitive sites where sugar maple and other high base cation-demanding species, such as white ash and basswood, may be more vulnerable to stress events such as insect defoliation (Horsley et al. 1999, pp 60-62). These conditions are exacerbated by drought conditions. Among the five most abundant tree species on the ANF, dead trees are proportionally greatest for sugar maple (Morin et al. 2001, p. 59, Morin et al. 2006, pp. 24-25).

Research results indicate the most important factors associated with sugar maple health are foliar levels of magnesium (Mg) and manganese (Mn), and defoliation history. The lowest foliar Mg, highest foliar Mn, and highest number and severity of insect defoliations were associated with unglaciated summits, shoulders, and upper backslopes. Locally, sugar maple decline has been associated with two or more moderate to severe defoliations within a decade on sites with low levels of base cations, especially magnesium and calcium (Horsley et al. 2002). The decline of sugar maple seems to result from an interaction between low levels of Mg (and perhaps elevated Mn) nutrition, topographic position, and stress caused by defoliation or drought. The unbalanced calcium (Ca), Mg and Mn nutrition predisposes sugar maple to decline by reducing crown vigor, and excessive stress such as defoliation or drought incites (triggers) decline. On the ANF, where sugar maple occurs along plateau top and shoulders, continued decline is expected.

For a healthy sugar maple component, ANF foresters will favor sugar maple on nutrient-rich sites like lower and bottom slopes. Conversely, other species will be favored on upper slope and plateau top sites where their nutrient requirements better match inherent site nutrient characteristics. Additionally, as detailed in the LRMP forestwide standards and guidelines, ANF managers will promptly evaluate the need for insect control where species sensitive to site nutrients (high base cation-demanding) occur on lower quality sites (summit, shoulder, upper backslope), multiple stressors are occurring (e.g. drought), and it appears defoliation will occur.

The application of lime to increase levels of calcium in forest soils, thereby improving the Ca, Mg and Mn balance, may hold promise in the future. A long-term study initiated in 1985 found that applying 10 tons of dolomitic limestone to forest soils per acre significantly increased diameter growth and improved crown vigor of overstory sugar maple, as well as the size of sugar maple flower and seed crops (Long et al. 1997). Conversely, a pattern of decreased vigor over time was noted for both beech and black cherry under this treatment. This may have been due to the effects of the BBD complex, defoliation by elm spanworm, and low occurrence of black cherry in all study blocks. Liming in this study increased exchangeable base cations in the upper 15 centimeters of the soil, especially calcium and magnesium, while reducing levels of exchangeable potassium, aluminum, and manganese. Lime application may become a viable alternative in ANF sugar maple stands at some point in the future. However, effects to species other than sugar maple and other ecosystem elements require further study. Additionally, the amount of lime required (10 tons per acre) is impractical in managing forest landscapes. Future research may identify application methods and rates that are more feasible in managing forested ecosystems, which may be applicable to the ANF.

Rationale for Prescriptions for Each Forest Type

The scientific basis for the application of silvicultural treatments on the ANF rests largely on the research conducted on the Allegheny Plateau and on the ANF by the Northern Research Station, as well as in similar forest types in other parts of the Eastern United States. Table A-1 displays references that contain the scientific rationale for choosing and developing specific prescriptions for each forest type, including stocking guidelines, and are the basis for the discussion on individual forest types that follows. The degree to which even-aged or uneven-aged management is recommended by forest type is indicated in the table.

Table A-1. Silvicultural Guides for ANF Forest Types

EAM = Even-aged Management and UEAM = Uneven-aged Management

Publication or Manual	Forest Type						
	Aspen	Allegheny Hardwoods	Upland Hardwoods	Northern Hardwoods	Oak	Hemlock	Conifer
Marquis, D.A., Ernst, R.L., and S.L. Stout. 1992. Prescribing Silvicultural treatments in hardwood stands of the Alleghenies (Revised). USDA Forest Service, General Technical Report, NE-96.		EAM, Limited UEAM	EAM, Limited UEAM	EAM, Limited UEAM	EAM, Limited UEAM		
Marquis, D. A., ed. 1994. Quantitative Silviculture for Hardwood Forests of the Alleghenies. USDA Forest Service, General Technical Report NE-183.		EAM, Limited UEAM	EAM, Limited UEAM	EAM, Limited UEAM	EAM, Limited UEAM		
Barrett, J.W., editor. 1995. Regional Silviculture of the United States. Third edition. John Wiley & Sons, Inc., New York, New York, USA.		EAM, Limited UEAM	EAM, Limited UEAM	EAM, UEAM	EAM, Limited UEAM		
Johnson, P.S. March 1993. Perspectives on the Ecology and Silviculture of Oak-Dominated Forests in the Central and Eastern States. General Technical Report NC-153. USDA Forest Service, North Central Forest Experiment Station, St. Paul, MN. 28 pp.					EAM, Limited UEAM		
Hornbeck, J.W. and W.B. Leak. 1992. Ecology and Management of Northern Hardwood Forests in New England. USDA Forest Service, Northern Forest Experiment Station. General Technical Report NE-159.				EAM, UEAM			
Johnson, P.S., S.R. Shifley, and R. Rogers. 2002. The Ecology and Silviculture of Oaks. CABI Publishing, New York, New York, USA.					EAM, Limited UEAM		
McShea, W.J. and W.M. Healy, editors. 2002. Oak Forest Ecosystems: Ecology and Management for Wildlife. The Johns Hopkins University Press, Baltimore, Maryland, USA.					EAM, Limited UEAM		

Publication or Manual	Forest Type						
	Aspen	Allegheny Hardwoods	Upland Hardwoods	Northern Hardwoods	Oak	Hemlock	Conifer
Brose, P.H., D.H. Van Lear, and R. Cooper. 1999. Using shelterwood harvests and prescribed fire to regenerate oak stands on productive upland sites. Forest Ecology and Management 113:125-141.					EAM		
Brose, P.H. 1999. A Shelterwood-Burn Technique for Regenerating Productive Upland Oak Sites in the Piedmont Region. Southern Journal of Applied Forestry 16(3):158-163.					EAM		
Brose, P.H., and D.H. Van Lear. 1998. Responses of hardwood advance regeneration to seasonal prescribed fires in oak-dominated shelterwood stands. Canadian Journal of Forest Research 28:331-339.					EAM		
Roach, B.A. and S.F. Gingrich. 1968. Even-aged Silviculture for Upland Central Hardwoods. Agricultural Handbook No. 355. 39 pp.					EAM		
Agricultural Handbook No. 486, Quaking Aspen Silvics and Management in the Lake States.	EAM						
Perala, Donald A. 1990. Silvics of North America Volume 2. Hardwoods-Quaking Aspen. USDA Forest Service. Agriculture Handbook 654.	EAM						
Perala, D.A. 1977. Manager's Handbook for Aspen in the North Central Sates. USDA Forest Service, Technical Report NE-36.	EAM						
Paper No. 1439, Minnesota Ag. Exper. Station, Improving Your Forest Land for Ruffed Grouse, S.W. Gullion.	EAM						
Lancaster, K. 1985. Managing Eastern Hemlock- A Preliminary Guide. NA-FR-30.						EAM, UEAM	

Publication or Manual	Forest Type						
	Aspen	Allegheny Hardwoods	Upland Hardwoods	Northern Hardwoods	Oak	Hemlock	Conifer
McManus, K.A., K.S. Shields, and D.R. Souto, eds. 2000. Proceedings: Symposium on Sustainable Management of Hemlock Ecosystems in Eastern North America; 1999 June 22-24; Durham NH. GTR NE-267 Newtown Square, PA: USDA Forest Service, Northern Research Station. 237 pp.						EAM, UEAM	
D.T. Funk, compiler. 1986. Eastern White Pine: Today and Tomorrow Symposium Proceedings; June 12-14, 1985: Durham, NH. General Technical Report WO-51. USDA Forest Service, Northern Research Station. 124 pp.							EAM, Limited UEAM
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Aspen

Aspen is a relatively uncommon forest type on the ANF and is important to wildlife, with areas typed as aspen occupying less than one percent of the total forested land. In addition, individual trees or small groups of aspen are scattered throughout much of the ANF, primarily in association with upland, Allegheny, and oak hardwoods. Principal components of this type are quaking aspen and bigtooth aspen. Common associates on the ANF are black cherry, red maple, yellow birch, sweet birch, beech, eastern hemlock, red oak, white oak, and scarlet oak. As aspen is relatively short-lived and very intolerant of shade, these associates eventually dominate the stand on better sites.

Despite abundant seed production, aspen reproduces most commonly from adventitious root sprouts (suckers). Aspen suckering is suppressed by auxin transported from growing shoots. The parent stems must be killed by cutting, bulldozing, or fire to relieve this apical dominance and allow suckering to occur (Perala and Russell in Burns 1983, p. 113). Under natural conditions, aspen is regenerated by larger scale natural disturbances such as wildfire, windstorms followed by high intensity fires, or other events that leave a site devoid of vegetation. Site conditions as a result of these events expose the forest floor to sunlight, warming the soils and further enhancing sucker development. Aspen seedlings are preferred by deer; therefore, areas where aspen regeneration is desired will need to be fenced.

Optimality

Even-aged management using clearcutting is the optimum method for maintaining aspen due to its intolerance for shade, its physiological requirements for suckering, and the early age at which it deteriorates and declines in its regeneration potential (Perala and Russell in Burns 1983, p. 114). Harvesting practices usually consist of commercial or non-commercial cutting and scarification of the site, which promotes root suckering resulting in aspen regeneration. Single tree or group selection will discriminate against aspen. Both seedlings and suckers are very intolerant of shade and can endure little suppression. Natural thinning in dense young stands is rapid, and trees that fall below the canopy stop growing and die within a few years.

Aspen is not a long-lived species. By age 50, decay pathogens start to become a concern. The fungus *Phellinus tremulae* is the chief cause of decay in aspen and is the major deterrent to growing aspen on long rotations (Perala and Russell in Burns 1983, p. 114). At 50 to 70 years of age, aspen stands on the ANF will begin to deteriorate. Deteriorating clones will produce significantly fewer root suckers following harvest or catastrophic disturbances than their healthy counterparts. Without clearcutting or other similar substantial disturbance, aspen will be replaced by more shade-tolerant or longer-lived associates.

Aspen is not an important timber producing species on the ANF. Pulpwood is the only marketable product for aspen on the ANF, and this market is often limited. Consequently, objectives for maintaining aspen relate mainly to wildlife and maintaining vegetative composition and structural diversity on the ANF.

The aspen type is particularly good habitat for wildlife associated with forest margins and openings, such as ruffed grouse, woodcock, snowshoe hare, and a large number of songbirds. A diversity of aspen age classes, along with intermixed conifer stands, provides quality habitat for these species. Aspen is predominantly dioecious, and the male flower buds are important winter food for grouse. For increased grouse production, clearcuts should be no larger than 10 acres (Perala and Russell in Burns 1983, p. 114).

Cherry-maple (Allegheny Hardwoods)

The cherry-maple forest type covers about 12 million acres in the Allegheny Plateau and Allegheny Mountains sections of New York, Pennsylvania, Maryland, and West Virginia. It is a variant of the northern hardwood or beech-birch-maple forest that spans the northern portion of the Eastern United States from New England to the Lake States (Marquis, 1994, p. 5). The ANF lies in the heart of this area.

Forested areas on the ANF are classed as Allegheny hardwoods when at least 50 percent of the basal area consists of black cherry, yellow poplar, and/or white ash. Black cherry and the maples usually dominate these stands on

the ANF. American beech, eastern hemlock, yellow birch, sweet birch, yellow poplar, and cucumbertree are common associates. Based on ANF plot data, Allegheny hardwoods on average consist of 55 percent black cherry, 14 percent red maple, 12 percent sugar maple, 7 percent beech, and 12 percent other species. The cherry-maple or Allegheny hardwood forest type covers 28 percent of the total forested land area on the ANF.

Appropriateness

Even-aged management best satisfies the reproduction and growth requirements of the intolerant species that dominate this type (Bjorkbom and Walters 1986, Horsley et al. 1994 pp. 205-246). Allegheny hardwood stands have been successfully regenerated on the ANF for the past 40 years using even-aged regeneration methods. Black cherry, white ash, and yellow poplar are shade-intolerant, and they germinate in uncut stands, but only survive a few years unless additional light is supplied, so turnover is high (Horsley et al. unpublished 1998). Husch (1954) found that if residual stand density was more than 50 square feet of basal area per acre, few black cherry seedlings became dominant and they were of lower quality. Light is a critical barrier for these species to become established and survive. Red maple seedlings tend not to become established where low or intermediate canopy shade is present and take longer (3 to 4 years) to become established than black cherry (Horsley et al. unpublished 1998).

Optimality

When using even-aged management, we rely on natural regeneration to reestablish nearly all Allegheny hardwood stands. Clearcutting is optimal where adequate advanced seedlings are already present beneath the canopy. As mentioned previously, black cherry, white ash, and yellow poplar are shade-intolerant, and only survive a few years unless additional light is supplied, so turnover is high (Horsley et al. unpublished 1998). A clearcut is optimal when advanced seedlings are present, as it provides additional light to seedlings in one step, allowing them to survive and mature. Additionally, a clearcut eliminates the need for a shelterwood seed cut, which can increase the abundance of interfering vegetation (Horsley et al. 1994, pp. 214-216), thereby increasing the need to treat interfering vegetation through herbicide application or site preparation. Using a clearcut when advanced regeneration is present can also reduce damage to advanced seedling regeneration and site disturbance such as soil compaction by regenerating the stand in a single entry. Where advanced seedlings are not present, the shelterwood method should be used to obtain greater abundance and diversity of tree seedling regeneration, often in conjunction with herbicide application and area fencing to reduce deer browsing impacts (Horsley 1982, Bjorkbom and Walters 1986). The shelterwood removal cut takes place when adequate advanced tree seedling regeneration develops, as described by Horsley et al. (1994, pp. 220-223), following the shelterwood seed cut. In even-aged management of Allegheny hardwood stands, thinnings play an important role in increasing sawtimber production, stand value, and maintaining forest health (Marquis 1994b).

Uneven-aged Management Considerations

Most shade-intolerant and some intermediate species found in this type, such as black cherry, red maple, white ash, and yellow poplar, will not grow well or survive long under a dense canopy (Marquis and Gearhart in Burns 1983, p. 138). Uneven-aged management, particularly single-tree selection, will result in a shift towards shade-tolerant species, and not sustain Allegheny hardwoods (Stout 1994 p. 330). Therefore single tree selection is not recommended where the objective is to sustain the Allegheny hardwood type. Dale and others (1995) found that numbers of trees per acre (both total and of shade-intolerant trees) increased steadily as the distance from the edge of openings increased. They observed this trend in openings up to about three acres in size. Therefore, where uneven-aged management is desirable in limited situations to achieve other resource objectives, and the objective is to sustain the Allegheny hardwood type, group selection with openings of 2 to 3 acres should be utilized in this type.

Upland Hardwoods

The mixed upland hardwood type is dominated by red maple and black cherry, in association with sweet birch, sugar maple, and American beech. It is a variant of the northern hardwood or beech-birch-maple forest that spans

the northern portion of the Eastern United States from New England to the Lake States (Marquis, 1994, p. 5). Based on ANF plot data, upland hardwoods on average consist of 36 percent red maple, 23 percent black cherry, 10 percent American beech, 8 percent sugar maple, 7 percent eastern hemlock, and 16 percent other species. The upland hardwood forest type is the most abundant forest type on the ANF, covering 33 percent of the total forested land area, and includes areas typed as upland and lowland hardwoods, birch, and red maple. It falls between Allegheny and northern hardwoods in terms of shade tolerance and is considered intolerant to mid-tolerant.

Appropriateness

The upland hardwood type has seedling responses similar to Allegheny hardwood stands, though upland hardwoods have fewer black cherry trees in the overstory (USDA FS, 1995a, Appendix L, p. 8). Seedling development for black cherry is generally rapid where abundant seed source exists, while some species (red maple, cucumbertree, sugar maple, and American beech) can take substantial time (Horsley et al. unpublished 1998). Reproduction of intermediate-tolerant species, such as red maple, sweet birch, or cucumbertree, usually follows a moderate opening of the canopy and can persist for several years. Birches germinate well on a disturbed seedbed.

ANF personnel have been working with scientists at the Northern Research Station to develop a series of regeneration prescriptions to apply in upland hardwood stands that have low stocking of black cherry. Deer browsing impacts, light quality, and the length of time needed for seedlings to develop are the three most critical factors that must be considered in regenerating upland hardwoods. Strategies to regenerate maples and other species include reducing low shade to increase light to the forest floor for seedling establishment during shelterwood seed cuts, controlling deer browsing impacts, and allowing longer seedling development stages between shelterwood seed cuts and final shelterwood removal cuts.

Even-aged management best satisfies the reproduction and growth requirements of the shade-intolerant and mid-tolerant species that dominate this hardwood type (Marquis and Gearhart in Burns 1983). As noted by Marquis and Johnson (1989), shelterwood cutting is quite flexible in that the density of sheltering overstory and amount of time it is retained can be varied to suit the ecological requirements of a wide range of species. Shelterwood cutting provides conditions that favor a range of shade tolerance levels, from partial shade following the shelterwood seed cut to full sunlight after the shelterwood removal cut. Given the diversity of species comprising upland hardwoods, the shelterwood system is appropriate, as it can be used to successfully regenerate a diversity of species. Both shelterwood and clearcutting are appropriate where it is desirable to regenerate red maple (Marquis and Johnson 1989) or black cherry (Horsley et al. 1994, pp. 205-246), which comprises the largest proportion of the upland forest type on the ANF. In even-aged management of upland hardwood stands, thinnings play an important role in increasing growth and maintaining forest health (Marquis 1994b).

Optimality

When using even-aged management, we rely on natural regeneration to reestablish nearly all upland hardwood stands. Clearcutting is optimal where adequate advanced shade-intolerant and mid-tolerant seedlings are already present beneath the canopy. Black cherry, white ash, yellow poplar, birch, red maple, and other species comprising upland hardwoods are shade-intolerant or mid-tolerant, and most seedlings of these species will only survive if sufficient light is supplied. A clearcut is optimal when advanced seedlings are present, as it provides additional light to seedlings in one step, allowing them to survive and mature. Additionally, a clearcut eliminates the need for a shelterwood seed cut, which can increase the abundance of interfering vegetation (Horsley et al. 1994, pp. 214-216), thereby increasing the need to treat interfering vegetation through herbicide application or site preparation. Using a clearcut when advanced regeneration is present can also reduce damage to advanced seedling regeneration and site disturbance such as soil compaction by regenerating the stand in a single entry. Where advanced seedlings are not present, the shelterwood method should be used. The shelterwood removal cut takes place only if there is adequate advanced tree seedling regeneration, as described by Horsley et al. (1994, pp. 220-223), following the shelterwood seed cut.

Uneven-aged Management Considerations

Single tree selection would favor the shade-tolerant species comprising this forest type. Group selection favors more shade-intolerant and mid-tolerant species than single tree selection, but results in substantially fewer intolerants than even-aged management (Stout 1994, p. 333). Dale and others (1995) found that numbers of trees per acre (both total and of intolerant trees) increased steadily as the distance from the edge of openings increased. They observed this trend in opening up to about three acres in size. Therefore, where uneven-aged management is desirable in limited situations to achieve other resource objectives, group selection with openings of 1 to 2 acres should be utilized in this type, or openings of 2 to 3 acres in stands where shade-intolerant species such as black cherry and/or tulip poplar comprise at least 40 percent of the overstory stocking. Single tree selection should not be applied where less than 35 square feet (basal area) of healthy, shade-tolerant species (sugar maple, American beech, eastern hemlock) are present as described by Stout (1994, pp. 342-343).

Northern Hardwoods

The northern hardwood forest in the Northeastern United States covers nearly 15 million acres. The northern hardwood forest type covers 16 percent of the total forested land area on the ANF, and includes areas typed as northern hardwood, sugar maple-beech-yellow birch, sugar maple, and beech. Based on ANF plot data, the northern hardwood forest type on average consists of 24 percent eastern hemlock, 18 percent American beech, 13 percent sugar maple, 13 percent red maple, 13 percent black cherry, 6 percent yellow birch, and 13 percent other species. Common associates include white ash, yellow poplar, sweet birch, and cucumbertree. Species composition depends on stand age, site characteristics, geographic region, and past land use.

Appropriateness

Species in this type differ in shade tolerance, longevity, and growth rates. Yellow birch is intermediate in shade tolerance and growth rate. Red maple is also intermediate in shade tolerance but has moderately fast growth rates. Sugar maple, beech, and eastern hemlock are shade-tolerant, long-lived species. Sugar maple and beech have moderately slow growth rates, while hemlock grows rapidly in diameter, though not in height.

All important commercial species in this type characteristically reproduce from seed, and some also reproduce by vegetative means. Eastern hemlock, American beech, and sugar maple are very shade tolerant and can become established in the low light of uncut stands if intermediate and ground level canopies are not too dense (Horsley et al. unpublished 1998). Beech regenerates primarily through root suckers, and eastern hemlock reproduces from seed but is very vulnerable to deer browsing. The highly shade-tolerant beech is common in the understory of northern hardwood stands on well-drained sites. Eastern hemlock is more commonly found on the wet sites. These species and other long-lived, shade-tolerant species, when established, can respond to release after long periods of suppression. Yellow and sweet birches need overhead light and seedbeds of moist humus or mineral soil for optimum early establishment and development. Birches must become dominant early in life if they are to survive to maturity. Sugar maple, though it comprises 13 percent of northern hardwood overstory trees on the ANF, comprises less than 1 percent of seedling or sapling stocking (USDA FS 1995a, Appendix L, p. 9). Seed supply is an important barrier to sugar maple regeneration. Good seed crops on the ANF occur only every 7 to 8 years, compared to every 2 to 3 years in New England and the Lake States. A good ANF sugar maple seed crop contains less than 10 percent of the amount of seed in a good seed crop elsewhere (Horsley et al. unpublished 1998). Sugar maple seeds have no storage life in the forest floor, and the seedlings are very palatable to deer. Even though sugar maple is shade tolerant, it doesn't stand up well to the dense, low shade from ferns or thickets of beech and striped maple (Horsley et al. unpublished 1998).

Reforestation normally occurs through natural regeneration and relies heavily on adequate advance regeneration. The choice of silvicultural systems and intensity of management in the northern hardwood type is influenced by species composition, forest health considerations, habitat, site productivity, deer browsing, and management objectives. Additionally, the length of time (up to 15 years) it takes for a diversity of seedlings to develop is a critical factor in regenerating northern hardwoods on the ANF.

Three of the dominant shade-tolerant species comprising northern hardwoods on the ANF are presently threatened by forest health concerns, which must be considered in developing silvicultural treatments in the northern hardwoods type. The northern hardwoods forest type is comprised of shade-tolerant species such as sugar maple (sensitive to site nutrients and subject to decline on nutrient poor sites), beech (subject to introduced BBD complex), and eastern hemlock (potentially subject to HWA).

The BBD complex is of particular concern in northern hardwood stands with a large beech component. In New England, where the BBD complex has been present and killing American beech for over 50 years, on average half of the trees die, and only 1 percent of the trees appear immune to the complex (Houston 2005), though some will demonstrate partial resistance. Efforts should be made to retain beech trees that show evidence of being resistant to the disease complex.

Research has provided recommendations to maintain the health of sugar maple and other tree species (e.g. ash, basswood) with higher base cation requirements. These recommendations are incorporated into LRMP direction, and include proactive insect suppression on sensitive sites, protecting base cations, and choosing appropriate sites (mid and lower slopes on the ANF) to culture sugar maple.

Eastern hemlock, another component of the northern hardwood forest type, is susceptible to the introduced HWA, a non-native insect that could substantially impact eastern hemlock on the ANF within the plan period. The current strategy is to generally maintain hemlock until we see the nature of HWA effects locally.

The fourth major species in this type, yellow birch, is susceptible to *Nectria galligena*, a major cause of defect and mechanical stem failure on yellow and sweet birch on the ANF. Most birch trees on the ANF become infected with the Nectria fungus and few exceed 60 years of age (Morin et al. 2006, p. 38).

The current strategy for regenerating northern hardwoods includes retaining a beech component that is resistant to the BBD complex, allowing longer seedling development stages between shelterwood seed cuts and final shelterwood removal cuts. This encourages sugar maple regeneration on nutrient rich sites (lower and bottom slopes), and promotes regeneration of a diversity of tree species present in northern hardwood stands to maintain forest health over the long term. Because sugar maple and eastern hemlock grow slowly and are preferred as deer browse, it is especially important to control interference and deer browsing when regenerating northern hardwood stands. Reforestation treatments (site preparation, herbicide application, scarification, and fencing) will be required to create adequate conditions for a diversity of seedlings to become established.

Harvest methods that provide abundant sunlight, such as clearcutting or shelterwood removal cuts, will encourage a greater range of species with different shade tolerance levels to develop, including other species not subject to present forest health concerns. In portions of the northern hardwood range where species such as black cherry, yellow poplar, and oaks are mixed with northern hardwood species, even-aged management is appropriate (Tubbs, 1977). If the objective is to maintain or increase the stocking of intolerant and intermediate species, even-aged management is appropriate because it allows these species to outgrow their competition. On the ANF, even-aged management provides a better seedling growth response than uneven-aged management, thus allowing seedlings to grow above browse height sooner (Stout 1994, p. 334). Since shade-tolerant trees comprising the northern hardwood type do not respond well to fertilization, fencing is often required to reduce browsing damage. Even then it is important that the trees grow above browse height as quickly as possible. Shelterwood cuttings produce rich mixtures of hardwoods, including black cherry, birch, red maple, beech, sugar maple, white ash, and yellow poplar.

Optimality

Clearcutting in this type is optimal when adequate advanced reproduction is present in the understory, as it provides additional light to seedlings in one step, allowing them to survive and mature. Additionally, a clearcut eliminates the need for a shelterwood seed cut, which can increase the abundance of interfering vegetation (Horsley et al. 1994, pp. 214-216), thereby increasing the need to treat interfering vegetation through herbicide application or site preparation. Using a clearcut when advanced regeneration is present can also reduce damage to

advanced seedling regeneration and site disturbance such as soil compaction by regenerating the stand in a single entry.

Uneven-aged Management Considerations

If the objective is to move the stand towards shade-tolerant vegetation, then the uneven-aged system will accomplish this in the northern hardwood type. Single tree selection works in the northern hardwood type in the Northeastern United States because sugar maple, beech, and eastern hemlock can grow under partial shade and develop in the small openings created by harvesting of a single mature tree. However, on the ANF, sugar maple seed supply is limiting and sugar maple seedlings have had very limited success in becoming established, hemlock and sugar maple are vulnerable to deer browsing, and the vast majority of beech regeneration that becomes established is susceptible to the BBD complex. Seedlings of black cherry, yellow poplar, white ash, yellow birch, basswood, and red oak will not normally survive in such shade (Marquis and Gearhart in Burns 1983, p. 138). Their numbers will decrease with each subsequent harvest, unless the stands are cut heavily enough to ensure adequate sunlight reaches the forest floor. Single tree selection should be judiciously applied in northern hardwood stands on the ANF for the following reasons:

- Forest health concerns associated with American beech, eastern hemlock, and sugar maple, which are favored under this system (Stout 1994, p. 330).
- The poor success rate with this method on the ANF to date (USDA FS, 1998, pp. 18, 19, 78, 79 and USDA FS, 2002, pp. 22, 23).
- Deer browsing impacts seriously compromise the potential for adequate preferred seedling regeneration to become established (Stout 1994, p. 334).

The group selection method will create larger openings in the forest canopy than the single tree selection method so more sunlight can reach the ground. Methods such as group selection will allow species that are intermediate in shade tolerance or a mix of tolerance classes to become established (Hornbeck and Leak 1992). This is because group openings allow more sunlight to reach tree seedlings, facilitating regeneration of a broader range of shade tolerance classes. Due to present forest health concerns associated with shade-tolerant species comprising the northern hardwood types, if uneven-aged management is desirable, group selection with openings of one-half to two acres should be utilized in this type. Species that cannot survive and grow well under partial shading can develop in these openings, so the regeneration will often include more yellow birch, black cherry, white ash, red maple, and yellow-poplar seedlings than are found under single-tree selection. By combining group removals and selection cutting of immature trees, the cuttings maintain a proper mix of tree sizes and ages to provide for regular harvests.

Oak Hickory

The oak-hickory forest type covers 16 percent of the total forested land area on the ANF, and includes all forest types on the ANF where at least 25 percent of the stocking consists of oak species. It occurs mainly along the river corridors (including the Allegheny Reservoir) and their major tributaries on the ANF. Based on ANF plot data, the oak and oak transition types as a whole average 32 percent northern red oak, 24 percent red maple, 12 percent white oak, 5 percent beech, 4 percent black cherry, 4 percent eastern hemlock, and 19 percent other species. White oak, northern red oak, and black oak are found throughout this type on the better sites. Red oak is the most demanding oak in terms of site quality and is more abundant on the higher quality sites. Other common oaks on dry sites are scarlet oak and chestnut oak. Shagbark and bitternut hickories are consistent but minor components of the type. Other species occurring in the oak-hickory type are yellow poplar, white ash, sugar maple, black gum, and eastern white pine.

Recent research indicates the occurrence of oak forests in the major drainages (Allegheny River, Clarion River, Tionesta Creek and others) is related to Native Americans use of fire for hundreds and thousands of years, but was broken during the early 20th century (Ruffner et al. 1997; Ruffner and Abrams 1999; Abrams 2005; Black et al. 2006). Historically, the disturbance regime created by Native Americans was one of frequent to periodic low-

intensity fires. This fire regime, coupled with continuous hunting pressure on whitetail deer, would create and maintain a mosaic of forest structures with a diverse herbaceous understory, an ideal environment for the periodic establishment of oak seedlings and saplings (Brose et al. 2001; Ruffner, 1999; Ruffner, et al, 1997; Ruffner and Abrams, 1999; Black et al. 2006).

Following settlement of the ANF area by Europeans, the frequent low-intensity fire regime along major oak dominated drainages on the ANF changed to one of fire exclusion. On a broader scale, oak recruitment has nearly ceased in the past 50 to 100 years in much of the Eastern United States. The lack of fire has allowed many other hardwoods, like red maple, to increase in numbers and size, dominating oak forest understories and creating dense shade on the forest floor (Abrams, 2005). Additionally, the deer population on the Allegheny Plateau has increased dramatically since the early 1900s. These two factors, dense shade and high deer populations, are especially troublesome in mixed-oak forests as oak regeneration can only survive for a few years in dense shade, and deer preferentially browse oak seedlings in lieu of other vegetation. The near absence of fire in oak forests since settlement by Europeans is a major reason for present-day oak regeneration difficulties (Brose et al. 1999b).

Appropriateness

A lack of oak regeneration, as well as the inability of oak to outgrow or compete well with other species often limits successful regeneration of oak stands. Walters and Auchmoody (1993) summarized a number of factors that limit oak regeneration and measures to reduce those limitations. Limiting factors were grouped into three categories: (1) acorn production; (2) acorn predation and desiccation; and (3) seedling predation and competition. Corrective measures cited by them include partial overstory harvest to increase light to the forest floor, excluding deer by fencing and removing interfering understory vegetation. Bumper seed crops occur irregularly, and may occur as far as 10 years apart (Horsley et al. unpublished 1998). Acorn production differs greatly from year to year, species to species, and tree to tree within the same species and forest stand (Walters and Auchmoody 1993). Crown release of co-dominant individual oak trees can enhance acorn production (Healy 1997). Scarification, or exposing bare mineral soil and burying acorns mechanically, is a new technique recently applied on the ANF and appears very promising in increasing the number of new oak germinants given an abundance of acorns, as described by Lhotka and Zaczek (2003). This technique helps reduce acorn desiccation and predation on acorns by small mammals by burying acorns in the upper soil. Fencing reduces browsing on oak seedlings by deer, and the use of prescribed fire (discussed below) will increase the abundance of oak seedlings that are competitive with other tree species.

In order to maintain the oak type present on the ANF, new strategies will be employed to regenerate oak stands, including lowering overstory tree stocking to allow adequate sunlight to reach the forest floor for oak seedling establishment to occur. These strategies also include mechanical seed bed preparation, release treatments, and reintroducing controlled fires to bring managed oak stands closer to pre-settlement natural fire regimes. These treatments are all designed to create favorable conditions for the establishment and development of oak seedlings and saplings that are competitive with other more rapidly growing tree seedlings, thereby improving sustainability of oak on the ANF. Thinnings are also an integral part of maximizing stand growth, acorn production, and value, in addition to maintaining forest health.

Oaks and hickories range from intolerant to moderately tolerant of shade (Sander et al. in Burns 1983, p. 116), with northern red oak intolerant of shade, and white and chestnut oak moderately tolerant of shade. Therefore, many oak seedlings do not exhibit long-term survival or growth under closed canopy conditions (Abrams, 1992). Oak is much less shade tolerant than many of its competitors (McShea and Healy, 2002, p. 61) such as the maples and beech. Most shade-intolerant and some intermediate species, such as northern red oak, will not survive long under a dense canopy. Consequently, if undisturbed, oak stands on the ANF will transition to shade-tolerant or mid-tolerant species.

Even-aged management provides the best response where the management objective is to perpetuate the shade-intolerant and moderately tolerant oaks and hickories (Sander et al. in Burns 1983, p. 117, Roach and Gingrich 1968, Roach 1972). It also provides the best seedling growth response, so trees can exceed browse height as soon as possible. Clearcutting and shelterwood cutting are the two regeneration harvest methods most often used in the

oak-hickory type. Both methods depend on the presence or development of advanced oak reproduction and on stump sprouts. Adequate numbers of advanced oak seedlings that are large enough to compete with other hardwood seedlings is critical to ensure they will be able to survive and become dominant or codominant trees in the future stand (Miller et al. 2002). The combination of a shelterwood seed cut followed by prescribed fire in 3 to 5 years (shelterwood-burn technique) mimics natural disturbances that have occurred in eastern North America for millennia. A shelterwood harvest mimics moderate canopy disturbances, and increases air movement and sunlight penetration, which in turn facilitates the use of controlled fires on the forest floor (Brose and Van Lear 1998, Brose et al. 1999a, 1999b).

The purpose of the shelterwood seed cut is to stimulate development of existing oak regeneration and provide sufficient leaf litter to carry a fire (Brose et al. 1999b). The overstory keeps competing vegetation sufficiently small enough to be susceptible to fire. In areas with no existing oak regeneration, pre-harvest low shade removal and fencing is an option to enhance oak seedling survival and growth (Miller et al. 2002). Herbicide cut and frill (girdle) or injection methods may be used to selectively remove low shade, particularly where competing species are prone to sprouting (e.g. maples).

In order to ensure developing oak seedlings have adequate light levels, reforestation treatments and shelterwood seed cutting are generally required. Prescribed burning would be implemented to reduce the abundance of non-oak hardwood species such as birch, black cherry, and red maple that out compete oak regeneration. It would be carried out when non-oak species are most susceptible to top killing by fire. Larger oak seedlings/saplings are quite resistant to fire; the rootstocks are capable of sprouting numerous times. Stands may require up to three burns in order to adequately control some species, and subsequent burning will allow the sprouted oak to become more competitive.

Once the oak regeneration is considered competitive (it may take up to 20 years to develop sufficient quantity and size of oak seedlings on the ANF), it should be released using a commercial timber harvest to provide full sunlight to encourage growth of the young oak trees, ensuring they form a sizeable component of the new stands. Oak dominance can be maintained by non-commercial crop tree release of young stands, and by moderate fire return intervals in mid and mid-to-late successional stands.

Optimality

Clearcutting is optimal where adequate advanced shade-intolerant seedlings are already present beneath the canopy. As mentioned previously, oaks and hickories are intolerant of shade (Sander et al. in Burns 1983, p. 117, Roach and Gingrich 1968, Roach 1972). A clearcut is optimal when advanced seedlings of competitive size are present, as it provides additional light to seedlings in one step, allowing them to survive and mature. Additionally, a clearcut eliminates the need for a shelterwood seed cut, which can increase the abundance of interfering vegetation (Horsley et al. 1994, pp. 214-216), thereby increasing the need to treat interfering vegetation through herbicide application or site preparation. Using a clearcut when advanced regeneration is present can also reduce damage to advanced seedling regeneration and site disturbance, such as soil compaction, by regenerating the stand in a single entry. Due to the amount of time it takes to develop adequate numbers of oak seedlings of sufficient size to compete with other seedlings, clearcutting in the oak type will be infrequently used.

Uneven-aged Management Considerations

Where uneven-aged management is desirable in limited situations to achieve other resource objectives, group selection is recommended, and group openings should be large enough to provide full sunlight in much of the opening. Weigel (1994) found group selection openings ranging from 0.2 to 0.6 acres were not large enough to satisfactorily regenerate oak species. Sanders et al (in Burns 1983, p. 118) found group openings must be about 2 acres before a substantial area of the opening is not affected by the surrounding stand. In areas with high deer populations, even larger openings may be needed. Group selection with openings of 1 to 2 acres (chestnut and white oaks) should be utilized in this type, or openings 2 to 3 acres where northern red oak predominates.

Single tree selection in particular favors shade-tolerant species, and does not generally work as a regeneration method for oaks and other less shade-tolerant species on good quality sites. Using single tree selection in most oak types will not perpetuate the oaks or other shade-intolerant species (Sanders et al. in Burns 1983, p 118, Roach and Gingrich 1968), and should not be used, particularly on good quality sites, unless gradual conversion to red maple or other more tolerant species is acceptable (Marquis et al. 1992, p. 13). The exception would be where white and chestnut oaks are present on lower quality sites. Of the oak types, white oak is considered the most shade-tolerant, can live vigorously for long periods as an overtopped tree, responds quickly to release, has a moderately fast growth rate in full sunlight, and has great longevity (Barrett, 1995, p. 193). Chestnut oak is intermediate in tolerance, and is more shade tolerant than its associated species (Barrett, 1995, p. 185). Loewenstein (personal communication, 1998) suggests the sustainable practice of single-tree selection in an oak dominated forest is most likely to succeed when applied on successionally stable oak sites. Successionally stable oak-hickory stands (see Barrett, 1995, pp. 143-144; Johnson, 1997, pp. 18-20) tend to occur where the plant community is under severe water stress and the site index is below 65 feet. Single tree selection should not be applied in oak stands where less than 35 square feet (basal area) of healthy, shade-tolerant species (white and chestnut oaks) are present as described by Stout (1994, pp. 342-343) on successionally stable (low site index) sites as described by Loewenstein (personal communication 1998).

Red Pine

Red pine is not native to the ANF, but planted stands make up a large portion of the conifer type that comprises 2 percent of forest vegetation on the ANF. Native red pine exists approximately 30 miles east of the ANF near Emporium, Pennsylvania. Plantations vary from stands of pure red pine to stands where red pine is the major species with varying amounts of native species and/or one or more species of planted white spruce, Norway spruce, and larch.

Appropriateness/Optimality

Since red pine is shade-intolerant, even-aged silvicultural systems provide the optimal growth response (Benzie and McCumber in Burns 1983, pp. 89-91). Where the management objective is to perpetuate the red pine type, clearcutting the mature stand if seedlings are present, or planting a new stand are the most reliable (optimal) methods (Benzie and McCumber in Burns 1983, p. 90). A shelterwood seed cut followed by a shelterwood removal cut may also be used, where seedlings are not present and natural regeneration is desired.

Red pine grows up to 200 years or more. Over half of the total yield can be removed in periodic thinnings, beginning when the stand is approximately 30 years old. The initial planting density, timing of thinnings, and stand density left after thinning greatly affect tree diameter growth. Several light (15 to 25 percent stocking removed) thinnings are necessary at an early age to maintain vigorous diameter growth, develop wind-firmness in residual trees, and sustain healthy trees resistant to pests and disease.

Even-aged seedling red pine stands provide a relatively open area with a large variety of pioneer plant species and good edge habitat for about a decade. Dense sapling red pine stands provide cover for many species of wildlife.

Uneven-aged Management Considerations

Where uneven-aged management is desirable in limited situations to achieve other resource objectives, group selection with openings of 1 to 2 acres should be utilized in this type.

Eastern White Pine

Eastern white pine and eastern hemlock are the only native conifer species found in any abundance on the ANF (there are a few scattered pitch pine trees, the only other native conifer species found here). White pine and eastern hemlock occasionally occur in small pure stands, but most often occur in mixtures with each other or with hardwood species. Areas typed as white pine forest type cover less than one percent of the total forested land area on the ANF. White pine grows on many sites, from moist stream bottoms or wet soils to ridgetops or dry soils. White Pine historically existed on the Allegheny Plateau where large scale disturbances occurred (Abrams and

Orwig 1996; Lutz 1930). Experience has demonstrated that white pine is preferred by deer on the ANF; hence, white pine regeneration tends to be scarce.

Appropriateness

Growth characteristics of white pine indicate that it can be managed best under even-aged stand conditions, though there is considerable leeway in choosing regeneration methods. White pine regenerates well under partial shade as provided through a shelterwood seed cut, mechanical scarification and even through the use of prescribed fire (Wendell et al. in Burns 1983, p.132).

White pine has been naturally regenerated in the Northeast by clearcutting in blocks and strips, and by seed tree, shelterwood, and group selection methods. Clearcutting during or just after a heavy seed crop often results in well-stocked stands on light soils (Wendell et al. in Burns 1983, p. 132).

Optimality

Clearcutting is optimal where adequate advanced saplings taller than 20 feet are already present beneath the canopy, as the clearcut releases the well-established saplings and regenerates the stand in one step. Additionally, a clearcut eliminates the need for a shelterwood seed cut, which can increase the abundance of interfering vegetation (Horsley et al. 1994, pp. 214-216), thereby increasing the need to treat interfering vegetation through herbicide application or site preparation. Using a clearcut when advanced regeneration is present can also reduce damage to advanced seedling regeneration and site disturbance such as soil compaction by regenerating the stand in a single entry.

Abundant, established, advanced white pine regeneration can be released by cutting the remaining pine or hardwoods. Release from competing hardwoods is often necessary several years following overstory removal (Wendell et al. in Burns 1983, p. 132). In order to minimize damage to white pine saplings and poles from white pine weevil (Pissodes strobe), it is important to maintain high overstory densities (>60 percent relative density) to maintain adequate shade over white pine seedlings and saplings until they reach about 20 feet in height (Hamid et al. 1995).

Uneven-aged Management Considerations

Single tree selection cutting has usually not proven satisfactory in regenerating white pine (Wendell et al. in Burns 1983, p. 132). Where uneven-aged management is desirable in limited situations to achieve other resource objectives, group selection with openings of 1 to 2 acres should be utilized in this type.

Eastern Hemlock

The hemlock forest type covers 2 percent of the total forested land area on the ANF. Eastern hemlock is the most shade-tolerant species in the Eastern United States (Ward et al. 2004). Reforestation is by natural regeneration. Deer browsing can severely affect regeneration, so fencing or lower deer populations are necessary to help ensure successful regeneration.

Appropriateness

Even-aged or uneven-aged management (selection) systems can be successfully used to manage hemlock. In the East, the selection system has been used successfully on a limited basis, but the even-aged system is preferred and most frequently used. A two- or three-cut shelterwood system is the best even-aged method for regenerating eastern hemlock (Godman and Lancaster 1990, p. 609).

Eastern hemlock responds well to release, and can survive being suppressed for up to 200 years. To minimize shock to residual hemlock trees, no more than one-third of the basal area in a stand should be removed in one entry (Wendell et al. in Burns 1983). Of all the eastern tree species, eastern hemlock may be one of the fastest growing in diameter, and well-formed suppressed trees, once released, can grow faster than unsuppressed trees (Solomon and Leak, 2000).

The current strategy is to maintain the hemlock forest type where it is present on the ANF. Should eastern hemlock mortality occur on the ANF due to the introduced HWA, it may be necessary to replace the lost conifer component through planting other conifer species, in order to maintain some of the ecological values that hemlock trees provide. Forest managers will have to select the species that best achieves management objectives for a particular site (Ward et al. 2004).

Uneven-aged Management Considerations

Because of its tolerance to shade, eastern hemlock can regenerate under low-light conditions. Scarification facilitates hemlock regeneration (Goerlich and Nyland 2000). To increase the proportion of hemlock and hasten growth of the understory hemlock in mixed stands, single tree selection can be used (Wendell et al. in Burns 1983). Single tree selection cutting, group selection, and shelterwood methods have all proven effective at regenerating eastern hemlock. The two or three stage shelterwood method is considered the most reliable method for securing eastern hemlock regeneration (Goerlich and Nyland 2000). This requires periodic removal of mature trees or groups of trees to increase hemlock growth. If uneven-aged management is desirable, group selection with openings of one-half to two acres should be utilized in this type.

Final Selection of Silvicultural Systems

Silvicultural Systems and Harvest Methods

The silvicultural system can be viewed as the process by which we establish, grow, and regenerate a forest stand for a specific purpose. This process includes all practices over a rotation–harvest or regeneration cuttings, intermediate cuttings, and other cultural or reforestation treatments–necessary for replacement and development of the forest stand.

Although there are many harvest methods used in managing forest lands, there are only two silvicultural systems, even-aged and uneven-aged. Silvicultural systems are employed to help meet the objectives, goals and overall desired conditions for a given management area. The ANF will utilize both even-aged and on a more limited basis, uneven-aged systems. Trees removed in harvested areas vary in size from smaller pole-sized trees that are utilized for pulp or chipping, to larger sawtimber sized trees of high quality. The trees to be removed within individual harvest units are determined at the project level, and the decision is guided by the silvicultural objectives for the harvest treatment.

Under an even-aged system, stands are managed with harvest methods and associated reforestation treatments that regenerate trees of a single age class on the site at the time of regeneration harvest. In nearly all cases, areas managed using even-aged silvicultural systems retain trees that serve as biological and structural legacies of the stand over the long term. Though generally considered an even-aged system, two-aged systems are unique in that they maintain trees of two age classes on a regenerated site, through retention of additional older trees. Under an uneven-aged system, harvest methods and associated reforestation treatments maintain trees of more than two age classes on the site through retention of older trees and regeneration of younger age classes.

Silvicultural treatments are designed to achieve site specific resource management objectives. These include improving age class diversity; developing desired visual conditions; maintaining tree vigor and forest health; carrying out integrated pest management; maintaining species composition; enhancing wildlife habitat; responding to overstory mortality, blowdown, or catastrophic damage; accelerating the development of late structural characteristics; and restoring structural conditions in forested stands on the ANF. Timber harvest is the primary tool used to accomplish vegetation management objectives while providing a timber product mix, revenues, and contributing to local and regional economies. Prescribed fire, non-commercial reforestation treatments, and herbicide application are also used to achieve vegetation management objectives.

Salvage harvest occurs in response to tree mortality, tree decline, or tree damage from insects, disease, or catastrophic events. Salvage harvest involves the removal of dead, dying, damaged, or high-risk trees that would die within the next 5 to 10 years. The direct effect of salvage harvest is primarily limited to those effects

associated with the removal of woody material from the site. Effects to species composition, stand density and structure are the direct effect of the agent causing tree mortality and would occur whether or not the salvage harvest occurs.

Research (Marquis, et al. 1992) suggests that when sites fall below 40 percent density of acceptable trees they should be considered for regeneration treatments because the overstory becomes too sparse and cannot fully utilize the site's resources, such as water and nutrients. When the density of healthy trees in a stand is below 40 percent, stand conditions are generally assessed to determine what kinds of reforestation treatments are needed to help regenerate the stand. Either even-aged or uneven-aged methods could be used, depending on management area direction, stand conditions, and forest type. Remaining healthy trees are used to facilitate re-establishment of the new stand, through acting as a seed source and providing shelter for seedlings to become established. Healthy trees may be removed in subsequent harvest actions once adequate seedlings develop.

The following harvesting practices are options in the various forest types for each of the silvicultural systems. The effects of these prescriptions and associated reforestation treatments are described in detail in the environmental consequences section of Chapter 3 of the Final EIS.

Even-aged System:

- thinning or intermediate cut
- shelterwood seed cut/shelterwood removal cut
- two-aged shelterwood seed cut/two-aged harvest
- clearcut

Uneven-aged System:

- single tree selection
- group selection (0.5 to 3 acre group size)

Late Structural Treatments:

- oak release
- white pine release
- thinning to accelerate mature forest conditions
- group selection to restore understory mature forest conditions (RUMFC)

Even-aged Management

Many forest types present on the ANF are dominated by tree species intolerant or moderately tolerant of shade. Even-aged regeneration methods, which provide nearly full sunlight conditions for seedling regeneration, have been successfully applied for several decades to successfully regenerate forested stands on the ANF. White-tailed deer influence seedling abundance and composition, causing extensive damage by feeding on tree seedlings on the ANF. Historically, the choices of silvicultural systems in ANF hardwoods would have been greater were it not for the substantial deer damage to regeneration on the ANF. All-age silviculture (uneven-aged) is not recommended in areas of high deer populations for any forest type (Marquis et al 1992, p. 13, Marquis and Gearhart in Burns 1983, p. 138). In areas with high deer browsing impacts, even-aged methods that provide abundant sunlight for seedlings to grow quickly out of reach of deer are practical. Where it is desirable to regenerate forested stands on the ANF, shelterwood removal cutting or clearcutting provide the most appropriate response. In one step, these harvests provide abundant sunlight to existing tree seedlings permitting them to rapidly develop (Horsley et al. 1994, p. 223). In nearly all cases, areas managed using even-aged silvicultural systems retain trees that serve as biological and structural legacies of the stand over the long term. In many cases it is necessary to treat interfering

vegetation, fence areas to protect seedlings from deer browsing, or apply fertilizer so the leader on the main stem quickly grows above deer browse height within one or two growing seasons.

Many stands that may receive an even-aged regeneration harvest (shelterwood seed cut, shelterwood removal cut, clearcut, two-aged shelterwood seed cut and two-aged harvest) have interfering understory vegetation consisting of fern, grass, beech and striped maple. Reforestation treatments are often required to provide adequate conditions for seedlings to germinate and grow (these are described in the reforestation subsection). To ensure successful tree seedling development, salvage regeneration areas may require more supplemental planting or other reforestation activities than normal since adequate numbers of seed producing trees may not be well distributed across the site. The species that develop on a particular site depend, among other things, on the seed source present, the impact of selective deer browsing (deer prefer some species more than others), and reforestation and release activities.

Clearcutting regenerates a stand to a single age with one cutting entry, shelterwood cutting regenerates it to a single age through more than one cutting entry, and a two-aged harvest regenerates it to two ages through more than one cutting entry.

Shelterwood Seed Cut

A shelterwood seed cut treatment is used on sites where it is desirable to establish tree regeneration and there is an opportunity on the landscape to increase the seedling structural component to achieve wildlife and/or age-class diversity objectives by completing the subsequent shelterwood removal cut (Horsley et al. 1994, p. 223). Typically this treatment is prescribed for mature or maturing stands, and results in a single, regenerated age class.

The shelterwood method of treatment is a multiple-step regeneration harvest where approximately one-third of the overstory is removed in the initial or shelterwood seed cut to encourage tree seedling development. The purpose of the shelterwood seed cut is to leave diverse mid-sized, seed-bearing trees, while removing enough trees to provide at least 50 percent sunlight on the ground for seedling development. Many of the trees removed will be pole-sized understory trees. These smaller trees, predominantly pulp material, are important to remove in order for adequate sunlight to reach the forest floor. Once adequate tree seedlings develop, usually in 3 to 15 years, but sometimes as late as 20 years, the second step called the shelterwood removal cut would occur (see explanation in next subsection) (Horsley et al. 1994, p. 223).

Local research has concluded that shelterwood seed cuts, in combination with herbicide application, resulted in greater amounts and diversity of desirable hardwood regeneration than herbicide-clearcut treatments (Horsley 1982). As different tree species found on the Allegheny Plateau vary in their abundance, frequency, storage life, and viability of seed crops, a shelterwood seed cut opens the forest canopy and allows sufficient sunlight to the forest floor for seedling establishment. The shelterwood itself normally maintains a seed source for several years, allowing a diversity of tree species to become established.

Shelterwood Removal Cut with Reserves

Shelterwood removal cutting would normally occur within 3 to 15 years following a shelterwood seed cut, as soon as adequate tree seedlings develop (Horsley et al. 1994, pp. 220-222).

In a shelterwood removal cut, nearly all of the overstory trees (except for wildlife and reserve trees) that were left as a seed source during the shelterwood seed cut are removed, allowing full sunlight to reach established seedlings (Horsley et al. 1994, pp. 223-224). Residual trees that include snags, den trees, conifer, mast species, and uncommon species are retained following harvest. Removal of the overstory results in rapid growth and development of tree seedlings, shrubs and herbaceous understory vegetation and would promote the development of primarily intolerant and mid-tolerant tree species (black cherry, white ash, red maple, birch, and tulip poplar), with lesser amounts of shade-tolerant species (American beech, sugar maple, eastern hemlock). In combination with reforestation activities, these treatments are expected to reduce the amount of American beech in the stand that is susceptible to the BBD complex.

Clearcut with Reserves

Clearcutting is a regeneration method used to establish even-aged stands whereby all trees, except residuals designated according to mitigation measures, are removed in one harvest. It is normally used where adequate tree seedlings are already present on the forest floor (Horsley et al. 1994, pp. 219 and 221), where established sapling or small pole regeneration exists, or in areas with high potential to develop new stems from stump sprouts, buried seed, or seeds produced on the site (Horsley et al. unpublished 1998, Roach 1972). Clearcutting is the optimal regeneration method for any hardwood species, including northern hardwoods, if advanced tree seedling regeneration is present in sufficient amount and size (Roach 1972). A clearcut is optimal when advanced seedlings are present, as it provides additional light to seedlings in one step, allowing them to survive and mature. In a clearcut treatment, there is no need to conduct a shelterwood harvest to initiate tree seedling development (i.e., one harvest is optimal). The shelterwood seed cut can increase the abundance of interfering vegetation (Horsley et al. 1994, pp. 214-216), thereby increasing the need to treat interfering vegetation through herbicide application or site preparation. Using a clearcut when advanced regeneration is present can also reduce damage to advanced seedling regeneration and site disturbance such as soil compaction by regenerating the stand in a single entry. Clearcutting is the optimum method for maintaining aspen due to its intolerance for shade, its physiological requirements for suckering, and the early age at which it deteriorates and declines in its regeneration potential (Perala and Russell in Burns 1983, p. 114). Clearcutting is also the optimal method to establish permanent wildlife openings (there is no objective or requirement for seedling stocking after the harvest).

Clearcutting may be the optimum method to salvage and regenerate stands impacted by insects, disease, or catastrophic damage from wind, ice, fire, etc., or to stop the spread of an insect or disease outbreak. It may also be the optimum method to improve the condition of stands which have a high risk of dying within the next 10 years or which are sparsely stocked and will be unable to fully utilize the site within 10 years.

The increased light conditions created by the clearcut and understory reforestation treatments will result in rapid growth of primarily mid-tolerant and intolerant tree seedlings, such as black cherry, white ash, red maple, birch, and tulip poplar.

Two-aged Shelterwood Seed Cut

A two-aged shelterwood seed cut treatment is used on sites where it is desirable to establish tree regeneration and there is an opportunity to increase the seedling component to achieve wildlife and/or age-class diversity objectives by completing the subsequent two-aged harvest. It can provide a compromise between even-aged and uneven-aged management objectives in areas dominated by both overstory and seedling species that are moderately shade tolerant, or perhaps somewhat intolerant. The concept is to maintain two age-classes on a particular site, with their ages one-half rotation apart. This treatment can maintain aesthetics and a more diverse vertical stand structure as compared to a more traditional final harvest (Miller et al. 1995a).

The two-aged shelterwood seed cut is very similar to a shelterwood seed cut, in that it is a sequence of cutting where approximately one-third of the overstory is removed in the initial or two-aged shelterwood seed cut to encourage seedling establishment. The purpose of the two-aged shelterwood seed cut is to leave mid-sized, seed-bearing trees, while removing enough trees to provide at least 50 percent sunlight to the ground for seedling development. Once adequate tree seedlings develop, usually in 3 to 15 years, but sometimes as late as 20 years, the second step, called the two-aged harvest, would occur. The two-aged harvest would retain 20 to 30 percent of the trees in the original stand to form the older age class, with the seedlings forming the second age class.

The increased light conditions created by the two-aged shelterwood seed harvest and understory reforestation treatments will result in development of primarily mid-tolerant and intolerant tree seedlings, such as black cherry, white ash, red maple, birch, and tulip poplar. A two-aged harvest will likely result in a greater proportion of mid-tolerant and shade-tolerant seedlings, such as birch and red maple, than a traditional shelterwood removal cut because of the shade from residual overstory trees (Miller et al. 2004). The species that develop on a particular site depend on the seed source present, the presence of advanced regeneration, the impact of selective deer browsing (deer prefer some species more than others), and reforestation and release activities.

Two-aged Harvest

Once adequate seedlings become established following the two-aged shelterwood seed cut, as described by Horsley et al. (1994, pp. 220-221), the two-aged harvest would occur, with 70 to 80 percent of the overstory (except for reserve and wildlife trees) removed. The remaining 20 to 30 percent of the trees left from the original stand are primarily mid-sized, codominant sawtimber trees of good quality and health, and form the original age class, with the growing seedlings forming the second age class. The younger age class and individuals from the older group may be thinned later in the rotation. The older age class will be retained for the remainder of the rotation. In about 40 to 60 years, the majority of the entire older age class would be harvested and the younger age class would be shelterwood seed cut to initiate another age class (Stout 1994, p. 360).

Two-aged harvesting may have some silvicultural drawbacks and has not been used extensively on the ANF. Uncertainty exists concerning the long-term use of two-aged management in various forest types on the ANF. Seedlings grow more slowly in partial sunlight and are thus exposed to deer browsing longer. Stem quality may also be substantially lower. There is a risk that the trees in the older age class may not survive through the second rotation. The risk of regeneration failure is greater, and successful regeneration takes longer to achieve when additional residual overstory trees are retained. The residual overstory trees provide added vertical and horizontal diversity to the site. They also serve as a seed source for the second age class, if it is not already present. However, they may cast sufficient shade to substantially affect long-term development and quality of seedlings that are shade-intolerant species (Miller et al. 2004). Partial sunlight and deer browsing favor tree species more tolerant to shade and less desirable to deer as food, such as beech, striped maple, and black birch. Reforestation treatments, such as release and fencing, will be particularly important under a two-aged harvest system.

Miller et al. (2004) made several recommendations for application of two-aged harvesting. Specifically, trees with smaller crowns (such as red maple and black cherry) should be retained for the original age class. Avoid retaining trees with large crowns, such as oak. They recommend:

- Leaving approximately 15 residual trees per acre.
- Leaving clumps of residual trees to increase open space and reduce the effect of crown expansion.
- Reducing the number of large residual trees by chemical or mechanical means once the new age class is established in order to maintain adequate light levels for the new age class.
- Conduct cleaning or crop tree release to accelerate growth and increase future competitiveness of trees in the new age class.
- Control interfering plants and deer browsing impacts.

Intermediate Thinning

This is an intermediate cut designed to enhance the growth and quality of trees. Thinnings are prescribed for stands which contain trees at risk of dying during the next 5 to 10 years, and/or are highly stocked stands (normally >80 percent stand relative density) that need to have stocking levels reduced in order to enhance residual tree survival or to concentrate growth on the best trees (Marquis 1994b, pp. 247-252). Thinning is a generally accepted method of improving tree vigor (defined as the ratio of growth to leaf area) and can also be used to alter the proportion of trees subject to forest health threats (Waring and O'Hara 2005). Thinning should maintain overstory diversity, to maximize the stand's potential for diverse natural seed production as well as reduce risk of damage from forest pests that favor one species. The trees that remain following harvest will consist primarily of larger diameter trees with healthy crowns and adequate growing space, with many harvested trees coming from the smaller diameter classes (with a substantial pulp component). Under normal conditions, the average relative density of the residual stand would be 60 to 70 percent. Normally, no more than one-third of the trees in the stand would be removed in a single thinning harvest entry (Marquis 1994b, pp. 247-252).

Uneven-aged Management

Within individual stands, uneven-aged management results in the development of trees that are of varying age and size class. A number of partial harvests are applied in a stand managed under an uneven-aged system, and every regeneration entry has the objective of establishing a new age class (Stout 1994 p. 333). In some cases an improvement cut might be applied in areas where seedling regeneration is not an objective, in order to improve stand quality and transition the structure towards that of an uneven-aged forest. Uneven-aged stands are developed on the ANF through either single tree or group selection methods. Single tree selection favors the shade-tolerant species such as American beech, sugar maple, or eastern hemlock. Group selection, particularly with larger group sizes, favors more shade-intolerant and mid-tolerant species than single tree selection (Stout 1994, p. 333), but it still yields substantially fewer intolerants than even-aged management. If deer browsing is controlled and appropriate conditions are provided for seedling establishment and growth through reforestation treatments, structural vegetative diversity within each stand is high. Soil drainage, site nutrient capability, animal damage, and other environmental factors also influence which trees would eventually occupy the site.

Most stands on the Allegheny are even-aged, resulting from turn of the 19th century cutting (Marquis 1975) or from even-age silviculture practiced in recent decades to achieve Forest Plan objectives in the face of high deer impact levels. In such situations, an adjustment period is required to establish a stable uneven-aged condition with the desired distribution of ages and tolerant species; most uneven-aged management practiced during the foreseeable future will involve stands in this transition from an even-age condition to an uneven-age condition (Stout 1994, p. 334). New information has emerged since the last Forest Plan on the subject of uneven-aged silviculture. Perhaps the most relevant information is that reported by Nyland (2003) who synthesizes a great deal of silvicultural research to focus attention on the problem of practicing uneven-age silviculture in even-age stands. Nyland (2003) recommends a series of selection cuts where uneven-age stand structures are consistent with management objectives, and suggests that effective conversion may take as long as a century. Individual tree selection cuts to develop advanced tree seedling regeneration before group selection cutting seem particularly important for the ANF, where research has shown that advanced tree seedling regeneration is key to successful regeneration (Grisez and Peace 1973).

Further, Nyland (2003) recommends that where forest management objectives require retention of shade-intermediate and intolerant species, these selection cuts should include creation of patches with diameters two or more times the height of adjacent trees. Dale and others (1995) found that numbers of trees per acre (both total and of intolerant trees) increased steadily as the distance from the edge of openings increased. They observed this trend in openings up to about three acres in size. They found that there was a detectable suppression of growth through 100 feet into the openings. As a result of this information, we include both selection cuts, as suggested by Nyland (2003), and larger patch sizes in group selection.

The success of uneven-aged management depends on the establishment of a new age and size class at each regeneration cut, and eventual growth of these stems into the main crown canopy. Therefore, appropriate reforestation practices must be prescribed to ensure reforestation success at every entry (i.e., every 15 to 20 years) and are particularly important under an uneven-aged system. Success of both single tree and group selection depends on successfully developing a new seedling age class during each regeneration entry to the stand (Stout 1994, p. 334). It should be noted that it would be necessary to fence areas managed under an uneven-aged system for very long periods of time, in order for the seedling class from each entry to successfully reach the next size class. Protecting seedlings from browsing by deer is particularly important under an uneven-aged system, where seedlings are subject to deer browsing for a longer period of time due to the long period of slow growth in the understory (Stout 1994, p. 334). Reforestation treatments, including site preparation, fencing, and the application of herbicides, are necessary in order to assure that seedling regeneration can occur. There is uncertainty related to the long-term use of uneven-aged management, particularly under single tree selection, due to the anticipated need for herbicides in subsequent entries (15 to 20 years later) and the impact that herbicides would have on seedlings and saplings that develop slowly under partial shade of the selection system (Stout 1994, p. 334). Scarification facilitates hemlock regeneration (Goerlich and Nyland, 2000), and may be applied where a hemlock

seed source is present and hemlock seedlings are desirable. Release treatments may be needed in the groups to tend growing saplings.

Concerns exist about the use of uneven-aged management on the ANF, particularly single tree selection, as it features three shade-tolerant species (American beech, sugar maple, and eastern hemlock) currently subject to serious forest health concerns. American beech regeneration, which is susceptible to the BBD complex, must be controlled when using uneven-aged harvest methods, or less intensive shelterwood cutting strategies that favor shade-tolerant species (Mielke et al. 1986). Waring and O'Hara (2005) suggest that when shade-tolerant species are affected by forest pests or diseases, silvicultural activities should create openings large enough to facilitate regeneration of all species, affected and unaffected. Due to these concerns, single tree selection should be applied judiciously on the ANF, and only where necessary to meet special resource needs such as maintaining Scenic Integrity, riparian and wildlife habitat objectives.

The results of implementing the 1986 Forest Plan during the last 15 years also provide an important context, which helps frame the range of reasonable options for considering and implementing uneven-aged management locally. Local silvicultural guidelines specify stands having at least 35 basal area (BA) of shade-tolerant species as potentially providing an adequate seed source for uneven-aged management (Marquis et al. 1992, p. 57), though local success with uneven-aged management on these sites has been very marginal (USDA FS 1998, pp. 18 and 86; USDA FS 2001d pp. 16, 17, 76, 77; USDA FS 2002, p. 23). Conversely, reforestation success with even-aged management has been quite good (USDA FS 1998, pp. 18 and 86; USDA 2000g, Appendix F; USDA FS 2001d pp. 16, 17, 76, 77 and USDA FS 2002, p. 23). Uneven-aged management is considered adaptive management, as its use on the ANF is fairly recent, and there is still some uncertainty concerning the silvicultural outcomes.

Group Selection

Group selection is an uneven-aged regeneration technique and involves harvesting all trees in small groups, as well as harvesting individual trees between the groups (Stout 1994, p. 333). Group selection should generally follow a single tree selection applied across the stand. Single tree selection harvest is often used to start to create an uneven-aged structure in an even-aged stand, or to transition these stands from even-aged to uneven-aged management. The single tree selection cut would remove approximately 30 to 40 percent of the trees, and reduce overstory crowding to increase light levels on the forest floor and initiate understory development (seedlings, shrubs, herbaceous vegetation) as described by Nyland (2003). Every selection cut in the stand should apply appropriate reforestation practices to develop a new seedling age class with that entry. Single tree selection harvests in future entries may be necessary to develop additional advanced seedling regeneration outside previously created groups.

New standards and guidelines for the use of uneven-aged management will allow for larger group opening sizes, with the intent of increasing the success of this system on the ANF and regenerating a greater diversity of tree species, including shade-intolerant (black cherry, yellow poplar, ash, northern red oak) and mid-tolerant (red maple, birch, cucumber) species that are presently not subject to substantial forest health concerns. Group selection, to meet specific management area objectives, is appropriate with varying group sizes as specified below:

- **Upland hardwoods:** Generally 1 to 2 acres; up to 3 acres in stands where black cherry and/or tulip poplar comprise at least 40 percent of the overstory stocking.
- **Northern Hardwoods:** 0.5 to 2 acres
- **Hemlock:** 0.5 to 2 acres
- **Allegheny hardwoods:** 2 to 3 acres
- **Oak hardwood:** 1 (chestnut and white oaks) to 3 (northern red oaks) acres

These group sizes allow for some range of shade tolerance in seedling regeneration. In general, the wider the opening, the greater the potential is for establishment and growth of the less shade-tolerant species as part of the

new cohort (Nyland 2003; Dale et al. 1995; Kelty et al. 2003). Keeping group sizes to less than 1.5 times overstory tree height will limit establishment of the most shade-intolerant species; groups should have diameters of two or more times the height of adjacent trees to provide the light conditions required by shade-intolerant species such as black cherry, yellow poplar, and oaks (Nyland 2003, Miller et al. 1995). Miller et al. (1995) suggest group openings be a minimum of 0.4 acres in central Appalachian hardwoods (West Virginia), with the maximum opening size based on aesthetic requirements or other management constraints. Leak (1999) suggest group sizes up to two acres in northern hardwoods in New England (New Hampshire) to increase the component of shade-intolerant and intermediate species, using area control to regulate the cut. Dale and others (1995) found that numbers of trees per acre (both total and of intolerant trees) increased steadily as distance from edge of openings increased up to openings about three acres in size. The openings need to provide the biological conditions for a variety of hardwood species to become established, which varies to some degree by forest type. Where uneven-aged management is desired, group selection is favored over individual-tree selection, since reforestation treatments, coupled with increased light, would discriminate against beech brush that is susceptible to the BBD complex, and favor shade-intermediate and intolerant species (Filip 1978).

Once applied, groups would occupy up to 15 to 20 percent of a stand to provide full sunlight conditions on the ground that enables the establishment, development, and growth of a diversity of seedlings. The groups would normally be purposely located where tree seedlings are already established in order to assure reforestation success for the same reasons discussed above for shelterwood removal cutting and two-aged harvesting. Each group selection cut in conjunction with single tree selection as necessary, occurs generally 15 to 20 years apart, and is designed to create temporary gaps in the forest canopy. Over the long term, red maple, birch, and other mid-tolerant species would dominate most openings, while some shade-intolerant species such as yellow poplar and black cherry would persist in the center of the larger openings. Shade-tolerant species (eastern hemlock, American beech, sugar maple) would dominate the edges of the openings. Standard harvests in this category generally result in an average relative density of 50 percent across the stand (Stout 1994, p. 337). Because a mature overstory would continue to predominate on most of the stand, group selection would provide habitat for primarily mid to late successional wildlife species.

Single Tree Selection

Single tree selection is an uneven-aged regeneration technique that involves harvesting individual trees, or small clusters of trees. Due to the even-aged nature of forest vegetation on the ANF, a primary challenge in the use of uneven-aged management will be to start to create an uneven-aged structure. One of the objectives of this harvest is to start to create an uneven-aged structure in an even-aged stand or to transition these stands from even-aged to uneven-aged management. In many cases, this harvest would be used to begin the transition towards an uneven-aged structure, and develop seedling regeneration for subsequent group selection. In other cases, single tree selection might be the featured regeneration method. Every selection cut in the stand should apply appropriate reforestation practices to develop a new seedling age class with that entry.

This treatment will result in the removal of trees from the suppressed, intermediate, codominant, and dominant crown classes to allow more sunlight to reach the forest floor. Experience in attempting to transition even-aged stands to uneven-aged has found smaller overtopped and intermediate trees that have been in that canopy position for an extended period of time will continue to grow the slowest of all classes even after release cutting, and prove unsuitable as residuals (Nyland 2003). This harvest should remove most trees of lower crown position and reduce crowding of larger trees in a manner similar to a shelterwood, reducing relative density to no less than 50 percent as described by Nyland (2003). Like with a shelterwood treatment, the disruption in the upper canopy, additional sunlight, and growing space enables new tree seedlings to become established. Timely re-entry will maintain a discontinuous upper canopy so that younger trees stay alive and regeneration is promoted, and over time, a series of similar cuttings will create multiple vigorous age classes within the stand (Nyland, 1998, pp. 18-21, Nyland 2003).

Following the initial single tree selection, a single tree selection cut could occur approximately every 15 to 20 years to promote another cohort of seedling regeneration while simultaneously releasing existing small trees. Each

cutting will leave fewer older trees, with the spacing of the oldest trees becoming widening, and younger trees filling in the gaps. This process may require four to five entries to bring a stand to an appropriate multi-aged condition (Nyland 2003). A fully stabilized uneven-aged stand will not be achieved until most of the intolerants have been replaced by new age classes of tolerant stems in all size classes (Stout 1994, p. 334).

Single tree selection is designed to remove individual trees, creating very small gaps in the canopy and primarily favors establishment of tree seedlings tolerant of shade (Miller and Smith 1993; Miller and Kochenderfer 1998; Stout 1994, p. 330). Each selection cut is designed to create small temporary gaps that generally do not exceed one-half acre in the forest canopy. This provides a small increase in the amount of sunlight that reaches the forest floor, causing seeds to germinate and stumps to sprout. The result of these selection cuts, or partial harvests after a number of entries to the stand, is a stand with many different age classes. In single-tree selection, the Q factor (the quotient or ratio between numbers of trees in successive diameter classes) should be between 1.25 and 1.35, with a maximum tree size of 28 inches diameter at breast height. This will result in retaining larger trees and a greater proportion of large to small size trees than other all-aged structures (Stout 1994, p. 343). Standard harvests in this category generally result in an average relative density of 60 percent following the harvest (Stout 1994, p. 337), whereas in a salvage harvest it could drop to lower than 40 percent.

Area fencing will likely be required for long periods of time in most stands treated with uneven-aged management. Seedlings can be subjected to browsing by deer for longer periods of time as compared to those under even-aged management due to the slower development and growth that occurs in the understory (Stout 1994, p. 334). In recent years, browsing intensity has decreased on the ANF, but understory response lags behind the deer population drop (deCalesta 2005). Assuming deer populations remain low, improved success with uneven-aged management on the ANF is anticipated.

Late Structural and Riparian Area Treatments

Old growth has been characterized as containing a high degree of vertical diversity (multi-layered canopy), large trees, large snags and down woody debris, and patchiness associated with small scale disturbances and death of individual trees (Haney 1996). Further, old growth displays a specific and complex set of structural characteristics and an associated community of organisms. These characteristics include a size distribution of live trees that includes old individuals, snags, downed logs and undisturbed soils with a pit and mound topography, and a volume of coarse woody debris similar to what occurs in the absence of human modification (Trombulak in Davis 1996, p. 306).

Several prescriptions have been developed specifically for use on the ANF in stands selected for active management to accelerate development of late successional structural attributes or enhance riparian area vegetative structure. These are described here, indicating the specific goals of each prescription.

Thinning to Accelerate Mature Forest Conditions (AMFC)

Variable density thinning is a treatment designed to accelerate development of mature forest conditions, including larger trees and variable tree density, as described by Runkle (1991), Singer and Lorimer (1997), and Franklin (2001). Thinning to accelerate mature forest conditions is appropriate in stands that are overly dense, with smaller diameter trees present (generally pole sized or small sawtimber sized). This is an intermediate thinning that would remove approximately 20 to 30 percent of the trees overall, and be applied in a non-uniform manner to emulate the heterogeneity present in old growth forests as described by Franklin and VanPelt (2004). Some trees would receive complete crown release, while others would not be thinned around at all ("antigap," Franklin 2001.) Nyland (personal communication, 1998, 2004) feels crown thinning will best maintain shorter trees present in stands. These trees will have enhanced health and vigor as a result of the thinning, thereby remaining to contribute to vertical diversity within treated areas. This treatment would reduce canopy density, resulting in more rapid development of larger diameter trees with enlarged crowns than would occur naturally over time, as well as introducing more complex structure to the stand as the intensity of thinning will vary. It is designed to mimic small natural disturbances, where cutting would be a surrogate for competition-induced mortality.

The gradual growth of tree crowns coupled with the gradual decrease in the number of canopy trees eventually gives rise to the gap sizes typically seen in old growth temperate-zone hardwood forests (Runkel 1991). Crown release treatment, in which the larger trees in a stand are favored by cutting adjacent competitors of similar height, is particularly effective in accelerating tree growth (Smith 1986, pp. 51-52, 121). Singer and Lorimer (1997) found that trees given full crown release would reach large diameters (50 centimeters) in 46 to 49 years, compared with an estimated 92 years, when no silvicultural treatment was applied.

Group Selection to Restore Understory Mature Forest Conditions (RUMFC)

Given the even-aged nature of forest vegetation on the ANF, the treatment would normally begin with a single tree selection cut to promote development of a new seedling age class, and start the transition from an even-aged forest to an uneven-aged forest. Group selection would generally occur as a follow up to a single tree selection cut designed to begin the transition to an uneven-aged structure and to develop tree seedlings. This system of cutting is designed to accelerate development of selected late successional and mature forest structural attributes. This would occur once adequate seedlings have developed in 3 to 15 years (Horsley et al. 1994, pp. 220-222). These groups would occur in a non-uniform manner and range from 0.5 to 3 acres in size depending on forest type, just as they do for standard group selection. They would be located where patches of seedling regeneration occur.

For best results, each selection cut should reduce residual stocking below full site utilization by the overstory trees, but not to lower than 50 percent relative density; timely re-entry will maintain a discontinuous upper canopy so that younger trees stay alive and regeneration is promoted (Nyland, 2003). Group selection cuts would occur once adequate tree seedlings are established, thus beginning the transition to an uneven-aged structure over time. A selection cut should be applied every 20 to 40 years under RUMFC group selection. This process may require four to five entries to bring a stand to an appropriate multi-aged condition (Nyland 2003).

A group selection cut to restore mature forest conditions is designed to hasten stand development processes; initiate understory development; and to create gaps, multiple age-classes, multi-layered canopies, irregular canopy cover, larger trees, down woody material, and vertical structure earlier than would occur naturally, as described by Nyland (personal communication 1998, 2004), Livaitis (2003a), Jenkins et al. (2004), Crow et al. (2002), Franklin (2001), and Runkle (1985). This stand regeneration prescription mimics three characteristic features of old-growth forests: the gap dominated disturbance regime, dynamics of dead trees, and complex stand structure with large trees, to hasten the onset of some old growth features several decades before they might otherwise occur, as described by Runkel, 1991. Stand structure is a combination of tree size classes (overstory) and understory conditions. Because of the even-aged nature of many stands, and the lack of understory diversity due to past deer browsing, there is little vertical diversity across much of the ANF. The general intention is to accelerate the transition of even-aged hardwood stands with dense fern and grass understories to a multi-aged and more complex structural condition. Given high deer browsing pressure, establishing patches of young trees and enhancing structure requires establishing an abundance of seedlings beneath the canopy of the existing overstory.

Areas appropriate for this treatment consist of mature trees that are developing larger sizes, have understories dominated by fern that lack a woody component, lack an intermediate canopy layer, and presently have very little vertical structure. Experience in attempting to transition even-aged stands to uneven-aged has found smaller overtopped and intermediate trees that have been in that canopy position for an extended period of time will continue to grow the slowest of all classes, even after release cutting, and prove unsuitable as residuals (Nyland 2003). This treatment will result in the removal of trees from the suppressed, intermediate, codominant, and dominant crown classes to allow more sunlight to reach the forest floor. The selection cut would remove approximately 30 to 40 percent of the trees and reduce overstory crowding to increase light levels on the forest floor and initiate understory development (seedlings, shrubs, herbaceous vegetation) as described by Nyland (2003). Like in a shelterwood treatment, the disruption in the upper canopy, additional sunlight, and growing space enables new tree seedlings to become established. Selection cutting is expected to result in establishment of a mix of mid-tolerant and shade-intolerant species such as birch, red maple, black cherry, and white ash, along with shade-tolerant species such as American beech, sugar maple, and eastern hemlock. Most of the shade-intolerant regeneration will not survive, however, without removal of additional overstory trees through a

subsequent group selection harvest. This treatment would be followed by a group selection cut as described below. Over time, a series of similar cuttings will create multiple vigorous age classes within the stand (Nyland, 1998, pp. 18-21, Nyland 2003).

Both the single tree selection and group selection cuts would be applied in a non-uniform manner to emulate the horizontal heterogeneity found in old growth forests and stimulate development of vertical heterogeneity as described by Franklin and Van Pelt (2004) and Franklin (2001). The remaining canopy would continue to provide a mature overstory with small gaps. Removal of overstory groups would result in rapid growth and development of tree seedlings, shrubs, and herbaceous understory vegetation and would promote the development of primarily mid-tolerant tree species, with lesser amounts of shade-intolerant species. These seedlings in larger gaps created by group selection cut would develop into saplings and pole-sized trees, increasing structural diversity in these stands much more quickly than would occur naturally. This treatment can also incorporate snag creation and under planting of shade-tolerant tree species, as suggested by Franklin (2001).

Appropriate reforestation and release practices must be prescribed to ensure reforestation success at every entry (i.e., every 20 to 40 years), and are just as important as with the standard uneven-aged system. Success of uneven-aged management depends on successfully developing a new seedling age class during each entry to the stand (Stout 1994, p. 334). The same concerns and uncertainty that exist for standard uneven-aged treatments exist for uneven-aged treatments to accelerate development of late structural characteristics. If deer browsing is controlled, and appropriate conditions provided for seedling establishment and growth through reforestation treatments, structural vegetative diversity and complexity within each stand would be high.

It is commonly recognized that conifer was a major component of old growth northern hardwood stands. Depending on the status of the HWA, hemlock regeneration may be encouraged in order to provide a conifer component in these treatments. Scarification (Goerlich and Nyland 2000) and supplemental underplanting of hemlock may occur.

Once applied, groups would occupy up to 15 to 20 percent of a stand to provide full sunlight conditions on the ground that enables the establishment, development, and growth of a diversity of seedlings. Each group selection cut, along with selection cuts as necessary, are 20 to 40 years apart in this case, depending on resource objectives and overall stand conditions, and are designed to create temporary gaps in the forest canopy. Because a mature overstory would continue to predominate on most of the stand, group selection would provide habitat for primarily mid to late successional wildlife species.

Two-aged Shelterwood Seed Cut/Two-aged Harvest

Two-aged regeneration harvesting is another option where it is desirable to feature late structural vegetation in the long term. This treatment can be used to regenerate shade-intolerant species, while better maintaining aesthetics and a providing additional vertical stand structure as compared to a more traditional final harvest (Miller et al. 1995a).

Where late structural conditions are the long-term objective, the two-aged cut should be applied in a non-uniform manner, to emulate the horizontal heterogeneity found in old growth forests and stimulate development of vertical heterogeneity as described by Franklin and Van Pelt (2004) and Franklin (2001). Twenty to 30 percent of the trees from the original stand would be retained as biological and structural legacies to form the older age class, with the growing seedlings forming the second age class. The younger age class and individuals from the older group may be thinned later in the rotation. The older age class will be retained for the remainder of the rotation. In about 40 to 60 years, the majority of the entire older age class could be harvested and the younger age class shelterwood seed cut to initiate another age class (Stout 1994, p. 360). The remaining canopy would continue to provide a mature overstory, source of mast, and future snag recruitment.

Oak Release

Commercial and noncommercial oak release is an intermediate treatment designed to reduce stocking around desirable individual oak trees in order to enhance growth, crown size, and vigor with the ultimate goal of

enhancing mast production for wildlife. This would be done by either felling, or girdling trees that are directly competing with codominant oak trees. Cutting of trees will act as a surrogate for competition induced mortality. This treatment would enhance crown development and growth of featured oak trees, resulting in development of larger diameter trees and late successional structural conditions more quickly than would occur without release.

Recommendations to promote seed (acorn) production for wildlife include periodic thinnings (or release) to promote vigorous crowns and rapid growth of oak mast producers and managing for a diversity of mast producing species. Mast producing stands include oak types greater than 40 years old, sawtimber size hardwood types with 50 percent of the basal area in oaks, and any cover type with more than 39 square feet of basal area in oak (Healy 2002, p. 322). Healy (1997) further found differences in acorn production between thinned and unthinned trees and stands were greatest during years when acorn production was least. One potential benefit of this treatment, therefore, would be enhanced acorn production during years of overall poor seed production. This treatment can be applied in younger, pole-sized stands to increase growth rates and competitiveness of oak trees with other tree species, in order to increase the relative abundance of oak (Schuler 2006).

White Pine Release

White pine was an important species associated with old growth on the Allegheny Plateau where large scale disturbances occurred (Abrams and Orwig, 1996, Lutz 1930). White pine seedling and sapling regeneration responds well to release, and removing hardwoods can enhance growth and vigor of white pine regeneration (Wendell et al. in Burns, 1983, p. 132).

Commercial and noncommercial white pine release is an intermediate treatment designed to reduce stocking around desirable individual understory white pine trees in order to enhance growth and crown size, and vigor, primarily for wildlife objectives. This can be done by either felling or girdling hardwood species that are directly competing with understory white pine trees, followed by fencing to protect white pine saplings from deer browsing. Cutting of trees will act as a surrogate for competition induced mortality. In order to minimize damage to white pine saplings and poles from white pine weevil (Pissodes strobe), adequate shade needs to be maintained in order to slow growth of the leader. As a goal, approximately 40 to 50 percent crown closure of the overstory trees should be maintained (Hamid et al. 1995). In the longer term, released white pine trees would have enhanced growth and vigor, developing into larger diameter trees with late successional structural characteristics more quickly than would occur without release.

Timber Stand Improvement Practices

Pre-commercial Thinning

Pre-commercial thinning removes trees in a stand that is not old enough for a commercial treatment. Trees are left on site where they are felled. The objectives of the treatment are to control species composition, maintain stand diversity, improve stand quality, and to increase growth rates on the preferred trees. The optimum stand age for completing this treatment is 20 to 30 years.

Non-commercial Thinning

Non-commercial thinning is implemented to complete the silvicultural prescription where the optional pulpwood is not cut in the commercial timber sale or to thin stands that are inaccessible or low in commercial value, in order to meet a variety of resource objectives including improving mast production and wildlife habitat. Felling trees helps control species composition, stand quality, and improves growth rates on the preferred trees. Trees are generally left on site and increase small woody debris on the forest floor.

Release

In 1995, ANF personnel began a release treatment program in regenerating stands. ANF silviculturists have found that it is often necessary to release desired developing tree seedlings from competition with other, often faster

growing seedlings. Release treatment involves the non-commercial, manual cutting of tall-growing woody vegetation (generally of seedling or sapling size) that interferes with the growth and survival of tree seedlings, saplings, or shrubs (either naturally occurring or planted) desired on the site. The treatment can be used to regulate species composition to those species best suited for either even-aged or uneven-aged management. Release can also promote growth and survival of species not common on the site (such as aspen, oak, ash and cucumber) which are at risk of being killed by species that out-grow them, potentially increasing long-term species richness on the site (Miller 2000; Schuler 2006). Release is expected to improve tree species composition in the long term (USDA FS 1998, pp. 26 and 79; Marquis 1994b, pp. 269 and 282). Birch and pin cherry have been gaining in dominance on disturbed sites on the Allegheny Plateau in recent years due to a reduction in deer density (Horsley et al. unpublished 1998). Release treatments may be necessary to prevent them from dominating the next stand and excluding long-lived species.

Release generally is carried out when stands are between 5 and 20 years of age, depending upon site specific stand development patterns, weather conditions, and deer browsing effects. Multiple release treatments may be necessary over a period of five to ten years. The need for release is determined through site-specific surveys conducted at appropriate times during the stand regeneration process.

Reforestation Practices

Since we know that tree seedlings do not usually develop on their own on the ANF (Horsley et al. 1994, pp. 207-215), forest sustainability would be assured when regeneration harvests occur with various combinations of the following understory treatments to promote the development of desired tree seedlings, herbaceous vegetation, and shrubs. Successful regeneration treatments, whether even-aged or uneven-aged, are dependent on several factors: increasing the amount of light by removing overstory vegetation through a shelterwood seed cut, group or single tree selection, or removal cut; removing mid-story shade through site preparation; reducing interfering vegetation through herbicide application; reducing deer browsing impacts through area fencing; enhancing seedling growth by fertilization; and maintaining desired species composition in young stands through release activities. The first factor is required. Depending on site specific conditions, the others may or may not be necessary for successful seedling establishment.

The reforestation treatments discussed here can be used in either even-aged or uneven-aged systems. In either case, the purpose of the treatments is to promote the development of desired tree seedlings, herbaceous vegetation, and shrubs. They are particularly important on sites where conditions favorable for seedling development are not found.

In cases of catastrophic damage or tree mortality, more supplemental planting or additional reforestation activities may be required since adequate numbers of seed producing trees may not be well distributed across the site.

Planting

Tree seedlings are planted to help achieve several objectives: (1) to help establish tree seedlings in an area where natural regeneration has failed or is not attainable, (2) to help bring about a conversion of forest types (though this does not occur often on the ANF), and (3) to help achieve tree species diversity objectives in regenerating stands. Planting is projected for 5 to 10 percent of all areas regenerated, depending on forest type, primarily for those areas where adequate seedlings fail to develop. Since some natural regeneration usually exists on the site, planting normally serves as a supplement, with the average planting designed to fill in 50 percent of full stocking. Even at that, tree planting is an expensive reforestation practice, especially since almost all planted seedlings on the ANF require individual protection (tree shelters) from deer browsing.

Fencing

Where deer browsing impacts are high, area fencing is used to exclude deer and reduce the amount of browsing that occurs on that site. Area fencing (using 8-foot tall woven-wire fence) does not eliminate deer browsing (since a few deer inevitably breech the fence) but reduces it to a level that does not adversely affect most tree seedlings,

shrubs, or herbaceous vegetation. A dense layer of seedlings, shrubs, and herbaceous vegetation has been shown to develop inside the fenced area if adequate light exists and there are few interfering plants.

Small woven-wire fences around clumps of planted stock (cribs) or protective plastic tree shelters provide planted tree seedlings protection from deer browsing, and tree shelters provide a microclimate that serves as a miniature greenhouse to enhance seedling survival and growth.

Fertilization

This treatment is used to accelerate natural seedling regeneration. Fertilization of recently regenerated Allegheny hardwood stands has proven successful in prompting seedlings to grow rapidly above the reach of deer. By accelerating the height growth of seedlings, increased regeneration success can be achieved. Fertilizer is used primarily in the Allegheny hardwood type or where the great majority of seedlings are black cherry since other tree species do not respond to it as well (Auchmoody, 1982; Horsley et al. 1994, pp. 234-236). This treatment generally is used only after the final harvest cut is complete, and normally only on unfenced stands that are more susceptible to deer browsing. Fertilization generally involves the aerial or ground application of nutrients on existing seedlings, usually during the month of May. The formulation used on the ANF contains 200 pounds of nitrogen and 43 pounds of phosphorous per acre (Auchmoody, 1982; Horsley et al. 1994, p. 236). The immediate result is growth of a dense thicket of seedlings, generally black cherry, that are tall enough to escape being browsed by deer. These seedlings naturally thin themselves, though some may also require a release treatment (see below) to help maintain tree species diversity on the site.

In response to new science, fertilizer use on plateau and upper sideslope sites will be reduced, with the goal of minimizing loss of soil base cations (reference the LRMP). Other methods, such as fencing, may be used more often to enhance tree seedling diversity and growth.

Experience on the ANF has shown that due to deer browsing impacts, either fertilization or fencing is required most of the time in order to achieve adequate seedling stocking (USDA FS, 2004c, p. 31). Fencing, an alternative to fertilization, is used where a diversity of seed tree species or seedlings exist. Fencing is not always logistically feasible due to areas being bisected by roads.

Site Preparation for Natural Regeneration

This treatment occurs to remove stems that would interfere with the development of a diversity of seedlings. Site preparation for natural regeneration would be completed on many sites under either even-aged or uneven-aged regeneration methods. If conducted before the final harvest cut, it involves the cutting of mid-story beech, striped maple, birch, red maple, or other selected woody species in order to reduce shading and promote development of tree seedlings. These small trees are usually 5 to 30 feet tall.

If site preparation for natural regeneration is conducted following a final harvest cut, it would involve cutting the same species, as well as poorly formed or severely damaged stems that may interfere with tree seedling development and growth (Marquis et al 1992, pp. 4 and 65).

If the treatment focuses primarily on cutting striped maple, either in lieu of herbicide treatment or in preparation for an herbicide treatment, it is called site preparation/striped maple cutting. If tree seedlings are abundant beneath the taller striped maple, hand cutting the taller striped maple concurrent with the overstory removal often stimulates adequate seedling development and eliminates the need for herbicide treatment. If tree seedlings are not already present, the striped maple that sprouts from the cut stems will most likely require herbicide treatment to prevent it from quickly recapturing the site. In the latter case, the striped maple, before cutting, would be taller than existing spray equipment can effectively treat. Following cutting, the stem generally sprouts prolifically and is well within the sprayer's effective treatment range (12 to 15 feet high).

Mechanical Scarification

The LRMP contains guidelines for the use of mechanical site preparation to prepare seedbeds for species such as oaks, hemlock, ash, aspen, red pine, and white pine. New information indicates this technique is particularly

useful in encouraging successful germination of acorns and establishment of oak seedlings. Soil scarification is a site preparation technique designed to expose bare mineral soil to enhance the regeneration and establishment of seedlings. This treatment involves traversing the site with a small machine that rakes or otherwise disturbs the forest floor. The objective is to mix the forest floor and mineral soil surface, increase seed and mineral soil contact, and lightly bury seeds in the surface soils.

Scarification is particularly applicable in oak stands in the fall when acorns are dropping to the forest floor. This treatment has been shown to increase germination and survival of various oak species because the acorns are hidden from predators, have optimal soil conditions upon germination, and reduced desiccation. Measurements taken the growing season after scarification indicated that oak responded to the treatment with 3 to 12 times the number of seedlings when compared to control areas (Zaczek et al. 1997; Lhotka and Zazcek 2003). An additional benefit of burying acorns in mineral soil is that the dormant buds on the resulting seedlings are beneath a thin layer of soil, protecting them and allowing the seedlings to successfully resprout following fire.

Prescribed Burning

The LRMP provides for the use of prescribed fire in fire adapted ecosystems to improve the successfulness of regenerating certain species on the ANF. Prescribed fire is most applicable in oak types on the ANF, but it may also occur to prepare seedbeds for white pine, aspen, or hemlock regeneration, though on a limited basis.

Timely surface fires have been shown to increase oak seedlings and sprout densities. New information and science indicates this will give the species the competitive advantage needed to ensure an oak component in the next stand (Brose et al. 1999a; Brose et al. 1999b; Brose et al. 2006). A prescribed fire disturbs the forest floor, top kills all regeneration, and forces oak rootstocks to sprout (Brose et al. 1999a). Prescribed fires would be used when species that interfere with oak regeneration such as birch, striped maple, and red maple are most susceptible to top killing by fire. The fires would generally be characterized as moderate to high intensity surface fires that consume the upper portions of the leaf litter. This treatment would occur several years after the shelterwood seed cut when the oak seedlings have had enough time to develop their root systems. Larger oak seedlings/saplings are quite resistant to fire as the rootstocks are capable of sprouting numerous times (Brose et al. 1999b). Multiple burns over a 10-year period may be necessary to build the competitive advantage needed for oak seedlings to reach the main canopy.

Directionally felling trees away from residual seed trees to prevent slash from accumulating around seed trees, and clearing slash away from residual seed trees prior to burning the stand will help reduce mortality of residual overstory trees. Timing of reforestation treatments (e.g. site preparation) should be coordinated to ensure fuel accumulations are kept within desired conditions.

Species with seed stored in the forest floor may require more than one burn, as will species whose seed is wind disseminated. Grasses and herbaceous plants may increase in response to fires.

Herbicide Treatments

This section is broken into three broad categories:

1. Herbicide treatment of interfering vegetation to meet silvicultural objectives
2. Herbicide use to achieve other resource management objectives
3. ANF herbicide policy

Silvicultural objectives that herbicide application can help meet include stand regeneration, fostering young stand development, stand improvement, stand restoration/regeneration in response to overstory mortality, tree planting, and understory restoration/structural improvement. Other resource objectives that herbicide use can help meet include wildlife habitat enhancement, heritage site restoration and conservation, vista development and maintenance, electric fence maintenance, and NNIS treatment.

The first step in the process is to identify the objectives for vegetation management. If it appears herbicide use may help accomplish identified vegetation management objectives, the next step in the process is to decide which herbicide or combination of herbicides to use on each type of area. The final step is to select the application method and rate appropriate to the density and size of vegetation to treat, site characteristics, access, and effectiveness.

Herbicide Treatment of Interfering Understory Vegetation to Meet Silvicultural Objectives

Background

The interference of understory vegetation with the establishment and growth of tree seedlings has been recognized as a problem on the ANF for several decades (Horsley et al. 1994, pp. 214-216, 231-238). Silvicultural guidelines for hardwood regeneration on the Allegheny Plateau recommend that in areas with heavy deer browsing, abundant seedlings must be present before the final harvest (Horsley 1982; Bjorkbom and Walters 1986; Horsley et al. 1994, pp. 220-223). On the Allegheny Plateau, extensive and selective deer browsing has impeded the growth of seedlings and saplings, impacting natural regeneration and reforestation following natural or anthropogenic disturbances (Whitney 1984; Tilghman 1989; Jones et al. 1993; deCalesta 1994; Redding 1995; deCalesta 1998; Horsley et al. 2003). This legacy of extensive and selective browsing by deer has decreased the number of other hardwood seedlings, while increasing the abundance of beech seedlings and suckers (which are susceptible to BBD complex mortality), striped maple, fern and grass that interfere with the establishment and survival of a diversity of seedlings (Horsley et al. 2003).

A number of research projects have been conducted by the Northern Research Station Forestry Sciences Laboratory in an effort to find solutions to this problem. Herbicide treatment is an important reforestation tool for both even-aged and uneven-aged management.

Current application methods to be discussed in this section include foliar broadcast (airblast equipment) and manual (backpack) foliar applications of both glyphosate and sulfometuron methyl. New application methods are included in order to selectively and more efficiently apply herbicides to target vegetation where necessary, with less effect on non-target vegetation in the treated area. These methods include cut surface treatments that consist of cut and frill, stem injection, and cut stump application methods. They are very target-specific, and would utilize glyphosate herbicide.

Interference

When hay-scented and New York fern are present beneath the overstory of a stand to be harvested, they often cause regeneration failure. Such stands often have 50 to 90 percent fewer desirable seedlings. Growth of these seedlings is poor, deer often browse them, and seedlings do not usually grow above the herbaceous cover before they die. Striped maple and beech suckers also occur in the understory of many hardwood stands, and can persist for a number of years because they are shade-tolerant. When these species are abundant before cutting, they tend to become the dominant vegetation after cutting, crowding out desirable species of reproduction.

As the BBD complex progresses through the ANF, beech mortality and associated beech root sprout development is expected to continue. Beech thickets formed by prolific root sprouting can pose significant competition to other seedlings. Forrester, et al. (2003) concluded that the slow death of canopy trees and lack of soil disturbance caused by the BBD complex does not appear to offer recruitment opportunities to shade-intolerant and mid-tolerant species. Shelterwood cutting usually won't work when interfering understory plants such as beech root suckers, striped maple seedlings, and fern ground covers are present in moderate amounts, because these plants are stimulated so much by the increased light levels created by the cutting that they interfere with the establishment of other desirable seedlings (Horsley et al. unpublished 1998; Nyland et al. 2006). When ground covers of fern or understories of striped maple or beech are excessive, as described by Horsley et al. (1994, pp. 216, 218, 231-238), action should be taken to reduce the amounts of these plants before cutting so that satisfactory regeneration of the stand can be obtained.

Though recent reductions in deer populations on the ANF have been observed, interfering vegetation is already established and will need treatment to meet silvicultural objectives. Surveys in 1992 determined that close to 70 percent of all MA 3.0 land is stocked with enough ferns, grass, striped maple, and beech brush to interfere with desired tree seedlings and herbaceous vegetation (USDA FS, ANF, 1995a, Appendix L, Table 6). On these areas, it is not possible to regenerate forest cover with either even-aged or uneven-aged silvicultural prescriptions without removing these barriers. Vertical diversity is lacking in the understory. This means there is less food and less cover for wildlife species.

The current situation results from a combination of factors. Selective browsing by large deer herds has drastically reduced or eliminated tree seedlings on many sites. Horsley et al. (2003) demonstrated that fern cover increased over a 10-year period in forests with high deer densities. Since fern, striped maple, and beech are not preferred deer food, they often survive and dominate the understory. Once established, these weed species are able to survive and interfere with reproduction of desirable tree species for an indefinite period of time, even with reduced deer browsing impacts (for example, orchard stands and savannahs have been dominated by herbaceous plants for nearly 80 years). Reductions in deer population, shading of overstory, and similar ecological factors do not seem to reduce interfering plants enough to permit seedling regeneration. Some form of direct control of the interfering plants is required. Control measures must be adopted during the 5 to 20 year period prior to final harvest cutting in even-aged stands and immediately prior to each periodic selection harvest cutting in uneven-aged stands.

Control Measures Using Herbicides

Herbicide treatment is an important reforestation tool for both even-aged and uneven-aged management. As noted by Horsley (1991) and Nyland et al. (2006), herbicide treatment is an effective, economical, and safe means of removing interfering plants and minimizing their regeneration so that desirable species can become established. It was first used operationally on the ANF in 1987. Only ground application techniques are used on the ANF. Several years after use began, ANF silviculturists found it necessary to make some adjustments in order to ensure effective and efficient control of the target vegetation. In March 1991, the Forest Plan was amended (Amendment Number 2) to allow the use of sulfometuron methyl, alone or in combination with the herbicide glyphosate. This new technology now provides for better control of a wider range of species. Primary formulations used include Roundup® (glyphosate) and Oust® (sulfometuron methyl), though in recent years, due to changes in the Roundup® label, ANF personnel have used Accord Concentrate®.

Herbicide treatments are generally only used in stands that lack adequate numbers of tree seedlings and that contain a dense ground cover of grasses, fern, beech root suckers and striped maple (Horsley et al. 1994, p. 231) that interfere with desired tree seedling establishment and growth. Treatments occur on sites where we are trying to establish and/or maintain new tree seedlings in order to perpetuate well-stocked forest cover, foster young stand development, prepare sites for planting, enhance forest structure, or where final harvest activities are planned to establish young, even-aged stands. Sulfometuron methyl or glyphosate (or a combination of the two) is primarily used during the latter part of the growing season (mid-July through mid-September) to control these plants.

Use of other Herbicides

Other herbicides considered in the 1986 Forest Plan but not recommended for understory control on the ANF are bromacil, picloram, simazine, hexazinone, oryzalin, napropamide, diuron, flourochloridone, and terbacil. They were evaluated by the Northern Research Station Forestry Sciences Laboratory for: (1) efficacy, (2) economics of use, (3) potential hazards to the public, applicators, and Forest Service employees, and (4) whether they have an Environmental Protection Agency (EPA) registration for forestry use. They are not recommended for understory control in this LRMP either.

Alternatives to Using Herbicides to Control Interfering Vegetation

Mechanical control, prescribed fire, and the use of other herbicides were considered as options to reduce widespread interfering vegetation present in ANF understory vegetation, but eliminated from detailed analysis in both the 1986 Forest Plan and the 1991 (USDA FS 1991a) Understory Vegetation Management EIS. They are

considered in similar fashion here since there is little new information indicating these techniques now merit more detailed consideration.

Mechanical Control

Manual methods, including using powered or non-powered tools to cut or mow interfering vegetation, have been evaluated by the Northern Research Station. These methods have been found impractical or ineffective on the Allegheny Plateau. Cutting of beech and striped maple is not effective because these species resprout rapidly. Small striped maple (less than three feet tall) can be controlled by hand weeding.

Plowing is difficult because of interfering terrain, rocky soil, and interfering tree roots and stems common to a forest setting. It also damages tree roots, which makes it undesirable. Mowing is similarly difficult to accomplish. Scarification or root raking can result in ferns growing back in even greater density than before because the rhizomes are broken and stimulated to produce new fern fronds (de la Cretaz and Kelty 1999). Mechanical methods or physical disturbances do not help control grass, but they actually increase its abundance on the forest floor. None of these techniques would protect existing seedlings or overstory trees.

Mechanical methods are effective in controlling ferns on sites where plowing and mowing can be done. Ferns can be controlled mechanically by plowing during the growing season or by mowing two to three times per year for two to three successive years. But these are impractical techniques in forest situations with large treatment areas or with uneven terrain, particularly where it is desirable to leave existing tree seedlings unharmed, and must be used several times to be effective (Engelman and Nyland 2006, de la Cretaz and Kelty 1999, de la Cretaz and Kelty 2006). Because of this, herbicide treatments have proven more practical and cost effective for site preparation in forests (Engelman and Nyland 2006, de la Cretaz and Kelty 2006). Striped maple can be controlled mechanically by repeated cutting, and mechanical techniques are ineffective in controlling beech. All of these techniques are labor intensive and prohibitively expensive.

Fire

In fire-adapted oak types, recent research indicates that prescribed burning appears promising as a means of controlling striped maple (Brose et al. In Press). On some sites, additional touch-up treatments (e.g. several burns during successive years or herbicide treatment) may be needed in order to provide adequate control. Conversely, Nyland et al. (2006) reports that prescribed burning does not adequately control understory beech and striped maple, and in some cases damage to beech surface roots may promote additional suckering of beech trees that remain alive.

Fire does not provide adequate control of ferns. A single burn will consume the current hay-scented fern foliage but also damages the underground fern rhizome and releases dormant buds, which can actually cause the fern to increase in density. New rhizomes that develop from these buds produce foliage, which will quickly result in a dense ground cover where previously only a few fern fronds were present. As noted by Dyer and Lindsay (1992), fern spore banks and buried rhizomes survive fires and readily restore the population after burning. Furthermore, dense colonies of hay-scented fern develop where deer browsing impacts are occurring, especially after fires and other overstory disturbances increase light to the understory (Engelman and Nyland 2006). Fire cannot be used to control grasses. It actually stimulates renewal of warm season grasses. Both single and repeated burns stimulate the germination of buried grass seed by releasing nitrates, which promote growth.

Fire use also has several limitations on the Allegheny Plateau. First, the numbers of operational burning days are limited in some years, depending on factors such as weather and precipitation. Additionally, the fuel that carries fire on the ANF typically consists of leaf litter. Differences exist in the flammability of leaf litter between different forest types. The leaf litter of oaks contains high lignin content, decomposes more slowly, and is more flammable than the leaf litter of other forest types found on the ANF (Abrams 2005). Conversely, the Allegheny, upland and northern hardwood forests, the major forest types on the ANF, typically do not develop a fuel accumulation large enough to sustain fires in each of several successive years. Due to the susceptibility of trees and seedlings comprising non-oak types on the ANF to damage and/or mortality from the use of fire, fire is not a viable option for controlling interfering vegetation in non-oak types. Additionally, burning would not protect existing intermingled tree seedlings (non-oak). Despite the potential effectiveness of fire as a weed control tool, it

is an ineffective weed control measure for a large scale program like understory control in many situations on the ANF, for the reasons given above.

Using Only Fencing

Fencing alone will not provide the ground conditions to allow tree seedlings to become established where interfering understory vegetation is the problem. There needs to be an adequate amount of light reaching the ground to allow seedlings to grow and become established. Competing understory vegetation intercepts this light and prevents it from reaching tree seedlings (Horsley 1994). Fencing is most effective where tree seedlings already exist and are of such a size that they are taller than any existing understory vegetation and are only being hindered by deer browsing. It is also effective where competing understory vegetation is removed and an adequate seed source of the desired seedling species exists.

Silvicultural Treatments

Vegetation Management Objectives

The section below lists five types of forest areas (each containing interfering vegetation) with different management objectives, where herbicide use can be considered to help achieve vegetation management objectives. Each type is followed by a list of stand or site characteristics that help determine which specific stands should be included in future herbicide treatment programs.

1. Stand Regeneration

   Type of stand:

   - Forested stands where silvicultural guidelines prescribe understory control using herbicides to remove or reduce interfering vegetation as part of an even-aged or uneven-aged regeneration harvest sequence (Horsley et al. 1994 p. 231). Interfering vegetation can include fern, grass, blackberry, beech, striped maple, mountain laurel, birch, and other hardwood tree species that interfere with desired vegetation. In some cases, other species that are part of the plant community may become dominant to the point that they interfere with a wider diversity of regeneration. In some of these stands, chainsaw cutting of 15 to 25 foot tall beech and striped maple saplings (preferably two growing seasons prior to treatment in order to permit adequate resprouting) may be combined with the herbicide treatment to obtain more effective control over beech and striped maple.
   - Forested stands that require spot herbicide treatment to eliminate fern, grass, blackberry, beech root suckers or striped maple not killed in a previous broadcast herbicide treatment (such as fern tracks).
   - Forested stands where the overstory beech trees are dying from the BBD complex. New tree seedlings other than beech are needed to perpetuate trees on the site (since the BBD complex will eventually kill almost all of the new beech trees). This overstory tree mortality threatens the structure of future stands and could result in a stand made up of primarily unhealthy trees (Ostrofsky and Houston 1989).
   - Areas of the ANF where significant mortality has occurred, and where grass, fern, blackberry, mountain laurel, striped maple, beech, or birch competition is hindering, or preventing tree seedling growth and establishment.

   Site Selection Criteria:

   - Condition of the stand currently occupying the site. A stand composed of large diameter, high risk, or mature trees that has been identified as a regeneration candidate using even-aged, two-aged or uneven-aged methods. It may or may not have already received a shelterwood seed cut which has not produced adequate seedlings for the removal cut to occur. It may be a well stocked stand, or it may be a low-quality, understocked stand. Less than 70 percent of the area is covered

with desirable seedlings, and more than 30 percent of the area is dominated by plants that limit tree seedling development (Horsley et al. 1994, pp. 214-225; Marquis et al. 1992, pp. 60-61).

- Potential for establishment of advanced seedling regeneration. A large number of quality seed trees and/or the presence of tree seedlings (the more diverse, the better) on the ground (in spots lacking beech root suckers, striped maple, fern, or grass) are indicators of good seedling regeneration potential. If these conditions exist, the stand is given a higher priority for regeneration.
- Stands which have suffered considerable mortality from the BBD complex, maple decline, or other factors. There is considerable grass, fern, blackberry, beech, striped maple, and/or birch competition, which is preventing seedlings from becoming established. These stands typically have less than 40 percent relative stand density, less than 70 percent of the area occupied by desirable seedlings, and greater than 30 percent of the area occupied by interfering understory vegetation. For stewardship purposes and based on the urgency to rapidly develop adequate seedling regeneration in declining areas, these areas are given a high priority.
- Height of competing beech sprouts and striped maple. Ground application of herbicide can only reach approximately 15 feet. Woody vegetation taller than 15 feet will generally not be killed. Stands with beech and striped maple approaching 15 feet are the highest priority for treatment because the plants will soon grow beyond the reach of ground-spraying equipment. When they grow taller than 15 feet, they will first have to be cut with chainsaws (preferably two growing seasons prior to treatment) and then allowed to sprout before the herbicide will be effective. Alternately, a cut surface treatment method could be applied.

2. Fostering Young Stand Development

   Type of stand:

   - Forested stands where the final overstory removal has occurred and fern, grass or blackberry interference threatens growth and survival of desirable seedlings.

   Site Selection Criteria:

   - These sites typically have substantial portions of the area occupied by interfering understory vegetation, and are normally treated with sulfometuron methyl alone to reduce the fern, grass, and blackberry interference while retaining existing seedling regeneration. These sites are a high priority for treatment.

3. Stand Improvement

   Type of stand:

   - Regenerated forest stands less than 40 years old that have poorly formed, defective or low-valued individuals that threaten the survival of potential crop trees, contain less abundant or desirable tree species that may not survive without release, or contain such a high density of trees or the trees are large enough that manual felling methods may result in excessive damage to residual stems.

   Site Selection Criteria:

   - These generally include regenerated forested stands that contain individual stems that are too large to treat with a foliar application and that interfere with seedling development and/or growth. These sites typically contain between 100 and 600 trees per acre to be removed, with the average being 350 per acre.

4. Tree Planting

   Type of stand:

   - Areas where tree seedlings have been or will be planted to supplement natural regeneration or enhance species diversity.

   Site Selection Criteria:

   - These include stands where seedlings have been planted or will be planted to supplement natural regeneration, but have interfering fern or grass that is limiting or will limit growth and survival of planted seedlings.

5. Understory Restoration/Structural Improvement

   Type of stand:

   - Areas where it is desirable to improve understory structure or species composition where fern, grass, blackberry, beech, birch or striped maple are interfering with the development of other desirable shrubs, tree seedlings, and diverse herbaceous vegetation as described by Horsley et al. (1994, p. 231).

   Site Selection Criteria:

   - These include stands composed of large diameter trees that are dominated by understory fern, grass, beech, or striped maple where it is desirable to develop greater understory and midstory structure. In some cases, other species that are part of the vegetative complex may become dominant to the point that they interfere with a wider diversity of regeneration. Sufficient numbers of seedlings are not expected to develop since more than 30 percent of the area is dominated by an interfering understory condition.

Herbicide Selection

1. Foliar Treatment

   Foliar herbicide application methods apply small droplets of herbicides to the foliage of target vegetation where it is then absorbed into the plant. This method is not selective in the vegetation it affects, though manual methods (backpack sprayer) are more selective than ground-based broadcast application methods.

   Glyphosate will successfully remove woody vegetation (beech, striped maple, and tree seedlings) and any grass which has germinated. It does not affect grass, which will germinate from seed after the spraying is finished. It will remove ferns as long as there is an unbroken path for the herbicide to move from the frond (leaf) to the rhizome (underground stem).

   Glyphosate is particularly effective in removing root-origin beech sprouts resulting from mortality of overstory beech trees, which are themselves susceptible to the BBD complex and are preventing other tree seedlings from becoming established (Horsley et al. 1994, pp. 214-216, 231-238; Kochenderfer et al. 2001; Kochenderfer et al. 2004; Otrofsky and McCormack 1986; Nyland et al. 2006). In order to retain a component of American beech that is resistant to the BBD complex, efforts will be made to identify and retain beech trees that are immune or resistant to the disease complex as suggested by Burns and Houston (1987) and Mielke et al. (1986). At the same time, beech that are susceptible to the complex will be removed to provide growing space for either resistant beech or other tree species. In conjunction with removal of susceptible beech stems, following a period of time for beech root sprouts to develop, foliar glyphosate treatments are applied to reduce the abundance of beech sprouts. This allows a diversity of tree seedlings, including beech sprouts and seedlings that are resistant to the disease complex, to become established. The use of foliar glyphosate treatments on the ANF in has not provided any evidence of translocation of glyphosate from treated understory foliage to other, larger beech trees.

Sulfometuron methyl effectively removes ferns, regardless of whether or not the frond is separated from the rhizome. It also reduces the amount of grass which emerges from seed after spraying is complete (Horsley, 1990b). There is some effect on grass seedling emergence and growth for up to two years. Sulfometuron methyl is not as effective as glyphosate on grass which is already established. It will remove up to 60 percent, depending upon when it is applied during the growing season (Horsley, 1988a).

The specific herbicide recommendation is based upon three stand characteristics: (1) primary competing vegetation species, (2) secondary competing species (usually covers greater than 15% of the area), and (3) whether tree seedlings are already established in part of the stand.

Either glyphosate or sulfometuron methyl or a combination of the two herbicides are options. The first herbicide prescribed should be the one which will remove the most abundant interfering species on the site. A second herbicide should be added if the proportion of plots stocked with interfering plants that would not be killed by the first herbicide exceeds 15 percent (Horsley, 1990a).

In stands prescribed for broadcast herbicide treatment to control ferns and grasses, where some tree seedlings are present and it is desirable to retain them, apply only sulfometuron methyl. Sulfometuron methyl damage to this woody vegetation (such as red maple, cherry seedlings, or oak stump sprouts) will be minimized if it is applied after September 1 (Horsley, 1988a, 1991, Horsley unpublished 2005b).

2. Cut Surface Treatment

   Glyphosate will successfully remove woody stems greater than one inch in diameter if applied as a cut surface treatment. Cut surface treatments can be much more targeted in their application than foliar methods. Cut surface treatments are non-broadcast treatments that include stem injection, cut and frill, and cut-stump methods. Injection application methods normally use an injection device that delivers a metered amount of herbicide through the bark, and into the vascular system of the targeted stem through a series of injections made by the handheld injection devise. Normally one milliliter of solution is injected per incision. Cut and frill involves using a hatchet or axe to cut several incisions into the sapwood around the trunk of the targeted stem, with herbicide sprayed by hand into the incisions. Cut stump methods involve the application of herbicide (normally by hand spray equipment) to the outer two inches of a stump surface within two hours of cutting the target tree down.

Herbicide Application Methods and Rates

Five methods of herbicide application, divided into two broad groups, are appropriate for use on the ANF. Selection of the appropriate method depends on management objectives; type, density and size of vegetation to treat; site considerations; access; operability; effectiveness and cost.

1. Mechanical Broadcast Foliar Application

   Mechanical broadcast application using airblast equipment has been used operationally on the ANF since 1987 with a high degree of effectiveness. Where interfering vegetation exceeds levels that permit the establishment of adequate numbers of desirable tree seedlings as described by Horsley et al. (in Marquis, 1994a, p. 216), broadcast herbicide application methods are effective in reducing interfering vegetation (Horsley 1981, 1988a, 1990a, 1990b, 1990c, 1991, 1994; Horsley and Bjorkbom 1983; Horsley et al 1994, pp. 205-246). To control the interfering vegetation, understory vegetation on selected sites is sprayed between July and mid-September with glyphosate and/or sulfometuron methyl, using a vehicle-mounted sprayer. Mixtures of liquid products (glyphosate and/or sulfometuron methyl) diluted with water are used. By determining the most effective treatment dates for herbicide application on the Allegheny Plateau, treatment rates (amount of herbicide needed per acre) have been minimized (Horsley and Bjorkbom 1983, Horsley 1988a, Horsley unpublished 2005b). There may be rare instances where respraying of an area would be necessary in a subsequent year.

   This broadcast application method may not be appropriate, however, on steeper slopes, on sites with wet areas or in close proximity to drainages, in areas with desirable regeneration interspersed with woody interference,

in visually sensitive areas, or in areas with scattered individual interfering trees to remove. Local research (Horsley 1981, 1988a, 1990a, 1990b, 1990c, 1991, 1994; Horsley and Bjorkbom 1983; Horsley et al 1994, pp. 205-246) has determined the following broadcast application rates to be effective:

- Typical application rate for broadcast application will be 1 pound per acre of active ingredient glyphosate with 2 pounds per acre maximum.
- Typical application rate for broadcast application will be 1.5 ounces per acre of active ingredient sulfometuron methyl with 3 ounces per acre maximum.

2. Manual Foliar Application

   Manual (backpack) foliar application of glyphosate and/or sulfometuron methyl is an option for treating interfering vegetation on steeper slopes, less accessible sites, and in riparian or other sensitive areas. This method is also appropriate where interfering vegetation is less contiguous or interspersed with desirable seedling regeneration, and a more selective application method is preferred. The following application rates should be used:

   - Typical Application Rate for manual foliar application will be 1 pound per acre of active ingredient glyphosate with 2 pounds per acre maximum.
   - Typical Application Rate for manual foliar application will be 1.5 ounces per acre of active ingredient sulfometuron methyl with 3 ounces per acre maximum.

3. Injection or Cut and Frill Application

   Injection or cut and frill glyphosate application methods are effective in selectively treating competing stems more than one inch in diameter, in order to release desirable crop trees (Kochenderfer et al. 2001; Kochenderfer et al. 2004). Kochenderfer et al. (2004) found a 50 percent solution of glyphosate applied at a rate of 1.5 ml of herbicide solution per inch of diameter was effective (99.98 percent average crown control) in selectively removing woody stems greater than one inch in diameter, and used far less herbicide than other individual stem treatment methods such as basal spray application. Where an abundance of interfering stems less than one inch in diameter need treatment, or fern and/or grass interference is present, foliar applications are recommended, though they are less selective. Injection or cut and frill herbicide application methods should occur outside the heavy sap flow period (March through May) (Kochenderfer et al. 2001; Kochenderfer et al. 2004). This treatment is best applied between June 1 and November 1, is site specific and particularly effective in partial harvest situations, or where an abundance of desirable advance regeneration exists and a selective treatment is desired. Treated stems remain standing with this method, reducing damage to desirable residual trees and providing standing dead wood for wildlife.

   This method can be used to treat some advanced beech reproduction of root origin that is susceptible to the BBD complex and interfering with the establishment of other tree species seedlings. Where a “parent” tree is treated through glyphosate injection, Kochenderfer et al. (2004) found 52 percent of the 2-foot tall to 0.9 inch diameter beech stems were effectively treated through translocation of herbicide from the injected “parent” tree to root-sprout origin regeneration. They also found 97 percent of advance beech reproduction to be of root-sprout origin. Unlike foliar applications, Kochenderfer et al. (2001) observed some damage to desirable trees of the same species being treated through injection of glyphosate, most likely from translocation of herbicide through root grafts. In order to minimize inadvertent damage to desirable tree regeneration and larger stems through translocation of herbicide, glyphosate herbicide should not be used to treat competing stump sprouts originating from the same stump as crop trees, or to control competing trees closer than 5 feet to crop trees of the same species when using injection or cut and frill application methods.

   Injection or frill applications are an effective method for crop tree release when density of trees is high enough, or the trees to be cut are large enough that undue damage would result to residual stems from felling trees (Kochenderfer et al. 2001). Injection or cut and frill herbicide application is also appropriate to reduce

the density of mountain laurel, where the objective is to regenerate hardwood seedlings in upland and oak hardwood stands. The following application rates should be used:

- Apply 1.5 ml herbicide solution per 1 inch of stem diameter (Kochenderfer et al. 2001).
- Typical per acre application rates for injection or cut and frill treatments will be 2 pounds active ingredient glyphosate per acre; 3 pounds maximum.

4. Cut-Stump Application

Cut-stump herbicide treatment is another selective, target specific application method that is successful in controlling stump sprouts as well as root suckers (such as from American beech). Glyphosate is applied to the surface of cut stumps shortly after cutting (within 2 hours) to prevent sprouting from the stump or attached root system. Only the cambium layer, or outer 2 inches of stumps larger than 6 inches need treatment (Kochenderfer et al. 2006).

Glyphosate is readily translocated from the surfaces of freshly cut beech stumps via parent root systems, to attached root-origin stems. Thus, the cut-stump method is an alternative to treating numerous interfering small beech stems, as only the larger cut "parent" stumps would be treated. These small stems are clones of "parent" trees that are susceptible to the BBD complex. Kochenderfer et al. (2006) eliminated stump sprouting on 100 percent of treated stumps and controlled an average of 93 beech stems around each cut-stump treated with glyphosate. They found cut-stump treatment to be more effective in controlling beech root sprouts than injection methods, because cutting the "parent" tree made more herbicide available for translocation to attached root sprouts. As stump diameter increased, so did the effective range of beech root sprout control. In this study, the cut-stump treatment did not affect other desirable regeneration.

The cut stump application method may help counteract the effects of the BBD complex by reducing the proportion of susceptible trees in future stands (Kochenderfer et al. 2006). Removing beech sprouts that are susceptible to the BBD complex is particularly important, as this frees up growing space for other tree species seedlings to become established. In order to minimize possible herbicide damage to potentially resistant beech stems, cut stump herbicide treatments should not be applied within 30 feet of the stem of a healthy beech tree greater than 8 inches DBH that exhibits signs of resistance to the BBD complex, and is designated as a residual tree to retain (Kochenderfer personal communication 2006a). The cut -stump application method should occur outside the heavy sap flow period (March through May) (Kochenderfer et al. 2006). This treatment is best applied between June 1 and November 1.

Cut-stump herbicide application is also appropriate to reduce the density of mountain laurel, where the objective is to regenerate hardwood seedlings in upland and oak hardwood stands. The following application rates should be used:

- Apply 4 ml herbicide solution per 1 inch of stem diameter.
- Typical per acre application rates for cut surface treatments will be 2 pounds active ingredient glyphosate per acre; 3 pounds maximum.

Herbicide Use to Achieve other Resource Management Objectives

Wildlife Habitat Enhancement

Vegetation Management Objectives

This section covers herbicide use to remove interfering vegetation, or create standing dead trees (snags) in order to improve wildlife habitat.

Site Selection Criteria:

- Areas where wildlife openings will be created and planted with shrubs or grasses.

- Stands that have an understory of ferns, grass, striped maple, or beech brush that have been designated for clearcutting in order to develop a wildlife opening.
- Savannah stands that contain an understory of fern, grass, striped maple, and beech brush (might also contain goldenrod or aster) that have been targeted for wildlife opening enhancement. Some overstory trees may be designated for harvest.
- Openings with a dense layer of ferns, striped maple and beech brush (might also contain goldenrod or aster) that are targeted for wildlife opening enhancement.
- Forested settings where a wildlife biologist has determined additional snags are desirable.

Herbicide Selection

For any areas that will be managed as a grass field and seeded with grasses and legumes, give preference to using glyphosate by itself. Sulfometuron methyl will kill many grass seedlings originating in the forest floor seed bank and will inhibit germination of any seed that is planted. If sulfometuron methyl is used, delay subsequent seeding with grasses and legumes as specified by the herbicide label. Neither herbicide will affect shrubs that are planted after treatment.

If bracken fern, goldenrod or aster are present in the understory, treat with glyphosate after August 1 for best control.

If a selective treatment is desired in order to protect witchhazel, juneberry, dogwood, crabapple, hawthorne or if other desirable wildlife shrubs or seedlings are present, treat after September 1 with sulfometuron methyl by itself, or use more selective backpack application methods if both sulfometuron methyl and glyphosate are necessary.

Glyphosate should be used for foliar and cut surface treatments of woody vegetation, including cut-stump, injection, or cut and frill methods.

Herbicide Application Methods and Rates

In areas to be seeded with grasses as wildlife openings, broadcast or hand application methods are appropriate, depending on access, site, and size of treatment area.

1. Mechanical Ground Application Methods

   Application techniques and rates would include the air blast treatment technique described in the silvicultural treatment methods above. In open areas, other broadcast application techniques, such as tractor or ATV mounted sprayers, may also be appropriate. Glyphosate and/or sulfometuron methyl would be appropriate depending on target vegetation.

2. Manual Ground Application Methods

   Backpack foliar spraying and cut surface treatments and rates as described in the silvicultural treatment methods above are appropriate application techniques for maintaining wildlife habitat. Glyphosate or sulfometuron methyl generally would be used depending on target vegetation.

   Cut and frill or injection of glyphosate application methods and rates, as described in the silvicultural treatment methods above, may be used to create snags for wildlife.

Heritage Site Restoration and Conservation, Vista Development and Maintenance, and Electric Fence Maintenance

Vegetation Management Objectives

This section covers the use of herbicide in areas where unwanted damage is occurring to heritage sites from roots of woody vegetation, where vistas have been or will be constructed to enhance scenic viewing of important sites and landscape features on the ANF, or where it is necessary to maintain the integrity of electric fences used to protect established tree seedlings from deer browsing.

Site Selection Criteria:

- Heritage sites that are overgrown or subject to encroaching woody vegetation that needs removal to protect the long-term integrity of the sites.
- Vista openings overgrown or subject to encroaching woody vegetation that need treatment to maintain the quality of scenic views and meet long term scenic quality objectives.
- Sites where weeds, woody vegetation, and grasses (directly under the wires) have grown tall enough to cause electrical shorting, thus reducing the effectiveness of the fence. Removal of this vegetation from a strip of land several feet wide immediately below the fence will improve effectiveness, safety, and longevity of electric fences.

Herbicide Selection

For heritage sites and vistas, since most target vegetation to be removed is woody, glyphosate is recommended. Sulfometuron methyl and glyphosate will be necessary for electric fence maintenance.

Herbicide Application Methods and Rates

For most of these heritage sites or vistas, it is desirable to maintain herbaceous vegetative cover while selectively removing the unwanted woody vegetation through cut surface and/or backpack foliar treatments. Below electric fences, herbaceous cover often needs to be removed using backpack foliar treatment. Broadcast mechanical ground application techniques generally are not appropriate for maintaining heritage resources, vistas, or electric fences. The following application rates should be used:

- Application rates will be no more than those listed under manual application methods and rates in the Silvicultural Treatments section.

Non-native Invasive Species Treatment

Vegetation Management Objectives

Areas where NNIS occur on the ANF and herbicides are determined to be an effective treatment to remove them, or reduce their abundance or spread.

Site Selection Criteria:

The list of NNIS species of concern is updated annually. Consider the following when proposing or planning the treatment of NNIS with herbicides:

- Assess the target species: what is its current life stage, the amount of infestation, and specific threats the species may pose to the environment or human health.
- Seasonal timing of application for effective treatment.
- Presence of desirable or rare species.
- Site accessibility to determine what type of equipment should be used.
- Site characteristics: soil types, location of surface water, depth to groundwater, potential for off site drift.
- Human safety.

Priority for treating sites is as follows:

- Treatment of new infestations, either new species or locations on the ANF.
- Treatment of sites with the greatest potential for spreading such as but not limited to, trailheads, boat ramps, parking lots, recreation areas, and administrative sites.
- Conservation of sites occupied by or providing habitat for endangered, threatened, candidate and sensitive plants and animals that are susceptible to harm from invasive species.

- Conservation of special areas.
- Containment and control of established infestation.

Herbicide Selection

Glyphosate is the primary herbicide to be used for both foliar and cut surface treatment. Sulfometuron methyl may be used to control seed/rhizome development for certain species.

Herbicide Application Methods and Rates

Mechanical Ground Application Method

Mechanical ground application equipment may be used in areas with extensive non-native invasive plant cover. Equipment consists of a rubber-tired or tracked skidder with an open cab and rear-mounted spray equipment. Herbicides are applied using broadcast air blast spraying with the vehicle operator exercising control of the spraying (on/off, direction of application, timing, coordination with weather conditions, etc.). Mixtures of liquid products (glyphosate and/or sulfometuron methyl) diluted with water are used. The following application rates should be used:

- Typical per acre application rates for mechanical broadcast application will be 1 pound active ingredient glyphosate per acre with a 2 pound maximum.
- Typical application rate for mechanical broadcast application will be 1.5 ounces per acre of active ingredient sulfometuron methyl with a 3 ounce per acre maximum.

Manual Ground Application Methods

The primary methods of manual herbicide application for non-native invasive plant species include both foliar spraying using backpack equipment and cut surface treatments. Where knotweeds grow within 75 feet of streams or rivers, the preferred treatment technique would be manual foliar spraying using backpack equipment.

Foliar Spraying Using Backpack Equipment

This application method applies herbicide selectively to target plants. Herbicide drift is reduced and the impact to desirable vegetation or other nontarget organisms would be minimal. Selective treatment includes manual ground application, which requires hand-carried or ATV mounted equipment. ATV units consist of a tank with a hand-held wand for manual application. Hand cutting some species throughout the growing season may be necessary prior to spraying foliage (to keep foliage at a treatable height) during the peak translocation time. For example, species such as Japanese knotweed (*Polygonum cuspidatum*) and giant knotweed (*Polygonum sachalinense*) grow too tall for foliar treatment during late summer to early fall, during its peak translocation time and would either be cut down or treated with herbicide two to three times during the growing season when foliage is below waist level. Where abundant propagules exist (seeds, rhizomes, etc.) that are not susceptible to foliar treatment, new infestations and resprouting vegetation may also need to be retreated during subsequent growing seasons. Sulfometuron methyl may be used to help prevent these abundant propagules of some species from recapturing the site, such as Japanese stiltgrass (*Microstegium vimineum*) and spotted knapweed (*Centaurea biebersteinii*). Some land owners suggest foliar glyphosate spray mixture concentration rates for manual NNIS treatments range from one percent (four ounces of active ingredient in three gallons of water) to two percent (eight ounces of active ingredient in three gallons of water) solution of active ingredient (Miller 2002). The following application rates should be used:

- Typical application rates for manual foliar application will be 2 pounds active ingredient glyphosate per acre with 4 pounds maximum (only for retreatment).
- Typical application rate for manual foliar application will be 1.5 ounces per acre of active ingredient sulfometuron methyl with 3 ounces per acre maximum.

Cut Surface Treatment

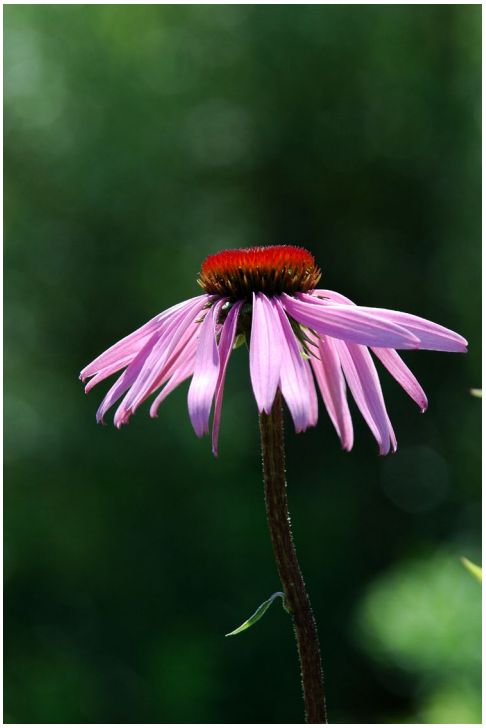
Cut-surface treatments are used to selectively treat NNIS. This method may be used on plants where the stems are too tall for broadcast mechanical or backpack foliar treatment, or where lower stem density or the need to protect nearby desired species makes this selective treatment more desirable. Injection, cut and frill, and cut-stump treatments are common types of cut surface treatments. Only glyphosate, formulated as a liquid herbicide, would be used for this type of treatment. The following application rates should be used:

- Typical cut stem glyphosate application rate is 25 percent solution of active ingredient (32 ounces of active ingredient in 1 gallon of water), with a maximum rate of 50 percent for retreatment or hard to control species. Rates may vary by species and size of the plant.
- Typical per acre application rates for cut surface treatments will be 1-pound active ingredient glyphosate per acre with 2 pounds maximum.

The ANF Herbicide Policy

Herbicides will be used to carry out vegetation management objectives as indicated in site-specific project analysis. This does not, however, preclude the use of other practices (i.e., planting, fencing, mechanical control, or fire) if the project analysis shows them to be an acceptable alternative for existing on-site conditions. In addition, we will consider for future use, any new methods of treating interfering or invasive vegetation which prove to be safe, economical, and biologically feasible. Future research may identify a new or better herbicide that could be proposed for use on the ANF. If this happens, ANF personnel will conduct an analysis and document the findings in appropriate environmental analysis, which includes an analysis of possible impacts to human health, the environment and non-target organisms, before such use can occur on the ANF.

Literature cited in Appendix A is available in the FEIS Reference section.



Allegheny purple cone; photo courtesy of R Hokans, US Forest Service

Appendix B—Summary of the Analysis of the Management Situation

The complete, detailed analysis of the management situation (AMS) can be found in the official planning record for the Allegheny National Forest (ANF) Land and Resource Management Plan (LRMP) revision process. The AMS identifies any need for change in management direction from the original 1986 Forest Plan. It also determines demand and supply conditions for resource commodities and services, production potentials, and use and development opportunities.

This summary of the AMS will highlight the detailed reports included in the complete AMS. These topics include:

- Major Revision Issues
- Recreation and Special Areas
- Habitat Diversity
- Forest Vegetation
- Synthesis of Resource Areas
- Soil and Water
- Air Quality
- Heritage Resources
- Scenery
- Transportation Systems
- Monitoring
- Management Areas
- Social and Economic Sustainability
- Oil and Gas
- Special Forest Products
- Lands and Special Uses

Major Revision Issues

These issues were identified during an extensive review process by the ANF Forest Plan revision interdisciplinary (ID) team. The ID team has reviewed changes in forest conditions, changes in laws and regulations, monitoring reports, and the amendments to the current 1986 Forest Plan. In addition, the ID team has participated in public workshops and reviewed approximately 2,000 public comments. These comments resulted from individual and public interest group response to the public scoping process, both in 1996 and 2003, and the September 2003 "Analysis of the Need for Change and Notice of Intent." All comments, including those received after the official public comment period closed, have been reviewed and considered.

The complete AMS discusses a reorganization of revision issues and identified subtopics to provide consolidation and reduce redundancy.

Recreation and Special Areas

Recreation opportunities are highly valued on the ANF. After just a day's drive, one-third of the nation's population can access the diverse recreation offerings supplied by the ANF. With such a large user base, it may be challenging to satisfy the broad range of user demands. Specialists acknowledge that more detailed and statistically valid monitoring methods are needed to determine if recreation program management objectives are being met and whether or not changes to management direction will be necessary.

Of the 57 developed recreation sites on the ANF, 21 are trailheads. Nearly half of the sites are located along the Allegheny Reservoir. Due to the nature of funding, there are concerns for how new and existing facilities will be constructed and maintained. Demand continues for a motel/restaurant complex on the Allegheny Reservoir.

The present inventory of non-motorized trails totals 271 miles. There is no emphasis on bicycle or equestrian trail designations on the ANF. Popular trends call for establishing trails with each designation.

Motorized trails are split into two designations: motorized summer and motorized winter.

Motorized summer trails accommodate all terrain vehicles (ATVs) and off-highway motorcycles (OHMs). Trail inventory includes 108 miles. Trail expansion is allowed in designated intensive use areas (IUAs) only. Supplying additional trail mileage must be weighed against potential impacts to soils, wildlife, and water quality.

The current inventory of snowmobile trails is 366 miles. With 287 miles falling on joint-use roads, user conflicts and operator safety are concerns. An additional concern is that snowmobile connector trails may not be adequate to meet public needs.

Dispersed recreation activities have progressed since the 1986 Forest Plan was finalized. Terminology, user activities, technology, recreational equipment, and pursuits have changed. Management must consider how road densities and oil and gas developments affect recreational settings. Direction for concentrated dispersed use areas, equestrian use, and bicycle use needs changing.

Public demand exists for remote, roadless or wilderness type areas. Recommendations for special area designations will be carefully considered.

Recreation demands have evolved and trends have changed from those of two decades ago. The opportunity exists to respond to demands and trends by adjusting plan goals and objectives and standards and guidelines. Modifying management area designations may also be used to satisfy demands and changing trends.

Habitat Diversity

Habitat diversity is one of the preliminary issues identified in the "Analysis of the Need for Change and Notice of Intent" (2003) and involves five topics:

1. Maintaining habitat for native and desired non-native species.
2. Conserving habitat for threatened, endangered, and sensitive species (TES).
3. Managing non-native invasive species.
4. Providing habitat for game species.
5. Providing late structural and old growth forests and habitat connectivity across the landscape.

New management indicator species (MIS) that respond to monitoring difficulties should be identified. Effective MIS choices represent a group of species that utilize similar habitat. These MIS choices should be habitat specialists rather than generalists. Choices should reflect changes in ANF management and should allow managers to better determine and supply habitat needs.

Four federally listed threatened or endangered species are known to occur on the ANF: the bald eagle, Indiana bat, clubshell mussel, and northern riffleshell mussel. Habitat for a fifth species, the small whorled pogonia, is present, but populations have not been documented on the ANF. In addition, sensitive species have been identified. The ANF is expected to conserve and supply habitat for these species within the limits provided by the landscape. Disease outbreaks, over-abundance of white-tailed deer, native and non-native invasive species, and continuous development of privately owned mineral rights could complicate management efforts. Consultation with the U.S. Fish and Wildlife Service (USDI FWS) should guide development of management strategies.

The non-native invasive species (NNIS) program should be updated and expanded to reflect new legislation and new information. The NNIS program should include inventory, prevention, and control components and an integrated pest management (IPM) program should be developed. Monitoring and evaluation requirements and a public outreach program are important aspects of the program.

Hunting and fishing play an important role in maintaining the health and diversity of the ANF. Demand for opportunities has increased slightly and remains high. A flexible management approach that responds to conditions on the ground should be adopted to supply and improve the habitat that supports the ANF's diverse game species. An opportunity exists to achieve multiple goals and objectives by collaborating with specialists managing timber harvest and rights-of-way to create habitats important to species such as turkey, grouse, woodcock, and deer. Developing "old farm" and shrub habitats where timber value is marginal or non-commercial is another possibility. Areas impacted by insects, disease, or over-browsing by deer could be restored as well.

Providing old growth forests and habitat connectivity across the landscape is vital to providing the variety of habitats that supply food, cover, and shelter to a diversity of wildlife species. Connectivity of similar habitats generally provides higher quality habitat elements. Accomplishing this requires special management emphasis as a result of the longer periods of time needed to achieve these characteristics. While recognizing that true old growth values can only be developed over time, direction regarding the amount of old growth and distribution across the landscape should be included in the Forest Plan. A landscape approach should foster achieving these goals.

There is a general need to update management practices to correspond with new science and research results. This can be accomplished by updating standards and guidelines and making appropriate management area designations. The AMS also calls for continuation of proven ANF conservation practices.

Forest Vegetation

The AMS identifies six primary types of activities within the vegetation management program:

1. timber harvesting
2. timber stand improvement or release
3. reforestation
4. prescribed burning
5. control of non-native invasive species
6. integrated pest management to control insects and diseases

While the public demand for timber varies greatly from those who would prefer no timber be harvested to those who seek increased harvest levels, the 1986 Forest Plan concluded that the demand for ANF timber far exceeds the supply. Indications are that this conclusion remains valid now and will likely be valid in the future. A changing landscape and evolving science indicate the need to use adaptive management practices.

The allowable sale quantity (ASQ) and long-term sustained yield (LTSY) projections should be adjusted to reflect current information and research. Given the considerable deviations from past projections, it is paramount that future projections be made using the latest research techniques and newest information.

Acreages per forest types have changed substantially as ANF personnel adopted the Region 9 expanded list of forest types that better suits ANF overstory vegetation. This system more correctly defines management limitations, tree seedling development potential, tree species diversity, and product values for the ANF.

Harvest activities should be updated to incorporate new information learned, particularly about timing and sequencing. Conflicting harvest method direction will be resolved. The list of silvicultural guidelines appropriate for each forest type should be updated as well.

As a result of various factors, such as windstorms, beech bark disease complex, and sugar maple decline, some forest conditions have changed significantly since the 1986 Forest Plan was finalized. The Forest Plan should reflect these changes and should respond with updated, state of the art forest health management practices.

Competing vegetation has become a greater threat to establishing tree seedlings than initially projected, and tree seedling species composition often differs substantially from overstory composition. In addition, tree mortality and decline occurred at a far greater rate than predicted. These conditions must be considered and addressed in the Forest Plan.

The AMS includes a clear message to call upon lessons learned during implementation when proposing the next Forest Plan. Modeling capability and outputs should be improved as a result. This and the other changes suggested should lead to better management and a better and more predictable supply of timber.

The opportunity exists to respond to demands and new information and research by adjusting plan goals and objectives and standards and guidelines. Modifying management area designations may also be used to satisfy demands and help implement improved management techniques.

Synthesis of Resource Areas

The "Analysis of the Need for Change and Notice of Intent" (2003) identified a number of additional resource issues that need attention, but these issues should not drive the plan process or vary greatly by alternatives. These issues respond to both public and internal concerns and will be best addressed through adjustments to standards and guidelines and monitoring strategies, in addition to environmental effects disclosures.

Soil and Water

Specialists identified a need to update Forest Plan direction to match evolving management practices and a need for more consistent monitoring. Soil management concerns include drainage, erosion potential, parent material, and landform. Ecological land-typing (ELT) work has been completed after approximately 10 years of effort, easing identification of areas of concern for soil quality. In addition, riparian areas and watersheds need more focused management.

Air Quality

The Clean Air Act (1990) is the driving force behind air quality management, but was preceded by the 1986 Forest Plan. The ANF air quality management program was developed to comply with the Clean Air Act and this program should be incorporated into the Forest Plan.

Heritage Resources

Formerly "Cultural Resources," this program had been managed to ensure legal compliance by other resource work. Changing the name to "Heritage Resources" (1992) reflects the broader nature of the program. As stewards of heritage, the Forest Service manages for public interpretation and participation, preservation and continued use. The program has evolved to comply with changes in national direction including new legislation enacted over the past two decades.

Scenery

Scenery management was guided by the Visual Management System (VMS). The Forest Plan should be updated to conform to the Scenery Management System (SMS) which incorporates many elements of the VMS inventory while making use of the geographic information system (GIS). This will allow ANF management to be consistent with nationally accepted standards and facilitate comprehensive scenery management.

Transportation Systems

The existing ANF road system is a complex mix of state highways, township roads, National Forest System (NFS) roads and roads constructed for oil, gas and mineral rights access. Many factors drive transportation system planning, but roads are managed primarily to permit management of ANF resources or activities. Roads are typically built or maintained to respond to these needs.

Monitoring

The current monitoring plan emphasizes two primary elements. One is administrative in nature and focuses on implementation performance. The other, effects monitoring, focuses on social, economic, and environmental effects and how they compare to the expected results. A more systematic program that includes a framework of criteria and indicators will assist in monitoring management outcomes. This will allow for improved evaluation and adjustments, enabling an ecosystem management approach and a more effective use of adaptive management principles.

Management Areas

Each management area has a defined purpose, which is reflected by the corresponding desired condition, goals and objectives, and standards and guidelines. Any changes in allocations will be in response to primary issues, conflicting management goals, or will address whether or not the area is being managed as intended. Area boundaries and acreage may be refined to incorporate new information.

Social and Economic Sustainability

The current 1986 Forest Plan primarily allows indirect discussion of these issues within the context of other resource areas. The Forest Plan should more clearly speak to these concerns, i.e., recreation, scenery, and production of forest products. Specific analysis will be accomplished to determine public benefits and the impacts to the local area and the greater region.

Oil and Gas

The ANF is comprised of acquired, or once-privately owned, lands. As a result, 93 percent of the subsurface mineral rights on the ANF are privately held. These mineral estate owners have a right to extract oil, gas or minerals (OGM). Activities, primarily road construction, associated with accessing OGM estates are not considered Federal actions. The Pennsylvania Department of Environmental Protection (PA-DEP) is the regulatory authority. Along with associated soil erosion, sedimentation and water quality standards, road standards are established by PA-DEP. As the surface owner, the ANF is compelled to cooperate with the mineral estate owners, which may include assistance identifying and correcting problems with their road construction. Analysis related to specific resource areas will be accomplished and mitigation measures negotiated with OGM operators.

Special Forest Products

The special forest product (SFP) direction in the current 1986 Forest Plan should be expanded. There was a lack of demand for SFPs and a corresponding lack of national planning process direction when the 1986 Forest Plan was adopted. In response to increasing demands and trends, the ANF should develop a management strategy that will address inventory and monitoring needs and interact with harvesters and collectors. Permit issuance and enforcement are needed. A comprehensive strategy should address the impacts of SFP harvesting on biodiversity and the impacts of forest management on SFPs. A collaborative approach with harvesters and collectors is warranted.

Lands and Special Uses

Land acquisition isn't common on the ANF, but procedures and guidelines should be outlined in the Forest Plan. Special uses management should be more comprehensive, including identifying areas where communication towers, utility corridors, pipelines, and road rights of ways are suitable.

Conclusion

The primary purpose of the AMS is to provide a basis for formulating a broad and reasonable range of alternatives that will allow the ANF to supply goods and services sufficient to meet society's demands. A collaborative approach was used identify issues and resource concerns. The three areas identified as having the greatest need for change include recreation and special areas, habitat diversity, and forest vegetation management. This analysis will help guide the Forest Plan revision, with an emphasis on the major revision issues.

Appendix C—Recreation Opportunity Spectrum and Development Level Table

ROS Descriptions

Primitive – An unmodified environment generally greater than 5,000 acres in size and generally located at least three miles from all roads and other motorized travel routes. A very low interaction between users (generally less than 3 group encounters per day) results in a very high probability of experiencing solitude, freedom, closeness to nature, tranquility, self-reliance, challenge, and risk. Evidence of other users is low. Restrictions and controls are not evident after entering the land unit. Motorized use is rare.

Semi-primitive Non-motorized – A natural or natural-appearing environment generally greater than 2,500 acres in size and generally located at least 1/2 mile (depending on terrain and vegetation, but no less than 1/4 mile) but not farther than three miles from all roads and other motorized travel routes. Concentration of users is low (generally less than 10 group encounters per day), but there is often evidence of other users. There is a high probability of experiencing solitude, freedom, closeness of nature, tranquility, self-reliance, challenge, and risk. Subtle on-site controls are minimal. No roads are present in the area.

Semi-primitive Motorized – A natural or natural-appearing environment generally greater than 2,500 acres in size and generally located within 1/2 mile of primitive roads and other motorized travel routes used by motor vehicles; but not closer than 1/2 mile (depending on terrain and vegetation, but no less than 1/4 mile) from better-than-primitive roads and other motored travel routes. Concentration of users is low (generally less than 10 group encounters per day), but there is often evidence of other users. There is a moderate probability of experiencing solitude, closeness to nature, and tranquility along with a high degree of self-reliance, challenge, and risk in using motorized equipment. Local roads may be present, or along freshwater shorelines there may be extensive boat traffic.

Roaded Natural – Resource modification and utilization are evident, in a predominantly naturally-appearing environment generally occurring within 1/2 mile (depending on terrain and vegetation, but no less than 1/4 mile) from better-than-primitive roads and other motorized travel routes. Interactions between users may be moderate to high (generally less than 20 group encounters per day), with evidence of other users prevalent. There is an opportunity to affiliate with other users in developed sites but with some chance for privacy. Self-reliance on outdoor skills is only of moderate importance with little opportunity for challenge and risk. Motorized use is allowed.

Roaded Modified – Vegetative and landform alterations typically dominate the landscape. There is little on-site control of users except for gated roads. There is moderate evidence of other users on roads (generally less than 20 group encounters per day), and little evidence of others or interactions at campsites. There is opportunity to get away from others but with easy access. Some self-reliance is required in building campsites and use of motorized equipment. A feeling of independence and freedom exists with little challenge and risk. Recreation users will likely encounter timber management activities.

Rural – The natural environment is substantially modified by land use activities. Opportunity to observe and affiliate with other users is important as is convenience of facilities. There is little opportunity for challenge and risk and self-reliance on outdoor skills is of little importance. Recreation facilities designed for group use are compatible. Users may have more than 20 group encounters per day.

Urban – Urbanized environment with dominant structures, traffic lights and paved streets. May have natural appearing backdrop. Recreation places may be city parks and large resorts. Opportunity to observe and affiliate with other users is very important as is convenience of facilities and recreation opportunities. Interaction between large numbers of users is high. Outdoor skills, risk, and challenge are unimportant except for competitive sports. Intensive on-site controls are numerous.

Management Area	Recreation Opportunity Spectrum	Development Level
1.0	Roaded Natural	3
2.1	Roaded Natural	3
2.2	Roaded Natural	3
3.0	Roaded Natural	3
5.1	Semi-primitive Non-motorized	1 or 2
5.2	Semi-primitive Non-motorized	1 or 2
6.1	Roaded Natural	3
6.3	Roaded Natural	3
7.1	Rural	4 or 5
7.2	Semi-primitive Non-motorized in Areas >2,500 acres	2
	Roaded Natural	3
8.1	Rural – Recreational River Segments	4 or 5
	Roaded Natural – Scenic River Segments	3
8.2	Semi-primitive Non-motorized in land units (Tracy Ridge, Allegheny Front, Cornplanter)	2
	Semi-primitive Motorized in water unit (Allegheny Reservoir)	2
8.3	Roaded Natural	3
8.4	Roaded Natural	3
8.5	Roaded Natural	3
8.6	Roaded Natural	3

Development Level	ROS Class and Development Level Definition
1	Primitive ▪ Rustic or rudimentary improvements designed for protection of the site rather than comfort of the users. ▪ Use of synthetic materials excluded. ▪ Minimum controls are subtle. ▪ No obvious regimentation. ▪ Primary access usually over primitive roads Spacing informal and extended to minimize contacts between users.
2	Semi-primitive Non-motorized and Semi-primitive Motorized ▪ Rustic or rudimentary improvements designed primarily for protection of the site rather than the comfort of the users. ▪ Use of synthetic materials avoided. ▪ Minimum controls are subtle. ▪ Little obvious regimentation. ▪ Spacing informal and extended to minimize contacts between users. ▪ Primary access usually over primitive roads. Interpretive services informal, almost subliminal.
3	Roaded Natural or Roaded Modified ▪ Facilities about equal for protection of natural site and comfort of users. ▪ Contemporary/rustic design of improvements is usually based on use of native materials. Inconspicuous vehicular traffic controls usually provided. ▪ Roads may be hard surfaced and trails formalized. ▪ Development density about 3 family units per acre. ▪ Primary access may be over high standard roads. Interpretive services informal if offered, but generally direct.

Development Level	ROS Class and Development Level Definition
4	Rural ▪ Some facilities designed strictly for comfort and convenience of users. ▪ Luxury facilities not provided. ▪ Facility design may incorporate synthetic materials. ▪ Extensive use of artificial surfacing of roads and trails. ▪ Vehicular traffic control usually obvious. ▪ Primary access usually over paved roads. ▪ Development density 3-5 family units per acre. ▪ Plant materials usually native. Interpretive services, if offered, often formal or structured.
5	Urban ▪ Facilities mostly designed for comfort and convenience of users and usually include flush toilets; may include showers, bathhouses, laundry facilities, and electrical hookups. ▪ Synthetic materials commonly used. ▪ Formal walks or surfaced trails. ▪ Regimentation of users is obvious. ▪ Access usually by high-speed highways. ▪ Development density 5 or more family units per acre. ▪ Plant materials may be non-native. ▪ Formal interpretive services usually available. ▪ Designs formalized and architecture may be contemporary. Mowed lawns and clipped shrubs not unusual.
For more detail on the suitability of proposed facilities with the desired ROS classification, see the Built Environment Image Guide (BEIG).	

Appendix D—Species with Viability Concerns

Table D-1. Federally Listed Threatened, Endangered or Candidate Species

Taxa	Common Name	Scientific Name	Status
Bird	bald eagle	*haliaeetus leucocephalus*	Threatened
Mammal	Indiana bat	*myotis sodalis*	Endangered
Mollusk	clubshell	*pleurobema clava*	Endangered
Mollusk	northern riffleshell	*epioblasma torulosa rangiana*	Endangered
Mollusk	sheepnose	*plethobasis cyphyus*	Candidate
Mollusk	rayed-bean	*villosa fabalis*	Candidate
Plant	northeastern bulrush	*scirpus ancistrochaetus*	Endangered
Plant	small whorled pogonia	*isotria medeoloides*	Threatened

Table D-2. Non-Federal Species with Viability Concerns

Broad Habitat	Taxa	Common Name	Scientific Name
Mid to Late Structural Habitat	**Amphibian**	four-toed salamander	*hemidactylium scutatum*
		Jefferson salamander	*ambystoma jeffersonianum*
Mid to Late Structural Habitat	**Bird**	black-throated blue warbler	*dendroica caerulescens*
		great blue heron	*ardea herodias*
		northern goshawk	*accipiter gentilis*
		raven	*corvus corax*
		red-shouldered hawk	*buteo lineatus*
		Swainson's thrush	*catharus ustulatus*
		yellow-bellied flycatcher	*empidonax flaviventris*
Mid to Late Structural Habitat	**Mammal**	northern flying squirrel	*glaucomys sabrinus macrotic*
Mid to Late Structural Habitat	**Plant**	American ginseng	*panax quinquefolius*
		American yew	*taxus canadensis*
		checkered rattlesnake plantain	*goodyera tesselata*
		Hooker's orchid	*platanthera hookeri*
		kidney-leaved twayblade	*listera smallii*
		mountain starwort	*stellaria borealis*
		mountain wood fern	*dryopteris campyloptera*
Mid to Late Structural Habitat	**Reptile**	timber rattlesnake	*crotalus horridus*
Mid to Late Structural Oak Habitat	**Bird**	cerulean warbler	*dendroica cerulea*
Mid to Late Structural Oak Habitat	**Reptile**	coal skink	*eumeces anthracinus*

Broad Habitat	Taxa	Common Name	Scientific Name
Aquatic (River/Impoundment)	Aquatic Insect	green-faced clubtail	*gomphus viridifrons*
		harpoon clubtail	*gomphus descriptus*
		Maine snaketail	*ophiogomphus mainensis*
		midland clubtail	*gomphus fraternus*
		mustached clubtail	*gomphus adelphus*
		ocellated darner	*boyeria grafiana*
		rapids clubtail	*gomphus quadricolor*
		resolute damsel	*coenagrion resolutum*
		ski-tailed emerald	*somatochlora elongata*
		Uhler's sundragon	*helocordulia uhleri*
		zebra clubtail	*stylurus scudderi*
Aquatic (River/Impoundment)	Bird	osprey	*pandion haliaetus*
Aquatic (River/Impoundment)	Fish	bluebreast darter	*etheostoma camurum*
		burbot	*lota lota*
		channel darter	*percina copelandi*
		gilt darter	*percina evides*
		gravel chub	*erimystax punctata*
		longhead darter	*percina macrocephala*
		mountain brook lamprey	*ichthyomyzon greeleyi*
		mountain madtom	*noturus eleutherus*
		northern madtom	*noturus stigmosus*
		spotted darter	*etheostoma maculatum*
		tippecanoe darter	*etheostoma tippecanoe*
Aquatic (River/Impoundment)	Mollusk	creek heelsplitter	*lasmigona compressa*
		long-solid	*fusconaia subrotundra*
		rabbitsfoot	*quadrula cylindrica*
		rainbow	*villosa iris*
		round pigtoe	*pleurobema sintoxia*
		snuffbox	*epioblasma triquetra*
		threeridge	*amblema plicata*
		wabash pigtoe	*fusconaia flava*
		white heelsplitter	*lasmigona complanata*

Broad Habitat	Taxa	Common Name	Scientific Name
Riparian/Wetland	**Plant**	bartram shadbush	*amelanchier bartramiana*
		boreal bog sedge	*carex magellanica ssp. Irrigua*
		bristly black currant	*ribes lacustre*
		butternut	*juglans cinerea*
		creeping snowberry	*gaultheria hispidula*
		red currant	*ribes triste*
		rough cotton-grass	*eriophorum tenellum*
		stalked bulrush	*scirpus pedicellatus*
		sweet-scented Indian plantain	*hasteola suaveolens*
		threadrush	*juncus filiformis*
		white trout-lily	*erythronium albidum*
		Wiegand's sedge	*carex wiegandii*
Riparian/Wetland	**Reptile**	eastern box turtle	*terrapene carolina*
		wood turtle	*glyptemys insculpta*
Grassland (non-forest xeric or hydric conditions)/ Seedling Sapling	**Bird**	golden winged warbler	*vermivora chrysoptera*
		Henslow's sparrow	*ammodramus henslowii*
Grassland (non-forest xeric or hydric conditions)/ Seedling Sapling	**Plant**	American fever-few	*parthenium integrifolium*
		queen-of-the-prairie	*filipendula rubra*

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