



Aspen Monitoring

City of Rocks National Reserve

Importance: At risk of region-wide decline

Quaking aspen is currently undergoing a region-wide decline. This decline has been observed throughout the West over the past 50 years and is commonly attributed to a decrease in fire frequency, caused by the effective fire suppression that began as a result of Euro-American settlement. Changing fire regimes has allowed an expansion of conifer species into some aspen stands. Another phenomenon commonly referred to as aspen 'die-off' has been observed within the past decade, and is possibly a result of drought and early snow melt caused by warming climate trends. Mature aspen stems begin to die, and if aspen regeneration is limited, this will eventually lead to the loss of the aspen roots and stand. Aspen ecosystems contribute considerably to regional biodiversity and their unique beauty attracts visitors in the summer and fall.

Status and Trends

Aspen stands in City of Rocks National Reserve have been identified and mapped via remote sensing, aerial photo interpretation and field reconnaissance. The sampled population consists of all stands larger than 0.3 ha in size, except for aspen growing on private land, directly in riparian areas or shrubby snow-damaged aspen. Circular plots of 4-meter radius are sampled along transects, and the total number of plots in each stand depends on stand size. In 2008 we sampled 77 plots in 15 stands, which were re-sampled in 2011. In 2009 we sampled 45 plots in 9 stands which were re-sampled in 2012. At each plot the number of aspen and conifer stems in six predefined size classes, including dead standing stems, are recorded. These data provide estimates of aspen regeneration and the abundance of live aspen, dead aspen, and conifer species. Aspen stem counts in stems/hectare for the first sampling period (2008-2009) and the second sampling period (2011-2012) were:

- 2008/09: suckers – 2,800, regeneration – 2,249, mature – 435, and dead – 310
- 2011/12: suckers – 5,429, regeneration – 2,479, mature – 724, and dead – 365

Statistical analysis indicates a significant park-wide increase in regeneration, mature, and dead aspen stems. There was no statistically significant difference for suckers (stand #33 was classified as an outlier because of its high sucker count). Live conifers are present at low densities in 14 stands.

Management Applications

- Provide information and decision support to park management.
- Identify stands with insufficient regeneration or a negative trend in regeneration, live aspen abundance, or conifer density.
- Provide feedback on the timing and success of park management and restoration activities.
- Inform integrated assessments of climate change impacts on park resources.

Objectives

Estimate current status and long-term trend in:

- regeneration of park aspen populations as well as individual stands
- conifer density within park aspen stands
- aspen abundance, as measured by stem density of live and dead trees



Aspen suckers increased considerably in stand #33, from 2,188 stems/ha in 2008 to 66,514 stems/ha in 2011. This increase in suckering was not typical for other stands.



2009



2012

Distance photos of stand #72 show the changes between 2009 and 2012. While suckering and regeneration remained around 1200 stems/ha, the mature stem count decreased from 348 to 199 stems/ha.