

A New Survey Tool for Identifying Sudden Aspen Decline (SAD)

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BACKGROUND

The status of quaking aspen (*Populus tremuloides*) is currently an issue of concern. In the absence of disturbance, shady conditions and hormonal feedbacks prevent aspen regeneration and succession of shade-tolerant conifers occurs (Shepperd 2001). As a result of fire suppression and increased ungulate pressure, aspen may be decreasing in acreage in parts of the western United States (Kay 1997, Bartos and Campbell 1998, Jones et al. 2005). However, the historical extent of aspen is disputed, leading to uncertainty as to whether aspen are decreasing in the west due to conifer succession exacerbated by increased grazing and fire suppression (Kulakowski et al. 2006).

In some areas, a different phenomenon is occurring: a dramatic decline in aspen populations has been observed, with up to 20% stand mortality in the Intermountain West in just a few years. A 58% increase in mortality was seen between 2005 and 2006 in parts of southwestern Colorado (Worrall et al. 2008). Worrall and colleagues have named this SAD, or sudden aspen decline. The characteristics that lead to tree decline can be divided into 3 categories (Manion 1991, Frey et al. 2004):

- **predisposing factors:** chronic stressors that increase vulnerability to inciting factors; e.g., regional climate, conifer succession
- **inciting factors:** the primary instigators of decline that allow contributing factors to establish; e.g., drought, defoliation
- **contributing factors:** secondary factors that eventually cause mortality; e.g., wood-boring insects, stress-related fungal pathogens

Particular attributes of SAD seem to be sudden extensive stand mortality, little to no regeneration, and root death. Worrall et al. 2008 hypothesized that **recent drought conditions, along with high temperatures**, stressed **adult** trees, particularly those **found in drier areas (at low elevations and with south/southwestern aspects)**, allowing **native insects and pathogens** to kill stands. Thus, future climate projections of drier and warmer weather in the western US may point to aspen decline there. Unfortunately, no systematic surveys have looked at whether SAD is occurring in other regions of the Rocky Mountains or the west. Further, there remains confusion over whether there are unique properties of SAD that separate it from general aspen decline. Because management treatments depend on whether SAD is actually occurring, it is critical to distinguish conifer succession from SAD. We propose a way to address these issues.

GOALS

1. Develop a rapid-survey method to classify the status of aspen stands in the western US.
2. Gather data that can be used to identify unique characteristics of SAD.
3. Improve understanding of the role of anthropogenic climate change in aspen decline.
4. Share knowledge on status and treatment of SAD with managers across the west.

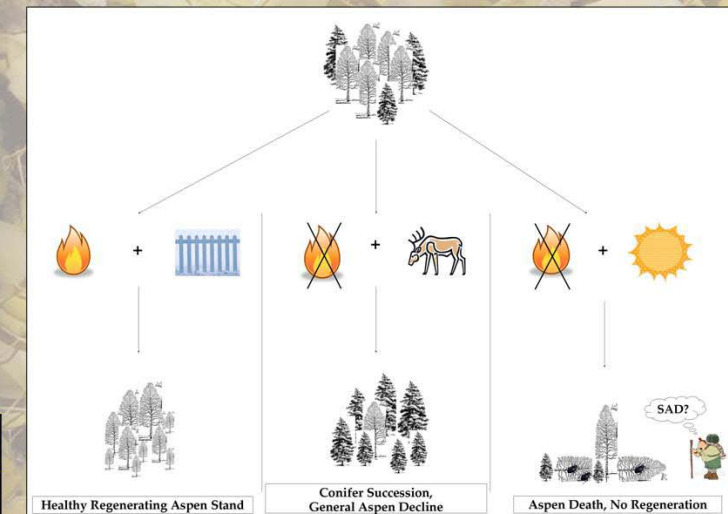
METHODS

We are developing an information packet to distribute to researchers, land managers, and interested groups in order to conduct the SAD survey. This packet includes background information on aspen, aspen decline in general, and SAD in particular. We have also developed a survey worksheet that will standardize the survey of sudden aspen decline throughout the west. This survey is based on the Aspen Delineation Project (ADP) survey protocol and has been developed as either stand-alone or as an addendum to the ADP protocol. It is derived from extensively reviewing the literature on aspen decline, and summarized with an example in the table presented here.



SAD Survey Checklist	Yes	No
Is there >75% recent crown loss across the canopy?	✓	
Are most dead trees standing with bark still on?	✓	
Is the majority of current mortality located in size classes >12 cm dbh?	✓	
Are there many young established aspen present (1-12 cm DBH)?		✓
Is regeneration occurring (many more sprouts than adult trees)?		✓
Is there evidence of ungulate herbivory on sprouts?		✓
Is there evidence of pathogens or insect damage?	✓	
Canker <input checked="" type="checkbox"/> Poplar borer <input type="checkbox"/> Bark beetle <input checked="" type="checkbox"/>		
Other/Specify <u>sooty-bark canker</u>		
Other important indicators:		
-Elevation: <u>2100</u> m		
-Aspect: <u>41</u> °		
-Slope: <u>18</u> %		

To access full survey email tmorelli@fs.fed.us



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