Concurrent Presentation Abstracts

Managing Aspen in Western Landscapes Conference
September 22, 2004: Cedar City, Utah

Tim Benedict, District Ranger, Lewis and Clark National Forest, White Sulphur Springs, Montana, Aspen Restoration from the Role of a District Ranger
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How do you get an aspen management program started from scratch? How do we take science and turn it into management? Aspen has declined by 64% in Montana (Jodie Canfield, PowerPoint presentation, 2004). The aspen sites on our district serve as unique sites of diversity and have been neglected for many decades. By developing partnerships with research, peers, and other ranger districts we can start building a successful program. Start with what you have to work; that may be a low budget and volunteers but at least you get started. Try new approaches and use known methods of fencing and prescribed fire that deliver results. On the White Sulphur Springs Ranger District we are starting to develop some ideas to sprout our aspen management program.

Shauna Rae Brown, Ecologist, Fishlake National Forest, Mesa, Arizona, Coauthor Dale Bartos, Burn Severity Effects on Quaking Aspen Regeneration
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Western quaking aspen (*Populus tremuloides*) is a disturbance species and has been perpetuated on site for extended periods of time by fire, disease, and other types of disturbances. Where aspen initially existed, it will reoccupy and stabilize sites after burning. Initial data obtained by Forest Inventory and Analysis (RMRS's RWU-4801) shows there has been a 50-95% decline in aspen dominated lands in the Interior West since European settlement. Most of this decline can be attributed to the efficiency of management to minimize natural occurring fires and to the loss of fine fuels by grazing animals both domestic and wildlife. This lack of burning has allowed natural succession to occur, which causes aspen to change to conifer or shrub dominated sites. The fires of 2000 & 2002 allowed us the opportunity to study the impact of fire on late successional aspen.

Aspen sampling during the summer of 2003 documented first-year response of the different burn severities found within the Battle Creek (SD), Hayman (CO), Million (CO), Missionary Ridge (CO), and Sanford (UT) fires that occurred in 2002. The Jasper fire (2000), in South Dakota, was also sampled. Observations included the type of damage to the aspen suckers from disease, insects, wildlife, and weather. In addition, it was noted if domestic or wild ungulate signs were found in or adjacent to the mil-acre sample plots.

Burn severity (relates to the amount of fuels consumed and damage done to a site by fire) had a consistent impact on initial response of aspen regeneration following the wildfires of 2002. Generally, low severity sites produced the greatest amount of regeneration, followed by moderate severity, and then highest severity. Unburned sites usually produced the fewest number of aspen; however, if the fire in high-severity sites killed the aspen roots, then fewer suckers were produced.

Sampling of the Jasper fire (2000) revealed that ungulate browsing had a profoundly negative impact on aspen regeneration following fire, especially if the sites are allowed to be grazed too soon following fire. Grazing should not be permitted until aspen stems average at least 6 feet tall (1.8 m) at the terminal bud, and the percentage of stems browsed can be kept below 30 percent.

David Burton, Aspen Delineation Project, Multi-agency, Penryn, CA, Development of a Protocol for the Ecological Assessment of Aspen
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Resource managers across the West have a heightened interest in aspen issues since government mandates are increasingly directing land managers to protect the biodiversity of flora and fauna on public lands. Among those actively working on aspen issues, there is an interest in developing consistent inventory, assessment, and monitoring protocols in order to make science-based management decisions, share data more easily, produce a consistent evaluation of treatment results, and develop training programs for management and field staff.

Because of this heightened interest, the Aspen Delineation Project, a collaborative effort of the U.S. Forest Service Pacific Southwest Region, California Department of Fish and Game, and the California State Office of Bureau of Land Management, has undertaken development of a consistent approach for collecting data about ecological condition of aspen stands on agency lands.

Protocols for determining ecological condition were developed and field tested by review groups. To date, units from seven state and federal agencies have collected data using the same protocols and field form.

The effort has focused on the identification of key indicators of ecological condition within aspen stands. The key indicators were established through extensive review of aspen research. Identification of the range of factors that create or affect those indicators were then incorporated into the protocols. Resulting ecological assessments conducted through the protocols describe stand structure, indicate unique stand management conditions, and record factors that might be putting stands at risk.

Jodie Canfield, Elkhorn Coordinator and Wildlife Biologist, Helena National Forest, Townsend, Montana, Small Aspen Stand Dynamics in the Elkhorn Mountains
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In an effort to better understand the dynamics of small aspen stands in dry habitats, the Slim Sam aspen project, located in the southeast portion of the Elkhorn Mountains, was initiated in 1999. Eighteen aspen stands were inventoried. Before treatment, on average, there were about 4 live sprouts per 100 square feet and aspen stands were generally in a state of decline. The factors contributing to the decline in the Slim Sam project area included shading from conifers, old age, and browsing and mechanical damage from livestock, moose, and elk.

Eight stands were burned in the spring of 2002. Six of the burned stands were fenced, with 7-foot high wildlife fencing during the summer of 2002. In 8 of the 18 stands, conifers were removed and placed around the outside of the stand to provide some protection from browsing animals. Two of the stands were not treated. Following the initial treatments, ground cover and sprout densities were assessed for 2 field seasons. This presentation summarizes the dynamics of different treatments in isolated aspen stands and compares costs and effectiveness of treatment types.

Mary Lou Fairweather, Plant Pathologist, Forest Health Protection, USDA Forest Service, Flagstaff, Arizona; Coauthors Kelly Barton and Mike Manthei, <u>Aspen Decline in Northern Arizona</u>
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An accelerated decline of aspen communities has recently occurred across northern Arizona, following two defoliation events and several years of drought. The Southwestern Region's 1998 aerial detection survey showed a doubling of defoliated aspen acres (>85,000), compared to previous years, followed by another doubling in 1999 (>170,000). Although 1998 defoliation was caused by foliar insects and pathogens, the 1999 defoliation was due to frost damage following a severe June snowstorm, which occurred across most of Northern Arizona. Since 2000, aerial surveyors have switched from reporting acres defoliated to acres in decline, the latter marked by thinning crowns and mortality. Many small lower elevation clones appear completely dead. We began evaluation and monitoring of affected aspen at the stand level on the Coconino National Forest (NF) in 2003, followed by the Apache-Sitgreaves NF in 2004. This monitoring project describes mortality levels, regeneration condition, and stand and site variables that are influencing decline. Preliminary results show that elevation, which varies from 6,800 to 9,300 feet, is a key factor in both tree species composition and severity of decline. Lower elevation sites (<7,500 feet) are on northerly aspects and are dominated by aspen with a ponderosa pine and oak component. In some sites, more than half the overstory aspen died in the past 3 years and more mortality is expected as many trees have only 10 to 30 percent of the original crown left. Higher elevation sites were on various aspects with a mix of conifer species and a higher ratio of live to dead aspen. Since decline appears to be progressive, remeasurements will determine detrimental levels of crown dieback. Aspen regeneration is slight, especially at lower elevations, but ungulate damage is rampant. A few sites had 100 percent browse damage. The large die-off of mature aspen trees in many lower elevation sites coupled with browsing by ungulates is expected to result in type conversion of many ecologically unique and important sites across the state.

Brian Ferguson, Regional Silviculturist, Intermountain Region, USDA Forest Service, Ogden, Utah, Aspen Regeneration: How Many and How Much?
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Aspen management is beginning to gain momentum in the Intermountain Region as we look at ecosystem processes and function. Restoring aspen to landscapes dominated by conifer forests has become an emphasis toward restoring healthy forests. One of the major questions that are asked is, "How many suckers do I need to establish a new aspen stand." The second question that follows is, "What do I have to do to get full coverage of aspen because I have some sites that don't regenerate well." The basis for the numbers and amount of aspen regeneration within a treatment area are driven primarily by the project objectives described in the proposed action. Aspen generally has the potential for great numbers of suckers following disturbance. Suckering has been noted within a few weeks following fire. The Dixie National Forest has documented as many as 350,000 suckers per acre. I have noticed that people tend to underestimate the potential for suckering and want to manage aspen stands at extremely low numbers. This can present a big problem where grazing ungulates can deplete aspen regeneration to the point the aspen clone is lost. At the same time people want to overestimate the potential for aspen recovery across a stand or landscape. We must gain an understanding of the distribution of the live remnant trees and potential where rootstock may no longer exists. We have noted many cases where aspen only occupies a portion of a stand. As vegetation managers we need to gain a greater understanding for aspen needs and where we have the greatest opportunity for success. We must recognize and deal with potential conflicts with other resource uses and understanding the potential for aspen regeneration and how that contributes to the establishment of new aspen stands.

Stephen Fettig, Wildlife Biologist, Bandelier National Monument, Los Alamos, New Mexico, Aspen Regeneration Across the Southern End of the Cerro Grande Burn
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In the spring of 2000, the Cerro Grande fire burned nearly 19,000 ha (48,000 acres) of aspen (Populus tremuloides) and mixed conifer forest on the east side of the Jemez Mountain in northern New Mexico. During winter, the southern part of the burned area can host many of the mountain range's 4,000 elk (Cervus elaphus). Previous work has documented a range of aspen regeneration heights and browse intensities due to this elk population. To quantify the post-fire variation in aspen regeneration and to examine the relationship between site characteristics and the level of browse, we focused on the southern portion of the burned area. In September 2002, we surveyed 58 random 10 m x 10m (33 ft x 33 ft) plots in the study area. We recorded the maximum sprout height; number of sprouts (up to a maximum of 200); sprout condition (browsed or not browsed); elevation, slope, aspect; dominant pre-fire overstory tree species; estimated current percent canopy cover; smallest Diameter at Breast Height (DBH) live tree-size (> 4 cm

DBH) aspen; and elk and deer pellet groups. For plots with aspen sprouts, we observed a correlation between the percent browsed shoots and measured maximum height after 3 years ($r^2 = 0.45$, n = 31, F = 23.37, p < 0.0001). Maximum sprout height was correlated with UTM Easting ($r^2 = 0.21$, n = 31, F = 7.66, p = 0.0097), while inversely correlated with UTM Northing ($r^2 = 0.15$, n = 31, F = 5.12, p = 0.0313) and elevation ($r^2 = 0.15$, n = 31, F = 5.29, p = 0.0289). Northing and slope together explained the measured maximum shoot heights after 3 years better than other predictors ($r^2 = 0.31$, n = 31, F = 6.36, p = 0.0053). The impact of elk browsing on aspen regeneration on gentle slopes in the northeastern part of the study area is clearly exemplified by aspen sprouts over 4 m (12 ft) tall within protective exclosures four years after the fire, while outside elk browsing is preventing aspen sprouts from getting much above ankle-level. In one high burn-intensity area, where the Cerro Grande fire killed all trees, aspen spout density has dropped from several thousand sprouts/ha in late 2000 to nearly zero/ha over a 3.1-ha (7.7-acre) area in 2004 years. Considering that annual elk ranges in the eastern Jemez Mountains are most concentrated on the Valles Caldera, our observations suggest slope may be as important as distance from the Caldera in determining levels of browse on aspen sprouts. Because of the highly browsed structure and decreasing spout density of some aspen clones on gentle slopes, future work should examine future sprout density and heights across the range of sites characteristics. Such information may provide the data needed to make longer-term predictions about aspen regeneration in the study area.

Sherel Goodrich, Ecologist Ashley National Forest, Vernal, Utah, <u>Aspen Regeneration on the Ashley National Forest</u>
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Aspen has generally regenerated after clear-cut harvest and fire on the Ashley National Forest. Examples of regeneration and a few cases with little or no regeneration are demonstrated by photography.

John Guyon, Forest Pathologist, Forest Health Protection, USDA Forest Service, Ogden, Utah, <u>The Role of Forest Insects and Diseases in Aspen Ecology</u>
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A forest decline in is often described as a syndrome involving multiple abiotic and biotic factors leading to the death of trees. Many agents can cause stress contributing to aspen forest decline including abiotic agents such as drought or frost, and a wide range of biotic agents including grazing animals, humans, and forest insects and diseases. Insect and disease incidence in aspen the Intermountain Region ranges from 18 to 85% in trees over 5” DBH from surveys conducted on several national forests, but the actual rate of mortality caused by these native organisms has only been examined in a few areas by repeated measurements over time. Where they have been reported, average annual aspen mortality rates varied from 1.1 to 5.2 percent on trees between 2.5 and 30 cm DBH. Insects and diseases can play a wide range of roles in aspen forest ecology, and the roles they play are different in young suckers versus large stems. They can cause outright mortality or contribute to decline or cause insignificant minor damage. For example, the impact of an outbreak of defoliating insects or foliar fungi can stimulate a clone to produce new sucker sprouts or contribute to mortality if additional stresses are present. Recognition of the roles that all contributing agents play in aspen decline is critical to future successful aspen management.

James Hadfield, Forest Pathologist, Okanogan and Wenatchee National Forest, Wenatchee, Washington, Coauthor Roy Magelssen, Assessment of Aspen Condition of the Okanogan and Wenatchee National Forests
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Aspen stands occupy less than 1 percent of the Okanogan and Wenatchee National Forests but the species is an important resource. 105 aspen stands considered to be representative of the aspen population on the Forests were surveyed in the summer of 2003 to assess their condition. Most aspen stands occupy small areas and contain small numbers of stems. 56% of the stands were estimated to cover 2 acres or less, 28% covered 5 or more acres. 56% were rated as stable, 41% were classed as successional to conifers, and 3% were rated decadent. Similarly, area occupied by living aspen stems was classed as 43% stable, 19% expanding, and 38% retreating. 24% of the stems were dead from a variety of causes. 15% of the mortality could not be identified to causal agent, 5% were killed by fire, but less than 1% was killed by diseases. 7.4% of the sprouts were dead. 47% of the stands had active sprouting. 57% of the sprouts had been browsed. Elk were believed to be responsible for the almost total lack of seedling size aspen stems on the southern-most District. Many damage agents, including canker fungi, decay, wood borers, and ungulates were found affecting aspen stems.

Seth Ohms, Graduate Research Assistant, Utah State University, Logan, Utah, Management Recommendations for Restoring Cedar Mountain Aspen
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Aspen clones of an aspen-dominated community on Cedar Mountain in southwestern Utah are deteriorating, some having experienced high mortality coupled with insufficient regeneration. The objectives of this study were to (1) determine if decadent, non-regenerating mature aspen stands could be regenerated by clearcutting; (2) determine the extent of ungulate use of regenerating aspen ramets; and (3) develop management recommendations. Clearcuts were made in late summer of 2001 in 10 different clones that exhibited various levels of decline on a continuum from relatively healthy to extremely deteriorated. Nested wildlife/livestock exclosures were constructed in each clearcut plot, as well as in a corresponding uncut control plot. In the fall of 2002, regenerating suckers were counted. In addition, vigor and ungulate utilization of these suckers were measured in the wildlife and livestock exclosures, as well as in an unprotected portion of the clearcut and control plots.

Regeneration of the clearcut plots ranged from none in the most decadent clones, to 75,000 stems/ha in the least decadent clone, and was significantly greater than the control plots. Greenhouse trials found no difference in regenerative abilities between clones, however regeneration success in the clearcut plots was significantly related clone basal area prior to treatment. Vigor, as measured by height of the suckers, was 1.5 to 2.1 times greater in the clearcut plots than in the control plots. Seventy-three percent of the suckers in the unprotected portion of the plots were heavily browsed, while only 12% were not browsed. As a result of severe decadence and browsing pressures, which may limit the clone's ability to successfully restock and remain on the landscape, management recommendations for Cedar Mountain aspen clones were developed utilizing regenerative status, basal area, and browsing pressure.

Don Okerlund, Interdisciplinary Team Leader, Fishlake National Forest, Richfield, Utah
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The Final Environmental Impact Statement describes the analysis completed on the Monroe Mountain Ecosystem Restoration Project area. The proposed action and action alternatives considered in detail are consistent with current management direction. Each alternative responds differently to the issues associated with the Proposed Action.

The purpose and need for action in the project area is to: 1) restore the abundance of aspen ecosystems where losses occurred because of changed disturbance regimes and increased ungulate pressure, 2) work towards improving watershed conditions that favor long-term improvement of riparian areas and water quality, 3) reduce the risk of large, intense episodes of wildland fire in the mixed conifer/aspen stands, 4) reduce the potential of epidemic level spruce beetle outbreaks in spruce/fir stands, 5) contribute to the restoration of the grass/forb ecosystems to improve habitat for wildlife and livestock, and 6) provide timber products to support local economy, while performing ecosystem restoration.

Two significant issues were identified through the scooping process: the effects of the proposed activities on the character of the Roadless Area Review Evaluation II Inventoried Roadless Areas (RARE II IRA's), and effects of timber harvest and associated activities, prescribed fire, road construction, and herbicide treatments on water quality and fisheries habitat. Five alternatives, including a "No Action" alternative, were developed to respond to the purpose and needs identified above. In response to the water resources and fisheries significant issue, several watershed improvement projects have been identified that would be common to all action alternatives.

Chad R. Reid, Associate Extension Agent, Iron County Extension Office, Cedar City, Utah Coauthor Charles E. Kay, The Use of Repeat Photography to Document Changes in Aspen Communities in the West
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Historical repeat photography provides valuable data on long-term vegetation change and land management practices. Repeat photography is also of great educational value because it is easily interpreted by the general public. To date, 800 photo sets have been repeated in Southern Utah and placed on the Utah State University Extension web site (http://www.ext.usu.edu/rra). By systematically evaluating vegetation changes in these photos some clear trends emerge; range conditions have improved, soil erosion has decreased, riparian and stream conditions have improved, while conifers, pinyon-juniper and sagebrush have greatly increased in area and density. Aspen is depicted in 223 repeat-photos in South-Central Utah. In 64% of the photosets, aspen declined, while it remained unchanged in 27% and increase in 9%. This is similar to other research that has reported a major decline in aspen across the Intermountain West. Where aspen declined, it usually was replaced by invading conifers. Conifers were depicted in 221 repeat-photosets and in 92% of those images conifers increased markedly. To stop the decline of aspen and return it to its former abundance, disturbance mechanisms must be instituted that remove conifers and stimulate aspen suckering, controlled burning is the preferred alternative in many situations, however where burning is not practical, mechanical means can be used to restore aspen.

Tom H. Rickman, B.E. Jones, A. Vazquez. Eagle Lake Ranger District, Lassen National Forest, Susanville, CA, Aspen Restoration in California: Examples from the Eagle Lake Ranger District, Lassen National Forest
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The Eagle Lake Ranger District (ELRD) of the Lassen National Forest has developed an aspen restoration program that has been recognized as the most progressive in California. This program was initiated due to observed declines in health and distribution of aspen stands on ELRD. The overall goal of the program is to prevent further loss of aspen on ELRD. Objectives of this program are to, 1) map and assess all aspen stands on ELRD, and, 2) implement restoration treatments on all ELRD aspen stands. The perimeter of each inventoried aspen stand is delineated using Global Positioning Systems (GPS), and the condition of each stand is assessed using risk factors adapted from Bartos and Campbell (1998). We present inventory and monitoring data collected to date, and will discuss lessons learned in our implementation of restoration projects.

Paul Rogers, Ecologist, Rocky Mountain Research Station, Ogden, Utah, Coauthors Dave Roberts and Dale Bartos, Using Forest Inventory Data to Assess Aspen Health in the Western United States
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The health of the regional aspen (Populus tremuloides Michx.) community is currently a disputed topic in the Interior West. Numerous recent studies have addressed "aspen decline," purportedly a regional phenomenon, using landscape-level analyses. While we assume that aspen conditions vary throughout the Interior West we believe a study of a regional forest health issue should employ a systematic plot network as a complement to local empirical studies. The study has four primary objectives: 1) Conduct an empirical assessment of aspen conditions across Utah using FIA (USDA Forest Service's Forest Inventory and Analysis) annual inventory data; 2) Refine and enhance statistical methods employed in previous studies for potential

export to other regional aspen assessments; 3) Assess the utility of extensive data sets in addressing large-scale forest health issues; 4) Place the Utah example in the context of the greater western U.S. aspen community.

In the Rocky Mountains "healthy" or "stable" aspen communities are regenerating vegetatively at relatively short time intervals (20-80 years) via disturbances such as fire, wind, avalanche, or management actions. Forest assessments from examination of FIA stand structure and condition variables (species, crown position, dbh, stand age, regeneration, tree damage, and recent disturbance) at a single point in time provide a 'window on the past' as to whether aspen is actively sustaining itself or declining. Variables that prove to have significant relations with NMDS (Nonmetric Multidimensional Scaling) ordinations of stand structure and composition will be combined into a synthetic aspen stability index through multivariate statistical analysis. Results presented here quantify the extent of aspen stability, and hence provide a current assessment of aspen community health in Utah.

John D. Shaw, Rocky Mountain Research Station, Forest Inventory and Analysis, Ogden, Utah, Analysis of Aspen Stand Structure and Composition in the Western U.S.: Implications for Management
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Aspen communities in the western U.S. are considered at risk because of low levels of disturbance (primarily fire) and high levels of herbivory by wild and domestic ungulates. Although estimates of the affected area vary, there appears to be a trend toward the loss of aspen-dominated stands West-wide. In some cases the loss is caused by succession, with shade-tolerant conifers becoming dominant. On dry sites where aspen is considered to be the climax, deterioration of aspen stands and loss of regeneration may lead to a conversion to sagebrush or grassland. As a result, regeneration efforts have tended to classify aspen stands according to two "classic" models: aspen as seral to conifer communities, and pure aspen as a climax community. However, there is evidence that other stand dynamics models exist in stands having an aspen component. The discovery of very old aspen (275-300 years) and multiple aspen age classes in spruce-fir forests suggests that aspen may persist in these stands through gap-phase replacement. In stands where aspen and lodgepole pine are only tree species, dominance may shift in favor of either species depending on the type and intensity of disturbance. Aspen is also a common associate of ponderosa pine, and the two species may coexist over time under a "maintenance" fire regime. Data from 3371 Forest Inventory and Analysis plots, located in stands with an aspen component and covering the range of aspen west of the 103rd meridian in the lower 48 United States, are being used to classify stands according to composition and structure. The results of this analysis should aid management decisions by providing a method for classifying stands according to their successional status, and may suggest alternative stand dynamics models by which aspen may be maintained on the landscape.

Barton R. Stam, Graduate Research Assistant, Utah State University, Logan, Utah, Coauthors John C. Malachek, Dale Bartos, James E. Bowns, and E. Bruce Godfrey,
Quantifying Losses of Understory Forage in Aspen Stands on the Dixie and Fishlake National Forests
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The Western United States has lost up to 60% of its historic aspen (*Populus tremuloides*) stands over the last century, probably as a result of the successional tendency of aspen to be replaced by coniferous species in the absence of periodic fires. One of several major impacts of this change is the loss of understory forage as conifer canopy cover increases. We measured understory biomass in aspen stands ranging from 0% to 81% absolute conifer cover in the canopy and found that understory production declines exponentially as conifers replace aspen. We also did an economic analysis to determine the value of the forage that is not being produced by aspen sites due to the presence of coniferous species within the tree canopy. Study results indicate significant losses in forage, marketable through the sale of livestock, and losses in revenue generated through grazing fees for the USDA Forest Service