

TITLE: Recent, Rapid, Severe Aspen Mortality in the Rocky Mountain Region

INT-EM-07-01

LOCATION: Southern Colorado

DURATION: 3 years

FUNDING SOURCE: Base EM

PROJECT LEADERS: Jim Worrall (970-642-1166, jworrall@fs.fed.us)

COOPERATORS: Roy Mask, Tom Eager and Leanne Egeland, R2 Forest Health Protection; Wayne Shepperd, Rocky Mountain Research Station; John Guyon, R4 FHP; Phil Kemp, San Juan National Forest; Tim Garvey, Carol McKenzie and Matt Etzenhouser, Grand Mesa, Uncompahgre and Gunnison National Forests

PROJECT OBJECTIVES: We will determine the severity, site factors and causal complex associated with recent, rapid mortality of aspen in Colorado. This mortality event has attracted intense media attention, particularly in southwestern Colorado.

JUSTIFICATION: This project directly addresses many of the emphases of the 2007 Base EM competition:

Drought: We suspect that recent, rapid and heavy mortality was incited by the severe drought from about 2000-2005. Although this cannot be proven or disproven, we will measure site factors that are associated with drought stress, including soil texture, soil type, elevation, aspect, etc.

Tree mortality: Aerial survey and ground observations have revealed a new syndrome of aspen mortality, much different from the west-wide, long-term “decline” due to succession and lack of disturbance. This new mortality is very recent, rapid, and generally has a clumped distribution. Over 75% of stems in a stand can die within a span of only 2-4 years.

Poor crown condition: Mortality is usually preceded by several years of branch dieback and crown deterioration.

Insects and diseases: A variety of usually secondary diseases and insects is associated with the mortality, though their incidence varies greatly among affected stands. These include Cytospora canker, poplar borer, bronze poplar borer, and aspen bark beetle (*Procryphalus* sp.).

Soil conditions: We will determine whether mortality is associated in part with well-drained, coarse-textured (i.e., droughty) soils and soil types that are generally less favorable for aspen.

In addition, it addresses evaluation criteria as follows:

Biological impact and/or political importance of the issue: Rapid deterioration of aspen stands has attracted intense media attention (see Appendix with examples), has raised concern in areas that are economically dependent on aspen, both for fiber and for tourism, and has led to requests from the Washington Office for an assessment of the situation.

Feasibility of successful project completion: We demonstrated our ability to manage and produce products from similar projects in the past and have a good record of reporting (e.g., Worrall et al. 2004, based on STDP funding).

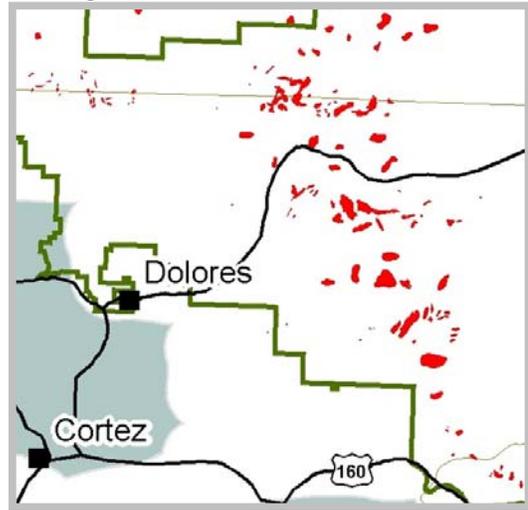
Significance in terms of geographic scale: Although in reports and discussions it is sometimes difficult to distinguish this new, rapidly occurring mortality from other forms of aspen mortality that are given various names, a similar phenomenon is occurring in northern Arizona and New Mexico and perhaps in

parts of Utah and Montana. We have been in contact with our colleagues in those regions and will continue to communicate with them regarding objectives, methods and results.

Linkage to FHM detection monitoring: Data from FHM/FIA plots on long-term loss of aspen acreage was analyzed recently (Rogers 2002).

DESCRIPTION

a. Background: Beginning in 2004, sharply elevated levels of aspen mortality became apparent on the western San Juan National Forest. This increased in 2005 and became a focus for the Dolores District managers. Of 300,000 acres of aspen, they reported that 8.6% is dead and that mortality in some measured stands increased from 9% to 60% in less than three years. Similar mortality was seen on the Grand Mesa, Uncompahgre and Gunnison (GMUG) National Forests in 2005 and expanded in 2006. Reports have also indicated heavy, concentrated mortality in other parts of Region 2. This may be related to the high levels of aspen mortality seen earlier in northern Arizona and northern New Mexico. We have received numerous requests from the media, forest managers, and from the Washington Office for assessments of the situation. In 2005, we intensified aerial survey of these areas and began to phase in a prioritization of aspen decline for recording that was complete in 2006. We now need to conduct detailed field assessments and analyze aerial survey and ground data to quantify the severity of the problem, assess potential causal factors, and determine the regeneration potential of affected stands. We suspect that the recent drought was a trigger for this event, and therefore predict that dying stands tend to occur on marginal aspen sites as characterized by elevation, aspect, soil type, etc.



Aspen decline polygons near Dolores, CO, San Juan NF, in 2005 aerial survey.

Neighboring regions 1 and 3 have recently conducted EM-funded studies of aspen (INT-F-06-01 and INT-EM-03-02). Recent, rapid mortality in R3 may be similar to the syndrome in R2, but it is not clear in either case that the phenomena are the same or even related. Managers, administrators and the media are demanding answers regarding events in R2, and this project is necessary to provide them and relate these events to those in the neighboring regions. This proposed project uses the same general plot design as the R1 and R3 projects.

b. Methods: Although the phenomenon is occurring at a larger scale, we will restrict our study to the western San Juan and GMUG NFs and nearby public lands. **GIS-based:** Aerial survey polygons coded for aspen decline will be compared with aspen cover type outside those polygons. Using digital elevation models and soil type layers, we will statistically compare elevation, slope, aspect and soil types between decline and non-decline aspen. **Ground-based:** A systematic sampling grid will be placed in both decline and nondecline aspen that is within 0.5 km of roads. Points will be sampled if canopy composition is > 50% aspen and either > 50% of the aspen overstory is dead

or dying (decline points) or < 15% is dead or dying (nondecline points). At each sampled point, a 0.02 hectare (200 m², radius 8 m) plot will be used to record standard mensurational data, tree condition and damage agents, with smaller plots used to count aspen regeneration. Increment cores will be removed from three healthy and three recently dead trees (if available) in or near each plot to determine age and assess recent growth patterns. A soil pit will be used to classify soil texture and depth and color of the organic horizon; this information will be combined with information derived from soil maps. A trench, 3 m long and 0.2 m deep will be dug to sample aspen roots for vitality (Shepperd et al. 2001). Short segments of aspen roots > 1 cm diam will be removed, classed as live, dead or senescent, and the diameter measured.

c. Products: During the project, results will be used to answer inquiries from media, forest managers, and others. Upon completion, the results will be prepared for publication in a journal article or a regional report. Accurate interpretation of this mortality event will be an important determinant of policy direction for aspen management.

d. Schedule of Activities: GIS work will begin in the winter of 2006/2007, as soon as 2006 aerial survey data are complete. Field work will begin summer 2007.

COSTS:

Salary expenses include 3 GS-5 field personnel and a GS-7 crew leader for 7 weeks (2007 planning rate). Travel funds are requested for all involved personnel and the project vehicle.

	Item	Requested FHM EM Funding	Other-Source Funding	Source
YEAR 1				
Administration	Salary	17,366	32,000	SPFH, SPS4, NFTM
	Overhead (16%)	5,579	3,500	SPFH
	Travel	14,500		SPFH, NFTM
Procurement	Contracting			
	Equipment			
	Supplies	3,000	2,000	SPFH, NFTM
TOTAL		40,445	37,500	

Similar budget requests and “other source funding” are anticipated in years 2 and 3.

References and media stories provided on request.

