Winter Range Studies of the Western Arctic Caribou Herd

Kyle Joly

National Park Service

Wildlife Biologist, Gates of the Arctic National Park & Preserve

Caribou Monitoring Lead, Arctic Network Inventory & Monitoring Program

Acknowledgements

Paul Duffy and Scott Rupp

Funding

NPS – Gates, ARCN

BLM – Central Yukon

FWS – Selawik NWR

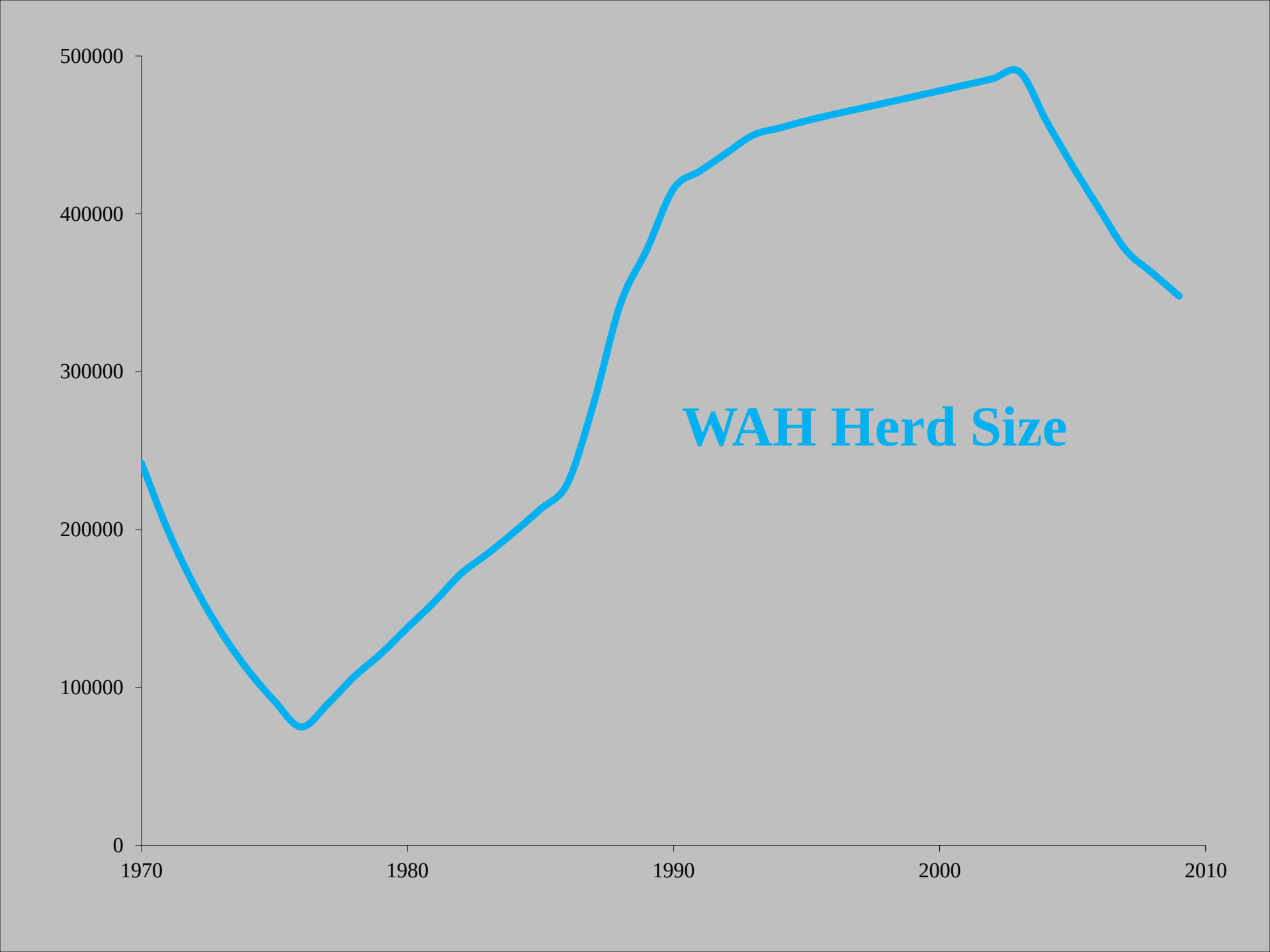
Photo: R. Jandt

Background

- **Historic Debates**
  - **Fire destroys lichens**
  - **Caribou can just find new range**
  - **Centered on boreal forests**
- **Preliminary Alaska Work**
  - **Nelchina Caribou Herd**
  - **Western Arctic Herd**
- **Current Efforts**

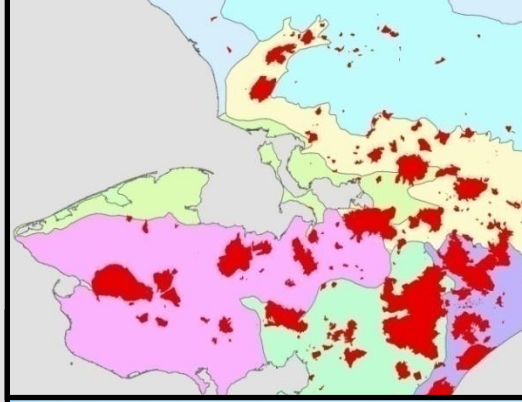
WAH Background Information

- **Wide Ranging**
- **~ 40 Villages**
- **15,000 Harvested Annually**
- **~ 97 % Subsistence Use**
- **348,000 (in 2009)**


WAH Herd Size
500000
400000
300000
200000
100000
0
1970
1980
1990
2000
2010

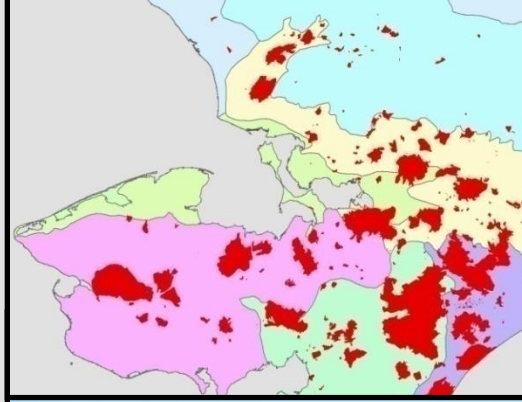
Summary

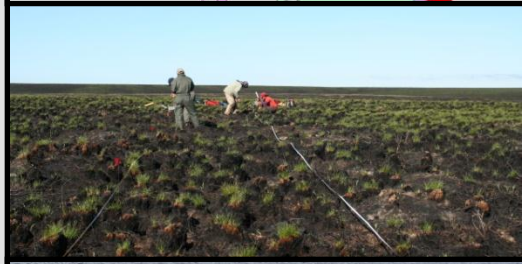
- **Wildfires are relatively common in tundra**
- **Quick re-growth allows greater reburning**



Summary

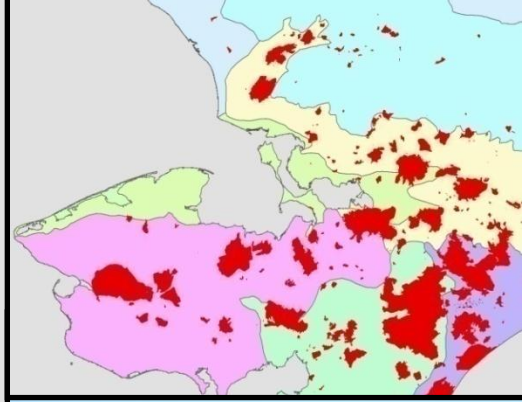
- Wildfires are relatively common in tundra
- Quick re-growth allows greater reburning
- Extensive winter use of tundra by WAH
- Caribou avoid burned tundra and taiga





Summary

- Wildfires are relatively common in tundra
- Quick re-growth allows greater reburning
- Extensive winter use of tundra by WAH
- Caribou avoid burned tundra and taiga
- **Few differences b/t burned and burned plots**
- **Lichens > 4x at unburned locations**
- **Lichen recovery, caribou avoidance times similar**
- **Caribou seek out lichen and impact them**



All models are wrong,

but some are useful.

-George Box

Reality is just a single replicate.

- Tony Starfield

Goals

Quantify effects of climate change scenarios on:

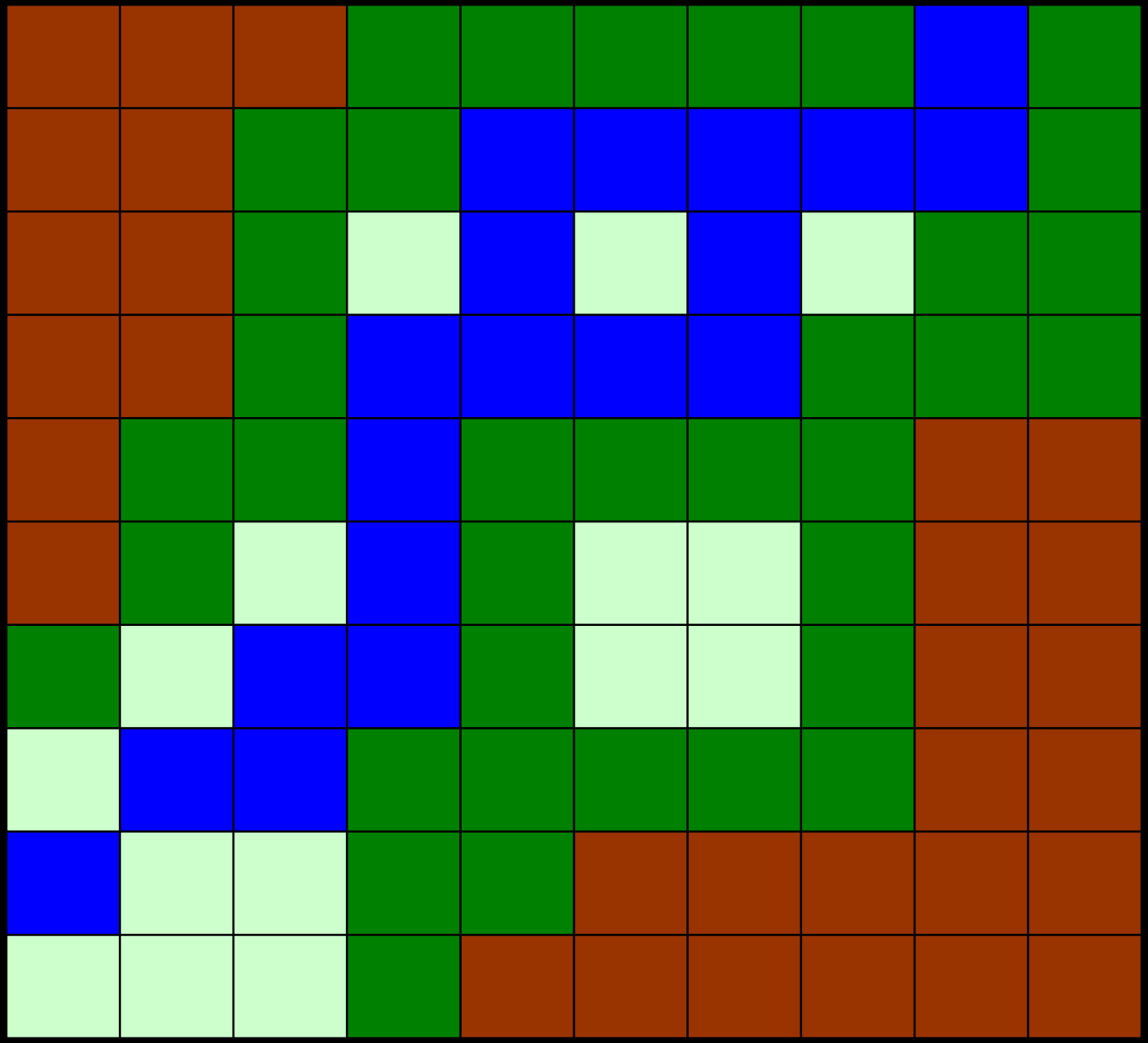
- **Fire regime of northwest Alaska**
- **Extent of caribou winter range**
- **Extent of quality moose habitat**

ALFRESCO

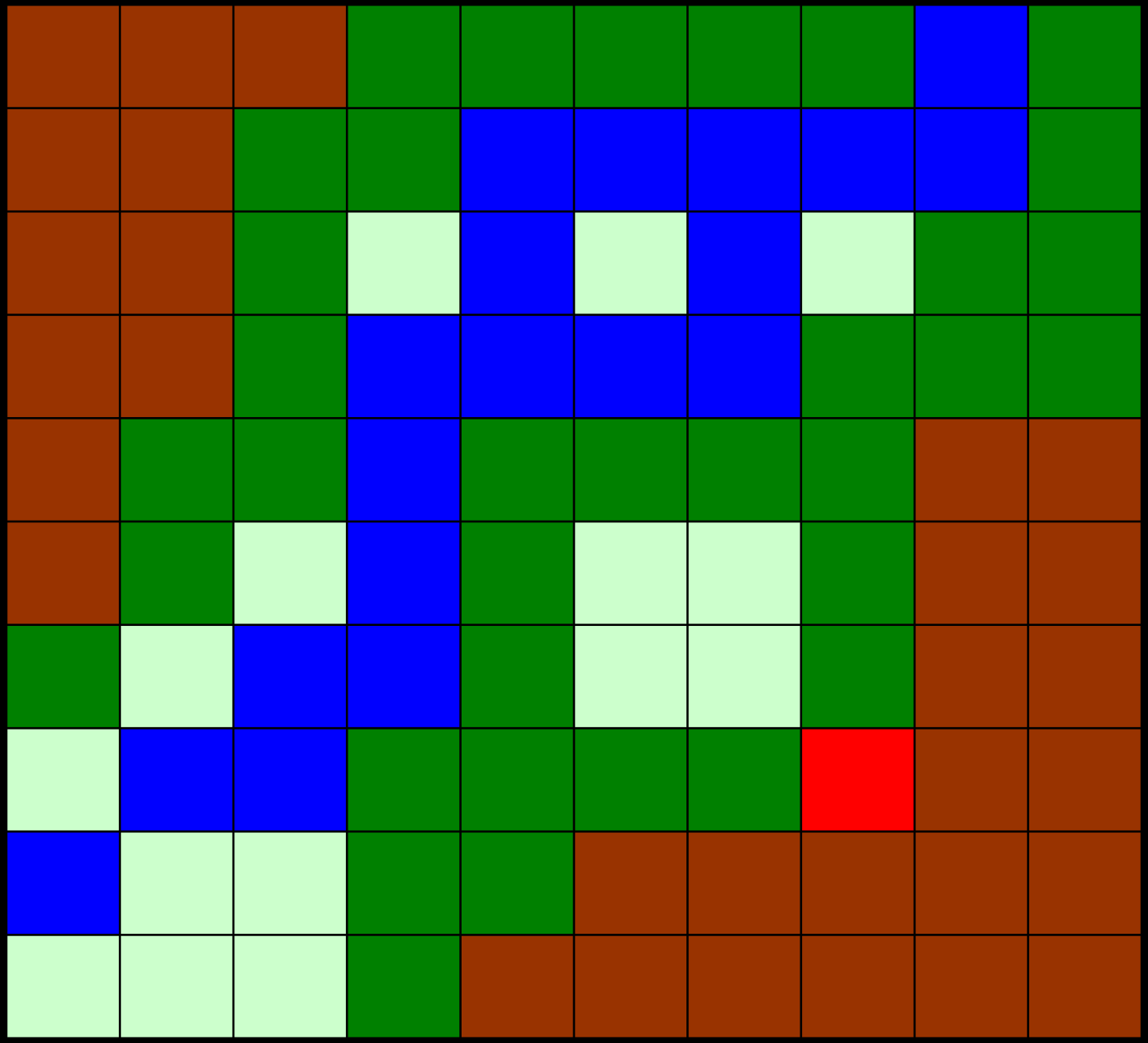
(ALaska FRame-based EcoSytem Code)

- State-transition type vegetation succession model
  - Deciduous a successional state of spruce
  - Tundra stays tundra after disturbance (fire)
- Focuses on system interactions and feedbacks
- 1 km^2 pixels, 1 year time steps
- Pixels randomly "ignited"
- Fire "spread" a function of climate and vegetation state

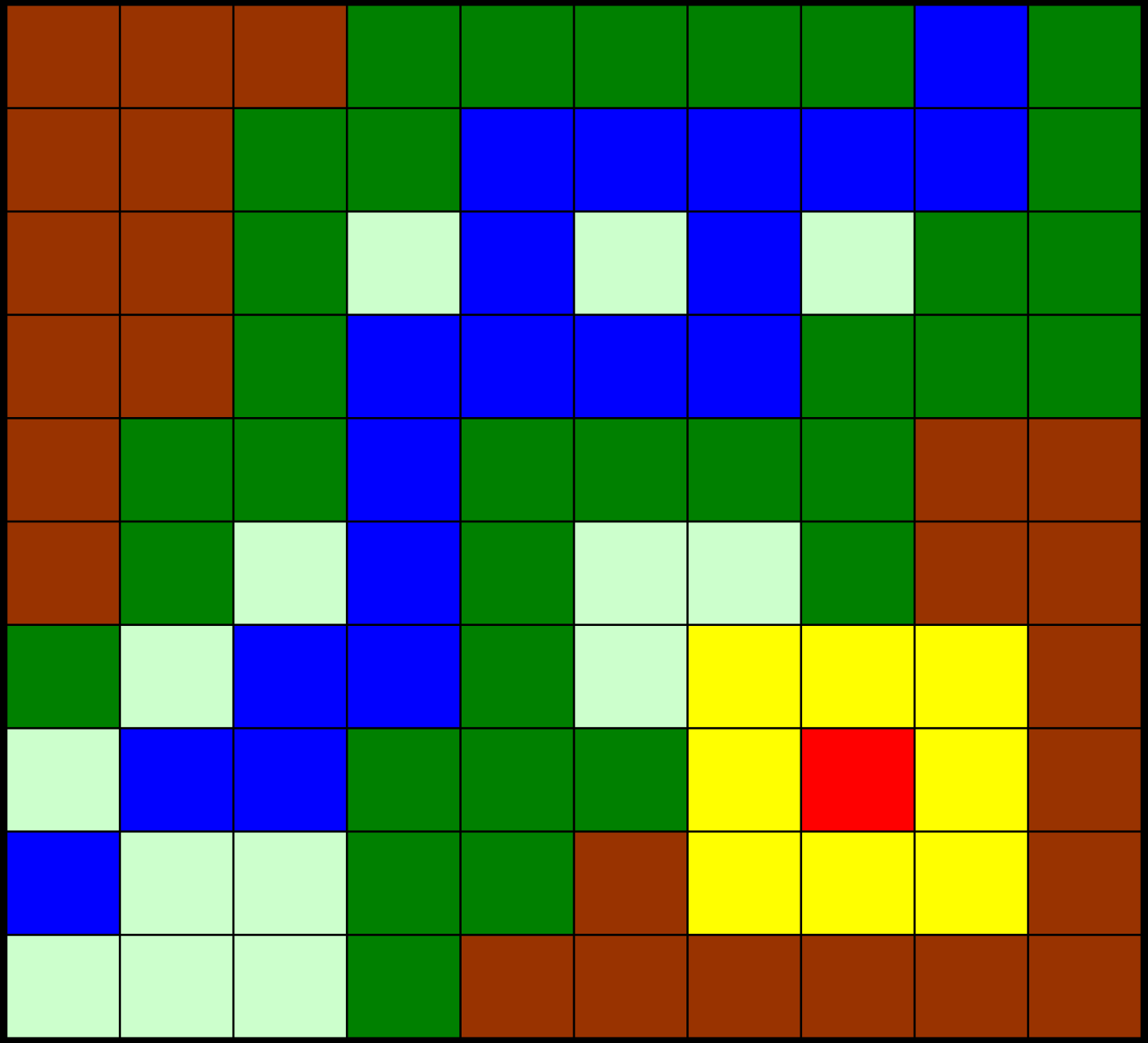
Simulating the effects of climate change on winter range



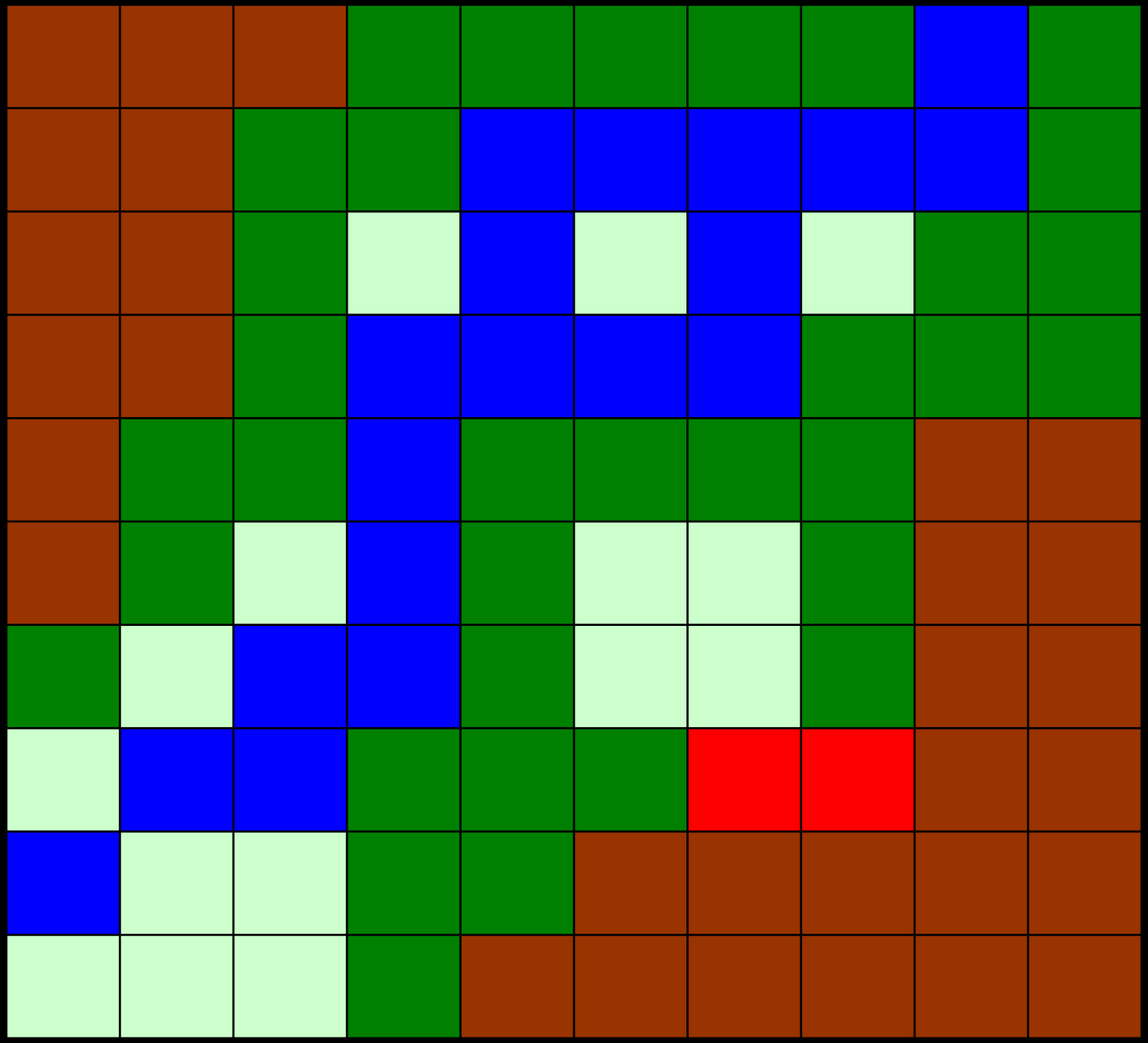
Simulating the effects of climate change on winter range



Simulating the effects of climate change on winter range

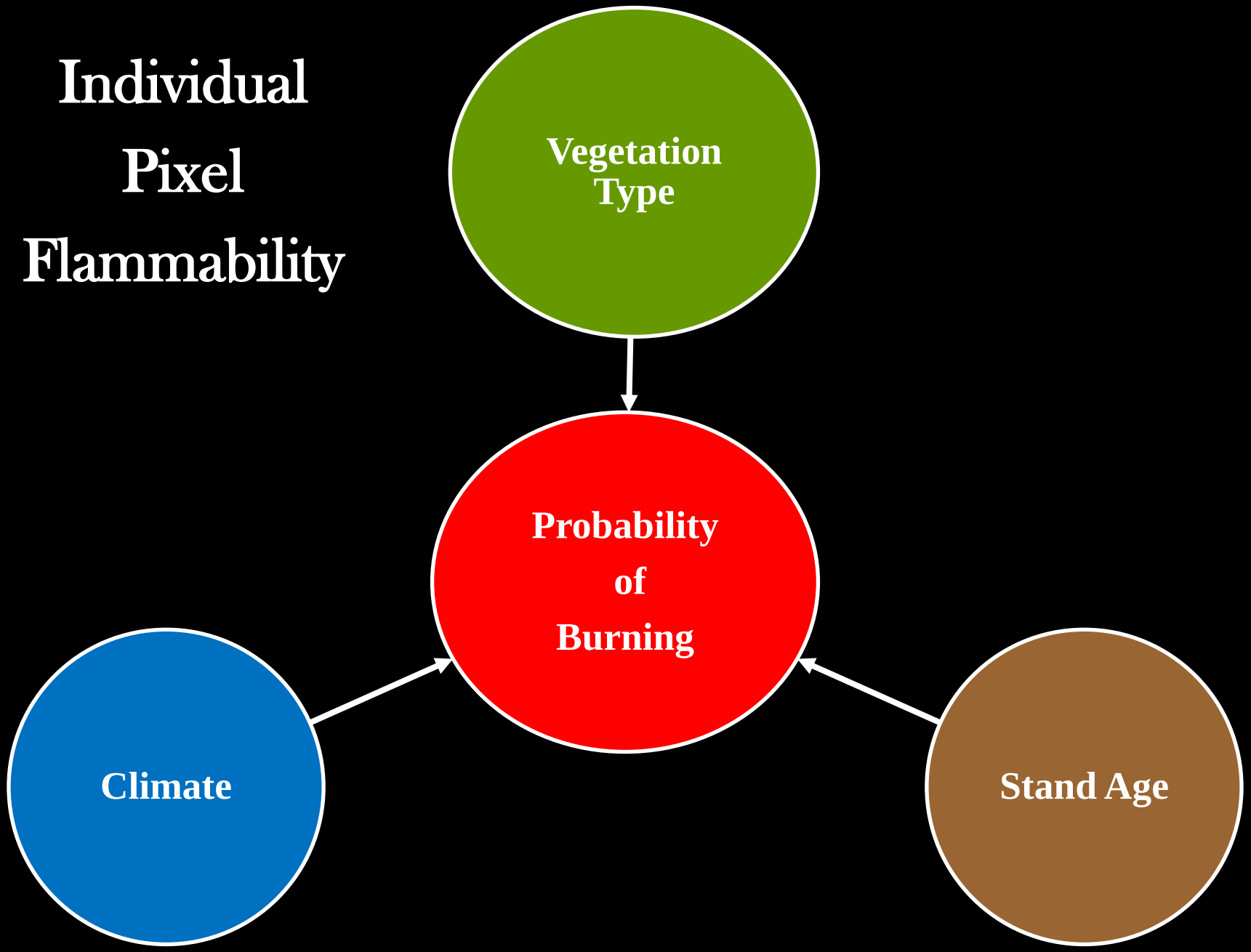


Simulating the effects of climate change on winter range

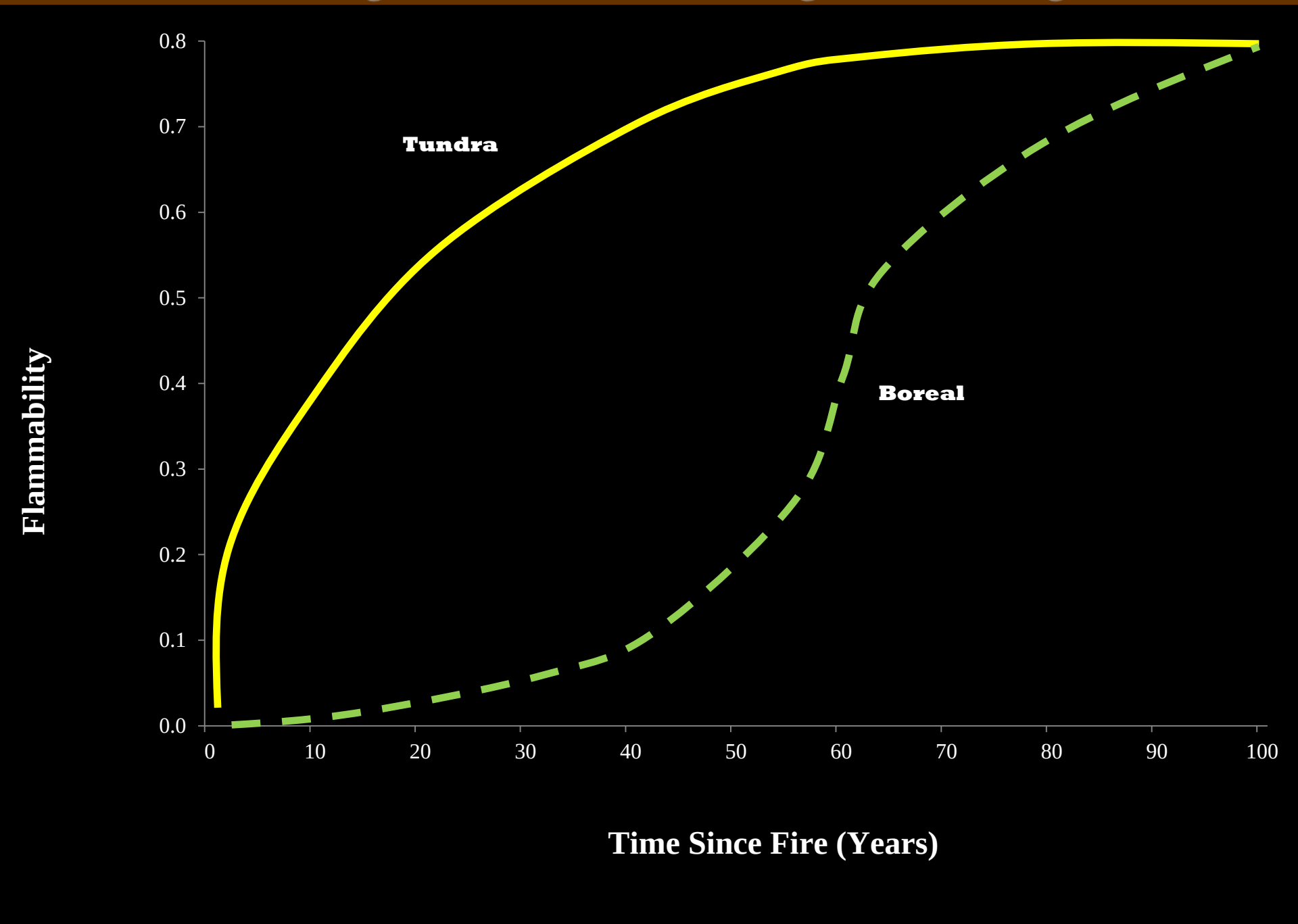


Simulating the effects of climate change on winter range

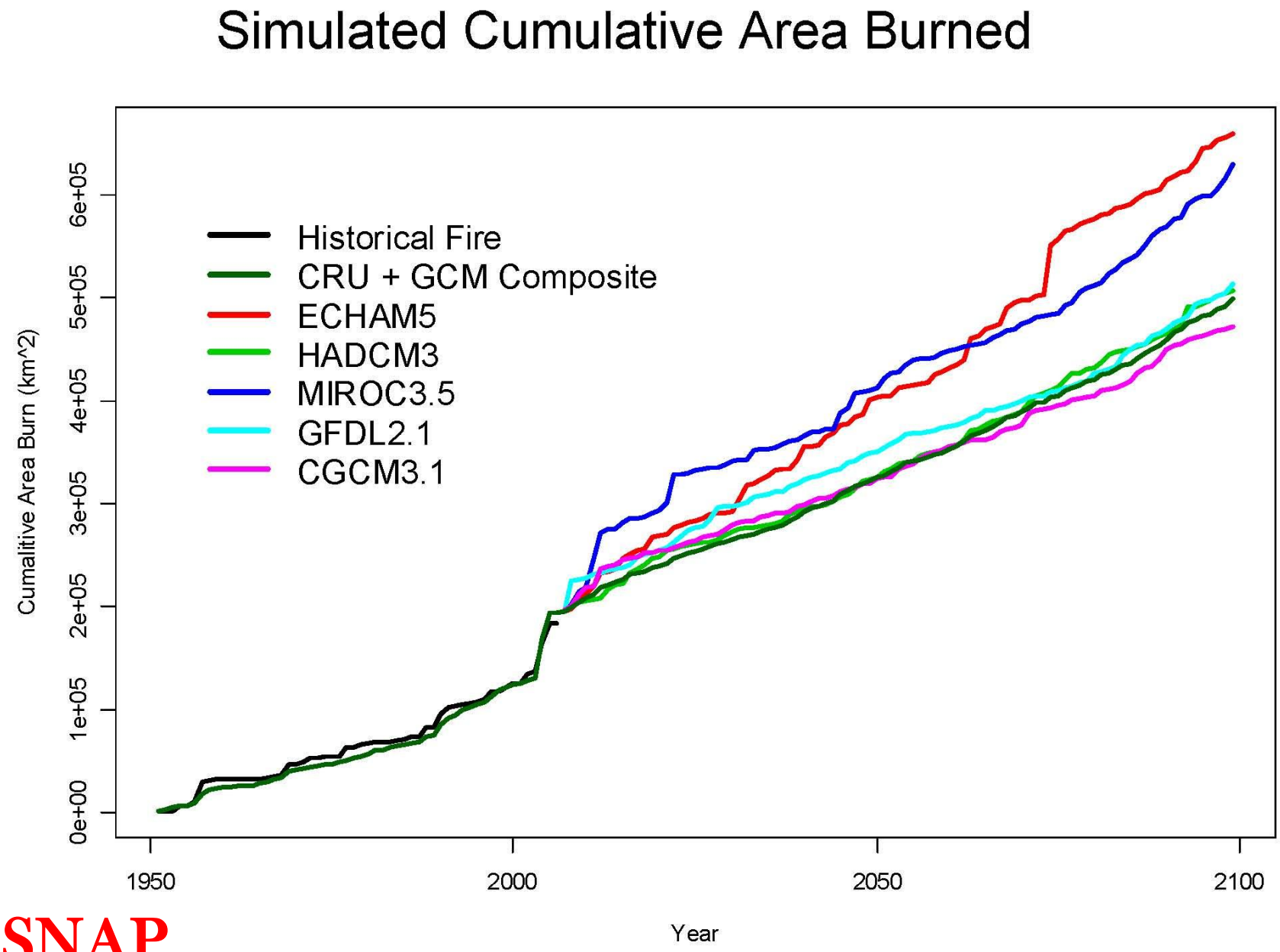
Individual Pixel Flammability



Simulating the effects of climate change on winter range

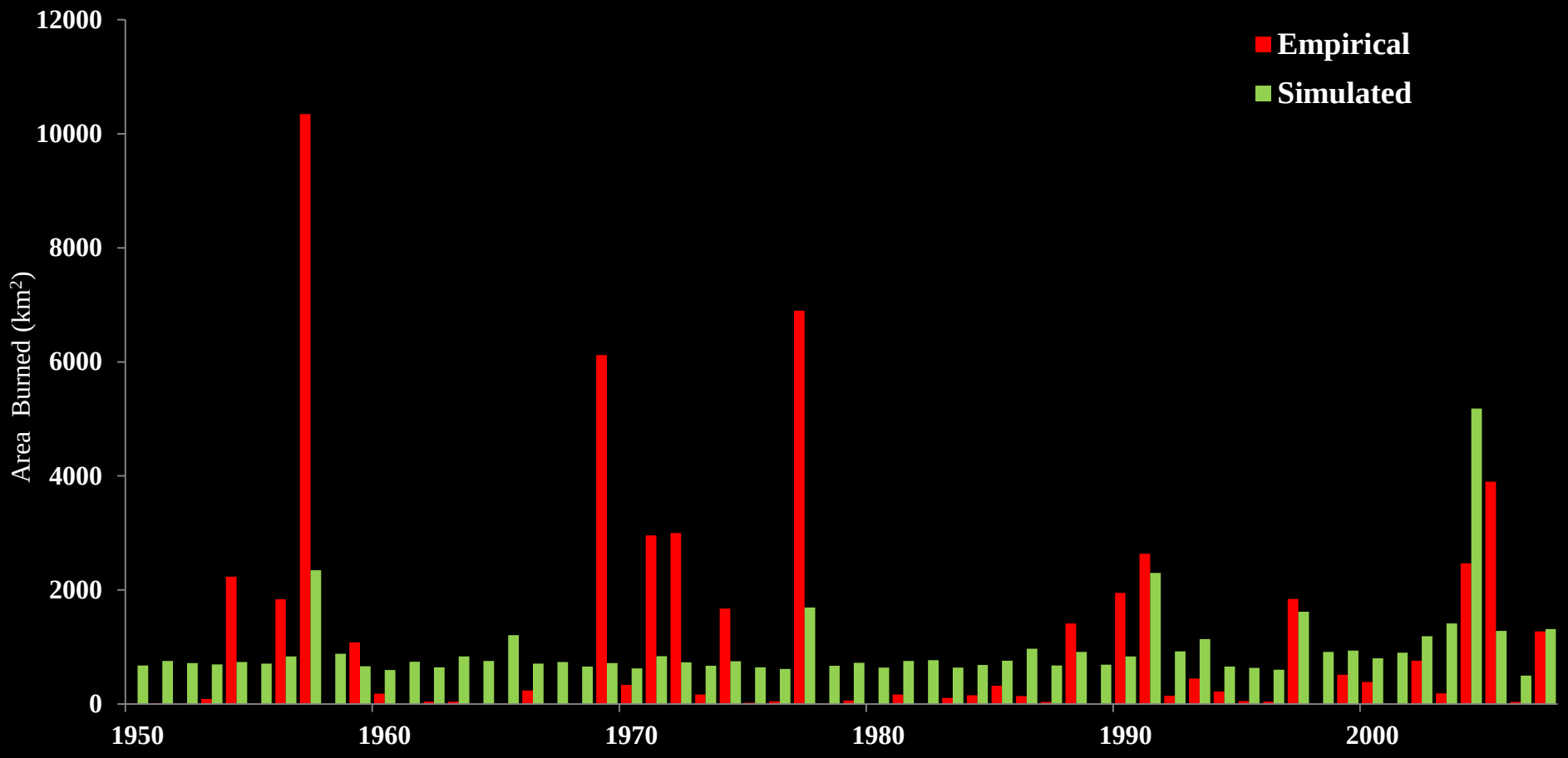


Simulating the effects of climate change on winter range

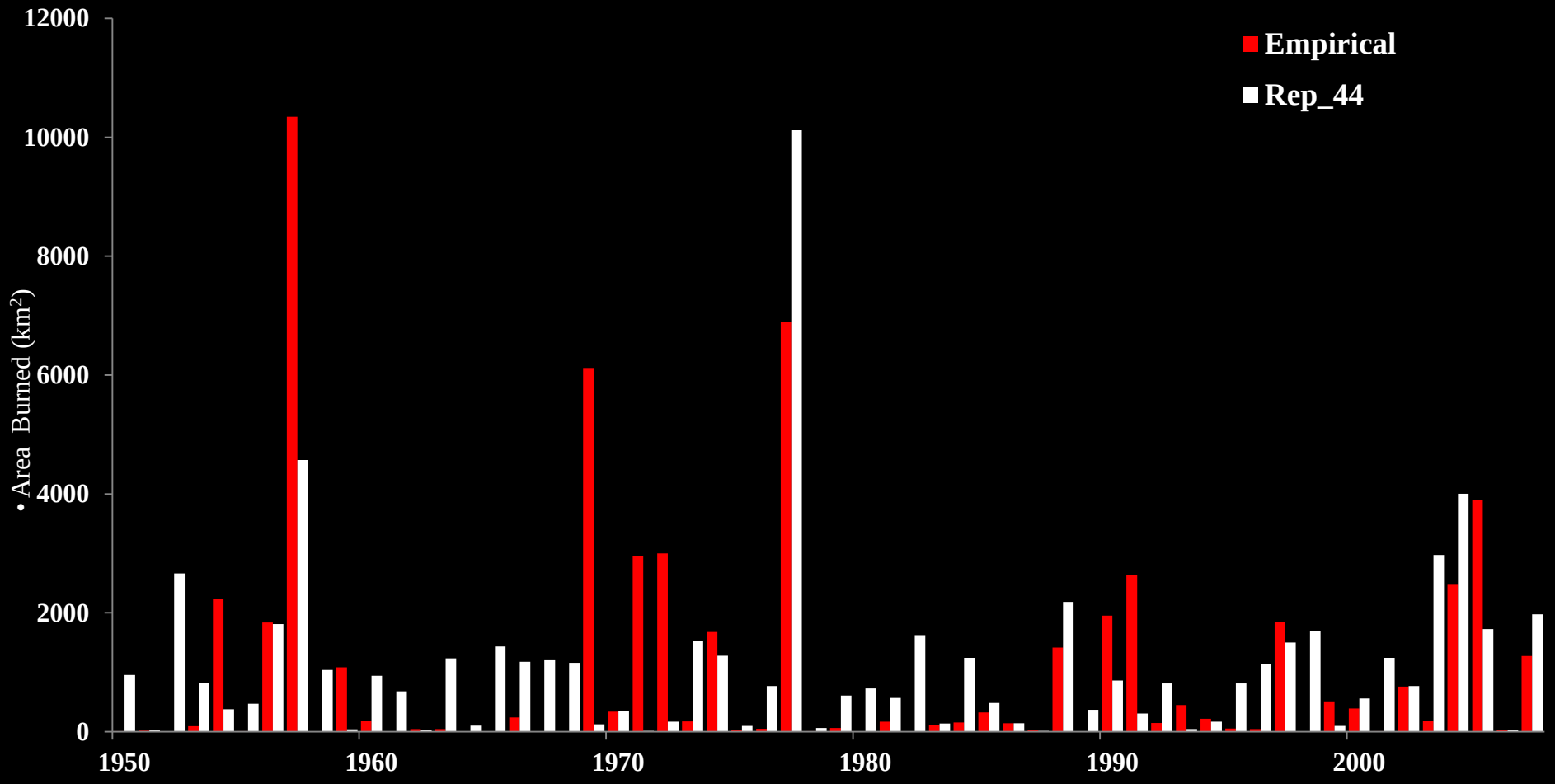


SNAP

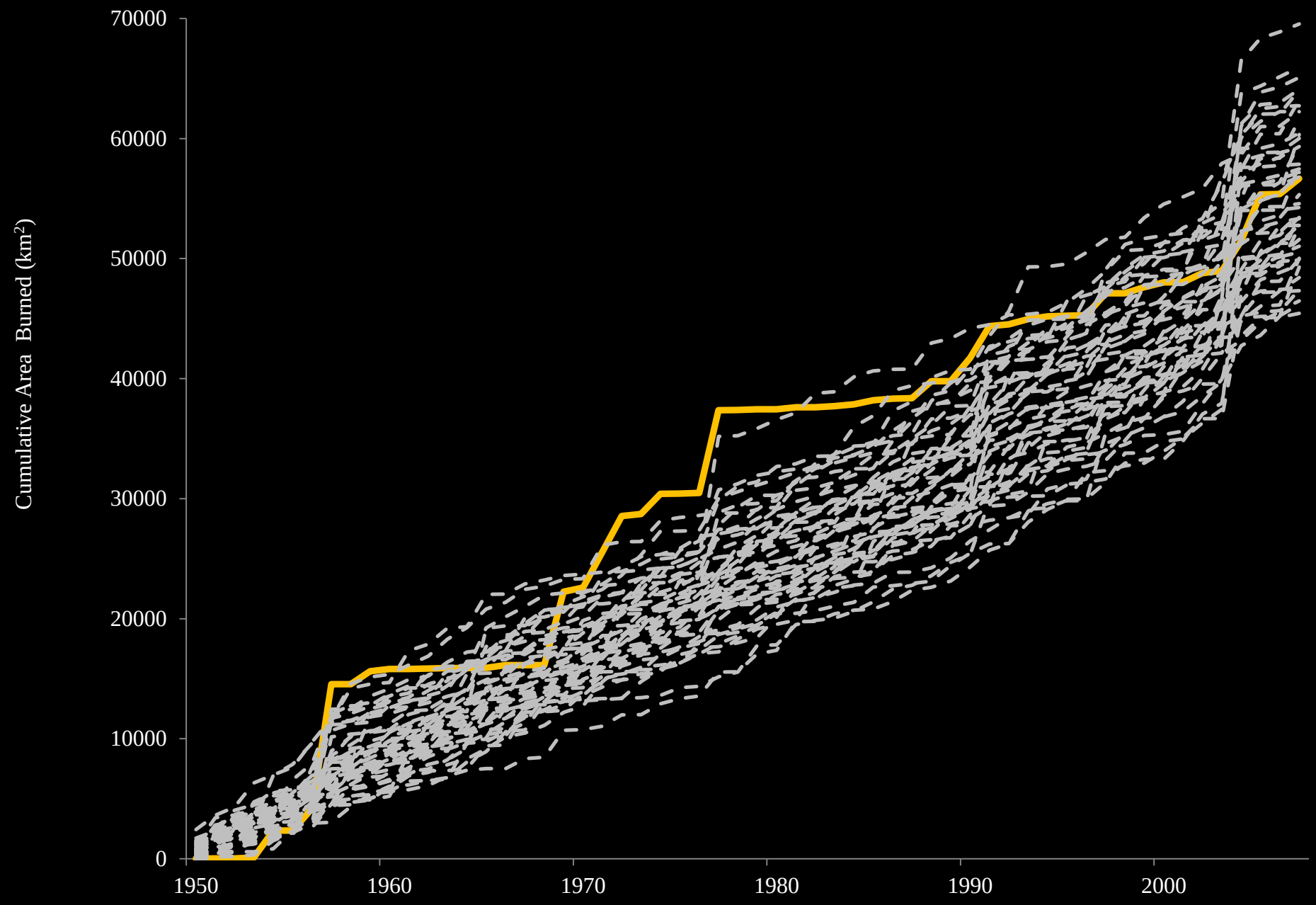
Simulating the effects of climate change on winter range



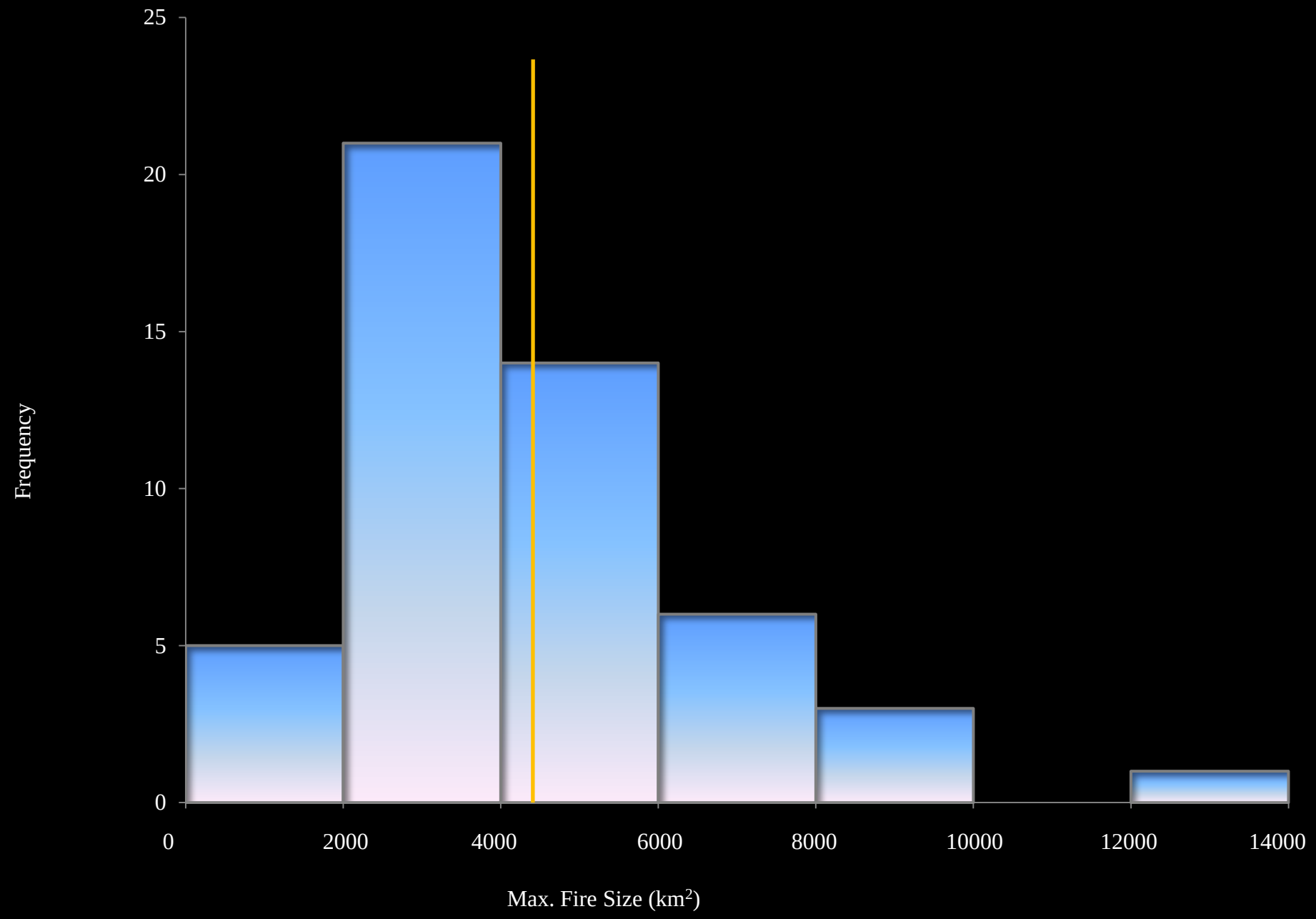
Simulating the effects of climate change on winter range



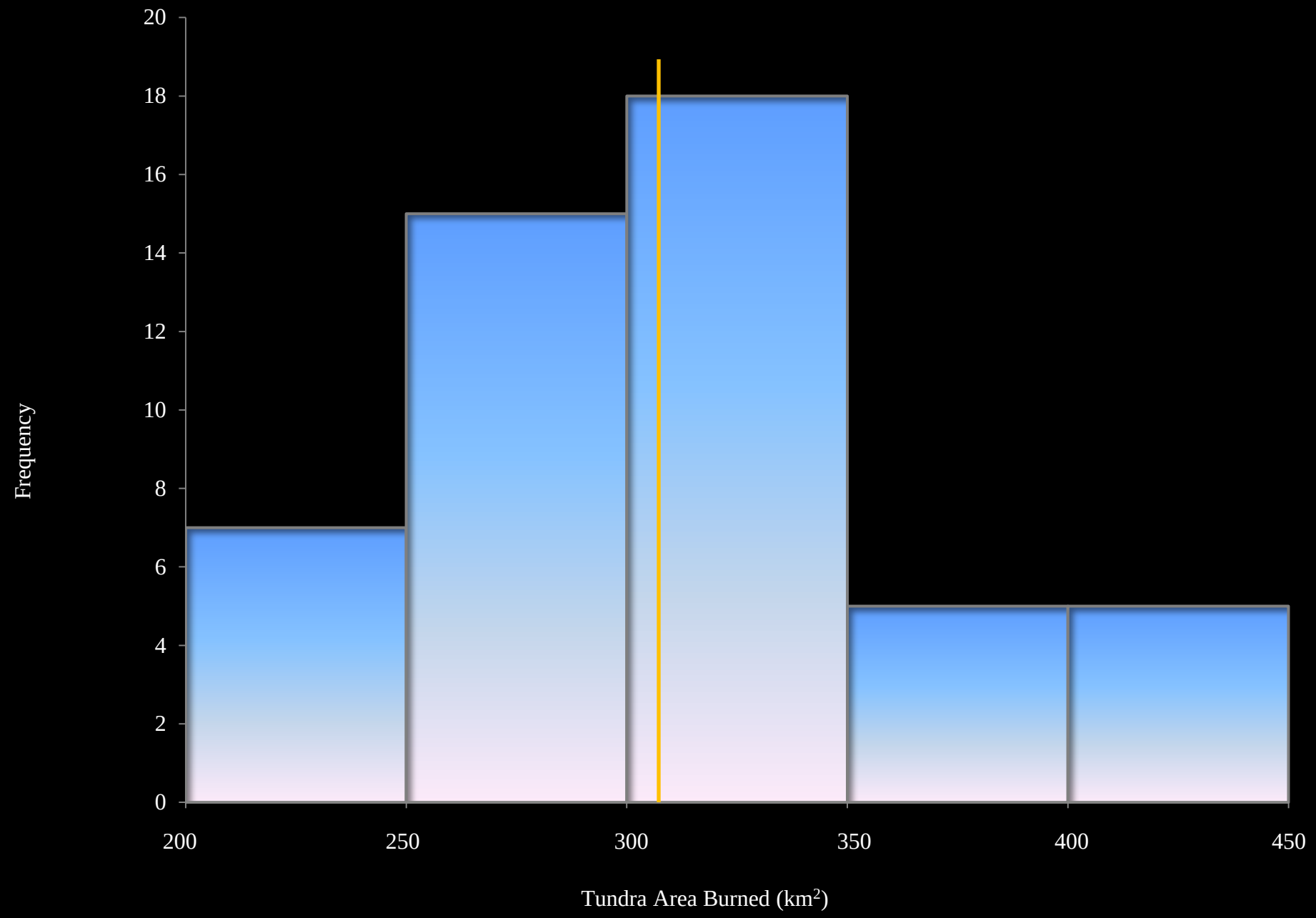
Simulating the effects of climate change on winter range



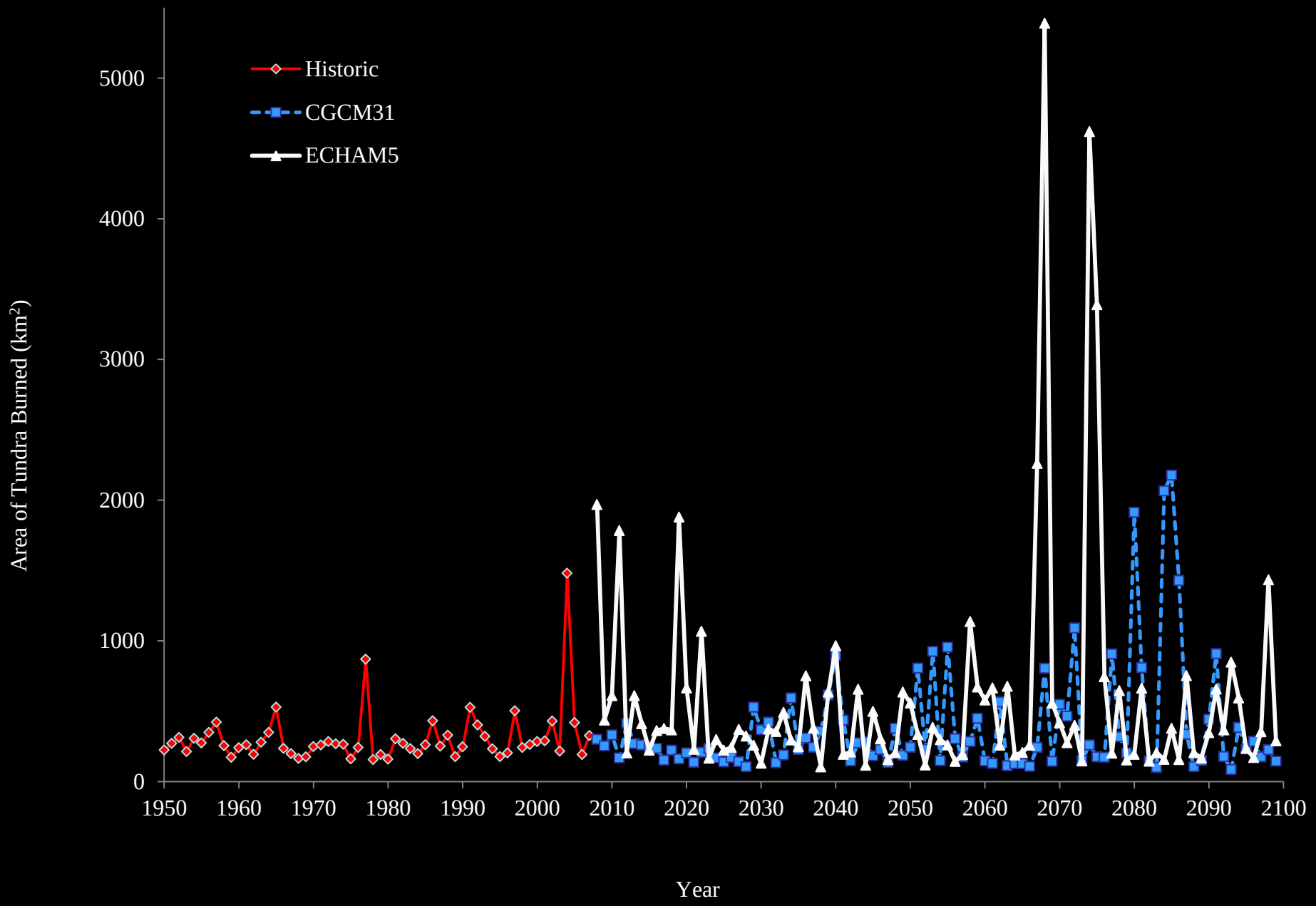
Simulating the effects of climate change on winter range



Simulating the effects of climate change on winter range



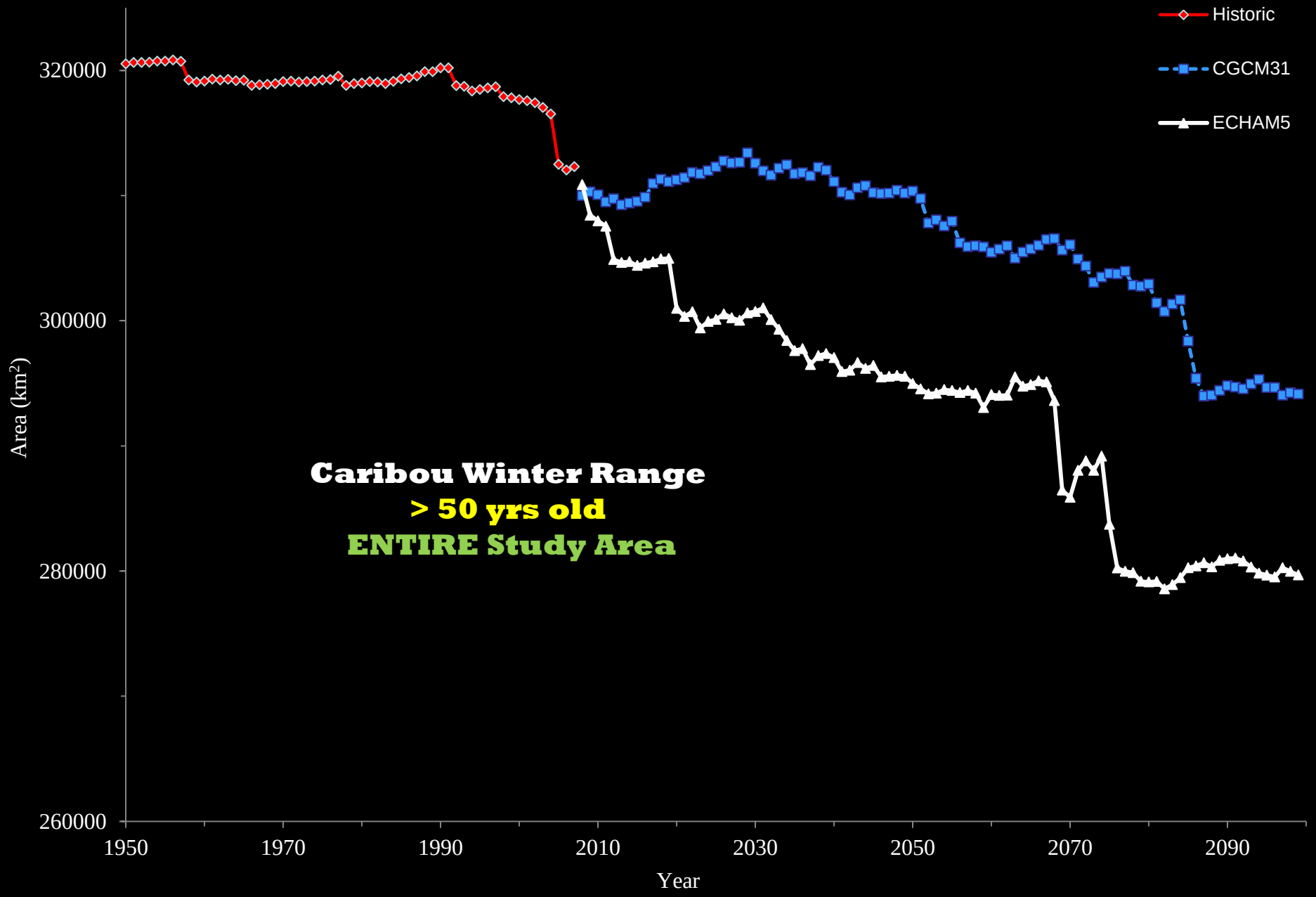
Simulating the effects of climate change on winter range



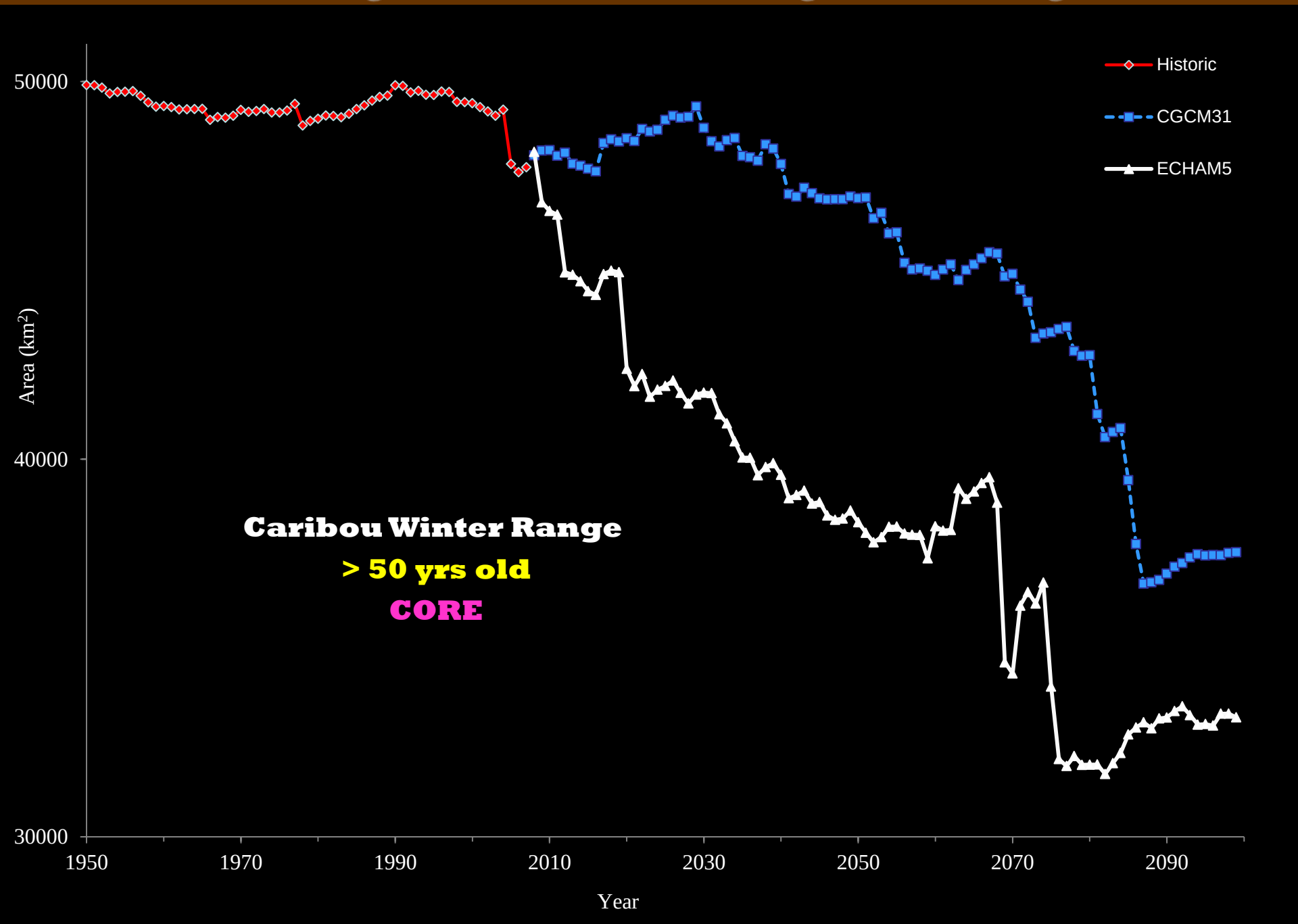
2010 Fire Season

- 37 fires in Noatak Preserve (most ever)
- 3 Re-burns just in Noatak
- # 3 all-time fire year in northwest area Parks
- Barrow Aug temps 2 C (4 F) above average

Simulating the effects of climate change on winter range



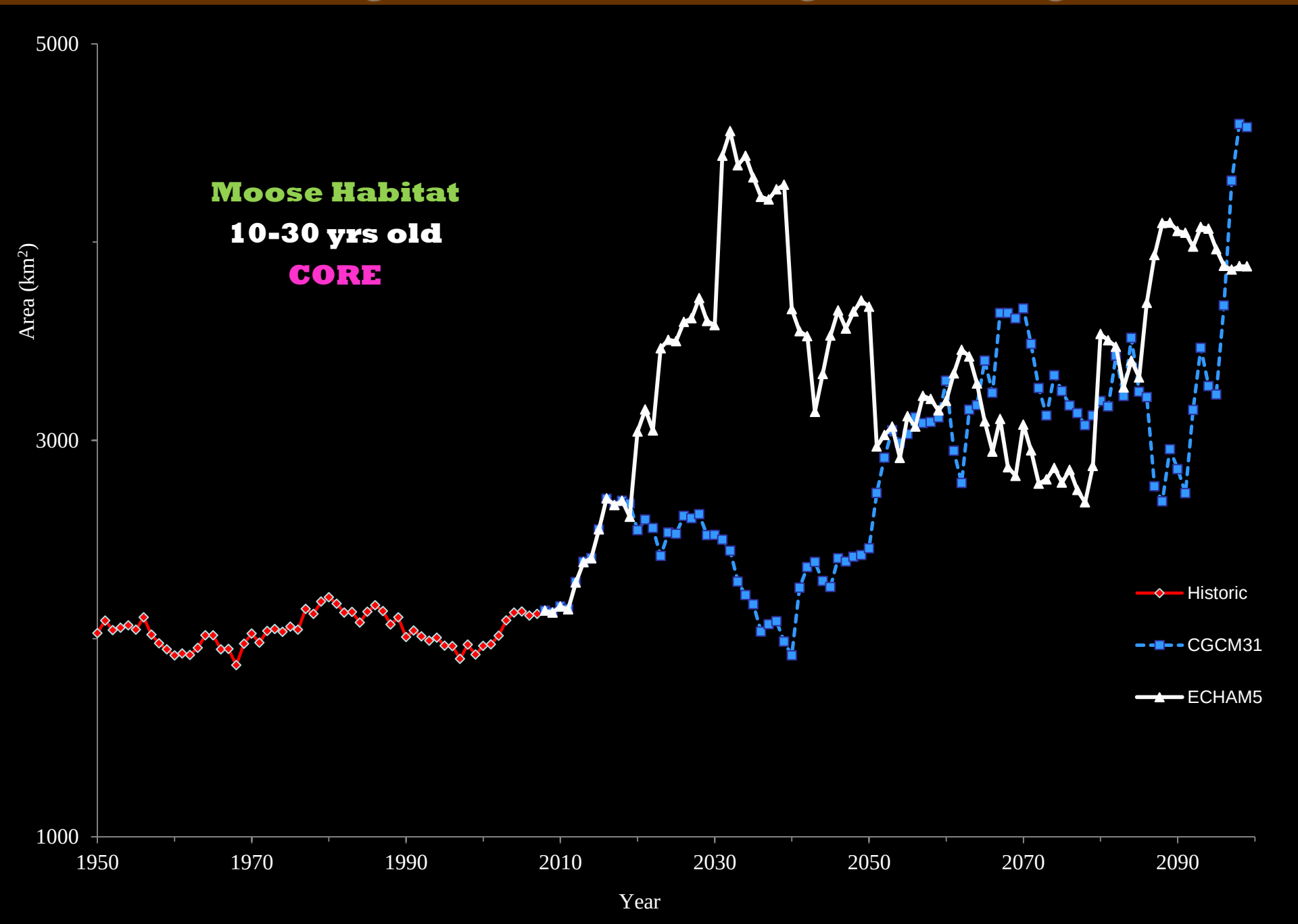
Simulating the effects of climate change on winter range



Potential Impacts Of Less Winter Range

- Range shifts
- Increased competition
- Increased dispersal
- Reduced nutritional condition
- Reduced reproductive output
- Smaller group and herd sizes

Simulating the effects of climate change on winter range



Simulating the effects of climate change on winter range

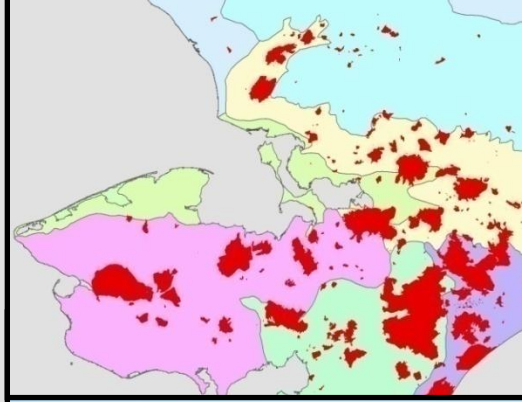
Simulating the effects of climate change on winter range

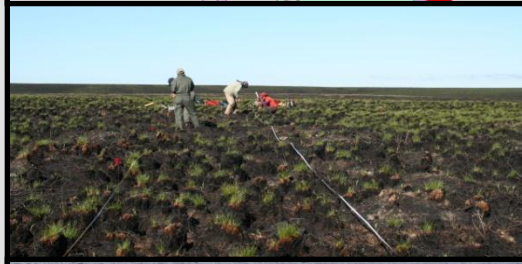
Simulating the effects of climate change on winter range

Part 3: Habitat selection in relation to lichens, wildfires, grazing and landscape

Summary

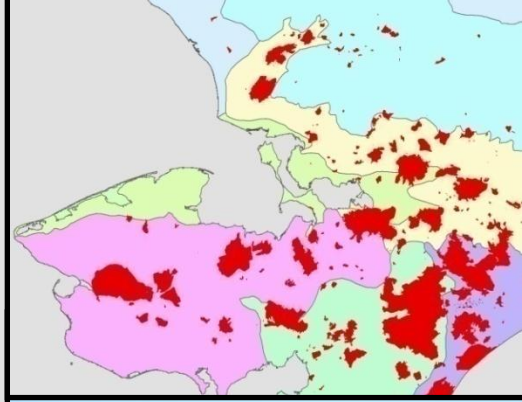
- Wildfires are relatively common in tundra
- Quick re-growth allows greater reburning
- Extensive winter use of tundra by WAH
- Caribou avoid burned tundra and taiga
- Few differences b/t burned and burned plots
- Lichens > 4x at unburned locations
- Lichen recovery, caribou avoidance times similar
- Caribou seek out lichen and impact them
- **Simulations forecast more fires**
- **Less quality caribou winter range**
- **Conservative forecasts**
- **Climate-induced impacts increase moose habitat**

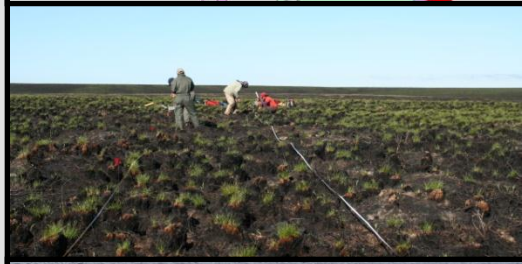




Summary

- Wildfires are relatively common in tundra
- Quick re-growth allows greater reburning
- Extensive winter use of tundra by WAH
- Caribou avoid burned tundra and taiga
- Few differences b/t burned and burned plots
- Lichens > 4x at unburned locations
- Lichen recovery, caribou avoidance times similar
- Caribou seek out lichen and impact them
- Simulations forecast more fires
- Less quality caribou winter range
- Conservative forecasts
- Climate-induced impacts increase moose habitat
- **Forage, fire and predation part of winter range story**
- **Winter range is just one piece of the puzzle**





Prior to Fire Plan

- TEK and AFS input required
- Consider more than caribou

Preliminary Fire Management Plan

- Maintain 296-year fire cycle
- 3-Year Moving Average of Area Burned
- Stand Age ~ Lichen abundance
- Protect large areas > 30 years old
- Resource Advisor Galena Zone Fires

Questions ?
Kyle_Joly@nps.gov