United States Department of Agriculture **Forest Service** **Allegheny National Forest Supervisor's Office**

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File Code: 1920
Date: May 7, 2004

Dear Friends of the Allegheny National Forest:

Enclosed is a copy of the Allegheny National Forest Monitoring and Evaluation Report for FY 2001. This annual report provides you with the status of the Forest's progress toward meeting the goals and objectives outlined in the Allegheny National Forest's 1986 Land and Resource Management Plan.

This Monitoring and Evaluation Report can also be found on our website at http://www.fs.fed.us/r9/allegheny/publications/monitoring_reports.

If you have any questions or comments concerning the Monitoring and Evaluation Report, please contact report editor Linda Houston at (814) 723-5150. Your comments will be appreciated.

Sincerely,

/s/ Kevin B. Elliott
KEVIN B. ELLIOTT
Forest Supervisor

ALLEGHENY NATIONAL FOREST
MONITORING AND EVALUATION REPORT
FOR
FISCAL YEAR 2001

ABSTRACT

This report evaluates the results of monitoring the implementation of the Allegheny National Forest Land and Resource Management Plan for Fiscal Year (FY) 2001. It is the fifteenth Monitoring and Evaluation Report since the Forest Plan was approved in 1986.

The objectives of monitoring and evaluating Forest Plan implementation are to determine how well management standards and guidelines have been applied, and to evaluate the effectiveness of management direction. This report displays monitored items by resource program. It also discusses the effects and effectiveness of Forest Plan management direction by resource program.

APPROVAL

I have reviewed and approve the Forest Plan Monitoring and Evaluation Report for FY 2001, which was prepared by the Allegheny National Forest Interdisciplinary Monitoring Team. I am satisfied that monitoring and evaluation efforts meet the intent of both the Forest Plan (Chapter 5 and Appendix B) and the National Forest Management Act planning regulations (36 CFR 219).

/s/ Kevin B. Elliott

KEVIN B. ELLIOTT
Forest Supervisor

Date: May 6, 2004

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FOREST PLAN PROGRESS

2001 ACTIVITIES, BY MANAGEMENT OBJECTIVE

During the Forest planning process, issues raised by the public were grouped to form the management objectives. Forest Plan direction for the future was developed to resolve the management objectives. A summary of the actions that were taken in Fiscal Year 2001 (October 1, 2000 - September 30, 2001) to address each objective follows.

Providing Developed Recreation

- Major facility construction and re-construction completed at Willow Bay during 2001 except for the water lines and planting plan, which will be completed in 2002 and 2003 respectively.
- Rehabilitation of Morrison Run and Pine Grove boat access campgrounds. Camping fees under the Fee Demo program will be initiated in FY02.
- Re-paving of the Wolf Run Marina parking.
- Completed NEPA analysis for the replacement of restrooms at Beaver Meadows, Jakes Rocks, Twin Lakes and two campground loops Tracy Ridge Recreation Areas.
- Completed construction of new accessible vault toilet facilities at Beaver Meadows, Minister Creek, and Twin Lakes.
- A playground was constructed at Hearts Content Campground in response to customer comments.
- Paved pathways and repaired stone wall at Loleta Recreation Area.
- Replaced roof on Kinzua Beach bathhouse.
- Replaced major roof support beams were in the lower group area pavilion at Twin Lakes Recreation Area.
- Installed interpretive sign for CCC Camp 7 in the Kane area.
- Operated and maintained a developed site capacity of 3,627,545 PAOT Days in 2001 (99.8% of available capacity). All sites were open for the normal managed season.
- Completed 100% of the visitor surveys required for the National Visitor Use Monitoring program conducted on the Allegheny NF in 2001.
- Removed abandoned buildings at the Indian Valley Campground site, which is currently being used as a dispersed campsite by boaters along the Allegheny National Wild and Scenic River.
- Initiated a forest wide Interpretive Plan and Recreation Strategy in response to the National Recreation Strategy and draft Region 9 Recreation Blueprint. Held an agency meeting in February and a public meeting in June to collect comments and ideas.
- Use for dispersed recreation in the general forest area, will not be re-calculated until 2002. Changes in use will be an estimation based on observations, car counts, and personal interviews.

- Developed recreation use in 2001 was approximately 2% below that of the 2000 season. This was partially due to the cold wet spring weather. This decline in campground use was somewhat less than that reported by other recreation and tourism providers in the ANF area.

Providing Dispersed Recreation

- Employed a summer trail crew for maintenance and rehabilitation of the pedestrian trail system. With the help of volunteers maintained over 79% (590.7 out of 746 miles) of the hiking trail miles on the Forest. Hosted the North Country Trail Triad Meeting.

- Rehabilitated 2 miles of the Marienville Bike Trail by contract. This work consisted of improving drainage with stone surfacing and culvert pipes.

- Reconstructed 4.5 miles of the Marienville and Rocky Gap Bike Trails.

- Constructed 5.4 miles of new trail to relocate substandard sections of the Marienville Bike Trail.

- The ANF produced and distributed the Middle Allegheny River Water Trail brochure in partnership with the Pennsylvania Fish and Boat Commission. The multicolor tri-fold brochure is designed to provide much needed and desired river information (access points, mileages, and services) to recreational river users.

- Offered ghost town tours of the town of Arroyo in cooperation with the Elk County Historical Society.

- Dispersed recreation was estimated to be approximately 3% less than the 2000 level due the cool spring and early summer, and lack of snowfall for winter sport activities. Mild temperatures continuing through October and November provided an extended season of peak fall foliage colors. A snow free fall and winter provided open road access for a successful fall/winter hunting season. Summer motorized trail use continues to have the most significant annual increase of all recreational activities on the forest.

Timber Management

The Forest Plan set the long-term sustained yield and the allowable sale quantity for each decade at 94.5 million board feet (MMBF) per year. The Forest sold (awarded) 13.7 MMBF of timber in 2001, with a value of $18.8 million. A total of 836.7 MMBF have been sold (awarded) since 1986, a 52.3 MMBF annual average.

The Forest Plan identified management practices that directly help establish tree seedlings: site preparation for natural regeneration, planting or seeding, herbicide control of competing understory vegetation, fencing, and aerial fertilization. Table 1 displays the activity amounts estimated in the Forest Plan for Decades 1 and 2, and the amounts accomplished since 1986.

TABLE 1. ACRES OF REFORESTATION ACTIVITIES

Type of Activity	Forest Plan 20-year Estimate	2001 Amount	Ave. Annual Amount since 1986	Total Accomplishments 86-01	% of Forest Plan Estimate
Site Prep	**36,000**	**983**	**1,201**	**19,220**	**53**
Fertilization	**39,000**	**777**	**882**	**14,119**	**36**
Fencing	**8,000**	**798**	**851**	**13,617**	**170**
Herbicide	**38,000**	**122**[1]	**1,046**	**16,728**[2]	**44**
Planting/Seeding	**4,000**	**153**	**155**	**2,475**	**62**

1 - Includes re-spray Acres
2 - Excludes re-spray Acres

Since 1986, the following harvesting activities have been completed. They are designed to move the Forest toward the desired future vegetative condition as specified in the Forest Plan.

TABLE 2. ACRES OF HARVESTING ACTIVITIES IN AWARDED TIMBER SALES

Type of Activity	Forest Plan 20-year Estimate	2001 Amount	Ave. Annual Amount since 1986	Total Accomplishments 86-00	% of Forest Plan Estimate
Final Harvest*	**67,000**	**591**	**1,592**	**25,465**	**38**
Thinning	**172,000**	**627**	**2,874**	**45,978**	**27**
Selection	**6,000**	**0**	**388**	**6,206**	**103**
Shelterwood Seed/Prep	**60,300**	**416**	**1,030**	**16,478**	**27**

**** includes clearcutting and shelterwood removal***

Wildlife and Fish Management

- Hunting use increased slightly (3%) from FY '01, and fishing use decreased slightly (-0.7%) due partially to low stream conditions, but also following a downward trend as identified by the Pennsylvania Fish and Boat Commission.

- Deer population densities decreased in 3 of the 4 counties in 2001.

- Black bear harvest levels increased in 2000 (Fiscal year 2001). A total of 384 bears were harvested in the four-county area in which the ANF is located. It appears that this area can sustain a harvest of approximately 250 to 400 bears annually.

- Surveys for the Federally listed endangered Indiana bat were conducted on 34 sites during 2001. No Indiana bats were caught in mist nets. Over a 4-year period, 159 sites have been surveyed for bats. Indiana bats have been caught at one site and possibly detected at 16 of 103 sites.

- Adult walleye and small mouth bass populations were surveyed in the Allegheny Reservoir in the spring. Walleye numbers decreased for the fourth year in a row. The smallmouth bass population decreased from its all time high in 2000, to a five-year low.

- Yearly monitoring for brook trout on four streams continued in 2001. Brook trout population estimates increased in all four streams surveyed; however, biomass estimates decreased in two of the four streams, indicating a dominance of younger, smaller trout in the streams where biomass decreased. Water quality results meet the State's high quality cold-water standards.

- In an attempt to minimize the potential for introducing zebra mussels into the Allegheny Reservoir, boats and other watercraft were screened for the presence of zebra mussels before launching into the reservoir. The purpose was to protect two endangered freshwater mussels in the Allegheny River downstream of the reservoir.

Soil and Water and Water

- Water quality was measured on nine streams in conjunction with Pennsylvania Fish and Boat Commission fisheries surveys. All streams met state water quality standards.

- A summary of the power line ROW herbicide treatments was completed by ECI……

Private Oil and Gas

- There were 315 new wells drilled on Federal lands in 2001.

- One USA-ownership well was plugged. The DEP and private owners plugged 103 wells.

- Overall, total samples (for 34 criteria) averaged 9.18, above the standard of 8.0. Better documentation of project activities is necessary. An emphasis on Spill Plan development is also needed.

DESIRED FUTURE CONDITION

The Forest's definition of Desired Future Condition (DFC) relates to the type, condition, location, and amount of various facilities, vegetative conditions, and other aspects of the ecosystem that will be created long term (150 years or at "steady state") by implementing specific Management Area Direction. Projects that are implemented should be integrated with other existing resource opportunities in the area to move us toward the DFC.

The following information measures the Allegheny's overall progress toward meeting the DFC across all management areas. The assumption is that there is a relationship between movement toward the DFC and the production of various goods and services estimated in the Forest Plan.

The Allegheny National Forest is now in the second decade of Forest Plan implementation. Progress towards reaching the DFC at the end of this decade is measured as the sum of all goods, services, and habitat treatments estimated for both Decades 1 and 2. The amounts given in the Forest Plan for Decade 2 were based on accomplishing 100 percent of the Decade 1 goals. We know from previous monitoring that this is not the case. Therefore, in the Table 3, amounts for Decade 2 have been recalculated to reflect Decade 1 accomplishments.

The amounts shown in the "Balance Decade 2 Forest Plan" column would need to be accomplished in the second decade to fully implement the Forest Plan for Decades 1 and 2. Negative numbers indicate that we have already over-accomplished the Forest Plan estimate for both decades. The information in Table 3 will be used for various comparisons in this Monitoring Report, and in the Forest's 20-year Implementation Spreadsheet (Appendix A).

TABLE 3. REVISED DECADE 2 FOREST PLAN PROJECTIONS

Output/Activity	Unit of Measure	Decade 1 Forest Plan	Decade 2 Forest Plan	Sum of Decades 1 & 2 Forest Plan	Decade 1 (FY 86-95) Accomp.	Balance Decade 2 Forest Plan
DEVELOPED RECREATION						
...Semi-primitive Motorized	**MRVD**	**370**	**380**	**750**	**583.1**	**166.9**
...Roaded Natural	**MRVD**	**4,300**	**4,710**	**9,010**	**4,553.2**	**4,456.8**
...Rural	**MRVD**	**4,190**	**4,320**	**8,510**	**4,966.9**	**3,543.1**
DISPERSED RECREATION						
...Semi-primitive/Non-motorized	**MRVD**	**300**	**420**	**720**	**335.8**	**384.2**
...Semi-primitive/Motorized	**MRVD**	**3,680**	**3,720**	**7,400**	**5,175.7**	**2,224.3**
...Roaded Natural	**MRVD**	**4,990**	**5,250**	**10,240**	**8,194.1**	**2,045.9**
WILDERNESS						
...Semi-primitive/Non-motorized	**MRVD**	**10**	**16**	**26**	**23.0**	**1.0**
TRAIL CONSTRUCTION						
...Pedestrian	**Miles**	**48**	**41**	**89**	**39.3**	**49.7**
...Motorized-Winter	**Miles**	**11**	**11**	**22**	**50.5**	**-28.5**
...Motorized-Summer	**Miles**	**145**	**145**	**290**	**70.0**	**220.0**
TIMBER MANAGEMENT						
...Hardwood Sawtimber	**MMBF**	**383**	**460**	**843**	**350.1**	**492.9**
...Hardwood Pulpwood	**MMBF**	**562**	**480**	**1,042**	**333.1**	**708.9**
...Hardwood Firewood	**MMBF**	**0**	**0**	**0**	**17.1**	**-17.1**
...Total Sell	**MMBF**	**945**	**940**	**1,885**	**700.3**	**1,184.7**
...Clearcut	**Acres**	**3,300**	**3,400**	**6,700**	**6,925.0**	**-225**
...Shelterwood Seed/prep	**Acres**	**29,700**	**30,600**	**60,300**	**12,930.0**	**47,370**
...Shelterwood removal	**Acres**	**29,700**	**30,600**	**60,300**	**12,971.0**	**47,329**
...Thinning	**Acres**	**94,000**	**78,000**	**172,000**	**40,653.0**	**131,347**
...Selection Cut	**Acres**	**6,000**	**0**	**6,000**	**5,573.0**	**427**
...Timber Stand Improvement	**Acres**	**8,000**	**6,000**	**14,000**	**855.0**	**13,145**
...Herbicide	**Acres**	**20,000**	**18,000**	**38,000**	**11,240.0**	**26,760**
...Fertilization	**Acres**	**25,000**	**14,000**	**39,000**	**9,571.0**	**29,429**
...Fencing	**Acres**	**4,000**	**4,000**	**8,000**	**9,451.0**	**-1,451**
...Planting	**Acres**	**2,000**	**2,000**	**4,000**	**1,096.0**	**2,904**
...Site Prep	**Acres**	**18,000**	**18,000**	**36,000**	**11,887.0**	**24,113**
...Release	**Acres**	**0**	**0**	**0**	**169.0**	**-169**
ROADS						
...Construction	**Miles**	**239**	**134**	**373**	**157.3**	**215.7**
...Reconstruction - Betterment	**Miles**	**97**	**55**	**152**	**116.9**	**35.1**
...Reconstruction - Restoration	**Miles**	**0**	**0**	**0**	**426.1**	**-426.1**
...Temporary	**Miles**	**17**	**17**	**34**	**12.7**	**21.3**
WILDLIFE						
...Hunting Use	**MWUF**	**1,970**	**2,200**	**4,170**	**2,302.2**	**1,867.8**
...Fishing Use	**MWUF**	**1,510**	**1,720**	**3,230**	**1,663.1**	**1,566.9**
...Fish Habitat Improvement	**Acres**	**N/A**	**N/A**	**1**	**149.0**	**-148**
...Wildlife Habitat Improvement	**Acres**	**23,720**	**27,580**	**51,300**	**22,273**	**29,027**
...Wildlife Habitat Improvement	**Structure**	**60**	**110**	**170**	**2,256.0**	**-2,086**
SOIL/WATER/AIR						
...Water/Soil Improvement	**Acres**	**N/A**	**N/A**	**0**	**7,765.5**	**-7,765.5**

The Forest's 20-year Implementation Spreadsheet (Appendix A) compares the total number of goods, services, and habitat treatments estimated in the Forest Plan for Decades 1 and 2 with the actual accomplishments to date. If the sum of projections for Decades 1 and 2 were spread equally over the 20-year period, the sixteenth year (2001) would show 75 percent accomplished. The following data on percent actually accomplished indicates resources or activities that have been over or under emphasized at this point in the 20-year planning period. These figures are used as a relative indicator of how integrated our program has been and the rate at which we are moving toward the Forest's overall DFC.

CUMULATIVE FOREST PLAN ACCOMPLISHMENTS
THROUGH FY 2001 (PERCENT OF 1986 - 2005 ESTIMATES)

Developed Recreation (RVD)[1]	**Semi-primitive Motorized Use**	**NA[2]**
	Roaded Natural Use	**NA**
	Rural Use	**NA**
Dispersed Recreation (RVD)	**Semi-primitive Non-motorized Use**	**NA**
	Semi-primitive Motorized Use	**NA**
	Roaded Natural Use	**NA**
Wilderness (RVD)[3]	**Semi-primitive Non-motorized Use**	**NA**
Trail Construction[4]	**Pedestrian Trail (miles)**	**64.2%**
	Motorized Winter Trail (miles)	**341.8%**
	Motorized Summer Trail (miles)	**28.7%**
Timber Management	**Sell Volume (MBF)**	**44.4%**
	(Sawtimber)	**50.7%**
	(Pulpwood)	**37.1%**
	Final Harvest cuts (acres)	**38.0%**
	(Clearcuts)	**118.2%**
	(Shelterwood Removals)	**29.1%**
	Shelterwood Seed/prep (acres)	**27.3%**
	Thinning (acres)	**26.7%**
	Selection Cut (acres)	**103.4%**
	Herbicide Use (acres)	**44.0%**
	Fencing for animal control (acres)	**170.2%**
	Aerial Fertilization (acres)	**36.2%**
	Site Prep (acres)	**53.4%**
Roads	**Construction (miles)**	**44.1%**
	Reconstruction - betterment (miles)	**80.1%**
Wildlife/Fish	**Wildlife Habitat Improvement (acres)**	**61.5%**
	Wildlife Habitat Improvement (structures)	**1,525.3%**

[1] Forest Plan Table 4-1, page 4-4
[2] Current accomplishment is no longer being tracked in MRVDs due to change in monitoring protocols that occurred in 2001. New protocols to track recreation use will be displayed in the 2002 Monitoring and Evaluation Report.
[3] ANF LRMP Table 4-15, page 4-98
[4] Based on Avg. Annual Amount Projected (miles), see ANF LRMP Table C-1, page C-1

EMERGING ISSUES AND PUBLIC CONCERNS

BIOLOGICAL ISSUES

Deer Herd Management: During the development of the Forest Plan, the overpopulation of deer on the Forest was well recognized by both the Forest Service and the Pennsylvania Game Commission. The Game Commission was increasing antlerless license allocations at a steady rate. Research had revealed that 87 percent of all clearcuts that had failed to regenerate into a new forest stand could be directly attributed to excessive deer browsing (Marquis and Brenneman 1981). Game Commission biologists and other researchers had documented the impacts of high deer populations on turkeys and other wildlife species (Wunz and Hassinger personal communications, Dorio and Marquis 1986, Harrison 1984).

The Pennsylvania Game Commission has set deer density goals, but antlerless licenses have not been allocated to move the population toward the goal. Consequently, the sustainability of many forest resources is at an increased risk.

This led to an agreement between the Game Commission and the Forest Service. The Commission agreed to continue to bring the deer herd population down, striving to reach a goal of about 20 deer per square mile, Forest-wide. The Forest Service agreed to provide more early succession vegetation, mainly through timber harvest. By increasing the food supply through the creation of early successional vegetation, and by reducing the population through increased antlerless allocations, a balance should be reached where deer are in equilibrium with their habitat.

In 2000, the Pennsylvania Game Commission reorganized their deer management staff and placed more emphasis on improving hunter success (instead of increasing antlerless permits) and increasing public understanding of deer management. In 2001, hunting seasons were changed to a 2-week concurrent buck and doe season. Despite unseasonably warm weather, harvest levels remained near the 2000 level (while adjacent states experienced a decrease in harvest).

In McKean County, The Kinzua Quality Deer Cooperative (KQDC) expanded to include more than 9,000 acres of land managed by Commonwealth Forestry. The total acreage within the cooperative is now 73,250 acres. The deer density increased from 30 deer per square mile of forested land during the winter of 1998-99 to 35 deer per square mile in 1999-2000. In 2000-2001 the density decreased to 30 deer per square mile of forested land. Pellet group transects were conducted to estimate deer densities, and check stations were set up to estimate harvest.

The intent of managing habitat on the National Forest is to provide habitat to "maintain viable populations of native and desirable non-native species" (from National Forest Management Act regulations). This requires managing for a variety of habitats, managing for unique habitats, and managing for specific features that may be needed by a species. Habitat for forest interior species, as well as forest edge species must be provided in a balance that maintains ecological integrity. We believe that the Forest Plan provides sound guidance for managing all native wildlife species on the Forest, including deer.

Endangered Species: During FY '01, the partnership with Dr. Mike Gannon from Pennsylvania State University to survey the ANF for bats continued plus a contract was issued to Environmental Solutions and Innovations (ESI) for additional bat survey work. Dr. Gannon mist netted 20 sites while ESI competed surveys on 14 sites bringing the total number of sites surveyed on the ANF between 1998 and 2001 to 159 survey sites. Only one Indiana bat has been captured during surveys at these 159 sites. However, during a separate telemetry study an Indiana bat was caught and fitted with a radio just north of the Bradford Ranger District on private lands.

Forest Health: A variety of insects, diseases, droughts, and local site limitations are affecting tree health locally. Pear thrips, forest tent caterpillars, gypsy moth, cherry scallop shell moth, fall cankerworm, elm spanworm, linden looper, beech bark disease complex, maple decline, and ash dieback are of particular concern. Damage from most

of these was observed between 1993 and 1995, and a substantial number of trees in the eastern part of the ANF are showing symptoms of decline from repeated impacts by these species. Severe droughts occurred in 1988, 1991, and 1995. Substantial tree mortality developed suddenly in the summer of 1994 (primarily sugar maple, but white ash, beech, birch and red maple also suffered in lesser amounts). Some tree decline has continued to develop since then; trees with less heavily affected crowns have demonstrated some recovery. Rainfall was abundant during the 1996 growing season, but below normal in 1997, 1998, and 1999. In Warren County, rainfall showed a deficit of almost 4.7 inches between April 1, 1997, and November 9, 1997; a deficit of 2.51 inches for the April 1 to November 1, 1998 period; and a deficit of 7.7 inches between April 1 and November 1, 1999. Conditions improved in 2000; between April 1 and October 15, 2000, Warren County rainfall was 2.75 inches above normal. However, during the 2001 growing season, precipitation returned to below normal conditions; between April 1 and October 28, Warren County rainfall was 2.44 inches below normal, Bradford was 10.22 inches below normal, and Kane was 6.84 inches below normal. Additional tree recovery may occur if drought and defoliation are minimal over the next few years. It is quite probable that frequent rainfall deficits during the past 14 years have played a substantial role in observed tree decline.

In 1993, close to 261,000 acres of National Forest land were moderately to severely defoliated by elm spanworm. This marked the third year of such defoliation on 7,500 acres, and the second year on 51,800 acres. Very little elm spanworm defoliation occurred in 1994, but close to 18,000 acres were defoliated by forest tent caterpillar, cherry scallop shell moth defoliated approximately 54,000 acres, and slightly more than 1,500 acres were affected by pine budworm. In 1995, cherry scallop shell moth defoliated over 205,000 acres, with close to 124,000 acres classified as severe. Since 1992, close to 700 acres have been defoliated three times by this insect, 36,600 acres have been defoliated twice, and 238,000 acres have been defoliated once. Most of the same areas have also been defoliated at least once since 1991 by either elm spanworm or forest tent caterpillar. In 1996, cherry scallop shell moths defoliated close to 11,800 acres, with 70 percent of that defoliation classified as moderate to severe. Most of those areas had already been defoliated at least once since 1993 by cherry scallop shell moth. In 1997, the only detectable ANF defoliation was 1,350 acres in the oak type from oak leaf tier. In 1998, 2000, and 2001, there was no detectable defoliation on the ANF, and in 1999, only a small area of light gypsy moth defoliation was detected.

Noticeable tree mortality developed in 1994 on about 89,600 acres from the combined effects of a variety of factors, including repeated defoliation and two recent (1988 and 1991) droughts. Spray treatment (with Bacillus thuringiensis, or B.t.) completed in 1995 limited additional defoliation stress on the surviving trees, but another drought that year did place trees under additional stress. Decline and mortality continued to develop in many areas, but some areas demonstrated slight recovery. The total impact these multiple stresses have had, and will have in years to come, remains largely unknown. It depends on environmental conditions and additional stresses that may develop. If natural events over the next few years place additional stress on the trees, permanent effects on wildlife habitat, vegetation diversity, recreation, and timber harvest volumes could be severe.

Forest personnel are working on additional analyses to determine management alternatives for many areas having the heaviest mortality. Since mid-1995, eight environmental assessments, which have looked at site-specific tree mortality and ecosystem sustainability on about 81,232 acres, have been completed, resulting in over 13,500 acres of treatment. Reforestation of affected sites has been a key issue addressed. The Mortality II Project (one of the eight EAs mentioned above) included over 5,350 acres of treatment. In October 1997, the Federal District Court in Pittsburgh (PA) enjoined the ANF from implementing the Mortality II Project. The Court ordered ANF personnel to prepare an environmental impact statement (EIS) and to revisit certain parts of the analysis. Between 1998 and 2000, ANF personnel prepared the East Side EIS, a project designed in part, to analyze some of the activities originally included in the Mortality II EA. Analysis efforts slowed down for part of FY 1999 and 2000 pending the outcome of consultation with the U.S. Fish and Wildlife Service regarding threatened and endangered species management. The East Side Project FEIS was completed in December 2000, but it has been under appeal or litigation since then. Work continues on developing a long-term strategy to address these forest health questions. Between 1998 and 2001, ANF personnel, cooperating with USDA Forest Service Forest Health Monitoring and Forest Health Protection personnel completed data collection on a network of permanent plots to

evaluate a number of indicators of Forest Health. A formal analysis of the data collected will be completed in 2003.

Tree Seedling Development in Upland Hardwood and Northern Hardwood Forest Types: Data collected in 1992 in Management Area 3 indicates that tree seedlings of a variety of species are not becoming established beneath the overstory tree canopy of these forest types. Selective deer browsing, dense interfering plants, and erratic seed production all play a role in limiting seedling development. If this situation continues, forest structure and tree species composition will be affected. Over the long term, it raises serious questions about tree composition and sustainability in Management Areas where the Forest Plan direction permits little human intervention to control forest and ground vegetation structure, composition, and development. Trees that die will not be replaced by similar species or, in many cases, by any species of vigorously growing tree seedlings that are capable of growing up to replace them. In 1996, Forest personnel initiated an adaptive management approach designed to help answer questions about how to reforest these kinds of areas. The study may take up to 10 years to complete. Work continued in 2001, though progress continued to be slow due to a continued expansion of work related to appeals, litigation, and threatened and endangered species management (see further discussion in the research, administrative studies, and adaptive management subsection of this document).

IMPLEMENTATION ISSUE

Degree of Ground Disturbance in Timber Harvest Areas: The ANF Fiscal Year 1999 Monitoring and Evaluation Report includes an Implementation Issue pertaining to the degree of ground disturbance in timber harvest areas (ANF FY 1999 Monitoring and Evaluation Report, p. 9). Since 1990, monitoring of ground disturbance within harvest units has occurred to determine if timber harvest activities comply with Forest Plan standard and guidelines (S&Gs). Within individual monitoring years, the Forest Plan standard and guideline of 15% soils disturbance has been exceeded five times. The average disturbance across all years where samples were taken is less than 15%. The purpose of the analysis is to provide a re-evaluation of existing data and to recommend change, if needed.

Background

Forest Plan Standards and Guidelines

Existing Forest Plan direction related to soils disturbance with harvest areas includes:

- Forest Plan p. 4-21 – Soil Group I – surface area disturbed by logging operations should be less than 15 percent of the sale area.
- Forest Plan p. 4-22 – Soil Group II – surface disturbance by logging operations should be less than 15 percent of the sale area. Consider winching to avoid surface damage on wetter areas.

There is no explicit limit on the degree of disturbance permitted on Soil Group III, however similar concerns exist regarding the degree of disturbance within this group. Field monitoring of disturbance within Group III soils has occurred. Evaluation of data has assumed the 15% disturbance threshold also applies to this soil group.

The Forest Plan does not provide a description for disturbance, does not define how to measure disturbance, nor does it make any distinction between moderate and severe disturbance. The plan also does not define what is intended by 'sale area.' Taken literally, the sale area usually encompasses a large area that surrounds and includes all of the harvest units included in a timber sale. Typically, the harvest units might make up only 25-30% of the sale area.

Forest Plan Monitoring and Evaluation Requirements

The purpose of monitoring and evaluation is to determine progress in meeting Forest Plan direction. Monitoring and evaluation are separate, sequential steps. Monitoring and evaluation provides information to determine whether Forest Service programs are meeting the Forest Plan direction, which includes goals and objectives, management prescriptions, and standards and guidelines. Any change needed in Forest Plan Management direction is determined through this process. (Forest Plan, p. 5-3, paragraph 1).

The Forest Plan requires that evaluation of monitoring results be made so that appropriate recommendations can be made. The plan provides 7 categories of evaluation results and includes recommendations for follow-up actions (Forest Plan, p. 5-6).

Monitoring and Evaluation Protocol

The sampling strategy used on the ANF was developed following procedures outlined in 'Guidelines for Sampling Some Physical Conditions of Surface Soils' (USDA-FS 1981). Annually, recently harvested stands are randomly selected for collection of soil monitoring data. The results have been reported in annual monitoring and evaluation reports since 1990.

The guidelines state that the populations from which samples are to be taken is called the activity area, and that the activity area would usually be considered to be a unit of a timber sale (or other designated area for which disturbance is measured (USDA-FS 1981, p. 3). Based upon this, the determination was made to measure and evaluate soil disturbance within harvest units, rather than at the sale area level. This is consistent with Soil Management Handbook Direction included in the Washington Office Amendment (FSH 2509.18, WO Amendment 1509.18-91-1, effective 9/3/01).

The results of monitoring are reported in two ways – the degree of disturbance for sites collected within the year when the monitoring report is issued and the cumulative average disturbance calculated by combining results for all units, for all years. The value that is used as a measure of compliance with the Forest Plan standard and guideline is the cumulative average disturbance calculated by combining results for all units, for all years because the total number of samples taken within individual years is relatively small. More meaningful results can be achieved by increasing the size of the population as each year's monitoring occurs.

Analysis

Previous Analysis Methods

Stand level estimates of disturbance were calculated by averaging the amount of disturbance found along transects within the stand. Average annual level of disturbance was calculated by averaging the degree of disturbance found across all transects. Limitations to this method of analysis are that it does not account for differences in sample intensity or differences in stand size.

Current Analysis Methods

In the current analysis, weighted averages are used to calculated average annual disturbance levels. Field data will be evaluated to distinguish between soil groups, between undisturbed, moderately disturbed, and severely impacted areas, and between methods of harvest.

Results

Table 4 is provided to show the differences in disturbance as reported in previous monitoring years with the disturbance as calculated using current analysis methods. As can be seen from the data, there are minor differences in the amount of total disturbance reported in 1992, 1993, 1995, 1996, and 1997. The number of years where the 15% threshold is exceeded does not change.

TABLE 4. COMPARISON OF RESULTS BETWEEN ANALYSIS METHODS

			Annual Monitoring Report Results				New Analysis Results			
Fiscal Year	**Acres Sampled**	**# Stands Sampled**	**% Undist.**	**% Mod. Dist**	**% Severe Dist.**	**% Total Dist.**	**% Undist.**	**% Mod. Dist**	**% Severe Dist.**	**% Total Dist.**
1990	111	5	84.3	7.9	7.8	15.7	84.3	9.1	6.6	15.7
1991	29	1	88.9	6.3	4.9	11.1	88.9	6.3	4.9	11.1
1992	39	3	91.9	4.6	3.6	8.1	91.6	4.6	3.7	8.3
1993	83	4	91.7	3.8	4.5	8.3	92.9	3.1	4.0	7.1
1994	22	1	79.0	17.2	3.8	21.0	79.0	17.2	3.8	21.0
1995	45	4	83.7	4.7	11.6	16.3	84.2	4.7	11.0	15.7
1996	40	2	75.4	15.4	9.2	24.6	73.7	16.5	9.8	26.3
1997	48	4	90.8	6.3	2.9	9.2	89.4	6.5	4.1	10.6
1998	27	1	80.6	11.9	7.5	19.4	80.6	11.9	7.5	19.4
2000	33	2	N/A	N/A	N/A	N/A	97.1	0.8	2.1	2.9

There are differences in disturbance when the data is stratified by soil group (Table 5). Disturbance on Group 1 soils is 11.7%, on Group 2 soils is 14.4%, and on Group 3 soils is 18.3%. Most stands are composed of more than one kind of soil, with the majority of the stand belonging to one soil group. Group 1 or Group 2 soils comprise at least 60% of all sale units. Group 3 soils comprise the smallest soil component within all stands. Of the 27 stands that were sampled, Group 3 soils are found in only 11 stands and make up between 1% and 38% of the stands. Group 3 soils are absent from the remaining 16 stands. There are only four stands where Group 3 soils make up 15% or more of the surface area.

TABLE 5. PERCENT DISTURBANCE, ALL UNITS AND ALL YEARS

Sale & PU	FY	Acres	# Transects	Prescription	Type Equip	% Undisturbed	% Moderate Disturb.	% Severe Disturb.	% Total Disturb.	% SG 1	% SG 2	% SG 3
Pigeon Sal YB	1990	13	7	Salv. Removal	Wh Skidder	57.86	34.29	7.86	42.14	100	0	0
Pigeon Sal NF	1990	11	11	Salv. Thin	Wh Skidder	75.27	3.00	21.73	24.73	91	9	0
Baffled B PU 9	1990	33	19	Thin	Wh Skidder	91.47	6.16	2.37	8.53	68	21	11
Baffled B PU 13	1990	30	19	Thin	Wh Skidder	87.64	7.82	4.55	12.36	68	21	11
S3a Salvage	1990	24	24	Removal	Wh Skidder	88.92	3.88	7.21	11.08	92	8	0
Old Camp PU5	1991	29	32	Thin	Wh Skidder	88.90	6.30	4.90	11.10	0	85	15
Lady Wait 8	1992	10	7	Shelt. rem	Wh Skidder	90.10	5.57	4.29	9.90	14	86	0
Lady Wait 12	1992	6	4	Shelt. Seed	Wh Skidder	91.50	3.25	5.25	8.50	0	100	0
Klondike 5	1992	23	28	Thin	Wh Skidder	92.36	4.56	3.14	7.64	96	4	0
Loop Tr Sal	1993	9	7	Thin	Feller Bunch	83.00	9.29	7.71	17.00	71	29	0
Charlies Bee	1993	10	4	Clearcut	Wh Skidder	85.25	1.75	13.00	14.75	0	88	12
Raven cable	1993	32	8	Clearcut	Cable	97.50	1.63	0.88	2.50	100	0	0
Crazy Gray II 11	1993	32	23	Thin	Wh Skidder	93.39	3.22	3.39	6.61	30	57	13
Queen 8 & 9	1994	22	22	Clearcut	Pre-hauler	79.05	17.18	3.77	20.95	100	0	0
Zypher 4	1995	6	4	Thin	Wh Skidder	97.50	2.50	0.00	2.50	100	0	0
Thirty Some 8	1995	21	22	Thin	Wh Skidder	82.09	3.23	14.68	17.91	95	5	0
Coon Re-en 8	1995	2	2	Clearcut	Wh Skidder	84.50	13.50	2.00	15.50	0	100	0
Coon Re-en 9	1995	16	14	Thin	Wh Skidder	82.07	6.43	11.50	17.93	21	72	7
Hubert R Sal 1	1996	19	11	Clearcut	Wh Skidder	60.36	24.82	14.82	39.64	2	61	37
Bandit 13	1996	21	16	Thin	Wh Skidder	85.81	8.88	5.31	14.19	0	78	22
Greely Farm 1	1997	11	11	Overstory rem	Wh Skidder	96.18	3.73	0.09	3.82	100	0	0
Greely Farm 11	1997	4	4	Clearcut	Wh Skidder	91.25	6.50	2.25	8.75	0	96	4
US Rd 631	1997	8	4	Clearcut	Wh Skidder	73.50	8.25	18.25	26.50	14	86	0
Cherry Hill 10	1997	25	24	Thin	Wh Skidder	91.25	7.17	1.71	8.88	0	99	1
Goat Farm	1998	27	16	Thin	Wh Skidder	80.56	11.94	7.55	19.44	0	62	38
FS Rd 464-3	2000	16	8	Removal	Wh Skidder	99.50	0.13	0.38	0.50	100	0	0
FS Rd 464-7	2000	17	16	Removal	Wh Skidder	94.88	1.50	3.63	5.13	94	6	0
TOTAL		**477**	**367**									
Average % Disturbance - All Stands						**86.74**	**7.42**	**5.86**	**13.27**			
Average % Disturbance - Group 1 Soils, All Stands						**88.33**	**6.54**	**5.14**	**11.67**			
Average % Disturbance - Group 2 Soils, All Stands						**85.66**	**7.85**	**6.53**	**14.36**			
Average % Disturbance - Group 3 Soils, All Stands						**81.72**	**10.96**	**7.35**	**18.28**			

There are also differences in disturbance when the data is stratified by method of harvest (Table 6). Regardless of the soils group, disturbance is below 15% in all partial harvests (thinnings, shelterwood seed harvest). Disturbance varies greatly by soils group in the removal harvest areas, however. On average, soil disturbance exceeds 15% on Group 2 and 3 soils in removal harvest areas.

TABLE 6. AVERAGE PERCENT DISTURBANCE WITHIN PARTIAL AND REMOVAL HARVEST UNITS

Average Disturbance	Undisturbed	Moderate Disturbance	Severe Disturbance	Total Disturbance
ALL UNITS	**86.74**	**7.42**	**5.86**	**13.27**
Group 1 Soils	88.33	6.54	5.14	11.67
Group 2 Soils	85.66	7.85	6.53	14.36
Group 3 Soils	81.72	10.96	7.35	18.28
PARTIAL CUTS	**87.69**	**6.36**	**5.98**	**12.32**
Group 1 Soils	87.82	5.16	7.04	12.18
Group 2 Soils	87.91	6.98	5.16	12.12
Group 3 Soils	86.28	8.25	5.50	13.72
REMOVAL CUTS	**85.28**	**9.05**	**5.68**	**14.73**
Group 1 Soils	88.79	7.77	3.45	11.21
Group 2 Soils	78.77	10.50	10.72	21.23
Group 3 Soils	64.51	21.17	14.32	35.49

Conclusions: Total disturbance has averaged below 15% during the time period (1990 - 2000) when monitoring data were collected. This includes moderate, as well as severe disturbance. There are five monitoring years where average disturbance exceeds 15%. Average total disturbance is less than 15% for Group 1 and Group 2 soils, but exceeds 15% on Group 3 soils.

Considering only severe disturbance, on average, the Forest Plan S&G is met in all years. There is very little difference between soil groups. There are only 2 stands where severe disturbance exceeds 15%.

Looking more closely at the data, it can be seen that average total disturbance in removal harvests is slightly higher than in partial harvest units. In particular, average total disturbance in removal harvests on Group 2 and Group 3 soils exceeds Forest Plan S&Gs. Partial harvests, on the other hand, had less than 15% average total disturbance, regardless of the soil group.

While average total disturbance is below 15%, there are individual stands where total disturbance has exceeded 15%. There are ten stands where total disturbance exceeds the S&G. Severe disturbance exceeds 15% in only 2 of these stands.

Mitigation measures that are specified to protect soil quality usually pertain to the kind of equipment to be used, the season when logging may occur, the placement and restoration of skid trails and landings and specific direction to protect wetlands and riparian areas. While these mitigation measures contribute towards maintaining soil quality, the number of instances where S&Gs are exceeded serves as a warning that an adjustment in practices may be needed to prevent significant impairment to soil properties (FSH 2509.18, SO amendment 1509.18-91-1, effective 9/3/91).

Currently, National and Regional efforts are being made to better define issues related to maintaining soil quality and to identify measurable criteria for soil quality evaluation. The Eastern Region is moving towards soil quality standards that emphasize maintenance or restoration of inherent soil properties and function. Management

prescriptions will minimize (factoring in practical considerations such as desired conditions, site-specific management objectives, and economics) the cumulative amount of activity area impacted by severe soil disturbances. Moderate disturbances should be considered when considering cumulative impacts. Moderate and severe disturbances do interact with one-another and therefore it is important to keep each to a minimum. As an interim measure, until these initiatives are completed, the following actions are recommended:

By letter from the Forest Supervisor (Interim Guidelines for Soils, August 7, 2001, file code 2500/1920), the following interim measures to reduce soil disturbance in harvest units will apply:

Field personnel (stand layout crews, sale administrators, and timber markers) will be trained to examine soil conditions and determine Soils groups found. They will consult existing soils and ELT maps to determine the Soils Group or ELT for stands being considered for treatment. The ELT's of primary concern for Group 2 soils are PS2, PS2T, LM2 and CO2, and for Group 3 soils, DS3, FP3, and PS3. Soils typing will be verified during field examination.

For ***all stands typed and verified*** as Group 2 or Group 3 soils, the following shall apply:

1. On Group 2 soils, main skid trails (skid trails that are expected to have three or more passes with heavy equipment) should occupy less than 10% of the stand (i.e. on average there would be one 10 foot wide skid trail, 100 feet apart. Actual density and distance between skid trails will vary widely across the unit). Existing main skid trails should be used whenever possible to reduce additional impacts.
2. In stands where ELT mapping units DS3, FP3, PS3, or PS2T predominate, a soil scientist should be consulted for recommendations on management options.

All stands will be field checked to determine if inclusions of wet soils are found. ELT and topographical maps can be used to determine if inclusions are likely (look for broad, concave PS2 plateaus, PS2T, LM2, and CO2 ELT's). Site indicators such as low concave areas, heads-of-drainage ways, or wet-site indicator vegetation will be considered. For stands where ***inclusions of wet soils (Group 2 or Group 3)*** are found, the following shall apply:

1. All harvest equipment (including feller-bunchers) will be excluded from wet soils inclusions less than 1 acre.
2. Main skid trails should be kept out of wet soil inclusions greater than 1 acre whenever possible. The stand-level measures identified above will apply where skid trails must be located within wet soil inclusions.

Annual monitoring will continue. A more intensive monitoring effort will be initiated when Regional monitoring criteria are established. A more intensive sample that is designed to answer specific management questions will be designed and evaluated. This will likely occur by the end of FY 2003.

SOCIAL ISSUES

National Visitor Use Monitoring (NVUM): Prior to the mid-1990's, the Forest Service used the Recreation Information Management (RIM) system to store and analyze recreation use information. Forest managers found they lacked the resources to simultaneously manage recreation facilities and monitor visitor use following established protocols. Both Congress and the General Accounting Office questioned the credibility of recreation visitation estimates reported by the Forest Service in RIM reports and in 1996, the RIM monitoring protocols were no longer required to be used and the data subsequently abandoned. RIM reports were used to estimate recreation capacity and use for the current Forest Plan and for reporting implemented conditions in the ANF Monitoring and Evaluation Reports. Since the credibility of RIM reports has been questioned, the numbers used for estimating total recreation visits over the past decade, is at best an estimate.

In response to the need for accurate recreation use data, the Forest Service developed a permanent sampling

system known as the NVUM project, which has been implemented nationwide. NVUM provides statistical recreation use information at the forest, regional and national level. A four year cycle has been established for data collection. NVUM methodology and analysis is explained in the research paper entitled: *Forest Service National Visitor Use Monitoring Process: Research Method Documentation*; General Technical Report SRS-57, English, Kocis, Zarnoch, and Arnold; Southern Research Station; July 2002 (http://www.srs.fs.usda.gov/pubs/gtr/gtr_srs057.pdf).

The ANF participated in the NVUM project from October 2000 through September 2001. For more information on NVUM and to view national and regional reports visit the following web site: http://www.fs.fed.us/recreation/programs/nvum.

Wild and Scenic River Management: Since approval of the Final Environmental Impact Statement (FEIS) and River Management Plan (RMP) for the Allegheny Wild and Scenic River in 1997, a partnership agreement has been executed with the Venango Museum of Art, Science and Industry in Oil City to assist the Forest Service with public involvement in river management. The director of the Museum has formed the Allegheny River Support Group (ARSG) to assist with implementation of recommendations in the RMP as well as other projects of interest to the group that are consistent with the "spirit" of the RMP. The ARSG is open to any interested party and meets quarterly. To date, their accomplishments include construction of the viewing platform and interpretative signing at the Indian God Rock, and construction and placement of several osprey-nesting platforms along the Allegheny River. The ARSG also sponsored fundraisers for future projects, and several river cleanups along the Allegheny River in Venango County.

The ANF continues to work with the Elk County Commissioners and their consulting engineering firm regarding the replacement of the Arroyo and Maxwell Run bridges over the Clarion River.

The ANF continues to participate in the process of relicensing the Piney Dam Hydroelectric Project due to the proximity of the designated river immediately upstream of the Piney Reservoir and dam. The Piney Project is privately owned and operated by Reliant Energy. The license to operate this facility is granted by the Federal Energy Regulatory Commission, and is due to expire on October 12, 2002.

The continuing public inquiries about the Allegheny and Clarion Wild and Scenic Rivers concerning recreational opportunities, possible restrictions and permit requirements, unpermitted activities, proposed water resource projects (such as bank rip-rapping), and riparian land uses (such as timber harvesting), indicates a continuing need for better public information and education. As use along the river continues to increase, there is a need to develop facility and signing plans to manage use along the rivers. A final corridor boundary and management plan for the Clarion W&SR is yet to be completed.

Developed Recreation Facilities Rehabilitation/Deferred Maintenance: Although good progress has been made, there are still significant needs to rehabilitate aging recreation facilities developed in the early to mid 1960s. A comprehensive list of recreation capital investment needs was developed and prioritized to address this concern. Since the early 1990s, twelve recreation sites have been partially or completely upgraded with an investment of over five million dollars. Capital funds are limited and allocated to National Forests on a competitive basis. Although the ANF has been very successful in obtaining substantial amounts of funding in the past, needs are continuing, and in the future will be addressed through the capital investment process. A business approach to managing facilities will be used to develop more functional, low-maintenance facilities, and to assess which facilities should be decommissioned, with the goal of increasing the quality of public service. In addition, few of these facilities and sites fully meet the needs of people with disabilities. Such needs are being addressed during rehabilitation.

Dispersed Recreation Management: Dispersed recreation activities include a number of activities that people engage in on the Forest that are generally not managed due to lack of budget and staffing. These activities normally occur with low frequency or are considered benign. However, there is a growing need to manage some high use areas and address excessive resource impacts and visitor safety. Some of the highest use dispersed sites

are linked to summer motorized recreation opportunities. Many of these sites are showing typical site impacts like soil compaction, erosion, vegetation trampling, and unsanitary conditions that are associated with overnight camping or use by high numbers of visitors.

North Country National Scenic Trail: Use on the NCT is light, but hikers are dedicated to the NCT objectives. There continue to be concerns of keeping motorized and non-motorized uses segregated along the length of this trail system as expressed during the NCNST Triad meeting held on the forest this year. Relocation of trail segments off major road systems will continue as funds and time allow. Summer trail crews will continue to be used to help maintain this nationally significant trail.

Motorized Summer Recreation: The Forest Plan could be clearer in describing the goals for ATV trail management, particularly in terms of motorized trail construction (both summer and winter motorized). Previous monitoring and evaluation reports have identified the Forest Plan goal for "ATV" trail construction as 350 miles by the end of the second planning decade (2005). This figure included the existing 60 miles of trail plus the motorized summer trail construction goal of 145 miles in the first decade and an additional 145 miles in the second decade[1]. The Plan made a critical distinction by implementing the basic premise of the multiuse trail system outlined in the 1977 Off-Road Vehicles FEIS that assumed trail bikes and snowmobiles would be using the same trail system. The forest plan further described the motorized summer category to include both ATVs and trail bikes[2]. Since the implementation of the Forest Plan the entire complexion of offroad motorsports has changed. The balance of use has shifted from predominately trail bikes to a preponderance of four-wheelers today. Consequently trail design standards have changed, ridership has increased, and rider demographics have broadened.

The ORV FEIS was also used to help establish the policies and procedures to control and direct the use of off-road vehicles on the Allegheny National Forest. Key excerpts from the ORV FEIS were used to establish the overriding goals and objectives found in the ANF LRMP. The Record of Decision (ROD) documents the decision to establish and place the policy for ORV management in the 2300 section of the Standards and Guidelines in Chapter 4 of the Forest Plan. Again, these S&Gs were based on the 1977 Off-Road Vehicles FEIS *but they did not include all of the direction found in the 1977 FEIS.* Specifically, the Forest Plan eliminated the long distance riding policy that called for 200 miles of new construction outside of intensive use areas.

Additionally, the Forest Plan established these key guidelines:

- All new ORV trail construction (both motorized summer and motorized winter) is limited to five intensive use areas. Connector trails located outside these areas will be limited to re-designation of existing system roads[3].

- New trail construction consists of a combination of actual trail construction and designation of existing roads. The combination of new trail construction plus existing roads cannot exceed 145 miles per decade for motorized summer and 11 miles per decade for motorized winter[4].

Motorized Winter Recreation: There continues to be great interest by snowmobile riders to add to and improve the Allegheny Snowmobile Loop (ASL) and connectors. As described above, confusion over forest plan specified mileage and accomplishments is prevalent. As identified in the Forest Plan the total of all trail systems for motorized winter recreation is not to exceed 350 miles. This figure includes the 328 original miles of trail existing at the time of the ROD and the allocation of and additional 22 miles over the next two decades[5]. As of

[1] Decadal limit as displayed in table 4-7 in 1986 ANF LRMP FEIS page 4-14 and, Appendix C, page 32. New construction limited to the ORV intensive use areas (see ANF LRMP page 4-9)
[2] ANF LRMP FEIS page 4-13
[3] ANF LRMP, page 4-9&10
[4] ANF LRMP FEIS page 4-13
[5] Decadal limit as displayed in table 4-6 in 1986 ANF LRMP FEIS page 4-14

2001, the trail system is made up of the ASL, other minor snowmobile connectors located on Forest Service system roads and township roads, and dual use ATV/snowmobile trail totaling 366[6] miles. Over 40% of the trail (158 miles) is designated outside of the intensive use areas on forest and township road systems. Monitoring reveals there has been a problem understanding the ORV mileage targets found in the current Plan, which will be addressed in Forest Plan revision by clearly stating that the mileage identified in the Plan is located solely on National Forest System lands and roads.

The PA DCNR Bureau of Forestry continues to cooperate with the ANF in the maintenance and grooming of the trail system by providing partial funding through the PA snowmobile registration program. Several snowmobile clubs also contribute substantial amounts of time and resources to maintain this system.

Horse Use: Horse riding is a traditional, but generally minor, recreation activity on the ANF; however, during the last 15 years, it has grown to a dominant use in some locations on the Forest. Current management does not designate horse trails as part of the Forest trail system. Equestrian trails were identified as appropriate in the major management areas under the current Forest Plan direction however; no output or mileage objectives were identified. Three companies are currently conducting guided trail rides on national forest system lands (Flying W, Hickory Creek Wilderness Ranch, Yellow Hammer Corral).

In recent years, resource damage associated with horse use has been identified in some areas (stream bottoms, stream crossings, steep slopes). Ongoing inventory conducted during the 2001 field season for the Spring Creek Watershed Assessment and the Spring Creek Project EIS identified over 70 miles of poorly located user-designed horse trails. Many of these user located trails will require major restoration and relocation. The Spring Creek project further emphasized the need for Forest Plan revision standards and outputs that would meet the needs of the obvious demand and the potential for additional adverse resource impacts.

Development of Private Outstanding/Reserved OGM Rights: The United States Government owns only seven percent of the mineral rights under the surface of the Allegheny National Forest. The remainder is in private ownership. The subsurface owners have the right to develop their mineral estate. The public has expressed concerns regarding oil and gas development on the Forest, but is not generally aware of the limitations of Forest Service authority with regard to these privately owned minerals.

The Forest Service, the private mineral developer, and the Commonwealth of Pennsylvania are jointly responsible for protection of the surface resources. The Forest's management objective, as defined by the courts, is to negotiate to the greatest extent possible with individual developers to manage and protect the surface resources while allowing full development of the privately owned mineral rights.

FOREST PLAN AMENDMENTS

No amendments were issued in FY 2001

[6] INFRA database

MONITORING RESULTS, EVALUATION, AND RECOMMENDATIONS

IMPLEMENTATION AND MONITORING REVIEWS

Conduct Interdisciplinary Field Reviews of Projects in Several Management Areas to Determine Application and Effectiveness of Standards and Guidelines

Method of Measure: Interdisciplinary field review of projects in different Management Areas by the Forest's Leadership Team, the Ecosystems Management Team, and others.

Monitoring Results: The two-fold purpose of these reviews is to determine: 1) if projects are being implemented as planned in their environmental documents; and 2) if those projects, as implemented, are moving the Management Areas towards their Desired Future Condition (DFC), as outlined in the Forest Plan. No fewer than four project reviews will be conducted during the year.

In FY 2001 Forest Plan Monitoring and Implementation Reviews were conducted on five projects. Before each review, NEPA documents were thoroughly reviewed by resource specialists, and a list of site-specific and general Forest planning questions were developed for use during each review. Resource specialists, Forest Leadership Team, and Ranger District personnel field reviewed each project area, and gathered technical resource data on the application of existing standards and guidelines, and actual environmental effects. This project-specific data was carried into discussions held during each review.

As part of the review process, follow-up actions were recommended. Ranger District personnel are establishing plans of action to address them.

Rocky Gap Trail Rehabilitation/Relocation (MA 3.0) – This review was done in follow-up to a previous review on the Rocky Gap II project to determine whether recommendations included in that review have been implemented. Recommendations included: removal of any signs remaining on portions of the old trail that have now been relocated as a result of this project; establishment of an annual trail maintenance schedule for this and other ANF summer motorized trails; assessment of the need for additional drainage and surfacing as soon as possible; addition of splash rock/rip rap needs at the outlet end of the culvert; and removal of old erosion control devices

Most signs had been removed, however, two old trail signs were missed. A contract for both heavy and light trail maintenance has been established. Light maintenance is being performed on a monthly basis throughout the summer and winter season. Heavy maintenance (trail surface grading) is being done on a “twice per year” basis.

In September 2000, short-term maintenance needs were addressed on one section of the trail. Work included installation of 2 culvert pipes, 300 feet of geotextiles and application of 200 tons of commercial stone. Repair work was done to approximately 800 feet of the trail. Additional drainage and surfacing needs will be implemented as part of the Rocky Gap III project. The addition of splash rock and riprap and installation of a settling basin will also be done through the Rocky Gap III project. Old erosion control devices have been removed and old trail locations are stabilized, well vegetated and not evident.

Overall, these actions move the ANF towards the DFC for a quality user experience, but not towards additional miles of trail, as approved in the Forest Plan.

Forest Road 119 Resurfacing 10% Project (MA 3.0 and 6.1) - This project was submitted as part of the ANF’s FY 99 “10% Fund” project proposals. From the proposal: “The purpose of the project is to reduce the potential for sediment entering the Allegheny River.” The restoration of FR 119 will include replacement/installation of

culverts, construction of sedimentation basins, construction of a parking lot and turnouts, and application of limestone surfacing.

Approved activities were implemented as planned and, being adjacent to the Hickory Creek Wilderness, were consistent with Wilderness values. Expected results were achieved.

As far as mitigation measures are concerned, this project was done "as" mitigation to reduce/eliminate sedimentation into the stream. The final cost of the project was $258,702, well under the $300,000 initial cost estimate.

This project meets the DFC for Management Areas 3.0 and 6.1. It is well integrated with dispersed recreation opportunities and wilderness. The turnouts, turnarounds, and camping areas created with this project blend well with the needs of the dispersed recreationist. The camping areas near Hickory Creek that were refurbished or eliminated improve the Wilderness and dispersed recreation setting in an area that is heavily used. The project meets the ROS Class for Roaded natural and semi-primitive motorized use. The road is still a low standard, TSL "C" road, with trees overhanging the road. This level of development is appropriate considering the road is 100 feet from the Hickory Creek Wilderness Area.

This project addresses MA objectives by reducing the impact of roads on the environment by placement of limestone surfacing, replacement of culverts, construction or reconstruction of turnouts, turnarounds and parking areas. This will also have a beneficial effect on downstream mussels and meet a forest plan objective. This project also removed a gate from within a wilderness area (without using motorized equipment within the wilderness area). Implementation of this project also allowed for an unbroken canopy, thus resulting in connectiveness for forest canopies between the Hickory Creek Wilderness area and areas south of FR 119. Of equal importance is the fact that this area is part of the drainage area into the Allegheny River (commonly referred to as the 13% lands). This project addressed concerns with sedimentation from this road in the 13% lands.

Recommended follow-up action include:

- Remove silt fence and any remaining stationing tags (some of these may be leftover from pipeline installation).
- Clean the bridge surface of sediment that has washed onto the bridge and dump silt in an old pit area, where it will not get back into stream.
- Have the Forest botanist and/or hydrologist review the Forest-wide seed mixtures.
- Consider the creation of a vista near the tornado swath when the opportunity presents itself.
- Investigate the USGS stream data site for further monitoring of stream data.

Marienville Bike Trail Relocation (MA 3.0 and 6.1) – The project was implemented to reduce environmental impacts caused by failing segments of the Marienville Bike Trail. The 1999 Decision Memo states: "Relocation will consider the lay of the land and use topography to break up the flow of water on the trail. Where needed, broad-based dips, super-elevated curves, and mounds will be used to control wear and erosion on the trail. Old trail segments will be blocked. New trail segments will be (8.7 miles) long. The project will be financed by funds from the Forest Service's 10% and a grant that Three Rivers Competition Riders has been awarded from the Pennsylvania Recreation Trails Program. Some of the work will be accomplished by Forest Service personnel and volunteers."

Approved activities included relocation of the trail, construction of new trail to no greater than 72" tread width, tight and serpentine trail design with varying degrees of vertical alignment to improve drainage on the trail surface; application of Perforated Geocell on trail section through spruce plantation west of the Blue Jay Road,

restoration of abandoned trail sections, application of commercial stone on one trail section to provide a sustainable tread, and improved signing. The decision also calls for blocking multiple trails on hill climbs to prevent use.

All activities proposed at this site were implemented as planned in the Decision Memo. The specialized equipment called for in the contract worked well in building trail to specifications and avoiding the "road-look" trail. Perforated Geocell is working well to allow water to travel under/through the built up trail while eliminating erosion. Abandoned sections of the trail have been obliterated; vegetation on those areas has taken a good hold. Trail signing has been improve; however the sign at the trail entrance on Blue Jay Road should indicate the summer only open season.

Overall, the expected results were achieved; however, some suggested mitigation measures from Wildlife Biologists proposed in the Biological Evaluation were not brought forward to the Decision document and, therefore not implemented. Some portions of the trail at one review site were very rocky/rough after only one year of use, resulting in trail widening and the beginning of multiple trails around these rough areas.

Mitigation measures included: constructing the trail to "Most Difficult" standards, as defined by the Trails Management Handbook (6/85); mature trees will not be cut; disturbances will be confined for the most part to the trail tread width, necessitating the use of specialized equipment).

Small whorled pogonia surveys were to be completed on one section of the trail prior to trail relocation/construction. At the time of the review, Small whorled pogonia surveys had not been completed, therefore, work had not been done.

At Slater Run (Stop 1 of this review), mitigations called for the establishment of a 100 ft. buffer around the boulders to avoid this area, and a 25-foot buffer at Segment II of Watson Branch to avoid small boulder field.

Mitigation measures in the Decision Memo were implemented as planned and appear to be effective. The average trail width is around 70 inches. There has been some "pushing out" on a few areas on the trail due to this summer's use, but on native soils, that is to be expected. Mature trees were not cut.

Mitigation measures proposed in the Biological Evaluation for these stops were implemented with the exception of the establishment of a 100-foot buffer around the boulders at the Slater Run section. The resource trade-offs were not coordinated between all resource specialists. Specifically, impacts to sensitive species of not buffering the large boulders were not documented in the Decision Memo. It was the Ranger's decision to allow the trail to be built through the boulders after weighing trade-offs.

The use of specialized equipment for trail construction confined disturbance to trail tread width. A pogonia survey was completed on the Duhring section of the trail, where there is potential Small Whorled pogonia habitat, and was made part of the project file prior to construction activities. At Segment II of the Watson Branch, a 25-foot buffer was established to avoid a small boulder field, however, this is also the area where the trail is widening. Mitigation measure proposed by the Forest Fisheries Biologist/Hydrologist were implemented and appear to be effective in reducing erosion on the trail and sediment entering streams.

Final cost for this project was $172,000, slightly above the initial estimate of $160,000.

This was a "stand alone" project that fits well in MA 3.0 that meets the ROS Class for roaded-natural. Accomplishment rate towards the desired future condition is appropriate. The objective of this project was to rehabilitate damaged segments of existing, not to increase trail miles on the ANF. The project increased total summer-motorized trail miles by one mile. The ANF is at 27% of the summer motorized trail miles approved in the Forest Plan. This trail is also used by equestrian, mountain bikers and hikers.

The project is located in an "Intensive Use Area" in MA 3.0 and helps maintain the current level in proportion to moving the ANF closer to meeting the summer motorized trail miles approved in the Forest Plan.

Recommended follow-up actions include:

- Consider the use of limestone at bridge approaches at the Watson Run crossing.
- Determine if and where commercial stone might be needed on top of native surfacing.
- Have hydrologist and soil scientist validate the effectiveness of mitigation measures.
- Consider temporary trail closures when weather conditions indicate a need to suspend use of the trail.
- Have District trail personnel place the correct signs at trail crossings (summer use only).
- Consider realignment of sharp turns on Route 66 East segment, commercial surfacing and obliterating multiple trails in their early stages of formation.
- Revise the CE in the near future to capture the trade-off evaluation made by the Ranger during development of this project.
- Document in the project file the potential impacts to sensitive species of not implementing the wildlife mitigations (boulder buffer zones). Review the validity of species "determinations" in the BE).
- Coordinate with wildlife biologist and recreation staff to re-evaluate the site as it currently exists. Re-evaluate the area and assess tradeoffs in terms of costs and resources in implementing the recommended wildlife mitigation or other options that meet the needs of all resource objectives involved.

Songbird Re-entry (MA 3.0) – This is a second-entry timber harvest approved in an environmental assessment for the Songbird Integrated Project Set. The Decision Notice was signed September 30, 1991. A Supplemental EA was completed in 1999 following the Forest Plan amendment for Threatened and Endangered Species management. A FONSI was "refreshed" on September 27, 2000. Activities approved include herbicide application, shelterwood seed harvest, shelterwood removal harvest and some group selection treatment.

Most activities were implemented as planned or as modified based on field reviews conducted in 1998, with the following exception. A letter to the record in 1998 reflected the need to include a 2nd herbicide application but did not address the 2nd shelterwood seed harvest. The supplemental EA did not acknowledge that the 2nd herbicide application had occurred, nor did it reflect that an additional shelterwood seed harvest would occur. The supplemental EA did address the shelterwood removal harvest. At one review site, the 1991 prescription included herbicide application on 5 acres, followed by group selection. Herbicides were applied; however, group selection occurred on 3 acres.

The expected results were obtained, with good advanced regeneration of a mix of species, including black cherry, red maple, black birch and hemlock, found throughout the stands reviewed.

Mitigation measures for this re-entry project included, seasonal operating restrictions, protection of riparian areas, seeps, pipelines, cultural resources, electric lines, regeneration patches, and a stick nest, and a visual quality objective of Partial Retention within a ¼-mile radius of PA 66, PA 948, Highland Corners and the Knox Kinzua Railroad. Skidding requirements included the following: equipment must stay on approved skid trail locations; trees will be directionally felled; within stands affected by the designated hiking trail, skidding equipment must stay on approved skid trails locations and trees must be directionally felled away from trail corridors keeping the corridor free of slash.

For the most part, seasonal operating restrictions were implemented, with harvesting occurring June 15-September 15 and December 15-March 15 or during normal operating periods if low ground pressure equipment was used. One of the three units reviewed was harvested outside of the allowable operating period using a Bell feller/buncher and a skidder. The skidder met the industry standards for low-ground pressure equipment. The feller/buncher was not evaluated to determine whether or not it met the standards for low ground pressure equipment. The sale administrator's notes indicate that very little disturbance occurred as a result of using the feller/buncher.

Riparian areas were adequately protected; however, the review team noticed that a skid trail had crossed the steam channel.

The stick nest identified as active in 1992 was found to be abandoned by 1995. The reserve area identified and implemented to protect the nest was found, however no nest was evident. Leave trees and snag met mitigation measures in the Supplemental EA, in accordance with the Biological Assessment for Threatened and Endangered Species on the Allegheny National Forest. This pipeline was found to be abandoned. The unit layout avoided the cultural resource site. The pipeline was protected and kept clear of slash. Skid trails were located outside of groups. Electric lines were protected and free of slash, and the VQO was met as seen from PA 66 and Knox Kinzua RR.

This project is well integrated with other resources opportunities and includes a good mix of disciplines and analysis of multi-resource opportunities especially recreation aesthetics, wildlife, and timber. Activities implemented and evident on the ground are normal within the Roaded Natural ROS class.

The Songbird IPS satisfies objectives for MA 3 by establishing young age classes that contribute towards long-term productivity and achieve age class distribution objectives for vegetative structure and wildlife habitat. Successful stand regeneration contributes towards long-term forest sustainability. Road management provides for seasonal motorized access for hunting and firewood gathering.

Wolf/Pigeon Integrated Project Set (MA 3.0) – Monitoring for this project was done to determine if mitigation measures in the Biological Assessment for Threatened and Endangered Species on the Allegheny National Forest are being met. Two stands were reviewed.

Untreated Stand (441-2)
The adjacent treatment stand (441-27) was originally part of this stand. The stand conditions you see here are representative of what the treatment stand would have looked like in 1985.

441-2 Stand Conditions

Stand Conditions	1996
Relative Density	86%
Crown Closure	89%[1]
Average Diameter	13”

[1] Optimum Roosting = 60%-80% CC, Optimum Foraging = 50%-70%

Wolf/Pigeon Shelterwood (441-27)

History

The following table provides a summary of the stand history including, past insect infestations, past and anticipated future treatments and environmental analysis.

441-27 History

Year of Treatment/Event	Description
1985	Gypsy moth Defoliation
1989	Forest-wide Gypsy Moth Salvage EA

1990	Salvage Shelterwood Prep harvest
1990	Area fence
1993	Gypsy moth suppression spray treatment (Bt, double treatment)
2/1997	Wolf Pigeon EA analysis
6/2000	Wolf/Pigeon SEA analysis
9/2000	Shelterwood Seed harvest
10/2000	Scarification
5/2001	Oak Underplanting
8/2001	Oust treatment was to occur, but due to drought conditions, was deferred until 2002.
2003/2004	Under burn to reduce oak competition
2005/2006	Shelterwood Removal Harvest

Stand Prescription and Instructions to Field Crews

Prescription – shelterwood seed harvest, site preparation, series of prescribed burns, scarification if necessary, herbicide, underplanting and eventual final harvest after oak seedlings have become established. Manual release of oak seedlings/saplings may also be necessary.

Original Marking guides for shelterwood seedcut – Reduce crown cover to 50%. Leave approximately 50-70 square feet of the largest diameter oaks with well formed crowns.

Order for removing trees

1. High risk trees not capable of surviving ten years
2. Unacceptable growing stock
3. Pole size trees except those left for diversity like cucumber, do not leave red maples as residuals.
4. Smaller diameter sawtimber trees

Leave

1. The largest diameter oak trees with well formed crowns
2. Any white pine
3. All den trees and snags
4. Hickory
5. ¼ acre exclusion for every 5 acres harvested; try to form them around den trees and snags if possible

Stand was marked and sold in 1997
BO and subsequent SEA 1999/2000

Additional marking guides added with SEA

- Retain at least 16 live trees/ac
- Retain >=54% canopy closure
- Designate and retain living residual trees in the vicinity of about 1/3 of all snags >=12" dbh.

Timber Harvest Completed 9/28/2000

Stand Conditions

Pre-treatment conditions, marked residual conditions, and stand conditions that have resulted from implementation of the above marking prescription are shown below. The marked residual condition was based on

a survey conducted in 2000, to evaluate the conditions that would result following treatment. This survey was conducted in order to ensure compliance with the BO.

Pre and Post Harvest Stand Conditions

Stand Conditions	Pre-treatment Condition	Marked Residual Condition	Actual Post Treatment Condition
Crown Closure (%)	81	60	57
Relative Density (%)	76	54	50
Snags >=9" dbh/acre			1.5
Live trees/acre >=9" dbh			66
Average Stand Diameter	12 "		17"

BO Compliance

BO Compliance

Applicable IBAT Terms and Conditions	Post Treatment Condition/Monitoring
1a – retain hickory	All hickory retained
1b – retain at least 16 live trees>9"	66/acre
1b - retain all snags	no snags removed during operations snags retained include 46>=9" and 9 snags 6-9" in size
1d – maintain canopy closure at >=54%	57%
1e – retain live trees in vicinity of 12" snags	100% of 12" snags shaded
1f – retain Class 1 and 2 trees	Residuals include 94% oak
4a-c – Forest-wide monitoring	Documentation of individual sales by sale administrator and marking crew. Annual monitoring of partial and final harvest units, Snag longevity monitoring
5 – Determine use of the ANF by Indiana bats	On-going surveying across the Forest and within project areas. On-going Forest-wide GIS habitat evaluation. Lewis Run GIS habitat evaluation (2000).
Applicable Forest Standards and Guidelines	
Where possible, leave snags in the following categories (6.1 guidelines) 10-16"- 3/ac 18-22" – 3/ac >24" – 3/ac	All snags were retained. 37 (1.2 trees/ac) 7 (0.2 trees/ac) 2 (0.1 trees/ac)

Observations

- Even though no snags were harvested, this stand has less than the required number of snags per acre for all size classes. The history of tree mortality due to gypsy moth and subsequent salvage has left this stand and other stands in this area of the forest with low levels of snags. In an effort to mitigate the lack snags,

clumps have been identified while marking the shelterwood seed harvest. The clumps will be a source of future recruitment of snags.

- Over 30% of snags >=9" dbh had little or no bark

HERITAGE RESOURCES

Verify that Heritage Resources are being protected [36 CFR 219.24]

Method of Measure: Field observations.

Monitoring Results: Earlier attempts at monitoring, such as those conducted in 1990, revealed that "many" of the past cultural resource surveys on the ANF may have been inadequate and that "damage had occurred inadvertently to archaeological sites." One of the 1990 recommendations states, "All surveys conducted under earlier contracts should be revisited by in-house personnel to check site locations and correct oversights." In 2001, a number of previously recorded cultural resources and selected areas that had been covered by earlier surveys were re-examined. This was to test the validity of the previous investigators' methodologies and results, as well as to determine the adequacy of mitigation measures.

The results of our review showed that, although the majority of the areas that were re-examined appeared to have been adequately surveyed, some of the previous investigations did indeed miss or overlook potentially significant cultural resources. These results suggest that, whenever possible, selected areas of high probability pre-1990 surveyed acres located within newly proposed project areas be re-examined to test the adequacy of previous investigations.

Throughout the year, a select number of previously recorded cultural resources were checked during the course of our cultural resource investigations. Monitoring revealed that implemented projects were generally designed to avoid impacts to the cultural resources.

In 2001, as in all previous years since 1978, heritage resource specialists on the Forest continued to have problems relocating cultural resources recorded before 1979. The reasons for this are many but include the following: the sites were recorded simply on the basis of historical documentation, informant interviews, or folklore; and the site records contain little or no location or descriptive data and rarely contain a map of their location (or suspected location). None of the sites recorded before 1979 were ever field verified before being recorded as a cultural resource site. Field verification of these sites is being accomplished with limited success on a case-by-case basis within analysis areas.

Throughout the year, monitoring efforts were also conducted at the most significant cultural resources on record, including the Buckaloons sites, the Elk County earthwork sites, a number of prehistoric rock shelter sites, and a number of historic petroleum central power systems. This was done to assess the nature and degree of damage to these cultural resources caused by vandalism, visitor use, and natural deterioration, and to identify and implement appropriate protective measures.

Our monitoring of the earthwork sites found no human caused degradation of the sites.

At Buckaloons, monitoring also revealed no evidence of human impacts to the cultural resources; however, uncontrolled/unmanaged vegetation on the Irvine Flats (known as the "Bean fields") continues to adversely affect the subsurface archaeological features in the now overgrown fields. The first steps to reverse this process began in 1997, and have continued yearly. Portions of the field were plowed, disked, and replanted with a mixture of

cool season grasses to provide a soft vegetation cover to protect the sites from natural and human causes. Before planting, a systematic controlled archaeological surface collection was conducted. The archaeological work was accomplished through a partnership with the Pennsylvania Historical and Museum Commission, the Brokenstraw Valley Area Authority, and Mercyhurst Archaeological Institute's archaeological field school, which, in turn, was assisted by Forest Service Passport in Time volunteers.

Elsewhere at Buckaloons, additional impacts continue to be noted along Brokenstraw Creek, where bank erosion first observed in 1997 continues to erode the south bank, beginning approximately at the midpoint of the mouth of the creek. In 2001, the rate of bank erosion was less than that of the preceding year, but nonetheless continues at a rapid pace. The erosion threatens to destroy an historic saw mill site as well as a sunken road, which also may represent one of the few, if any, intact portions of the Brokenstraw Indian Trail. Stabilization of the bank would reduce this erosive damage.

As has been the case in previous years, our monitoring efforts have identified impacts to prehistoric rock shelter sites caused by dispersed recreational users on the Forest. These results suggest that monitoring efforts should continue to focus on the most threatened rock shelter sites on the Forest.

Also, as has been the case in previous years, our monitoring efforts have identified impacts occurring to historic oil and gas related sites. The impacts include human caused damage because of vandalism, as well as the removal of equipment. Naturally caused damage, such as trees falling onto powerhouses and porcupine damage, was also noted. A variety of steps have been taken to address this issue, including documenting and recording several potentially historically significant central power systems.

TIMBER

Application of Silvicultural Guides for Intermediate or Selection Cuts [36 CFR 219.12(k)(2)]

Method of Measure: Timber sale marking checks were conducted in 2001 by gathering new silvicultural examination plot data for a number of intermediate thinnings, shelterwood seed cuts, and a two-age cut on all Ranger Districts. This information was used to generate a new SILVAH summary of the stand characteristics and to determine whether the marking followed the silvicultural prescription and any interdisciplinary modifications approved for the stand. SILVAH is the stand analysis program developed by the Northeastern Forest Experiment Station Laboratory in Irvine. The program is used to evaluate vegetative data, to quantify silvicultural characteristics of the stand, and to develop silvicultural prescriptions.

Monitoring Results:

Certified silviculturists prepared or reviewed the prescriptions. Coordination with other resource uses was good for all stands reviewed.

Implementation of silvicultural prescriptions was evaluated by comparing the residual stand condition with the original prescription, as written. The following types of harvest activities were reviewed:

- ***Intermediate Thinnings.*** Seven stands were reviewed. Two stands after marking had 10 BA or 11% - 13% higher relative density than prescribed, but it was determined there was no need to mark additional trees. Five of the stands were marked to within 6% of the relative density prescribed and were marked well.

- ***Shelterwood Seed Cuts.*** Ten stands were reviewed. In nine of the ten stands, the prescriptions were implemented well. In one stand, insufficient basal area was removed. The stand will be monitored for one more growing season to determine if seedlings will develop or if additional basal area should be

removed in a non-commercial treatment.

- ***Two-age.*** One stand was reviewed. The prescription was implemented well in this stand.

Summarize Results of Regeneration/Final Harvest Cuts [CFR 219.12(k)(5i)]

Method of Measure: By evaluating the results of stocking surveys taken one year or more following regeneration harvest.

Monitoring Results:

TABLE 7. REGENERATION SUCCESS FOR AREAS HARVESTED 1976 TO 1996 IN MA 1.0, 3.0 AND 6.1

Type of Regeneration	Established [2]	Probable Success [3]	Probable Failure [4]
Green Final Harvest[1]	**96%**	**2%**	**2%**
Final Harvest in 1985 Tornado Swath	**97%**	**2%**	**1%**
Regeneration with No Salvage Cutting in Tornado Swath [5]	**92%**	**6%**	**2%**
Oak Mortality Salvage Final Harvest	**97%**		**3%**
Salvage two-aged	**55%**	**18%**	**27%**
Green two-aged	**33%**	**39%**	**28%**
Other salvage	**96%**	**4%**	
Green selection Cutting [6]	**37%**	**26%**	**37%**

1 Non-catastrophic event (not salvage related).
2 70% or more of the stocking survey plots have adequate numbers of seedlings present.
3 50% to 69% of the plots have adequate seedling numbers.
4 Less than 50% of the plots have adequate seedling numbers.
5 No surveys have been done in wilderness, Tionesta Scenic Area, savannas, or very steep areas (1,660 acres).
6 American beech and sweet birch (species that can be substantially impacted by insects and diseases) dominate the tree seedlings that have developed.

Evaluation of Results: Regeneration harvests occur as part of both even-aged and uneven-aged silvicultural systems. We use the term *final harvest* to describe the regeneration success that occurs in even-aged systems. This category includes clearcuts and shelterwood removals. We use the term *selection harvest* to describe the regeneration success that occurs in uneven-aged systems. This category includes individual tree selections, and group selections. Even-aged and uneven-aged silvicultural systems can be applied in stands that are healthy (referred to as "green" treatments), or in stands where catastrophic damage has occurred (referred to as "salvage" treatments).

Table 7 displays the monitoring results for even-aged and uneven-aged regeneration harvests for both green and salvage treatments. The table also displays the regeneration success in areas of the 1985 tornado swath where no timber harvest activities took place.

The Green Final Harvest and Final Harvest in 1985 Tornado Swath categories show high levels of success in establishing regeneration in areas where more than five years have elapsed since the cutting occurred. We anticipate that additional seedling development will occur in the probable success and probable failure categories as time passes, and as additional reforestation treatments (area fencing, fill-in planting, etc.) are employed. The least well-stocked areas will be evaluated for potential use as permanent openings. Approximately 10 percent of the probable failures reported in the "Green Final Harvest" category are old tornado salvage areas.

There is good success in establishing seedlings on areas blown down by the 1985 tornado where salvage did not occur, although seedling development has been slower than in final harvest areas, and there is a higher percentage of birch and pin cherry. No additional reforestation efforts are planned in areas included in the probable failure category. Approximately 1,660 acres blown down by the tornado and not salvaged were not surveyed. Many of these stands were originally savannah stands that had low overstory tree stocking and understories composed of thick interference. Limited regeneration response was predictable. Other stands are those located on extremely steep side slopes, which had higher levels of overstory tree stocking and understories composed of thick interference, which also had an expected limited regeneration response. Reforestation treatments could be attempted in these areas, however it is highly unlikely that full stocking would ever be achieved. Leaving these areas as they are does provide important habitat (savannas, openings) that is otherwise lacking on these portions of the ANF. No monitoring was done of the tornado swath in the Hickory Creek Wilderness Area and Tionesta Scenic Area.

Reforestation success in the oak mortality category improved 3 percentage points from last year. Areas will continue to be evaluated for additional reforestation needs as appropriate.

This is the first year we have reported two-aged harvest reforestation success. There are relatively few acres (less than 100) in the green and in the salvage two-aged categories, and success has been limited.

On the ANF, there is limited success in establishing seedlings following selection cutting. Where seedlings have become successfully established, they are predominately beech and birch. Both of these species are significantly impacted locally by specific insects and/or diseases which threaten the potential for affected stems to develop into larger, quality trees. Additional reforestation treatments (herbicide application, area fencing, etc.) will be considered for stands in the probable success and probable failure categories. ANF personnel will continue to examine the effectiveness of UEAM prescriptions and standards for evaluating tree seedling stocking as part of the ongoing adaptive management study.

Table 8 summarizes data that has been reported annually since 1990 in this section of the Monitoring Report. It shows the trends for each harvest category during the twelve-year period from 1990 to 2001.

TABLE 8. TRENDS IN REGENERATION SUCCESS (AREAS ESTABLISHED) FOR AREAS HARVESTED SINCE 1976 IN MA 1.0, 2.0, 3.0 AND 6.1

Type of Regeneration	FY '90	FY '91	FY '92	FY '93	FY '94	FY '95	FY '96	FY '97	FY '98	FY '99	FY '00	FY '01
Green Final Harvest	**88%**	**91%**	**89%**	**91%**	**90%**	**92%**	**94%**	**94%**	**95%**	**95%**	**95%**	**96%**
Final Harvest in 1985 Tornado Swath	**37%**	**61%**	**62%**	**81%**	**87%**	**91%**	**93%**	**95%**	**95%**	**96%**	**96%**	**97%**
Oak Mortality Salvage	**0%**	**0%**	**0%**	**10%**	**57%**	**76%**	**76%**	**84%**	**92%**	**94%**	**94%**	**97%**

Selection Cutting [1]	-	-	-	-	-	**41%**[2]	**22%**[2]	**31%**	**46%**[3]	**53%**[3]	**52%**	**37%**

1 Cutting practice not evaluated FY 90 to FY 94.

2 For 1995, 69 acres (41%) out of the 167 acres cut from 1988 to 1990 had adequate tree seedlings, whereas for 1996, 113 acres (22%) out of 500 acres cut from 1988 to 1991 had developed adequate tree seedlings; for 1997, 217 acres (31%) out of the 693 acres cut from 1988 to 1992 had developed adequate tree seedlings

3 American beech and sweet birch (for which insect/disease concerns exist) dominate tree seedlings that have developed

The Green Final Harvest areas have shown a relatively constant (but slightly improving) level of regeneration success or seedling development during the past eight years. The tornado swath and oak mortality salvage categories have shown a dramatic increase in establishment during the same period. It will take several more years to determine trends for selection cutting. The fifteen percent decrease from 2000 to 2001 results primarily from adding 1996 harvest (with 400 acres of poorly stocked areas) to the report and from decreased stocking on several hundred acres of areas evaluated in the FY 2000 report.

Report the Percentage of Successfully Stocked Regeneration Units in the Following Categories: Oak Regeneration Cuts; Shelterwood Seed Cuts; Units Treated with Herbicide; and Units Fenced [36 CFR 219.12(k)(1)]

Method of Measure: Most of the data came from the vegetation database. The discussion for Final Harvest Cuts (see preceding section) describes the overall reforestation success in regeneration units. Historical reforestation activity success rates are difficult to extract from the vegetation database at this time. Readily available information is summarized below by acres rather than percentages.

Monitoring Results: In 2001, 1,790 acres were certified as "established" in regeneration cutting areas. In order for a regeneration unit to qualify for certification, at least 70 percent of the area must be stocked with tree seedlings taller than 4.5 feet. Tables 6 and 7 show the acres certified *by forest type* and *by Management Area*.

TABLE 9. ACRES CERTIFIED AS REGENERATED IN FY 01 BY FOREST TYPE

Timber Type	Acres
Red Maple	**24**
Northern Red Oak	**23**
Red Pine	**8**
Upland Hardwood	**308**
Northern Hardwood	**67**
Allegheny Hardwood	**1,304**
Quaking Aspen	**16**
Sweet birch	**40**
Total	**1,790**

TABLE 10. ACRES CERTIFIED AS REGENERATED IN FY 01 BY MANAGEMENT AREA

Management Area	Acres
1.0	**5**
3.0	**1,695**
6.1	**90**
Total	**1,790**

On the Allegheny National Forest, more than one reforestation activity may be required in an area in order to establish tree seedlings. For the 1,790 acres certified as reforested in FY 2001, Table 11 shows the combination of reforestation activities that had occurred on them.

TABLE 11. ACRES CERTIFIED AS REGENERATED IN FY 01 BY REFORESTATION ACTIVITY

Reforestation Activity	Acres
Fertilization and site prep	**119**
Fertilization	**199**
Fencing, fertilization, site prep	**10**
Herbicide, fencing	**36**
Shelterwood seed cut[1]	**1,342**
Fencing	**67**

Fencing, release, fertilization	**16**
Fencing, striped maple cutting	**30**
Fencing, site prep	**72**
Herbicide	**149**
Herbicide, release, fence	**33**
Herbicide, striped maple cutting	**63**
Herbicide, plant, fence,	**28**
Herbicide, fence, striped maple cutting	**12**
Herbicide, site prep, fertilization	**174**
No reforestation activity required	**105**
Site prep only	**128**
Striped maple cutting, fertilization, site prep	**60**
Herbicide, fencing, release, striped maple cutting	**23**
Herbicide, fertilization, striped maple cutting	**4**
Herbicide, fencing, site prep	**117**
Striped maple cutting	**32**
Site prep, fencing, planting	**33**
Fertilization, herbicide	**56**
Herbicide, fencing, site prep, release	**57**
Herbicide, site prep	**42**
Fencing, fertilization, herbicide	**42**
Planting, fencing	**65**
Plant, fence, striped maple cutting	**10**
Plant, fertilization, fencing	**8**
Total	1,790

1 *Shelterwood seed cuts - These acres are spread throughout the rest of the reforestation activity categories listed here. Therefore, they should not be included when adding to get the total acres shown below.*

Units Treated with Herbicide

The ANF began to implement an herbicide application program on an operational level in 1987. Herbicides are used to remove understory woody and herbaceous vegetation that interferes with the establishment and growth of tree seedlings. They are used primarily in forested areas to help establish tree seedlings as part of even-aged management systems (the final harvest would not occur until adequate tree seedlings become established). They have also been included in stands being managed under uneven-aged systems. The herbicide glyphosate (RoundUp®) was the only herbicide used until 1989. In that year, one district made a test application of the herbicide sulfometuron methyl (Oust®). In March 1991, the Forest Plan was amended to allow the use of sulfometuron methyl, alone or in combination with the herbicide glyphosate. In recent years, due to changes in the RoundUp® label, ANF personnel have used Accord®.

ANF Personnel conduct substantial on-site monitoring to ensure that treatment occurs as planned, that appropriate mitigation measures are implemented, and to assess vegetation response to treatment. Besides the initial review of the site made at the time treatment is planned, a qualified Forest Service employee is on-site when spraying is in progress to make sure the contractor successfully implements the treatment prescription, including mitigation measures, and to be able to take corrective action promptly, if necessary. Field surveys (stocking surveys) to assess vegetation response are also an important monitoring tool. Management requirements and constraints outlined in Chapter 5 of the Environmental Impact Statement for Understory Vegetation Management and Forest Plan standards and guidelines are considered for each stand that receives an herbicide application.

Stocking surveys (surveys which measure the kinds and quantities of understory vegetation present) are used to monitor the understory development of stands following herbicide application. Generally, surveys are taken annually or bi-annually in stands where treatment has taken place at least two years earlier. We can evaluate the effectiveness of treatments by looking at the amount of seedling development that has occurred since treatment. The survey data includes only seedlings that are more than one year old, taller than two inches and have two or more normal sized leaves. Before spraying, almost all of these areas had virtually no seedlings present. Table 12 displays survey results through FY 2001 for stands treated with herbicides.

TABLE 12. ACRES OF SPRAY AREAS HAVING TREE SEEDLINGS[1]

Year	0-30[2]	31-50[2]	51-70[2]	70+[2]	Final Harvest Complete	No Data	Re-spray Defer & Unknown[3]	Total	% Acs >50% Stock
1987	12	0	13	14	224	0	88	351	72
1988	0	0	84	89	394	15	262	844	67
1989	50	16	113	193	879	41	373	1665	71
1990	49	17	108	156	818	0	203	1351	80
1991	61	41	25	102	282	28	245	784	52
1992	115	93	232	310	722	35	159	1666	76
1993	218	91	168	376	607	34	175	1669	69
1994	129	166	169	514	425	35	21	1459	76
1995	46	95	254	676	277	0	137	1485	81
1996	153	64	147	330	555	4	62	1315	78
1997	171	238	236	847	115	2	29	1638	73
1998	282	74	239	482	276	82	18	1453	69
1999	219	61	220	265	60	32	1	858	64
Sub-total	**1505**	**956**	**2008**	**4354**	**5634**	**308**	**1773**	**16538**	**73**
2000	70	16	84	131	62	150	0	513	na***4***
2001	90	20	0	12	0	0	0	122	na***4***
TOTAL	**1665**	**992**	**2092**	**4497**	**5696**	**458**	**1773**	**17173**	

1 Figure represents the most recent stocking survey taken for a stand.
2 Percent of plots with adequate number of tree seedlings.
3 This category includes areas we were unable to categorize into a stocking category due to data base errors.
4 na = not available. Survey data has not yet been summarized.

Evaluation of Herbicide Results:

Through the end of FY 2001, stocking surveys are available on 14,942 acres of the 17,173 acres treated with an herbicide application between 1987 and 2001. Of the 2,231 acres where surveys are not available:

- 150 acres were treated in either 2000 or 2001 and insufficient time has elapsed to make surveys in these areas worthwhile,

- 308 acres were treated before 2000, however treatments occurred in portions of stands and separate stocking surveys to measure success of herbicide treatments have not been made.

- 1,773 acres treated between 1987 and 2000 have either been resprayed (930 acres), and are being tracked in the year when follow-up treatment occurred – OR – (on 843 acres) are no longer being tracked due to change in management objective for the stand, or treatment failure. Outdated survey data that has been collected in the past is not presented here for these acres.

The discussion of survey results will focus on areas where it has been at least two years since treatment (16,538 acres) because we know that it takes at least three to five years for good seedling development to occur. Final

harvest cuts were sold on 5,634 acres (34%) of the 16,538 acres that were treated between 1987 and 1999. The stocking level was above 70 percent on these acres at the time of the sell. There are 4,354 acres (26%) that have more than 70 percent stocked plots. In addition, the 2,008 acres in the 51-70 percent stocked plot category (or 12 percent of the total 15,680 acres treated) are well on their way to becoming adequately stocked. This means that 73 percent of the acres treated between 1987 and 1999 have become or are making good progress towards becoming adequately stocked with tree seedlings.

A number of environmental conditions can affect the establishment, survival, and development of tree seedlings within the first few years after spraying. Drought can take a heavy toll on seedlings whose roots are shallow. The Forest experienced several droughts during the 1988, 1991, and 1995 growing seasons. Rainfall was below normal during April – October in 1997 (-4.7 inches), 1998 (-2.5 inches), 1999 (-7.7 inches), and 2001 (-2.4 inches). Insect defoliation (cherry scallop shell moth) occurred on 205,000 acres across the Forest in 1995. This defoliator removed the leaves from overstory trees as well as the understory seedlings. In areas where seedlings did not develop quickly after herbicide application, the potential for re-invasion by fern and grass was high. In the last 7 years, conditions favorable for seedling development have occurred in 1996 and 2001.

Overall program success can also be looked at by examining the survey results that have been reported in our previous annual monitoring reports. Table 13 displays the trends in seedling development over time by looking at the acres reported in Table 12. Each line displays the total number of acres for that monitoring year where it had been at least two years since treatment, and the number of acres which were more than 50 percent stocked with seedlings.

TABLE 13. TRENDS IN SUCCESSFUL SEEDLING DEVELOPMENT IN STANDS WHERE AT LEAST TWO YEARS HAVE ELAPSED SINCE TREATMENT

Survey Year	Total Acres Treated	Acres >50% Stocked
1991	**2,890**	**891 (31%)**
1992	**4,221**	**1,824 (44%)**
1993	**4,995**	**3,684 (74%)**
1994	**6,661**	**3,964 (60%)**
1995	**8,360**	**5,300 (64%)**
1996	**9,819**	**5,873 (60%)**
1997	**not calculated**	**not calculated**
1998	**not calculated**	**not calculated**
1999	**14,227**	**9,454 (66%)**
2000	**15,680**	**10,738 (68%)**
2001	**16538**	**11,996 (73%)**

The data shows that seedling development success where it has been at least two years since treatment is variable. Data reported in 1991 and 1992 reflects a period where program development occurred, where we gained a better understanding of site selection criteria and treatment protocols. From 1993 through 1996, seedling stocking has equaled or exceeded 60%, although variability in seedling establishment is evident. We know that drought and defoliation can impact seed production and seedling development. We believe that droughts that occurred in 1991 and 1995 and the rainfall deficits during the 1997 – 1999 growing seasons, as well as defoliations from elm spanworm and cherry scallop shell moth that occurred from 1991 through 1996 are reflected in seedling response rates reported here. The improvement in seedling development from 1996 (60%) to 2001 (73%) is quite encouraging, especially when considering the stress factors on seedling development from 1995 through 2001.

The ultimate goal of the herbicide program is to bring seedling counts to a high enough level so that a final harvest cut can occur. In some cases, it is necessary to include a shelterwood seed cut in this process. From 1991 through 2001, shelterwood seed cuts occurred on 6,356 acres that had been treated with an herbicide application. These areas had very dense overstory tree canopy that was inhibiting seedling development. The shelterwood

seed cut was designed to remove enough trees so adequate light will reach the forest floor to stimulate tree seedling development and growth. Within the next few years, adequate seedlings should begin to develop in most of these areas since lighting and conditions for seedling establishment and growth will be improved.

Table 14 on the following page summarizes the acreage treated with herbicides in past years where seedlings have become successfully established and where a final harvest cut was sold since 1991.

The herbicide program plays an important role in the timber harvest program on the Forest. In 2001, 373 acres (63%) of the 591 acres prepared to sell as final harvest on the Forest had been treated with an herbicide. Final harvest cuts have been sold in 5,643 acres where herbicides have been applied. This represents 33 percent of the total number of acres treated with herbicides through the end of FY 2001 (17,173 acres). A total of 884 acres of selection cutting have also been sold. Stocking survey data indicates that there are another 4,497 acres that have seedling densities high enough to qualify for regeneration cutting (see Table 12). The 2,092 acres in the 51-70 percent stocked category should soon qualify for a final harvest cut if favorable seedling growth and development continues to occur.

TABLE 14. ACRES OF FINAL HARVEST CUTS SOLD IN FY 91 THROUGH FY 01 IN AREAS TREATED WITH HERBICIDE SINCE 1986

Year of Herb. Trtmnt	Year Final Harvest Sold											Total Acres Sold	Total Acres Treated w/ Herbicide
	FY 91	FY 92	FY 93	FY 94	FY 95	FY 96	FY 97	FY 98	FY 99	FY 00	FY 01		
1987	66	0	112	0	0	46	0	0	0	0	0	224	351
1988	66	91	87	0	61	83	6	0	0	0	0	394	844
1989	24	157	202	201	145	64	60	0	0	0	16	869	1,665
1990	9	58	120	40	204	274	101	0	0	0	12	818	1,351
1991	32	39	4	19	99	37	45	0	7	0	0	282	784
1992	78	31	0	0	120	45	273	44	131	0	0	722	1,666
1993	10	0	86	40	0	28	146	59	78	0	160	607	1,669
1994	44	5	0	54	0	48	69	104	75	0	26	425	1,459
1995	0	5	6	12	0	9	22	51	64	21	87	277	1,485
1996	6	0	21	39	0	23	0	0	269	117	68	543	1,315
1997	10	0	7	0	13	25	0	0	25	0	4	84	**1,638**
1998	**24**	0	0	41	24	78	36	0	29	44	0	276	**1,453**
1999	**19**	0	0	0	0	5	36	0	0	0	0	60	**858**
2000	**0**	0	0	0	0	62	0	0	0	0	0	62	**513**
2001	**0**	0	0	0	0	0	0	0	0	0	0	0	**122**
Total	388	**386**	**645**	**446**	**666**	**827**	**794**	**258**	**678**	**182**	**373**	**5643**	17,173

**** Acres shown here were prepared for sale in FY 99, however actual award of sale did not occur until FY 2000.***

Summarize Size of Final Harvest Blocks by Management Area [36 CFR 219.12(k)(5iii)]

Method of Measure: Summarize data from timber sale prospectus and appraisal report for each sale.

Monitoring Results:

MA	Average Size (acres)	Minimum Size (acres)	Maximum Size (acres)	MA Maximum Size (acres)
3.0	**16**	**3**	**40**	**40**

The size of final harvest units in timber sales awarded in FY 2001 conformed to management area direction.

Volume of Hardwood Sawtimber, Pulpwood, and Firewood in Timber Sales Awarded

Method of Measure: Automated Timber Sale Accounting System (TSA) and Timber Activity Control System (TRACS)

Monitoring Results:

TABLE 15. VOLUMES AWARDED TO TIMBER SALE PURCHASERS

	FY 01 Volume of Sale (MMBF)[1]	FY 01 $ Return of Sale [1]	Total MMBF since 1986
Sawtimber	**7.9**	**18,728,278**	**427.5**
Pulpwood	**4.8**	**15,454**	**386.3**
Fuelwood	**1.0**	**10,860**	**22.9**
Total	13.7	18,754,592	836.7

[1] ***From TSA Report 478.***

Evaluation of Results: The total budgeted FY 2001 target for timber offered for sale was 34.0 million board feet. The actual volume offered for sale was 25.9 million board feet, or 76 percent of the target. The volumes shown in Table 15 are based on "award," which includes those sales for which a valid contract had been awarded by the end of the fiscal year. The offered volume is substantially below the target due to delays, harvest volume losses, and litigation associated with the East Side EIS. The total volume awarded in FY 2001 (13.7 MMBF) was well below historical averages for the same reasons.

Units of Accomplishment by MA for the Following Activities

Method of Measure: Commercial cutting activities are from sales awarded in FY 2001. The information source is the Combined Data System (CDS) and Timber Sale Accounting (TSA) reports.

TABLE 16. FY 2001 ACCOMPLISHMENTS, BY MANAGEMENT AREA

Activity	MA 1.0	MA 2.0	MA 3.0	MA 6.1	MA 6.2	MA 6.3	MA 6.4	MA 8.0	MA 9.1	Totals
Hardwood Sawtimber (MMBF)	**0.1**	**0.1**	**7.4**	**0.2**	**0.1**					**7.9**
Hardwood Pulpwood (MMBF)	**0.1**	**0.1**	**4.4**	**0.2**						**4.8**
Hardwood Fuel (MMBF)			**1.0**							**1.0**
Final Harvest with Residuals (Acres)	**1**	**7**	**556**	**22**	**5**					**591**
Shelterwood Seed (Acres)			**328**	**88**						**416**
Thinning (Acres)			**619**	**8**						**627**
Selection Cut (Acres)										**0**
Acres Certified without Site Prep			**105**							**105**

Timber Stand Improvement (Acres)										**0**
Herbicide (Acres) *			**65**	**20**	**37**					**122**
Fertilization (Acres)			**716**	**6**	**55**					**777**
Fencing (Acres)	**11**	**14**	**690**	**46**	**37**					**798**
Planting/Seeding (Acres)	**11**		**142**							**153**
Site Prep (Acres)		**23**	**750**	**45**	**165**					**983**
Release (Acres)			**499**							**499**
Striped Maple Cutting (Acres)			**78**							**78**

**** Includes Re-spray Acres***

Evaluation of Results: Final harvest acreage is less than the Forest Plan average because less than the expected amount of advanced regeneration is being found during site-specific analysis. Timber harvests cannot take place until there is adequate advanced regeneration on the site. During the last several years, it has been lower for the same reasons (mentioned in the last subsection) that harvest volumes awarded have been low.

Timber stand improvement, as specified in the Forest Plan, is implemented to complete the silvicultural prescription only where the pulpwood is not removed in the commercial timber sale. In FY 2001, all pulpwood was cut and/or removed in sales, so none of this kind of timber stand improvement was necessary.

The Forest's herbicide program is lower than planned. We began this program in 1987 by treating a relatively small acreage, and monitoring those areas closely to ensure the equipment and technology used were appropriate for the various sites. We soon found we needed to make some adjustments to ensure effective and efficient control of the target vegetation. New technology now provides for better control of a wider range of species. With the 1991 addition of sulfometuron methyl as a valid treatment technique and a new and better sprayer in 1992, effective control of competing understory vegetation can now be considered on many more sites.

Fertilization stimulates rapid tree seedling growth so seedlings quickly grow beyond the deer browsing height. Fertilization is a function of past final harvest cuts. It is completed only in stands that have a high component of black cherry, significant deer pressure, and dense enough black cherry regeneration. It is used to stimulate trees to rapidly grow above the deer browsing height.

Pre-fencing combined with shelterwood cut or herbicide is used to establish advance regeneration quickly and, where there are adequate seed sources, with a greater diversity of tree species. To accomplish these objectives, personnel have fenced more acres than were anticipated in the Forest Plan. Fencing has also been used in mortality areas.

Site preparation is necessary when a significant amount of damaged or small diameter, poor-quality stems remain following a final harvest cut. To prevent interference with new seedling development, they must be cut with a chainsaw.

In 1995, Forest personnel initiated a tree release program in regenerating stands. Release generally is carried out when stands are between 5 and 20 years (or perhaps 30 years) of age, depending upon site-specific stand development patterns, weather conditions, and deer browsing effects. In many instances it is difficult to forecast whether release will be needed; the final determination of need is based on site-specific surveys conducted at appropriate times during the stand regeneration process. Desired tree seedlings or saplings sometimes grow more slowly than other competing vegetation in young, developing forest stands. In order to assure the desired seedlings/saplings survive, we release them by cutting down the taller, competing vegetation. The treatment can be used to regulate tree species composition to those species best suited for either even-aged or uneven-aged management or for site conditions. Release can also promote growth and survival of species not common on the site (such as aspen, oak, ash, and cucumber) that are at risk of being killed by species that can outgrow them; in this situation release has the potential to increase tree species richness.

Release is expected to improve tree species composition on the ANF over the long term. (USDA-FS 1998, pp 26 & 79; Marquis 1994, pp 269 & 282)

Striped maple cutting occurs where tall, dense striped maple is interfering with tree seedling establishment and growth. If tree seedlings are abundant beneath the taller striped maple, hand cutting the striped maple concurrent with the overstory removal may adequately stimulate seedling development. 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 our 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).

Suitable And Unsuitable Lands

There is a requirement in 36 CFR 219.12(k)(5ii) that every 10 years land not suited for timber production shall be evaluated to determine whether it has become suited. If it is found to be suitable, this land is to be returned to timber production. This category of monitoring will assure that information is gathered which can be used to determine this suitability.

Method of Measurement: Determine suitability on a stand-by-stand basis during vegetation examination data collection.

Monitoring Results: Lands designated as not suited for timber production in the Forest Plan (Table C-3) have not become suited during the last 10 years.

In 1992, Forest personnel initiated and completed an intensive data collection effort designed to provide a better description of vegetation and site characteristics (including suitable and unsuitable lands) on 300,000 acres of Management Area 3. Data was collected on 6,000 plots located 1/4-mile apart.

Analysis of the data indicates additional acres are temporarily not suited for final harvesting until we learn more about reforestation response on them or develop appropriate reforestation practices. Because the sample was designed to provide us with a large-scale estimate, we do not have an accurate inventory of the specific sites. Reliable, site-specific data will not be available for several years. Additional details regarding the analysis we have completed thus far are included in Appendix L of the November 1995 "Analysis of Timber Harvest Program Capability 1995 through 2005" for the Allegheny National Forest.

FOREST HEALTH

Summarize Significant Changes in Health and Vigor of Stand Conditions [36 CFR 219.12(k)(5iv)]

Method of Measure: Annually from vegetation examination, vegetation data, aerial observation, and ground observation.

Monitoring Results: Overall tree health and vigor in the oak forest type has improved from that observed in 1988/89 when tree mortality from the combined effects of several gypsy moth defoliations and drought was at its peak. Little tree mortality has been identified in the oak type since then.

Such is not the case for the northern hardwood type. Substantial tree mortality developed in 1994, and tree decline continued between 1995 and 2001. Since a large portion of the Allegheny hardwood type was defoliated for a second time in 1995 and suffered a severe late-summer drought, ANF personnel became quite concerned about the health and vigor of the Allegheny hardwood forest type. Fortunately, the 1996 growing season was marked by abundant and regular precipitation, ideal conditions to permit some trees to begin to recover. Rainfall was less than normal during the 1997 through 1999 growing seasons, returned to normal in 2000, but was again

below normal in 2001. These relatively frequent rainfall deficits have no doubt limited tree recovery. There are, however, a number of forest health concerns that adequate rainfall cannot ameliorate, including sugar maple decline and beech bark disease impacts. Investigations are underway to determine some of the factors contributing to sugar maple decline.

Recent (since 1994) Tree Mortality/Decline

Background: Recent insect and disease impacts on the Allegheny hardwood and northern hardwood forest types have created substantial stress on trees. Severe 1988, 1991, and August/September 1995 droughts and rainfall deficits during the 1997 through 1999 and the 2001 growing seasons are also a factor. Over half (260,000 acres) of the Allegheny National Forest was moderately to severely defoliated in 1993 by several species of forest insects, primarily the elm spanworm. In 1994, over 72,000 acres were defoliated by forest tent caterpillar and cherry scallop shell moth, and in 1995, the cherry scallop shell moth defoliated cherry on over 205,000 acres. Fortunately in 1996, populations of defoliating insects returned to their normal, non-outbreak levels. The only defoliation, which occurred, was 11,800 acres from cherry scallop shell moths. No measurable defoliation occurred in these forest types between 1997 and 2001.

Prior to 1994, we reported finding increasing amounts of sugar maple dieback, sparse foliage, and tree mortality. In 1994, the new tree mortality we detected far exceeded that which had occurred in recent years. A substantial part of it appeared to have developed suddenly that year. We believe a series of environmental stresses caused the mortality, including repeated defoliation and several droughts, though site characteristics may also play a role. Evaluation of color infrared photos taken in mid-August 1994 showed that 89,565 acres of Management Area 3 had higher levels of tree mortality (29% of MA 3). Over half of it appeared to be moderate to severe.

Additional mortality occurred between 1995 and 1999, though it expanded to include black cherry (which has suffered repeated cherry scallop shell moth defoliations). Both the size of the area affected by tree mortality and the intensity of tree mortality will no doubt increase over the next few years as trees respond to the multiple stresses that have already occurred. It usually takes several years for the full impact to develop. Adequate soil moisture is important when trees are recovering from stress. Though rainfall was excellent during the 1996 growing season, rainfall reported for Warren County between April 1, 1997 and November 9, 1997 showed a deficit of almost 4.7 inches. For the April 1, 1998, to November 1, 1998, period, the deficit was 2.51 inches, and for April 1, 1999 through November 1, 1999, the deficit exceeded 7.7 inches. From April 1 through October 15, 2000, rainfall was 2.75 inches above normal, but it was 2.44 inches below normal between April 1 and October 28, 2001. In 2001, Bradford and Kane reported even higher deficits at -10.22 inches and -6.84 inches, respectively.

Analysis: Northeast Forest Experiment Station (NEFES) Research Note NE-360, "Characteristics of Declining Forest Stands on the Allegheny National Forest," published in June 1996, provides an additional summary of the species impacted by the 1994 decline. A summary of those findings was published in the FY 95 Monitoring and Evaluation Report.

In 1999 McWilliams and others updated this analysis to include an additional 529 stands (10,533 acres), primarily located within what is now called the Eastside project area, which showed substantial symptoms of tree decline. Stand data was collected in this second group of stands in 1995 and 1996. This second group of stands inventoried was believed to contain lesser amounts of dead and dying trees.

When analyzed together, the 1994, 1995, and 1996 data collected included 869 stands (18,876 acres) and represents a fairly large, site-specific inventory and independent analysis of conditions within the project area on sites where tree mortality and decline is most evident. Figures 1 and 2 below display the results of this larger area analysis by tree status and species group. Dead trees and trees at risk of dying account for 18.7% of the total basal area in this larger sample while they accounted for 28% of the total basal area in the smaller sample which was known to include areas where tree decline was more severe.

FIGURE 1. PERCENT OF BASAL AREA BY TREE STATUS FOR STANDS WITH NO SIGNIFICANT FOREST DECLINE SYMPTOMS

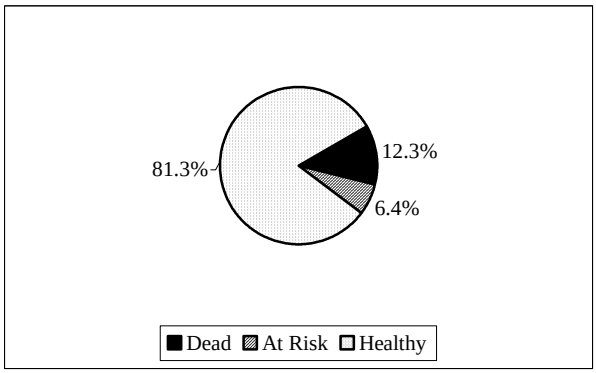
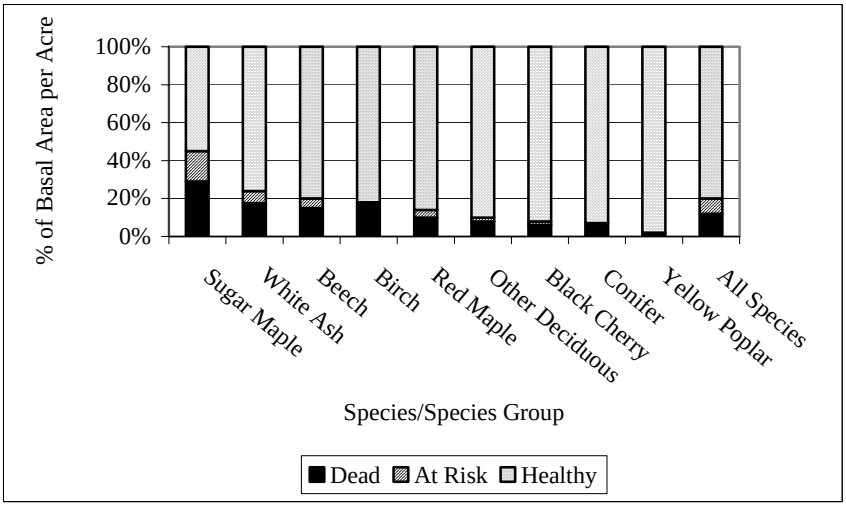


FIGURE 2. PERCENT OF BASAL AREA PER ACRE BY TREE STATUS/SPECIES GROUP FOR STANDS WITH SIGNIFICANT FOREST DECLINE SYMPTOMS



This expanded analysis also served to confirm the understory vegetation conditions described in the 1996 analysis. Adequate numbers of tree seedlings are present in only 8 percent of sampled stands. Vegetation that interferes with tree seedling development and growth is present in sufficient quantities to require treatment in 93 percent of the stands examined. Sparse regeneration and the abundance of interfering vegetation continue to raise serious concerns about tree seedling development and survival as well as the long-term maintenance of forest cover on sites where tree mortality and decline are or may become most severe.

Between 1995 and 1997, ANF personnel completed eight environmental assessments that looked at site-specific tree mortality and ecosystem sustainability on the ANF. Reforestation of affected sites is a key issue addressed. Those analyses covered 81,232 acres (through there is some overlap of the areas examined, and they include more than just Management Area 3) and prescribed the following kinds of treatment:

Type of Treatment	Acres
Thinning harvests	**5,873**
Sanitation harvests	**12**

Clear cuts	**606**
Shelterwood seed cuts	**3,538**
Two-aged harvests	**635**
Selection harvests	**356**
Shelterwood removal cuts	**1,072**
Reforestation treatment with no final harvest	**1,420**
TOTAL	13,512

We continue to work cooperatively with NERS personnel, Forest Health Protection, the Pennsylvania Bureau of Forestry and Pennsylvania State University on several projects designed to determine some of the causal factors or environmental conditions, which have set the stage for tree mortality.

Mortality II EA: In October 1997, the Federal Court for the Western District of Pennsylvania, located in Pittsburgh, ordered ANF personnel to revisit specific facets of the Mortality II analysis (one of the eight environmental assessments mentioned above) and to prepare an Environmental Impact Statement. The Court enjoined ANF personnel from implementing the Mortality II Project. This work is time-sensitive due to the urgency of completing the harvest before the dead/declining timber loses its value, and due to the need to complete reforestation treatments before field conditions deteriorate further. The following treatments were included in the Mortality II Project.

Type of Treatment	Acres
Thinning	**2,440**
Two-aged	**49**
Shelterwood seed cuts	**1,891**
Overstory removal cuts	**395**
Selection harvest	**356**
TOTAL	5,131
* **Reforestation treatments**	**4,363**
* **Reforestation with no harvest**	**988**
TOTAL	5,351

**** Reforestation treatments include herbicide, fencing, planting, and site preparation. More than one treatment may occur on a site.***

East Side Project EIS:

In response to the October 1997, order from the Federal Court in Pittsburgh for the Western District of Pennsylvania, ANF personnel initiated the East Side Project EIS. This project is designed to analyze many of the areas originally included in the Mortality II EA (see above). It also includes areas formerly identified as part of several other projects.

The East Side Project EIS considers treatment activities within a 140,000-acre (Federal land) zone of mortality, which is closely linked to a series of defoliation and drought events (described in previous sections of this report).

Initial project scoping and comment analysis have been completed. During FY 1999, the Interdisciplinary Team began evaluating alternatives and environmental consequences. Limited project work occurred during a portion of 1999 while ANF personnel consulted with the U.S. Fish and Wildlife Service regarding new threatened and endangered species information. Following receipt of the U.S. Fish and Wildlife Service Biological Opinion, ANF personnel reviewed East Side project stand prescriptions to ensure they complied with the terms and conditions of the opinion, and with the provisions of the ANF Threatened and Endangered Species Amendment. The East Side Project Draft EIS was completed in April 2000. Public comments were evaluated, and a Final EIS was published in December 2000. The decision was appealed in February 2001, and the Regional Forester

affirmed the decision in March 2001. Since May 2001, the project has been the subject of litigation in the US District Court for the Western District of Pennsylvania.

The following treatments are part of alternative 1, the selected alternative, in the FEIS.

TABLE 17. SILVICULTURAL ACTIVITIES IN THE PROPOSED ACTION FOR THE EAST SIDE PROJECT

Type of Treatment	Acres
Total Reforestation	**11,411**
Salvage Final Harvest	**2,018**
Green Final Harvest	**818**
Green Two-Age	**142**
Salvage Two-Age	**203**
Salvage Thinning	**2,479**
Green Thinning	**1,778**
Salvage Selection	**155**
Green Selection	**272**
Green Transition Cut	**18**
TOTAL HARVEST	7,883

September 1994 Tornado

In early September 1994, a tornado touched down at a few locations on the Marienville and former Sheffield Ranger Districts. Damage occurred intermittently along a path that extended for 9.8 miles on the Marienville District and 3.5 miles on the former Sheffield District. The amount of damage ranged from minor patches of partial blow down to patches of complete blow down in a swath that is 800-900 feet wide. Three environmental documents were prepared to address salvage and reforestation needs. A total of 545 acres of salvage thinning and 220 acres of salvage clear-cut were sold in FY 95. By the end of FY 96, 231 acres of the salvage thinning and 183 acres of the salvage clear-cut had been harvested. The remaining 314 acres of salvage thinning and 47 acres of salvage clear cuts were completed in FY 97 and 98. Reforestation work and stocking surveys are either in progress or scheduled to be completed at the appropriate time in the regeneration areas. The latest stocking surveys indicate 48% of the salvage clear-cut acreage has adequate tree seedlings, 14% are probable successes, and 38% may fail to become established without additional reforestation work.

May 1995 Tornado

In May 1995, a tornado touched down on the former Sheffield Ranger District. Approximately 391 acres of partial to severe blow down occurred. In FY 96, 262 acres of salvage thinning and 16 acres of salvage seed tree cutting were sold. Treatment options for the remaining 113 acres of blow down were analyzed in FY 96; 13 acres were included in a shelterwood seed cut that was part of the FY 97 sale program, and 100 acres of light blow down in areas managed to provide old-growth values were excluded from salvage harvest since it provides dead and down material, an important old-growth component. Harvests were completed in these areas in FY 97. Appropriate reforestation work has been prescribed, and tree seedling development will be monitored through stocking surveys. The latest stocking surveys show the seed tree harvest area is 96% stocked with tree seedlings, and the shelterwood seed cut area is 80% stocked with tree seedlings. No additional harvest is planned at this time for these areas.

May 25, 1995 Hail Storm Damage

A severe hailstorm on May 25, 1995, defoliated 4,880 acres of forestland on the Sheffield unit. Light defoliation occurred on 1,920 acres and moderate to severe defoliation on 2,960 acres. Almost all of this area was subsequently defoliated again by cherry scallop shell moth in July/August 1995, and all of it suffered from the 1995 late summer drought. In 1996 and 1997, many of the tree crowns were thin and poorly developed in the most severely damaged portion of this area. In 1997, about one-third of the black cherry on a monitoring plot had crowns with a low vigor class rating; by FY 2000, only 5% of the trees on the plot had a similarly low vigor class rating. Substantial tree mortality or decline has developed in part of the area. Management options for this area are being analyzed as part of the West Branch of Tionesta and the Duck - Sheriff Projects. Analysis of the West Branch of Tionesta Project is scheduled to begin in 2003. The Duck - Sheriff Project FEIS, which was completed in August 2000, evaluated approximately one-third of the moderately to severely defoliated area. The preferred alternative designated 137 acres for salvage harvest, thinning on 59 acres, delayed shelterwood removal on 12 acres, and two-aged harvest on 66 acres. Appropriate reforestation work and stocking surveys were also prescribed. No harvest or reforestation activity had occurred through the end of 2001.

1998 Blow down

In early June 1998, a major windstorm blew down a substantial number of scattered large trees on the Marienville Ranger District. two to three strips of strong, straight-line winds, which touched down sporadically along a path beginning west of Guitonville in the Devil's Hollow Area, tracking ENE through Byromtown, then turning ESE through the Parrish and Steck Run Areas, characterized it. The system then headed east through State Gamelands, caused damage in the Bear Creek Valley Area, and then moved off the ANF onto private land near the Ridgway Reservoir.

In mid August 1998, a series of severe thunderstorms blew down trees in the North Central part of the Marienville Ranger District. Scattered blow down occurred beginning in the Rocky Run Area (SW of Lynch) and followed a path that ended north of Russell City.

On the Bradford Ranger District, these windstorms blew down scattered large trees in 12 areas, ranging from 2 acres to 10 acres in size, located on the southern portion of the District.

Approximately 725 acres of partial and 7 acres of complete blow down from these two events occurred in areas where there were already active timber sales. Appropriate salvage activity occurred through these existing sales. Another 1490 acres of partial blow down and 7 acres of complete blow down are being reviewed to determine management options.

In FY 99, evaluation of these areas was on hold pending completion of consultation with the U.S. Fish and Wildlife Service regarding new threatened and endangered species information. In FY 2000, ANF personnel began evaluating these areas as part of the ANF Windthrow Project Environmental Assessment. Evaluation continued in FY 2001.

1999 Blow down

In June 1999, a major windstorm blew down a substantial number of large trees scattered across the Bradford and Marienville Ranger Districts. Most of the areas where damage occurred are characterized by partial blow down; however, field reconnaissance is underway to more accurately characterize the affected areas. Over 400 acres were affected on the Bradford District plus an undetermined acreage in the Allegheny Front National Recreation Area. On the Marienville District, approximately 100 acres of scattered blow down occurred in numerous areas of about ¼ acre each. Management options are being evaluated in the ANF Windthrow Project EA, taking into account new information regarding threatened and endangered species management.

Summarize the Effectiveness of Insect and Disease Control Efforts and Status, as Determined by Forest Health Protection personnel [36 CFR 219.12(k)(5iv)]. Summary will include a Measure of Mortality Occurring, Especially from Major Outbreaks.

Methods of Measurement:

- Aerial survey by Forest Health Protection Staff
- High altitude aerial photography
- Low altitude aerial photography
- Field observations

Gypsy Moth

No gypsy moth spraying or detectable defoliation occurred in FY 97 or FY 98, and only a small area of light defoliation was detected in FY 99. Forest Health Protection (FHP) personnel conducted egg mass surveys and prepared an entomological evaluation to assess the defoliation potential for FY 2000. After increasing for two years, gypsy moth populations again collapsed, Forest wide. The egg masses that were found were very small, indicating a much-stressed population. A combination of the effects of the fungus Entomophaga maimaiga and the Nuclear Polyhedrous Virus (NPV) probably caused this collapse. It is not yet clear how these two potential control factors will affect gypsy moth populations in the future. No gypsy moth spraying or detectable defoliation occurred in FY 2000 or 2001.

Evaluation of Results: Following a gypsy moth population crash, egg mass and caterpillar densities usually remain low for two to five years before they begin to build again to higher levels. With the exception of the small amount of light defoliation in 1999, the last observed gypsy moth defoliation on the ANF was reported in the spring of 1993. FHP personnel will continue to monitor defoliation. When significant defoliation develops, they will again begin to assess egg mass sizes and densities, the indicator used to help assess defoliation potential and possible treatment needs for the coming spring.

Beech Bark Disease Complex

Beech bark disease complex is killing American beech trees on the Allegheny National Forest. The disease begins when beech scale insects infest the trunk of an American beech tree. The wounds they create are then invaded by fungi (primarily Nectria sp.). Nectria infections result in lower tree quality, or the resulting cankers may coalesce to girdle and kill the tree.

Two waves of tree infestation or colonization actually occur. The first is the wave of colonization by the scale insect, known as the "Advancing Front." The second, known as the "Killing Front", occurs as the fungus colonizes the feeding wounds left behind by the advancing scale insects.

Monitoring Results: In 1996, personnel (P. Gundrum, A. Iskra, and M. MacKenzie) from the USDA Forest Service, Forest Health Protection Staff, Morgantown, WV, completed a field evaluation of the status of the beech bark disease on the Allegheny National Forest. A report was written to document the location of the leading edge of both of these fronts.

Results from a previous survey (1990) showed the "Advancing Front" of the beech scale complex on the ANF was located north of a line drawn between Warren PA, and the Kane Experimental Forest, covering about 30 percent of the area within the proclamation boundary. Generally, beech scale populations were scattered within the southern portion of this area where about 16 to 18 percent of the beech was dead or affected by the disease complex. Populations of the disease complex increased as one moved further north and east. The "Killing Front" was located in the northeastern section of the Bradford Ranger District, affecting about five percent of the ANF. Within the "Killing Front", about 88 percent of the beech was dead or affected by the complex. The disease was spreading in a SW direction at about 2.5 miles per year. It was also present at one outlying location (ahead of the advancing front) in the Heart's Content Scenic Area.

The 1996 resurvey of the ANF revealed that the percentage of the ANF infested with the scale insect ("Advancing Front") had more than doubled from 30 percent to 70 percent of the ANF. The uninfected area is on the southern border of the ANF. Within the same period, the "Killing Front" had also doubled in size, now covering 10

percent of the ANF. The area occupied by the "Killing Front" encompasses only 14 percent of the area occupied by the scale insect.

Three fungi are involved in killing the trees, two native and one exotic. On the ANF, the scale insect is spreading much faster than the Nectria fungus, unlike other areas within the Northeastern US. For example, a survey completed in 1996 on the Monongahela National Forest in West Virginia revealed that the "Killing Front" encompasses 70 percent of the area occupied by the scale.

Three permanent beech bark disease-monitoring plots (containing 400 trees) on the ANF have been examined annually since 1986. Two plots are located within the northeast section of the ANF and one more southerly, near Westline.

1996 Survey Results: Combined plot data reveals that 5 percent of the trees on the plots had died by 1991. By 1996, 14 percent were dead. Presently scale insects are found on 71 percent of the beech trees, down from the 87 percent observed in 1991. While the total number of scale-infested trees may not be substantially different between 1991 and 1996, the number of trees classified as moderately to heavily infested differs substantially, dropping from 41 percent in 1991 to 13 percent in 1996. Nectria was initially found on 3 percent of the trees and in 1996 was found on only 1.5 percent of them.

1997 Survey Results: Despite the above-mentioned advance of the beech bark disease scale Cryptococcus fagisuga on the Forest, an increase in the amount of scale on individual trees has not occurred. Very light to light scale populations observed in past years still occur within the permanent plots. However, the percent of beech with any incident of scale increased from 71 percent in 1996 to 75 percent in 1997.

Scale density trends may continue to be low due to the very smooth scale resistant bark found on many beech within the survey plots. Additionally, the northerly climate conditions within this area might attenuate large-scale buildup.

Tarry spots, the beech response to the presence of the developing beech bark disease fungus, Nectria coccinea were found on only 27 trees or 7 percent of the total trees in all 3 plots. Nectria sp. fruiting bodies were observed on only two trees at 0.6% percent of the total trees in all three plots. Asexual fungal fruiting associated with Nectria sp., the fungal hyperparasite, Nematogonum sp., and the secondary scale Xylococculus betulae was not observed.

1998/1999 Survey Results: No additional surveys or data collection occurred in 1998 or 1999. Data collection is planned for FY 2001.

2000 Survey Results: The distribution of the scale was remapped in 2000. Today, the scale is essentially distributed over all of the forest. The probability of finding scale in a particular stand is related to the probability of finding a beech tree in the stand. That is not to say that all trees are infested, just that the more beech a stand contains, the greater is the chance of detecting the scale. The level of scale infestations varied across the forest. In some locations, the scale was extremely heavy, and in others, it was very light. There appeared to be no detectable pattern to the scale intensity; however, it is more likely that there is a pattern, and that it is related to a complex interaction of local biological and environmental factors.

2001 Survey Results: All three permanent plots were visited in 2001, and two plots were remeasured. Most of the trees on the third plot were removed during the construction of a gas well. On the remaining two plots, 23% of the trees are dead, an increase from the 14% reported in 1996. Scale insects are found on 96% of the beech trees, an increase from the 75% reported in 1997. Close to 26% of the trees have Nectria sp fruiting bodies, a substantial increase from the 3% reported in 1996 and the .6% reported in 1997, though at least part of the increase may be due to the timing of the surveys. Most significantly, eight trees on the two plots measured bore no evidence of beech bark disease. They had no Nectria sp., no canker, and no scale. These 4% of the remaining beech trees may be resistant to beech bark disease complex. They will be investigated for resistance using the foam board technique. Although only 4% of the trees appear to be resistant, some 77% of the trees on the two

plots measured are still alive. Of these remaining live trees, 30% are heavily cankered. While scale populations, being subject to environmental conditions, can rise and fall, cankering is forever. Once cankering has been initiated, it does not go away. Thus, emphasis should be placed on the level of cankering when looking for trees that may be resistant to beech bark disease complex.

Evaluation of Results: The beech scale insect continues to advance across the ANF, now covering 2.3 times as much of the proclamation area as it did in 1990. It can be found on almost all of the ANF. The scale insect is becoming more abundant, particularly in the central and southern portions of the ANF that have more recently become infested. Tree mortality and the percentage of trees infested with scale continue to increase within the 1990 killing front. It will be several years before we can begin to characterize the aftermath forest.

Management recommendations provided in the 1992 ANF Monitoring and Evaluation Report still apply.

Dogwood Anthracnose

Dogwood Anthracnose, a fungal disease of flowering dogwood that is most likely not native to North America, occurs in 23 eastern states (including Pennsylvania), and has spread to the northern limit of flowering dogwood's native range. It was first reported in New York in the mid-1970's. It attacks trees of all ages and sizes. Since it prefers cool moist conditions, trees are more susceptible at higher elevations and along waterways.

Dogwood Anthracnose first attacks the leaves and twigs in the tree's lower crown. During spring and early summer, the injured leaves have tan spots with purple rims. Twig dieback occurs next, along with the development of cankers on the twigs, branches, or trunk of the tree. Dogwood trees often die two to five years after being attacked by the fungus. Mortality has been very extensive in some southern states, where more than 80% of dogwood stems have died of this disease.

Through the end of 1996, in the four county area that includes the ANF, this anthracnose had been detected in only Warren and McKean Counties. In 1998, a Forest Health Protection staff pathologist from Morgantown, West Virginia, established Dogwood Anthracnose monitoring plots west of Tionesta in the Jamieson Run area of Forest County. Spring 2000 evaluation detected no evidence of anthracnose on the plots, but anthracnose was confirmed on the plots in 2001.

Pine Budworm

In 1994, about 1,500 acres of red pine plantation on the Marienville Ranger District became infested with pine budworm. Defoliation was heavy there. In 1995, these trees improved in appearance, developing more green needles in their crowns. They also suffered much less defoliation.

No defoliation occurred between 1996 and 2001. Tree crowns in previously defoliated areas continued to improve. Though the older foliage remained abnormally thin, as expected, the new growth appeared to be normal. Forest Health Protection personnel believe one good way to help maintain healthy red pine is to closely regulate stand density. Thrifty, vigorously growing trees demonstrate better recovery than do trees growing poorly in dense, over-stocked conditions.

Pear Thrips and Maple Decline

History in Pennsylvania: The pear thrip is a tiny insect that feeds on the expanding buds of many trees, but of particular importance are sugar maple and black cherry. It was first observed in Pennsylvania in 1912, feeding in fruit orchards in Erie County. It was not identified as a forest pest until 1979 when, following heavy defoliation in 1978, it was found to have caused severe leaf damage on an estimated 73,000 acres in Pennsylvania. Recent literature reports the pear thrips insect serves as a vector for a fungus that enters the thrips-created wound on the leaf and causes necrosis, deformity, and discoloration of the leaf tissue. There have been two cycles of recent Pear Thrips damage. In the first cycle, the acreage affected statewide increased from 11,000 acres in 1985 to a high of 1.3 million acres in 1988, followed by a reduction to about 500,000 acres in 1989, 186,600 acres in 1990,

and to no mapable acres in 1991 or 1992. In 1993, PA DEP estimated over 335,000 acres in Pennsylvania had moderate to severe pear thrips damage, though the damage was difficult to assess since it was obscured by widespread elm spanworm defoliation. From 1994 through 2001, pear thrips damage has been minimal.

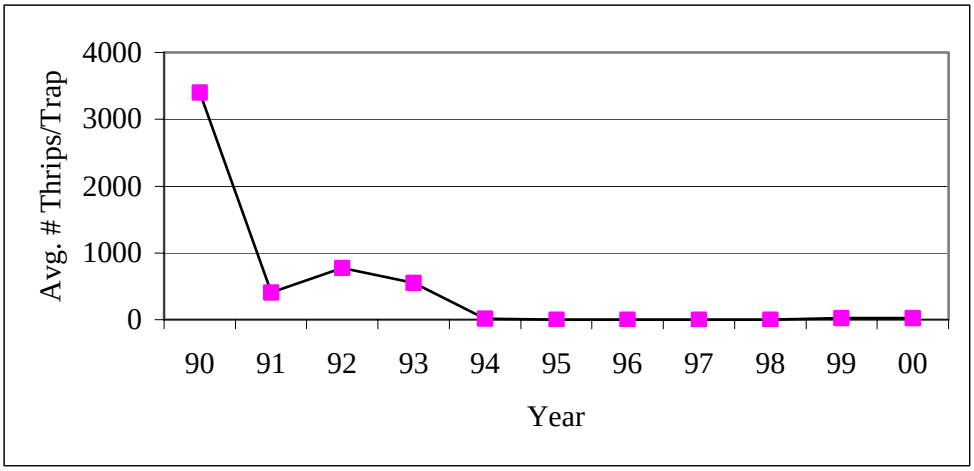
Monitoring Results: Extensive damage to sugar maple from pear thrips occurred on the Forest during FY 1989. Approximately 9,600 acres suffered heavy leaf damage, the highest level of pear thrips damage recorded on the Forest to date. Though some damage was observed in McKean County in 1990, little mapable damage occurred in 1991, 1992, and 1994 through 2001. In 1993, moderate damage was observed during random ground observations. The damage was impossible to map due to the widespread elm spanworm defoliation that occurred.

Pear thrips have been implicated in the decline of sugar maple, but there is no practical control for them at present. Even with the estimates of defoliation, it is difficult to evaluate the potential short-term and long-term effects due to our poor understanding of how thrips defoliation affects host species. Pesticides have been used effectively to control pear thrips in orchards, but more information is needed to develop valid control strategies that would be practical for large tracts of forest land.

In FY 90, Forest Health Protection personnel from Morgantown, WV, established 30 permanent plot clusters on all Ranger Districts to monitor pear thrips and maple decline. Plots were established within three different types of forested areas, based on the area's management history: no recent harvesting, thinned, and final harvest with residuals.

From 1990 through 1998, Pear thrips trapping has taken place on at least 12 of these sites each year to determine population densities and the threat to sugar maple on the sites. In 1999, the number of trap sites was reduced to six. Figure 3 shows the average number of pear thrips caught per trap from 1990 through 2000. Because the catch has been very low since 1994, pear thrips trapping was discontinued in 2001.

FIGURE 3. PEAR THRIPS POPULATIONS ON THE ANF SUGAR MAPLE MONITORING PLOTS



In August 1991 and every year thereafter, each tree on the 30 permanent maple decline plots was evaluated to determine amounts of crown dieback, foliage transparency, and foliage discoloration. This data has been examined by Dr. Robert P. Long, Research Plant Pathologist, NERS, Delaware, Ohio. The data includes annual estimates of the extent of tree decline symptoms. Dr. Long grouped these decline estimates into classes ranging from 5 (0-5%) to 10 (6-15%), and continuing by 10% intervals to 90 (86-95%) and 99 (96-100%)based on the percent of the tree crown affected. Results are summarized in the following table for trees with more than 15% dieback.

TABLE 18. PERCENT OF SUGAR MAPLE (ON 30 SAMPLE PLOTS) WITH MORE

THAN 15 PERCENT DIEBACK

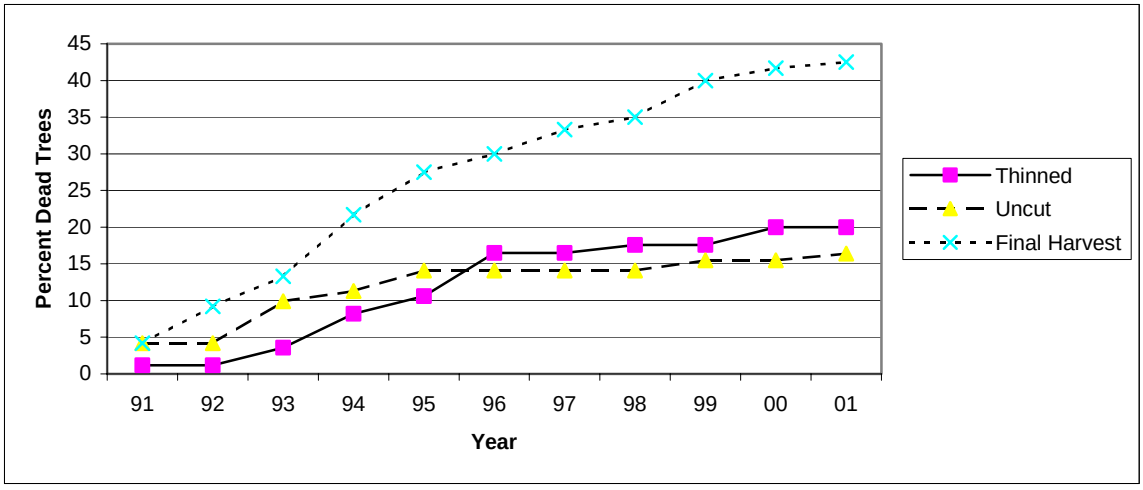
	FY 91	FY 92	FY 93	FY 94	FY 95	FY 96	FY 97	FY 98	FY 99	FY 00	FY 01
Final Harvest	**66**	**77**	**74**	**69**	**81**	**81**	**75**	**76**	**71**	**51**	**56**
Unthinned	**24**	**28**	**31**	**32**	**37**	**42**	**43**	**36**	**24**	**6**	**12**
Thinned	**30**	**32**	**41**	**39**	**39**	**43**	**46**	**43**	**38**	**10**	**13**

Between 1991 and 1997, sugar maple dieback increased in all management types. The majority of the sugar maples in the thinned and unthinned categories have less than or equal to 15 percent dieback. The percent of the trees in these two categories has been similar since 1995, and both categories reflected a substantial improvement in 1999 and 2000. The majority of the sugar maples in the final harvest cut category have more than 15 percent dieback, and this number (56%) has decreased substantially from the 81 percent reported in FY 96. In FY 2001, trees in all three management types, after showing substantial decreases in the amount of dieback in FY 2000, showed increases in the percent of sugar maple with more than 15% dieback. This increase may be related to drought conditions during the 2001 growing season.

The sugar maple mortality levels observed on the ANF from 1990 through 1995 were much higher than the average sugar maple mortality observed from 1989 through 1994 in similar plots located throughout the northeastern U.S. and southeastern Canada. In fact, the ANF rate was three to four times higher.

When the ANF plots were established in 1990, initial mortality ranged from 1.7 percent to 2.5 percent for all sugar maple trees greater than or equal to 10 cm DBH, for all three management types. By 1995, sugar maple mortality for dominant and codominant trees exceeded 10 percent for all management types (Figure 4). By 1996, sugar maple mortality reached at least 14 percent. Mortality of dominant and codominant sugar maple has been similar in the thinned and unthinned plots since the beginning of this project. Mortality in the final harvest plots is more than double the mortality in the uncut or thinned plots.

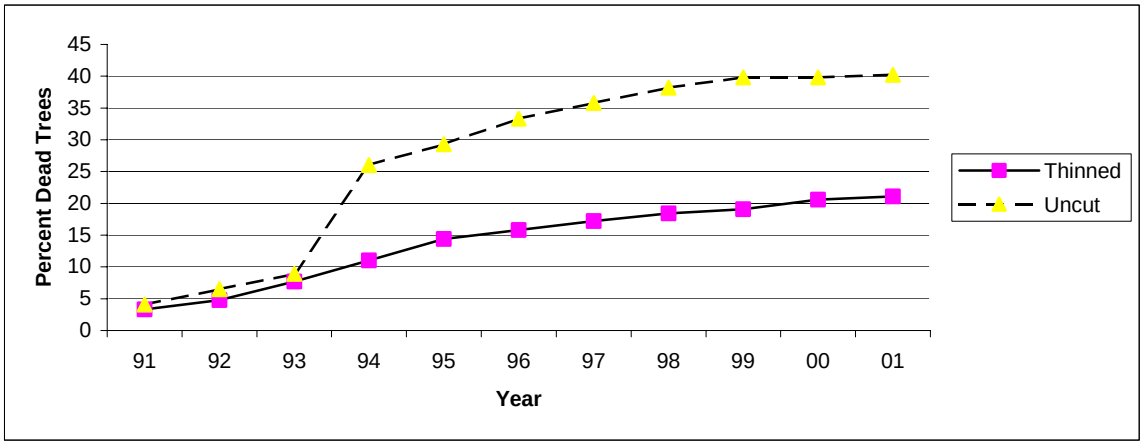
FIGURE 4. CUMULATIVE ANNUAL SUGAR MAPLE MORTALITY OF DOMINANT AND CODOMINANT TREES ON THE ANF SUGAR MAPLE MONITORING PLOTS



In 1995, mortality within the intermediate and suppressed crown class was more than 14 percent in thinned stands and more than 28 percent in uncut stands (Figure 5). Between 1995 and 2001, mortality in thinned stands has

increased only 7%, but in uncut stands, mortality has increased by about 12%. (Final harvest with residuals stands had no intermediate or suppressed class.)

FIGURE 5. CUMULATIVE ANNUAL SUGAR MAPLE MORTALITY OF INTERMEDIATE AND SUPPRESSED TREES ON THE ANF SUGAR MAPLE MONITORING PLOTS



We are continuing to monitor these plots and to evaluate the data collected to hopefully determine the cause or causes of this mortality and the differences observed between management types.

Oak Mortality

Monitoring Results: As was reported in 1988 and 1989, significant amounts of oak mortality (10 to 80 percent) were confirmed in the fall of 1988 on about 18,000 acres of the Forest. This oak mortality resulted from the combined effects of two major natural events: repeated and extensive moderate or severe gypsy moth defoliation from 1986 to 1988, and a severe drought that occurred in the summer of 1988. These events weakened the oak trees and made them more susceptible to attack by two secondary pathogens, the two-lined chestnut borer and the shoestring root rot fungus, which ultimately kill the trees. No significant additional mortality developed from 1989 through 2001.

Reforestation activities, including fencing (area and individual tree), herbicide treatment, and tree planting (seedlings and acorns) have been completed or are in progress on most of the heavily salvaged areas. Close to 94% of the acres have adequate seedling stocking, 3% are likely to become adequately stocked in several years, and 3% are failures needing additional reforestation treatment.

Tree Planting and Survival

Tree planting is an expensive reforestation practice, especially since almost all planted seedlings require individual tree protection from deer browsing. ANF personnel began planting in 1990, and through 1995, the planted stock was almost exclusively red oak. Much of this planting was in salvage areas. Beginning in 1996, ANF personnel began to expand the program to include other species (aspen, hemlock, and white pine). Four additional species (red maple, black cherry, hickory, yellow poplar) were planted on a trial basis in 1997. Three more species (red pine, white ash, and sugar maple) were planted as a trial in 1999, and one additional species (butternut) was planted as a trial in 2000. Much of the tree planting has occurred in salvage areas.

Table 19 shows acres planted and seedling survival for tree species each year.

Evaluation of Results: ANF personnel formally check tree seedling survival one and three years after planting. Red oak has the highest overall survival rate of all the species planted. Drought most likely caused red oak seedlings to die between 1992 and 1994 on several of the areas planted in 1991, resulting in the low survival rate (75%). The low survival rate for areas planted in 1993 (65%) resulted primarily from competition from unexpected natural seedlings that developed in two of the areas. The severe drought that occurred in late summer 1995, no doubt contributed to the lower survival rate (73%) for the areas planted in 1995. Low survival (67%) for 67 acres planted in 1996 was primarily due to too much shade (a shelterwood seed cut area which was underplanted), which limited seedling survival.

Natural seedlings are beginning to overtop planted seedlings in some of the areas. Where needed, we hand cut saplings and brush that are competing with both the planted and the naturally occurring seedlings/saplings. This hand cutting is termed a "release" treatment.

Hemlock and aspen have been planted for three years, and white pine for four years. These species have the poorest third year survival rates of all species planted to date. It seems prudent to limit the number of acres planted with these species until we learn more about techniques needed to ensure better survival.

Red maple, yellow poplar, and hickory third year survival for 1997 planting ranges from 66% to 53%, somewhat less than desirable (objective is 80% survival after three years). Red maple and yellow poplar first year survival rates for FY 1999 and 2000 planting range from 82% to 97%, a significant improvement from that observed for previous plantings. The primary factors affecting survival are deer browsing, drought, and competition from fern/grass. Yellow poplar survival for 3 acres planted in 1998 is exceptionally low (3%) due to poor quality of the planting stock and competition from other species.

Black cherry third year survival rates are excellent for 1998 planting (100%). First year survival rates for 1999 and 2000 are also good (83% and 97%, respectively). Third year surveys for the small acreage planted in 1997 show poor survival, due to competition from dense fern/grass cover.

Butternut survival rates (75%) are somewhat less than desired for our first trial planting.

Additional trial planting and monitoring is necessary before reaching any conclusions about the appropriateness of planting these hardwood species.

TABLE 19. ACRES PLANTED AND TREE SEEDLING SURVIVAL (%)*

Survey Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
PLANTED WITH OAK											
1991	**76 (98%)**										
1992		**312 (92%)**									
1993	**76 (87%)**		**251 (96%)**								
1994		**312 (75%)**		**142 (78%)**							
1995			**251 (87%)**		**164 (91%)**						
1996				**142 (65%)**		**145 (80%)**					
1997					**164 (89%)**		**67 (87%)**				
1998						**145 (73%)**		**87 (93%)**			
1999							**67 (67%)**		**97 (89%)**		
2000								**87 (83%)**		**138 (97%)**	

2001									**97 (78%)**		**102 (94%)**

PLANTED WITH ASPEN

1997							**41 (66%)**				
1998								**14 (77%)**			
1999							**41 (23%)**		**4 (85%)**		
2000								**14 (31%)**			
2001									**4 (45%)**		

PLANTED WITH HEMLOCK

1997							**10 (76%)**				
1998								**19 (52%)**			
1999							**10 (72%)**		**26 (61%)**		
2000								**19 (33%)**			
2001									**26 (32%)**		

Survey Year	Year Planted										
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000

PLANTED WITH WHITE PINE

1997							**25 (78%)**				
1998								**31 (46%)**			
1999							**25 (55%)**		**57 (79%)**		
2000								**31 (23%)**		**6 (50%)**	
2001									**57 (70%)**		

PLANTED WITH RED MAPLE

1998								**7 (75%)**			
2000								**7 (66%)**		**56 (89%)**	
2001											**36 (97%)**

PLANTED WITH BLACK CHERRY

1998								**8 (100%)**			
1999									**2 (100%)**		
2000								**8 (30%)**		**90 (83%)**	
2001									**2 (100%)**		**59 (97%)**

PLANTED WITH HICKORY

1998								**3 (100%)**			
2000								**3 (53%)**			

PLANTED WITH YELLOW POPLAR

1998								**22 (77%)**			
1999									**3 (13%)**		
2000								**22 (58%)**		**65 (82%)**	
2001									**3 (3%)**		**44 (85%)**

PLANTED WITH SUGAR MAPLE											
2000										**10 (64%)**	
PLANTED WITH WHITE ASH											
2000										**15 (100%)**	
2001											**25 (98%)**
PLANTED WITH RED PINE											
2000										**49 (66%)**	
2001											**6 (87%)**
PLANTED WITH BUTTERNUT											
2001											**2 (75%)**

**** First number is the planted acreage surveyed and the second number (in parentheses) is the average percent survival.***

Oak Leaf Tier Defoliation

Approximately 1,354 acres of moderate to severe oak leaf tier defoliation of the lower crowns of red and black oaks were detected in August 1997 on the ANF. In contrast, the upper crowns were mostly unaffected. Defoliation was also observed in 1997 on non-federal land east of the ANF. While there was no oak leaf tier defoliation on the ANF in 1998, defoliation was observed east of the ANF and on Seneca Nation land just north of the New York border. Throughout Pennsylvania, 1,666 acres of oak leaf tier defoliation were mapped in 1998. In 1999, there again was no oak leaf tier defoliation observed on the ANF, though east of the ANF in Potter and Tioga Counties, 3,786 acres were defoliated, a twofold increase from that observed in 1998. In 2000, there again was no defoliation on the ANF; though close to 10,000 acres of moderate to severe defoliation occurred in Tioga County. No oak leaf tier defoliation occurred on the ANF in 2001.

The oak leaf tier is a small moth whose larvae feed early in the growing season on various tree species in the red oak group. This insect was very abundant in the Northeastern United States between 1959 and 1962, when abundant populations caused severe defoliation of host trees throughout Pennsylvania, New York, New Jersey, Connecticut, and Massachusetts. The oak leaf tier can cause severe damage to foliage of host trees in the spring, when newly hatched larvae enter unopened buds and feed on newly formed leaves. At the highest population densities, the young larvae can destroy nearly all the buds on a tree. At lower densities, these larvae produce holes in expanding leaves.

Older larvae feed more openly within the protection of webbed and folded leaves, which are "tied" together by silk. Damaged leaves appear tattered, with only their major veins remaining. Mature larvae drop to the ground on silken threads to pupate in leaf litter by mid June. In late June, adult moths emerge. Females lay eggs singly on twigs where the bark is rough. These eggs over-winter and hatch in early April of the following year.

Elm Spanworm

Monitoring Results: The FY 94 Monitoring and Evaluation Report provided a detailed account of the elm spanworm life cycle, development, and defoliation history on the ANF. Between 1991 and 1993, close to 333,000 acres were defoliated by elm spanworm (about 21,000 acres of that also included frost and linden looper defoliation).

There has been little additional defoliation caused by elm spanworm since the 260,000 acres of moderate to severe defoliation that occurred in 1993. Populations crashed in 1994, and no egg masses were found during surveys conducted in the fall of 1995. The elm spanworm has returned to its normal status as a minor component of the total forest insect population. No defoliation has occurred between 1995 and 2001.

Forest Tent Caterpillar

One of the more significant types of insect damage observed in 1994 during aerial detection survey was 18,080 acres of moderate to severe forest tent caterpillar defoliation. This was a substantial increase from the 4,230 acres observed in 1993.

In 1995, 55,444 acres were treated with B.t. where forest tent caterpillar defoliation was expected to be heavy, unless natural parasites or predators intervened.

No detectable forest tent caterpillar defoliation occurred between 1995 and 2001.

Cherry Scallop Shell Moth

Statewide, this insect defoliated close to 229,750 acres in 1994 and over 858,600 acres in 1995. It produced the most significant type of defoliation observed statewide in either year. In 1996, the area defoliated in Pennsylvania decreased 99 percent from that observed in 1995. From 1997 through 2001, this insect defoliated no acres in Pennsylvania.

On the ANF, this insect produced the most significant type of defoliation observed in 1995. Defoliation of National Forest land reached 205,400 acres, a significant increase from the 3,840 acres observed in 1993 and the 54,200 acres observed in 1994. Close to 123,600 acres of the 1995 defoliation was severe. From 1992 to 1995, 666 acres have been defoliated three times by this insect, 35,562 acres twice, and 238,057 acres at least once. Most of the same acres have also been defoliated at least once since 1991 by elm spanworm or forest tent caterpillar.

In 1996, cherry scallop shell moth defoliation decreased to 11,800 acres, with over 8,200 acres classified as moderate to severe. Most of these areas had already been defoliated at least once since 1993 by cherry scallop shell moth. No acres were defoliated on the ANF from 1997 through 2001.

This insect defoliates only black cherry trees by webbing leaves into nests and feeding on the upper surfaces. Defoliated black cherry trees may lose vigor and become susceptible to the peach bark beetle, especially when outbreaks persist for several years and when soils are poorly drained. Extensive black cherry dieback and mortality have not been documented from local outbreaks that occurred in the 1970s and 80s.

FHP personnel will continue to monitor cherry scallop shell moth populations through observations of adult densities and egg parasitism.

We are concerned that additional tree mortality may develop over the next several years on many of these areas. Severe droughts occurred during the summers of 1988, ‘91 and ‘95, and rainfall was below normal during the 1997 – 1999 growing seasons. Rainfall was slightly above normal in 2000, and below normal in 2001. Since 1991, black cherry trees have also suffered some defoliation by other insects. By the end of August 1995, most new leaves were less than one-half normal size, and tree crown foliage density was substantially less than normal. Some trees did not refoliate at all and have died. With the additional moisture stress that has occurred between 1997 and 2001, the full effect may not be seen for several more years, or it may increase substantially if additional defoliation or stress occurs (for more information, see the following discussion regarding black cherry health).

Black Cherry Health Assessment

An assessment, BLACK CHERRY HEALTH ASSESSMENT - ALLEGHENY NATIONAL FOREST - 1997, was completed by Robert E. Acciavatti, Entomologist, Forest Health Protection, USDA Forest Service,

Morgantown, WV and, Timothy P. Virden, Forest Technician, Ecosystem Management, Allegheny National Forest, Warren, PA.

The following summarizes crown vigor and dieback data collected in 1995, 1996, and 1997 from 864 black cherry trees at seven locations on the ANF.

Recent natural disturbances on the Allegheny National Forest, especially from several annual defoliations by the cherry scallop moth from 1993 through 1995, were considered a threat to the health of black cherry trees. The severe droughts in 1988, 1991, and late summer 1995, are additional, severe stresses the trees have suffered.

Field sampling was performed in 1995, 1996, 1997, and 2000 (evaluation of FY 2000 data is incomplete) to assess the status and trends in health of the black cherry resource of the ANF. The health assessment was based on black cherry crown vigor and dieback as indicators of tree decline and crown mortality. Forest stands were sampled where black cherry trees had experienced the highest frequencies of defoliation since 1993. Initially, the assessment included about 600 black cherry trees in five stands on the Marienville Ranger District that had either two or three defoliations. In 1996, another 83 black cherry trees on the Bradford Ranger District were added to the assessment. This latter area had been severely defoliated by a hailstorm in May 1995, and again by cherry scallop shell moth in July/August 1995. In 1997, a seventh location containing 174 trees on the Bradford Ranger District was added.

Crown vigor: Results based on an assessment of black cherry crown vigor at the end of 1995 growing season indicated that a large majority (85%) of the black cherry resource on the Allegheny NF was healthy or showed only light decline (vigor classes 1 and 2) despite the recent defoliations and drought. The remainder of the black cherry resource had worse crown vigor (13% with moderate or severe decline, 2% dead). Furthermore, this health situation remained virtually unchanged after the 1996 growing season (even though defoliation was absent and precipitation was above normal) and the 1997 growing season. However, from 1995 through 1997, there was a gradual improvement (38% to 62%) in trees classified as healthy (vigor class 1), as trees showing light decline (vigor class 2) in crown vigor recovered.

The proportion of black cherry trees in the healthiest two crown vigor classes were about the same (84% to 88%) at the end of each growing season regardless of whether two or three defoliations had occurred.

While these findings represent average conditions, there is variation in the health of the Black cherry resource. Some stands sampled showed little decline. By contrast, the residual black cherry trees in the most disturbed stand (defoliated, hail damaged) had the lowest proportion (66%) in the healthiest crown vigor classes at the end of 1996 and 1997 (71%).

Crown Dieback: Results based on crown dieback at the end of the 1996 growing season indicated that the proportion of black cherry trees with 30 percent or greater dieback, was higher after three defoliations (11%) than after two defoliations (7%). Trees with mostly dead crowns doubled in occurrence (2% to 5%) between the 1995 and 1996 growing seasons. However, nearly all (88%) were pole timber or small sawlog sized black cherry trees.

Recommendations are to reassess the areas in several years to determine trends in crown vigor and crown dieback.

Forest Health Monitoring Program

In FY 98, ANF personnel initiated a cooperative project with USDA-FS Forest Health protection personnel in Radnor, PA, and Morgantown, WV, and with the USDA-FS National FHM program staff. Officially called the "Forest Health Monitoring (FHM) program" at the national level, the program is designed to collect data regarding a number of indicators of Forest Health and to use this data to help assess conditions and trends in the health of our nation's Forest Ecosystems. Data is collected from a network of permanent plots regularly visited to evaluate forest health indicators, including tree vigor, crown condition, signs of tree damage, and other site/ecosystem indicators. In the "detection monitoring phase" of the program, data from these plots and other

forest sources is used to determine if changes and trends are within normal bounds and whether there is cause for concern that warrants additional evaluation.

Because changes and trends observed on the ANF are at a level that appears to be outside normal bounds, in 1998, the ANF began the "evaluation monitoring phase" of the program. Evaluation monitoring examines the extent, severity, and probable causes of undesirable changes in Forest Health. Reports and analysis identify management consequences and follow up research needs.

Between 1998 and 2001, ANF personnel, specially trained in FHM data collection protocol, established and collected FHM data on a 173-plot network on the ANF. Data was collected for the following indicators of forest health: tree and crown damage, tree mensuration, down woody debris, soils, lichens, herbaceous/woody plants on the forest floor or in the understory, and fire fuel loading. Ozone damage data was collected from other sampling locations where suitable species existed. Initial data collection on all plots was completed in FY 2001.

In September 2001, USDA-FS Northeastern Area, Northeastern Research Station, and the Allegheny National Forest published a jointly prepared report that describes forest vegetation and health conditions on the ANF. The report is entitled "Forest Health Conditions on the Allegheny National Forest (1989-1999): Analysis of Forest Health Monitoring Surveys" (NA-TP-04-01). It documents an analysis of the first two years (1998 and 1999) of Forest Health Monitoring (FHM) data collected on the ANF. The report characterizes tree condition, decline, mortality, and damage on the ANF and reviews the correlation between disturbance processes (defoliation, beech bark disease, etc.) and tree damage. It also provides a forest-wide characterization of understory vegetation, Indiana bat habitat, ozone damage, and down woody debris. Copies are available upon request. Work is underway to publish a full report covering all of the plots and all of the Forest health indicators.

SOIL RESOURCES

Documentation of the measured prescriptions and effects, including significant changes in productivity of the land [36 CFR 219.12 (k)(2)]. Determine any changes in soil quality and function and the effectiveness of current standards and guidelines [FSH 2500-90-2 section 2554.1].

Method of Measure: Field observation of activity area using one 100-foot transect per acre in the vegetation treatment unit.

Monitoring Results: One sale unit was monitored with a total of 23 transects of measured soil quality condition data. This data indicated some level of disturbance on 6.2 percent of the unit. Severe disturbance was noted on 3.5 percent of the unit, and moderate disturbance was noted on 2.7 percent of the unit. The unit received a commercial thin in 2000 using a Bell 3-wheel feller and a rubber tired skidder and was monitored in 2001. The recorded level of disturbance was less than the average level of disturbance for partial harvests from the previous ten years (USDA-FS 2002).

TABLE 20. PERCENT OF 2001 TIMBER HARVEST AREAS UNDISTURBED/DISTURBED

(Data from 1 sample area – 23 transects)

Visual Condition Class	2001 MA 3.0	1990-2001
Undisturbed Area [1]		
- Large Rocks	6.5	2.6
- Open	71.1	60.4
- Slash	16.2	23.3
Total Undisturbed (%)	**93.8**	**86.3**
Disturbed Area		
- Skid Trails (open)	2.7	7.2
(slash)	0.0	0.3
- Displacement	1.1	1.7
- Puddled	0.0	0.1
- Erosion	0.0	0.2
- Observed compaction	2.4	4.3
Total Disturbed (%)	**6.2**	**13.7**
Timber Sale Activity Area Covered [2]	6.2	13.7
Number of Transects	23	350
Soil Groups found in transects (%)		
- Group I (well drained)	52	47.3
- Group II (moderately well drained)	48	44.3
- Group III (poorly drained)	0	8.4

1 *Large rocks = one foot or larger; open areas = free of large rocks and slash; slash = areas covered by slash.*

2 *Activity Area = the total area of ground surface impacted by an activity (all areas that had observable traffic plus all displacements, puddle, eroded, rutted, and /or observed compaction).*

Evaluation of Results: This monitoring represents one cutting unit. The unit is mapped as having primarily group 2, moderately well drained soils with a small area of group 3 poorly drained soils. However, on site testing indicated that the unit was approximately half group 1, well drained and half group 2, moderately well drained soils.

The total disturbed area was 6.2 percent well below the Forest Plan standard of 15 percent (USDA-FS 1986, 4-21 to 4-23). The cumulative surface soil disturbance found in timber sale monitoring from 1990 through 2001 is 13.7 percent.

WATER QUALITY

Land Disturbing Activities

Method of Monitoring: Three streams on the Forest have been monitored for any possible effects from nearby land management activities within their respective watersheds. The streams include Arnot Run, North Fork Chappel Fork/Indian Run, and Lewis Run/tributary. To determine if best management practices were effective, the level of sediment in the streams is measured. Because stream flows were very low in 2001, we were unable to conduct the surveys.

Management Indicator Species

Annual monitoring of brook trout populations also includes the analysis of water quality in the same four streams. One grab sample was taken from each of the streams and taken to a local lab for general chemical analysis. Also, stream temperature was measured on a daily basis from May to September using an automatic recording thermograph.

Monitoring Results: Based on the analysis, the water quality of the four streams meet Pennsylvania Department of Environmental Protection (DEP) water quality standards. Based on the results of the thermographs, stream temperatures are adequate to support cold-water aquatic communities.

It is recommended to continue annual monitoring of these four streams on the Forest.

Routine Surveys

Water quality was assessed in nine streams in conjunction with Pennsylvania Fish and Boat Commission stream surveys. Grab sample(s) were taken from the streams and analyzed at a local lab.

Monitoring Results: Results of the analysis indicate that the streams meet DEP water quality standards.

It is recommended to continue routine surveys of water quality, primarily in conjunction with Pennsylvania Fish and Boat Commission fisheries surveys, and for use with proposed land-use activities on the Forest, such as herbicide applications.

OIL, GAS, AND MINERALS (OGM)

Evaluation of OGM Activities to Verify the Effectiveness of Negotiations in Obtaining Industry Compliance with Standards

Method of Measure: The Allegheny National Forest OGM evaluation form was used. The Ecosystems Management Team and representatives from the Ranger Districts conducted monitoring by numerically scoring each of the 34 criteria for 6 cases. Scores ranged from 1 to 10 (1 = poor; 5 = minimum acceptable; 8 = standard; and 10 = excellent).

Monitoring Results:

TABLE 21. THIRTY-FOUR MONITORED OGM CRITERIA
BY MANAGEMENT AREA

	Criteria	Average Rating FY 2001
1 -	**Right to Operate**	**8.3**
2 -	**Maps**	**10.0**
3 -	**Operating Plan**	**8.0**
4 -	**Erosion Plan**	**8.0**
5 -	**Spill Plan**	**5.3**
6 -	**Environmental Analysis**	**9.3**
7 -	**Designated Representative**	**10.0**
8 -	**Forest Service Inspection**	**9.7**
9 -	**Documentation**	**8.2**
10 -	**Road Location**	**9.0**
11 -	**Stream Crossing**	**10.0**
12 -	**% Road Mile-Grade**	**10.0**
13 -	**% Road/Cross-drains**	**10.0**
14 -	**Road Clearing Width**	**9.7**
15 -	**Road Stabilization**	**9.2**
16 -	**Road Management Permit**	**10.0**
17 -	**Road Management - % Drains**	**9.7**
18 -	**Road Management - Surface**	**8.7**
19 -	**Road/ROW Restorations**	**NA**
20 -	**Timber Output**	**10.0**
21 -	**Recreation**	**8.3**
22 -	**Fish**	**9.3**
23 -	**Wildlife**	**8.3**
24 -	**Visual**	**9.0**
25 -	**Stream Condition**	**9.3**
26 -	**Tank/Battery**	**9.3**
27 -	**Pipeline/Electric**	**9.0**
28 -	**Signs/Gates**	**9.3**
29 -	**Timber Utilization**	**9.3**
30 -	**Well Sites**	**9.7**
31 -	**Litter/Trash**	**10.0**
32 -	**Safety**	**10.0**
33 -	**Old Wells**	**NA**
34 -	**Used Equipment**	**10.0**
	Average of 34 Criteria	9.18

Evaluation of Results: Overall, total samples (for 34 criteria) averaged 9.18, above the standard of 8.0. While

the DEP requires a Spill Plan for projects that include oil wells and pipelines, the Allegheny National Forest must ensure that a copy of the plan is obtained for our records.

One reportable oil spill occurred on the Allegheny during FY01. On May 16, a storage tank located in McKean County, between lots 42 and 60, began leaking crude oil. The incident was reported to the Coast Guard's National Response Center (Incident Report #566591) as required, as well as the Pennsylvania Fish and Boat Commission, DEP, and the U.S. Fish and Wildlife Service. The operator set his Spill Control Plan into action, and contained and remediated the release.

Estimate the Amount of OGM Activity on the Forest From the Number of Producing Wells, the Number of Wells Drilled, or Other Measure.

Method of Measure: From Ranger Districts EAs for 2001.

Monitoring Results: There were 315 new wells drilled on Federal lands in 2001. One USA-ownership well was plugged in FY01. Operators and DEP plugged 103 wells.

TABLE 22. WELLS DRILLED IN 2001 BY MANAGEMENT AREA

Management Area	# of Wells Drilled
3.0	**276**
6.1	**39**
Total	315

Evaluation of Results: The Forest Plan estimates that for the low oil/gas scenario, 86 wells would be developed per year, and for the high scenario, 860 wells. An average of 188 wells have been drilled per year since 1986.

Status of Lands Available for Exploration and Development of USA-Owned Minerals

Method of Measure: By deed search, and maintenance of this list.

Monitoring Results:

TABLE 23. MINERAL OWNERSHIP AND STATUS

Status	Acres	Ownership/ Acres
USA-OWNED MINERALS		**34,973**
- Withdrawn (Hickory Creek/River Islands Wilderness and National Recreation Areas	**13,960.57**	
- Mineral ownership only	**4,297.00**	
- Leased (3 current leases)	**1,026.27**	
- Available for lease	**15,689.12**	
OUTSTANDING AND RESERVED OWNERSHIP		**478,283**
TOTAL ACRES (rounded to nearest whole acre)		513,256

Forty percent (13,961 acres) of the total USA-owned mineral acreage is not available for exploration and/or development and 60 percent (21,012 acres) is available. The "available" acreage represents only four percent of the Forest's total land base of 513,256 acres. The subsurface oil/gas rights on the remaining 478,283 acres are reserved or outstanding.

While there are currently three USA-owned mineral leases on the Allegheny, they are not producing oil or gas at this time.

Cubic Yards of Rock Surfacing Used for Contracts, Permits, and Free Use

Method of Measure: Actual amount included in permits, contracts, and visual observations of pit use.

Monitoring Results:

TABLE 24. USAGE OF PIT RUN ROCK MATERIALS IN 2001

Use	Cubic Yards	Forest Plan
Oil, Gas Minerals (free use)	**88,620**	**41,000**
Forest Service Roads	**0**	**103,000**
Trails	**0**	**N/A**
Permits/Contracts	**1,500**	**N/A**
Total Cubic Yards used in 2001	**90,120**	**144,000**

Evaluation of Results: Pit run usage in FY01 is 63 percent of estimated Forest Plan use. Of the total amount used this year, 98 percent was for oil, gas, and mineral development (the Forest Plan estimate was 29%). This can be attributed to an increase in mineral activity due to rising gas prices, and our increased usage of commercial stone for Forest Service projects. During FY01, 1,000 tons of commercial gravel was purchased and used for sediment reduction projects, and at the Wolf Run Marina. 22,000 tons of commercial limestone was purchased and used for sediment reduction projects, and two timber sales.

Mineral Material Pit Management

Monitoring Results:

TABLE 25. 2001 MINERAL PIT MANAGEMENT

Monitoring Criterion	Average Rating
Pit plan development	**8**
Pit addressed in EA	**8**
Development follows plan	**8**
Restored, and to landform	**NA**
Present management of stone	**6**
Wildlife management	**NA**

Visual quality	**8**
Litter/trash	**10**
Unused equipment	**10**
AVERAGE Criteria	8.3

Note: A rating of "8" is the Forest standard (1 is low; 10 is high).

TABLE 26. NUMBER OF MINERAL PITS DEVELOPED (by MA)

MA	Total Closed	Total Open	Total Pits
1.0	**1**	**1**	**2**
2.0	**1**	**2**	**3**
3.0	**162**	**251**	**413**
5.0	**0**	**0**	**0**
6.1	**26**	**35**	**61**
6.2	**7**	**10**	**17**
6.3	**0**	**0**	**0**
6.4	**0**	**2**	**2**
7.0	**0**	**0**	**0**
8.0	**0**	**1**	**1**
9.1	**1**	**1**	**2**
Totals	196	305	501

Evaluation of Results: This monitoring expresses project planning and long-term planning and implementation efforts in managing the results of mineral materials extraction.

WILDLIFE HABITAT

Summarize the Following Components of the Desired Future Condition by MA: % Opening, % Old-growth, % Conifer Cover, Acres of Aspen Type, Age Class Distribution, and Acres of Oak Type

Method of Measure: The following chart lists five variables for determining the diversity of habitat and progress towards the Desired Future Condition on the Forest.

Habitat Variable	Acres	Existing % Forest Habitat	Forest Plan DFC[1]
Conifer	**18,831**	**4**	**5-10%**
Oak	**76,406**	**15**	**18%**
Aspen	**3,230**	**1**	**2%**
Openings	**20,825**	**4**	**6%**

Late Successional [2]	**14,866**	**3**	**16%**

1 Desired Future Condition based on vegetation conditions after 15 decades of Forest Plan implementation (Forest Plan FEIS, p. 4-94)

2 Stands older than 110 years (for this analysis)

Evaluation of Results: This information is based on 512,927 acres of National Forest Land that have been inventoried over the past 20 years. Some discrepancies exist in the data, and further refinements are continuing. Except for late successional habitats, we are approaching the desired future condition for the habitat variables. About 102,200 acres are between 90 and 109 years old, so additional acres will be moving into the late successional habitat in the next 20 years. We should continue to plant conifer and enhance/maintain the existing conifer component throughout the Forest.

TABLE 27. HABITAT ACRES BY MANAGEMENT AREA AND AGE CLASS

MA	Forest Type	0-19	20-59	60-89	90-109	110-179	OLDER	NO AGE	TOTAL ACRES
1.0	Aspen	203	93	149	11	0	0	0	456
	CAPS	523	193	2512	10	0	0	0	3238
	Conifer	30	350	212	32	0	0	0	624
	Hardwood	265	197	2421	114	0	0	0	2997
	Lowland Shrub	0	0	0	0	0	0	86	86
	Oak	0	0	47	0	0	0	0	47
	Open	0	0	0	0	0	0	420	420
	Upland Shrub	2	0	0	0	0	0	101	103
2.0	Aspen	0	0	6	0	0	0	0	6
	CAPS	40	109	219	216	7	0	0	591
	Conifer	0	16	35	33	8	0	0	92
	Hardwood	49	63	1196	1520	122	0	0	2950
	Lowland Shrub	0	0	0	0	0	0	5	5
	Open	0	0	0	0	0	0	52	52
3.0	Aspen	351	289	511	22	0	0	16	1189
	CAPS	21758	13528	54136	29046	744	0	2614	121826
	Conifer	131	1460	6743	1460	447	0	53	10294
	Hardwood	7230	8075	74291	50715	4312	16	4574	149213
	Lowland Shrub	0	0	0	0	0	0	768	768
	Oak	1164	831	8434	10594	1247	0	481	22751
	Open	80	104	53	0	0	0	19196	19433
	Upland Shrub	12		0	0	0	0	385	397
		0	0	0	0	0	0	45	45
5.0	Aspen	0	0	35	0	0	0	0	35
	CAPS	0	80	1358	71	21	0	0	1530
	Conifer	0	118	318	63	48	0	1	548
	Hardwood	179	0	2837	257	0	0	65	3338
	Lowland Shrub	0	0	0	0	0	0	1	1
	Oak	0	0	381	77	0	0	0	458

MA	Forest Type	0-19	20-59	60-89	90-109	110-179	OLDER	NO AGE	TOTAL ACRES
	Open	0	0	0	0	0	0	209	209
	Upland Shrub	0	0	0	0	0	0	12	12
6.1	Aspen	68	596	620	63	0	0	0	1347
	CAPS	1155	1837	12370	5227	188	0	226	21003
	Conifer	40	759	3523	1468	528	0	17	6335
	Hardwood	2168	2897	31969	16922	2016	0	833	56805
	Lowland Shrub	0	0	0	0	0	0	375	375
	Oak	816	269	15231	13040	1374	0	1916	32646
	Open	54	0	129	1	0	0	8190	8374
	Upland Shrub	3	0	0	0	0	0	422	425
6.2	Aspen	0	23	16	0	0	0	0	39
	CAPS	637	932	2222	3826	56	0	0	7673
	Conifer	0	12	100	106	0	0	0	218
	Hardwood	658	387	3225	3683	203	0	0	8156
	Lowland Shrub	0	0	0	0	0	0	15	15
	Oak	0	28	2376	2123	21	0	0	4548
	Open	0	0	0	0	0	0	326	326
	Upland Shrub	0	0	0	0	0	0	38	38
6.3	Aspen	0	78	6	65	0	0	0	149
	CAPS	41	0	271	27	0	0	0	339
	Conifer	0	0	24	0	0	0	0	24
	Hardwood	0	0	52	0	0	0	0	52
	Open	0	0	0	0	0	0	496	496
	Upland Shrub	0	0	0	0	0	0	28	28
6.4	Conifer	0	34	8	0	0	0	244	286
	Hardwood	0	0	682	698	30	0	57	1467
	Oak	0	0	526	450	0	0	13447	14423
	Open	0	0	0	0	0	0	64	64
		0	0	0	0	0	0	25	25
7.0	CAPS	0	0	0	7	0	0	0	73
	Conifer	0	0	23	0	0	0	35	58
	Hardwood	0	0	224	22	0	0	0	245
	Lowland Shrub	0	0	0	0	0	0	12	12
	Oak	0	0	81	5689	0	0	378	1148
	Open	0	0	0	0	0	0	374	374
	Upland Shrub	0	0	0	0	0	0	56	56
8.0	CAPS	0	41	0	35	0	0	0	76
	Conifer	0	0	0	2	0	0	0	2
	Hardwood	0	0	0	130	1292	0	683	2105
	Oak	0	0	0	51	2155	0	0	2206
	Open	0	0	0	0	0	0	168	168
9.1	Aspen	0	1	0	0	0	0	0	1

MA	Forest Type	0-19	20-59	60-89	90-109	110-179	OLDER	NO AGE	TOTAL ACRES
	CAPS	0	17	0	0	0	0	0	17
	Conifer	0	0	14	62	0	0	0	76
	Hardwood	27	22	66	62	31	0	0	208
	Oak	72	0	28	306	0	0	42	668
	Open	0	0	0	0	0	0	3	3
	Upland Shrub	0	0	0	0	0	0	16	16
	Hardwood	0	0	0	10	0	0	0	10
		0	0	0	0	0	0	68	68
		37,756	33,439	229,900	143,382	14,850	16	5,763.7	516,980

WILDLIFE

Measure Habitat and Population Trends for Management Indicator, Game, and Threatened and Endangered Species Based on a Specific Wildlife and Fish Monitoring Guide

and

Obtain Population Trend Data for Several Game Species from Pennsylvania Game and Pennsylvania Fish and Boat Commissions [36 CFR 219.99]

Appendix B of the Forest Plan identifies the wildlife species to be monitored. These species can be grouped into three categories:

Game Species	White-tailed Deer	Black Bear
	Ruffed Grouse	Woodcock
	Beaver	
Management Indicator Species	White-tailed Deer	Ruffed Grouse
	Woodcock	Red-Shouldered Hawk
	Magnolia Warbler	Yellow-bellied Sapsucker
	Beaver	Pileated Woodpecker
	Black-throated Green Warbler	Barred Owl
	Hermit Thrush	Timber Rattlesnake
	Great Blue Heron	
Federally-Listed Threatened or Endangered Species	Bald Eagle	Small Whorled Pogonia
	Clubshell Mussel	Northern Riffleshell Mussel

During the development of the Forest Plan, wildlife species were selected as management indicator species to monitor trends in habitat capability for them and other associated species with similar habitat requirements.

TABLE 28. MANAGEMENT INDICATOR SPECIES

Species	Habitat Indicator
White-tailed Deer	**Regenerating Deciduous**

American Woodcock	**Permanent Openings** **Regenerating Deciduous**
Magnolia Warbler	**Regenerating Hemlock**
Beaver	**Regenerating Deciduous (aspen)**
Black Throated Green Warbler	**Mature Mixed Hemlock - Deciduous**
Hermit Thrush	**Mature Mixed Hemlock - Deciduous with dense understory**
Barred Owl	**Old-growth Mixed Hemlock - Deciduous**
Great Blue Heron	**Old-growth Mixed Hemlock - Deciduous**
Ruffed Grouse	**Regenerating Deciduous**
Red-shouldered Hawk	**Mature Deciduous**
Yellow-bellied Sapsucker	**Mature Deciduous**
Pileated Woodpecker	**Old-growth Deciduous**
Timber Rattlesnake	**Regenerating Deciduous**

White-tailed Deer

Table 29 is a summary of winter deer densities over the past 13 years. These densities are calculated by the Pennsylvania Game Commission (PGC) based on deer harvest data and hunter report cards. In conjunction with the Forestry Sciences Laboratory, pellet group transects were completed on twelve sites in 2001. These pellet group transects are summarized in Table 29.

TABLE 29. WINTER DEER POPULATION PER SQUARE MILE OF FORESTED LAND

		YEAR (Winter Density)														
County	Density Goal	86-87	87-88	88-89	89-90	90-91	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-00	00-01
Elk	**21**	**31**	**33**	**29**	**30**	**25**	**21**	**22**	**26**	**30**	**29**	**23**	**21**	**24**	**26**	**26**
Forest	**23**	**33**	**36**	**32**	**35**	**31**	**24**	**28**	**29**	**32**	**33**	**29**	**32**	**39**	**43**	**37**
McKean	**20**	**29**	**28**	**26**	**26**	**23**	**22**	**25**	**28**	**26**	**26**	**25**	**25**	**30**	**35**	**30**
Warren	**21**	**30**	**31**	**32**	**32**	**30**	**30**	**31**	**27**	**29**	**27**	**30**	**30**	**31**	**39**	**33**

TABLE 30. OVERWINTER ESTIMATES OF DEER DENSITY ON STUDY SITES WITHIN THE ALLEGHENY NATIONAL FOREST

Transect Name	Deer/square mile
North End-Hubert Run	22.3
QHE #1	10.8
QHE #2	19.8
QHE #3	28.8
QHE #4	12.6
QHE #5	41
FR-338 Spring Creek	2.0
FR-396 Spring Creek	6.0
Cook – Eli Roadless Area	27.6
Crary Hollow	46
Libby Run	72.0
Chapel Fork	18.9

Evaluation of Results: The pellet group transects demonstrate the variability of the deer density across the Forest. This transect data supports the density figures calculated by the PGC, but shows that densities can be much higher and much lower than the average county density.

Black Bear

TABLE 31. BLACK BEAR HARVEST SINCE 1986, BY COUNTY

County	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	Total	AVG
Elk	**58**	**72**	**74**	**93**	**32**	**131**	**55**	**65**	**37**	**63**	**54**	**66**	**58**	**58**	**108**	**1032**	69
Forest	**21**	**23**	**50**	**85**	**59**	**29**	**33**	**52**	**16**	**51**	**41**	**72**	**65**	**65**	**58**	**707**	47
McKean	**63**	**58**	**134**	**147**	**55**	**90**	**98**	**75**	**36**	**102**	**96**	**114**	**91**	**91**	**154**	**1435**	96
Warren	**30**	**34**	**42**	**62**	**39**	**46**	**37**	**33**	**28**	**62**	**59**	**30**	**33**	**33**	**64**	**661**	44
Total	172	187	300	387	185	296	223	225	117	278	250	282	247	247	384	3,835	256

Evaluation of Results: Bear populations appear to be stable to slightly increasing. The harvest in 2000 was more than 100 bears above the forestwide 15-year average. Harvests are usually better when there is snow on the ground and winds are calm. It appears that a harvest of about 250-400 bears annually can be sustained in the four-county area.

Ruffed Grouse

Monitoring Results: The results of ruffed grouse surveys completed between 1991 and 2001 are presented in Table 32. Data indicate that populations were lowest in 1997 and highest in 2001.

Evaluation: Ruffed grouse populations appear to be stable on the ANF. Grouse populations are known to be cyclic, undergoing highs and lows every five to ten years (Fergus, unpublished). These fluctuations vary with locality but have been attributed to changes in cover, food, and weather conditions (Ibid.).

On the ANF, ruffed grouse are an indicator of regenerating deciduous habitat. In Missouri, Wiggers et al. (1992) recommend that 14% of the forest be maintained in 7 to 15 year old hardwood regeneration to enhance grouse habitat. Currently, about seven percent of the ANF is in the early successional stage (0-20 years old) with about 800 acres of early successional in small patches of aspen (USDA-FS, 1997). These data suggest that habitat is of sufficient quality, distribution, and abundance to allow the species population to stabilize and to be well distributed across the ANF, resulting in a high likelihood of persistence.

Pennsylvania Game Commission data indicate that the grouse harvest peaked in Pennsylvania in 1990 and 1995 with the harvest of 353,647 and 315,197 grouse respectively. In 1999, the Pennsylvania grouse harvest was estimated at 177,355, a 50% decline from the 1990 peak. The number of grouse hunters has also declined by 42% since 1990 (Rosenberry 2001).

TABLE 32. INDEX OF RUFFED GROUSE ABUNDANCE

Year	Grouse/stop
1991	**.53**
1992	**.42**
1993	**.53**
1994	**.47**
1995	**.44**
1996	**.47**
1997	**.38**

1998	*****
1999	**.40**
2000	*****
2001	**.67**

**** No surveys were conducted in 1998 or 2000. Starting in 1997, Ruffed Grouse surveys will be conducted every other year.***

Woodcock

Monitoring Results: Woodcock surveys were completed annually between 1990 and 1997. In 1997, the ANF decided to alter the monitoring schedule to every other year. Results have varied from a low of 0.05 woodcocks per survey point to a high of 1.20 woodcocks per survey point. The average number of woodcocks per year is 0.36. In 2001 the number of woodcocks heard per survey point was exactly the 10 year average.

TABLE 33. WOODCOCK SINGING GROUND SURVEY

Year	Total Miles	Survey Points	Woodcock Heard	Woodcock/ Survey Point
1990	**11.1**	**20**	**1**	**.05**
1991	**29.1**	**75**	**18**	**.24**
1992	**8.6**	**20**	**7**	**.35**
1993	**20.6**	**35**	**8**	**.22**
1994	**16.2**	**35**	**8**	**.22**
1995	**17.6**	**40**	**15**	**.38**
1996	**6.3**	**10**	**12**	**1.20**
1997	**3.2**	**5**	**1**	**.20**
1998	*****			
1999	**5.4**	**10**	**4**	**.40**
2000	*****			
2001	**11.3**	**25**	**9**	**.36**

**** No surveys were conducted in 1998 or 2000. Starting in 1997, American Woodcock surveys will be conducted every other year.***

Evaluation: With the exception of 1996, woodcock populations do not appear to be widely fluctuating on the ANF. Data suggest a sparse but stable population. Woodcock were selected as an indicator of permanent openings and regenerating deciduous habitat. However, biologists now recognize that wet soils, often in lowlands and bottoms, are specific components of the woodcock's niche. These low wet areas with small openings and saplings contain earthworms, an important food source for woodcock. Small openings near early successional stands, and near wet soils comprise a small portion of the ANF. In 1997, permanent openings comprised about 24,393 acres (5%) of the ANF, while 36,179 acres (7%) were considered regenerating deciduous habitat. Consequently, woodcock populations are expected to be sparse.

Since woodcock are a migratory game bird, the Pennsylvania Game Commission and the USDI Fish and Wildlife Service conduct monitoring. The PGC reported that the number of woodcock hunters dropped from 30,045 in 1990 to 12,212 in 1999, while the number of woodcock harvested dropped from 50,918 in 1990 to 25,704 in 1999 (Rosenberry 2001). These data represent an increase from 1.7 woodcock harvested per hunter in 1990 to 2.1 woodcock harvested per hunter in 1999. Woodcock hunter densities for Pennsylvania are believed to be similar to woodcock hunter densities on the ANF.

USDI Fish and Wildlife Service data show long-term declines in woodcock populations in the Eastern Region (Amman, 1997). The woodcock index for Pennsylvania based on singing ground surveys dropped from 2.40 in 1968 to 0.85 in 1992 (Straw, 1992). Reasons for this decline are unknown.

These data, plus incidental observations of both young and adults in suitable habitat, indicate that habitat is of sufficient quality, distribution, and abundance to allow the species population to stabilize and to be well distributed across the ANF, resulting in a high likelihood of persistence.

Barred Owls

Monitoring Results: Barred owl data have been collected along seven standard routes across the ANF for eight years. In 1997, the ANF decided to monitor barred owls every other year; hence, no surveys were done in 1999 and 2001. Responses have remained fairly constant over this period. New timber sales, oil and gas development, and other new activities have changed the habitat along some sections of these barred owl routes over the past nine years. No analysis or correlations with habitat changes have been completed with these data, but plans are to complete a habitat analysis using the Geographic Information System (GIS) in the future.

TABLE 34. BARRED OWL SURVEY
AVERAGE RESPONSES/TRANSECT

Year	Brad. 1	Brad. 2	Shef.	Ridg. 1	Ridg. 2	Marn. 1	Marn. 2	Average
1991	**7.3**	**11.3**	**2.3**	**12.0**	**12.0**	**7.7**	**4.0**	8.1
1992	**7.3**	**8.3**	**12.0**	**14.0**	**18.0**	**3.7**	**5.0**	9.8
1993	**8.7**	**8.0**	**5.5**	**10.7**	**19.0**	**6.7**	**3.7**	8.9
1994	**7.7**	**12.3**	**7.0**	**15.7**	**29.0**	**11.0**	**2.7**	12.2
1995	**7.3**	**5.3**	**11.3**	**8.7**	**16.0**	**5.0**	**3.0**	8.1
1996	**4.7**	**6.3**	**7.0**	**8.7**	**14.7**	**5.0**	**2.3**	7.0
1998	**10.3**	**12.7**	**10.7**	**9.7**	**17.3**	**10.0**	**10.0**	11.5
2000	**12.0**	**16.0**	**18.3**	**11.0**	**15.0**	**1.7**	**8.0**	11.7

Evaluation: The total average Barred owl responses per year have remained relatively stable since 1991 suggesting a fluctuating but stable population. These owls are an indicator of old-growth-mixed hemlock/deciduous habitat, but are found throughout the ANF in second growth (mature) forests. A hemlock component appears to be preferred, and cavity trees used for nesting must be a minimum of nine inches in diameter at breast height (Devereux and Mosher, 1984). Suitable Barred owl habitat is abundant on the ANF. An analysis that correlates habitat with Barred owl responses is planned. Based on these data, habitat is of sufficient quality, distribution, and abundance to allow the species population to stabilize and to be well distributed across the ANF, resulting in a high likelihood of persistence.

Beaver

Monitoring Results: By 1991, all beaver habitat on the ANF had been mapped using aerial photography and ground surveys. Results indicate about 20% of all drainages surveyed contained beaver activity. Leaf-off aerial photography was flown on the ANF in 1998 and 1999. New mapping of beaver activity is in progress.

Pennsylvania Game Commission beaver tag records are displayed in Table 35. Although beaver harvest is influenced by pelt prices, these data suggest two plateaus in the population. Between 1986 and 1993, the harvest was steady to slightly decreasing. In 1994, the harvest increased dramatically, and then leveled off.

Evaluation: Beavers have shown a steady increase on the ANF since 1986 peaking at an estimated harvest of 802 animals in 1997. Harvest data in Table 31 is supported by on-the-ground observations of beaver activity throughout the ANF. Beavers are an indicator of regenerating aspen, but observations have shown that they will readily adapt to many other hardwood species. About 4,000 acres (1%) of the ANF is aspen (USDA FS, 1997). Although managers believe the amount of aspen has remained fairly constant since 1986, the Forest Plan

estimated about 10,000 acres (2%) are aspen. These differences may be a result of better data rather than actual changes on-the-ground. Ruffed grouse and woodcock are other MIS known to utilize regenerating aspen habitat. Beavers often enhance habitat for other species such as waterfowl, river otters, and sometimes brook trout. However, they may also cause problems by flooding roads and other facilities. Maintaining viable populations of beavers on the ANF is not currently a problem. The challenge is to achieve a sustainable beaver population, provide habitat for other wildlife, and provide recreation opportunities for wildlife viewers and trappers in balance with other forest uses.

These data support observations by Forest Service wildlife biologists that habitat is of sufficient quality, distribution, and abundance to allow the species population to stabilize and to be well distributed across the ANF resulting in a high likelihood of persistence.

TABLE 35. BEAVER TRAPPING HARVEST REPORTED TO PENNSYLVANIA GAME COMMISSION

Year	County				Four-County Total	Estimated* ANF Harvest
	Elk	Forest	McKean	Warren		
1986	150	89	433	256	928	399
1987	160	109	432	246	947	407
1988	114	58	310	183	665	286
1989	88	62	269	182	601	258
1990	60	53	184	119	416	179
1991	62	125	285	172	644	277
1992	134	86	269	184	673	289
1993	66	58	225	162	511	220
1994	184	139	650	554	1527	657
1995	244	78	529	351	1,202	517
1996	257	181	445	473	1,356	583
1997	378	222	710	538	1,848	802
1998	245	205	636	392	1,478	628
1999	292	180	585	277	1,334	592
2000	257	124	585	360	1,326	538
2001	378	276	565	466	1685	869

**** Estimates for 1997 – 2000 are based on sealing records. Estimates prior to 1997 were calculated ANF totals based on a beaver harvest of 43% of the four county total. Data provided by Tom Hardinsky, PGC furbearer biologist.***

Red-Shouldered Hawk

Monitoring Results: Monitoring data for red-shouldered hawk nests on the Marienville and Bradford districts is displayed in Tables 36 and 37. Active nests monitored range from a low of 0 in 1991 to a high of 9 in 1996**.** Total nests found or monitored range from a low of 1 to a high of 32.

Evaluation: Fluctuations in the total number of nests monitored is most likely the result of variation in search effort. Search effort was not tracked each year. Red-shouldered hawks are an indicator of mature deciduous habitat. About 78% of the ANF currently provides this habitat condition (USDA FS, 1998). Their nests are difficult to find and the monitoring protocol is labor intensive resulting in some nesting going undetected. Breeding and reproduction are occurring but more monitoring needs to occur to determine population trends on

the ANF. Based on the above data, red-shouldered hawk populations are believed to be viable on the ANF.

Within Pennsylvania and the Northeast, red-shouldered hawk populations appear to remain relatively stable. Pennsylvania lists this species as vulnerable, although the Pennsylvania Breeding Bird Atlas recorded this raptor in 745 blocks and confirmed breeding in 134 blocks (Brauning, 1992). Titus and Fuller (1990) found no discernable populations trends when evaluating counts of red-shouldered hawks migrating past six Eastern hawk lookouts between 1972 and 1987.

These data suggest that habitat is of sufficient quality, distribution, and abundance to allow the species population to stabilize and to be well distributed across the ANF resulting in a high likelihood of persistence.

TABLE 36. RED-SHOULDERED HAWK NESTING ACTIVITY ON THE MARIENVILLE RANGER DISTRICT

Year	Active	Inactive	Unknown	Total # found/monitored
1988	6	0	0	6
1989	4	0	2	6
1990	1	1	5	7
1991	0	0	1	1
1992	1	1	3	5
1993	2	1	4	7
1994	3	8	2	13
1995	8	17	7	32
1996	5	5	2	12
1997	1	0	0	1
1998	1	1	0	2
1999	3	4	3	10
2000	0	0	0	0
2001	6	0	0	6

TABLE 37. RED-SHOULDERED HAWK NESTING ACTIVITY ON THE BRADFORD RANGER DISTRICT

Year	Active	Inactive	Unknown	Total # found/monitored
1995	8	17	7	32
1996	5	5	2	12
1997	1	0	0	1
1998	1	1	0	2
1999	4	0	2	6
2000	0	0	0	0
2001	0	0	0	0

Great Blue Heron

Monitoring Results: Tables 38 and 39 reflect monitoring results on the Marienville and Bradford Ranger Districts. Seventeen sites (colonies) have been monitored on the ANF. Not all nests are monitored every year and some nesting colonies move locations. No data have been collected to determine what causes these herons to move.

In general, great blue heron colonies on the Allegheny National Forest are small ranging in size from 1 nest to 33

nests per colony.

TABLE 38. GREAT BLUE HERON NESTING ACTIVITY ON THE MARIENVILLE RANGER DISTRICT

Great Blue Heron Nest Activity – Marienville RD Number of Nests/Site/Year																
Site	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99
1*						**2U**									**2A4U**	
2												**1A**		**1G**	**2A**	
3											**5A**		**3/5A**			
4														**1A**		
5	**Pre 1998 - possible nest w/unknown activity; 1998 - no nests found; this site is near site 6.**															
6															**3U**	
7										**2A**	**2A**	**2G**				
Key: Activity Status A=Active I=Inactive U=Unknown G=Nests Gone or Not located																

- ***Site 1 is on private land adjacent to the Allegheny National Forest. One of the nests found in 1989 was on the ANF. The six nests found in 1998 are on private land.***

*****0 active nests in 00 and 01 for Marn.*****

TABLE 39. GREAT BLUE HERON NESTING ACTIVITY ON THE BRADFORD RANGER DISTRICT

Great Blue Heron Nest Activity – Bradford RD Number of Nests/Site/Year																
Site	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99
1												**33A**	**3A**	**13A**		**5A**
2							**1I**									
3							**1I**									
4												**5U**		**5A**		**5I**
5	**23 nests in 1980; inactive since 1986**										**1I**					
6*							**1U**									
7			**16A**												**16G**	
8	**2A**			**2I**								**1I**				
9		**6A/6U**														
10						**5-9A**						**5-9G**				
Key: Activity Status A=Active I=Inactive U=Unknown G=Nests Gone or Not located																

- ***Site 6 is in New York State, near the Allegheny National Forest.***

*****0 for 00 and 12A for 01*****

Evaluation: Great blue herons are an indicator of old-growth-mixed hemlock deciduous habitat on the ANF. Currently about 1.5% of the ANF is older than 111 years and provides this habitat (USDA FS, 1997). However, on the ANF, great blue herons are known to nest in stands that are 60 years old or older, a habitat condition found

on about 78% of the forest. No wildlife species on the ANF have been found to depend solely on old-growth, so great blue herons remain a valid MIS.
Reproduction is occurring and great blue herons are frequently spotted foraging along many streams and impoundments on the ANF indicating that the location of all colonies is not known. These data indicate a viable population on the ANF. During the Pennsylvania Breeding Bird Atlas project, great blue herons were found in 46 percent of all survey blocks but reliable confirmation of breeding was found in only five percent of the survey blocks (Brauning 1992). Additional monitoring data needs to be collected on the ANF to determine population trends.

These preliminary data suggest that habitat is of sufficient quality, distribution, and abundance to allow the species population to stabilize and to be well distributed across the ANF resulting in a high likelihood of persistence.

Rattlesnake

Monitoring Results:

TABLE 40. TIMBER RATTLESNAKE SIGHTINGS ON THE ALLEGHENY NATIONAL FOREST

Year	Bradford RD	Marienville RD
1982	-	1
1983	-	-
1984	-	-
1985	1	-
1986	-	-
1987	-	1
1988	-	-
1989	3	1
1990	5	2
1991	2	1
1992	2	1
1993	-	-
1994		4
1995	2	3
1996	1	3
1997	-	4
1998	-	6
1999	-	25
2000	1	3
2001	2	27

Evaluation: Timber rattlesnakes are a difficult species to monitor. Their secretive nature and ability to hide beneath logs, rocks, and vegetation make them difficult to detect. Protective measures have focused on maintaining the integrity of known and potential den sites and placing seasonal restrictions on logging operations near known den sites when the snakes may be traveling and foraging in the area. Timber rattlesnakes were identified as an indicator of regenerating deciduous habitat in the Forest Plan probably because they like to bask in the sun (warming of the body is necessary to ensure proper functioning of several organs and to rid the body of

disease and parasites). However, second growth forests on hillsides with a southern exposure and rock outcrops is preferred habitat (Shaffer, 1991). These habitat conditions occur on about 20 to 30 percent of the ANF.
The primary cause of mortality in this species is most likely persecution by humans and not forest management activities. Many people are afraid of snakes and will kill any that they may come in contact with. Some people collect rattlesnakes and use them in rattlesnake roundups or rodeos. The Pennsylvania Fish and Boat Commission is the state agency responsible for managing reptiles and has placed more stringent regulations on the collecting of rattlesnakes.

More data is needed to determine population trends for this species although current data suggests that habitat is of sufficient quality, distribution, and abundance to allow the species population to stabilize but with gaps in the historic species distribution on the ANF. These gaps cause some limitations in interaction among local populations resulting in a moderate likelihood of persistence.

Northern Saw-whet Owl

In 2000, ANF biologists participated in a statewide effort to monitor saw-whet owls, a species for which data was lacking. Four monitoring routes were established on the ANF. Each route consists of eight stops in which a taped broadcast call is played and responses are recorded. The following is a summary of the saw-whet owl monitoring data.

Route	Responses 2000	Responses 2001
Westline, McKean Co.	0	6
Cornplanter Bridge, Warren Co.	0	
Kane, McKean Co.	2	5
James City, Elk Co.	0	

Evaluation: Only two saw-whets were detected using this statewide monitoring protocol. Additional surveys are needed to refine the monitoring technique and possibly to survey additional areas of the ANF.

Bluebird nestbox monitoring

Bluebird nest boxes have been constructed, installed, and monitored in suitable habitats throughout the ANF. In 2000, 336 nest boxes were monitored (165 on the Marienville District and 171 on the Bradford District). Data on nesting success has not been compiled, but nest box use by bluebirds, swallows, flying squirrels, and other animals is substantial.

FISHERIES

Management Indicator Species

Brook trout are an indicator of good water quality and habitat conditions in cold-water streams on the forest. This species occurs in most headwater streams on the forest, with the exception of a few streams where pH is too low or water temperatures are too warm. Populations are monitored annually in September on four different streams across the forest.

Monitoring Results: Population estimates increased in all four streams from 2000. While population estimates increased in all of the streams, the biomass estimates increased in two streams and decreased in the other two. This implies that the majority of the fish surveyed in streams where the biomass decreased are younger, smaller trout. Overall, the streams maintain reproducing populations of brook trout. Stream flows, based on visual observation, were the lowest ever observed in the 11 years the surveys have been conducted on these four streams.

Smallmouth bass is the cool-water management indicator species. The small mouth bass is primarily an inhabitant of the Allegheny Reservoir and the larger rivers, such as the Allegheny River, Tionesta Creek, and the Clarion River. Populations also reside in the Ridgway Reservoir and Tionesta Lake. The ANF has been an active participant in the surveys of the Allegheny Reservoir, and results are reported for this location only. A consistent monitoring method has been applied on an annual basis since 1991 at the Allegheny Reservoir.

Monitoring Results: The smallmouth bass population dropped to 5 fish/100 net hours in 2001 from its all time high in 2000. The 2001 results were the lowest number recorded in 5 years.

The **walleye** is also a cool-water management indicator, but a demand species. The population is annually monitored in the Allegheny Reservoir. It is not listed as an ecological indicator like the small mouth bass or brook trout since its numbers are artificially influenced by the stocking of three million fry annually. This results in less than a natural population. The population is monitored annually in the Allegheny Reservoir because of its importance to the recreational fishery.

Monitoring Results: walleye numbers dropped for the fourth year in a row, to 23 fish/100 net hours. It is not clear what is causing the decline, but the reservoir does go through these cycles of high and low populations.

ZEBRA MUSSELS

One of the recent threats to the two endangered freshwater mussels in the Allegheny River is from zebra mussels. The zebra mussel, an introduced species first documented in the U.S. in 1989, has been spreading throughout the Midwestern and eastern parts of the U.S.

In an attempt to minimize the risk of introducing zebra mussels into the river, the ANF screened boats and other watercraft launching into the Allegheny Reservoir. The concern with zebra mussels being introduced into the reservoir is that should a population become established, they would ultimately get into the river downstream of the dam where the endangered mussels reside.

The goal of the screening process was to educate boaters about zebra mussels and ways to keep their watercraft free of zebra mussels. We also wanted to determine what the risk was of boaters introducing zebra mussels to the reservoir based on a set of criteria.

The results indicate a high percentage of the boating public is familiar with zebra mussels, and knowledgeable about the proper methods to prevent the spread of zebra mussels. As a result of the survey, those boaters that previously were not familiar with decontamination methods now have a better understanding of ways to prevent the transport of zebra mussels. A breakdown of the educational results of the survey include:

Total # of boaters surveyed: 4186

- # of first-time encounters with boaters: 2609 (1577 were repeats users)
  - # of first-time encounters familiar with zebra mussels in general: 2317 (89%)
  - # of first-time encounters familiar with educational materials: 1953 (75%)
  - # of first-time encounters familiar with decontamination methods: 2013 (77%)

Note: “first-time encounter” is defined as the first contact made with a boater. Several boaters are repeat users of the reservoir, and these subsequent encounters with the same boaters are not included in the percentages.

Based on a set of criteria, boats were assigned a risk factor for transporting zebra mussels to the Allegheny Reservoir. The results of the 4186 boaters surveyed are summarized in the following table.

Watercraft Risk	No. of Watercraft	%
Low (no)	4104	98.1
Moderate	65	1.6
High	17	0.3

As the table shows, the majority of watercraft was low risk.

WILDERNESS

Monitor "Limits of Acceptable Change" (LAC) in the Allegheny Islands and Hickory Creek Wildernesses

Method of Measure: A variety of methods are used to monitor wilderness, from trail logs and vehicle counts for recreation use, to impacts from human use, to sampling surveys measuring physical conditions. The Wilderness Implementation Schedule indicated trails, campsites, island shorelines, recreation use, biological species, vegetative/exotic species, and soil erosion categories will be monitored. Since 1996, baseline condition inventories have been completed for stream conditions, aquatic insects and fish habitat, campsite and trail conditions, visitor use, and visitor Leave No Trace knowledge. Several of these projects were completed through partnerships with area universities and volunteers. Before LAC monitoring can begin, a baseline resource condition (present condition) must be established. Monitoring of vegetative/exotic species and heritage resource sites can begin when the condition inventories are completed. Condition inventories for these resources in the Allegheny Islands Wilderness were initiated in 1999 through partnerships with Clarion University and continued through 2001.

Trail logs have long been used as the basis for monitoring recreation use. Since the early 1990’s, a part-time Wilderness Ranger and other seasonal employees have been patrolling the area observing use, trail and campsite conditions, and making personal contracts. In addition to the trail log, a trail counter and personal observation records are sometimes collected to improve baseline data on wilderness use.

An intensive inventory of campsites in the Allegheny Islands Wilderness was completed in 2000 to refine inventory data. Permanent photo points were established for campsites identified in the Allegheny Islands Wilderness and campsite locations were recorded using global positioning technology. Conditions were measured and recorded at each campsite, in addition to photographic records. No unacceptable resource damage from use was noted. This inventory will be repeated in 2003.

The partnership with Clarion University continues with the ongoing baseline condition inventory of pre-historic and historic resources and inventories for exotic or non-native plants of the Allegheny Islands Wilderness. The first phase of this inventory process was initiated in 1999-2000 and work continued in 2001.

Monitoring Results: Trail conditions are considered acceptable. Campsite conditions were also monitored and maintained or naturalized as necessary to meet wilderness and/or Leave No Trace standards.

Scenery Management

Visual Quality Objectives, Existing vs. Planned Within MAs: 3.0, 5.0, and 6.1

The Forest Plan requires monitoring of Visual Quality Objectives (VQO) to determine if Forest Plan Management Direction within the Management Areas is meeting VQOs[7]. This monitoring and summary is accomplished at five-year intervals.

Visual Monitoring was conducted in FY 92 and 97; the next monitoring will take place in FY 2002. The FY 97 Monitoring and Evaluation Report summarized areas where existing visual conditions fell below the standards adopted in the Forest Plan. It also builds on the findings of the 1992 report with an updated chart comparing the existing and proposed visual condition. Additional information includes a comparison of the percentage of acres of the MAs in the sample areas to the percentage of acres of those MAs on the entire Forest.

Method of Measure: Please refer to the 1997 report for an explanation of the measurement methodology. The table below shows the distribution of the analysis quadrants.

TABLE 41. DISTRIBUTION OF ANALYSIS QUADRANTS

Mgmt Areas in Sample	% of Forest in MA[8]	Acres of Sample	% of Sample in MAs
1.0	**2%**	**417**	**3%**
3.0	**61%**	**6,908**	**49%**
5.0	**2%**	**60**	**<1%**
6.1	**25%**	**3,865**	**27%**
6.2	**4%**	**843**	**6%**
6.4	**4%**	**2,106**	**15%**
Acres	98%	14,199	100%

Monitoring Results:

TABLE 42. EXISTING VS. PROPOSED VQO (1997)

Proposed Acres of VQO in Sample Sites (Based on Forest Plan)		Existing Acres of VQO in Sample Sites (Based on field Survey/Data Base)			
VQO		R	PR	M	MM
Retention (R)	**3,271**	**2,979**	**192**		
Partial Retention (PR)	**3,846**	**2,773**	**1,173**		
Modification (M)	**3,283**	**2,790**	**493**		
Maximum Modification (MM)	**3,799**	**3,020**	**182**	**597**	
Total Acres	14,199	11,562	2,040	597	0

Evaluation of Results: Please refer to the 1997 report for a full evaluation. The table above summarizes the 1997 results.

[7] 36 CFR 219, 12(k) (2)
[8] Percentages are based on the most recent MA acreage calculations using GIS

Future Five-year Monitoring for Scenery

The Visual Management System (VMS) was developed in 1976, and the use of VQOs has been the standard for both Forest Planning and Project Implementation as well as for the monitoring visual conditions. In the last five years, a new system that builds on the VMS has been introduced. It is called the Scenery Management System (SMS), and it primarily addresses issues that develop at the Forest Plan scale versus the project scale. Other features of the SMS include the consideration of the human dimension through a constituent analysis and identification of special places when evaluating the intrinsic scenic values in a landscape. This new SMS, with its changes in terminology, will most likely be incorporated in the next Forest Plan and in future monitoring reports. In addition, CDS is being integrated with GIS, which is becoming the best tool for handling vast amounts of spatial information. As layers of information create a more complete database, and people become proficient at querying it, GIS will be the best source for the data needed in future monitoring.

RECREATION

Recreation Use by Activity Type

Method of Measure: Allegheny Visitor Use Monitoring Project

National results of the National Visitor Use Monitoring project (NVUM) project showed that over 214 million National Forest visits occurred on National Forest system lands, waters, and recreation sites in 2001. The report provides broad summary information about recreation use and visitor characteristics nationally and at the nine Forest Service regions and includes data for the Allegheny National Forest.

The ANF participated in the NVUM project in the second round that occurred between October 2000 and September 2001. The forest was assigned 168 interview days, including 8 viewing corridor sample days, and accomplished 100% of them. The forest coordinator reported a typical weather year and typical recreation season.

Monitoring Results: A total of 1,665 visitors were contacted on the forest during the sample year. Of these, 9% refused to be interviewed. Of the 1,517 people who agreed to be interviewed, about 39% were not recreating (including 1% who just stopped to use the bathroom, 6% were working, 15% were just passing through, and 18% had some other reason to be there). The remainder, or 61% of those interviewed, said their primary purpose on the forest was recreation and 75% of them were exiting for the last time. Of the visitors leaving the forest agreeing to be interviewed, about 46% were last exiting recreation visitors (the target interview population).

NVUM reports visitation estimates using standard definitions of national forest visits and national forest site visits that provide comparable estimates of visitor use.

TABLE 43. ANF ANNUAL RECREATION USE ESTIMATE[9]

National Forest Visits		Site Visits		Wilderness Visits	
Visits	**Error Rate**	**Visits**	**Error Rate**	**Visits**	**Error** Rate
1,411,875	29.3 %	1,634,086	26.5 %	36,815	45.9 %

A description of visitor activity during their national forest visit was developed. This basic information includes participation in various recreation activities, length of stay on the national forest and at recreation sites, visitor satisfaction with national forest facilities and services, and economic expenditures. The average length of stay on the ANF for a national forest visit was 17.4 hours. Over 15% of visitors stayed overnight on the forest. In

[9] Recreation use for FY 2001 at the 80% confidence level +/- 29 %

addition, visitors reported how much time they spent on the specific recreation site at which they were interviewed. Average time spent varied considerably by site and is displayed below.

TABLE 44. ANF SITE VISIT LENGTH OF STAY (HOURS) BY SITE TYPE

Site Visit Average	DUDS[10]	OUDS[11]	Wilderness	GFA[12]
16.2	**1.2**	**71.5**	**15.5**	**17.6**

The average recreation visitor visited 1.1 sites during their national forest visit. Forest visitors sometimes go to just one national forest site or area during their visit. For example, downhill skiers may just visit the ski area and nowhere else. About 74% of visitors visited only the site at which they were interviewed.

The top five recreation activities of visitors were relaxing, hiking/walking, viewing natural features, viewing wildlife, and driving for pleasure. Each visitor also picked one of these activities as their primary activity for their current recreation visit to the forest. The top primary activities were hiking/walking, hunting, fishing, viewing wildlife, and driving for pleasure. Please note that the results of the NVUM activity analysis DO NOT identify the types of activities visitors would like to have offered on the national forests. It also does not evaluate displaced forest visitors, those who no longer visit the forest because the activities they desire are not offered.

TABLE 45. ANF ACTIVITY PARTICIPATION AND PRIMARY ACTIVITY

Activity	% participation	% who said it was their primary activity
General/other- relaxing, hanging out, escaping noise and heat, etc,	61.8	4.1
Viewing wildlife, birds, fish, etc on national forest system lands	60.7	**10.2**

[10] Day Use Developed Site
[11] Overnight Use Developed Site
[12] General Forest Area

Viewing natural features such as scenery, flowers, etc on national forest system lands	52.8	5.2
Hiking or walking	52.8	24.0
Driving for pleasure on roads	31.2	8.9
Fishing- all types	24.9	10.5
Hunting- all types	12.1	11.2
Gathering mushrooms, berries, firewood, or other natural products	8.0	7.1
Primitive camping	7.7	5.3
Picnicking and family day gatherings in developed sites (family or group)	5.5	0.9
Camping in developed sites (family or group)	5.4	4.1
Motorized water travel (boats, ski sleds, etc)	4.5	1.5
Visiting historic and prehistoric sites/area	3.1	1.1
Other non-motorized activities (swimming, games and sports)	2.8	0.9
Backpacking, camping in unroaded areas	1.9	1.0
Snowmobile travel	1.8	0.8
Off-highway vehicle travel (4-wheelers, dirt bikes, etc)	1.7	1.3
Visiting a nature center, nature trail or visitor information services	1.4	0.0
Resorts, cabins and other accommodations on Forest Service managed lands (private or Forest Service run)	1.2	0.0
Other motorized land/air activities (plane, other)	1.1	0.7
Non-motorized water travel (canoe, raft, etc.)	0.8	0.5
Bicycling, including mountain bikes	0.7	0.1
Nature Study	0.6	0.0
Horseback riding	0.6	0.6
Downhill skiing or snowboarding	0.0	0.0
Cross-country skiing, snow shoeing	0.0	0.0

Twenty-five percent of recreation visitors interviewed were asked about the types of constructed facilities and special designated areas they used during their visit. The most used facilities and areas were: Forest Service roads, nonmotorized trails, scenic byways, developed fishing sites, and designated Wilderness.

TABLE 46. USE OF ANF FACILITIES AND SPECIALLY DESIGNATED AREAS

Facility / Area Type	% who said they used (all national forest visits)
Other forest roads	54.2
Hiking, biking, or horseback trails	20.6
Scenic byway	17.2
Developed fishing site/ dock	7.9
Designated Wilderness	6.3

Boat launch	3.8
Developed campground	3.5
Picnic area	3.2
Motorized developed trails	2.9
Swimming area	2.8
Visitor center, museum	1.5
Interpretive site	0.8
Designated Off Road Vehicle area	0.5
Forest Service office or other info site	0.3
Downhill ski area	0.0
Organization camp	0.0
Designated snowmobile area	0.0
Nordic ski area	0.0
Lodges/Resorts on National Forest System land	0.0
Fire Lookouts/Cabins Forest Service owned	0.0
Designated snow play area	0.0
Recreation residences	0.0

Number of Wildlife/Fish User Days Associated with Hunting and Fishing Use

Method of Measure: Management Attainment Report, trends estimated from car counts, hunting and fishing license sales and field observations.

Evaluation of Results: Hunting use in 2001 was about the same as in 2000 with approximately 177,000 RVDs. The open winter, which provided easy forest access, and good mast crop provided excellent harvest opportunities for hunters. Fishing use is estimated to have again decreased slightly from 2000. The cool spring weather kept many trout fishermen from the streams.

National trends indicate the number of persons who participate in hunting and fishing has declined by 12.3% and 3.8%, respectively, over the previous decade[13]. Trends for hunting in Pennsylvania however, have shown an overall lower decline and numbers have somewhat stabilized in recent years[14]. Car counts for the 2001 big game season were about the same as the previous season. Hunting license sales were up 0.5% statewide. Fishing license sales for Pennsylvania have shown a 16.5% decline over the past decade, which is somewhat greater than national trends. Fishing license sales in PA declined approximately 0.7% last year[15].

Recreation Opportunity Spectrum, Existing vs. Planned

Formal monitoring for Recreation Opportunity Spectrum (ROS) evaluation and inventory is planned for every five years and was due in FY 2001. The planned monitoring did not occur. The FY 95 monitoring concluded that, with the exception of some inconsistencies that existed before Forest Plan implementation, the ROS class objectives are being met or exceeded.

Recreation Visitor Days by Activity and Recreation Opportunity Spectrum Class by MA

Method of Measure: NVUM results and Management Attainment Report

Monitoring Results: No monitoring of this item was conducted this fiscal year due to the implementation of a new monitoring protocol using NVUM data.

[13] National Survey on Recreation and The Environment, USDA-FS, 1990
[14] Personal communication w/ANF Biologist Brad Nelson
[15] PA Fish & Boat Commission

Evaluation of Results: As mentioned in the Emerging Issues section elsewhere in this report data management for recreation use has undergone a significant change in the way it is gathered, interpreted, and updated since the inception of the Forest Plan in 1986. The original database for the Forest Plan development utilized RIM, which was abandoned in 1996 due to questions by Congress and the General Accounting Office about the credibility of recreation visitation estimates, reported by the Forest Service. NVUM was implemented on the ANF during FY 2001 to replace RIM and provide a statistically sound protocol for measuring and interpreting recreation use.

Data gathered during the FY 2001 was not ready for incorporation at the time of this report. A new NVUM based monitoring and data updating protocol will be in place in late FY 2002.

General observations show the FY 01 season to be similar to that of 2000. Again, the most notable exception was the continued steady increase in the summer motorized trail use which continues to be the fastest growing recreation use on the forest and a 2% decrease in occupancy at developed campgrounds due to the cool wet spring and early summer.

Conditions were favorable for hiking and other day-use activities, as well as fall hunting. Swimming and boating use declined with camping due to the less than ideal weather conditions. Fall tree color was again excellent due to an extended fall color season. Winter weather was erratic, with early snow followed by thaws then light snow cover. This allowed for only a few weekends of snowmobile use. ATV use again continued to show the greatest and most significant increase in use on the Forest. State registration continued at record levels (from PA DCNR).

Another general measure of recreation use on the ANF can be interpreted from developed campground occupancy rates. An average across the 17 campgrounds where fees are collected is 48%. Demand does not exceed supply when evaluated this way.

Miles of Trail Constructed, by Type and MA

Method of Measure: INFRA Data System and Management Attainment Report

Monitoring Results:

TABLE 47. MILES OF TRAIL CONSTRUCTION (NEW TRAIL MILES)

Type of Trail	MA	Forest Plan Amount	2001	Total to Date (86-01)	% Of Forest Plan
Pedestrian	**1.0**	**0**	**0**		
	3.0	**26**	**0**		

	5.0	**3**	**0**		
	6.1	**38**	**0**		
	6.2	**8**	**0**		
	6.4	**9**	**0**		
	8.0	**5**	**0**		
(All MAs)		89	0.3	62.6	70.3%
Motorized/Winter	**3.0**	**22**	**0**		
	6.1	0	**0**		
(All MAs)		22	0.5	76.3	346.8%
Motorized/Summer	**1.0**	**6**	**0**		
	3.0	**240**	**1**		
	6.1	**44**	**0**		
(All MAs)		290	3.5	85.1	29.3%

Evaluation of Results: Summer and Winter Motorized Trail: In past Monitoring and Evaluation Reports, Township road mileage had been included as part of the motorized trails accomplishments. Original documentation in the Forest Plan project record indicates that Township roads were included in the trail system that existed at the time. Designation of these roads as snowmobile or ATV trails is often made without the Forest Service's consent or knowledge, and tracking exact mileages is difficult. A result of this report will be a recommendation for Forest Plan revision to disaggregate township and other non-Forest Service system trail mileage from other miles that occur solely on National Forest system lands. This approach will provide a better measure of Forest Plan objectives.

TABLE 48. SNOWMOBILE TRAIL ON NFS LANDS (MILES)

	Dedicated Snowmobile Trail		**Road Used as Trail**		**Total**	
	Inside IUA (ATV Trail)	Outside IUA	Inside IUA	Outside IUA	Inside IUA	Outside IUA
National Forest	60	3	148	155	**208**	**158**
Total	63		303		**366**	
Township/OGM/Private	0		60%	40%	**52**	

Pedestrian Trail: Pedestrian trail mileage suffers some of the same problems in that hiking, interpretive, and cross-country ski trails are counted under the heading of Pedestrian Trails. A similar disaggregation is proposed to

clarify goals for each of these activities.

TABLE 49. PEDESTRIAN TRAIL MILEAGES

Hiking	Interpretive	Cross-Country Ski	Pedestrian Total
201	18	52	**271**

Total Recreation Receipts and Management Capacity Figures for Developed Recreation Sites

Method of Measure: Management Attainment Report

TABLE 50. RECRETAION RECEIPTS/CAPACITY FIGURES FOR DEVELOPED RECREATION SITES

	Forest Service	Concessionaire	Total
PAOT[16] Days	**255,455**	**3,372,090**	**3,627,545**
Receipts	**$112,601[17]**	**$401,714**	**$514,315**

Evaluation of Results: The PAOT-Day figure is a measure of the total amount of developed recreation site capacity the Forest operates and maintains during the year. This figure is not associated with use; it measures the amount of recreation available for use each year. In other words, even if no one chose to use a campground, trailhead, etc., this figure would not change because the Forest would still have to operate and maintain the areas open for use.

The PAOT-Day figure is derived by determining the capacity of a site in terms of how many people it is designed to accommodate multiplied by the number of days it is expected to be open and available for use. Take, for example, a campsite designed to handle five people at one time (PAOT). If it was operated and maintained for 100 days, then the PAOT-Day figure would be 500 (5 PAOT x 100 days). The average total figure for the Forest is approximately 3,600,000 PAOT Days. Occasionally there is a need to close sites for reconstruction or reduce the length of time they are open.

In FY 01, a total of 3,627,545 PAOT Days were managed for (same as FY 2000). Licensed concessionaires operated the same sites with the same managed days as FY 2000.

Total receipts for FY 01 decreased by approximately 2% from 2000 due to an overall decrease in use at developed sites. Recreation receipts have increased over 70 percent since concessionaire operations began in 1994. Fee collections after major renovations at Twin Lakes (1991), Loleta (1995), and Willow Bay have increased significantly.

Status of Recreation Site Construction and Maintenance

Monitoring Results: The following projects were initiated or continued during FY 01:

- Willow Bay: Thirty-one new walk-to sites in the new Deer Grove camping area were completed with the placement of new site furniture, signing and trail surfacing.

[16] Persons at One Time; a measure of capacity
[17] 2001 ANF Cash Balance Statement

- Rimrock: Accessible handrails were placed on the steps through the rocks and on the wooden stairways.
- Tracy Ridge: the water well was pulled and serviced to improve drinking water quality in the campground.

ECONOMICS

The National Forest Management Act (NFMA) planning regulations requirement for monitoring this category of information is very specific [36 CFR 219.12(k)(3)] and states that we will monitor "costs associated with carrying out the planned management prescriptions as compared with costs estimated in the Forest Plan." Carrying out this section of the monitoring program will involve the continued use of job codes for keeping track of costs by activity. The use of job codes was standardized nationally in FY 2000. This has reduced our ability to track the costs of specific types of work within each finding category.

Cost per Unit for the Following Activities

Method of Measure: Job codes, Foundation Financial Information System (FFIS), contract records, and engineering reports.

Monitoring Results: (See Table 51)

Evaluation of Results: Trail construction costs were unusually high due to high costs for specialized trail building equipment and special trail design considerations in Group III Soils.

TABLE 51. 2001 COST OF IMPLEMENTATION, PER UNIT

Activity	Unit of Meas.	FY 01 Units Accomp.	FY 01 Total Cost	FY 01 Unit Cost	Forest Plan Estimate	FY 99 Unit Cost	FY 98 Unit Cost	FY 97 Unit Cost	FY 96 Unit Cost	FY 95 Unit Cost	FY 94 Unit Cost	FY 93 Unit Cost
Trail (direct costs only)												
Construction/Reconstruction												
... Pedestrian Trails	**Mile**	**1**	**$47,787**	**$47,787**	**$2,782**	**$9,592**	**$3,433.89**	**$3,338**	**N/A**	**$54,369**	**$11,734**	**$13,970**
... Bridges	**Bridge**					**$0**	**$10,927.33**					
... Motorized/Summer	**Mile**					**$10,927**	**$8,834.95**	**$29,705**	**$116,688**	**$6,245**	**N/A**	**$15,931**
... Motorized/Winter	**Mile**					**$24,789**	**$2,522.50**	**$28,129**	**$97,158**	**$16,614**	**N/A**	**$7,935**
Sale prep to offer	**MBF**	**25,949**	**$2,535,592**	**$97.71**	**$10.90**	**$105.60**	**$286.82**	**$56.86**	**$51.11**	**$49.64**	**$34.56**	**$36.58**
	MCF	**4,208**		**$602.55**		**$647.36**	**$1,763.58**	**$348.53**	**$313.23**			
Wildlife, Fish, T&E Species Habitat Improvement	**Acre**	**740 acres**	**$196,021**	**$264.89**		**$301.35**	**$313.42**	**$302.26**	**$295.27**	**$197.20**	**$188.21**	**$159.19**
Wildlife, Fish, T&E Species Habitat Improvement	**Struct.**					**$1,051**	**$115.38**	**$56.82**	**$57.00**	**$69.86**	**$66.91**	**$34.53**
Site Prep for Natural Regeneration	**Acre**	**3,026**	**$1,404,829**	**$462.93**	**$40**	**$130.95**	**$98.94**	**$103.80**	**$87.50**	**$63.06**	**$93.43**	**$57.18**
Herbicide					**$57**	**$197.05**	**$153.12**	**$161.62**	**$152.89**	**$134.85**	**$155.70**	**$218.38**
Aerial Fertilization					**$244**	**$221.01**	**N/A**	**$216.10**	**$196.59**	**$197.31**	**$207.80**	**$138.31**
Fencing						**$307.60**	**$445.62**	**$608.16**	**$395.79**	**$344.96**	**$301.13**	**$368.86**
Timber Stand Improvement (Release)	**Acre**	**499**	**$92,440**	**$185.25**	**$60**	**$150.89**	**$208.99**	**$154.25**	**$172.57**	**$0**	**$0**	**$0**
Road Construction	**Mile**	**19.7**	**$818,975**	**$41,572.34**	**$46,337**	**$0**	**$46,795.33**	**$39,569.29**	**$46,207**	**$29,765**	**$36,099**	**$50,225**
Road Reconstruction					**$26,659**	**$32,089**	**$28,348.39**	**$18,240.03**	**$21,070**	**$14,229**	**$13,420**	**$9,249**

ROADS

Road Status Summary showing the Following Categories:

a. Total system road miles and density by Management Area (MA).

b. Miles of new construction by MA - no prior existing corridor.

c. Miles of temporary road construction (Forest-wide).

d. Miles of new system road constructed by MA on existing, unimproved locations (this is identified as "reconstruction" in the Forest Plan).

e. Resurface road miles and cumulative resurface road miles.

Method of Measure: By Transportation Planner from completed work.

Evaluation of Results: Road densities are well within or below the Forest Plan's mile/square mile guidelines (see Table 52). As in past Monitoring Reports, we have included a column titled road restoration miles (roads that have had minor work completed on them). This work would include culvert replacement, grading, and replacement of surfacing material. During the development of the Forest Plan, this type of work was included within road maintenance. However, shortly after the Forest Plan was approved, the national definitions and funding philosophies were changed to include this type of work within the general category of road reconstruction. To better understand what has occurred on the ground and its relationship to the Forest Plan projections, we will discuss and display all categories of reconstruction.

The National definition for road reconstruction is found in Forest Service Manual (FSM) 7705.

Road Reconstruction - The investment in construction activity that results in betterment, restoration, or in the realignment of a road as defined in the following:

Realignment - Investment in construction activity that results in the new location of an existing road or portions thereof.

Betterment - Investment in construction activity that raises the traffic service level of a road or improves its safety or operating efficiency.

Restoration - Investment in construction activity required to rebuild a road to its approved traffic service level.

Road Maintenance - Expenditures in the minor restoration and upkeep of a road necessary to retain the road's approved traffic service level.

The differences in these definitions are one of intention or purpose of the work to be performed, not necessarily the work activities themselves (i.e., applying pit run surfacing could be a work activity under realignment, betterment or restoration or even road maintenance). If we are replacing worn out surfacing or culverts that are corroded through, then the project intent is restoration. If the intention is to improve the road from a Traffic Service Level (TSL) "D" to a TSL "C," then it is classified as betterment.

In an effort to improve understanding of what is actually happening on the ground, a decision was made to not use the general term *road reconstruction* itself but to explain the subcategories. The subcategories of reconstruction called realignment, betterment, and restoration will be tracked and described in all NEPA and monitoring documents.

TABLE 52. ROAD STATUS BY MANAGEMENT AREA

					Road Construction			Temporary Road Construction			Road Reconstruction				
											Betterment			Restoration	
Mgmt Area	Total Miles	Density (mi/sq mi)	Forest Plan Density (mi/sq mi)	Existing Roads	FY 2001 (miles)	Cum. Total (mi)	% of Forest Plan Miles	FY 2001 (miles)	Cum. Total (mi)	% of Forest Plan Miles	FY 2001 (miles)	Cum. Total (mi)	% of Forest Plan Miles	FY 2001 (miles)	Cum. Total (mi)
1.0	**8.9**	**0.8**	**1 to 3**	**0.0**	**0.0**	**2.3**	~	**0.0**	**0.0**	~	**0.0**	**3.1**	~	**0.0**	**7.3**
2.0	**13.8**	**1.5**	**2 to 4**	**0.0**	**0.0**	**1.0**	**14**	**0.0**	**0.0**	~	**0.0**	**3.4**	**113**	**0.0**	**5.5**
3.0	**875.6**	**1.7**	**2 to 4**	**0.0**	**0.4**	**144.4**	**52**	**0.0**	**10.3**	~	**0.9**	**104.0**	**92**	**4.4**	**559.4**
6.1	**175.9**	**1.1**	**1 to 3**	**0.0**	**0.0**	**8.4**	**35**	**0.0**	**1.0**	~	**0.0**	**5.5**	**57**	**7.9**	**81.1**
6.2	**32.0**	**1.0**	**1.5 to 4**	**0.0**	**0.0**	**7.8**	**70**	**0.0**	**1.8**	~	**0.3**	**4.1**	**91**	**0.0**	**8.9**
6.3	**5.7**	**3.6**	~	**0.0**	**0.0**	**0.0**	~	**0.0**	**0.0**	~	**0.0**	**1.7**	~	**0.0**	**2.7**
6.4	**5.3**	**0.1**	~	**0.0**	**0.0**	**0.0**	~	**0.0**	**0.0**	~	**0.0**	**0.0**	~	**0.0**	**1.1**
7.0	**11.5**	**7.2**	~	**0.0**	**0.0**	**0.6**	~	**0.0**	**0.0**	~	**0.5**	**1.3**	~	**0.0**	**14.9**
8.0	**5.0**	**0.0**	~	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	~	**0.0**	**0.0**	~	**0.0**	**4.7**
9. 1	**1.4**	**0.9**	~	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	~	**0.0**	**0.0**	~	**0.0**	**0.0**
Total	1135.1	1.8	~	0.0	0.4	164.5	52	0.0	13.1		1.4	123.1	95	12.3	685.6

***Density** - Total miles divided by square miles assigned to that Management Area (Forest Plan, p. 4-55).*
***Existing Roads** - Existing non-system roads added to system minus roads taken off the system (obliterated) and adjustments for changes due to improved data.*
***Cumulative Totals** are for FY 86 to present.*

It should be noted that on Jan 12th, 2001, the National definitions for road construction and reconstruction were changed. These changes will be reflected in the next monitoring report.

We have slightly exceeded our Forest Plan estimate for betterment and realignment for management area 2.0. We are near the estimate for management area 3.0. We consider this a positive environmental impact, because by doing so, we have been able to keep the amount of new road construction (which has more impacts to the landforms) at a level significantly less than estimated in the Forest Plan.

We have also been attempting to minimize new road construction. In some instances, we have been able to perform betterment or realignment, and thereby eliminate the need for new construction. This is evidenced in the fact that we have constructed less than 60 percent of the amount the Forest Plan estimated projection for new roads.

Other factors have also contributed to increased road reconstruction - betterment mileages. We have reconstructed several roads primarily to reduce the potential for erosion and sedimentation from those roads. For example, we have improved 5.9 miles of Township Roads, some within 100 feet of perennial streams. These types of projects were not included in the Forest Plan reconstruction estimates.

A review of our records indicated that all of our road reconstruction projects fell within the definitions of either betterment or restoration. Therefore, there is no column titled realignment in Table 47.

The status of road management is: 38% open, 25% restricted, and 37% closed. The Forest Plan calls for 20% of the roads to be open, 20% restricted, and 60% closed. As stated in the plan, this is a long-term objective, to be attained within 50 years. At the present rate, it is projected that the forest will meet this objective in the 50-year time frame. Table 53 compares our progression toward meeting this objective since 1987.

TABLE 53. ROAD MANAGEMENT BY YEAR

	OPEN		RESTRICTED		CLOSED		TOTAL
Year	%	Miles	%	Miles	%	Miles	Miles
1987	**63**	**573.5**	**24**	**216.2**	**14**	**123.5**	**913.2**
1988	**na**	**na**	**na**	**na**	**na**	**na**	**na**
1989	**58**	**564.1**	**22**	**214.0**	**20**	**194.4**	**972.5**
1990	**55**	**550.8**	**21**	**210.3**	**24**	**240.3**	**1,001.4**
1991	**52**	**542.8**	**21**	**219.2**	**27**	**281.8**	**1,043.8**
1992	**na**	**na**	**na**	**na**	**na**	**na**	**1,055.7**
1993	**41**	**449.8**	**19**	**211.5**	**40**	**445.5**	**1,106.8**
1994	**39**	**438.4**	**24**	**269.3**	**37**	**416.3**	**1,124.0**
1995	**38**	**430.6**	**25**	**385.2**	**37**	**419.6**	**1,135.4**
1996	**38**	**430.6**	**25**	**284.6**	**37**	**422.1**	**1,137.3**
1997	**38**	**430.6**	**25**	**284.6**	**37**	**426.3**	**1,141.5**
1998	**38**	**430.6**	**25**	**284.6**	**37**	**426.6**	**1141.8**
1999	**38**	**428.9**	**25**	**284.6**	**37**	**422.9**	**1136.4**
2000	**38**	**428.9**	**25**	**284.6**	**37**	**421.2**	**1134.7**
2001	**38**	**428.9**	**25**	**284.6**	**37**	**421.6**	**1135.1**
w/ OGM Roads on System	**36**	**432.4**	**24**	**288.2**	**40**	**478.7**	**1198.3**

na - data not available

The table demonstrates the significant progress the ANF has made towards the road management guidelines in the

Forest Plan since plan implementation. Due primarily to the increase in deer density, progress towards closing more roads has been reduced in the past several years. The Forest Plan emphasizes road management. Our NEPA documents are discussing road management to a greater extent than they have in the past. Beginning January 2001, a Roads Analysis is required for all NEPA projects that have a decision related to road construction/ reconstruction/ road management changes.

LAND ADJUSTMENTS

Summary of National Forest Land Adjustments by MA

Method of Measure: Continuous tabulation of land adjustments.

Monitoring Results:

TABLE 54. SUMMARY OF NATIONAL FOREST LAND ADJUSTMENTS

Mgmt. Area	Acres Acquired in FY 2001	Acres Disposed of in FY 2001	Net Change since 1986
1.0	0	0	0
2.0	0	0	0
3.0	0	0	+716
6.1	0	0	0
6.2	0	0	+1,580
6.3	0	0	0
6.4	0	0	0
7.0	0	0	0
8.0	0	0	+300
9.1	0	0	0
Total	**0**	**0**	**+2,596**

Evaluation of Results: No adjustments were made to the total land base of the Allegheny National Forest in FY 2001.

RESEARCH, ADMINISTRATIVE STUDIES, AND

ADAPTIVE MANAGEMENT

Research needs were identified in the Forest Plan [36 CFR 219.7(e)]. Since 1986, when implementation of the Forest Plan began, ANF personnel have followed three paths to accomplish needed research. First, we have worked with scientists to develop formal research studies that will answer our research needs. ***Research studies*** are conducted to advance the frontiers of scientific knowledge and to test hypotheses of broad forest management interest. Second, we can use ***administrative studies*** to test solutions proposed by Research that we believe will work within our boundaries and our administrative and management framework. Third, when we believe that information already available suggests a probable solution for problems that we face, but these solutions are accompanied by uncertainty, we can use an ***adaptive management*** approach. To us, adaptive management means defining expected outcomes and designing methods to measure responses to the implementation of proposed solutions, monitoring results with planned measurements and analyses, learning from the comparisons between expected and actual outcomes, and changing actions and plans according to what we learn. In the sections that follow, we describe ongoing applications of all three approaches to meeting research needs. For additional information, refer to summaries presented in previous ANF Monitoring and Evaluation Reports.

EFFECTS OF GYPSY MOTH EGG MASS DENSITIES ON SHELTERWOOD AND SEED TREE CUTS ON THE ALLEGHENY NATIONAL FOREST

This research study is being conducted by Dr. Kurt Gottschalk, Project Leader, and David Feicht, Forester, Northeast Forest Experiment Station, Morgantown, WV. It was completed in FY 2000, and a final summary of results will be available in FY 2003.

Problem Statement: Because of repeated gypsy moth defoliation, drought, and the action of secondary organisms, significant acreages on the ANF have developed substantial tree mortality. Increasing acreages have very low (overstory) stocking with valuable trees that are highly susceptible to defoliation. Are these stands with low residual stocking at higher risk of defoliation with lower densities of gypsy moth egg masses than are currently used as spray thresholds?

Objectives:

1. To evaluate the susceptibility of shelterwood seed cut areas to defoliation where egg mass densities are low.

2. To evaluate the effects of expected defoliation on vulnerability to mortality of residual trees in regeneration cuts.

3. To evaluate tree regeneration response under various residual stocking levels as well as the effects of gypsy moth defoliation of tree seedlings.

Status: Study areas were established in 1991 on the ANF and State Game Lands 29. Egg mass density data was collected through 1993.

Evaluation of susceptibility (Objective 1) and vulnerability of residual trees (Objective 2) was discontinued in 1994 due to the treatment of all study plots on the ANF with B.t. The B.t. treatments were necessary to minimize potential mortality of planted oak seedlings from expected gypsy moth defoliation. Replanting costs would be high. This B.t. treatment compromised the several years of gypsy moth population data that were being monitored in these shelterwoods. No further overstory data collection is planned at this time.

Tree regeneration (seedling) response (Objective 3) was re-measured annually between 1991 and 1995. The next scheduled re-measurement will be in the year 2000. Tree seedling development data is still important due to the timely bumper acorn crop in 1990. Through the end of 1995, the number of oak seedlings greater than one foot tall has gradually increased inside the fenced shelterwoods to around 1,200/acre, while the number has declined in

the unfenced shelterwoods, and no oak larger than one foot tall was recorded in 1995 in the control (fully stocked) stands. This same pattern holds true for black cherry and other commercial hardwoods (birch, red maple, etc.) in these stands.

During FY 2000, the regeneration plots were located and remeasured. Regeneration of oak, black cherry, and other commercial hardwoods (birch, red maple, etc.) has continued to decline in unfenced shelterwoods and in control (fully stocked) stands where fern coverage is very high (80–100 percent). Regeneration in fenced shelterwoods has continued to develop with large regeneration (10–15 foot) present on most plots. Oak is still a minor component of the regeneration mix, and is shorter on average than other species. Species that dominate plots include black birch, black cherry, red maple, aspen, and American beech.

EXAMINING THE EFFECTIVENESS OF CLEANINGS TO ENHANCE THE SURVIVAL AND DEVELOPMENT OF OAK SPECIES IN YOUNG MIXED-SPECIES STANDS

Principal Investigators: Dr. Kurt Gottschalk, Research Forester and Project Leader, and Dr. Gary Miller, NERS, Morgantown, WV; Dr. Tom Schuler, Research Forester, NERS, Parsons, WV; Dave Lombardo and Jerry Jordan, Silviculturists, Allegheny National Forest, Marienville Ranger District, Marienville, PA; and Bob White, Silviculturist, ANF, Warren, PA. This study is scheduled for completion in FY 2010.

Problem Statement: Previous research in the Eastern United States has shown that various pre-commercial thinnings, cleanings, and weedings can improve growth and survival of the species released. Treatments can help regulate tree species composition in developing stands. The tree age or stage of development is critical to the success of the treatment. Most of the ANF stands treated are between 8 and 25 years of age. Without treatment, local observations indicate numerous young stands (including harvested areas as well as areas where no harvest has occurred) may lose some of the desired tree species diversity present initially when the stand is at the seedling stage of development.

Objectives: Initial objectives of this study are two-fold: 1) to test the appropriateness of cleaning/release/pre-commercial thinning standards for the ANF, and 2) to assess the efficiency (biological effectiveness and economic feasibility) of cleaning/release/pre-commercial thinning treatments to enhance the survival probabilities of oak crop trees in young stands established after a variety of natural disturbances and cutting.

Status: ANF and research personnel selected proposed study sites, and research personnel collected pre-treatment data in FY 1999. In FY 2000, ANF personnel completed appropriate NEPA analysis and advertised/awarded contracts to complete the release treatments. Treatments were started in the fall of 2000 and completed in the spring of 2001. All trees greater than or equal to .6 inches DBH were remeasured in 2001.

REGENERATING NORTHERN RED OAK ON THE ALLEGHENY NATIONAL FOREST USING TREE SHELTERS

Principal Investigators: Thomas M. Schuler, Research Forester, Northeastern Research Station, Parsons, WV, with cooperation from Bob White, Silviculturist, Allegheny National Forest, Warren, PA and Andrea Hille, Forester, Bradford Ranger District, Bradford, PA. This research study is scheduled for completion in 2010.

Problem Statement: Regeneration of northern red oak on good to excellent growing sites is a common problem throughout the eastern and central United States. Natural regeneration methods are still being tested and depend on existing natural seedlings of sufficient size and quantity to be successful. Adequate natural stocking of this advanced regeneration is an uncommon situation in many of today's forests. A possible alternative to natural regeneration is the use of plastic tree shelters in conjunction with a planted seedling. This method has been widely adopted on the Allegheny, Monongahela, and other eastern National Forests. However, detailed silvicultural prescriptions regarding the use of tree shelters have not been tested, and information about the long-term results does not exist.

Objectives: Many environmental variables could influence the success or failure of regenerating a stand with the use of tree shelters. Some of those discussed which are relevant to the conditions on the ANF include the use of herbicides to control competing vegetation, tube height and color, stake material, the use of nets on top of the shelter, competing species and height of competing vegetation, the use of fencing to prevent or reduce deer browsing of the natural regeneration, site quality or land type association, age of planting stock, quality of planting stock, planting technique, month planted, species planted, and density of residual overstory. Initially, given the restrictions of time and money, it was clear that the study would have to focus on one or two explanatory variables of greatest interest.

After evaluation, it was decided to initially investigate only the role of residual overstory density and competing understory density on the height growth and survival of northern red oak seedlings planted in white shelters. Study sites would incorporate existing operational efforts by the ANF staff and not establish any new experimental sites.

Status: Study sites were established in May 1995, and initial measurements were taken on 400 trees from four different stands. Residual basal area of the overstory trees ranged from an average of 14.5 to 62.8 square feet per acre.

Height of the sheltered seedlings and height and species composition of the competing vegetation were measured again in May 1996, May 1997, April 1998, April 1999, May 2000, and May 2001. In July 1996, 14 trees were minimally released to prevent overtopping by competing vegetation. In 1997, 12 trees were released in the same manner, and 8 were released for the second year. In April 1998, 22 trees were released, of which 12 had been released at least once before in the spring of 1996 or 1997. In April 1999, 26 trees were released, of which 19 had been previously released. In May 2000, twenty-one trees were released, of which fifteen had previously been released at least once. Twenty-seven trees were released in May 2001. The release procedure was experimental (though it has demonstrated success in West Virginia) and only removed the branches that were overtopping the sheltered tree, leaving the majority of the competing vegetation. In 1997 and 1998, some plots were difficult to re-measure because brass tags and flagging were missing. For this reason, one plot with very low survival and growth has been dropped.

First year observations suggested that growth rates declined as overstory basal area increased. Following the second through seventh years of measurements, it was possible to measure the growth, and the results correspond with initial observations (see table on next page). The two stands with the highest residual overstory basal area (i.e., about 60 square feet per acre) exhibited a sheltered seedling growth rate of about 0.5 feet in the 1995 growing season, 0.35 feet in the 1996 growing season, .1 foot in 1997 growing season, .2 feet in the 1998 growing season, -.2 feet in the 1999 growing season (based on one remaining stand), and +2.2 feet for the 2000 and 2001 growing seasons. The two stands with lower levels of basal area (i.e., about 15 and 31 square feet, respectively) had an average growth rate of just over 1.0 foot during 1995, 0.65 foot in 1996, 1.05 feet in 1997, 1.1 feet in 1998 (based on one remaining stand), 1.2 feet in 1999, and 3.0 feet for 2000 and 2001.

Comparative seedling survival rates between stands provide important information that assists in interpreting recent changes in height growth between these two groups of stands. While the stand with the highest overstory basal area grew 2.2 feet between 2000 and 2001 (compared with -.2 feet in 1999), seedling survival decreased substantially from 56% in 2000 to 38% in 2001 due to mortality of the shorter trees. Actual growth of surviving trees has only been one foot during the last two growing seasons. These surviving trees tend to occupy canopy gaps where they receive more sunlight.

While growth rates are significantly related to the residual overstory density and tree seedling survival, the variation in growth rates cannot be explained by this variable alone. Among the multitude of other potentially significant explanatory variables, it appears that the competing vegetation is going to play an increasingly important role in determining sheltered seedling survival and growth. The stand with the lowest level of residual overstory density is dominated by red maple regeneration that has been heavily browsed but has grown above

browse height in some areas of the stand. Browsing has undoubtedly benefited the sheltered oaks by slowing the growth of the competing vegetation.

The interaction between sheltered seedling growth, residual overstory density, and competing understory vegetation is an important aspect of this study. Past efforts have shown that sheltered seedlings demonstrate the greatest growth rates in full sunlight. The drawback to this is that so does the competing vegetation. Our objective is to establish the desired species in the newly created stand following overstory removal. It is our desire to find a level of stocking that favors sheltered seedling development while minimizing the competition from natural regeneration of undesirable species. Continued monitoring and analysis of these stands may provide some important insights into this complex problem.

STAND LEVEL CHARACTERISTICS OF ANF STUDY SITES AND SHELTERED SEEDLINGS USING MEASUREMENTS TAKEN IN MAY 2002

ID	Basal Area[1] (ft^2/ac)	Date of Origin[2]	Survival May 2002	Height May 1995 (feet)	Height May 1996 (feet)	Height May 1997 (feet)	Height April 1998 (feet)	Height April 1999 (feet)	Height May 2000 (feet)	Height May 2002 (feet)	Sample Size	Remarks
411-1	62.8	1991	38%	3.1	3.6	3.9	4.1	4.3	4.1	6.3	100	by aspen
411-2	14.5	1992	81%	4.3	5.3	6.0	7.2	8.2	9.9	13.5	100	behind gate
424-3	31.8	1991	58%	3.9	5.0	5.6	6.5	6.9	7.7	10.1	100	spring
424-4	59.4	1993	N/A	1.5	2.1	2.5	2.5	N/A	N/A	N/A	100	oil tank[3]

1 - Stand average residual overstory basal areas as measured in May 1995.
2 - Planted before the onset of the growing season in the year specified.
3 – Dropped from study due to vandalism.

USING AN ADAPTIVE MANAGEMENT APPROACH TO ANSWER QUESTIONS RELATED TO TREE SEEDLING DEVELOPMENT IN OAK, UPLAND HARDWOOD, AND NORTHERN HARDWOOD FOREST TYPES

Development of an adaptive management strategy to regenerate stands having a low black cherry seed source has been a cooperative venture between the Ecosystem Management Team of the Allegheny National Forest and scientists at the Northeastern Research Station (NERS) in Irvine, PA. Primary responsibility lies with Lois DeMarco and Bob White on the ANF and with Dr. Susan Stout and Dr. Stephen Horsley at NERS. District silviculturists Stan Kobielski, Andrea Hille, and Jerry Jordan are responsible for recommending specific sites to include in the study and ensuring that prescribed treatments occur.

Problem Statement: As reported in the 1995 Monitoring and Evaluation Report, ANF personnel are concerned about the mix of tree species and the low number of seedlings of species other than black cherry and black birch that are developing in these forest types. Selective browsing by white-tailed deer, dense interfering plants, and erratic seed production all play a role in limiting seedling development. Strategies are needed to regenerate other species. In response to this situation, the ANF has initiated an adaptive management approach to find answers to management questions related to seedling development and composition in regenerating stands.

Adaptive management is a process that allows existing and evolving research findings to be blended with applied management actions. Carefully monitoring preliminary results and being flexible in applying subsequent actions can help us successfully attain management objectives, while furthering overall knowledge. By placing a strong emphasis on understanding the starting conditions, the series of management actions or environmental events which take place, and the response to actions and events, we will be able to generate an increased understanding of patterns and levels of seedling development.

Objectives: Our objectives for this adaptive management strategy are the following: 1) to develop full stocking of advance regeneration of a variety of species appropriate to each forest type, and 2) to make final harvests in stands of each forest type that have good advance regeneration and achieve full stocking and establishment of a variety of appropriate species.

Status: Three work plans were developed in 1996 to address the needs of the different forest types. Progress on each is described in the following paragraphs.

The Oak Type

The first step in developing an adaptive management approach for the oak type was to determine under what conditions, if any, had successful oak regeneration become established during the last 25 years. Field visits were made to stands that had been regenerated since the early 1970's. While we do not have data that describes the conditions that existed at the time of treatment, and in some cases we do not have a complete picture of stand treatment history, we did find that oak seedlings have been successfully established in some stands. The following is a summary of what we have observed.

- Oak seedlings were established on some sites through natural regeneration processes. Most of these successes followed some kind of catastrophic event such as tornado, wildfire, or tree mortality associated with severe drought and insect defoliation.
- Some of these stands are in areas where low levels of deer impact exist (i.e., adjacent to farmland, high levels of 0-20 year age class, etc.).
- Planting and protecting oak stems with tree shelters have successfully helped establish oak seedlings, particularly where overstory shade is minimal and competing vegetation is controlled.
- It was evident in some of the older (10-25 year old) stands that oak had been established early on in the life of the stand, however it had become or was becoming over-topped by faster growing species such as red maple, black birch and black cherry. Tree mortality was occurring, thereby removing some of the oak component from these stands. This is occurring in stands regenerated both through natural and artificial regeneration methods.

Based on these observations, we intend to implement a series of regeneration treatments in oak stands focusing on the following:

- Overstory tree stocking needs to be lowered sufficiently to allow adequate light to reach the forest floor for seedling establishment to occur.
- Seedbed preparation could include herbicide application or prescribed burning to remove vegetation, which competes with developing oak seedlings.
- Continued monitoring following the removal cut will be needed to ensure the retention of oak as the stand develops. Release treatments (mechanical, manual or prescribed burn) will be applied to see what works best under a variety of conditions.

Stand selection has taken place in the Wolf/Pigeon project area. Implementation of one ten-acre prescribed burn for seedbed preparation in the Wolf/Pigeon sale area took place in 1999. Pre- and post- burn surveys were taken. Oak seedlings resprouted following the burn. FY 2001 surveys showed 75% seedling stocking (primarily aspen and red maple) with an average of one red oak seedling per plot. The area will be resurveyed in 2003 and evaluated for additional reforestation treatment. Six additional stands were selected for shelterwood seed cutting and subsequent prescribed burning to control species competing with oak regeneration. On two of these stands, shelterwood seed cutting was completed in FY 2000. FY 2001 stocking surveys reflect the following:

- One stand averages 30% stocking, including 12 oak seedlings per plot with red maple and birch the primary competitors along with 100% fern coverage. The fern will be treated with the herbicide Oust (that has minimal effect on tree seedlings) in 2002, and regeneration surveys are scheduled for 2003.

- The second stand averages 50% stocking, including .3 oak seedlings per plot with red maple and birch the primary competitors along with 70% fern. The fern was treated with Oust in 2001, and seedling surveys are scheduled for FY 2003.

In FY 1999, we began a cooperative administrative study with NERS, Morgantown, WV, titled *"Examining the Effectiveness of Cleanings to Enhance the Survival and Development of Oak Species in Young Mixed-species Stands."* The status of this study is described earlier in this administrative study subsection.

The Upland Hardwood Type

Working with scientists at the NERS, Irvine, PA, ANF personnel developed an action plan which outlines a series of regeneration prescriptions that will be applied in upland hardwood stands which have low stocking of black cherry. It is believed that deer impact, light quality and the length of time needed for seedlings to develop are the three most critical factors which must be considered in regeneration prescriptions for upland hardwood stands. The purpose of this phase of adaptive management will be to determine the ranges and combinations of tree harvest and/or reforestation treatments, which will encourage the development of red maple seedlings. In 1998, data collected in association with the Brush Creek project set were reviewed, and 7 stands covering approximately 150 acres were identified as adaptive management candidates. Pending NEPA analysis (NEPA analysis will begin in 2003), these stands would be candidates for non-commercial removal of saplings and small poles, followed by herbicide application, fencing to exclude deer if necessary, and careful monitoring of seedling development over several years after treatment. These stands include seed source for such species as red and sugar maple, white ash, basswood, and others. Where diverse seedlings develop, these stands would be candidates for either final removal cuts or perhaps for two-age management.

Between 1999 and 2001, plot data were collected in a select group of 10-30 year old stands to monitor seedling/sapling development and species composition of regenerated stands. Based on preliminary assessment of survey data, this data collection will be expanded in FY 2002 to provide more information on this age class.

The Northern Hardwood Type

The action plan for the northern hardwood type included revising regeneration standards for uneven-aged management treatments and the completion of a formal analysis of regeneration success in selected stands where uneven-aged prescriptions have been implemented.

Forest managers on the Allegheny plateau have questioned the viability of uneven-age silvicultural systems (UEA) for many years because of the regeneration challenges associated with these systems: long periods of exposure to deer browsing and widespread difficulty in regenerating eastern hemlock and sugar maple. Since 1986, the Allegheny National Forest has been applying UEA prescriptions in areas where multiple resource objectives precluded the use of even-age silvicultural systems and to comply with the 1986 Allegheny National Forest Land and Resource Management Plan. In 1996, Forest personnel undertook a project to assess these areas to determine if modifications in prescription application are needed, and to complement emerging results from the Hoffman Farm administrative study.

During the summer of 1996, field data were collected in 35 stands totaling 749 of the 2,027 acres that received UEA silvicultural treatments between 1988 and 1994. In the 1996 Monitoring and Evaluation Report, we reported the survey results, indicating that uneven-aged treatment success has been limited. We continue to review regeneration standards and local site-specific results, paying particular attention to standards used elsewhere in the Northeast. Regeneration surveys will be completed again in 2002.

Implementation and monitoring has continued to occur in both the Hoffman Farm and Porter's Prize Administrative Study areas. Both of these studies are expected to contribute to developing strategies for treating northern hardwood stands. In 2004, we will use a similar process as was used in the oak type to determine under what conditions successful northern hardwood regeneration has occurred. We then plan to develop a treatment strategy for this forest type.

IMPACTS OF GLYPHOSATE AND SULFOMETURON METHYL ON DIVERSITY OF PLANTS AND WILDLIFE IN ALLEGHENY HARDWOODS

This is a cooperative research project between the Allegheny National Forest and the Northeastern Research Station in Irvine, PA. It is scheduled for completion in FY 2005. The principal investigators are Dr. Stephen B. Horsley and Dr. David S. deCalesta.

Problem Statement: The effects of the operational herbicide applications in use on the Allegheny National Forest on wildlife habitat and non-target organisms need to be better understood. This study will examine the impacts of the herbicides glyphosate and sulfometuron methyl on songbirds, tree seedling development, non-arborescent vascular plants, small mammals, amphibians, and wildlife habitat components.

Status: After completing herbicide treatments on half of each study site in late summer 1994, a full round of plant and animal measurements was collected during the spring and summer of 1995. During the '95-'96 winter season, shelterwood seed cuts were conducted in the six study areas with high relative density to stimulate regeneration development. Small mammal, songbird, and amphibian censuses were performed during the spring and summer of 1996, 1998, and 2000, as were surveys of tree seedlings, non-arborescent vascular plants, and wildlife habitat components.

No data were collected in this study in 2001, but after the observations and data from 2000 showed that vegetative responses were heavily dominated by the impact of white-tailed deer browsing, 8-foot woven wire fence was erected around each study area, excluding white-tailed deer from both treated and untreated sides. Data will be collected in 2002 and 2004 to complete the original study. The long-term data sets produced by this study are very valuable, and discussions are underway about continuing data collection on these sites after overstory removals are completed at the end of the initial study period.

SNAG AND LOG MANAGEMENT IN MIXED SPECIES HARDWOOD FORESTS ON THE ALLEGHENY PLATEAU

Dr. David S. deCalesta, Research Wildlife Biologist, Northeastern Research Station, Warren, PA, and Scott Reitz, Wildlife Biologist, and Stan Kobielski, Silviculturist, Bradford Ranger District, Allegheny National Forest, Bradford, PA are conducting this administrative study. It is scheduled for completion in FY 2006.

Problem statement: Most managed second-growth forests have relatively low amounts of both snags and logs compared to unmanaged second-growth or true old-growth forests. Research already completed has documented the amounts of snags and logs found in true old growth in the Allegheny National Forest region, and research completed elsewhere has shown that cultural creation of those elements where they are missing can enhance habitat. This may enhance the functions and values of a stand by providing habitat for many wildlife communities. This study will test the local applicability of these existing research results and ensure optional local use of them. Few guidelines currently exist to direct snag and log management in Allegheny Plateau forests.

Objectives: 1) to determine which snag creation method is locally most effective, 2) to determine when cultured snags and logs become useful, by what wildlife, for how long, and 3) determine if the pattern of snag and log creation elicits different responses in wildlife communities. The study is being conducted in two stands, each with two 10-acre areas of scattered, cultured snags and logs and 10 acres of untreated area. Snags were created by girdling.

Status: No data were collected on this study in 2001.

DEFINING CHARACTERISTICS OF OLD-GROWTH ON THE ALLEGHENY PLATEAU

Dr. David S. deCalesta, Research Wildlife Biologist, Northeastern Research Station, Irvine, PA, and Dr. Christopher A. Nowak, State University of New York College of Environmental Sciences and Forestry are conducting this research study.

Problem Statement: General definitions for old-growth forest exist for the Eastern U.S., but preservation, restoration, and maintenance activities for old-growth requires forest cover type and locale-specific definitions.

Objectives: 1) to characterize forest structure and wildlife communities in the true old-growth hemlock-beech forests in the Tionesta Scenic and Research Natural Areas and 2) compare the forest attributes and functions of true old-growth with unmanaged and managed second-growth. The study is being conducted in 41 stands, of which 7 are in Tionesta Scenic and Research Natural Areas and the rest scattered throughout the ANF.

Status: Preliminary results of the assessment of vegetative change in the Heart's Content Old Growth area were presented at the annual meeting of the Ecological Society of America in Madison, WI. These results were based on tallies of 160 1-m^2 plots across 60 acres, the exact plots that were used in a 1928 survey of the area published by Harold Lutz in Ecology in 1930. In addition, a systematic search of the area was conducted to compile a more complete species list. In 1928, 50 percent of the plots contained *Vibrunum alnifolium*. In 2000 that species was only found in the systematic search. Twenty-three other species found on plots in 1928 were missing in 2000, with 16 of the 23 found in the systematic search. Thirty-two species not encountered in 1928 were found in the 2000 search, many of them early successional, and found adjacent to an interpretive trail. Rhizomatous ferns increased in abundance from 3 to 21 percent on average. Since 1928, the white-tailed deer herd in the region has become overabundant, and is likely directly or indirectly responsible for most of the vegetation composition changes.

Publications:

Ristau, Todd E. 2001. Seventy-two years of change in the herbaceous vegetation layer of Heart's Content Scenic Area, Warren County, PA. In: Keeping all the parts: preserving, restoring and sustaining complex ecosystems. The Ecological Society of America 86th annual meeting; 2001 August 5-10; Madison, WI. [Washington, DC]: [The Ecological Society of American]: 190 [abstract].

ECOSYSTEM RESPONSE TO INTENSIFIED CUTTING WITHIN A FOREST COMPARTMENT

Pam Thurston, Wildlife Biologist, Lois DeMarco, Silviculturist, Allegheny National Forest, and Dr. Susan Stout, Research Forester, Northeastern Research Station, Warren, PA are conducting this administrative study. It is scheduled for completion in 2003.

Problem Statement: Understanding deer-forest interactions is critical to sustaining Allegheny Plateau forests. Research has shown that the population of deer has an effect on the understory vegetation that develops following

different management treatments. The scale at which deer population dynamics respond to plant communities is of the order of square kilometers or square miles, while plant communities respond at a much smaller scale to local disturbances and deer impact. One of the critical elements of ecosystem management is understanding interactions that cross scales.

Objectives: 1) to test the effect of additional cutting on development of advance regeneration (tree seedlings) stocking in final removal cuts and in stands left uncut; 2) to test the impact of this sequence of cutting on species composition and diversity of the tree regeneration (research work linked with this study will look at effects on herbaceous plant and songbird communities.)

Status: The second round of cutting within the Porter's Prize Project Area was completed in 1997. Two pellet group surveys of this area during the spring of 1999 suggested a mean over- wintering deer density in the area of 19.7 deer per square mile, down from the 1997 estimate of 23.3 and the 1998 estimate of 31.2 deer per square mile. Pellet group surveys were not conducted in this area in 2000. Regeneration surveys were conducted in five stands within the area during 2001, all of which had received partial cuts in 1989, as part of the first phase of harvesting in the area. These plots averaged 8% stocking of advance regeneration, all black cherry, prior to the 1989 partial cut. By 2001, they were still only 22% stocked, although the species composition had changed. There were still substantial numbers of black cherry seedlings, but the advance regeneration was dominated by birch (46% of plots) and beech (33% of plots). The birch and beech seedlings were taller than the cherry seedlings, with about 13% of plots, on average, containing at least 5 stems greater than 3 feet tall, all beech and birch.

In addition to these tallies, overstory data were collected on two stands that received final removal cuts in the second round of cutting at Porter's Prize. Stand 795 was dominated by an average of 98 hemlock residuals (medial diameter 9.6 inches) left per acre. The new age class was dominated with an average of 1284 birch trees per acre (medial diameter 2.1 inches). The new stand is 117% stocked, and has an average basal area of 81 square feet per acre. Stand 797 is dominated by about 627 pin cherry stems per acre (medial diameter 2.8 inches), and also contains about 717 black cherry stems per acre (medial diameter 2.3 inches) and 536 birch trees per acre (medial diameter 2.1 inches). The stand is 222% stocked and has an average basal area of 48 square feet per acre.

KINZUA QUALITY DEER COOPERATIVE: ECOSYSTEM RESPONSES TO INTENSIVE MANAGEMENT OF WHITE-TAILED DEER

This adaptive management study is being conducted in partnership with several other landowners, community members, and partner agencies, including the Penn State University Cooperative Extension, the Pennsylvania Game Commission (PGC), and the Sand County Foundation. Leadership on the study includes Scott Reitz and Brad Nelson of the Allegheny National Forest, Dr. Tim Pierson of Penn State University Cooperative Extension , Dr. Dave deCalesta, and Dr. Susan L. Stout of the USDA Forest Service Northeastern Research Station in Irvine, PA.

Problem Statement: While the impacts of white-tailed deer on forest vegetation in the Allegheny Plateau region have been well-documented, integrated management of deer, hunter participation and satisfaction, and forest ecosystems is not well-understood. New leadership in the Pennsylvania Game Commission creates an opportunity to involve hunters, landowners, and land managers in a cooperative effort to manage for healthy deer, healthy forest ecosystems, and high hunter satisfaction. The Kinzua Quality Deer Cooperative (KQDC) represents such an effort. The approximately 70,000 acres of the KQDC became the first area in the Commonwealth to receive PGC approval of its Deer Management Plan.

Objectives: Through the partnership of the KQDC, we hope to test the response of the forest ecosystem and of hunters to sharp reduction in deer impact across the KQDC. Specifically, by facilitating participation by hunters in monitoring and management activities, monitoring deer abundance, sex and age ratios, and taking detailed measurements of forest vegetation through a decade-long period of intensive deer management, we hope to: 1)

Increase the size and antler dimensions of KQDC deer; 2) Reduce deer impact on forest plant communities so that diverse regeneration can be achieved without fencing; and 3) Develop detailed data on indicators of vegetative recovery in forests historically damaged by deer browsing.

Status: A square-mile grid was superimposed on the area of the KQDC and 24 grid squares were selected at random for detailed sampling. Beginning in 2001, 6 forest vegetation sampling clusters were laid out in each sampled grid square, and detailed measurements of herbaceous and woody plants were collected on a total of 131 plot clusters between June and August. More than 10,000 individual plants of *Maianthemum canadense* were sampled; average leaf length was 39 cm, and only 0.3% of the sampled individuals showed evidence of flowering. This was comparable to the characteristics of *Maianthemum* sampled on low boulders where deer had access to them in an earlier sampling effort. Some 336 *Trillium spp.* individuals were also sampled; their mean height was 8 cm. and only 2% showed evidence of flowering. Earlier research on *Trillium grandiflorum* suggested that healthy, sustainable populations of *Trillium grandiflorum* had mean heights greater than 12 cm. and flowering in about 20% of individuals. More than 80% of the clusters had interfering levels of beech or striped maple or fern above other woody species regeneration. Black cherry, beech, striped maple, and fern were the most common understory plants. Overall, the condition of the vegetative community within the Kinzua Quality Deer Cooperative is that of an area heavily impacted by white-tailed deer for a long time.

OPERATIONAL TESTS OF UNEVEN-AGE SILVICULTURE IN MANAGEMENT AREA 2.0

This administrative study is being conducted by the Ridgway Ranger District, Allegheny National Forest, and Dr. Susan Stout, Research Forester, Northeastern Research Station, Irvine, PA, and is scheduled for completion in 2002.

Problem Statement: Implementation of uneven-age silviculture on the Allegheny National Forest faces many challenges. These are the impact of deer browsing on development of new age classes of trees, insect and disease problems in sugar maple, limited establishment and survival of eastern hemlock seedlings, the competitive influence of dense understories of fern, grass, American beech root suckers, and striped maple, and the advancing front of the beech bark disease complex. Yet, the Forest Plan calls for practicing uneven-age silviculture throughout Management Area 2.0. Previous research has shown that uneven-age treatments in Allegheny hardwoods lead to the establishment of sparse and unsatisfactory regeneration where interfering plants are present. Other research has led to the development of techniques that effectively remove this interfering vegetation. The Allegheny National Forest needs to make a formal test of the results of uneven-age silvicultural treatments and reforestation practices on an operational basis.

Objectives: To test the conditions that result from using reforestation activities to help initiate the transition to uneven-aged management on the Hoffman Farm project area, Ridgway Ranger District, ANF.

Status: We completed pretreatment measurements on all study areas in the spring and summer of 1995. Treatments on two of the five study stands--those with a high percentage of overstory basal area in hemlock--were completed during the winter of 1995-1996, and we collected data during the summer of 1997 to characterize regeneration, herbaceous plant communities, songbirds, and amphibians. Harvesting in the other study stands was completed in 1996-1997. We collected a full suite of data in 1998 on all study stands. Since then, we have collected data in the hemlock-hardwood stands in odd-numbered years, and in the Allegheny hardwood stands in even-numbered years. In 1999, we collected data on the stands with a high proportion of hemlock in the overstory. In 2000, we collected data in the three Allegheny hardwood stands in the administrative study. The ANF Fiscal Year 2000 Monitoring and Evaluation Report contains a summary of that data.

Herbaceous communities of the hemlock-hardwood stands were sampled twice during the 2001 growing season. In addition, during the spring tally, each treatment area received a systematic search for species not found on sample plots. An average of 38 species was found on the plots that received the group selection treatment; an average of 30 species was found on the untreated plots. Mosses and ferns were the most abundant species on both

kinds of plots. In the treated plots, more species grew into the second sampled height strata (1 – 3 feet tall) and some treated plots had ferns in the third height strata (> 3 feet tall).

SUGAR MAPLE HEALTH

On-going studies in this research area focus on the role of soil nutrition on health, growth and vigor of sugar maple trees and regeneration and have two parts.

Part 1 investigates the impact of forest liming on sugar maple vigor and regeneration (Lime study). This is a joint study of the Pennsylvania Department of Conservation and Natural Resources, *Bureau of Forestry and the Northeastern Research Station. Principal investigators include Paul Lilja, Dr. Tom Hall, and Dr. Barry Towers for the Bureau of Forestry, and Dr. Stephen Horsley (Warren, PA) and Dr. Robert Long (Delaware, OH) for the Northeastern Research Station. Additional research collaborators include: Dr. Phil Wargo (NERS, Hamden CT), Dr. Dave DeWalle (Penn State), Dr. Carolyn McQuattie (NERS, Delaware OH), and Dr. Tom Pauley (Marshal Univ.).

Part 2 investigates the distribution of calcium and magnesium along topographic gradients in northwestern Pennsylvania and southwestern New York (Gradient study). This is a collaborative study between the Northeastern Research Station, the Pennsylvania Department of Conservation and Natural Resources, the Allegheny National Forest, International Paper Co., the New York Department of Conservation and Natural Resources and private landowners. Principle investigators include Dr. Stephen Horsley (Warren PA), Dr. Robert Long (Delaware OH), Dr. Scott Bailey (Hubbard Brook NH), Dr. Phil Wargo (Hamden CT) for the Northeastern Research Station, Dr. Tom Hall for the Pennsylvania Department of Conservation and Natural Resources, and Dr. Dave DeWalle for Penn State University.

Problem Statement: Since the late 1970s, sugar maple across the northern tier of Pennsylvania has been suffering from a decline syndrome. Droughts, insect defoliations, disease organisms, forest management, atmospheric pollutants, and soils are all hypothesized contributors to this decline. A better understanding of the ecological mechanisms associated with the decline, and of its extent, is needed.

Objectives: The objectives of this research are: 1) to understand the causes of maple decline and 2) to document the extent of sugar maple mortality across the northern tier of Pennsylvania using remote sensing and geographic information systems data. Objectives for the two parts are: Lime study- to understand the impact of lime on health, growth, vigor and nutrition of sugar maple. Gradient study- to determine the distribution of calcium and magnesium with topographic position on glaciated and unglaciated sites.

Status: Work continued during 2001. Attention turned to the regeneration consequences of liming in declining sugar maple stands and to patterns of sugar maple growth in relation to health. Preliminary results were published as abstracts in the proceedings of the annual meeting of the Ecological Society of America.

The Lime Study was initiated to determine the role of deer, interfering vegetation, and acid soil on sugar maple regeneration. Treatments with and without fence, herbicide (2.2 kg. ai ha^{-1} glyphosate) and lime (22.4 Mg ha^{-1} dolomitic limestone) were installed in a split-plot experiment at 4 sites and all areas were thinned to 50% relative density. Interim results presented at the 2001 meeting of the Ecological Society of America were based on a 10-year evaluation of these treatments. Few sugar maple seedlings were present at the beginning of the experiment. Two sugar maple flower and seed crops occurred during the study; all were larger on limed than on unlimed areas. Sugar maple seedling abundance was positively correlated with overstory sugar maple basal area and with the abundance of grass ground cover; seedlings were more abundant on fenced than unfenced and limed than unlimed areas; herbicided and unherbicided areas had similar numbers of seedlings. Percent seedling survival was highest on limed and herbicided areas; fenced and unfenced areas had similar survival. Height development was promoted by lime, but not fence or herbicide. Foliage of limed seedlings had higher concentrations of P, Ca, Mg, molar ratios of Ca:Al, Mg:Mn, lower Mn and similar aluminum compared to unlimed seedlings.

Previous work from the Gradient Study revealed that, over 43 stands at 19 sites in northern PA and southern NY, declining sugar maple stands were confined to upper slope unglaciated sites that have low foliar Mg and two or more moderate to severe insect defoliations in the past 10 years. Mean radial growth over 10 years (1987-1996) was determined from cross-dated increment cores (2 cores/tree) obtained from 5 apparently healthy sugar maples in each stand (n=215). These same trees were used to sample foliage for nutrient analyses in 1995 and 1996. Analysis of variance using stand averaged mean radial growth during the 10 years as the dependent variable and relative stand density as a covariate revealed significantly less growth in upper slope unglaciated stands compared with lower slope unglaciated and upper and lower slope glaciated stands. There were significant positive correlations between sugar maple mean decadal growth and foliar Ca and Mg, but not with N, P, K, Al, or Mn. These preliminary results indicate that Ca and Mg have a major influence on sugar maple growth.

Publications in 2001:

Horsley, Stephen B.; Long, Robert P.; Lilja, Paul R. 2001. Effects of fence, herbicide, and lime on regeneration of sugar maple in northern Pennsylvania. In: Keeping all the parts: Preserving, restoring, and sustaining complex ecosystems. The Ecological Society of American 86th annual meeting; 2001August 5-10; Madison, WI. [Washington, DC]:[The Ecological Society of America]: 116. Abstract.

Long, Robert P.; Horsley, Stephen B.; Bailey, Scott W.; Hallett, Richard A. 2001. Sugar maple growth in relation to health, glaciation, and foliar nutrition in northern Pennsylvania and southern New York. In: Keeping all the parts: Preserving, restoring, and sustaining complex ecosystems. The Ecological Society of American 86th annual meeting; 2001August 5-10; Madison, WI. [Washington, DC]:[The Ecological Society of America]: 144. Abstract.

ONGOING RESEARCH PROJECTS IN THE TIONESTA SCENIC AND RESEARCH NATURAL AREAS

The following is a listing of numerous on-going research projects currently underway in the Tionesta Scenic and Research Natural Areas and a brief description of each:

UNDERSTORY VEGETATION CHANGES IN A VIRGIN FOREST. S. Stout, USDA-Forest Service. 1942 to present. A periodic survey of 21 permanent milacres, understory vegetation.

THE ROLE OF HISTORY AND PATCH DYNAMICS IN THE REVEGETATION OF A CATASTROPHIC WINDTHROW IN AN OLD-GROWTH BEECH-HEMLOCK FOREST. C. Peterson, University of Georgia; S. Pickett, Rutgers University. 1985 to present. A periodic survey of permanent milacres for vegetation in the Scenic Area's 1985 tornado swath.

FOREST RECOVERY FROM CATASTROPHIC WINDTHROW. C. Peterson, University of Georgia. 1996 to present. Periodic survey of permanent plots for vegetation in the Research Natural Area's 1994 tornado swath.

INFLUENCE OF FOREST INSECT DEFOLIATORS ON STREAM SOLUTE CHEMISTRY. G. Lewis, Cornell University. 1993 to present. A periodic survey of West Fork Run chemistry, before and after an irruption of elm spanworm.

CHARACTERIZATION OF OLD-GROWTH ON THE ALLEGHENY PLATEAU. C. Nowak and D. deCalesta, USDA-Forest Service. 1993 to present. Survey of live and dead vegetation, songbirds (three summers), small mammals (one summer), and deer density (three winters) across a chronosequence of seven stands, including three true old-growth stands.

AMPHIBIAN COMMUNITIES IN A CHRONOSEQUENCE OF FOREST STANDS ON THE TIONESTA SCENIC AND RESEARCH NATURAL AREAS. D. deCalesta, USDA-Forest Service; P. Dalby, Clarion University of Pennsylvania. 1995 to present. One summer survey of amphibians across chronosequence of seven stands, including three true old-growth stands.

DENDROCHRONOLOGY OF TIONESTA RNA ACROSS A LANDSCAPE GRADIENT. C. Ruffner and M. Abrams, Pennsylvania State University. 1996 to present. Ring analysis of trees in old-growth stands located on different topographic positions.

FUNGI, LICHEN AND NON-ARBORESCENT PLANT COMMUNITIES IN HEMLOCK-HARDWOOD OLD-GROWTH. E. Frank, retired, Rutgers University; C. Nowak, USDA-Forest Service. 1997. One summer survey of fungi, lichen and non-arborescent plant communities in three old-growth stands in the Tionesta Areas.

MONITORING PLANT AND ANIMAL COMMUNITIES ACROSS THE TIONESTA AREAS. B. Nelson, C. Nowak and D. deCalesta, USDA-Forest Service. 1997 to 2007. A periodic survey of songbirds and vegetation, including songbird habitat, in and around the Tionesta Areas.

GLOSSARY

ANF	**Allegheny National Forest**
ARSG	**Allegheny River Support Group**
ASL	**Allegheny Snowmobile Loop**
ATV	**All-terrain vehicle**
BO	**Biological Opinion**
CATS	**Cumulative Accomplishments Tracking System. A Forest Service reporting system.**
CDS	Combined Data System. A forest Service reporting system.
CFR	Code of Federal Regulations
CPUE	Catch Per Unit Effort
CRBC	Clarion River Basin Commission
DBH	Diameter at breast height. A tree measurement -- an estimated 44 inches from the ground.
DEP	Pennsylvania Department of Environmental Protection
DFC	Desired Future Condition
EA	Environmental Assessment. A document that describes the environmental analysis for a proposed project to comply with the National Environmental Protection Act.
EIS	Environmental Impact Statement
ELT	Ecological Land Type
FEIS	Final Environmental Impact Statement
FFIS	Foundation Financial Information System
FHM	Forest Health Monitoring Program
FHP	Forest Health Protection
FR	Forest Service Road
FSH	Forest Service Handbook
FSM	Forest Service Manual
FY	Fiscal Year
GIS	Geographic Information System
GPS	Global Positioning System
ISI	Interstitial Space Index
KV	Knutson-Vandenberg Act
KQDC	Kinzua Quality Deer Cooperative
MA	Management Area
MBF	Thousand Board Feet (of timber)
MIS	Management Indicator Species
MMBF	Million Board Feet (of timber)
MSL	Mean Sea Level
NCT	North Country Trail
NEFES	Northeast Forest Experiment Station
NEPA	National Environmental Policy Act passed in 1980
NERS	Northeastern Research Station (formerly Northeast Forest Experiment Station)
NFMA	National Forest Management Act passed in 1976
NPV	Nuclear Polyhedrous Virus
NRA	National Recreation Area
NRIS	National Resource Information System
OGM	Oil, Gas and Minerals
PA DCNR	Pennsylvania Department of Conservation and Natural Resources

PA F&BC	Pennsylvania Fish and Boat Commission
PAMARS	Program Accounting and Management Reporting System
PAOT	Persons-At-One-Time. A measure of recreation capacity. The number of persons-at-one-time that a recreation facility can accommodate.
PGC	Pennsylvania Game Commission
pH	A scale for measuring acidity and alkalinity
RIM	Recreation Information Management. A Forest Service recreation use reporting system.
RMP	River Management Plan
RN	Roaded natural recreation experience
ROS	Recreation Opportunity Spectrum. A system of classifying the range of recreational experiences, opportunities, and settings available on a given area of land.
ROS CLASSES	*Wilderness* - managed to preserve naturalness and solitude. Timber harvests, road construction, and mining activities are generally prohibited. *Semi-primitive (motorized and non-motorized)* - largely unmodified natural environments that contain at least 2,500 non-roaded acres. These areas provide good to moderate opportunity for isolation and may be managed for either motorized or non-motorized recreation uses. Roaded Natural - managed for only moderate resource utilization and presence of people. These areas include less that 2,500 acres of non-roaded forest and allow for both social interaction and moderate isolation. *Rural* - areas characterized by a substantially modified natural environment where sights and sounds of people are evident. *Urban* - areas characterized by high social interaction and significant modification of the natural environment such as city parks. *Developed* - managed as small, distinctly defined areas where facilities are provided for concentrated public use, such as campgrounds, picnicking and swimming.
ROW	Right of Way
RVD	Recreation Visitor Day. Measures 12 hours of recreation use on the Forest.
S&Gs	Standards and Guidelines
SILVAH	Computer simulation model used for silvicultural examinations.
SMS	Scenery Management System
SPM	Semi-primitive motorized recreation experience
SPNM	Semi-primitive non-motorized recreation experience
SR	State Road
TRACS	Timber Activity Control System. A Forest Service timber use reporting system.
TSL C&D	Traffic Service Level. Describes a design standard for a road. Traffic Service Level D roads are the lowest standard Forest System roads.
UEAM	Uneven-aged management
USDA	United States Department of Agriculture
USDI	United Stated Department of Interior
VMS	Visual Management System
VQO	Visual Quality Objective. Refers to the quality of a landscape.
W&SR	Wild and Scenic River
YOY	Young of Year

APPENDIX A

FIRST AND SECOND DECADE
FOREST PLAN IMPLEMENTATION

FIRST AND SECOND DECADE FOREST PLAN IMPLEMENTATION

ACTIVITY	UNIT OF MEASURE	DECADE 1 PLAN AMT	DECADE 2 PLAN AMT	SUM OF DEC 1 & 2 PLAN AMT	FY 86-95 ACCOMP.	BALANCE DECADE 2 PLAN AMT.	FY 96-00 ACCOMP.	FY 01 ACCOMP.	ACCOMP. TO DATE	% COMPLETE TO DATE
DEVELOPED REC										
..Semi-primitive Motorized	MRVD	370	380	750	583.1	166.9	349.33	*	932.4	124.3%
..Roaded Natural	MRVD	4,300	4,710	9,010	4,553.2	4,456.8	3700.2	*	8,253.4	91.6%
..Rural	MRVD	4,190	4,320	8,510	4,966.9	3,543.1	3953.6	*	8,920.5	104.8%
DISPERSED REC										
..Semi-primitive/Non-motorized	MRVD	300	420	720	335.8	384.2	179.7	*	515.5	71.6%
..Semi-primitive/Motorized	MRVD	3,680	3,720	7,400	5,175.7	2,224.3	4425.1	*	9,600.8	129.7%
..Roaded Natural	MRVD	4,990	5,250	10,240	8,194.1	2,045.9	5669.7	*	13,863.8	135.4%
WILDERNESS										
..Semi-primitive/Non-motorized	MRVD	10	16	26	23	1	22.0	*	45	173%
TRAIL CONSTRUCTION										
..Pedestrian	Miles	48	41	89	39.3	49.7	23.0	.3	62.6	70.3%
..Motorized-Winter	Miles	11	11	22	50.5	0	25.3	.5	76.3	346.8%
..Motorized-Summer	Miles	145	145	290	70	220	10.8	3.5	85.1	29.3%
TIMBER MANAGEMENT										
..Hardwood Sawtimber	MMBF	383	460	843	350.1	492.9	69.3	7.9	446.5	52.9%
..Hardwood Pulpwood	MMBF	562	480	1,042	333.1	708.9	48.4	4.8	399.5	38.3%
..Hardwood Firewood	MMBF	0	0	0	17.1	0	4.7	1.0	25	N/A
..Total Sell	MMBF	945	940	1,885	700.3	1,184.7	122.0	13.7	870.6	46.1%
..Clearcuts	Acres	3,300	3,400	6,700	6,925	0	814.0	179	8,090	120.7%
..Shelterwood Seed/Prep	Acres	29,700	30,600	60,300	12,930	47,370	3,132	416	17884	29.7%
..Shelterwood Removal	Acres	29,700	30,600	60,300	12,971	47,329	4,164	627	18851	31.3%
..Thinning	Acres	94,000	78,000	172,000	40,653	131,347	4,698	1,434	47,488	27.6%
..Selection Cuts	Acres	6,000	0	6,000	5,573	427	633	0	6,206	103.4%
..Timber Stand Improvement	Acres	8,000	6,000	14,000	855	13,145	0	0	855	6.1%
..Herbicide [1]	Acres	20,000	18,000	38,000	11,240	26,760	5,366	122	17,857	47.0%
..Fertilization	Acres	25,000	14,000	39,000	9,571	29,429	3,771	777	14,933	38.3%
..Fencing	Acres	4,000	4,000	8,000	9,451	0	3,368	798	14,242	178.0%
..Planting	Acres	2,000	2,000	4,000	1,096	2,904	1,226	153	2,572	64.3%
..Site Prep	Acres	18,000	18,000	36,000	11,887	24,113	6,350	983	22312	62.0%
..Release	Acres	0	0	0	169	0	2,634	499	4,061	N/A
ROADS										
..Construction	Miles	239.0	134.0	373.0	158.1	214.9	6.8	0.4	166.4	44.6%
..Reconstruction - Betterment	Miles	97.0	55.0	152.0	116.9	35.1	4.8	1.4	130.0	88.5%
	Miles	17.0	17.0	34.0	12.7	21.3	0.4	12.3	13.1	38.5%
WILDLIFE										
..Hunting Use	MRVD	1,970	2,200	4,170	2,302.2	1,867.8	853.7	*	3,155.9	75.7%
..Fishing Use	MRVD	1,510	1,720	3,230	1,663.1	1,566.9	971.5	*	2,634.6	81.6%
..Fish Habitat Improvement	Acres	N/A	N/A	1	149	0	193	34	485.0	N/A
..Wildlife Habitat Improvement	Acres	23,720	27,580	51,300	22,273	29,027	8,397	876	35083	68.4%
..Wildlife Habitat Improvement	Struct	60	110	170	2,256	0	301	36	2823	1,660.6%
SOIL/WATER/AIR										
Water/Soil Improvement	Acres	N/A	N/A	0	7,765.5	0	218.7	101	8163.2	N/A

1 Excludes respray areas (Total of 400 acres from 1986 to 1998)

* Measurement of recreation use changed in 2001

APPENDIX B

ALLEGHENY NATIONAL FOREST
MONITORING PLAN
FOR FY 2001

INTRODUCTION

BACKGROUND

The purpose of this Monitoring Plan is to provide a framework for observing and recording the results of implementing the Allegheny National Forest (ANF) Land and Resource Management Plan (Forest Plan). Chapter 5 of the Forest Plan includes a discussion about the basic requirements and standards for monitoring, and Appendix B translates these requirements into the details of a general monitoring plan.

To implement this Monitoring Plan, specific steps and actions must be identified, organized and assigned to Districts and/or Supervisor's Office Teams through the Annual Program of Work. This document provides the necessary detail for implementing the Monitoring Plan and identifies the individual items to be measured. This information will be used annually to evaluate progress toward meeting the direction in the Forest Plan.

This Monitoring Plan consists of two parts. The first part lists the items that will be monitored. It makes up the framework for a monitoring program for the decade.

The second part specifically explains how the monitoring tasks and responsibilities are assigned and carried out in the Annual Program of Work. This part of the monitoring program can be changed from year to year in response to variations in budgets, accomplishments or the previous year's evaluation report.

The emphasis of this plan is on monitoring Forest Plan activities. The Forest Service currently monitors a number of activities on a routine basis through timber sale administration, service contract administration, National Environmental Policy Act (NEPA) compliance reviews, supervisory reviews, and Regional Office management reviews. Such monitoring will continue to occur and will not be addressed within this document.

CATEGORIES OF INFORMATION TO BE MONITORED

Items to be monitored are organized into seven categories, which address definite monitoring requirements. These categories are:

1. Compliance with Standards and Guidelines
2. Verification of Effects
3. Quantitative Measure of Outputs and Performance
4. Costs
5. Emerging Issues
6. Suitable and Unsuitable Lands
7. Land Adjustments

All the monitoring requirements in the 1976 National Forest Management Act (NFMA) regulations and those specific to the ANF's Forest Plan are included in one of these seven categories. They are described in detail in Chapter IV.

PHILOSOPHY AND ASSUMPTIONS

Monitoring is a year-round process and is required by the Forest Plan. Monitoring is accounted for in the annual program of work. The Ecosystems Management Team has over all responsibility for monitoring and does conduct monitoring. Districts and other SO Teams also have responsibility for assigned items. All ANF associates have ownership in monitoring, because monitoring tells us how well we are implementing the Forest Plan.

Items to be monitored are based on needs identified in the Forest Plan (Appendix B, pp. B1-B5) or as identified by evaluation of previous years' monitoring results.

Monitoring the Forest Plan consists of: 1) monitoring specific items by the assigned persons/teams; 2) evaluating results by the ID Team; 3) compiling the report; and 4) acting on recommendations from past years' monitoring evaluations.

There is an expectation throughout the Forest Service's Eastern Region that management reviews will be conducted by an interdisciplinary team to ensure that integrated resource management direction is being carried out. The ANF has adopted this emphasis for Forest Plan monitoring wherever appropriate. As a result, many of the items will be monitored using Interdisciplinary Team reviews.

The ANF already has many systems for gathering and tracking information to monitor its programs; this is especially true for accomplishments and costs. However, compliance with direction and regulations and effects of management practices on resources are also monitored. Because there is not likely to be a significant increase in personnel or budgets for monitoring and because these traditional methods have worked well in the past, existing monitoring systems were included in this Monitoring Plan as much as possible to minimize costs. In this way, any additional funding for monitoring can be directed toward items in the Forest Plan that have not traditionally been measured.

Monitoring will be performed on a sample basis, which will assure that the widest possible range of projects is checked in a cost-effective manner.

OBJECTIVES OF MONITORING

Compliance With Standards And Guidelines

In this category, items to be monitored are based on Code of Federal Regulation 36 (CFR) 219.12(k). The objective of gathering this information is to provide data for evaluating how closely Forest-wide standards and guidelines and those for each Management Area (MA) in the Forest Plan have been applied. Ultimately, the evaluation of this data will provide the Forest with a measure of progress towards meeting the Desired Future Condition (DFC) of each MA.

Verification Of Effects

The emphasis in this category is to gather information that will be used to determine if the effects estimated in the Forest Plan are occurring. It will provide a measure of whether the standards and guidelines are working. This category is based on 36 CFR 219.12(k)(2) and is closely associated with the previous "Compliance" category.

Quantitative Measure Of Outputs And Performance

This category of monitoring is based on 36 CFR 219.12(k)(1) and will be used to measure how well objectives for outputs and services are being met. Information gathered will provide quantifiable measurements of completed practices and activities, as well as a gauge of Forest progress toward the DFC described for each Management Area.

Because outputs and practices have been traditionally monitored, most of the systems for gathering and organizing this data already exist.

Costs

The CFR for this category (36 CFR 219.12(k)(3)) specifically requires monitoring "costs associated with carrying out the planned management prescriptions as compared with costs estimated in the Forest Plan." This requirement is also included as a Region 9 IRM expectation.

Carrying out this section of the monitoring plan will involve the continued use of management codes for keeping track of costs by activity.

Emerging Issues

36 CFR 219.7(f) requires a consideration of "the effects of National Forest management on land, resources, and communities adjacent to or near the National Forest being planned and the effects upon National Forest management of activities on nearby lands managed by other Federal or other government agencies or under the jurisdiction of local governments."

This means that emerging issues resulting from Forest management or from other government agencies' actions will be monitored. These are issues that apply to National Forest land or have the potential to affect National Forest management goals or objectives.

Suitable And Unsuitable Lands

As required in 36 CFR 219.12(k)(5ii), lands identified as unsuitable for timber production will be reexamined for timber production suitability every 10 years. A determination of suitability will result in a return of these lands to timber production. Annual monitoring of acreage will assure that relevant information is gathered for this determination.

Land Adjustments

Land acquisition and exchange can have direct effects on meeting Forest Plan objectives. The potential exists for a major land adjustment to add or subtract acres from certain Management Areas.

The objective of monitoring land adjustments is to provide a basis for redistributing acres to Management Areas after an adjustment. The Forest goal is to minimize the negative effect or maximize the positive effect of land adjustment on meeting Forest Plan direction.

REPORTS TO BE PUBLISHED

The Forest produces two publications, the "Annual Report to the Public" (Annual Report) and the technical "Monitoring and Evaluation Report" (M&E Report), each having different objectives and audiences.

The Annual Report is published to inform, educate and involve the public on Forest Plan implementation. It may also include:

- Offering outreach to the public on future projects.
- Highlighting areas the Leadership Team would like to emphasize.
- Involving the public and partners in the development of the Annual Report to the public.
- Developing other objectives for special or one-time projects.

The Supervisor's Office Ecosystems Management (EM) Team is responsible for determining what is to be monitored, with assistance from District Planning/Design Teams. Resource Specialists on the EM Team may do the actual monitoring. Members of the Ecosystems Management Team will author, edit and publish the Monitoring and Evaluation Report.

The Information Management Team is responsible for providing accurate numbers from the Forest databases. The Information Management Team will also write, edit and publish the Annual Report.

The Annual Report and the Monitoring and Evaluation Report will be issued separately. Items from the M&E Report mentioned in the Annual Report will be incorporated by reference only.

ACTION PLAN FOR FOREST PLAN MONITORING

INTRODUCTION

The following action items will be used to monitor the progress made in implementing the Forest Plan during FY 2001 and will remain in effect unless modified according to recommendations in future Monitoring and Evaluation Reports. This monitoring will continue to be supplemented by quality control reviews that are an on-going part of all operations on the Forest.

RESPONSIBILITIES

The Ecosystems Management Team has overall responsibility for developing measurement standards and monitoring the progress being made in implementing the Forest Plan. This Team takes the lead in developing and organizing the annual Forest Plan monitoring program for the following year.

Each of the following action items is assigned to one or more individuals who are responsible for completing the item and reporting the results to the Ecosystems Management Team.

MONITORING ACTION PLAN

Subject Area	Monitoring Criteria	Responsible Person(s)/Team *
Economics	Report Costs per Unit for the Following Activities: a. Trail construction by type b. Timber sale preparation c. Wildlife Improvement acres: Shrub and tree planting, prune and release, opening creation, seeding, and Aspen regeneration (non-commercial) d. Wildlife structures e. Site Preparation (natural) f. Herbicide understory g. Fertilization h. Timber stand improvement i. Fencing j. Road construction k. Road reconstruction	**Accountant, Program Analyst, Resource Specialist (IR)**
Emerging Issues	**Emerging Issues and Public Concerns.**	**L.Team**
Forest Health	Implement a Detailed Sampling Program to Monitor Soil Productivity Changes to Determine if Cumulative Impacts are Within Forest Plan Limits.	**Soil Scientist (EM)**
Forest Health	**Summarize Significant Changes in Health and Vigor of Stand Conditions.**	**Forest Silviculturist (EM), Resource Specialist (IR)**
Forest Health	**Summarize the Effectiveness of Insect and Disease Control efforts and Status as Determined by Forest Health Protection Staff. Summary Will Include a Measure of Mortality Occurring, Especially from Major Outbreaks.**	**Forest Silviculturist (EM), Forest Health Protection**
Heritage Resources	**Verify that Heritage Resources are Being Protected.**	**Forest Archaeologist (EM)**
Impl./Mon. Reviews	**Conduct Interdisciplinary Field Reviews of Projects in Several Management Areas to Determine Application and Effectiveness of Standards and Guidelines.**	**ID Team (EM), L.Team**
Lands	**Summary of National Forest Land Adjustments by MA.**	**Forester - Lands (OPS)**
OGM	**Cubic Yards of Rock Surfacing Used for Contracts, Permits, and Free Use.**	**Materials Engineer (OPS), Forest Geologist (EM)**

* *L.Team* ***- Forest Leadership Team***
ID Team ***- Interdisciplinary Team***
IR ***- Information Resources Team***
EM ***- Ecosystems Management Team***
OPS ***- Operations Team***
RD ***- Ranger District***

MONITORING ACTION PLAN

Subject Area	Monitoring Criteria	Responsible Person(s)/Team *
OGM	**Estimate the Level of OGM Development Activity on the Forest.**	**Forest Geologist (EM)**
OGM	**Evaluation of OGM Activities to Verify the Effectiveness of Negotiations in Obtaining Industry Compliance with Standards.**	**Forest Geologist (EM)**
OGM	**Summarize the Status of Lands Available for Exploration and Development of USA Minerals.**	**Forest Geologist (EM)**
Recreation	Recreation Opportunity Spectrum, Existing Vs. Planned	**Recreation Program Manager (EM)**
Recreation	**Miles of Trail Constructed by Type and MA.**	**Resource Specialist (IR), Forester (OPS)**
Recreation	Report the Number of WFUDs Associated with Hunting (Big Game, Small Game, and Non-Game Species) and Fishing Use.	Resource Specialist (IR), Forest Biologist (EM), District Biologists
Recreation	RVDs by Activity Type and ROS Class by Management Area (MA).	**Resource Specialist (IR)**
Recreation	**Total Recreation Receipts ($) and Occupancy Figures (PAOTs) for Developed Recreation Sites.**	**Resource Specialist (IR), Accountant (IR)**
Recreation	Visual Quality Objectives, Existing Vs. Planned in at least these MA's: 3.0, 5.0 and 6.1.	Landscape Architect (EM)
Recreation	**Status of Recreation Site Construction**	**Recreation Program Mgr. (EM), Facilities Eng. (OPS)**
Roads	Road Status Summary with the Following Categories: a. Total system road miles by MA b. Total road system density by MA c. Miles of new road constructed by MA. d. Miles of temporary road constructed Forest-wide by MA. e. Miles of road constructed by MA on existing, unimproved locations. (called "reconstruction in the Forest Plan). f. Roads that have been resurfaced by MA.	**Civil Engineer (OPS), Transportation Planner (EM), Sale Administrators (RDs)**
Timber	**Application of Silvicultural Guides for Intermediate or Selection Cuts.**	**Forester - Timber (OPS), Forest Silviculturist (EM), District Silviculturists**
Timber	**Summarize Size of Final Harvest Blocks by MA.**	**Resource Specialist (IR)**
Timber	**Summarize Results of Final Harvest Cuts.**	**Forest Silviculturist (EM), District Silviculturists**
Timber	Summarize the Following Components of the Desired Future Condition by MA: a. Percent opening Percent old-growth b. Percent Conifer Cover c. Acres of Aspen Type d. Age class distribution e. Acres of oak type	**Forest Biologist (EM), Resource Specialist (IR)**
Timber	**Volume of Hardwood Sawtimber, Pulpwood, and Firewood Sold.**	**Resource Specialist (IR)**
Timber	**Suitable and Unsuitable Lands.**	**Forest Silviculturist (EM), Resource Specialist (IR)**

MONITORING ACTION PLAN

Subject Area	Monitoring Criteria	Responsible Person(s)/Team *
Various	Units of Accomplishment by MA for the Following Activities (by unit of measure): a. Final harvest - clearcuts (Acres) b. Final harvest - shelterwood (Acres) c. Shelterwood prep (Acres) d. Selection (Acres) e. Thinning (Acres) f. Timber stand improvement (Acres) g. Herbicide treatments (Acres) h. Fertilization (Acres) i. Fencing (Acres) j. Planting (Acres) k. Site preparation (Acres) l. Wildlife habitat improvement (Acres) m. Wildlife habitat improvement (Structures) n. Cultural resource surveys (Total Acres) o. Oil/Gas wells developed (Each) p. Mineral Materials pits developed (Each)	**Resource Specialist (IR)**
Wilderness	**Monitor "Limits of Acceptable Change" in the Islands and Hickory Creek Wilderness Areas.**	**District Ranger, Bradford**
Wildlife/ Fisheries	**Measure Habitat and Population Trends for Management Indicator, Threatened and Endangered, and Game Species Based on a Specific Fish and Wildlife Monitoring Guide.** **and** **Obtain Population Trend Data for Several Fish and Wildlife Species from Pennsylvania Game and Pennsylvania Fish and Boat Commissions.**	**Forest Biologist (EM), District Biologists (RDs), Fisheries Biologist (EM)**