

35 Years of Aspen Recruitment in the Greater Yellowstone Ecosystem

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Background

Quaking aspen (*Populus tremuloides*) stands are vital to ecosystem health and have a diversity of age and structural classes to provide wildlife habitat and natural fuel breaks. Rocky Mountain elk (*Cervus canadensis*) are the primary species that browse aspen suckers in the winter because they are palatable and available above the snow. The Northern Yellowstone Winter Range, hereafter referred to as the northern range, is the wintering ground for the largest elk herd in Yellowstone National Park (YNP) and extends outside YNP onto the Custer Gallatin National Forest (CGNF). The northern range elk population held approximately 20,000 individuals in 1995. During this time, aspen coverage on the northern range was reduced to 1% due to elk browsing and other environmental factors. As of 2023, the northern range elk herd has been reduced to approximately 6,000 individuals. St. John (1995) surveyed 341 aspen plots on the northern range outside YNP in 1990 to determine the relationship between elk browsing and aspen stand recruitment. In 2005, Kimble et al. (2011) surveyed the same aspen plots to determine if aspen recruitment had changed since 1990. St. John (1995) and Kimble et al. (2011) found that aspen stem recruitment was decreasing on a landscape scale. The objective of this study is to resurvey those 341 aspen plots to challenge earlier interpretations about aspen stand survival over time on the northern range. Using this information, we can identify aspen plots that would benefit from Forest Service management to insure aspen presence long-term in the GYE.

Methods

The study area is in south-central Montana on the CGNF, directly north of YNP. It consists of three subunits, east of Yellowstone River (East River), west of Yellowstone River (West River), and Tom Miner Basin (Tom Miner). Stem height and diameter at breast height (dbh) of all live aspen stems within each plot are measured and categorized as sprouts (<1 m tall), saplings (1-2 m tall), recruitment stems (>2 m tall and <5 cm dbh), and overstory stems (>2 m tall and >5 cm dbh). A total of 32 randomly selected browsed or unbrowsed saplings and sprouts are recorded. Recruitment stems represent recent growth of aspen stems above elk browsing height, while density of overstory stems ensure the sustainability of the aspen stand.

Results

Preliminary results include all 125 surveyed aspen plots within the East River subunit. Our results indicate that recruitment and overstory stems have increased in the East River subunit between 2005 and 2023. Kimble et al. (2011) and St. John (1995) found no significant relationship between elevation and aspen plots within the East River subunit. We found that aspen recruitment and overstory stems have increased at higher elevations since 2005. We also found that as time passed, recruitment and overstory stems increased in plots farther from YNP. Effects of elk browsing also varied with distance to YNP and according to year.