

# ASCC

## ADAPTIVE SILVICULTURE FOR CLIMATE CHANGE Second College Grant, New Hampshire

**ASCC is creating robust, science-based examples of integrating climate change into silvicultural planning and on-the-ground actions.**

### ***Project Purpose***

Adaptive Silviculture for Climate Change (ASCC) is a collaborative effort to establish a series of experimental silvicultural trials across a network of different forest ecosystem types throughout the United States. Scientists, USDA Forest Service land managers, and a variety of partners have developed trial sites as part of a multi-regional study researching long-term ecosystem responses to a range of climate change adaptation actions.



### ***Project Area***

The Second College Grant is one of the five ASCC study sites. “The Grant” consists of 27,000 acres of forests, rivers, and wetlands in the Northern Forest region of New Hampshire, and has been owned and managed by Dartmouth College since 1797. The

forest is predominantly rich, mesic northern hardwoods dominated by sugar maple, American beech and yellow birch with minor components of red maple, red spruce, and other species. “The Grant” has long been utilized for timber, but is also recognized as a model forest used for wilderness recreation and forest and natural resource research.

### ***Projected Climate Change Impacts***

Key projected climate change impacts that the project team considered for the Second College Grant include:

- Increasing wind and ice events leading to crown and other forest damage
- Increasing moisture stress due to drought as well as above-average precipitation periods, leading to more damage from pests and diseases and potential reduced growth
- Loss of key species or functional groups critical for maintaining ecosystem services

Climate change will present challenges and opportunities for accomplishing the management objectives of the Second College Grant, including:

#### ***Challenges***

- Several dominant tree species in these stands, such as sugar maple, are projected to have reduced habitat suitability under future climate scenarios.
- Dominant tree species face increased threats in the future from introduced insects and diseases.

#### ***Opportunities***

- Some tree species found nearby are expected to have increased habitat suitability, including red oak, red maple, white pine, and eastern hemlock.
- Habitat suitability for yellow birch and red spruce is not expected to change substantially in northern New Hampshire.

***To learn more about the Second College Grant ASCC project, contact the Site Leads:***

[Tony D'Amato](#), University of Vermont, & [Chris Woodall](#), USFS Northern Research Station

## Adaptation Options

What approach best prepares forest ecosystems for climate change?

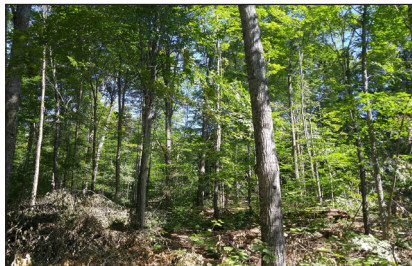
Adaptation options occupy a continuum of management goals related to their levels of desired change. A team of natural resource specialists and researchers developed a set of desired future conditions, objectives, and tactics for the Second College Grant based on three climate adaptation approaches:

### RESISTANCE

*Maintain relatively unchanged conditions over time*

Strategies & Approaches:

- reduce competition for moisture, nutrients, and light
- single-tree selection (70-80 ft<sup>2</sup>/acre)
- multi-aged cohort
- retain biological legacies
- increase downed dead wood



### RESILIENCE

*Allow some change in current conditions, but encourage an eventual return to reference conditions*

Strategies & Approaches:

- reduce competition for moisture, nutrients, and light
- group and single-tree selection (20% in gaps of 0.1-0.25 acre in size, 20% in reserves, 70-80 ft<sup>2</sup>/acre matrix)
- maintain and restore diversity of native species
- increase drought-adapted species (red maple and beech)



### TRANSITION

*Actively facilitate change to encourage adaptive responses to changing and new conditions*

Strategies & Approaches:

- variable density thin / irregular shelterwood (20% in gaps of 0.25-1 acre, 10-20% in reserves, 70-80 ft<sup>2</sup>/acre matrix)
- increase future-adapted, off-site species (northern red oak, bitternut hickory, eastern white pine, eastern hemlock, basswood, black birch, bigtooth aspen, chestnut)



← Reduce Climate Change Impacts

Facilitate Adaptive Responses →

### Monitoring

Monitoring is an essential component of the ASCC study. Research partners from many institutions are working together to investigate the effectiveness of different silvicultural treatments aimed at creating adaptive ecosystems. Some of the monitoring items include:

- Natural regeneration of planted seedlings
- Residual tree survival and growth
- Songbird, small mammals, insects, fungi, and other wildlife community responses
- Carbon pools, including living and downed woody materials and forest soils

### Progress & Next Steps

Stands are marked and measurements on pre-treatment vegetation, carbon, wildlife, and spatial data were collected in the summer of 2017. Harvest was initiated in the late summer and completed by fall of 2017. Project participants will continue tending and monitoring the Second College Grant ASCC site for many years.

### Project Impacts

Treatments and findings from this study are part of an active network of long-term silviculture research, and create a model experimental design for research on forest adaptation to climate change.

For more information on the ASCC approach and the ASCC project sites, go to: [www.forestadaptation.org/ascc](http://www.forestadaptation.org/ascc)



The University of Vermont



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