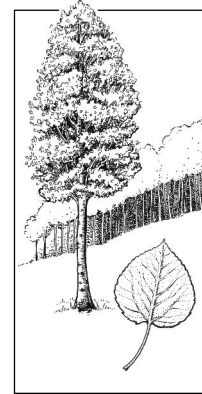


Upper Columbia Basin Network Aspen Protocol Development Summary

(July 2008)



Protocol: Aspen

Parks Where Protocol Will Be Implemented: CIRO and CRMO

Justification/Issues being addressed:

Quaking aspen is declining rapidly in the western United States with an estimated loss of 61% in Idaho (Bartos 2001). Aside from riparian ecosystems, aspen communities are the most biologically rich areas in the intermountain west. Aspen decline cascades into losses of vertebrate species and vascular plants as well as invertebrates and nonvascular organisms. The aesthetics of aspen brings visitors to western mountains and parks. Quaking aspen provide an oasis of lush vegetation and cool shade on hot summer days and offer a spectacular panorama of fall colors in autumn. Aspen is a particularly important attraction for visitors to CIRO. Aspen is a seral fast growing shade intolerant species commonly replaced by shade tolerant conifers. Current fire intervals, extents, and intensities are not regenerating aspen at historic rates, and are likely causes to the aspen decline observed today. Secondly, shade-tolerant conifer encroachment and overtopping is contributing to aspen decline. Our aspen monitoring program will address overall aspen abundance, conifer encroachment, and aspen regeneration. Management thresholds for sapling stems per hectare are available from the literature and our monitoring program will allow park managers to direct appropriate actions to maintain park aspen populations.

Initial signs of aspen decline can manifest as reduced regeneration and aspen canopy cover within the clone. Bartos and Campbell (1998) suggest that regeneration levels greater than 1,200 stems/ha is sufficient for the long-term maintenance of aspen clones. Regeneration is here defined as the number of stems 1.5 to 4.6 m (5 to 15 ft) tall. It is well established that conifer encroachment is a stressor that can reduce aspen regeneration to levels jeopardizing the long-term survival of the clone (Bartos and Campbell 1998; Kaye et al. 2005).

Preliminary visual examination of time series aerial photography (1950, 1977, 1990, and 2004) for a central area in CIRO, reveals a reduction in aspen density within several clones although the extent of the clones through time appear similar. It is desirable to detect declines in regeneration and canopy cover at an early stage where management may more effectively turn around a negative trend. Monitoring aspen and conifer cover and regeneration is important for determining when active management is necessary for the long-term maintenance of aspen stands in CIRO and CRMO.

Monitoring Questions and Objectives to be addressed by the Protocol:

Monitoring questions addressed by this protocol include:

- Are the aspen populations stable, declining, or increasing?
- Are changes in aspen aerial extent and clone density evident within the time period 1950 and 2004 as determined through analysis of available historical aerial photography for CIRO?
- Are aspen clones regenerating at rates at or above 1,200 stems/ha? What is the long-term trend in regeneration of park aspen populations as well as individual stands?
- What is the aspen density of live and dead aspen stems? Is the live and dead stem density declining or increasing in the parks and in individual stands?
- What is the status and trend in conifer density within aspen stands?
- What is the variability of regeneration in plots within an aspen stand and between different aspen stands?

Monitoring objectives addressed by this protocol include:

- 1) Estimate status and trend in aspen abundance, as measured by stem density of live and dead trees, within aspen stands.
Justification: Low density of live aspen or a trend towards dead stems along with lack of recruitment will eventually jeopardize the long-term survival of the aspen clone (Bartos and Campbell 1998).
- 2) Estimate status and trend in conifer density within aspen stands.
Justification: High levels of conifer encroachment in aspen stands (greater than 25% cover) affect the reproduction of aspen and the stand may eventually be permanently converted to a conifer stand (Bartos and Campbell 1998).
- 3) Estimate status and trend in regeneration of park aspen populations as well as individual stands.
Justification: Declines in aspen have been detected on time series aerial photos for CIRO. However, remotely sensed data will not readily detect changes in population structure of aspen within a clone and field assessments are therefore necessary.

Basic Approach:

We will generate a list-based sampling frame from aspen stands identified on current satellite imagery and aerial photography and further delineated on the ground using GPS technology. All available stands larger than 0.2 ha will be sampled (time permitting) in a panel design with a 5-year sampling interval. Within stands permanent and temporary circular sub-plots will be established along transects. Variogram analysis will determine the distance between sub-plots required for spatial independence between sub-plot data. The number of sub-plots required in each stand will be determined via power analysis to allow for detection of trend with statistical confidence and power while minimizing the sampling effort. The number of sub-plots placed in each stand will further be weighted by the size of the stand. Historical aerial photographs from the 1950's, 1970's, and 1990's for CIRO will be scanned and orthorectified for further visual analysis of change in aspen cover.

Regional-level protocols exist for assessment of regeneration and conifer encroachment in aspen stands. The Wyoming Department of Fish & Game (Kilpatrick et al. 2003) has developed a peer reviewed sampling methodology for aspen with the goal of assessing aspen regeneration at stages along a successional gradient, pre- and post-fire treatments. This sampling protocol describes established sampling techniques for acquiring a statistically reliable measure of aspen stem densities by tree size class and photo points. Thresholds for desirable levels of aspen regeneration and canopy cover and acceptable levels of conifer encroachment have been identified by Bartos and Campbell (1998) and will serve as guidelines for long-term maintenance of park aspen populations. Another resource is the Aspen Delineation Project, an interagency effort involving the BLM, the USFS and the California Department of Fish & Game, with the goal of providing agency personnel with information and tools they need to achieve long-term aspen conservation objectives. We will adapt these existing protocols to meet NPS standards (Oakley et al. 2003) and incorporate protocol narrative and SOPs, analysis and reporting procedures specific to CIRO and CRMO.

Principal Investigators and NPS Lead:

Protocol development will be done through a cooperative agreement with the Department of Rangeland Ecology and Management, College of Natural Resources, University of Idaho (975 W. Sixth Street, Moscow, Idaho, 83844, 1-208-885-7103). Principal Investigators: Stephen C. Bunting and Eva Strand (208-885-5779). NPS Lead: Lisa Garrett, NPS Network I & M Coordinator (208-885-3684).

Protocol Status:

A draft protocol was submitted for peer review in February 2008. Protocol reviews were received in June 2008. Protocol revisions are currently scheduled to extend into early fall 2008 with a final protocol submitted by November 2008.

Literature Cited:

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