



Aspen Monitoring

City of Rocks National Reserve

Importance: At risk of region-wide decline

Quaking aspen is currently undergoing a region-wide decline. Aspen decline in the West has been observed 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 have 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 the result of drought and early snow melt caused by a warming climate. If mature aspen stems begin to die and aspen regeneration is limited, this will eventually lead to the loss of the roots and stand. Aspen ecosystems contribute considerably to the biodiversity of the parks and their unique beauty attracts visitors in the summer and fall.

Objectives

Estimate current status and long-term trend in:

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

Long Term Monitoring

Aspen stands in City of Rocks National Reserve (146 plots in 25 stands) 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. Each aspen stand is assigned a number of plots depending on the stand size. In 2011, 84 permanently marked plots in 18 stands were sampled in the reserve. These plots and stands were also sampled in 2008 and this is the first year that we are able to evaluate change in the first panel in the reserve. At each plot we record the number of aspen and conifer stems in six predefined size classes, including dead standing stems. These data will provide estimates of aspen regeneration, stem density, dead aspen stems and conifer abundance. The aspen stem counts in stems/hectare in the first panel in City of Rocks National Reserve were:

- 2008: suckers – 2,644, regeneration – 1,837, mature – 493, and dead – 212
- 2011: suckers – 5,367, regeneration – 2,574, mature – 733, and dead – 328

Regeneration increased over the three year time period. There are four stands in the reserve with mature stem counts lower than 250 stems/ha. Conifers are present in eight 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.
- Record long-term trends for climate change assessments and effects in parks.



Rocky Mountain juniper seedling, about 5 inches tall. Several conifer species are present in aspen stands in City of Rocks National Reserve including Rocky Mountain juniper, Douglas-fir, pinyon pine, limber pine, and lodgepole pine. The majority of the stands have none or very low counts of conifers. In stand #37 the mature conifer and aspen stem counts are comparable.



In stand #33 the aspen suckers increased considerably from 2,188 stems/ha in 2008 to 66,154 stems/ha in 2011.