FOREST ADAPTATION:

CURRENT CHALLENGES AND WAYS FORWARD

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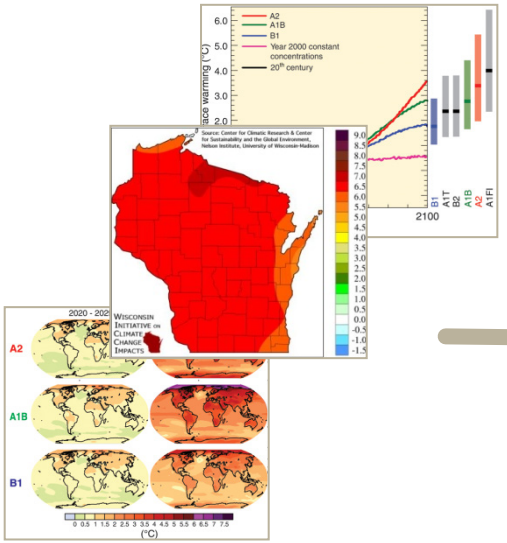
www.climateframework.org

Climate Change Response Framework

A collaborative approach among scientists, managers, and landowners to incorporate climate change considerations into forest management.



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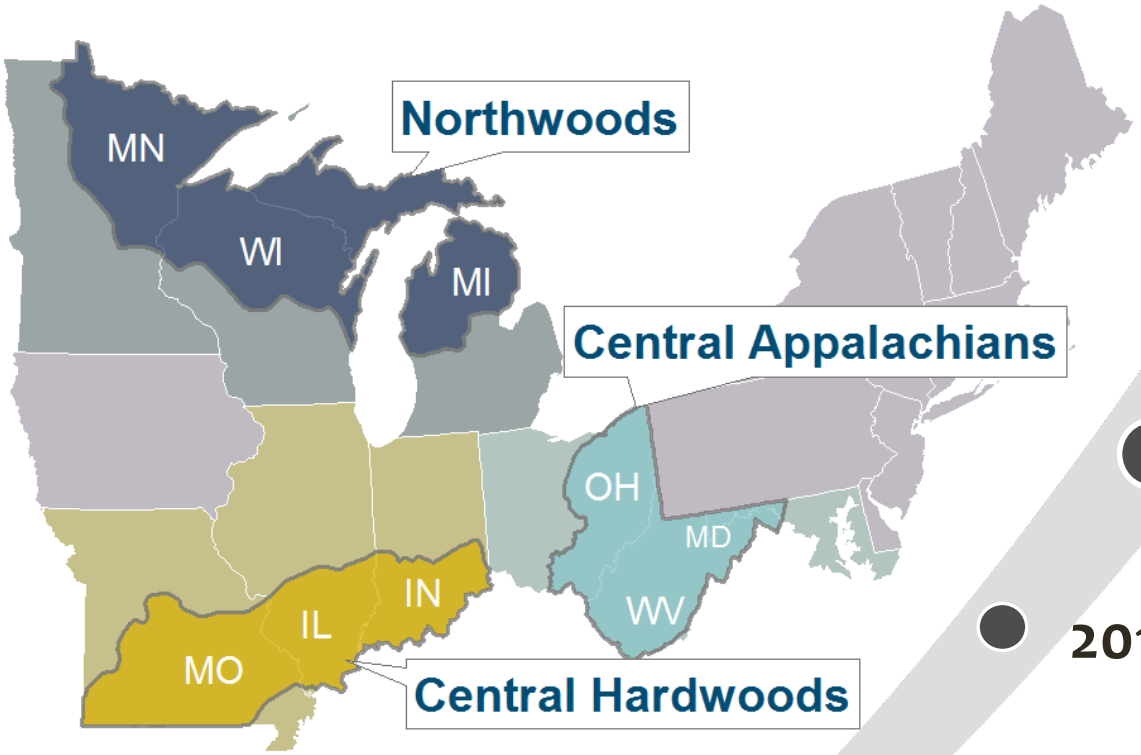
Climate Change Response Framework



2013: Northeast

2012: Central Appalachians

2011: Central Hardwoods

2010: Northwoods expansion

2008: Wisconsin pilot

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Framework Approach:

1. Identify location, ecosystems and time frame.
2. Establish partnerships.
3. Assess ecosystem vulnerabilities.
4. Compile adaptation strategies and approaches.
5. Plan and implement at appropriate scales.
6. Integrate monitoring and evaluate effectiveness.

Project Components:

- Partnerships
- Vulnerability Assessment
- Forest Adaptation Resources
- Demonstration Projects

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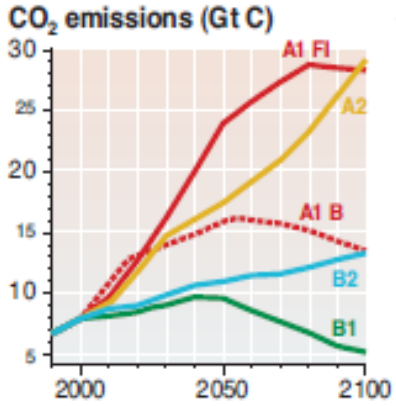
Challenges for Forest Adaptation

1) Uncertainty of future conditions
2) Scale of science ≠ Scale of management
3) No single, one-size-fits-all “answer”
4) Lack of real-world examples*

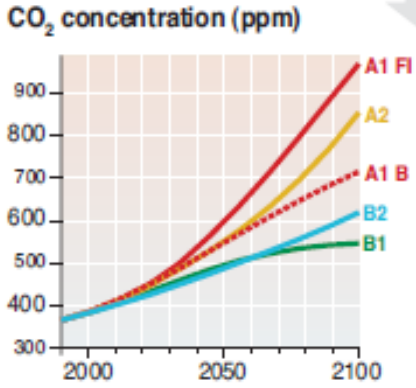
*until now… stay tuned!!

#1: Uncertainty of Future Conditions

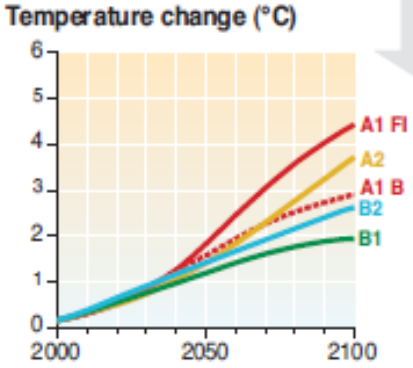
EMISSIONS



CONCENTRATIONS

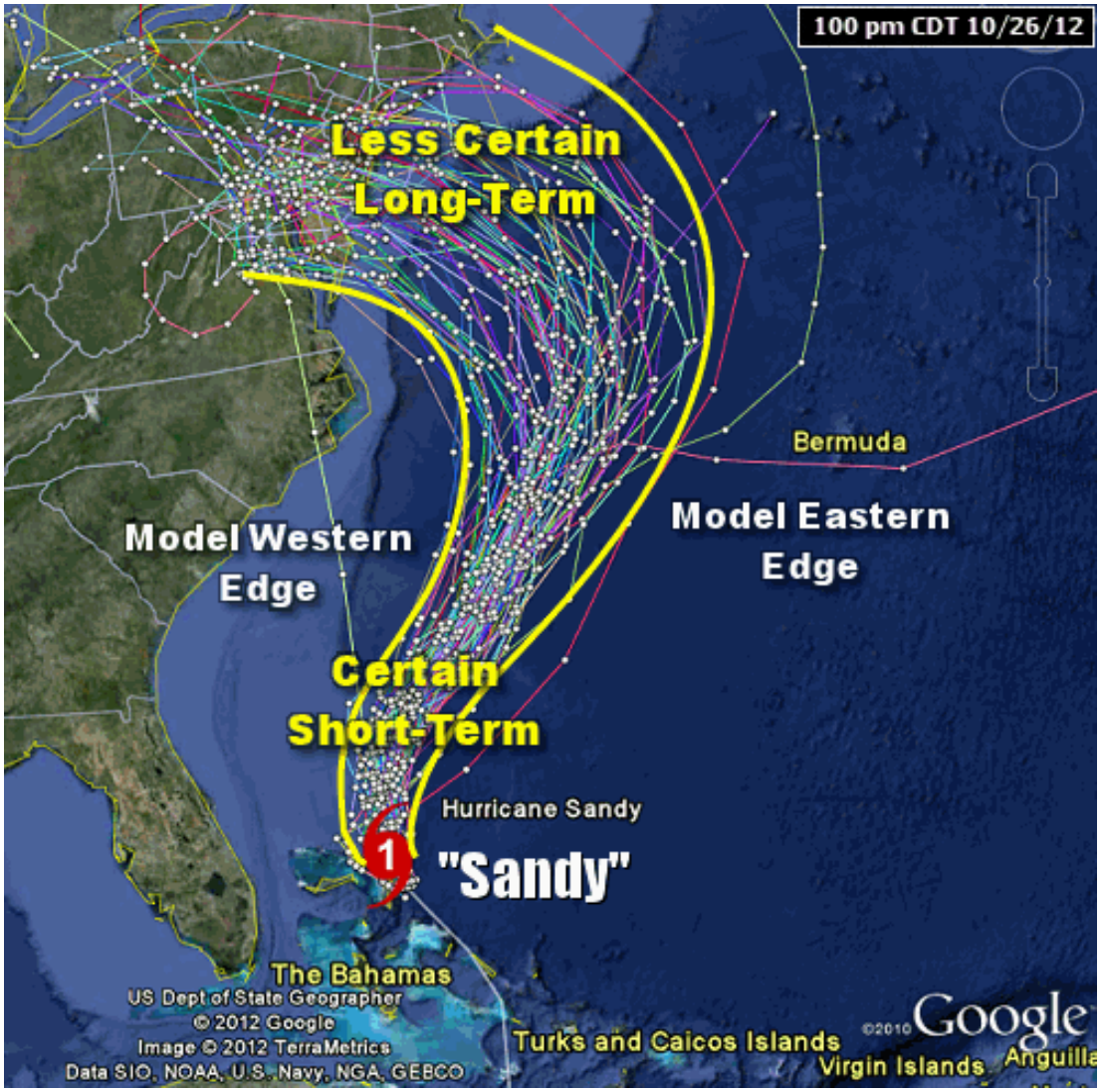


IMPACTS

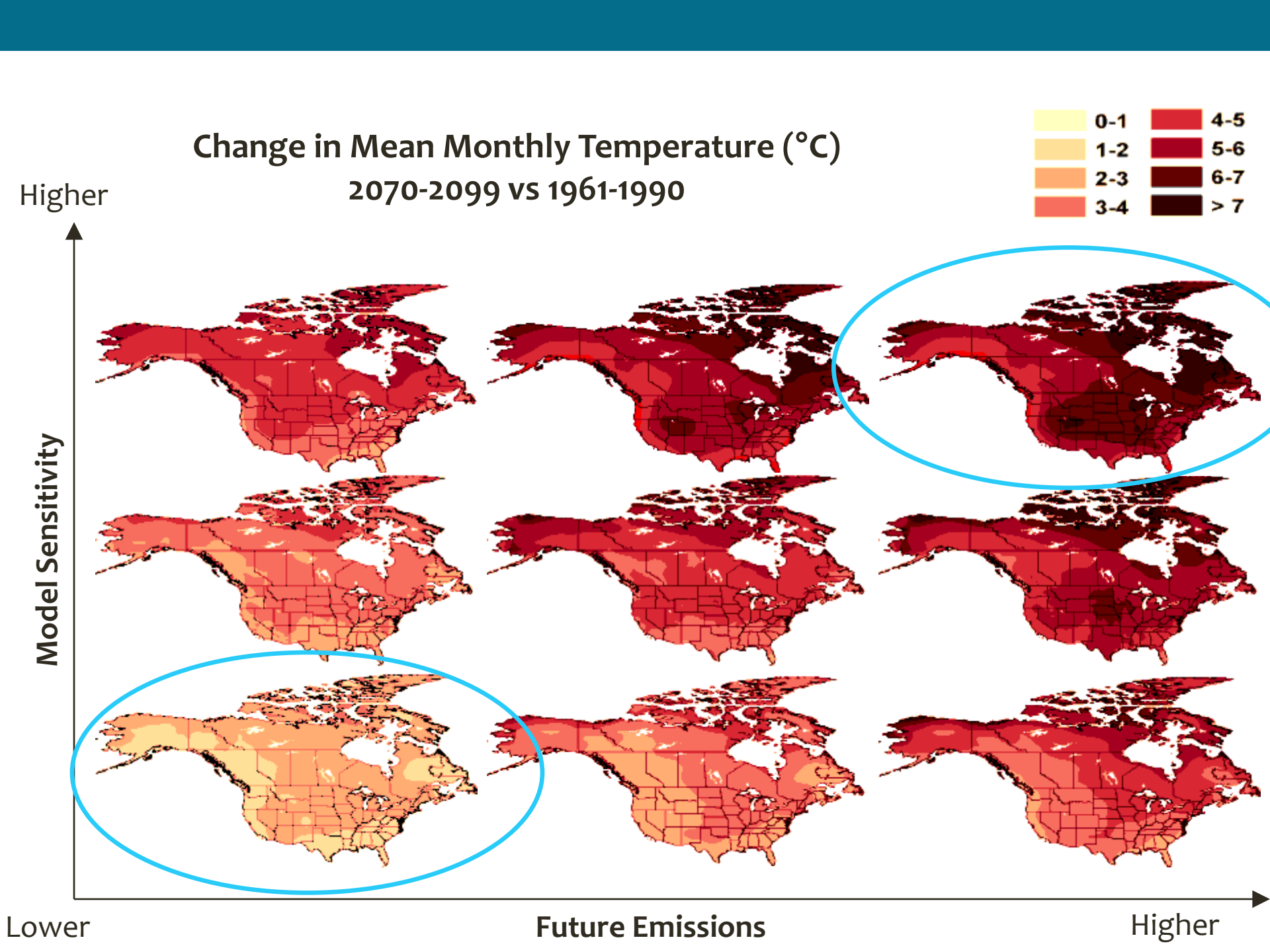


GRIDA

#1: Uncertainty of Future Conditions

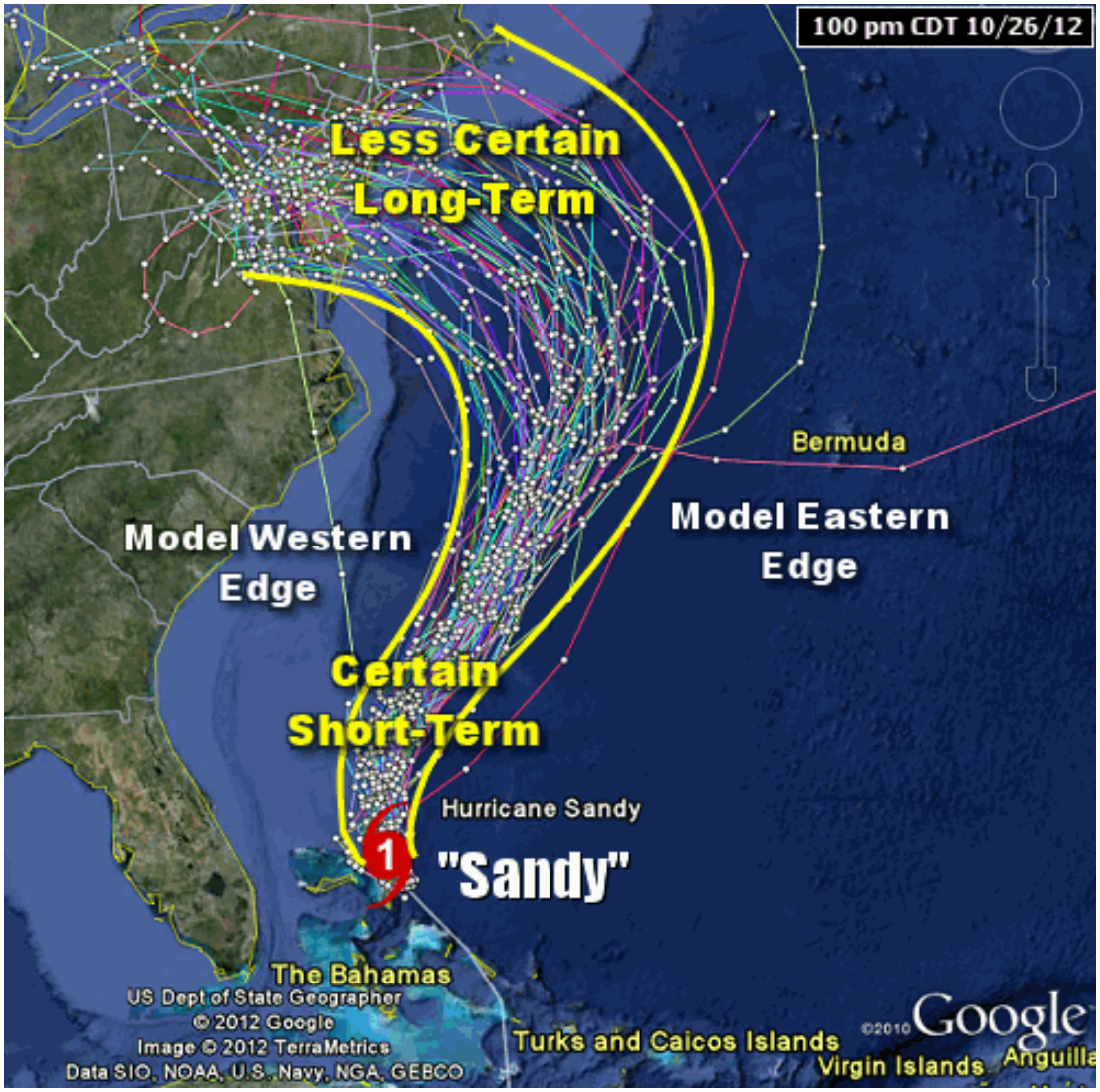


NOAA 2012


Change in Mean Monthly Temperature (°C)
2070-2099 vs 1961-1990
0-1
1-2
2-3
3-4
4-5
5-6
6-7
> 7
Higher
Model Sensitivity
Lower
Future Emissions
Higher

#2: Scale of science ≠ Scale of management

Longer time frames

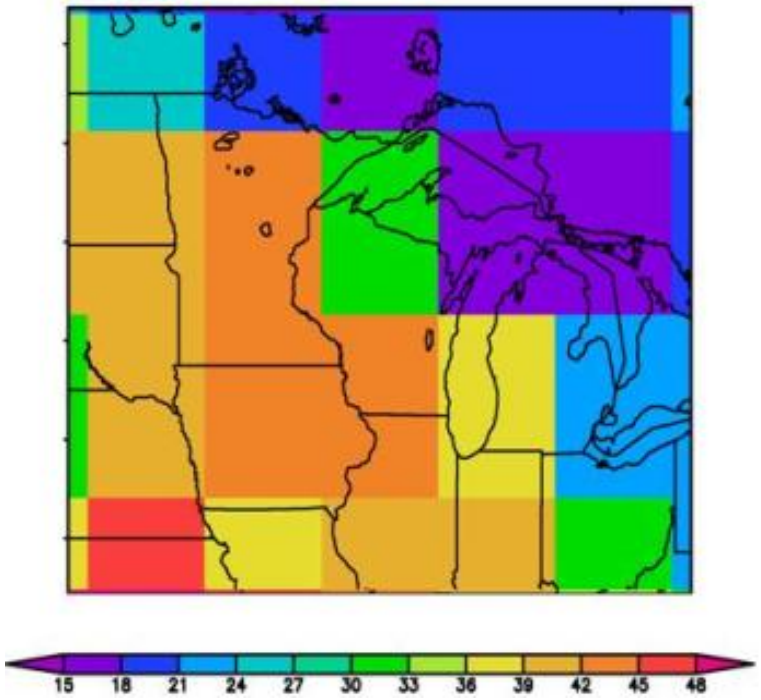


NOAA 2012

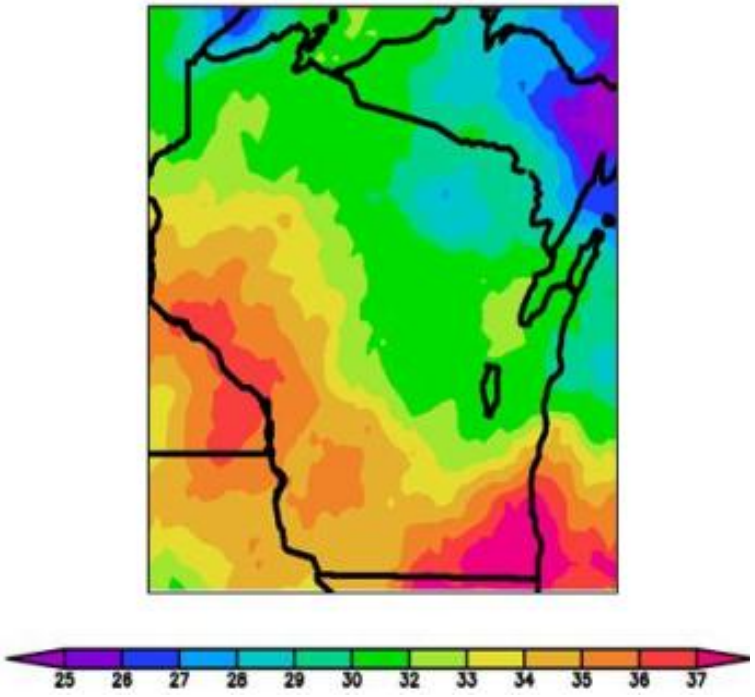
#2: Scale of science ≠ Scale of management

Spatial scales: "Downscaled" climate data

Global climate model grid



Downscaled grid (8x8 km)



Adapted from D. Vimont, UW-Madison

#3: No single, one-size-fits-all "answer"

Forest Adaptation Resources:

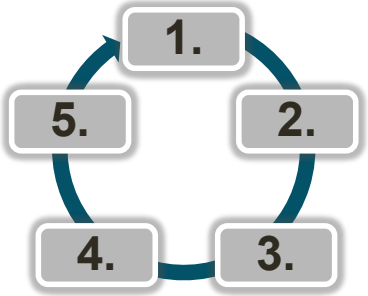
Climate Change Tools and Approaches for Land Managers

Adaptation Strategies and Approaches

A "menu" of adaptation actions for regional forests

Adaptation Workbook

Outlines a series of steps for incorporating climate change into existing management



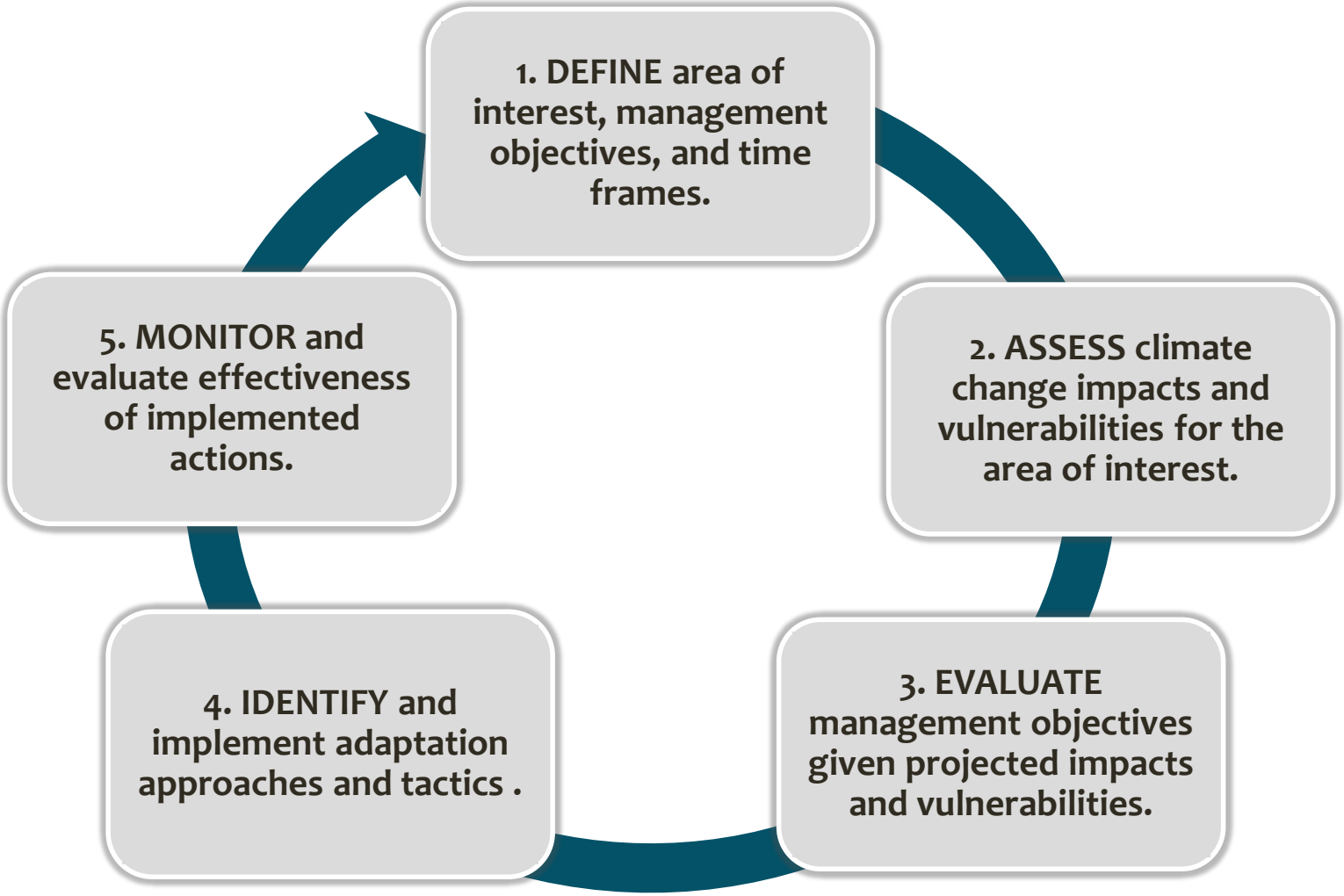
Case Studies (Illustrations)

Provides real-world examples of how these can be used together to develop tactics for adaptation

Swanston and Janowiak 2012; www.nrs.fs.fed.us/pubs/40543

Forest Adaptation Resources:

Climate Change Tools and Approaches for Land Managers

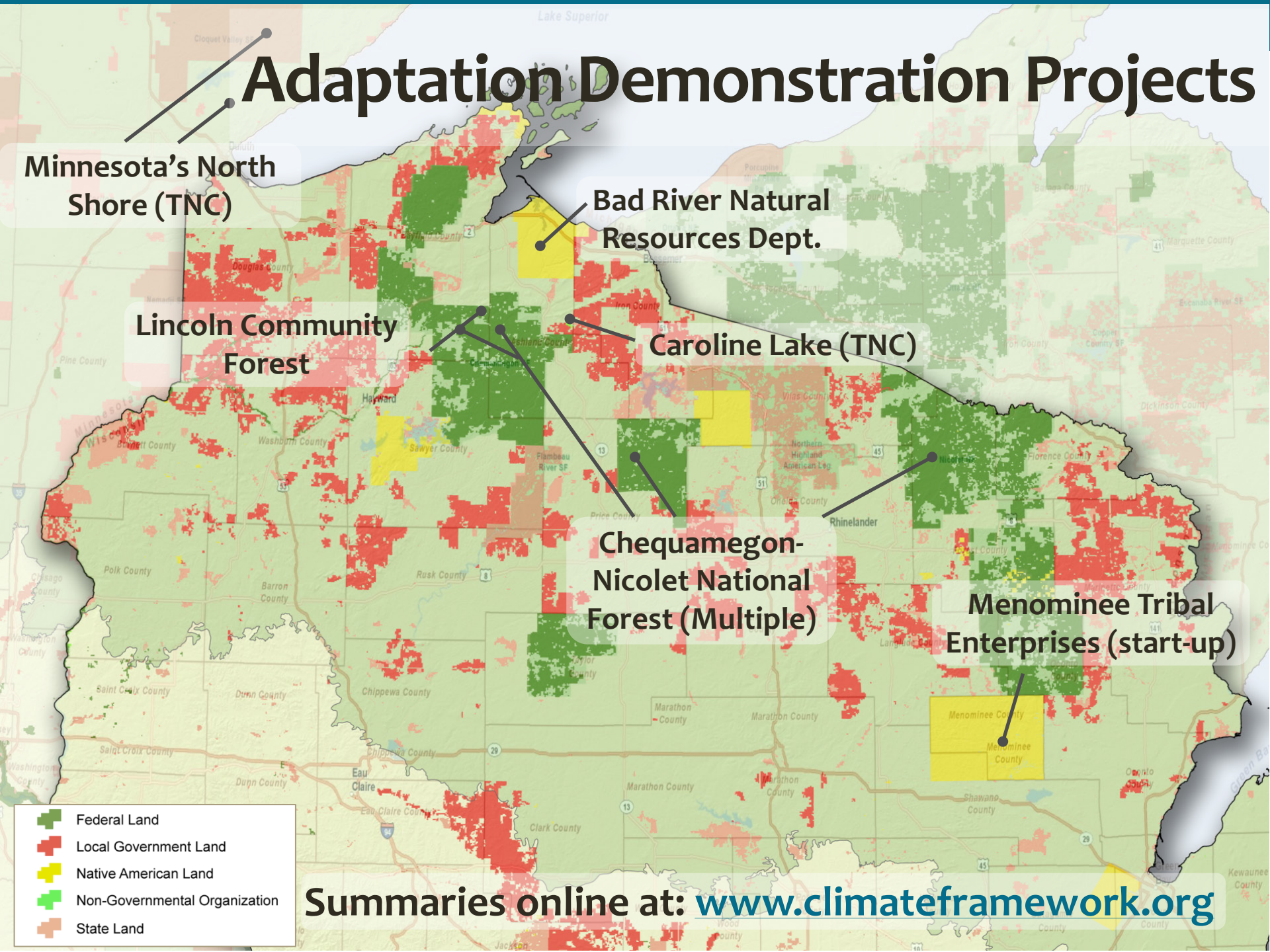


Swanston and Janowiak 2012; www.nrs.fs.fed.us/pubs/40543

#4: Lack of real-world examples*

*until now!!

Adaptation Demonstration Projects



Summaries online at: www.climateframework.org

Adaptation Demonstrations

- Provide **real-world examples** of forest management activities that:
  - Enhance the ability of forests to cope with changing conditions
  - Achieve land owner management goals
- Foster **cross-ownership** dialogue and learning

Short Example:

Upland Hardwoods at Caroline Lake Preserve

Upland Hardwoods

Management Goals & Objectives:

- Maintain/restore forests that were historically characteristic
- Mid-to-late successional forests
  - Natural disturbances
  - Under-represented species

Climate Change Challenges:

- Warmer temps, altered precipitation, drier summers
- Projected declines in many common northern species

Upland Hardwoods

Actions already being done (current mgmt.)

Practice	**Current Purpose**	**Adaptation Benefits**
Favor under-represented species	Species/structural diversity; habitats	Hedge against decline of one species; opportunity to favor future-adapted species
Encourage large woody debris	Structural diversity; habitats; nutrients	Create moister and cooler conditions on forest floor
Mimic natural disturbances	Species/structural diversity; accelerate succession	Makes it easier to take advantage of natural disturbances

Upland Hardwoods

Easiest

- Plantings to increase the component of local, native species that are expected to fare better under warmer and drier conditions (red oak, white pine).
- Conversion of mixed stands containing advance red oak regeneration into oak stands.

More Difficult

- Identify areas to potentially serve as refugia (difficult to maintain in long-term)
- Introduce species from outside of the area that might be better adapted to future conditions (bur oak, white oak, …)

Summary

- **Uncertainty is guaranteed.**
  Management will be most effective if it works with uncertainty, rather than against it.
- **There is not a shiny new tool for coping with climate change.**
  Rather, we have the same old tools but will need to use them in new ways.

Photo: animal.discovery.com