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Agroborealis

Spring 2017 Research Highlights

Miho Morimoto uses a laser rangefinder to measure the diameter of trees in the Bonanza Creek Experimental Forest.

Keeping forests sustainable

Researchers study how to improve forest regeneration and adapt to climate change

The Alaska Constitution requires a "sustained yield" on harvested state and private forestland. Additional regeneration efforts are required in Southcentral and the Interior if regeneration fails to meet the state's standards within seven years.

How well has regeneration worked, and what can forest managers do to improve regeneration in the face of a changing climate? Emeritus UAF Professor Glenn Juday said that although the state based its regeneration standards on sound research and accepted forestry practices, no one had done thorough, on-the-ground research to determine how well regeneration has worked over time on harvested Interior forestlands.

As part of her doctoral research with the UAF School of Natural Resources and Extension, Miho Morimoto studied regeneration of state boreal forestlands on which white spruce had been harvested between 1975 and 2004. Her research looked at historical and current practices of reforestation as well as predictive models of change based on different climate scenarios.

Understanding post-harvest regeneration is critical, she said, because of an increasing demand for wood biomass energy. An introduction to her dissertation points out that as of 2015, nine public wood biomass facilities have been built in the Interior, 10 are under construction and 11 more are being designed or studied for feasibility.

Morimoto considered whether state forest harvest units have adequately regenerated under a typical

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"low input" management. She also examined whether harvest type, site preparation method and reforestation technique resulted in differences in forest regeneration.

Miromoto and a research assistant sampled 726 plots from 30 representative units in the Tanana Valley State Forest and other state-classified forestlands that were harvested over a 40-year period. They looked at plots that were clearcut or partially cut, scarified or unscarified, and planted or naturally regenerated following the harvest. To enhance seedbed quality for white spruce, some sites were "scarified" with a bulldozer blade or disk trencher.

In each circular plot, which had a 1.69 m radius, they sampled the height and diameter of trees at 1.37 m and recorded tree species and density, the presence of understory plants and the amount of vegetation browsed by moose.

Her results showed that based on the state's regeneration standard, post-harvest regeneration has been largely successful. She also found that sites that had been clearcut and/or had undergone site preparation had better tree regeneration, more basal area and more biomass than sites that were partially harvested or had experienced no site preparation.

A harvest unit in the Salcha area was studied for reforestation.

Current small-scale, low-input management would represent sustainable forest management under stable environmental conditions, she concludes. The challenge forest managers face is that the effects of climate change in the boreal forest are more pronounced than at lower latitudes. Research conducted by Juday and others, she said, show that rising temperatures have already begun affecting the Interior boreal forest by changing tree growth, modifying wildfire behaviors and warming or thawing permafrost.

"We don't know exactly what will happen with climate change," she said.

Miho Morimoto is getting ready to sample a harvest unit in the Tanana Valley State Forest.

Morimoto said that climate change will likely require "adaptive management," an approach that looks at individual sites to determine the best forest management practices and then monitors and evaluates as conditions evolve. Her dissertation provides a set of guidelines that will help forest managers adapt to climate change.

One example is assisted migration of the current species or new species. Morimoto said climate change is likely to make some areas too warm and dry for the current species to grow, which will require the assisted migration of those species to more suitable climatic sites or the assisted migration of new species into the unsuitable sites. "It is obvious that we need to assess the risk of species introduction and study genetic suitability," she said.

Another outcome is that research done by Morimoto and Juday showed that the seven-year period the state requires for regeneration was too short. She and Juday persuaded state officials to lengthen the regeneration period to 10 years. Draft proposals are in the final stages of review.

"White spruce recruitment takes longer than seven years," she said.

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