2003 STORM ASSESSMENT

ADDENDUM

USDA Forest Service
Allegheny National Forest

Warren, Pennsylvania

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Document Structure

This 2003 Storm Assessment Addendum Report is organized into six sections, including an Appendix.

Section I. Introduction: Section I provides additional background information on the July 21, 2003 Storm, includes the purpose of this addendum, and presents updated summaries of blowdown acreage.

Section II. Storm Effects: Section II presents a range of effects and consequences caused by the storm, with storm effects organized by physical, biological and social environments.

Section III. Salvage Effects: Section III presents the potential direct, indirect, and cumulative effects, respectively, of salvage harvesting approximately 4500 acres of blowdown. The salvage harvest effects are organized by physical, biological and social environments. A summary of acres containing potential harvest is included in this section.

Section IV. Salvage Process and Conclusions: Section IV provides an overview of the salvage process requirements and conclusions to support the harvest of the down and damaged trees using NEPA tools, including the new Limited Timber Harvest Categorical Exclusions. The process to screen for extraordinary circumstances is included in this section.

Section V. Project Design Rationale: Section V provides the rationale for the salvage harvest project design.

Section VI. References and Preparers: A list of references and a list of preparers is provided in this section.

Appendix A. Maps: The Appendix provides a storm damage map and a potential salvage harvest map to support the analyses presented in this Addendum. Additional documentation, not included in this document, may be found in the Addendum project file located at the Allegheny National Forest, Supervisor's Office in Warren, Pennsylvania.

Section I – Introduction

The purpose of this storm assessment addendum is to:

- Update the estimate of acres impacted by the storm;
- Describe the impacts of the July 21, 2003 windstorm on the Allegheny National Forest (ANF);
- Identify acres where harvest activities have occurred or been proposed, as well as, acres where no harvest has been proposed; and
- Address the effects of salvage harvest of down and damaged trees.

A. Background

The U.S. Forest Service manages approximately 513,422 acres of National Forest Systems Land within the ANF proclamation boundary, which is located in Warren, McKean, Elk and Forest Counties, Pennsylvania.

On July 21, 2003, the ANF was affected by an unusual Mesoscale Convection system (MCS). This is a group of storms often dominated by a vigorous squall line and a number of weaker multi-cell clusters of storms in its interior. They often bring severe weather and heavy rain with the squall line and additional heavy rainfall with the interior storms. As the storm system entered Pennsylvania, the system took on a classic hurricane shape. The squall line on the downward (eastern) side spawned at least four confirmed tornadoes, ranging from F1 to F3, in counties east of the ANF.

The storm caused considerable damage across two large subsections of the National Forest. Two storm tracks were identified, approximately 45,550 acres for the Northern tract and 53,000 acres for the Southern track, respectively (Appendix A, Map 1). Severity of damage ranges from the breaking or toppling of scattered, single trees to larger acreages where trees were entirely blown down and/or damaged.

Since the storm, the ANF has been proactively assessing the storm damage and minimizing safety hazards to the public and employees. The preliminary storm assessment was completed by September of 2003. A Regional Office Functional Assistant Team reviewed areas of blowdown in October and provided recommendations on project development and analysis procedures. Local papers have published articles in the newspapers showing public interest in the downed trees. In addition, the ANF has published news releases addressing the status of the storm affects. Interdisciplinary Teams were established on both the Bradford and Marienville Ranger Districts to: propose salvage projects consistent with Forest Plan direction; to evaluate the storm's effects and the effects of salvage harvest; and to document project analysis in compliance with National Environmental Policy Act (NEPA) direction.

A Storm Summary (Table 1) shows the blowdown acres within the ANF Proclamation Boundary (on USFS and non-USFS lands) by 5th order watersheds. A revised estimate of acres impacted by the storm was developed through field-validated areas, together with initial aerial reconnaissance mapping that was conducted in August 2003. Blowdown acres were categorized by land ownership and Management Area. They include all of the land within the watershed. Private land, for the purpose of the addendum, may include State or local municipalities. The current estimate of storm-damaged acres on the ANF is 9,333 acres.

Table 1: Storm Summary: *Reported blowdown within 5th order watersheds of all land within the ANF Proclamation Boundary, 2004:*

Watershed name	Watershed acres	FS watershed acres	FS blowdown acres	Private watershed acres	Private blowdown acres	Total blowdown acres	Watershed blowdown percent
Clarion River	104,547	86,931	1,498	17,616	68	1566	1.5 %
Kinzua Creek	91,301	66,642	402	24,659	132	534	0.6 %
N. Allegheny Front	93,249	71,132	58	22,117	14	72	0.1 %
S. Allegheny Front	86,975	50,129	220	36,846	419	640	0.7 %
S. B. Tionesta Crk.	53,164	39,392	2,963	13,772	475	3438	6.5 %
Spring Creek	56,093	39,686	1,021	16,408	248	1269	2.3 %
Tionesta Creek	137,565	90,429	1,882	47,135	2,987	4870	3.5 %
Tunungwant Creek	13,877	8,927	38	4,950	6	44	0.3%
W. B. Clarion River	17,105	6,914	515	10,190	181	697	4.1%
W. B. Tionesta Crk.	83,879	43,632	736	40,246	531	1269	1.5%
TOTAL ACRES:	**737,755**	**503,814**	**9,333**	**233,939**	**5,061**	**14,399**	**2 % all ws**

Table 2 summarizes the storm-affected acreage in Forest Management Areas (MA's) within 5th order watersheds. Eight MA's were affected by the storm, including MA 3.0, which applies to 60 percent of the ANF. This MA received 4358 acres of damage, the greatest storm damage across the forest. However, these 4358 acres represent only 1.5 percent of all MA 3.0 designated land.

Table 2: Management Area Summary: *Blowdown acres within ANF – MA's by watershed. A description of MA's is located in the ANF Forest Plan* (*1986, as amended*)*, 2004:*

Watershed name	Management Area								TOTAL Blowdown acres
	1.0	2.0	3.0	5.0	6.1	6.2	6.4	8.0	
Clarion River	32	0	0	0	276	1070	0	120	1498
Kinzua Creek	0	0	234	0	35	133	0	0	402
N. Allegheny Front	0	0	58	0	0	0	0	0	58
S. Allegheny Front	0	0	24	94	73	0	29	0	220
S. Branch Tionesta Crk.	0	78	1765	0	126	0	0	994	2963
Spring Creek	16	0	799	0	206	0	0	0	1021
Tionesta Creek	0	0	888	0	612	382	0	0	1882
Tunungwant Creek	0	0	38	0	0	0	0	0	38
W. Branch Clarion River	0	0	88	0	0	9	0	418	515
W. Branch Tionesta Crk.	0	0	454	0	282	0	0	0	736
Total ANF blowdown acres by MA	48	78	4348	94	1610	1594	29	1532	9333

Section II – Storm Effects

Blowdown events are important in the life cycles of disturbance dependent species (Whitney, 1990). They are a common and recurring part of the ecology of the Allegheny plateau, and have been historically documented since late colonial times. Scientific evidence exists for the cyclic occurrence of these events throughout time. The July 2003 storm created a natural disturbance that caused both adverse and beneficial environmental effects. This section addresses these effects within the physical, biological, and social environments.

A. Physical Environment

The ANF is part of the northern, unglaciated Allegheny Plateau Province, characterized by sharper ridges, narrower valleys, and steeper slopes than the glaciated sections of the Allegheny Plateau (McNab and Avers, 1994). Over geologic time, these steep slopes have greater natural erosion rates and a higher degree of mass movement (Brady and Weil, 1996). The ANF is approximately 60 miles Southeast from Lake Erie, and commonly experiences *Lake Effect* weather systems. Forest elevations range from approximately 2100 feet to 1400 feet. Average annual temperatures range from 40 to 60 degrees F, ranging widely in severity between winter and summer months, and annual precipitation ranges from 35 to 60 inches per year.

1. <u>Hydrology and Soils</u>: It is difficult to quantify, accurately, the effects of windthrow and flooding on streams and nutrient status of soils, as a result, the changes must be inferred.

<u>Stream Channel Morphology Changes</u>

Channel morphology is a result of sediment, water input and streambed structure, such as bedrock, imbedded large woody debris and sediment wedges. Storms with large amounts of precipitation and blowdown create changes in the stream morphology.

A channel reforms during a storm event when flow transports coarse sediments that line the channel bed. Water moving downstream is forced to adjust its velocity and depth because of the change in structural constraints. The channel shape that is formed controls the ability of the stream to transport sediment (Swanston, 1991). Channel changes from flood events include increased movement of sediment and woody debris to channels; flood flows; local channel scour; movement and redistribution of course sediments; flushing of fine sediments; and the movement and redistribution of large woody debris.

Stream channel changes from blowdown include increased sediment delivery to channels; increased storage potential; decreased leaf litter fall over time; increased large woody debris in channel; and loss of riparian cover (Swanston, 1991). The short-term effects from the storm caused a variety of disruptions to streams and aquatic organisms' environments by changing the channel morphology and increasing the availability, transport, and deposition of sediment and woody debris. In the long term, the channel changes will most likely improve aquatic habitat quality (Swanston, 1991).

Hornbeck and Kochenderfer found that reductions in basal area that approach 25 percent were found to have measurable increases in annual water yield (2000). Annual increases in water yield due to tree removal are largely occurring during the growing season as a result of increases in summer low flow (Megahan and Hornbeck, 2000). It is assumed that watersheds on the ANF respond to forest disturbance in a similar manner as presented in the preceding studies conducted across the northeast. The July storm created varying reductions in basal area in the affected watersheds. None of the reductions were close to 25 percent of the basal area in a given 6th order watershed (Figure 1, page 41). However, an analysis is necessary to determine if any of these reductions could be cumulative with past, present or reasonably foreseeable future activities. Since the potential for a reduction of 25 percent is low on the ANF, only the watersheds with the greatest reductions in basal area from the July storm will be analyzed for potential measurable effects on stream flow (Figure 1, page 41).

Roads can alter stream morphology by diverting flow from one drainage to another which increases localized peak flows (USDA-FS, 2003). During storm events, the increased energy from peak flows during storm events creates channel instability by increasing channel erosion rates. Moreover, the movement of large wood, fine organic material and sediment are modified at road-stream crossings. Culvert and bridge crossings can constrict flood flow and create temporary impoundments as the water flows through the opening. When this occurs stream flow is slowed upstream of the crossing and deposition of material can increase, which reduces downstream transport of materials (USDA-FS, 2003).

Surface Erosion

During storm events, precipitation reaches the ground and stream surfaces, directly or intercepted by vegetation (Swanston, 1991). The movement of detached soil particles occurs after water reaches the ground. Vegetation may respond and uptake some of the soil particles through stem flow controls, or soil particles attach to vegetation surfaces. Surface erosion occurs when soil particles are detached and then transported. The detachment process is controlled by the particle size and vegetation and litter cover (i.e. leaves and woody debris) present on the forest floor. The amount of sediment transported during individual storms can be substantial (Swanston, 1991). The storm that occurred in July 2003 resulted in increased erosion rates and sedimentation. In addition, the storm reduced the amount of leaf litter and uprooted thousands of trees. This loss of ground cover will allow increased sediment erosion rates to occur during future storm events. However, as new plants establish, erosion rates will decline.

Rainfall on roads accelerates erosion processes by altering water flow, increasing sediment loading transport and deposition, respectively, in riparian areas of watersheds (Gucinski et. al, 2000). Through time, ruts and washboards can form on the road surface. During storm events, ruts and road wash-boarding act as channels on the road surface, which increases a road's sediment erosion rate. Pit run material from borrow pits is used to surface 91 percent of the ANF systems roads. The pit run material is native sandstone that tends to break down into fine particles at a faster rate than limestone, thus, increasing the amounts of sediment reaching streams during runoff, (USDA-FS, 2003). The roads are resurfaced approximately every 12 years (USDA-FS, 2003).

Soil nutrients

Soil quality and productivity are tied together and influenced strongly by soil nutrients and the soils ability to retain and recycle the appropriate amount of given nutrients for plant germination and growth. Trees and plants remove nutrients for growth and return many of these nutrients when

they die and decompose. Blown down trees left in the stand will decompose over time releasing stored carbon into the soil and atmosphere.

Carbon dioxide is a "greenhouse" gas, and has received international attention. The storage of carbon in soil, trees, wood products, etc. can help reduce the carbon dioxide in the atmosphere, where it can affect the temperature of the planet. At any given time, an old forest contains more carbon than a young forest; the rate of carbon storage generally ranging from zero to negative. While trees take up carbon dioxide from the atmosphere, they also release it through the process of respiration. As trees age, their net carbon storage decreases as respiration equals or exceeds production. Over the long-term, younger, rapidly growing forests, while containing less carbon at any given point in time, are removing carbon from the atmosphere and storing it at a faster rate than older forests. In general, a mixture of older trees with high current carbon storage and younger trees with rapid carbon accumulation rates would provide the best opportunities for carbon storage in trees (Hoover et. al, 2000). The July storm created hundreds to thousands of acres of young forests that will uptake carbon at a rapid rate.

The soils in the blowdown area are formed from parent materials of sandstone, shale, siltstone, conglomerate, mudstone and small quantities of coal and limestone (Berg et. al, 1980). Soils in the ANF are typically lacking in calcium (Ca) and magnesium (Mg) due to the rarity of limestone and dolomite in the area. A recent study on the ANF suggests that acid deposition may exacerbate the problem resulting in soils across the ANF being more acidic. To compound this, acid deposition is prevalent on the ANF. This then, further reduces the Ca and Mg in forest soils on the unglaciated plateau and shoulder slopes (S. W. Bailey et. al, 2004). Decay of blown down trees would return nutrients held in the tree to the soil and other plants over time.

In general, where the storm event caused stand replacement windthrow, the forest floor will be more open, will receive more light, and become warmer. Due to loss of evapotranspiration of trees that are currently down, the forest floor will also be wetter (Powers et. al, 1998, p. 61). These warming effects will be reduced by the remaining stem-wood and treetops. Nonetheless, litter decomposition is expected to increase, along with nutrient mobility and nutrient uptake.

Down trees and tops are known as down woody debris. While there is a greater prevalence in older mature stands, they exist in all life stages of a forest. Down woody debris on the ANF is highest in stands greater than 110 years of age and stands between 11 and 50 years of age (Morin et. al, 2001). The main stems of dead trees that have fallen decompose at a slower rate then tree branches. While tree branches are very useful for providing nutrients and organic matter back to the soil, and in time become part of the soil, the main stems of dead trees provide these benefits for a longer time (Maser and Trappe, 1984). Decay rate of the down wood varies by species, with black cherry generally decaying at a slower rate than red maple or aspen trees (Morin et. al, 2001). Down woody debris also provide habitat for many species of fungi, bacteria, insects and animals, all of which, provides nutrients, organic matter and other benefits for the soils (Maser and Trappe, 1984). Other benefits of down woody debris, especially larger diameter woody debris, include storage and slow release of water (Frelich and Puettmann, 1999). The wind event of July 2003 created more down woody debris in stands of most age classes.

Riparian Areas

Canopy loss within riparian areas can result in an increase in water peak flows, stream bank soil erosion and stream temperature during the summer (Hornbech and Kochenderfer, 2000; Swanston,

1991). Water entering the streams from the interior of the blowdown areas can increase temperatures due to solar radiation (Swanston, 1991). It is most likely that the level of change in riparian areas is greater with increasing area and intensity of blowdown.

Down woody debris is as important in aquatic ecosystems as it is in terrestrial ecosystems. Woody debris in streams provides habitat for fish and other aquatic species. At the turn of the 20th century, historic splash damming in streams removed stable wood and boulders from channels, allowing channel bed substrate mobility and pool loss due to the absence of structure and filling. Logging of streamside vegetation, around the same time, resulted in large woody debris loss in following years. As a result, current habitat is largely defined by a high frequency of riffle and glide features with a lesser number of pools. Pool habitat is needed for aquatic organism survival and propagation. Current levels of large wood within most stream channels on the ANF are well below the desired condition outlined in the Forest Plan, which suggests 75 to 200 pieces of large wood per stream mile for best conditions. The Forest Plan identifies that woody debris for perennial streams "provide habitat complexity, channel stability, and pool formation in cold-water streams by managing for recruitment of large woody debris", and for intermittent flowing streams "Manage for input of woody material" (USDA-FS, 1986, as amended, p. 4-19). Some of the areas that experienced blowdown during the July storm now contain streams that meet the desired future condition as described in the 1986 ANF Forest Plan, as amended.

B. Biological Environment

1. <u>Forest Vegetation</u>: The ANF lies within the Eastern Broadleaf Forest Province ecotype, with vegetation characterized as the temperate, deciduous-mesophytic forest (Baily, 1995). The ANF is composed primarily of the northern, upland and Allegheny hardwood forest types. Oak types are prevalent on western and northern ridges along the Allegheny River, and scattered at higher elevations and near the Clarion River. Hemlock inclusions generally follow streams and occur within riparian areas throughout the Forest.

The ANF is composed primarily of second-growth hardwood stands that are largely even-aged and dominated by shade-intolerant species such as black cherry and red maple, in association with shade-tolerant species such as sugar maple, beech and Eastern Hemlock (USDA-FS, 1995, Appendix L, p. 7). The understory vegetation, dominated by fern, grass, striped maple and beech, is generally lacking in tree seedling, shrub or sapling vegetation. In areas where tree seedlings are found, the majority of seedlings are either black cherry or red maple (USDA-FS, 1995, Appendix L, p. 7).

<u>Change in Forest Structure</u>

The storm created openings in the forest canopy by knocking over individual trees, small groups of trees and entire stands of trees. These openings range in size from less than one acre to over ca. 300 acres in size. Some additional tree mortality could occur as additional trees die due to damage sustained by the storm.

There are a variety of effects which follow a storm event of this nature. More light reaches the forest floor, growth and diversity of herbaceous and shrub understory plants increase, growth of seedlings; increased temperatures in openings; and changes in soil conditions. On the ANF, larger openings often become dominated by deer tongue grass, short husk grass, New York fern, wood fern or hay-scented fern in the understory, and/or areas of striped maple, American beech saplings,

and black birch. The presence of these plants can suppress the emergence of other vegetation, including more desirable tree seedlings. Although native species themselves, these low-growing early-succesional species sometimes form such dense populations that they crowd out many other native plants, reducing diversity in those areas.

Change in age class

There are approximately 4500 acres of heavy blowdown on the ANF due to the storm, which will result in the development of a new age class. These areas are widely dispersed throughout the 98,550 acres of the ANF where damage was sustained. They range in size from less than one acre to over ca. 300 acres in size. This change in age class has little impact on the overall age class distribution of forested stands on the ANF. Inventory data presented in the FY 2001 Monitoring and Evaluation Report showed that 37,756 acres, approximately 7 percent ANF land, of 0-19 year age class was found, forest wide. The addition of 4500 acres of new age class resulting from the July 2003 storm is a negligible change in age class, only increasing the percentage to eight.

Approximately 994 acres of the Tionesta Scenic Area and Tionesta Research Natural Area were blown down by the storm. This area is a remnant of old growth forest that was not harvested during the intensive logging period that occurred at the turn of the 20th century. Inventory data for this area shows that several similar catastrophic events have caused changes in age class. The result is a mosaic of age classes across this old growth landscape.

Insect Habitat

The storm increased the amount of downed woody material and dead and dying trees. This creates habitat for some insects that may result in both beneficial and adverse impacts, depending on the resource affected by the potential increase in insect numbers. For example, the increase in some insect populations will benefit insect-eating birds and bats. Other insects may cause damage to the commercial value of forest products.

The peach bark beetle is one species that may prove to be detrimental to forest products. Peach bark beetle populations are usually very localized and associated with scattered, physically damaged trees (e.g., broken tops) or with cherry stressed by insect defoliation. Prior research has suggested that over-wintering galleries of peach bark beetle produced large quantities of gum, often resulting in a continuous ring of gum spots in heavily infested logs. These gum spots and their potential for degrade in black cherry lumber and veneer has economic implications.

Reforestation Investments

In order to achieve successful stand regeneration it is often necessary to include reforestation treatments, such as the construction of area fences, to exclude deer from areas where the objective is to establish seedlings. The storm caused damage to 83 fences designed to protect seedlings being established as part of planned stand regeneration prescriptions. Some fences surrounded areas that had previously received a shelterwood seed harvest. The fences were designed to protect areas until adequate numbers of seedlings were present, in order to execute the regeneration sequence, which will be completed by scheduling a shelterwood removal harvest. Other fences were protecting developing seedlings from deer browse in areas where a shelterwood removal harvest had recently occurred.

Damage to individual fences varied, depending on the intensity of storm damage to trees surrounding the fence. Some fences were easily repaired through removal of debris. Others

require substantial reconstruction in order to return them to a useful state due to the considerable damage sustained.

2. Wildlife Resources: The ANF currently provides habitat for many species of mammals, birds, fish, amphibians and reptiles. White-tailed deer, turkey and local birds are regularly observed. Raptors observed include bald eagle, osprey, red-shouldered hawk, red-tailed hawk, goshawk, broad-winged hawk, great horned owl, barred owl, saw-whet owl and screech owls.

Wildlife habitat on the Forest is principally a mature mixed hardwood forest, in the 60 to 90 year age class. Mature hemlock wintering areas follow most waterways. Understory vegetation in many areas has been reduced, due to long-term effects of the white tailed deer. Surface rocks and large boulder complexes are distributed across the forest. Coarse woody debris are distributed throughout the Forest, as are snags and den trees.

Wildlife habitat change

Less then two percent of wildlife habitat on the ANF was affected by the storm. However, on that two percent, wildlife habitat was both created and disturbed by the storm, depending on the habitat needs of the wildlife species in question. Subject to site-specific storm intensity, many areas of the ANF underwent varying degrees of disturbance to vegetation, soils, water resources and microclimates. The varying intensity of wind gusts generated by the storm played a major role in the ensuing habitat that now exists, across the storm tracts.

Many areas on the Forest have entire trees blown over with accompanying upturned "root-wads". Root-wads create a depression in the area where roots were previously anchored, as they contain soil and rocks from that section of ground. Many of these depressions collect water from precipitation and snowmelt, and serve as temporary, seasonal vernal pools to provide habitat for amphibian species. These pools may also promote an increase in insect populations, benefiting the birds and bats that utilize this food source.

Downed woody debris is now prevalent in many of the storm-affected areas. Of the approximately 312 wildlife species (49 mammals, 213 birds, 24 reptiles, and 26 amphibians) found on the ANF, slash piles and downed trees are utilized by 16 species of mammals, five species of birds, seven species of reptiles, and nine of the species of amphibians (DeGraaf et. al, 1992). Based on the assumption that these species directly utilize dead wood on the ground, the number of species that indirectly utilize this type of structure is presumed to be much higher. Examples include: ruffed grouse often use logs as drumming sites; many species of furbearers routinely travel across fallen logs in order to cross a stream; etc. Preliminary results from an on-going study titled *"Snag and log management in mixed species hardwood forests on the Allegheny Plateau"* indicate that a threshold level of down and woody debris exists where any further accumulation does not provide further benefits due to the territorial nature and resultant habitat saturation of wildlife species. Most areas of the Forest are believed to meet or exceed the wildlife threshold of woody debris in the post-storm condition (Stoleson, personal communication, April 02, 2004).

Many den trees and/or cavity trees were destroyed by the storm. The existing cavities found in these trees may still serve as wildlife habitat once the tree fell to the ground, but the same species that utilized these cavities in a standing tree, may not be able to utilize them in a fallen tree. Potential den/cavity trees were also created by the storm. The wind gusts, which accompanied the storm, split tree limbs, broke the tops out of trees and, in some instances, snapped the tree off at

mid-height. The resultant condition of these trees is often predisposed to the increased potential for disease and insect infestation, which will augment the rate of decay in the section of tree left standing, thus increasing habitat for species that utilize cavities in stressed and/or dead standing trees. Fifty-seven species of wildlife found on the ANF are known to utilize standing live and/or dead trees.

Diverse types of wildlife habitat components affected by the storm consist of hard mast-producing trees such as oak, beech and hickory. The loss of these trees will affect wildlife by decreasing the amount of potential mast output found in a given area. One beneficial effect to wildlife from the storm was the creation of an alternate food source for white-tailed deer. The large amount of woody browse present on the ground after the storm provided substantial forage over the winter months and, due to the overall absence of mast crops on the Forest during the fall of 2003, may have reduced the mortality rates of deer during the winter of 2003-04. Fallen trees, along with the scattered branches and other vegetation, benefited wildlife by providing sources of cover in which to evade both hunting pressure and predation by other animal species.

Some conifer species, primarily hemlock and red pine, were damaged by wind gusts. This includes those within streamside zones. Hemlock stands are an important habitat component, as they provide thermal cover for various species of wildlife throughout the winter months and serve as cool, shade-producing areas during the summer months. Although, single tree occurrences of hemlock being blown down were reported, current reports from the field do not indicate any occurrences of hemlock stands on the ANF being severely affected. The absence of hemlock stand damage from the storm is to be expected, due to most hemlock stands generally being situated in lower elevation locations. In addition, the triangle shape of the trees, in relation to surface area, acts to catch wind gusts, and provides wind-buffering capabilities of dense hemlock stands in general.

Temporary openings are an important habitat feature for a variety of wildlife species on the Forest, such as brood habitat for ruffed grouse and turkey, fall forage for deer and black bear (USDA-FS, 2004), and foraging areas for insect-eating birds and bats. Temporary forest openings created by the storm vary in size and shape. Many openings were created by just one canopy tree falling down. The amount of increased sunlight and the original stand conditions, in terms of species in the understory and herbaceous ground cover present, soil conditions, local deer populations, etc, will most likely determine the effects that will take place. An increased amount of sunlight to the forest floor improves the potential for some herbaceous species and shade intolerant tree species to develop within temporary openings. These areas serve as hunting grounds for predatory mammals and raptors, which utilize small mammal species attracted to this habitat type.

The storm also created various levels of edge habitat throughout the forest. Species diversity generally increases near habitat edges, making them beneficial to wildlife. However, edges can have detrimental consequences as well, caused by modified distribution and dispersal patterns and increased incidences of nest parasitism and predation (Yahner, 1988).

Blowdown occurred on greater than 125 acres within riparian streamside management zones, not including acres within current ANF project analyses or privately owned land. A streamside management zone is ANF land located and protected within 100 feet on both sides of a perennial stream. Shaded stream habitat is now reduced or open in many of the riparian areas with blowdown. As a result, sunlight amounts may increase to increase stream water temperatures.

Trees that have fallen into or across streams may create fish habitat in various sections of the stream. However, increased water flow rates may have pushed collected debris (logs, branches, rocks, etc.) out of stream sections and made pools into riffles, disrupting existing aquatic habitat.

The value of headwater streams, including springs and seeps, is recognized in the 1986 Forest Plan, as amended. Quality of this habitat may be adversely affected by sedimentation and structural changes from direct storm impacts and extreme temperature fluctuations. Forest Plan MA direction and Standards and Guidelines outline measures to protect aquatic and riparian habitats (USDA-FS, 1986, as amended).

Wildlife Disturbance and Mortality

There are 213 species of birds known to inhabit the ANF at various times of the year (migration, nesting, winter visitors, etc.), and of these species at least 133 are known to nest on the ANF (Brauning, 1992; ANF Checklist of Birds). Based on the timing of the storm in relation to the nesting periods, approximately 32 species of birds may have been in the process of egg development when the storm occurred. This figure is based on the results of egg production and incubation surveys compiled during the data collection for the Atlas of Breeding Birds in Pennsylvania (Brauning, 1992). Nesting in southern Pennsylvania is expected to precede nesting in northern Pennsylvania. Therefore, this figure may be higher or lower, dependant on the statewide locations of the nests surveyed, which generate the average dates of egg production for the entire state. In addition, the number of species that may have been in the process of fledging during the time of the storm may be higher than the egg production figure. Moreover, some of the 213 bird species have unknown nesting status on the Forest. Estimates on the amount of disturbance occurring to species during the storm are unknown, but it can be safely assumed that gusting winds and falling debris likely caused some disturbance or mortality to birds. It is expected that nest production and reproductive success were affected by intense wind gusts and falling debris during storm events. Mortality to cavity-nesting species is likely to have occurred from falling timber. Overall, these impacts are anticipated to be minor, as only two percent of the ANF was affected by the storm and no measurable impacts to any individual species are anticipated.

Thirteen species of mammals on the Forest are known to utilize standing live trees as den trees, squirrel dreys, hollow cavities, etc. (DeGraaf et. al, 1992). In probability, disturbance, injury or mortality occurred to various mammalian species throughout the storm event. Falling debris, blown-over trees and uprooted root wads may have caused harm to several species. Falling trees and branches from the storm may have caused injury or mortality to birds, mammals, amphibians and reptiles located on the ground during the storm.

C. Social Environment

1. Road and Trails: Forest roads and trails were assessed immediately after the storm to determine whether closures were needed in order to assure public safety. Many Forest system roads were closed in the days following the storm until the clearing of debris allowed for safe vehicle passage. Road clean-up plans were prioritized based on the road class and blockage. Roads that normally receive moderate to high traffic were cleared first, while gated, barricaded or low traffic roads were placed on the lower priority list and, in some cases, still need to be cleared. Of the approximate 579 miles of roads and trails where damage occurred, over 521 miles have

since been re-opened (Table 3). Off-Highway Vehicle (OHV) and All-Terrain Vehicle (ATV) trails were re-opened within 60 days of the storm. The greatest amount of storm clean-up activities occurred on the Allegheny Snowmobile Loop, but all snowmobile trails were open in time for the 2003-04 winter riding season.

Table 3: Storm effects and status of ANF Trails: *2004*:

Trail	Storm damage (miles)	Storm repair accomplished (miles)	Storm clean-up remaining (miles)
North Country Hiking Trail	96.3	96.3	0
Other Hiking trails	48.7	1.6	47.1
Allegheny Snowmobile loop	301.4	301.4	0
ATV Trails	106	106	0
Cross Country Ski Trails	26.7	16.3	10.4
TOTAL MILES	**579.1**	**521.6**	**57.5**

Approximately 47 miles of pedestrian trail and 10 miles of cross-country ski trail remain to be re-opened to public use. Work is continuing on these portions of the ANF trail system.

2. <u>Scenic Quality</u>: The storm blew over trees along forest roads, trails, and in recreation facilities. Typically, blown over trees are common sights in the natural environment. However, this storm has created large areas of downed wood that affect the scenic condition. Mature stands of trees are now blown over or broken off with root wads turned up.

Some people consider larger areas of blown over trees unsightly and associate non-utilization of this material with waste. Conversely, others see the value of this material as part of the natural ecosystem. Generally, smaller patches of blown over trees are not considered as unsightly as large patches. The Scenic Management System (SMS) addresses the impacts of disturbance based on the viewers' position in the landscape from primary and secondary travel routes. It is also the basis for analyzing and mitigating scenic impacts on the ANF (USDA-FS, 1986, as amended).

According to the SMS, roads, trails and streams are given a value based on the public concern for scenery. These are Sensitivity Levels 1, 2 & 3. In addition, Visual Quality Objectives (VQO's) are assigned to each area of the forest. The VQO of Retention (R) has the highest standard, Partial Retention (PR) allows for disturbance that mimics natural forms only, and Modification (M) allows for a greater deviation from the natural landscape and more evidence of disturbance. Blow down in the immediate foreground of Sensitivity level 1 and 2 travel routes will have a greater negative impact than if viewed from a greater distance. Areas within the ¼-mile foreground, that are screened, will have little impact to scenic quality.

Table 4, on the next page, describes the blowdown location by Sensitivity Level, miles adjacent the travel-way, affected acres, Visual Quality Objective (VQO), recommended mitigation and meeting the VQO.

Table 4: Scenic Sensitivity along ANF roads with adjacent blowdown: *2004*:

Sensitivity Level	Location of Scenic Corridor	Adjacent to Travel way	Affected VQO Acres	Visual Quality Objectives	Meets VQO
1	State Route 219: State Route 321:	No No (.1 mi)	26 Ac 26 Ac	Retention Partial Retention (PR)	No No
2	State Route 2001 (both sides): FR 216 - Allegheny Snowmobile Loop: Martin Run: Kinzua Creek: FR 141:	Yes (.27 mi) Yes (.33 mi) No No Yes(.23 mi)	53 Ac. 20 Ac 11 Ac 77 Ac 19 Ac	PR PR PR PR PR	No No Yes Yes No

Only 26 acres of the retention VQO, and 197 acres of the partial retention VQO were affected.

3. <u>Economic loss</u>: The storm caused damage to trees located in the blowdown areas. Actions to expedite salvage are needed to capture the monetary value of fallen trees before wood decay occurs. The time it takes for trees to decay is dependent on a variety of factors including: tree species, tree diameter, amount of ground moisture, amounts of the log in contact with the ground and if the tree has sustained cracks, fissures, or breakage before or after falling to the ground.

The ANF is considering an adjustment to the three-year vegetation management plan due to the salvage potential created by the storm. Fifteen active timber sales have trees that sustained damage from the storm and will possibly require additional NEPA work, such as Supplemental EA's and/or correction notices, so that salvage of damaged timber may occur. Program priorities may shift because of additional NEPA work needed for new salvage sale projects. Projects presently in some stage of analysis require reevaluation because of the storm. New stand prescriptions, heritage surveys, and Threatened and Endangered species surveys are needed to meet timelines and commitments.

The FY 04 vegetation management program will be affected and will need adjustment. Outside of existing sale areas or areas already being analyzed for project development, the potential for salvage harvest exists on approximately 4,500 acres. The new Limited Timber Harvest Categorical Exclusions and Healthy Forest's Initiative options create opportunities to expedite salvage harvest. Future stability of the out-year timber sale program depends upon the timely availability of acres of final harvest cuts planned and scheduled in prior NEPA documents. The disruption of flow of volume from these units is likely to affect out-year sale programs.

4. <u>Landlines:</u> "Landlines", property markings that are usually painted lines on trees and USFS property signs, show the proclamation boundary and interior boundaries around private landholdings. Approximately 16.2 miles of the landlines were affected, due to the painted

boundary trees being blown down and/or USFS signs being broken by falling debris and trees. These landlines are presently being surveyed and repainted to disclose property boundaries for existing and potential harvest activities.

5. Dispersed Recreation Altered: The storm may have caused some disruption to dispersed recreation opportunities on the two percent of the Forest affected by the storm. Access to some locations is limited due to the hazards associated with blowdown. Ample opportunity exists to select alternate sites for most kinds of dispersed recreation activities such as hiking, berry picking, horseback riding, mountain biking, wildlife viewing and exploring by foot or vehicle. Ninety-eight percent of the Forest is still available for dispersed recreation.

6. Heritage sites: Heritage resource damage sustained during the storm continues to be assessed. Storm damage to the McKinley Earthworks site has been documented and reported to Historic Preservation Offices. Some heritage sites may have been damaged from debris and falling or uprooted trees. In contrast, these same conditions may act to obstruct vandalism by inconsiderate Forest visitors, an on-going concern on heritage site locations. These obstructions, beneficial to site fidelity, also act to obstruct agency personnel in finding and delineating heritage sites. On the other hand, uprooted trees may have uprooted heritage artifacts, making them more detectable.

7. Firewood Collection: The storm created an increase for firewood available to firewood collectors. An amendment to the firewood collection permit was issued from July 28, 2003 to April 16, 2004, and is now invalid. This temporary amendment was issued in order to provide increased opportunities to firewood collectors by allowing the collection of live (green) trees for firewood. The ANF firewood policy allows the removal of dead trees where there are no live branches and 25 percent of the bark had fallen off. The amendment made live trees, damaged by the windstorm, available to permit holders. The cutting and removal of firewood under the amendment was permitted on pieces no larger than ten inches maximum diameter from:

- Top portions or limbs of wind thrown, live (green) trees;
- Limbs that are broken-off standing, live (green) trees;
- Small, live (green) wind thrown trees with diameters up to ten (10) inches maximum;
- Trees or portions of trees, that have been cut to open Forest Service numbered roads, up to ten (10) inches in diameter.

Hazards

The hazard potential for being hit by falling trees is always present in a forested setting. Risks to Forest users and agency personnel are higher in areas of blowdown, due to the weakened state of many of the trees in areas affected by the storm. Falling trees and branches, sharp splinters of wood, downed logs, uprooted trees, mounds of soil and limited visibility are some of the safety hazards now more prevalent in blowdown areas across the Forest. Field reports indicate numerous leaning trees fell to the ground during the winter of 2003/04.

8. Research and Wilderness Areas:

Tionesta Scenic & Tionesta Research Natural Area: The Tionesta Scenic Area is 2,018 acres total and the Tionesta Research Area is 2,113 acres total. There is an estimated 994 acres of damage received in the area.

Kane Experimental Forest (KEF): The 1,650-acre KEF sustained approximately 300 acres of down and damaged trees. Public meetings were held in late February 2004 to identify potential research opportunities created by the storm.

Hickory Creek Wilderness**:** The Hickory Creek Wilderness and the Allegheny Wilderness Islands are the only Congressionally designated wildernesses in Pennsylvania. It is a special area encompassing 8663 acres. Only 95 acres of blowdown occurred in the Hickory Creek Wilderness, including damage along a quarter mile segment of the 12.1-mile trail.

Section III – Effects of Salvage Harvest

This section presents a discussion of the environmental effects that occur because of salvage harvest activities. Two kinds of salvage treatments are discussed, partial salvage harvest and stand replacing salvage harvest. In these treatments, trees that are blown down or leaning and present a hazard to forest workers and forest visitors are removed by commercial tree harvest. Freestanding trees that are either healthy, with intact crowns, or were damaged by the storm, crowns broken off, etc, are not removed. A small number of healthy standing trees may need to be removed in order to safely remove the damaged timber.

Salvage harvest treatments have been proposed in numerous projects. Some proposed treatments are being analyzed as part of the Spring Creek, Martin Run, Forest Renewal, and Eagles Mills Projects, respectively. Several research studies and salvage harvests are being considered for examination within the Kane Experimental Forest. In addition to these existing and proposed projects, a series of smaller salvage projects can be proposed, that utilize existing access roads for hauling logs. No new road construction is being proposed for these salvage harvest projects. However, road maintenance would occur where needed.

The discussion that follows provides an effects analysis of the proposed salvage harvest. It serves as the basis for project specific determinations on the likelihood of impacts associated with specific project proposals, and serves to evaluate the potential for adverse cumulative effects. Additional consideration of effects may occur as individual projects are evaluated. It is likely that additional salvage projects will be developed, when additional field information is gathered and site-specific salvage proposals can be made. Some areas have not yet been evaluated for salvage potential.

A. Physical Environment

1. <u>Hydrology and Soils</u>: The 6th order watersheds where blowdown salvage is proposed are included in Table 7. The Commonwealth of Pennsylvania, Department of Environmental Protection (PA-DEP) designated the streams located in the watersheds in potential salvage areas (Commonwealth of Pennsylvania, 2001). These designations give the following protected water uses: aquatic life, water supply for potable (drinkable), industrial, livestock, wildlife, irrigation uses. There are also protected recreational uses for boating, fishing, water contact sports and aesthetics. Streams within the potential salvage areas are not listed as "water quality limited" by the PA DEP listing of stream channels impaired from meeting Commonwealth water quality standards (Commonwealth of Pennsylvania, 2002). Therefore, all protected water uses are currently identified as "supported".

<u>Stream Flow and Channel Morphology Changes</u>

Unless additional road construction or reconstruction is proposed, there would not be additional effects of roads on stream flow or morphology. The increase in large woody debris aide stream resiliency to these potential changes. Stream flow changes from the potential salvage would be negligible, especially relative to the effects of the July storm.

Surface Erosion

Road maintenance would be proposed in areas where harvest activities occur, and would include spot surfacing, grading, and improving road drainage structures. While some sedimentation would occur because of road maintenance, this can be limited by following Forest Standards and Guidelines (USDA-FS, 1986, as amended) and Commonwealth best management practices (BMPs).

Woodland erosion potential and soil drainage for soils, for the proposed salvage areas were summarized using information from county soil surveys (Table 5) (Cerutti, 1985; Churchill, 1987; Kopas, 1993).

Table 5: Soil erosion potential and soil drainage types within proposed salvage acreage (data used as of March 18, 2004; serves as a sample of the proposed salvage areas)**:**

Soil Erosion Potential	**Blowdown acres**	**Percent area**
Low	2705	73%
Moderate	550	15%
Severe	427	12 %
Soil Drainage Type		
Group I, well drained	2007	54%
Group II, moderately well drained	1547	42%
Group III , poorly drained	133	4%

Soil Nutrients

Some nutrients leave a site if the main stem of the tree is harvested during salvage, but many of the nutrients are stored in branches, leaves, and roots. To recycle needed nutrients, roots, treetops, and branches are left onsite to decompose. Usually, the main stem harvested for timber, is composed primarily of carbon, which can remain stored for centuries in a wood product created from the timber. The pieces of the main stem that are not turned into a long-term wood product would likely be decomposed or burned, both of which would release the carbon back to the atmosphere. The branches and roots left in the stand would decompose over time, releasing stored carbon into the soil or atmosphere. Carbon stored in the soil is extremely stable, and the carbon storage in soils is only reduced if the soils are detrimentally disturbed throughout a large area (Johnson, 1992; Strong, 1997).

On average, about half of the nutrients stored in a tree are contained in the tops (Powers et. al, 1990). This means that, following the potential salvage of windthrow from the July storm, half the nutrients in down trees would be left on site. Where only the stem wood is removed, as is done on the ANF, nutrient losses tend to be low. Nutrient losses from stem only removal are often compensated by natural inputs of nutrients, resulting in no net loss of long-term productivity potential (Grier et. al, 1989, p. 28). The treetops that remain after stem removal, can act as nutrient sinks, releasing nutrients slowly over time. The decomposition of slash may assist in immobilizing nitrogen, in the short-term, by raising the carbon to nitrogen ratio. This, in turn, will limit leaching of nitrogen through the soil, providing greater soil productivity.

Soil Compaction

Harvesting or salvaging timber can cause compaction. This compaction can be detrimental, depending on the weight, area in which that weight is applied, number of passes, soil texture, soil moisture, and rock content of the soil (Alexander and Poff 1985; Liechty et. al, 2002). Loams, silt loams and sandy loams make up the texture of soils on the ANF. These soils are relatively to somewhat susceptible to compaction (Brady and Weil, 1996). However, some soils contain a high rock content, which provides some protection from compaction by dispersing the weight of equipment. To remain consistent with the Forest Plan, no salvage activities will occur on drainage group three soils, the soil most susceptible to compaction due to poor drainage. Soil compaction is considered detrimental when there is a 10 percent reduction in porosity, which typically equates to a 15 percent increase in bulk density of the soil (USDA-FS, 2002a). The greater the aerial extent of detrimental soil compaction, the greater the effect on runoff, infiltration and subsurface water movement (Froelich, 1975).

Soil quality monitoring from 2003 examined the effects of vegetation management on physical soil properties such as compaction, rutting, puddling, displacement and accelerated erosion. Monitoring included 28 stands with 240 transects where data was recorded. There were 18 stands with less than 5 percent detrimental disturbance, 24 stands with less than 10 percent disturbance, and only one stand that exceeded the 15 percent area standard (USDA-FS, 1986, as amended, p. 4-21) with 15.5 percent detrimental disturbance, all from detrimental compaction. Soil quality monitoring from 1990 to 2000 displayed that 10 stands, out of 27 monitored, exceeded the Forest Plan standard (USDA-FS, 2002a, p. 12). These results have lead to the creation and implementation of interim soil guidelines (USDA-FS, 2001) to help limit detrimental soil disturbance to less than 15 percent. The only stand in the 2003 soil quality monitoring that exceeded the Forest Plan standard was approved prior to the implementation of the interim guidelines.

Any salvage harvest activity will include the use of mitigation measures and will adhere to the interim soil guidelines and should therefore achieve levels of soil compaction that are consistent with Forest Plan direction.

Riparian Areas

Riparian areas receive special consideration (Table 6) during management activities. Streamside management zones are determined by the kind of stream or water feature, and salvage harvest activities would not occur within these zones. Down woody debris would remain on site. Improvements in streamside management zones that resulted from the storm would remain unchanged by salvage harvest.

Table 6: Streamside Management Zone- Protective Measures**:** *2004***:**

Water feature	**Streamside Management Zone**
Mapped “fish-bearing” perennial stream	100 ft each side of stream
Unmapped perennial and intermittent stream (includes seeps, springs, and wetlands)	50 ft, plus 4 feet for every degree of slope each side of stream
Water feature without an outlet	25 ft, plus 4 feet for every degree of slope each side of stream

The following tables provide acres of stand replacing or partial harvest within ANF management areas and 6th order watersheds where potential salvage harvest could take place.

Table 7: Blowdown intensity within 6th order watersheds and ANF salvage harvest proposals: *2004:*

Sixth Order Watershed	Total Acres	Private Land Condition			ANF land Condition			ANF Harvest Proposals	
		Pvt Ac.	Heavy	Lt/Mod	ANF Ac.	Heavy	Lt/Mod	Std Replace	Partial
Allegheny River (upper)	33,691	26,599	0	0	7,092	39	19	0	0
Allegheny River (lower)	22,474	15,416	30	22	7,058	17	0	0	0
Allegheny River (mid - upper)	29,144	19,470	0	0	9,674	0	29	0	0
Bear Creek	25,910	1,931	54	0	23,979	5	0	0	0
Big Mill Creek	21,163	3,326	1	0	17,837	995	196	0	69
Blue Jay Creek	14,082	2,530	42	0	11,552	0	38	0	35
Brown's Run	15,394	7,532	0	14	7,862	0	0	0	0
Chappel Fork Creek	15,673	7,506	0	0	8,167	194	10	28	10
Clarion River (mid - lower)	31,036	25,514	13	0	5,522	18	182	0	0
Clarion River (mid - upper)	28,835	18,417	0	0	10,418	0	2	0	0
Coon Creek	26,476	25,051	66	64	1,425	0	0	0	0
East Branch Tionesta Creek	22,551	8,584	15	249	13,967	643	802	641	756
East Branch Tunungwant Creek	37,161	30,048	6	0	7,113	26	12	26	12
East Hickory Creek	38,841	12,839	200	168	26,002	75	99	33	5
Farnsworth Branch	10,937	4,022	2	0	6,915	83	24	32	24
Kinzua Creek (lower)	18,481	1,767	0	0	16,714	20	22	20	22
Kinzua Creek (middle)	33,435	10,345	0	0	23,090	3	0	0	0
Kinzua Creek (upper)	21,543	19,371	0	0	2,172	107	45	107	45
Salmon Creek	35,043	9,948	961	30	25,095	384	591	76	383
South Branch Kinzua Creek	24,967	8,468	86	46	16,499	0	0	0	0
South Branch Tionesta Creek	32,603	7,178	169	42	25,425	275	1243	145	345
Spring Creek (lower)	29,388	12,155	22	31	17,233	197	28	5	28
Spring Creek (upper)	26,706	4,253	195	1	22,453	497	300	421	232
Tionesta Creek (middle)	30,450	10,203	0	45	20,247	168	149	0	5
Tionesta Creek (upper)	25,749	4,738	51	157	21,011	107	256	10	163
Tionesta Creek (lower)	35,385	24,287	1,567	4	11,098	134	49	3	38
Two Mile Run	19,076	7,528	0	94	11,548	8	23	8	0
West Branch Clarion River	45,439	42,356	9	127	3,083	69	166	18	157
West Branch Millstone Creek	15,440	6,335	0	0	9,105	102	0	0	0
West Branch Tionesta Creek	43,344	25,525	216	220	17,819	274	326	111	289
Wilson Run	14,375	5,618	4	42	3,831	102	179	0	179
TOTALS	**824,792**	**408,860**	**3,709**	**1356**	**411,006**	**4542**	**4790**	**1684**	**2797**

Table 8: Watersheds (5th and 6th order) with proposed blowdown salvage areas:

5th Order Watershed	6th Order Watershed
Clarion River	Bear Creek
	Big Mill Creek
Kinzua Creek	Kinzua Creek (lower)
	Kinzua Creek (middle)
	Kinzua Creek (upper)
	Chappel Fork
Kinzua Creek	South Branch Kinzua Creek
South Branch Tionesta Creek	East Branch Tionesta Creek
	South Branch Tionesta Creek
Spring Creek	Spring Creek (lower)
	Spring Creek (upper)
Tionesta Creek	Bluejay Creek
	Salmon Creek
	Tionesta Creek (lower)
	Tionesta Creek (middle)
	Tionesta Creek (upper)
Tunungwant Creek	East Branch Tunungwant Creek
West Branch Clarion River	Wilson Run
	West Branch Clarion River (lower)
West Branch Tionesta Creek	West Branch Tionesta Creek
	Farnsworth Branch
	Two Mile Run

Table 9 Potential ANF Salvage by Management Area**:**

Potential Salvage Harvest Type	ANF Management Area					
	2.0	**3.0**	**5.0**	**6.1**	**8.0**	**TOTAL**
Stand replacement	17	1549	0	90	55	1711
Partial harvest	23	2411	0	27	279	2740
TOTAL:	40	3960	0	117	334	4451

B. Biological Environment

1. <u>Forest Vegetation</u>: The salvage harvest of damaged trees results in little or no change to species composition of the residual forest. The preponderance of trees to be removed are dead and down on the forest floor, while others were partially uprooted by the wind and are leaning into surrounding trees. A minor amount of standing, live trees may be removed when needed to maintain safety for forest workers. This is not expected to cause any measurable change to species composition.

<u>Stand Structure</u>

The most dramatic changes in live stand structure within salvage harvest units occurred as a result of the windstorm, rather than because of proposed salvage harvest activity. Commercial harvest removes the damaged portions of trees that are lying on the ground or are leaning into neighboring trees. Treetops and limbs will remain on site. Occasional standing trees could be removed, when necessary, for safety reasons. There is no measurable change to basal area or residual stand stocking anticipated because of harvest. Commercial harvest will remove biomass that provides coarse woody debris on the forest floor; however, due to the damage that occurred because of the windstorm, greater than average amounts of coarse woody debris will be left after harvest.

<u>Age Class</u>

Any change in age class distribution occurred as a result of the windstorm. There would be no additional change in age class as a result of salvage harvest. On the ANF, approximately 4,500 acres of heavy blowdown occurred within 6th order watersheds, ranging from 14,000 to 39,000 acres in size. The potential for seedling development would be dependant on the presence or absence of seedlings prior to the storm; the presence or absence of interfering vegetation; the amount of stored seed in the forest floor; and the remaining live trees, as an existing seed source, in the stand.

While reforestation treatments may be needed in some of the areas of the areas being proposed for salvage harvest, the salvage harvest can occur with little or no impacts on the likelihood of subsequent seedling development. Monitoring results from the 1985 tornado event show that 97 percent regeneration success was achieved in areas where salvage harvest took place. Similarly, successful stand regeneration occurred on 92 percent of acres where no salvage harvest occurred; though it took much longer for seedlings to develop, and there was a much higher percentage of birch and pin cherry.

<u>Insect Habitat</u>

In areas proposed for salvage, harvesting removes much of the wood that was damaged by the storm. The salvage harvest lessens the risk of damage to adjacent stands of live trees from the establishment of some insect populations within the downed trees.

<u>Reforestation Investments</u>

There are merchantable trees that have fallen on some of the fences where substantial damage occurred. This material could be removed by commercial timber sale or could be cut and pushed out of the way in order for fence reconstruction to occur. A site-specific

assessment of seedling condition within each fence has been made to determine if a fence is no longer needed and does not require reconstruction, or if the fence should be replaced. The salvage of commercial material that has fallen on the fence would result in safer conditions for crews reconstructing the fence, and could provide a source of funding for reconstruction of some of the fences, through the collection of Knutsen-Vandenburg funds. The repair of these 83 fences will return them to their intended purpose, and would help recoup previous investments made to assist in seedling development.

2. Wildlife:

Wildlife habitat change

The 2003 storm created a new structural component of coarse woody debris. The presence of standing dead trees, commonly referred to as snags, and coarse woody debris (down or nearly down logs) can greatly affect wildlife diversity in an area. Across the Forest, these habitat components have the greatest chance of being altered by the proposed salvage harvests. This may result in an alteration of wildlife habitat. Salvage harvests will change the density and distribution of this habitat component.

An adaptive management study conducted by the ANF and North East Research Station (NERS) that examine the value of dead wood for wildlife is on-going. The preliminary results indicate that there is a threshold level of down and woody debris above which, any further accumulation does not provide further benefits to wildlife species (territorial nature and resultant habitat saturation) (Stoleson, personal communication, April 02, 2004). Most areas of the Forest will meet the wildlife threshold of woody debris if some of the treetops, limbs and branches are left on the ground. If all treetops, limbs and branches are left on-site, the threshold limit would be exceeded and the benefits for wildlife would be provided (Stoleson, personal communication, April 02, 2004).

Specific mitigations have been made recognizing the importance of snags and potential snags, especially standing damaged trees, as roost habitat for endangered species and shelter for a variety of cavity-dwelling species. The Forest Plan standards and guidelines regarding indigenous species and the retention of dead and down logs will be met by applying specific mitigations will be applied to areas of salvage harvesting on the Forest (USDA-FS, 1986, as amended, p. 4-92; 4-121).

Salvage harvesting involves many operational procedures that will cause earth-disturbing actions. The use of skid trails, winching cables and other ground-based actions will remove the leaf-layer and expose bare soils, thus, subjecting harvest areas to potentially increased amounts of erosion. It is also possible that this will increase the amounts of sedimentation running into nearby streams. Sediments entering stream channels can affect channel shape and form, stream substrates, the structure of fish habitats and the structure and abundance of fish populations (Chamberlin et al, 1991). The 1986 ANF Forest Plan, as amended, provides Standards and Guidelines to eliminate salvage harvesting operations within riparian areas of the Forest. It also provides standards and guidelines for the reduction of soil erosion potential within harvest areas. Specific mitigation measures will be applied to all areas of salvage harvesting operations in order to protect wildlife.

Wildlife Mortality/Disturbance

Salvage harvests may cause disturbance to wildlife individually and cause some species to avoid the area, thereby altering wildlife usage. However, these effects are expected to be only temporary or short-term, encompassing only one or two seasons, depending on the duration of the sale contract, and only applying to units being operated at the time. There is a potential for disturbance and/or mortality to individual of some species, which may not be able to avoid and/or flee areas of salvage harvesting operations, due to the timing of the production of offspring and some species being less mobile than others. Expected occurrences of mortality are anticipated to be low; however, site-specific mitigations will be applied to key wildlife habitat components beneficial to most species. Habitat for Federal and State proposed, threatened and endangered species, migratory birds, sensitive species, and P.A. Species of Special Concern may be affected by proposed activities. Implementation of Forest Plan Standards and Guidelines, site-specific mitigation measures, and protection of riparian, wetland, and specialized habitats would ensure that suitable habitat conditions for all wildlife species presently in blowdown areas would continue to be available. Based on recent court rulings, habitat modification does not constitute a "taking" under the Migratory Bird Treaty Act (MBTA) (Mahler v USDA-FS, 927 F. Supp. 1502 (D. Or 1991; Seattle Audubon Society v. Evans, 952 F.2d 297 (9th Cir. 1991). All proposed salvage activities comply with the MBTA.

Many animal species depend on meaningful sounds to communicate, navigate, avoid dangers, and find food (Bowles, 1995). The amount and type of noise created by timber harvest operations may cause a temporary disturbance to various species of wildlife. The responses of wildlife to human-made noise can be categorized as attraction, tolerance, and aversion. Each has the potential for negative or positive effects (Bowles, 1995), for example, the sound of snowmobiles and chainsaws in the winter can provide cover for deer in downed trees (Bowles, 1995).

Federal and State listed Species and Regional Forester Sensitive Species (Plants)

Salvage has the potential to disturb or kill listed plant species, if they occur within a salvage area and their occurrence is unknown. In most of the blown down areas, plant walkthrough surveys are difficult. This is due to access being restrictive, and areas of the ground being covered with trees and branches. However, the ANF Forest Plan provides a Standard and Guideline to provide preferential consideration to protect unique plant communities over other resources (USDA, 1986, as amended, pp. 4-6, 4-19, 4-20). Since surveys of the vegetation are being conducted within blowdown areas, salvage is not expected to have a detrimental effect on listed species. Most listed species that could occur on the ANF could only survive within riparian habitats. Riparian areas are presently protected from human disturbance, meaning that salvage activities will not take place within zones as specified in Table 6. Past surveys will be reviewed to avoid areas in which listed species have been documented.

The ANF is presently conducting surveys at potential salvage sites for the small-whorled pogonia (SWP) (*Isotria medeoloides*) and their suitable habitats. Surveys for SWP have been conducted across the ANF since 198_; none have been found.

No major changes to wildlife populations or habitats are anticipated because of salvage harvesting. This is for several reasons:

- The storm itself had the largest effect on wildlife species and habitat,
- Forest Plan Standards and Guidelines will be followed in order to minimize damage to resources from salvage harvesting operations, and
- Site-specific mitigation measures will be developed and followed in order to protect sensitive wildlife habitat and natural resources.

C. Social Environment

1. <u>Road and Trails:</u> Trails and roads are generally not closed, during harvest activities. Trees or falling debris could pose a safety hazard to passing motorists or hikers. Only a small portion of the North Country Trail is within a proposed salvage area. Timber sale contracts will have provisions for public protection during felling operations adjacent to open roads or trails. Closures of roads and trails due to salvage harvesting would be a temporary effect; no long-term effects are anticipated.

2. <u>Scenery:</u> Scenic management is driven by an area's intrinsic scenic quality (scenic variety class) and its sensitivity to scenic disturbance (National Scenic Management System Vol. 2, # 462), as well as, Forest Plan direction in maintaining the Visual Quality Objectives (VQO's). The Forest currently utilizes VQO's (USDA-FS, 1986, as amended, p. A-30) and Sensitivity Levels (USDA-FS, 1986, as amended, p. A-26) in order to maintain and improve the scenic quality of the scenic travel ways on the Forest. Due to the effects of the storm, various areas across the Forest are not considered aesthetically appealing due to the accumulation of trees which are laying on the ground, leaning, uprooted, or are otherwise damaged. The Forest will implement guidelines for areas of salvage where scenic quality was affected. Some examples of further mitigations used to maintain or improve scenic quality along sensitive travel ways are: locate log landings away from sensitive foreground situations and remove slash from these landings; decrease the depth of slash adjacent to trails and roadways; and apply marking paint to the side of the tree(s) opposite the travel-way.

The operation of, or even the mere presence of, timber harvesting equipment on the Forest may alter the public's perception of their Forest experience. The presence of timber operators, operating equipment and the associated noise will be a temporary occurrence, and is necessary in order to accomplish agency objectives.

Earth-disturbing activities such as the creation of skid trails and winching of logs may create areas of scenic disturbance to Forest users. Again, these activities are temporary disturbances and are necessary in order to accomplish agency objectives. Additionally, operating mitigations (such as seeding, mulching, installing silt fences, etc.) will be implemented in order to restore the ground area to its original condition or even improvements beyond the original condition.

3. <u>Economics:</u> With the harvest and sale of merchantable salvage trees, revenues will be added to the U.S. Treasury. Local economies will undoubtedly see economic gains because of timber salvage operations being implemented. Timber sale contracts will create job opportunities for residents of local communities on the Forest, and the sale of merchantable timber will provide standard flat-rate revenues to the four counties located within the boundary of the ANF based on the Title I and III agreements with the Federal government.

4. <u>Dispersed Recreation:</u> Approximately two percent of the Forest was affected by the storm. Thus far, salvage harvest activities are being considered on approximately 4500 acres. Salvage harvest activities may cause a short-term impact to dispersed recreation opportunity, primarily for the duration of the salvage sale, generally one year, due to the noise from logging operations, limited access or visual evidence of logging. Long-term, salvage would provide increased accessibility and the reduction of hazardous forest conditions.

5. <u>Heritage sites:</u> No adverse effects are expected to occur within heritage sites. All heritage sites are protected through National and agency policies, Standards and Guidelines of the ANF Forest Plan, and by providing site-specific mitigation measures. Salvage operations, which take place on or adjacent to cultural resource sites, would have site-specific mitigation measures implemented in order to control the amount of potential damage from operating equipment to the site.

Salvage operations may be encouraged near heritage sites due to the amount of protection these sites could achieve by implementing harvesting practices, which would benefit the site. An example would be the specific placement of slash and woody debris in order to decrease access to these sites, thus decreasing the potential for site discovery by Forest users.

6. <u>Firewood Collection</u>: Firewood collection was prohibited on the ANF immediately following the storm due to safety issues, and the potential for loss of merchantable logs. The ANF revised the firewood collection permit shortly after the storm in order to limit the types of trees being used for firewood collection. The new permit limited the size of the tree that could be cut, and the condition of the tree on the ground (amount of bark present). Salvage harvesting operations will result in fewer opportunities for the theft of timber that was blown down during the storm, improved safety to firewood collectors, and the overall "clean-up" of roadside areas. Salvage activities will most likely decrease the amount of firewood available to Forest users. However, after a salvage operation, the amount of merchantable trees and slash remaining on the ground will be minimal, and aside from woody debris purposely left on site (for wildlife habitat, cultural resource site-protection, etc.) a majority of the remaining woody debris may possibly be available to those purchasing firewood permits.

<u>Hazards</u>

Salvage harvest operations will ultimately benefit Forest visitors and agency personnel by eliminating many tree hazards, improving Forest user safety. Salvage harvest workers are exposed to tree hazards while working in areas of blowdown, through a combination of falling trees and increased noise from operating equipment, which increases risks to timber operations personnel. Safety procedures will be adhered to in order to reduce these risks.

The risk to the public from actual harvest activity is considered low. Harvest areas will be marked, timber operators will be present at the site when activity is occurring, and the activity is noisy; all of which, provide ample warning to anyone who happens to be nearby. Mitigation measures will be implemented to decrease the safety risks and provide protection to both Forest users and timber sale operators in all areas of salvage harvesting operations on the ANF.

7. Research and Wilderness Areas:

Tionesta Scenic & Research Natural Area: Approximately 994 acres of blowdown occurred within the Tionesta Scenic and Natural Areas. The Forest Plan permits salvage in the Tionesta Scenic Area, however, none have been proposed to date, nor are any likely to be proposed. Similarly, no salvage activities have been proposed within the Research Natural Area.

Kane Experimental Forest (KEF): Several research proposals are being considered within the KEF, which are designed to focus on the research questions below. The research will include areas where salvage activity is proposed as well as areas where no salvage will occur.

- Allegheny Windthrow Study: This study would describe and compare the recovery processes from this natural wind disturbance with the recovery processes after salvage or timber harvest. It would occur within four blocks of the Allegheny Windthrow Study. Each "block" consists of 40 acres of study plots.

- Management Strategies Study: This study would meet the need to continue accumulation of long-term data about forest ecosystem processes in forests managed under different silvicultural systems. The next treatments in the Management Strategies Study (installed 1979-80) could be conducted. The Management Strategies study is a long-term (80-year) study of alternative silvicultural systems as applied in Allegheny hardwood forests.

- The Weeding Study: This study would continue to accumulate long-term data about the impacts of early stand development manipulations of species composition on long-term stand development patterns. It also, conducts the next treatments called for in the Weeding Study (Installed 1936), renewing this long-term study of the effects of non-commercial weeding and cleaning treatments on stand development.

- Salvage: Some small patches of blowdown will be harvested to ensure public safety and access to several demonstration areas on the KEF, and provide wood to local economies. These areas are within the KEF, across from the Twin Lakes Trail, have not been used for research in the past, and contain only scattered blowdown.

Hickory Creek Wilderness: Although approximately 95 acres of blowdown occurred in the Hickory Creek Wilderness, no salvage harvests are proposed. The ¼-mile segment of trail that sustained damage will be cleared of debris.

D. Potential Cumulative Effects

In NEPA analysis, a cumulative effects analysis evaluates a proposed action in context with activities in the past, present, and foreseeable future, to determine incremental effects on the environment. The timeframe and geographical scale for such analysis varies by resource. Cumulative effects can be greatly lessened when appropriate mitigation measures are applied as part of a management action.

The ANF has completed a substantial number of NEPA analyses for projects that implement the ANF Forest Plan. Cumulative effects analyses have routinely been completed as part of these analyses. In most recent EA's on blowdown salvage, such as Painter Run Salvage Project EA, 2003, and Windthrow Salvage EA, 2002, no adverse cumulative effects were identified. Additionally, ANF personnel annually conduct monitoring reviews of projects to determine if projects have been implemented as planned, whether projects have had desired results, and whether anticipated impacts were increasing or decreasing over past levels. These reviews can be the basis for modification to mitigation measures, or the development of new mitigation measures. These reviews provide an opportunity to formulate new mitigation measures.

This storm impacted less than two percent of the entire ANF. Effects of the storm vary greatly between the patches of blowdown, with approximately one percent of the ANF receiving light to moderate blowdown and one percent receiving stand replacement blowdown. Salvage harvests could occur on as much as 5000 acres (approximately one percent of the ANF). Under current Forest Plan direction, an average of 3350 acres of even-aged stand regeneration harvest and 8600 acres of partial harvest are called for annually, therefore the amount of harvest response being considered is relatively small when compared to the average level of harvest anticipated to occur under the Forest Plan.

Storm damage was estimated within 10, 5th order watersheds. This analysis will assess the activities that could occur within these watersheds and determine whether adverse cumulative effects are anticipated.

1. Hydrology and Soils:

Stream Flow and Channel Morphology Changes

Harvesting activities and the results of the storm event can have the following potential cumulative effects on streams: timing or magnitude of runoff events, stream bank stability, sediment storage and structure of channels, and water temperatures (Chamberlin et. al, 1991). Studies from several areas of the northeastern U.S., including the Leading Ridge Watershed Research Unit in Pennsylvania, provide an understanding of how forest disturbance influences water yield over time. This research, summarized by Hornbeck et. al

(1993), identifies three generalizations relative to water yield change. These include the following:

- Initial water yield increases can occur following reduction in basal area from harvesting or blowdown, with the magnitude being roughly proportional to the percent reduction in basal area;
- Water yield increases can be prolonged for an undetermined length of time by controlling natural re-growth, otherwise they diminish rapidly to pre-disturbance levels within three to ten years; and
- Changes in water yield can also respond to changes in species composition.

Potential cumulative effects could be measurable, if 25 percent or more of the basal area of a watershed were removed. The highest level of blowdown is within the East Branch Tionesta Creek (6.2 %) (Figure 1, p. 41). The cumulative effect of this reduction in basal area with past, present and reasonably foreseeable future activities will be analyzed in the Martin Run EIS. The 6th order watershed with the greatest amount of blowdown, Spring Creek (upper), had 2.9 percent of the watershed in some level of blowdown, but did not come close to having 25 percent of the basal area removed based on cumulative effects analysis for a given 10 year period (USDA-FS, 2004). The next highest levels of blowdown in 6th level watersheds are shown in Figure 1, page 41.

Surface Erosion and Soil Compaction

Previous and potential future activities combined with the salvage of down trees could cause soil disturbance in excess of 15 percent aerial extent. The implementation of Forest Plan standards and interim guidelines, including avoidance of poorly drained soils, should keep soil disturbance below the 15 percent level. It is important to monitor some of these areas following salvage to determine if any corrective activities are necessary.

Soil nutrients

The removal of large woody debris in the form of salvaging timber blown down in the July 2003 storm would likely only have minor effects to the nutrient pool. Leaving tops and unmerchantable logs would enable recycling of most of the nutrients needed for tree growth. The effect of acid deposition in the area would cause continued leeching of some nutrients, through the soil profile below the roots, and sometimes to lower slopes. While the effects of acid deposition are important, the added effect on soil nutrients of salvaging timber would be minimal.

Riparian Areas

Maintaining down woody debris in the streamside management zones would help to alleviate some of the cumulative effects of turn of the 20th century logging and splash damming. This would be done by adding wood into the streams, which will help to create diverse stream morphology and aquatic habitat.

Vegetation removal and soil disturbances within and adjacent to riparian areas of the blowdown areas could cause cumulative effects on riparian areas. In addition, effects could be caused by the removal of vegetation in the riparian areas of private property and other Forest Service projects, including road construction, trails by riparian areas and various

crossing of riparian areas and including riparian enhancement projects or even road degradation.

The ANF Forest Plan provides Standard and Guidelines for the protection of riparian and wetland areas. Therefore, no adverse cumulative effects are anticipated as a result of potential salvage. There is the potential for vegetation removal on private property within riparian areas affecting riparian areas by increasing temperatures, changing the microclimates of the area, and increasing sunlight to change the character of the ecosystem.

No known wetlands are affected by salvaging the blowdown. There are no foreseeable future actions affecting wetlands. The PA-DEP regulates impacts to wetlands on private land.

2. Forest Vegetation: The potential for cumulative effects to occur, with respect to forest vegetation due to salvage harvest as discussed in this document, are somewhat limited. The majority of effects, such as change in age class and change in forest structure, on vegetation were associated with the storm rather than the salvage harvest. Any additional effects due to harvest is minimal. The magnitude of change that occurred as a result of the storm is also somewhat limited. Only two percent of the entire ANF was affected by the storm, with only one percent of the ANF considered to be heavy damage. The 9333 acres of damage were widely dispersed throughout a 98,000-acre area of the ANF.

Consideration of potential for cumulative effects will focus on the level of timber harvest that has occurred since the Forest Plan was approved in 1986, as amended, the distribution of storm effects across the 5th and 6th order watersheds, the potential for salvage harvest proposals in response to the storm and future harvest potential within the next several years.

Change in forest structure

One of the primary influences on stand structure and, thus, landscape forest structure, is change that occurs through the application of silvicultural treatments in forested stands. Since 1986, the level of harvest activity has been far below what was projected to occur with implementation of treatments included in the Forest Plan. The amount of salvage harvest being considered at this time, approximately 4500 acres, is only a minor increase to harvest levels that have occurred to date. Project development that could potentially occur within the next several years would be limited by previous levels of activity within a project area and would not exceed the level of activity that was originally anticipated to occur in the Forest Plan.

Data presented in Table 1 shows a range of impact from 0.1 percent to 6.5 percent within the 5th order watersheds that were affected by the storm. The watersheds with the least potential for any cumulative effect associated with the storm, subsequent harvest and any past or future treatment would be those watersheds with the lower degrees of impact. Of the watersheds listed in Table 1, several were impacted at higher levels, the most notable being: South Branch Tionesta Creek (6.5 percent); West Branch Clarion River (4.1 percent); Tionesta Creek (3.5 percent); and Spring Creek (2.3 percent). As individual projects are developed, some additional consideration, past levels of timber harvest, should occur to determine whether there is a potential for cumulative affects.

Productivity and Biomass

Down and woody debris provide biomass for nutrient cycling, which in effect improves vegetation productivity. As woody debris decays, new plants and fungi become established. On the ANF in stands that are aged 11 to 50 years and in the remaining old growth stands red maple and black cherry make up the majority of woody debris (USDA-FS, 2001). Most of the woody debris is in decay class three, where the bark is generally intact to sloughing, has significant decay and large branches are present (USDA-FS, 2001).

Dead trees increase the risk potential for wildland fires, given the right weather, environmental, and topographical conditions. However, cumulative fire risk on the ANF is low to moderate. Little is known of the ecological relationships between tornados, wind events and blowdown in correlation with fuels build-up on the ANF. Tornados have been documented, and wildland fires within these blowdown areas have been documented as well. Recently, relationships are becoming evident with some fuels build-up in past tornado areas and wildfire events. Though the cumulative risk of wildland fire within the blowdown is low to moderate, wildland fire risk varies by fuel concentration in addition to weather, environmental, and topographical factors. However, salvage operations within the blowdown areas would remove biomass concentrations, thereby reducing wildfire risk. Hazardous fuels reduction projects, employing prescribed fire and/or mechanical methods, would further reduce wildland fire risk, particularly in wildland interface or wildland intermix areas where salvage operations are conducted.

Insect infestation

The consequences of blowdown in relationship to peach bark beetle infestation and its potential cumulative effects are the focus of a research project at the Kane Experimental Forest. Salvage would remove some of the biomass that would provide habitat for the species. In combination with the low scale of the blowdown when compared to the age class and abundance of forest, no cumulative effects are anticipated by the peach bark beetle.

3. Wildlife: No major changes to wildlife populations or habitats are anticipated because of salvage harvesting. Considering that:

- The storm itself had the largest effect on wildlife species and habitat;
- Forest Plan Standards and Guidelines will be followed in order to minimize damage to resources from salvage harvesting operations; and
- Site-specific mitigation measures will be developed and followed in order to protect sensitive wildlife habitat and natural resources;
- Salvage harvesting is not anticipated to result in detrimental cumulative effects to wildlife populations or habitat.

The total ANF acreage, 513,422 acres, is used as a scale to evaluate the potential forest-wide cumulative effects to wildlife and their habitat. Only 4500 acres of salvage harvesting would occur as a result of this storm, less than two percent of the ANF. The salvage harvest activity would not decrease the acreage of continuous, mature forest, because the new open condition already exists. Salvage harvesting would temporarily disrupt existing habitat and wildlife activity. Cumulative effects are not anticipated, because these effects would be

spread out over the next year and salvaging would occur in various locations within the 98,500 acre tracts.

Habitat currently used by wildlife in the salvage areas would likely continue to be abundant, widely distributed and available, ensuring viable populations of local wildlife. Most trees that blew down are on the ground, while some are leaning and will eventually fall, and others are standing with damaged crowns. New, open areas, within the blowdown tract are now available for species with this habitat preferrence or requirement As mature habitats change to early successional habitat, a result of the storm, a shift may be seen in wildlife distribution and use. ANF monitoring sites, with similar habitats to those where salvage harvesting is proposed, contain similar species of songbirds, amphibians, and mammals when compared to un-managed second-growth habitat. The remaining area within the storm tracts provide areas of mature forest habitats, for this type of habitat dependant species, and continues to provide corridors connecting the remaining forest and large forest patches.

Coarse woody debris (CWD) studies suggest that its use by some wildlife and the amount that occurs in forests is almost always sufficient such that animal numbers are limited by food, competition, space, or other factors (Stoleson, personal communication, April 02, 2004). The storm created new areas of woody debris in decay class one, with bark intact and little decay present. Salvage could remove some of this log decay class within the storm areas, reducing this new type of wildlife habitat. However, about half of the July 2003 storm damage is being salvaged, allowing large CWD to provide habitat in the unsalvaged areas. Smaller storms continue to frequent the ANF blowing over pockets of trees that remain unsalvaged.

The ANF Standards and Guidelines provides for retaining woody debris (USDA-FS, 1986, as amended). CWD requirements for perennial streams identified in the Forest Plan, (USDA-FS, 1986, as amended) are to: "Provide habitat complexity, channel stability, and pool formation in cold-water streams by managing for recruitment of large woody debris"; and in intermittent flowing streams "manage for input of woody material" (USDA-FS, 1986, as amended, pp. 4-19). In MA 6.1, the Standard and Guideline is established to "provide for the retention of dead and down logs and other ground material necessary to maintain viable populations of indigenous species, such as reptiles and amphibians" (USDA-FS, 1986, as amended, pp. 4-121). CWD amounts, within most ANF stream channels, are well below the desired condition of 75 to 200 pieces of large wood per stream mile, outlined in the Forest Plan. Furthermore, dead trees (snags), live trees with broken tops, and leaning trees distributed throughout the Forest and establish the recruitment of future potential CWD. Therefore, with the small amount of harvest salvage proposed, as well as, the Forest Plan Standards and Guidelines to reduce and mitigate CWD impacts, adverse potential cumulative effects to this type of wildlife habitat is not anticipated.

Five Federally listed threatened and endangered (T&E) species are addressed in a Biological Assessment (BA) for the ANF to address salvage effects on these species. Federal and State listed Species and Regional Forester Sensitive Species will be evaluated in the salvage project-Biological Evaluation or additional BA's. No significant cumulative effects are anticipated for these species.

Due to the scattered acres of blowdown on the Forest, and the small amount of blowdown compared to the approximately 513,422 acres of Forest, cumulative effects to Management Indicator Species are not anticipated. Forest-wide changes to mature deciduous habitat and regenerating habitat are minor.

4. Scenic Quality: Visual Quality Objectives (VQO's) are met through mitigation, and evaluated during NEPA monitoring reviews. The ANF Landscape Architect monitors and reviews project implementation for consistency with VQO's of Forest Plan Standards and Guidelines requirements. Forest-wide Standards and Guidelines for scenery are located in the Forest Plan on p. 4-7 and p. 4-11. The last monitoring effort determined that Forest Plan Management Area Standards and Guides, scenic analysis processes, and project mitigation measures were adequate to manage the scenery resource and achieve the Forest Plan adopted VQO's (USDA-FS, 1998).

5. Dispersed Recreation: Dispersed recreation occurs throughout the ANF. Less then two percent of dispersed recreation was affected by the blowdown. Removal of the hazardous trees would improve dispersed recreation by allowing improved accessibility. No adverse cumulative effects are anticipated as a result of salvage harvests.

6. Heritage sites: Site surveys and risk assessments of the salvage areas determine the potential for heritage site disturbance, on sites, on a forest-wide scale. Heritage resources are protected through Standards and Guidelines and applied mitigation measures. No adverse cumulative effects are anticipated to Heritage Resources.

7. Economics: Trees removed within the salvage areas would add to the total cumulative wood products removed, revenues gained would add to the total cumulative revenues and jobs gained would add to the total timber industry jobs. Positive cumulative effects are anticipated for economics.

Potential Cumulative Effects that extend beyond project areas

No adverse cumulative effects at the proposed level of salvage harvest are anticipated.

Section IV - Salvage Process and Conclusions

Section IV provides an overview of Forest Plan direction regarding salvage response to storm damage and National Environmental Policy Act (NEPA) direction regarding the various kinds of analysis that could be used.

A. Federal Rules and Regulations:

NEPA requires that environmental analysis occur when Federal actions are proposed, and is regulated by the Council on Environmental Quality (CEQ). The CEQ regulations implementing NEPA, provide for three levels of environmental documentation: environmental impact statements; environmental assessments; and categorical exclusions.

An Environmental Assessment (EA) is a public document that provides evidence and analysis in determining whether, or not, to prepare an environmental impact statement (EIS) or a finding of no significant impact. Agencies may prepare an EA on any action at any time in order to assist agency planning and decision-making.

Categorical Exclusions were identified for reducing excessive paperwork. They are actions which "do not individually or cumulatively have a significant effect on the human environment", which exempts them from the requirements of making an EIS (NEPA, 1500.4).

The National Forest Management Act (NFMA) requires that Forest Plans be developed to provide broad programmatic direction for the kinds of actions that are needed to meet long-term goals and objectives. The 1986 Land and resource Management Plan (Forest Plan), as amended, directs the ANF to promptly evaluate tree damage from wind for salvage potential and provides direction for salvage by Management Area (USDA-FS, 1986, as amended, 4-48, 4-49).

The objective of salvage projects developed in response to the July 2003 storm event is to recover the commercial value of timber products damaged in the storm in a timely way. The commercial value can be recovered independently of reforestation treatments that also could be considered on a site.

Several basic questions are addressed when developing actions in response to the storm salvage:

- What actions are considered to be connected actions vs. similar actions?
- What actions must be considered within an individual analysis?
- What scale of environmental analysis is appropriate to adequately document resource impacts?

Connected vs. Similar Actions: Direction included in 40 CFR 1508.25 provides guidance to help determine whether actions are connected or merely similar. Connected actions need

to be considered in one environmental analysis. Actions that are similar in nature do not necessarily need to be included in the same analysis.

The salvage harvest activities can be considered to be similar actions that are scattered across the landscape. The decision to pursue the harvest action is based upon individual stand conditions that are not interdependent. The binding force behind a set of actions would be the presence or absence of a transportation system that is needed for access to an area. Therefore, it is reasonable to conclude that multiple salvage projects can be proposed that are similar in nature, and that they are not connected actions. It is logical to group together similar actions based on the local transportation system.

Logging haul routes are proposed to delineate many of the salvage areas. The effects of salvage harvesting are well documented and adverse effects are not anticipated. Some salvage area analyses are being incorporated into NEPA analysis projects that were underway at the time of the July 2003 storm, due to their geographical locations.

Limited Timber Harvest – Categorical Exclusions simplify documentation and analysis of routine actions where experience has shown that there are no significant environmental effects. The 2001 national monitoring of 154 randomly selected timber harvests showed the effects of harvesting in areas of 250 acres or less did not have significant effects on the human environment. Four project reviews are completed annually on the ANF to monitor completed management activities, two of which are timber projects. The ANF monitoring reports (1992 to present) show NEPA objectives for the protection of resources were achieved through mitigation measures, Standards and Guidelines of the Forest Plan and other regulatory requirements. The documentation provided for these analyses did not find that there were significant impacts associated with actions.

Category 13, Limited Timber Harvest – Categorical Exclusion allows the salvage of dead and dying trees, that have been damaged by wind, and that have value as a forest product on areas up to 250 acres with no more than a half mile of temporary road construction (FS Handbook 1909.15). The responsible official will consider, on a project-by-project basis, whether any of the Forest Service Extraordinary Circumstances applies when using Category 13 for Limited Timber Harvest. The responsible official considers public comments.

The ANF is presently working with the with U.S. Fish and Wildlife Service for guidance in its Threatened and Endangered Species management and mitigation measures have been established for the protection of species and their habitat.

Actions that must be considered in the same analysis (connected actions): The CEQ provides direction to help determine whether actions are connected or not. In 40 CFR 1508.25, "Actions are connected if they:

- Automatically trigger other actions which may require environmental impact statements;
- Cannot or will not proceed unless other actions are taken previously or simultaneously;

- Are interdependent parts of a larger action and depend on the larger action for their justification."

Generally, silvicultural proposals designed to achieve Forest Plan age-class diversity goals and objectives will include commercial harvest and reforestation treatments needed to ensure successful stand regeneration. Stands are selected based upon age and stocking criteria, and treatments are based upon the specific conditions found within the stand. For example, a dense understory of fern would indicate that an herbicide application was needed or a dense midstory layer of vegetation would indicate that the removal of low shade was needed, etc. The combination of a shelterwood seed harvest, reforestation treatments and shelterwood removal harvest would be considered to be connected actions, because they are all needed to achieve the long term management objective of stand regeneration.

The case of salvage harvest in response to storm damage is quite dissimilar. In the example provided above, the attainment of age-class and composition objectives might require the treatment of multiple stands across a landscape, which must be considered in a single analysis. In contrast, salvage objectives are met without the coordination of treatments between stands and do not depend on the combination of actions to meet objectives. Stand selection is based upon the location of the catastrophic event, the presence of operable volumes of salvageable material, and the suitability of the site for logging. Salvage harvests can be proposed where only the dead and damaged trees are removed. In rare exceptions, a live tree might need to be removed to be able to access leaning trees that pose a hazard to loggers. In these cases, removing the merchantable portion of damaged trees does not change the potential for stand regeneration at some subsequent time. Virtually all live healthy trees are left on site, therefore the existing seed source is maintained and reforestation options are virtually the same whether or not the stand receives a salvage harvest in a separate action from the reforestation treatment. The economic recovery of damaged timber is not connected to the need to reforest the stand because the reforestation options remain intact by virtue of leaving live trees (seed source) on site.

Treatments being proposed in areas where categorical exclusions are used to document environmental concerns and effects would not address reforestation needs – there is no authority within the CE category to approve those kinds of treatments. Once the harvest has occurred, additional field surveys will be used to determine if any additional treatments are needed. Some sites may have adequate seedling stocking and might not require further treatment. Some sites will likely require either the application of herbicides or the construction of a fence to exclude deer. These needs can be determined subsequent to the harvest activity. In some cases, the exact set of treatments are not fully known due to the difficulty in assessing ground conditions at the time the salvage harvest treatments is proposed. The selection of a set of reforestation treatments may not be 'ripe' at the time the decision for salvage harvest is made. Some sites may regenerate naturally, some sites may require treatments that cannot yet be specified in great detail, and some sites could be left to achieve other resource objectives.

Treatments being proposed in larger project areas will likely address the reforestation needs. In areas where stand regeneration treatments are proposed, the treatment will include the

eventual removal of almost all live trees and thus the removal of any remaining seed source – which means that the harvest and reforestation decisions need to be made at the same time. These would therefore be considered interdependent actions and would need to be considered within the same analysis.

The Healthy Forest Initiative and the Healthy Forest Restoration Act, part of the National Fire Plan, provide emphasis on improving ecosystem health through vegetation management for fire dependent ecosystems. There are provisions for ecosystems at risk due to insect and disease and/or windthrow related problems. The ANF falls within Fire Regime 3 and its condition class is presently being determined. Provisions of the Act may be applicable to salvage for some areas, and needs further review of its applicability for the ANF.

B. Extraordinary Circumstances (process to screen for)

Extraordinary circumstances are examined in order to assess the present condition of areas that are proposed for salvage harvests under the Limited Timber Harvest – Categorical Exclusion. The presence of one or more of the following extraordinary circumstances in a project area does not necessarily preclude the use of a category; rather it is the degree of effect that determines the applicability of a category. However, analysis of the effects resulting from potential activities will be addressed in order to provide safeguards to these circumstances.

The following screenings for extraordinary circumstances are:

(a) Federally listed threatened or endangered species or designated critical habitat, species proposed for Federal listing or proposed critical habitat, or Forest Service sensitive species:

The U.S. Fish and Wildlife Service (USFWS) provided a Biological Opinion for five federally listed threatened and endangered on the ANF: bald eagle, Indiana bat, northern riffleshell mussel, clubshell mussel, and small whorled pogonia (USFWS, 1999, Programmatic Biological Opinion). Critical habitat has not been officially designated on any area of the ANF. New information relative to listed species or their habitat present within a salvage area, and the potential effects associated with salvage will be assessed to determine the likelihood of adverse effects to the species. New literature, since the Biological Opinion, will be examined, survey data will be reviewed, and data compiled from the ANF and other National Forests will be assessed in order to identify potential extraordinary circumstances which may or may not limit proposed salvage activities on the Forest. Findings must be “not likely to adversely effect” or better in order to use a CE.

Forest Service Manual 2670 provides direction for the analysis of potential impacts to sensitive species, species in which the Regional Forester has identified population viability is a concern. On February 29, 2000, the Regional Forester approved the Sensitive Species List. Potential effects of salvage harvesting on sensitive species will be analyzed and documented in a Biological Evaluation for proposed salvage areas.

(b) <u>Flood plains, Wetlands, or Municipal Watersheds</u>:

Flood plains - The presence and identification of flood plains on the Forest will be validated by map and site-review. J:/fsfiles/ref/library/gis/allegheny/elt

Wetlands - The presence and identification of wetlands included in the National Wetland Inventory on the Forest will be validated by map and site-review.
J:/fsfiles/ref/library/gis/allegheny/nwi

Municipal watersheds - The presence and identification of municipal watersheds on the Forest will be validated by map and site-review. Municipal watersheds on the Forest are the Big Mill Creek in the Ridgeway Reservoir municipal watershed and the West Branch Tunungwant in the Bradford reservoir municipal watershed.

(c) <u>Congressionally designated areas such as Wilderness, Wilderness Study Areas, and National Recreation Areas</u>:

Wilderness - The presence and identification of Wilderness on the Forest will be validated by map and site-review. The two (2) Wilderness Areas located on the Forest are the Hickory Creek Wilderness Area and the Allegheny River Islands Wilderness Area. Wilderness is identified on the Forest as Management Area 5 (USDA-FS, 1986, as amended, p. 4-97). Salvage activities are presently prohibited in these areas under current Forest Plan direction.
J:/fsfiles/ref/library/gis/allegheny/wild_hickory (Hickory Creek),
J:/fsfiles/ref/library/gis/allegheny/wild_islands (Wilderness Islands),
J:/fsfiles/ref/library/gis/allegheny/wildernessbdy (Wilderness boundary)

Wilderness Study Areas - There are no Wilderness Study Areas on the Forest.

National Recreation Areas - The presence and identification of National Recreation Areas on the Forest will be validated by map and site-review.

The Allegheny National Recreation Area is the only National Recreation Area on the Forest and has been validated. (Forest Plan FEIS, pp. 3-27 to 3-28)
J:/fsfiles/ref/library/gis/allegheny/ (link the stand layer to CDS and select MA 6.4 or use Management Area Coverage).

(d) <u>Inventoried Roadless Areas:</u>

The presence and identification of Inventoried Roadless Areas will be validated by map and site-review. There are six (6) Inventoried Roadless Areas (RARE II or Forest Plan) on the Forest. J:/fsfiles/ref/library/gis/allegheny/

(e) Research Natural Areas:

The presence and identification of Research Natural Areas will be validated by map and site-review. Tionesta Research Natural Area is the only Research Natural Area on the Forest. J:/fsfiles/ref/library/gis/allegheny/ (need to link the stand layer to CDS and select MA 8).

(f) American Indians and Alaska Native religious or cultural sites, and,

(g) Archaeological sites or historic properties or areas:

USFS personnel will gather spatial data defining salvage project areas and prepare GIS coverage's and, subsequently, will create District-level GIS files. These GIS files will be used to associate salvage units with timber compartments and stands and identify Heritage Resources within or near the salvage units may represent "extraordinary circumstances" that might preclude the use of CE's. District Heritage Resource survey atlases and site records will be consulted in order to determine the number, scope, and intensity of associated previous Heritage Resource surveys, the need for additional surveys, and whether previously recorded heritage resources merit additional fieldwork to support a determination of eligibility for the National Register.

ANF Heritage staff will assure that:

- All necessary additional field surveys are conducted in accordance with Forest and District established project prioritizations;
- Field investigations are adjusted and/or modified as needed to meet on-site, inherent difficulties, safety hazards, accessibility problems, etc. that are encountered in undertaking archaeological investigations in blowdown areas;
- DOE-related testing is carried out for both previously recorded and newly found heritage resources;
- Survey, testing and excavation data collection and site documentation meet accepted professional standards; and,
- Mitigations are formulated and recommended as necessary.

Upon completion of the Heritage review and/or requisite fieldwork for each salvage project area, and after the State Historical Preservation Office (SHPO) accepts the proposed reporting process, USFS Heritage Resource personnel will prepare and submit to SHPO a summary document, for example, Bureau of Historic Preservation's (BHP) "Short Report", detailing field methodology and findings. At a future time, USFS Heritage Resource personnel will prepare and submit to SHPO an "umbrella" Cultural Resources Report (CRR) in keeping with BHP guidelines, detailing all investigations, results, and recommendations generated because of the salvage harvesting.

C. Conclusions

A key question for the line officers is to consider the uncertainty for significant environmental effect. The categorical exclusion analysis does not require a cumulative effects analysis. This analysis was intended to inform line officers of the potential for significant effects to reduce any level of uncertainty.

The Storm Addendum Interdisciplinary Team made the following conclusions after working on this analysis: no adverse cumulative effects are anticipated from the proposed level of scattered salvage harvesting using the limited timber harvest categorical exclusions. Line officers will have the flexibility to adjust proposed harvesting based on public comments received during scoping for each project. The following points formed the basis for this conclusion; however, this is not a cumulative effects analysis:

- At a broad scale, the blowdown areas (including aerial estimates from private lands within the forest proclamation boundary) are well distributed across the landscape with percentages ranging from 0.1 percent to 6.5 percent, as listed in ten fifth order watersheds, as shown in Figure 1, page 41. This natural disturbance is well below the 25 percent threshold where a hydrologic response in changes to stream flow would be measurable.

- Figure 1 below shows the comparison of the 6th order watersheds with the percent of proposed salvage timber harvesting. Only five out of 20, 6th order watersheds have greater that one percent of proposed, salvageable, blowdown harvest (Figure 1, page 41). This also supports the scattered nature of the proposed salvage.

- The two highest impacts are in 6th order watersheds where salvage proposals are being evaluated in ongoing EA's and EIS's. The highest is 6.2 percent of the East Branch in the Tionesta Creek Watershed (Martin Run and Eagle Mills Projects) and the next highest is 2.5 percent of the Spring Creek (upper).watershed, (Spring Creek Project). The other three highest range from 1.25 to 1.50 percent.

- The highest concentration of stand replacing blowdown occurred in the Martin Run EIS project area and the existing Eagles Mills Timber Sale Area. A range of alternatives to address salvage harvesting will be analyzed in these areas.

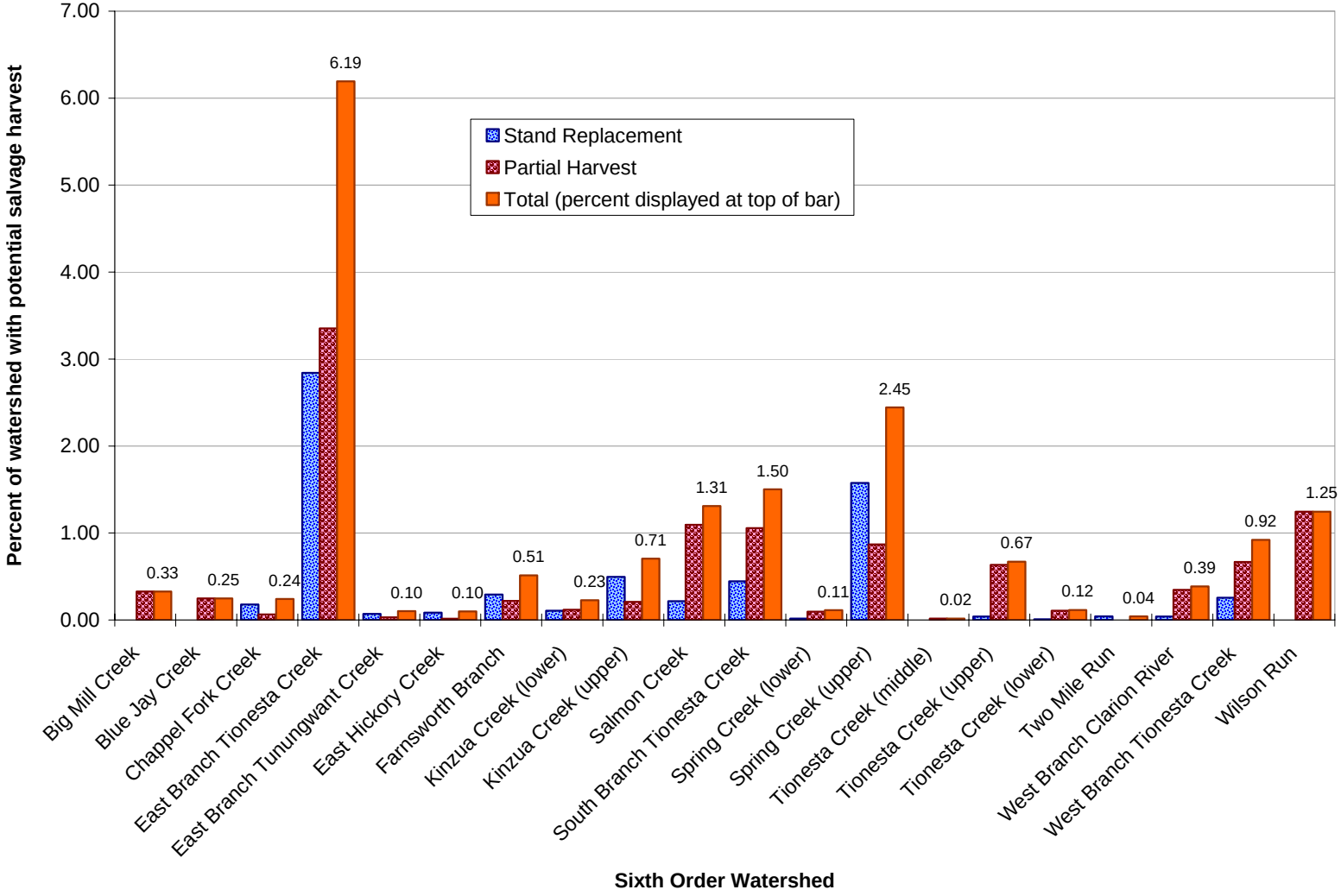
- The timber harvesting levels accomplished from 1986 to 1995 accounted for approximately 79,052 acres (1996 Forest Plan Monitoring Report). The timber harvesting levels accomplished from 1996 to 2003 has been approximately 19, 447 acres, or roughly 25 percent of the level that occurred in the previous decade. Therefore, effects from potential salvage harvesting (approximately 5000 acres) from the 2003 storm cumulatively would be at much lower levels than previous harvesting.

- The harvesting of downed woody debris has not been identified as a wildlife concern. Unmerchantable material remaining on the landscape will meet habitat requirements for threatened, endangered, and sensitive species.

- Of the 9333 acres of blowdown on the ANF, approximately 4852 acres where blowdown has occurred, will not receive salvage harvesting. Protection of streamside riparian areas will begin to restore historic levels of down woody debris where blowdown has added large diameter logs across streams (FP desired future condition in riparian streamside zones).

- Timber harvesting effects on scenery and recreation opportunities will be effectively mitigated through timber sale contract clauses. Any site-specific adverse effects to extraordinary circumstances will be analyzed after public scoping under the proposed limited timber harvest categorical exclusions.

Figure 1: Comparison of 6th order watersheds with the percent of proposed salvage timber harvesting: *2004*:



Section V – Project Design Rationale

- Salvage timber-harvesting opportunities in the following MA's were reviewed for logical environmental analysis: 1.0, 2.0, 3.0, and 6.1. This amounted to approximately 5000 acres, of which 30 percent was located in on going project boundaries currently under analysis.

- Main haul routes that logically connect harvest units from one or several Forest Service collector roads were selected to provide the most efficient means of organizing the salvage effort.

- With assistance from the Forest Transportation Planner, main haul routes were selected and the deferred maintenance needs were identified. Next, the appropriate NEPA tool filters, that could expedite salvage, were reviewed. This expediation involves getting sales to the market in the least amount of time to minimize degrade of saw timber values.

  If less than 250 acres, and, If less than ½ mile of new temporary road was needed, and

  If no adverse effects to extraordinary circumstances were anticipated then a CE proposal was made. 19 project CE proposals were made, ranging from 3 to 205 acres. Three CE's dealt with roadside harvesting only within 200 feet of high use roads open to the public to improve health and safety by cutting leaning and root sprung hazard trees. Separate BE's were prepared and approved by the USFWS. One Biological Assessment was prepared for the other 16 CE's and sent to the USFWS for review, covering approximately 1700 acres of salvage harvesting.

  If greater than 250 acres was identified, or a future project analysis containing green timber sale opportunities was scheduled to begin in the near future then an EA proposal was made. To date three EA's are identified, the Kane Experimental Forest Project, Eagle Mills Project, and Forest Renewal Project. These contain approximately 1200 acres of salvage harvesting opportunities.

  If an on-going EIS was underway, the salvage opportunities created by the storm were included for analysis. Currently, two EIS's are underway and both are located in areas where heavy concentrations of blowdown occurred. They are Spring Creek Project and the Martin Run Project, which contain approximately 1500 acres of salvage harvesting opportunities.

Section VI – References, and Preparers

Documenting References and an Index are provided in this section. In addition, the list of preparers is provided.

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B. List of Preparers

The following U.S. Forest Service Employees prepared 2003 Storm Assessment Addendum B: (listed alphabetically)

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Appendix A

MAPS