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Concerning Issues associated with Forest Health
Timber Salvage in Southern States

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MR. CHAIRMAN AND TASK FORCE MEMBERS:

The ability to salvage timber in National Forests after a natural or pest-related disaster is critical for maintaining forest health, regenerating a vigorous, productive forest, and providing a relatively safe environment for recreational activities. Harvest of designated areas under the auspices of the Emergency Timber Salvage Amendment complements the principles of multiple use management in National Forests.

The forests of North America are diverse ecosystems. Western forests are dominated by coniferous species. In contrast, eastern forests contain a rich diversity of forest types including upland and bottomland hardwoods, pine, spruce-fir, and oak-pine forest types. Forest management and regeneration practices can be different in each forest type, dependent upon species composition and environment.

In the southern Appalachian Mountains, there are five primary categories of natural or pest-related events that can necessitate using the Emergency Timber Salvage Amendment. Catastrophic damage to forests by gypsy moth, southern pine beetle, fire, wind storms ("blow-downs") and ice storms create disturbances that will influence future regeneration and future use of the affected sites. To understand the need for invoking the Emergency Timber Salvage Amendment necessitates a description of the forest damage inflected by each type of catastrophic event.

Gypsy moth - The European gypsy moth, an exotic insect introduced to the country in 1869, is capable of inflicting heavy mortality in forests when at high population levels. Gypsy moth caterpillars (instars) consume leaves and can completely defoliate trees. The caterpillars will consume a wide variety of plant species and especially prefer oaks. Mortality can occur even in cove hardwood settings that provide the best growing conditions for upland hardwood species. After an area has been subjected to heavy defoliation, the majority of mortality will be evident within three years generally occurring 2 to 3 years after heavy defoliation. Dead and declining trees provide relatively safe havens for egg masses, caterpillars

and adult gypsy moths, thereby increasing population levels and reproductive capacity.

Gypsy moth has become established in the New England States and presently is migrating into the southern Appalachian region. This region is particularly vulnerable to gypsy moth attack due to the relative percentage of oak species in forest compositions. The "killing front", extremely high population levels that are the precursor for permanent forest infestation, presently is in the Roanoke, Virginia area and is moving in a southeastern direction along the Appalachian Mountains. Forest devastation is particularly apparent in poor or marginal sites that have thin soils and low amounts of precipitation.

Southern pine beetle - Southern pine beetle is a native insect in southern forests. The insect attacks all pine species, but particularly prefers southern yellow pines, e.g., loblolly, pond, and pitch pines. The trees are killed by girdling caused by the construction of egg galleries and feeding by adults in the cambium. The cambium is the layer dividing cells that is the tree's mechanism for volume growth. The cambium produces xylem (water conducting tissue) and phloem (food conducting tissue). Without these tissues the tree will die. The invasion of the cambium by the beetles also introduces a blue stain fungi that clogs vessels and accelerates tree demise. Stands targeted by southern pine beetle usually are not vigorously growing due to over-stocking or are over-mature, dense stands. Areas with high beetle densities are called "beetle spots". These spots can grow to 8000 acres in size, although the usual infestation is 1-2 acres. The magnitude of southern pine beetle devastation is staggering. Approximately $256,522,000 in green stumpage value of timber was killed south-wide in 1995. Southern pine beetle populations increase and decrease, dependent upon environmental conditions, food supply, and natural predators.

Forest fire - Fires can weaken trees without inducing immediate mortality. Fires in areas with large amounts of combustible materials on the ground, i.e., fuel, are the most damaging, as they damage the lower portion of the stem. From a management standpoint, it is difficult to estimate the totality of fire damage immediately after a fire. Damage to the stem provides a site for invasion of wood-rotting fungi that will eventually predispose the tree to wind damage. Many trees are still able to produce new foliage, but the foliage is relatively sparse. Over the succeeding years, these trees will eventually decline in health and vigor. This decline can predispose trees to attack by insects and/or pathogens. As mortality progressively increases, the amount of dead wood in the area correspondingly increases, but at a disproportionate rate when compared to mortality from non-catastrophic causes.

Wind storms - Weather conditions that produce high and/or turbulent winds, e.g., hurricanes, tornados, "straight or straight-line winds", can devastate small to large areas of forested lands. Coniferous and hardwood species are susceptible to being toppled by high winds. These areas are known as "blow-downs". Usually the trees are not broken, but are uprooted by wind. Traversing blow-down areas is difficult and dangerous, as the ground is covered by stems and slash. The tremendous amount of wood and debris on the forest floor raises the fuel load, increase fire danger, and generally makes the area impassable.

Ice damage - Ice storms usually cause the greatest damage to pine species. Trees can be stripped of branches, bent and broken by the weight of accumulated ice. Although many trees in a stand can survive ice storms, there is an overall reduction in health. This decline will predispose the stand for attack by southern pine beetle.

Problems created by Forest Devastation

The above catastrophic events have common, profound effects on southern Appalachian forests if the situation is not addressed by management. Dead trees and debris from declining trees create a fire hazard by increasing the amount of available fuel on the forest floor. Forest ecosystems are altered in terms of biodiversity, local environment, and can have ramifications for environments associated with the affected area. For example, the effects of gypsy moth defoliation can alter compositions of flora and fauna species. Water yield from the watershed containing the affected area will increase. Decomposition of wood and debris will increase the amount of nitrogen and other nutrients entering the water system, affecting water quality.

Dead and declining forests are havens for forest pests. Weakened trees are prime targets for attacks by insects and pathogens. Dead and dying trees provide insects with shelter, a comparatively safe environment to reproduce, and protection from predators.

Without appropriate management, a devastated area may have problems in regenerating the same forest type before the catastrophic event. Standing dead trees generally will not sprout; the most common method of heavy-seeded hardwood regeneration in Southern forests. In blow-down situations, natural regeneration for heavy seeded species, e.g. oaks, will be reduced, as the fallen trees will be physically inhibited from sprouting and sprouting will be reduced by shading of fallen stems and debris.

Recreational opportunities are impacted by catastrophic events. Standing dead trees pose a safety hazard, as they can topple and kill or maim recreationists. Additionally, the aesthetic quality of the forests can be reduced. Gypsy moth defoliations have caused recreational use to drop as much as 25 percent in infested areas.

Importance of the Emergency Timber Salvage Amendment

Use of the Emergency Timber Salvage Amendment will address the above problems created by a catastrophic event, while providing the funds for reforestation efforts to restore the devastated areas. Funds generated from sales governed under the Emergency Timber Salvage Amendment are (by law) used for reforestation/restoration activities in the affected area.

A provision in the Emergency Timber Salvage Amendment allows for the timely removal of dead and declining trees. By invoking the Amendment, a full Environmental Analysis does not have to be conducted if the area does not contain Threatened and Endangered Species, and the sale will not exceed 1 million board feet. This significantly reduces the time interval from designation of a salvage area to actual harvest and thereby, will address fire, insect and recreational concerns. In addition, the expenses associated with an Environmental Analysis are reduced. The reduction of time will increase the profits from the sale, as there is less time for wood deterioration. The additional profit margin and reduced expenses will provide more money for reforestation activities in the salvage area.

The lack of an appeal process is another critical factor in the successful application of the Emergency Timber Salvage Amendment. Appeals can significantly delay the salvage harvest, thereby increasing fire, insect and regeneration problems.

Below is a contrast between a "green wood" sale under typical timber sale procedures and a timber salvage sale under the provision of the Emergency Timber Salvage Act that illustrates the greater economic return of salvage sales for reforestation purposes.

An average timber sale on the Cherokee National Forest would generate 700 thousand board feet. The sale documentation and appeal process would take an average of 15 months to complete. The following costs would be incurred prior to sale. Overhead is not included.

Sales Preparation Cost..... $9,100
Sales Administration Cost (cost of overseeing contract)..... $6,100
Planning/Analyses/Inventory Cost (to complete Environmental Analysis)..... $17,000

Total Costs = $32,200

The Planning/Analyses/Inventory costs are over 50 percent of the total costs associated with the sale (52.7%). The majority of these costs are incurred when specialists analyze and prepare the necessary documentation. The specialists can include: Botanists, Wildlife Biologists, Fisheries Biologists, Forest Planner, Landscape Architect, Forestry Technician, Engineer, Soils Scientist/Hydrologist, Archaeologist, and Line Officer.

In comparison, the costs associated with a sale on the same area of approximately 700 thousand board feet, but administered under the Emergency Timber Salvage Amendment provision, are significantly lower.

The time from designating the affected area to initiation of salvage operations would be approximately 10 days.

Sales Preparation Cost..... $11,100
Sales Administration Cost (cost of overseeing contract)..... $6,100
Planning/Analysis/Inventory Cost (to complete Environmental Analysis)..... $2,000

Total Costs = $17,600

The sale-associated costs would be reduced by approximately 45 percent. Although the returns from salvage verses "green wood" sale would be somewhat lower, the net profit from the salvage sale would be higher. This would result in a greater proportion of funds being allocated toward reforestation of the sale area. The overall result would be regeneration of a higher quality forest; higher quality in terms of timber production, wildlife habitat and/or recreational opportunities.

The Emergency Timber Salvage Amendment is particularly essential to the management of southern pine beetle. Aerial surveys detect beetle spots, and the ability to address the infestation by harvest is critical. The reproductive cycle of southern pine beetle is approximately 30 days in the growing season and resulting in 6-7 generations per year. Before the Emergency Timber Salvage Amendment was enacted, preparing a salvage sale took approximately 100 days before harvest could begin. Three generations of beetles could emerge and infest other trees during this waiting period.

The ability to rapidly remove dead and dying trees in oak-dominated hardwood forests is paramount to successful regeneration of a forest with the same species composition. The majority of oak trees in eastern forests are from sprout origin, as opposed to originating from acorns. Dead trees will not sprout unless the stem is removed from the stump. In addition, sprouting will not occur in stumps covered with dead stems and slash. Moreover, there is a finite time that the stump (and associated root system) has the capacity to sprout. Long delays before the initiation of salvage harvest will decrease the probability of natural oak regeneration.

Oak regeneration in eastern forests is problematic under the best management scenarios. Generally, there has been a decrease in the oak component in eastern hardwood forests. The decrease is caused by a variety of reasons including cyclical acorn production, sprout and seedling losses to pests, damage to the regenerating seedlings, and seedlings unable to compete in regenerating stands. The reduction of wildfire also has had an impact on oak regeneration. Fires will reduce the population levels of seed-born competing species, such as yellow-poplar, thereby allowing a greater number of oak sprouts to reach a dominant position. There is a relationship between fund expenditures for reforestation in oak-

dominated salvage areas and successful regeneration of an oak component. Delays in salvage harvest operations will promote wood degradation that will affect the sale value and thereby, reduce the amount of money available for reforestation.

Site Selection Bias in Salvage Sales

There is a heavy bias toward selecting sites with the most valuable timber, i.e., sites capable of providing the greatest economic return. This bias is due to the internal economics of the Forest Service. In preparation for an emergency salvage sale, the Timber Staff Officer will request dollars from the Salvage Trust Fund to pay for preparation of the sale. This "loan" will be reimbursed to the Fund from revenue generated by the sale that remains after site reforestation as required by law. Therefore, the forest manager must select sites that are capable of generating enough revenue to reforest the site and to reimburse the Salvage Trust Fund.

It is possible to use Salvage Trust Fund dollars to prepare salvage sales on poor or marginal sites where a catastrophic event has occurred. The financial returns from such sales, however, would not exceed the expenditures, causing the timber sale to be classified as a "below cost sale", assuming a buyer could be found. Even if the salvage harvest took place, the Salvage Trust Fund probably would not be fully reimbursed after reforestation costs, due to the net loss on the sale. This scenario would soon exhaust the Salvage Trust Fund, leaving no source of revenue to fund <u>any</u> salvage sales regardless of profit margin. Therefore, in general, only the good timber producing sites are properly managed on National Forests when a catastrophic event occurs, and poor or marginal sites are not salvaged/managed. This results in the poor sites not being properly managed to prevent hazard and regeneration problems associated with a catastrophic event. The problems in damaged areas, e.g., increased fuel load or pest haven, eventually will cause problems for adjacent areas under appropriate forest management. The same situation exists in forest stands without catastrophic events; management activities are concentrated on the better sites.

Reactive versus Proactive Forest Management

Salvage harvests are a reactive forest management practice. The harvests occur <u>after</u> a natural or pest-related disaster. While it is difficult to predict some natural disasters, e.g., blow- downs, insect-related disasters are more predictable. Many insect-related salvage harvests would not be needed, if proactive forest management had previously occurred. For example, gypsy moth problems can be addressed by altering species composition, decreasing the oak component in susceptible stands, and harvesting to promote vigorously growing sprouts. On the more productive sites, some proactive management is possible, but generally the management must be connected with a timber sale to use appropriated dollars to pay for the sale preparation and post-harvest management activities.

Problems with Public Perception and Harvests under the Emergency Timber Salvage Amendment

Although harvesting a salvage area by clearcutting is a permitted option under the National Forest Management Act (1976) and the proposed rules for National Forest System Land and Resource Management Planning (1995), forest managers are cautious about recommending salvage by clearcutting. The general public currently views clearcutting as a questionable harvest method, in terms of forest ecosystem health and regeneration. This perception is unfortunate, as clearcutting in oak-dominated forests is the most appropriate harvest method for regenerating a stand with the same species composition. Generally, oak species are intolerant to shade and best grow in full sunlight; conditions created by a clearcut harvest. Research recently conducted by the Forest Service's Institute of Root Biology has confirmed this growth behavior in field and laboratory experiments by contrasting oaks grown in shaded conditions with oaks growing in full sunlight. The studies have conclusively shown that oaks exhibit the fastest growth and compete best with surrounding vegetation when in 100 percent sunlight.

Forest managers also are cautious about clearcut recommendations due to internal Forest Service edicts concerning clearcutting and language in Appropriation Bills. These restrictions on clearcutting have been applied across National Forests regardless of the regeneration biology of the forest type, e.g., upland hardwood forests in the South vs. spruce-fir forests in the Pacific Northwest. Correspondingly, harvests by clearcuts have been dramatically reduced, despite the conflict of direction between the above memorandums and documents like the National Forest Management Act that give authority for clearcutting. Unfortunately, the hesitant use of clearcutting as a harvest method in salvage sales (and green wood sales), only reduces the amount of money available for reforestation of the affected area.

Certain segments of the public believe that the impetus behind a salvage sale due to a catastrophic event is no different from the impetus behind a commercial timber sale on private land. A private, commercial timber sale is economically driven by a profit margin, while the Emergency Timber Salvage is driven by the biology of the affected forest area as summarized above.

Closing Statement

In closing, I offer the following conclusions and opinions based on the above statements.

1. The Emergency Timber Salvage Amendment is necessary for proper forest management of areas in southern National Forests that have been devastated by catastrophic events. The Amendment allows National Forest managers to rapidly develop and implement a biologically sound harvest and regeneration plan that will address problems associated with catastrophic events.

2. Rapid facilitation of salvage sales under the auspices of the Emergency Timber Salvage Amendment is limited to sales of under million board feet. Biological problems associated with catastrophic events occur whether the board feet estimate in the affected area is large or small. Salvage sale size should be based on appropriate forest management principles and not limited by the amount of board feet. The board feet limitation should be eliminated from the Emergency Timber Salvage Amendment.

3. The Emergency Timber Salvage Amendment should be passed as a permanent law. Natural and pest-related disasters will always occur and to continue temporary renewal of a law that will always be needed is not time and resource efficient.

4. Forest management problems caused by catastrophic events are not confined to boundaries between productive and marginal or poor sites. Congress needs to work with the Forest Service to develop and fund forest management strategies that will encompass all sites affected by catastrophic events.

5. The reduction of clearcutting as a harvest practice in salvage and green wood sales in southern National Forests is not based on biological principles. Forest Service directives that reduce clearcutting by an arbitrary percentage over all National Forests need to be revised, based on the regeneration biology of different forest types and not on political, industrial, or preservationist agendas.