Wildlife Response to Environmental Arctic Change

17-18 November, 2008

UAF International Arctic Research Center

UAF Institute of Arctic Biology

ABR Inc.

Wildlife Conservation Society

Fish and Wildlife Service Mission

Working with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people.

- Protect
- Manage
- Restore

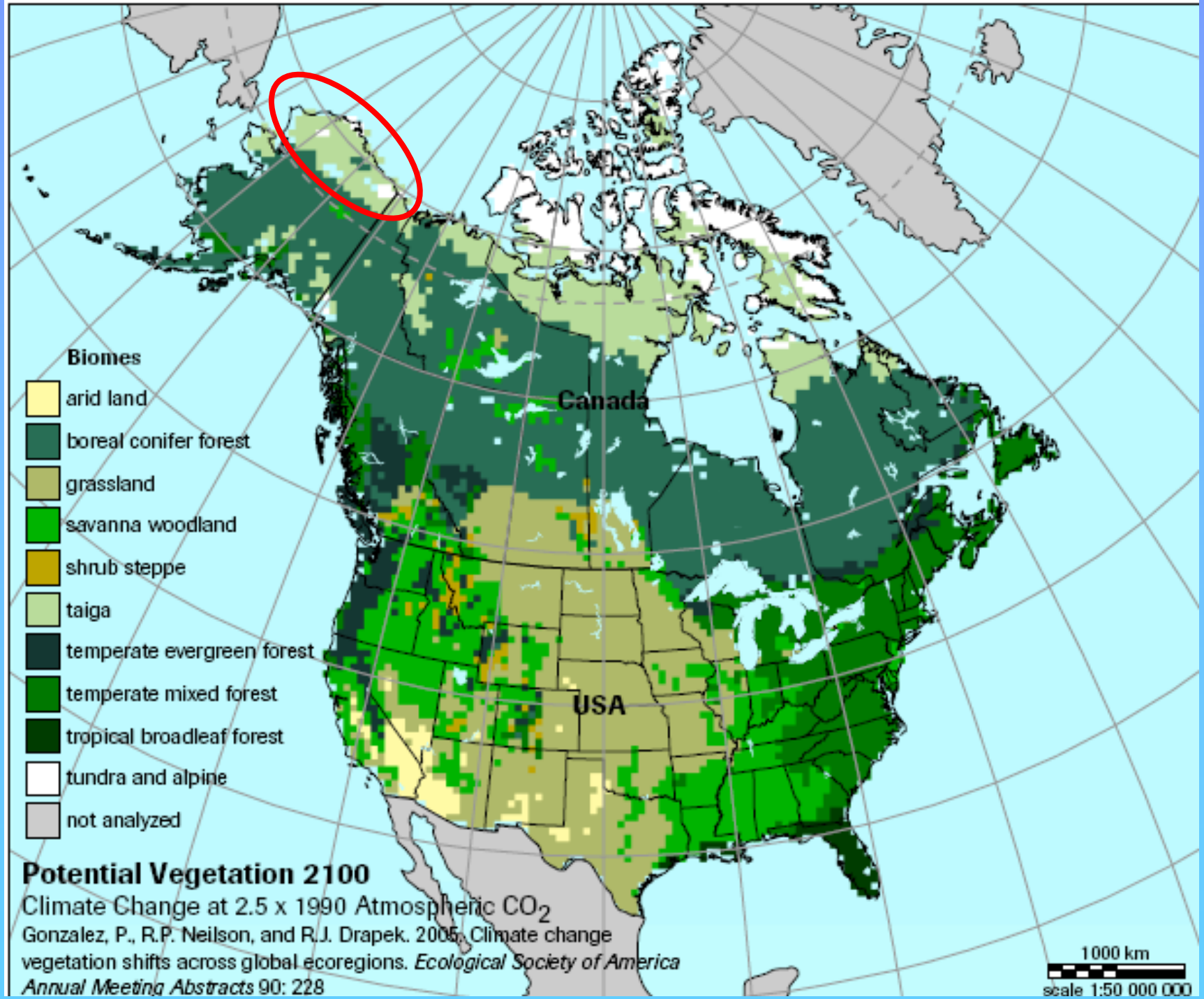
Desired Future Condition

The Dinosaurs of Arctic Alaska; December 2004; Scientific American Magazine; by Anthony R. Fiorillo
Painting by Karen Carr

October 2002 Storm at Barrow

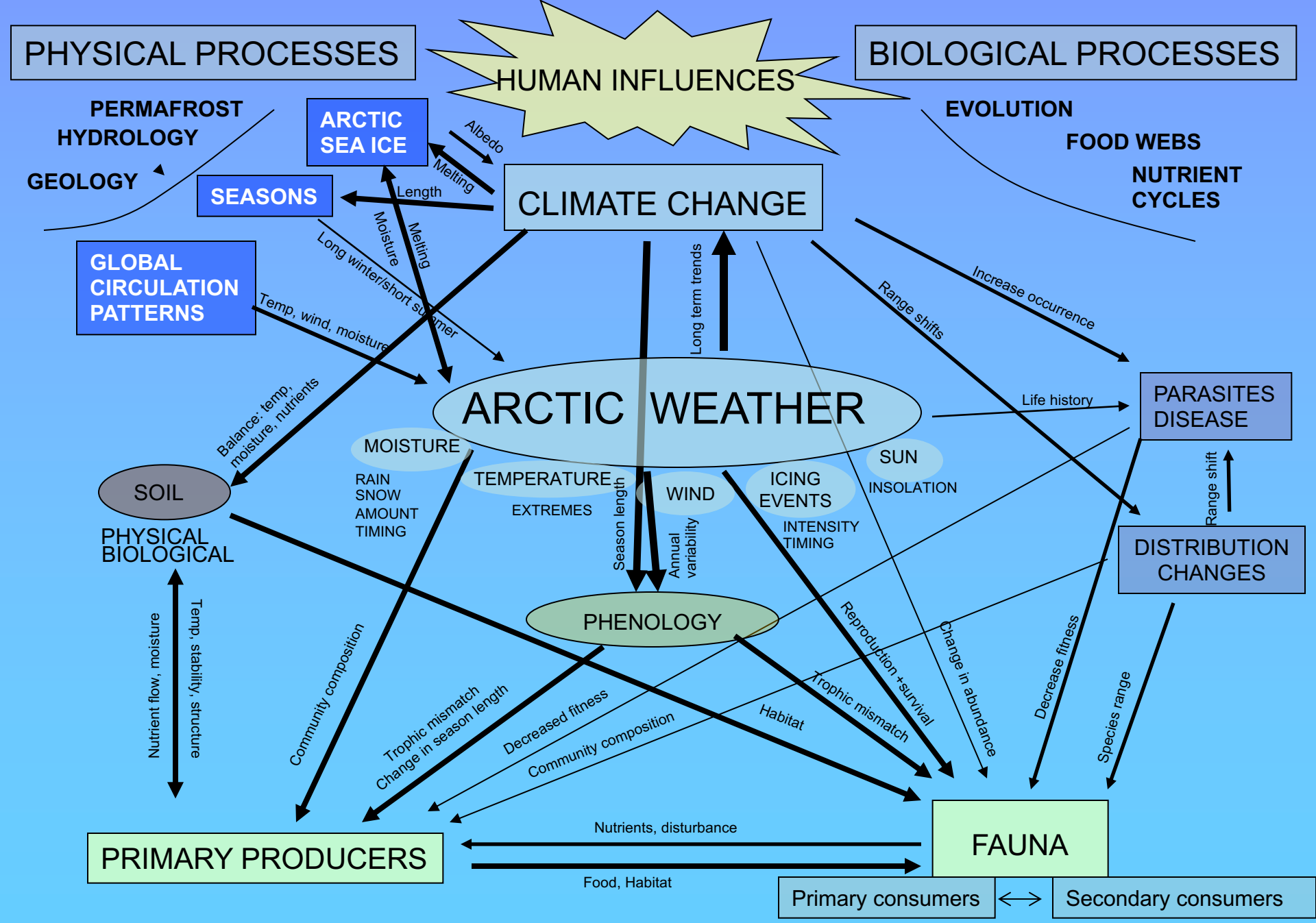
1949

2001


Biomes
arid land
boreal conifer forest
grassland
savanna woodland
shrub steppe
taiga
temperate evergreen forest
temperate mixed forest
tropical broadleaf forest
tundra and alpine
not analyzed
Canada
USA
Potential Vegetation 2100
Climate Change at 2.5 x 1990 Atmospheric CO_2
Gonzalez, P., R.P. Neilson, and R.J. Drapek. 2005. Climate change vegetation shifts across global ecoregions. *Ecological Society of America Annual Meeting Abstracts* 90: 228
1000 km
scale 1:50 000 000

Uncertainty = Inaction?

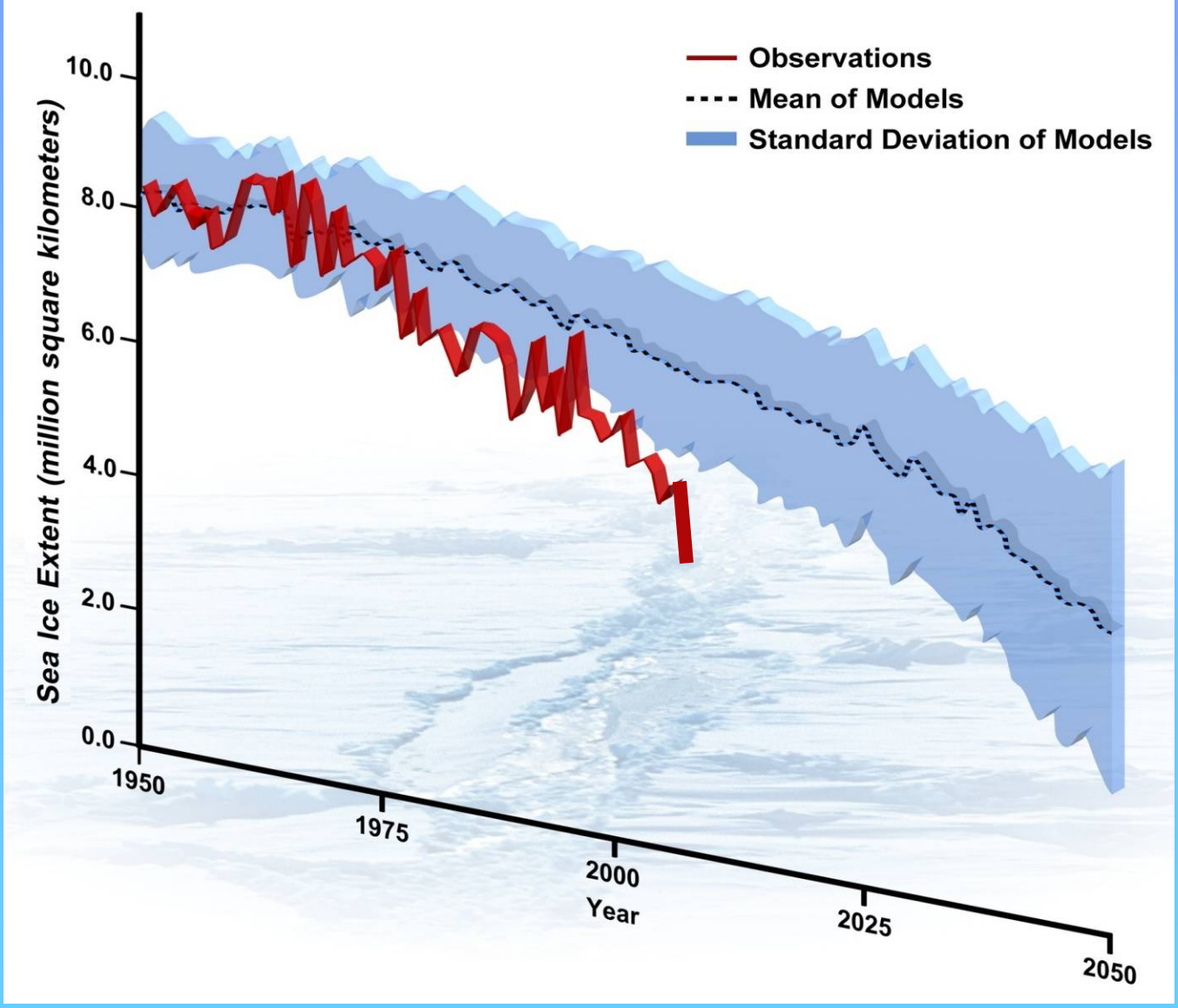
- Biological systems are hugely complex
  - Our understanding of processes under current conditions is poor, much less future condition



Conceptual model of the Arctic Coastal Plain ecosystem in the Arctic National Wildlife Refuge

Uncertainty = Inaction?

- Biological systems are hugely complex
- Model results may not be reliable
  - Biologists cannot make accurate predictions until physical process models are more accurate and precise


Observations
Mean of Models
Standard Deviation of Models
Sea Ice Extent (million square kilometers)
10.0
8.0
6.0
4.0
2.0
0.0
1950
1975
2000
2025
2050
Year

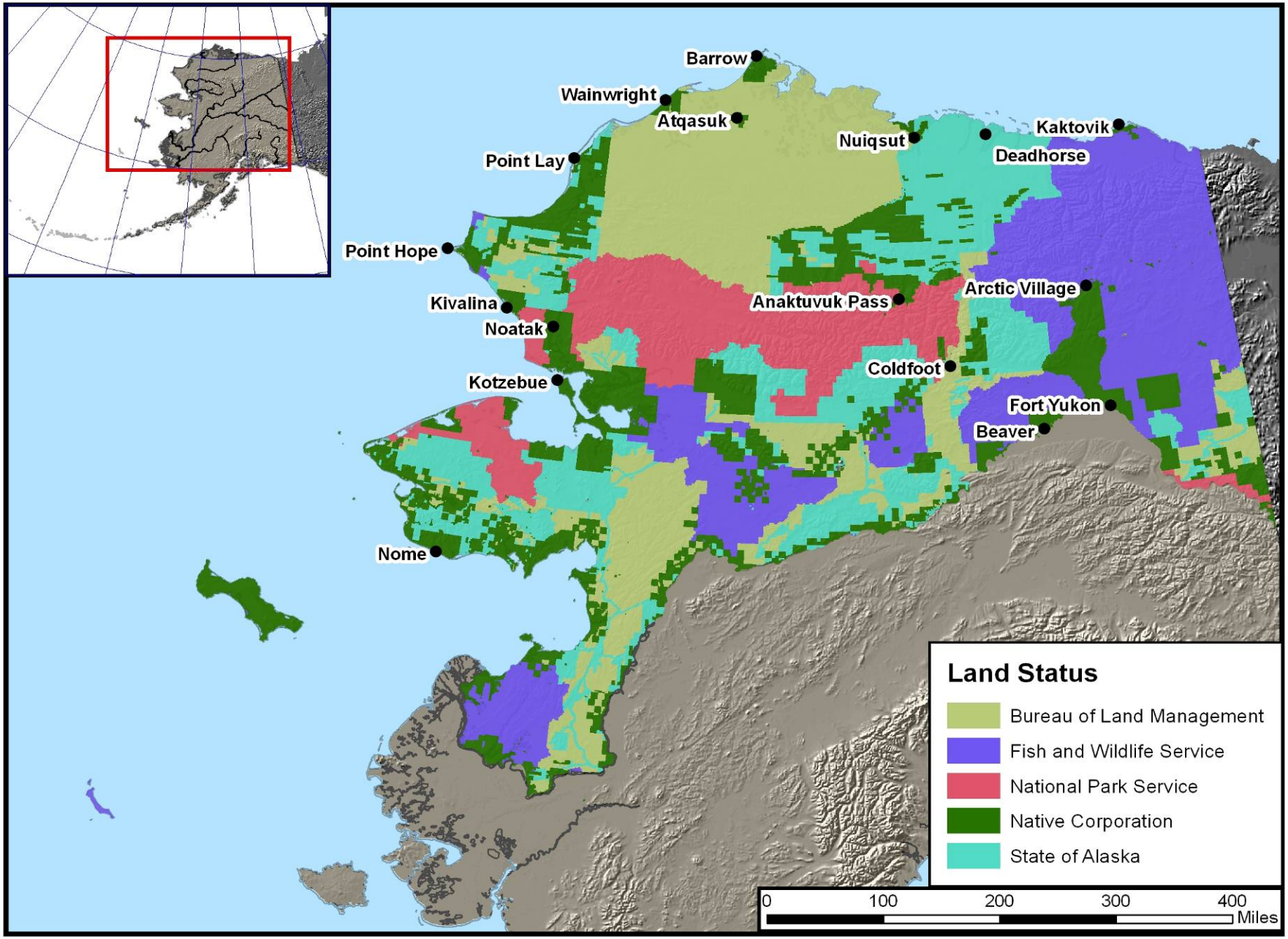
Shaking off the Paralysis of Uncertainty

IPCC Fourth Assessment Report

There is *medium confidence* that approximately 20-30% of species assessed so far are *likely* to be at increased risk of extinction if increases in global average warming exceed 1.5 - 2.5^{o} C (relative to 1980-1999). As global average temperature increase exceeds about 3.5^{o} C, model projections suggest significant extinctions (40-70% of species assessed) around the globe.

It Takes a Government

or at least multi-agency, multi-organization cooperative…


Barrow
Wainwright
Atqasuk
Point Lay
Nuiqsut
Kaktovik
Deadhorse
Point Hope
Kivalina
Noatak
Anaktuvuk Pass
Arctic Village
Coldfoot
Kotzebue
Fort Yukon
Beaver
Nome
Land Status
Bureau of Land Management
Fish and Wildlife Service
National Park Service
Native Corporation
State of Alaska
0
100
200
300
400
Miles

Landscape Conservation Cooperatives

- Share capacities - modeling, statistical analysis, data management, GIS, biology
- Provide best available science and decision support related to changing climate
- Promote shared collection, analysis and dissemination of climate data, modeling results, and related decision tools
- Target stewardship/management activities at all geographic scales

Products and Outcomes

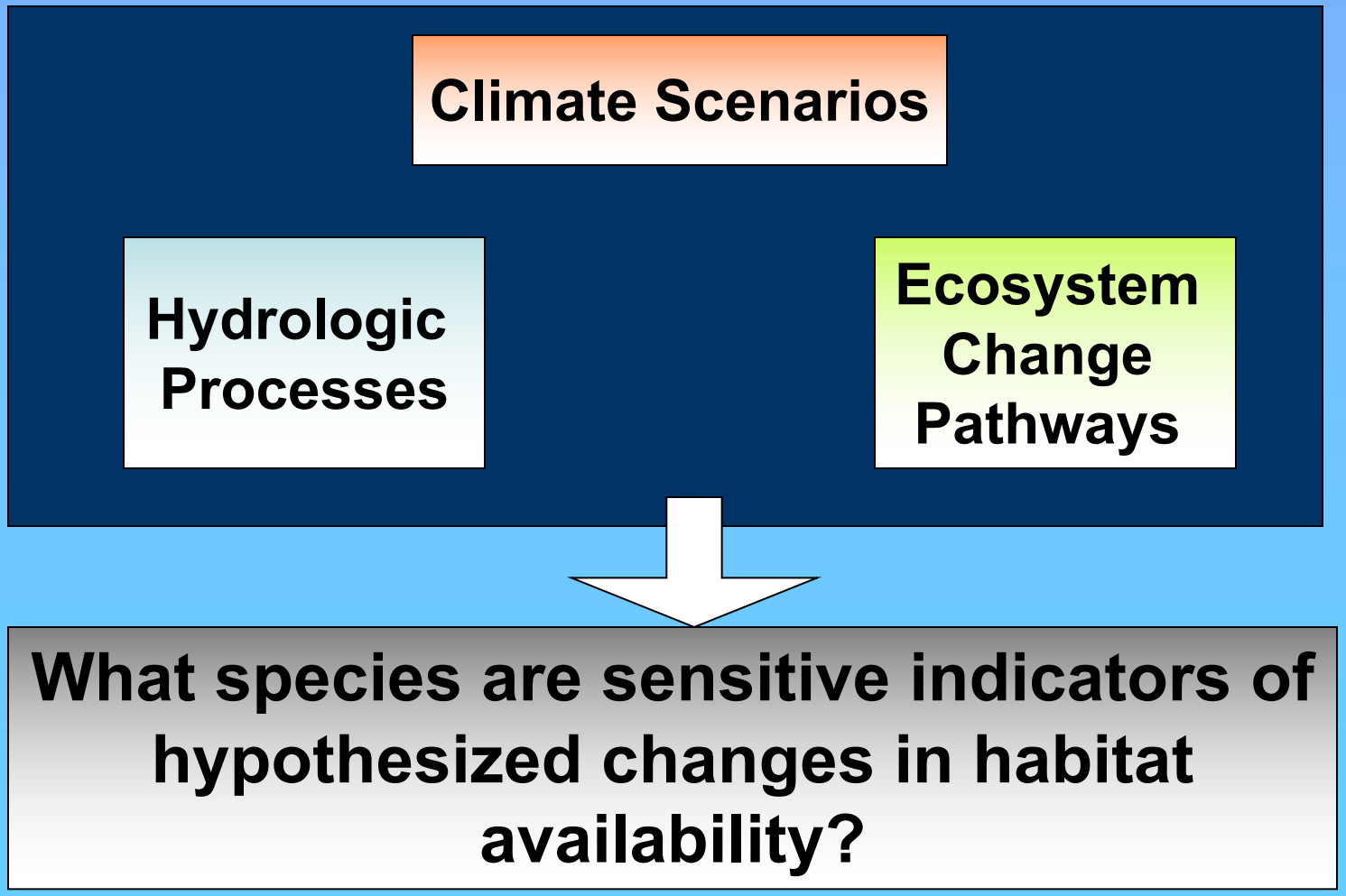
- Strategic Plan for Terrestrial and Freshwater Arctic Ecosystems
  - Contains needed research, monitoring, and modeling
  - Identifies priority or sensitive species
  - Informs conservation goals
- Multi-agency, organization, university partnership

Workshop Structure

Background Information -- Monday

- Climate
- Permafrost
- Coastal Processes
- Geomorphic Processes
- Vegetation
- Hydrologic Processes

Workshop Structure
Working Group Breakout Session I



Workshop Structure
Breakout Session I

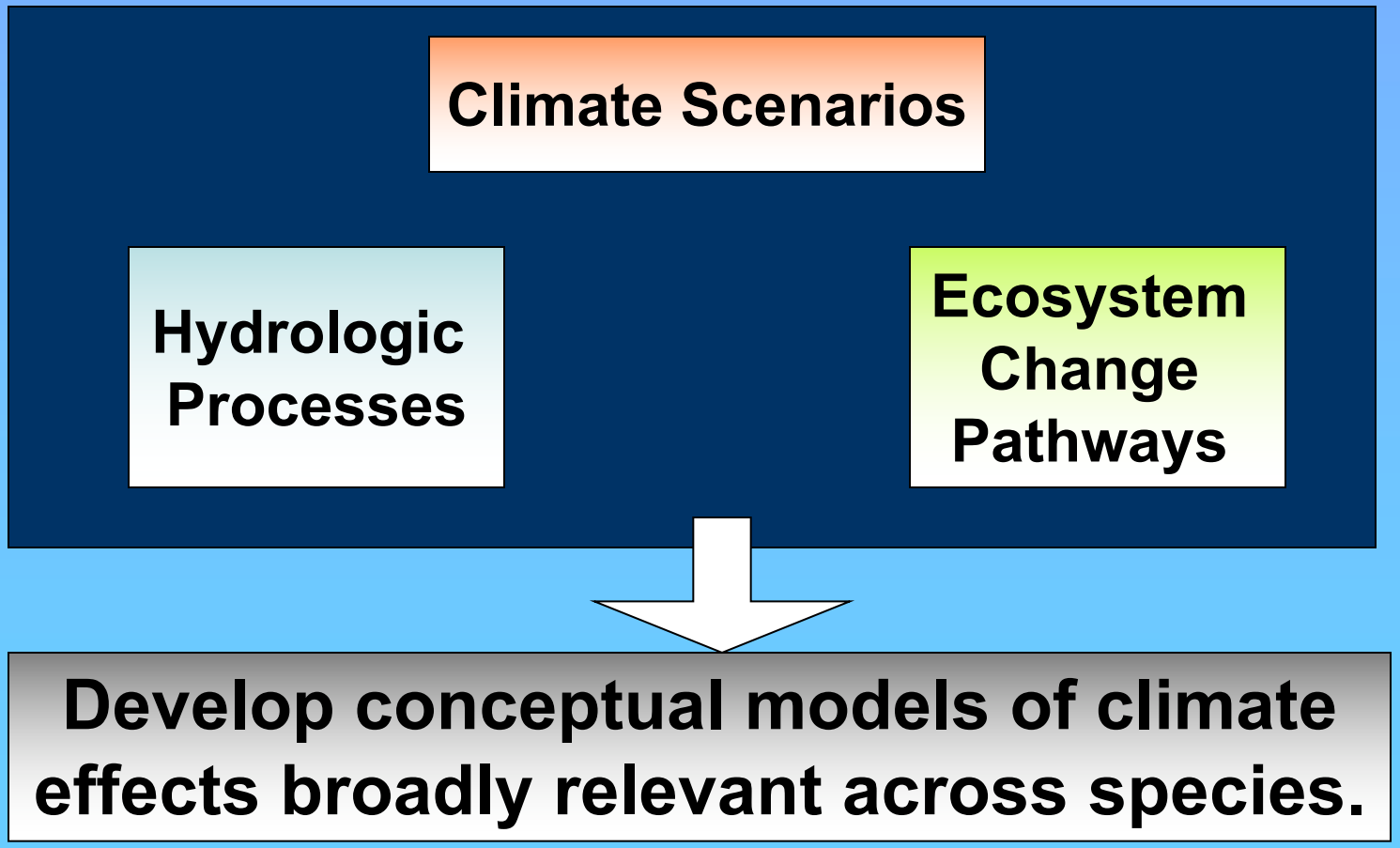
What species are sensitive indicators of hypothesized changes in habitat availability?

Workshop Structure

Background Information -- Tuesday

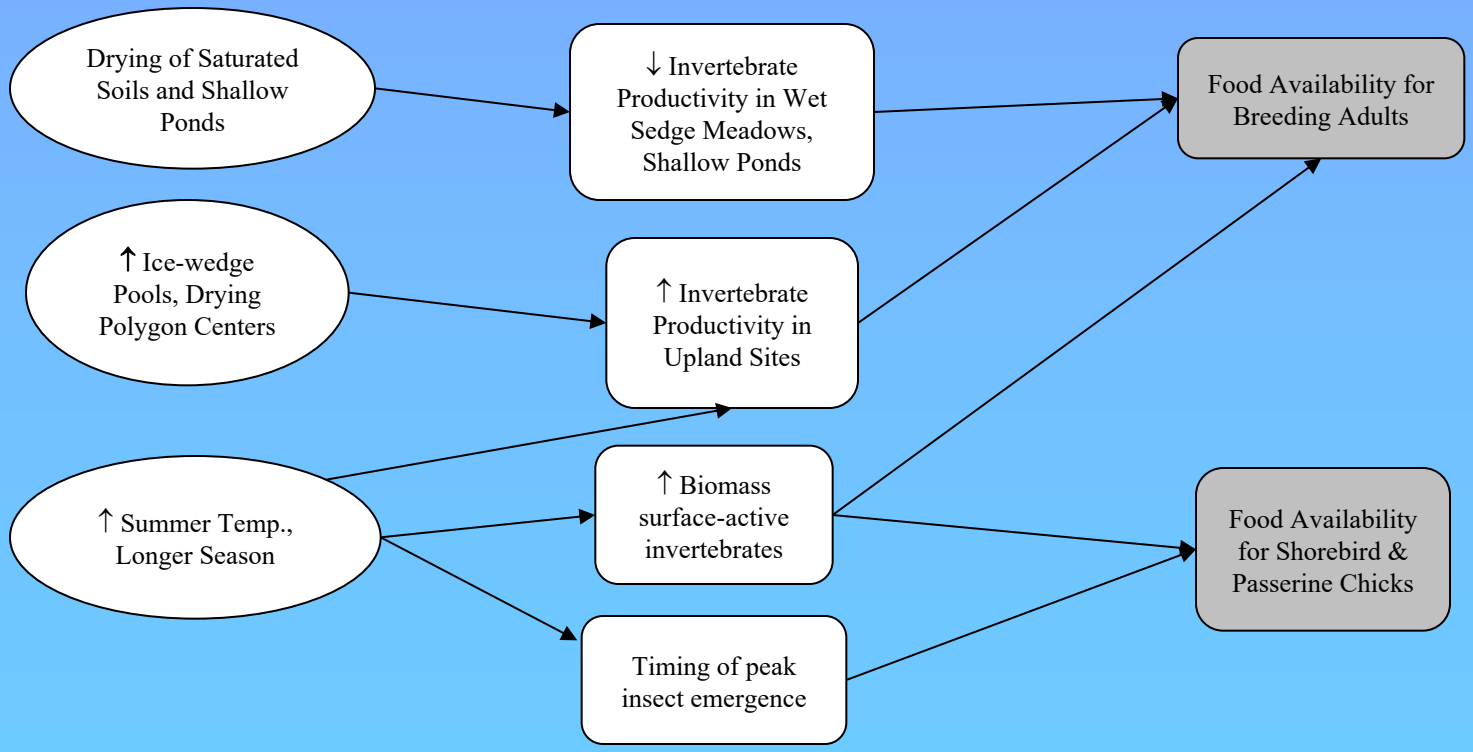
- Trophic Systems - Herbivores
- Trophic System – Aquatic Systems

Workshop Structure
Working Group Breakout Session II



Workshop Structure

Breakout Session II



Develop conceptual models of climate effects broadly relevant across species.

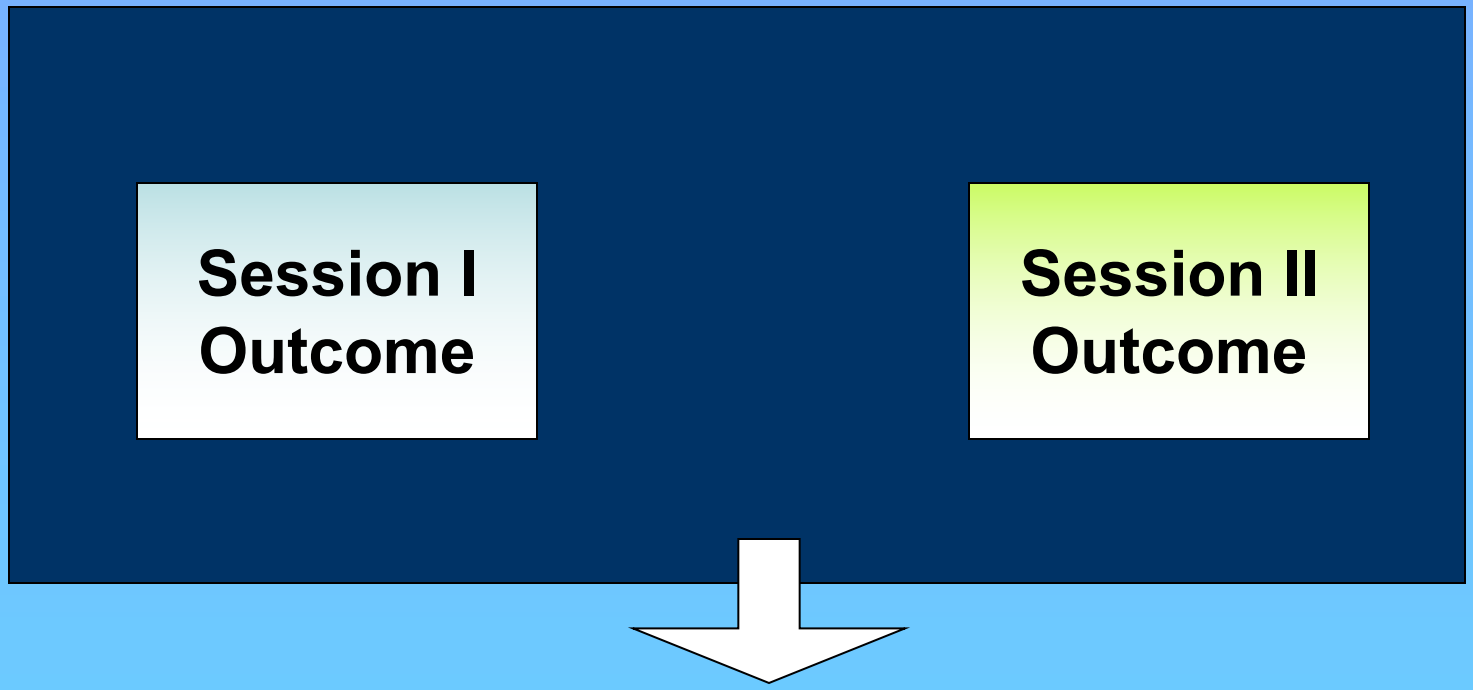
Workshop Structure

Background Information -- Tuesday

- Frame Based Modeling
- Bayesian Network Modeling

Workshop Structure

Working Group Breakout Session III



Identify data/modeling gaps, emphasizing physical and ecological process models that may affect species in all 3 groups of interest.

Workshop Structure

The Lucky Few will remain on Wednesday to begin synthesis of Workshop results into a 5-year Strategic Plan that identifies priority research, modeling, and synthesis activities needed to predict climate-related impacts to fish and wildlife populations in arctic Alaska.

THANK YOU!