

Influence of Repeated Alternative Biodiversity Thinning Treatments on Coastal Forests

Project Update, November 2018

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To manage forests for a broad set of ecosystem values including wood production, Carey and Curtis (1996) described a biodiversity pathway approach utilizing multiple thinnings, conservation of structural legacy, and extended rotations. In 1999, DNR initiated an empirical test of alternative biodiversity stand management pathways in young stands. The study began with five different pre-commercial thinning (PCT) treatments—combinations of thinning intensities and gap creation—replicated at five sites. In 2017, a commercial variable density thinning (VDT) with additional gap treatments was applied to explore the influence of gap timing on structural complexity and wildlife habitat.

This project will allow quantification of alternative PCT treatments and subsequent commercial thinning on stand complexity and growth. Information gained from this project will inform agency decisions about the value of different treatment options in meeting multiple management objectives under the biodiversity pathway approach.

Treatment responses have been quantified with repeated measurements of a permanent plot network and with LiDAR-derived canopy metrics. Results from this project will inform the operational application of biodiversity thinning by allowing DNR to more accurately predict outcomes. For example, how does the history of various PCT treatments influence future value of wood products and stand complexity? Do the unique tree forms, understory structure, and biological legacy from the previous biodiversity thinning remain distinct after a commercial thinning? What is the influence of the timing of gap creation (during PCT vs. during the later commercial thinning)?

Accomplishments to Date:

- Study plan developed and externally peer reviewed; study installed in 1997.
- PCT & gap treatments implemented in 1999.
- Commercial thinning & additional gap treatments implemented in 2017, as part of the Goodman DEMO timber sale.
- Plots measured in 1997 (pre-treatment), 1999, 2003, 2008, 2014, and after thinning in 2017.
- Initial stand growth results are reported in the November 2018 OESF newsletter.

Key Findings to Date:

- Tree live-crown ratios were increased significantly by PCT treatments, especially when thinned to a wide spacing (200 trees/acre). This effect on crowns was still present 15 years after PCT (Figure 1). Trees adjacent to gaps created during PCT maintained even greater live-crown ratios over time. Trees with larger crowns are associated with larger root systems, greater windthrow resistance, and faster growth, and it is anticipated that they will respond more rapidly to the 2017 thinning.

- In 2014, fifteen years after PCT treatments, all but the most intense PCT treatment (wide spacing plus gaps) had relative density values approaching or above 60, indicating the potential benefit of a second thinning, which was conducted in 2017.
- Compared with no PCT, traditional PCT (300 trees/acre) increased average tree diameter by 1.5 inches after 15 years, whereas wide spacing PCT increased diameter by 2.7 inches. Adding gaps during PCT did not affect tree diameter 15 years later.
- After 15 years, the number of larger trees (≥ 12 inches diameter) per acre was lowest with no PCT (80 per acre). Wide spacing PCT plus gaps produced 94 larger trees/acre, whereas all other PCT treatments (traditional PCTs, wide PCT without gaps) averaged 127 larger trees/acre.

Analysis of understory growth response is underway; early results suggest even small canopy gaps allow the understory to re-establish and provide valuable forage for herbivores such as deer and elk.

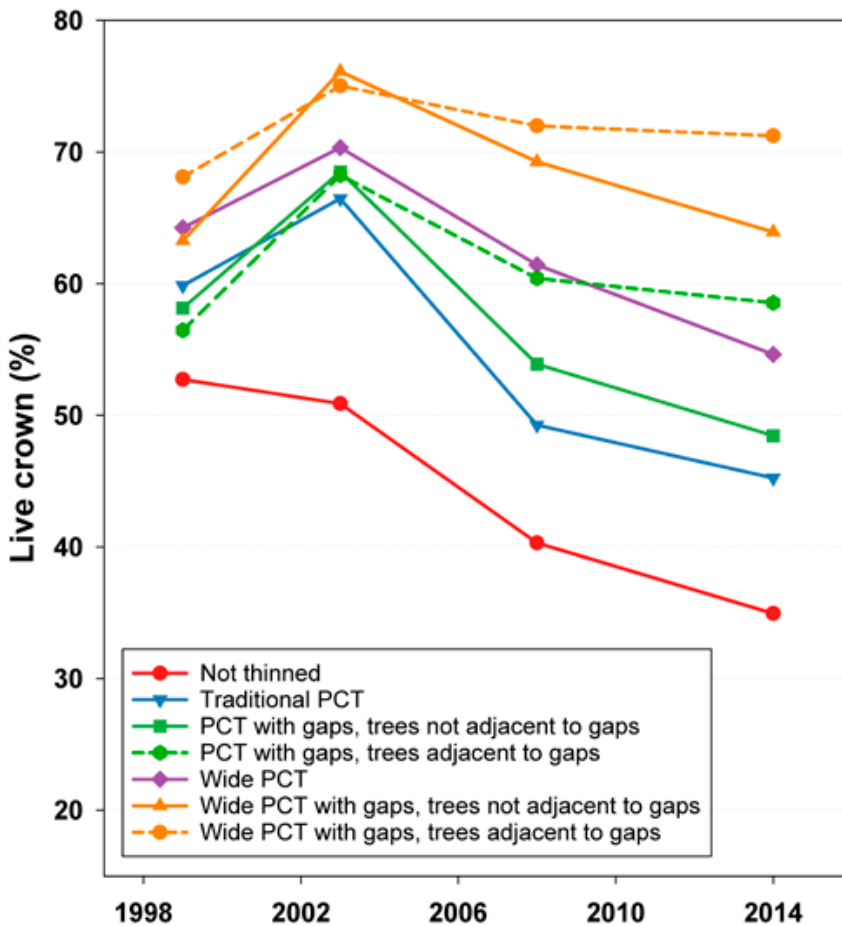


Figure 1. Changes in average live crown ratio after treatment