Adaptive Silviculture for Climate Change

Shifting Precipitation and the Regeneration Bottleneck of Local and Transitional Forests

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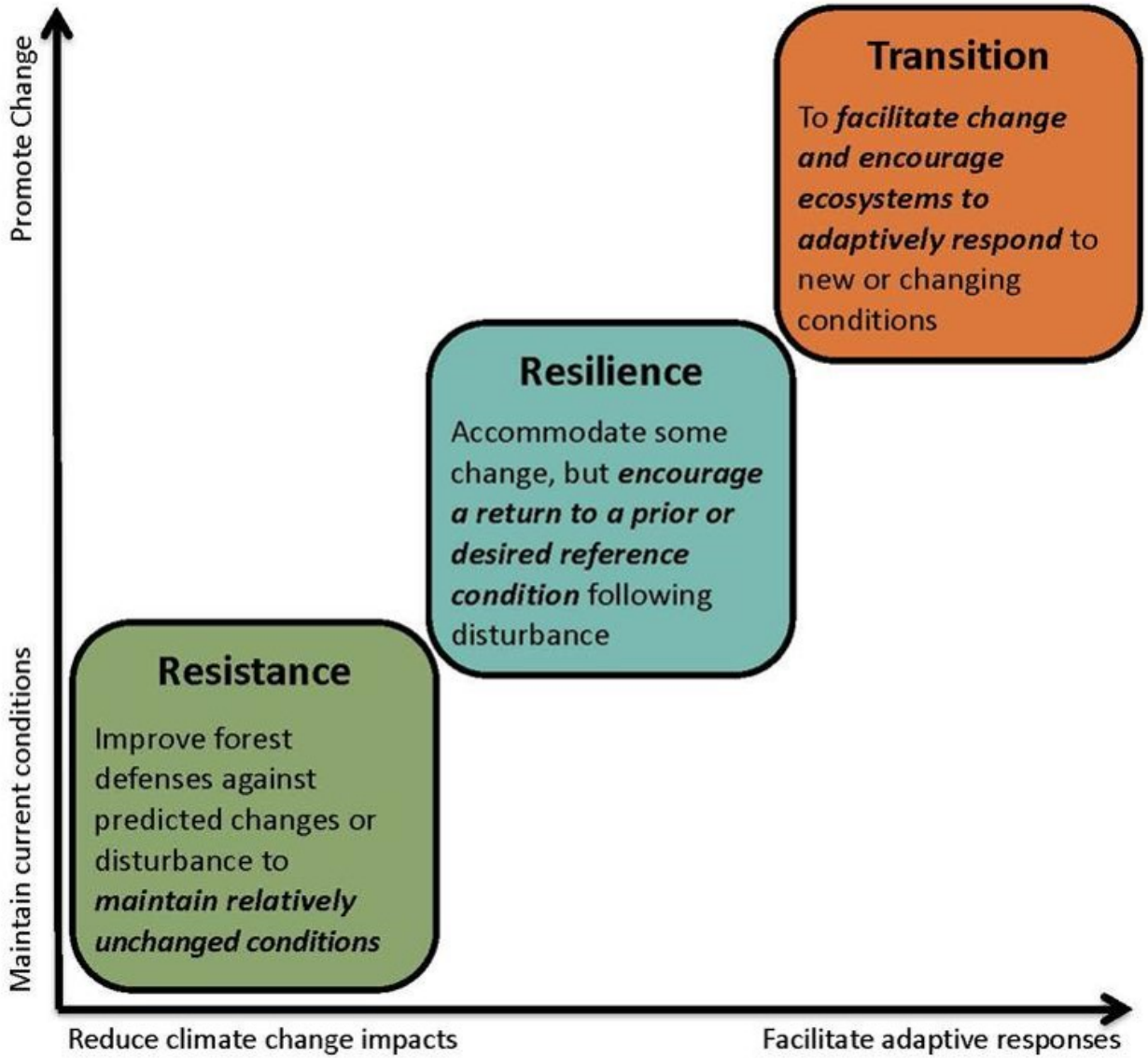
May 2, 2017

Changing Forests

V.R.F. Sand blow 16 acres, fall 1937 showing dune which covered Butternut tree to height of 9 feet. Dune planted in 1937.

Jericho Research Forest Collections

Managing for Uncertainty



Nagel et al. 2017

Proposed Research

01

Adaptation and mitigation strategies through long-term, retrospective experiments

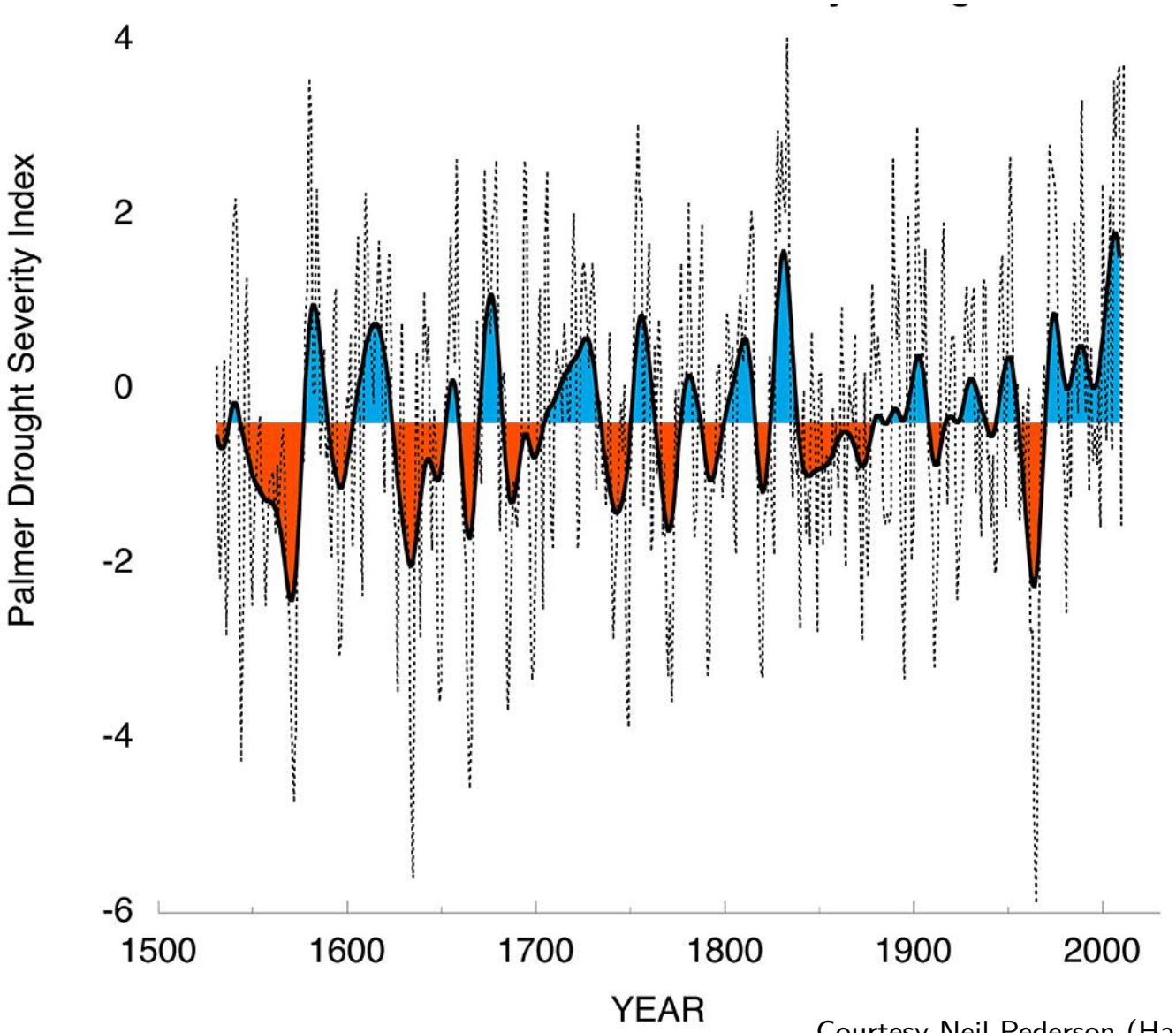
02

Future adapted tree species response filtered by site

03

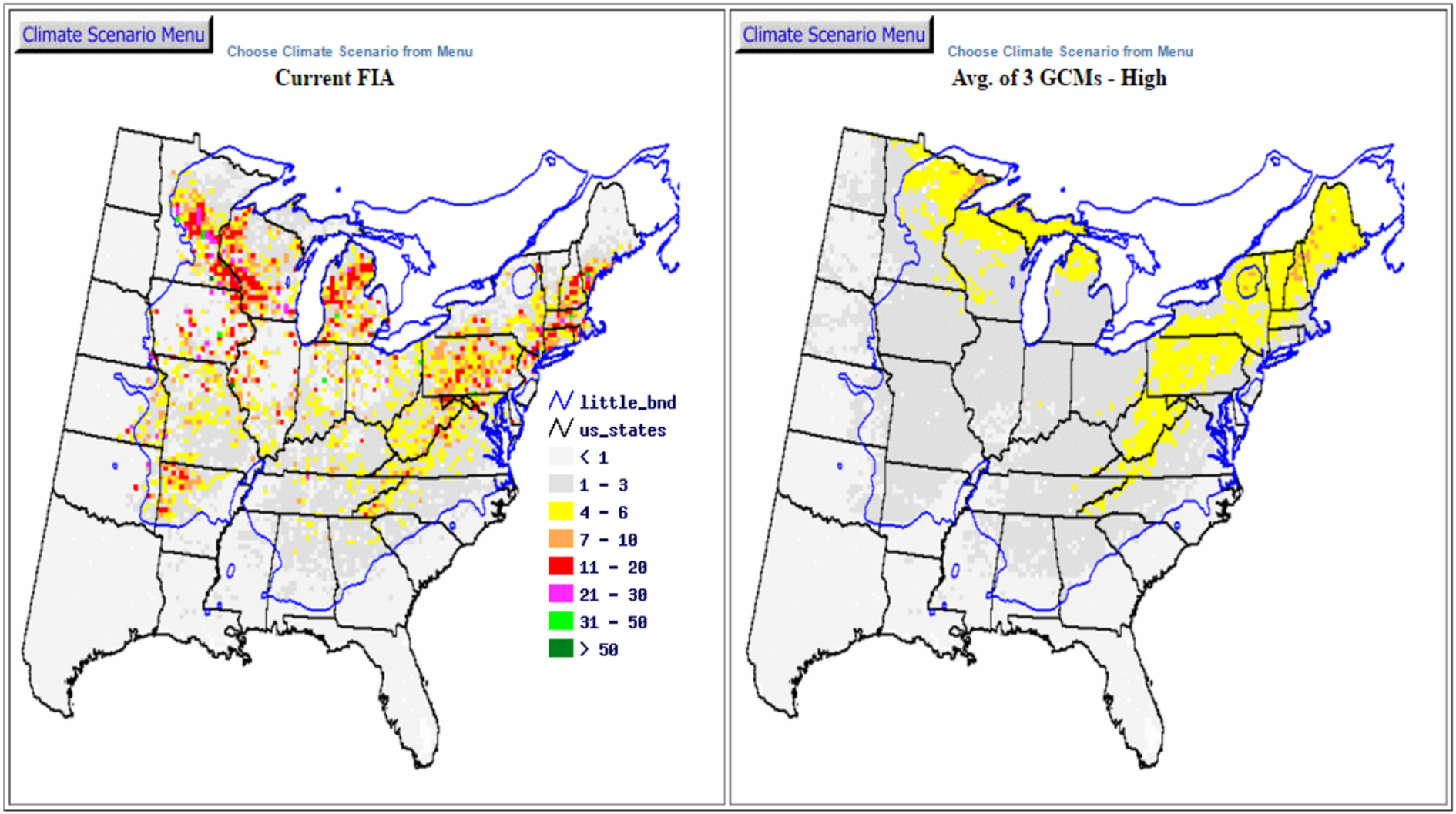
Examining the regeneration bottleneck under shifting climate and species ranges

A Shifting Precipitation Regime



Courtesy Neil Pederson (Harvard Forest)

Shifting Habitat, yet "Failure to Shift"



Prasad et al. 2007

Germination Bottleneck

How does shifting precipitation influence success of naturally and transitional seedbank?

How does site (soils, litter) and canopy moderate regeneration response under manipulated precipitation?

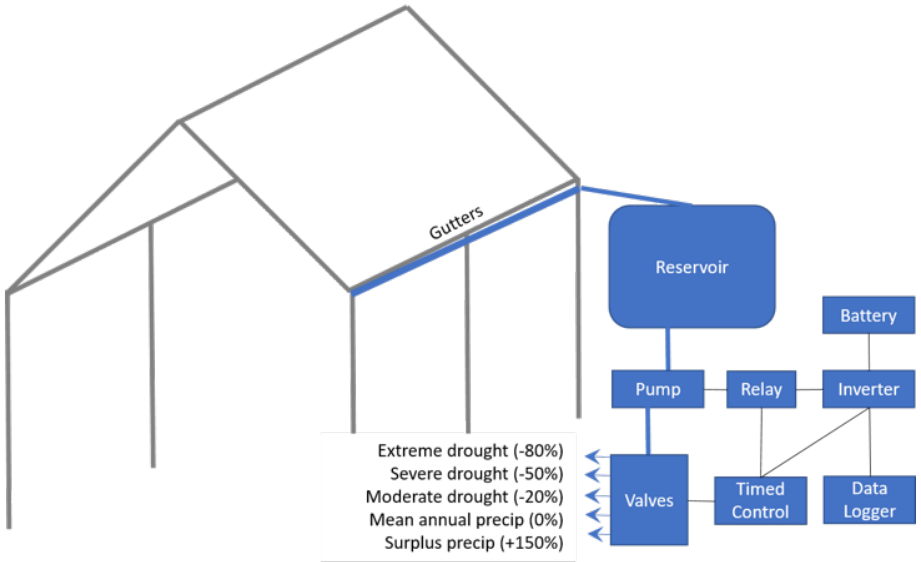
How do functional traits (tolerance, seed size, geographic centroid) drive future forest development?

Study Design: Study Sites

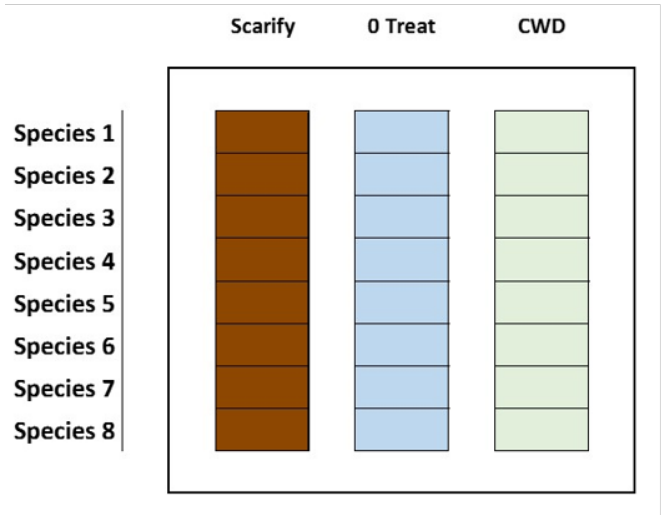
Research Forest	Acres	Dominant forest types
Jericho Research Forest (JRF)	485	**northern hardwoods**, hemlock, pine-red oak, conifer plantations
Wolcott Research Forest (WRF)	130	**spruce-fir**, old field, conifer and hardwood plantations
Washington Research Forest (WaRF)	55	**sugar maple**, northern hardwood
Second College Grant, Dartmouth Col. (SCG)	27,000	**northern hardwoods > spruce-fir**

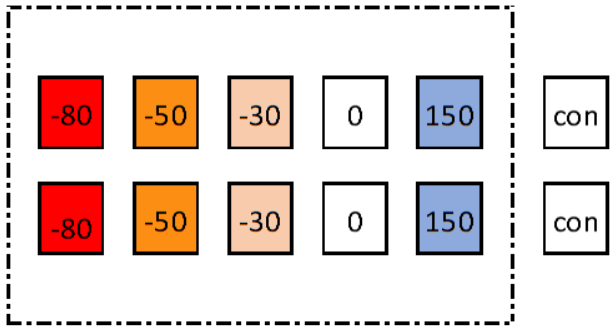
Study Design: Precipitation Manipulation

Shelter Design

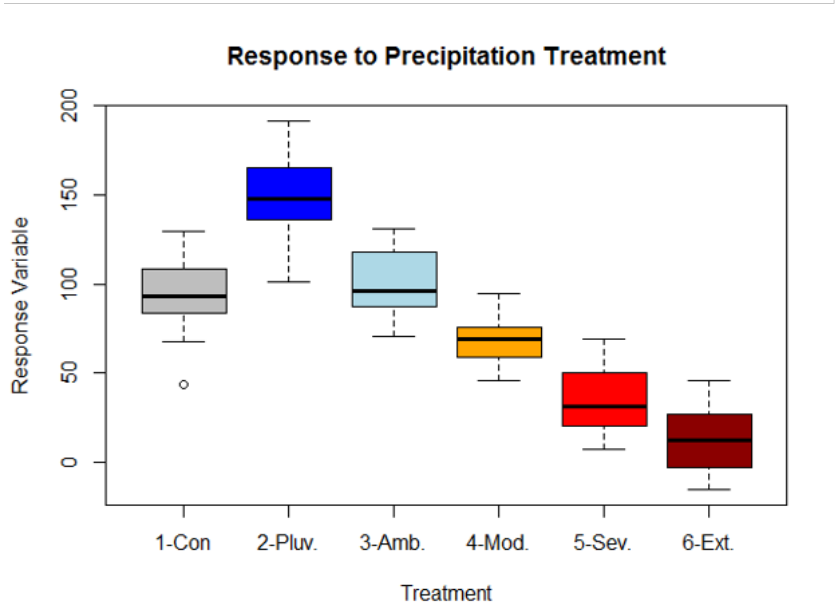


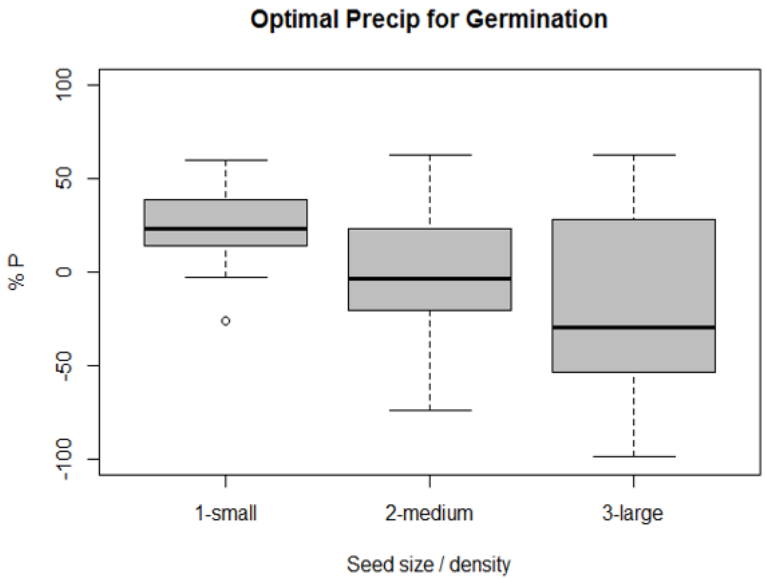
Plot layout

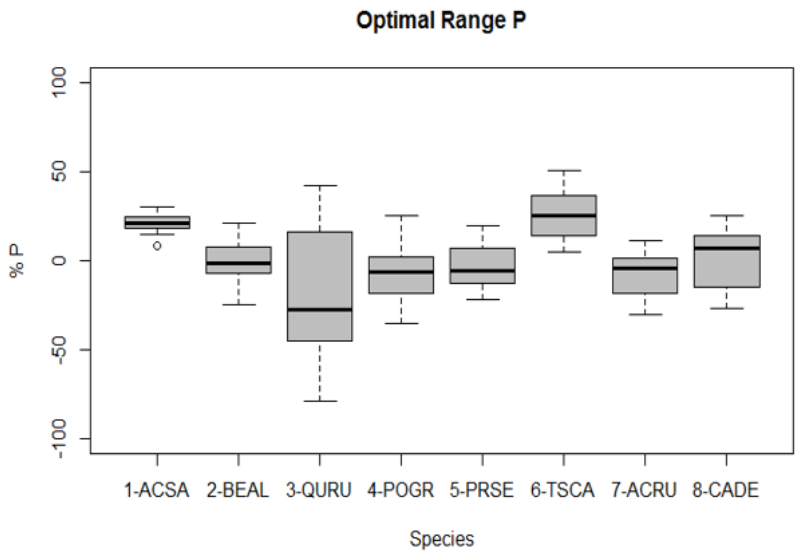


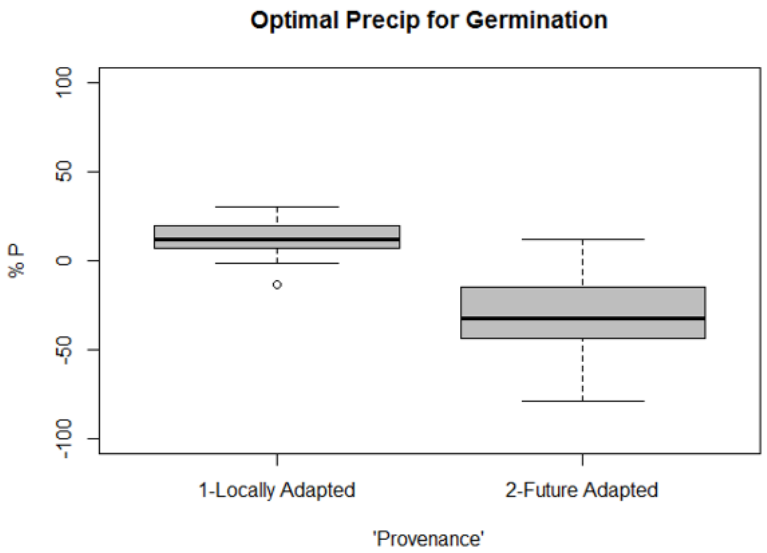


Expected Results









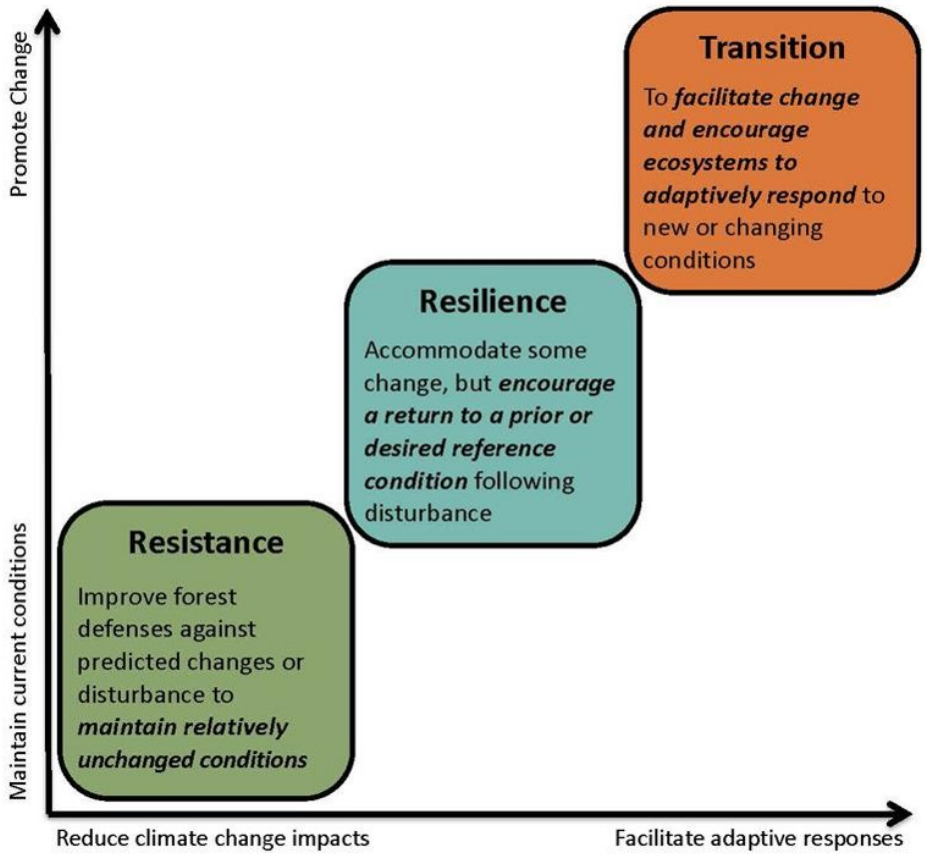
Implications

"Site matters"

Function of future forests

Refine models

Test framework



Ackowledgements

The University of Vermont

UQÀM

Northern Research Station USDA Forest Service

Harvard Forest

NIACS Northern Institute of Applied Climate Science

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Slide with Plot

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plot(pressure)
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