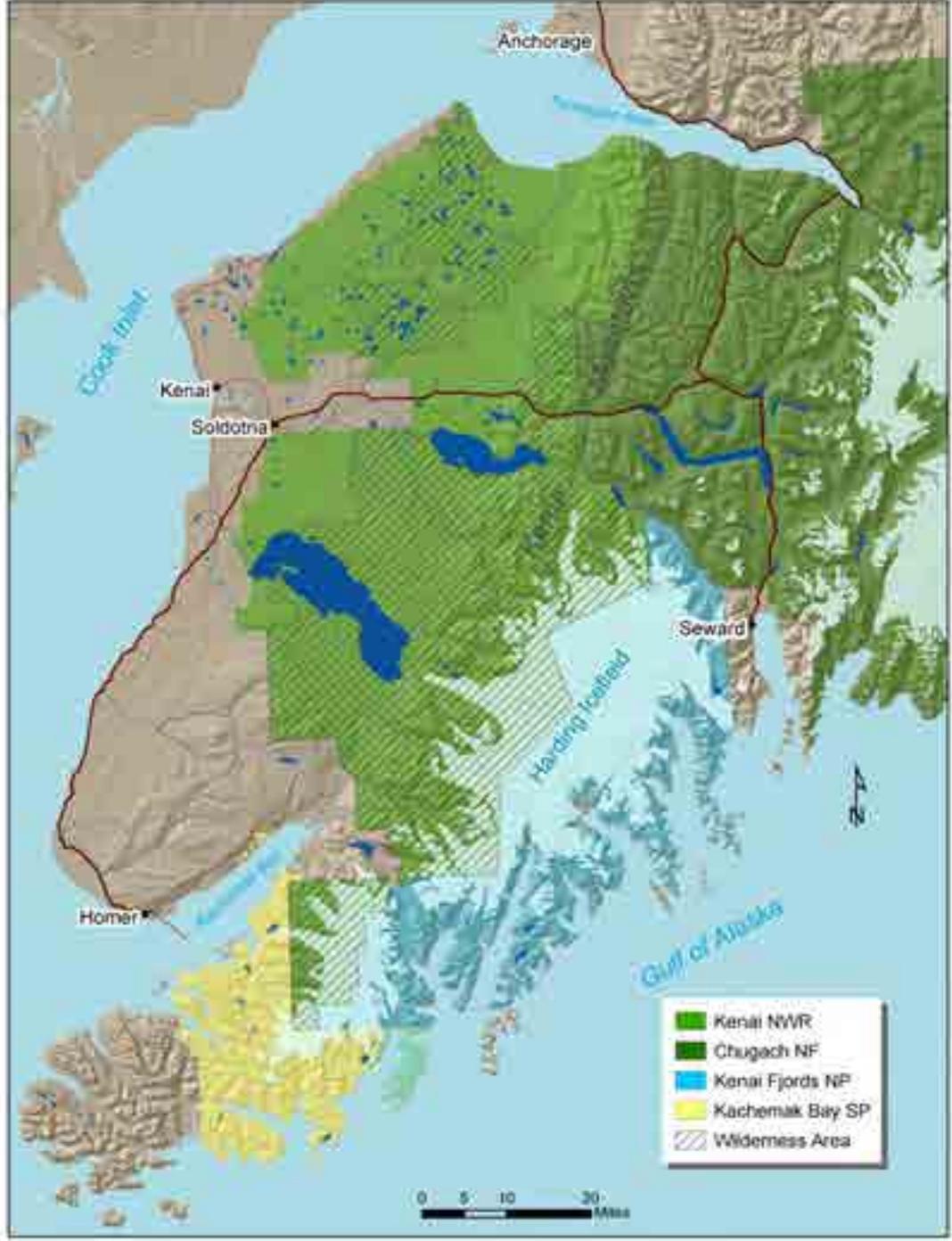


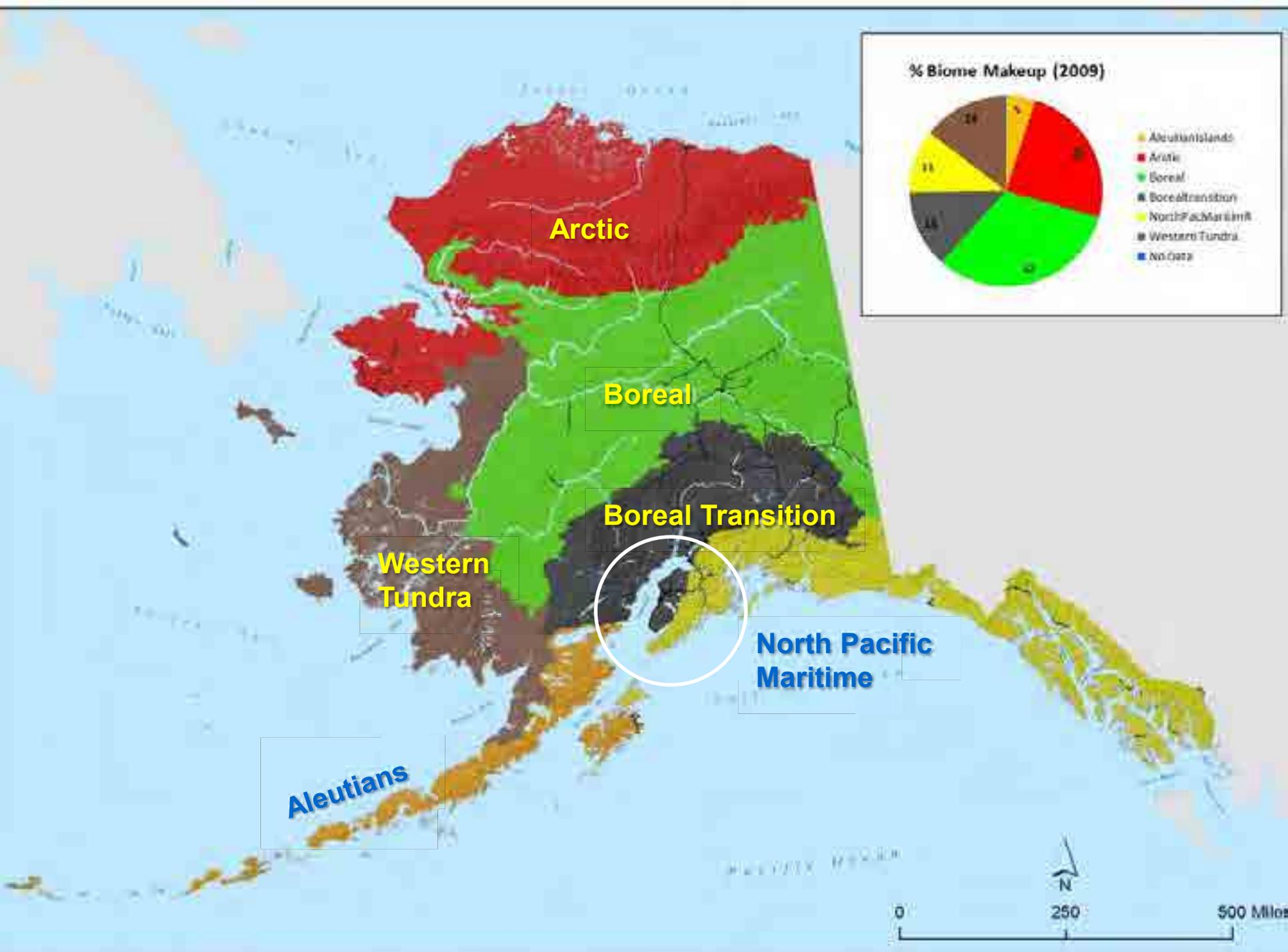


Case Study 2: Facilitating ecological transformation on the Kenai Peninsula?

Doing nothing vs doing something

**John Morton
Kenai National Wildlife Refuge**









05 15 2007



3230B

6/14/2004 9:









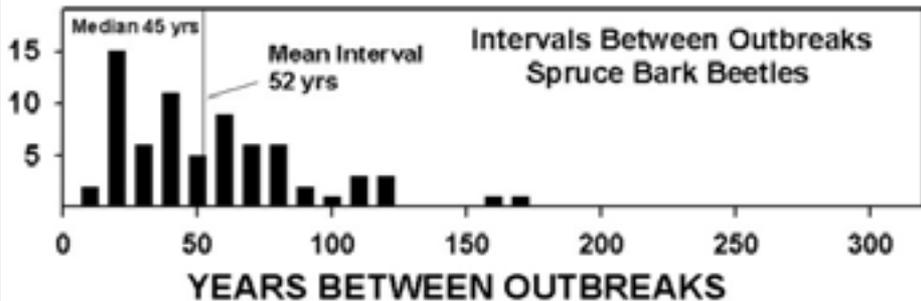
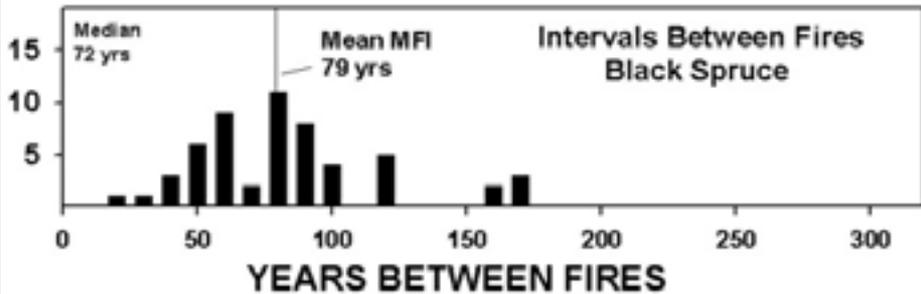
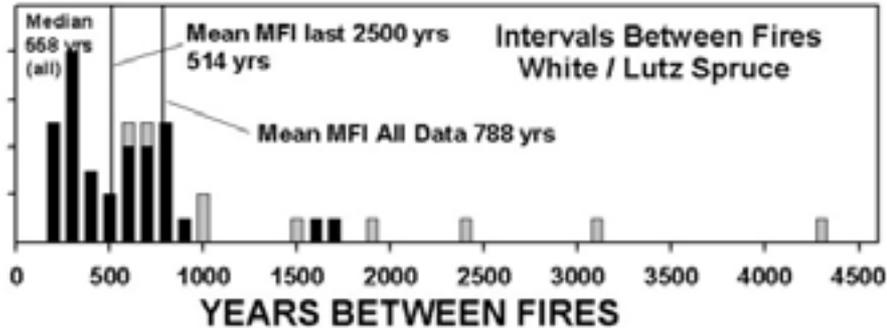
Measured rates of climate change impacts on the Kenai Peninsula



- available water (60% loss since 1968)
- wetlands (6 – 11% per decade since 1950)
- glaciers (5% surface area, 21 m elevation since 1950)
- + SB beetle outbreaks (triggered by 2 consecutive warm summers)
- + treeline (10 m per decade)
- Δ species distributions
- Δ wildfire (spring, grass)



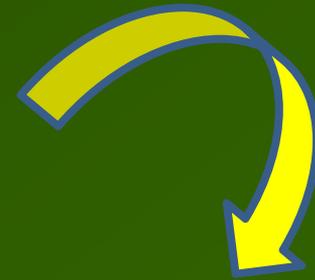
Changing fire regime? 2005 fire season



Woody shrub encroachment into Sphagnum peatlands



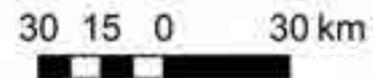
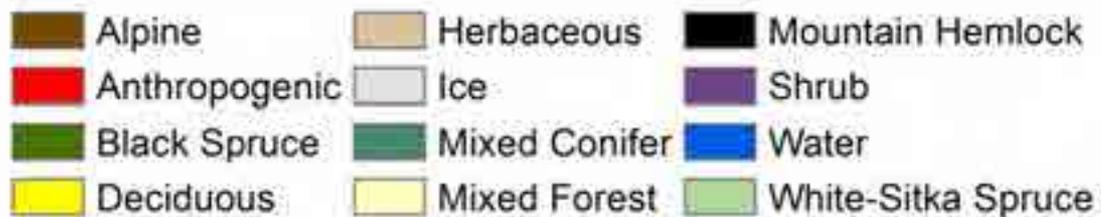
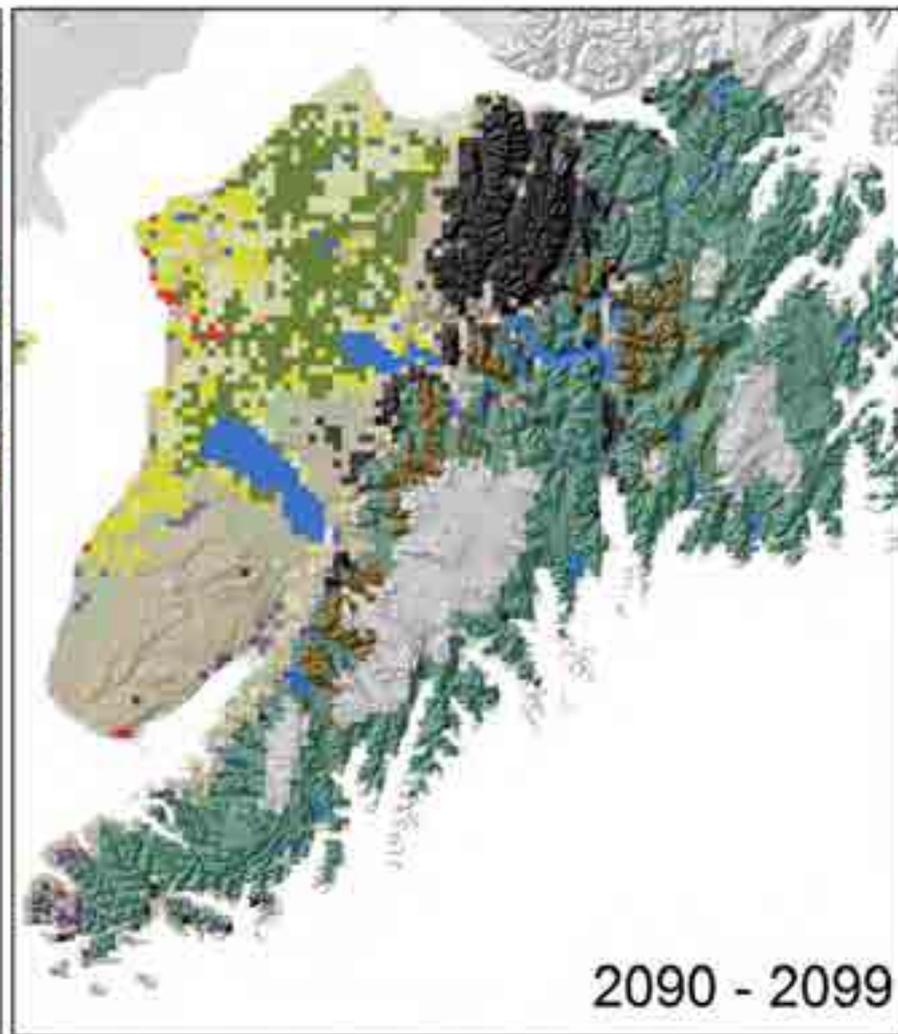
Conversion of white/Lutz spruce forests to *Calamagrostis* savannah



Forecasting the Kenai Peninsula's landscape through 2100

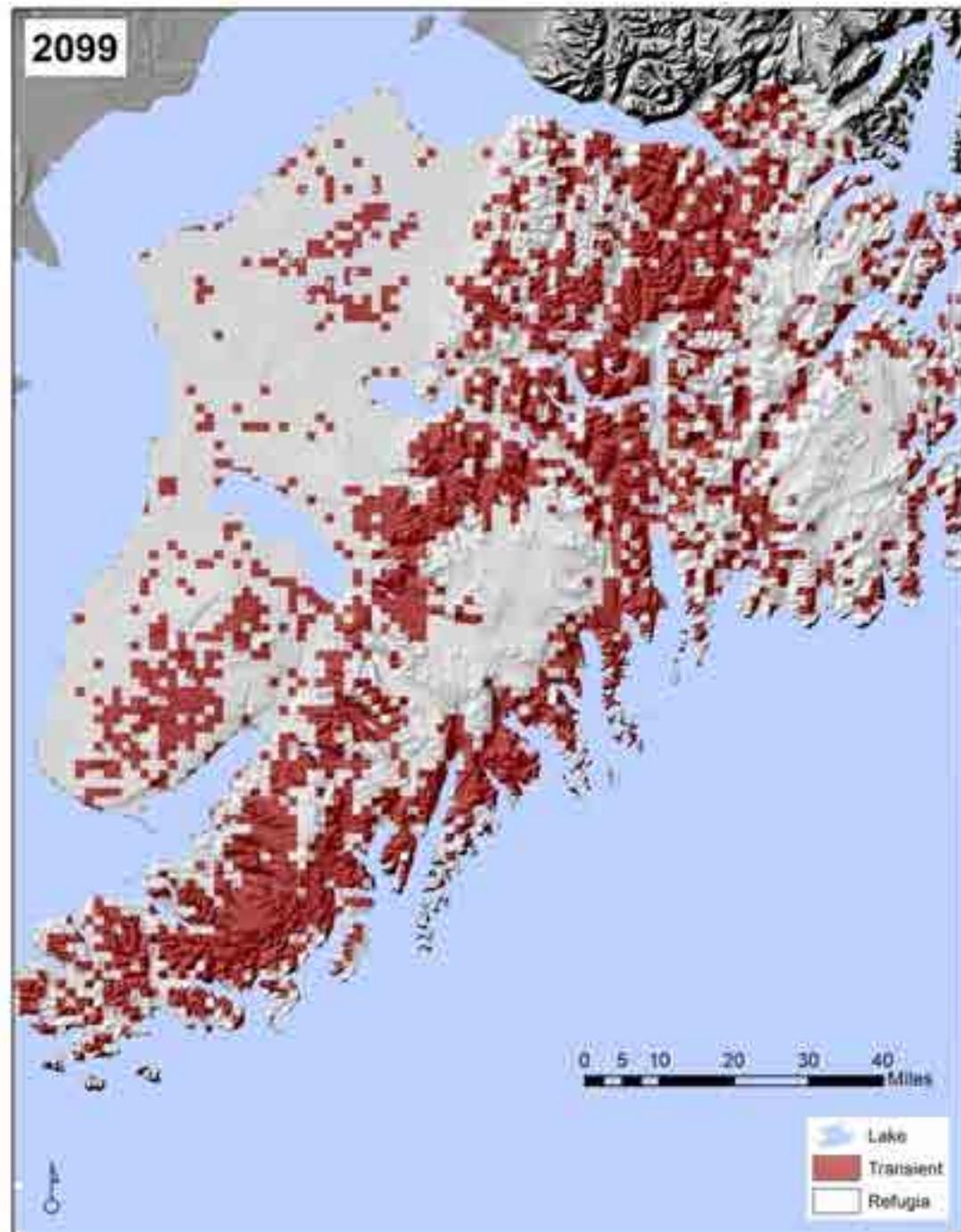
- ✓ Climate envelope modeling using Random Forests™
- ✓ a1b scenario decadal averages for temperature, precipitation (SNAP)
- ✓ landcover type with the greatest % cover in 2km pixels
- ✓ if previous landcover type for each timestep (2039, 2069, 2099) $P > 0.5$ then stay; if $P < 0.5$ then landcover type with highest probability





37% of the Kenai Peninsula is forecasted to change landcover type by 2099!

- ✓ Eastern side shows **afforestation** of alpine (hemlock) and coast (Sitka spruce)
- ✓ Western side shows **deforestation** (white and black spruce), expanding grasslands



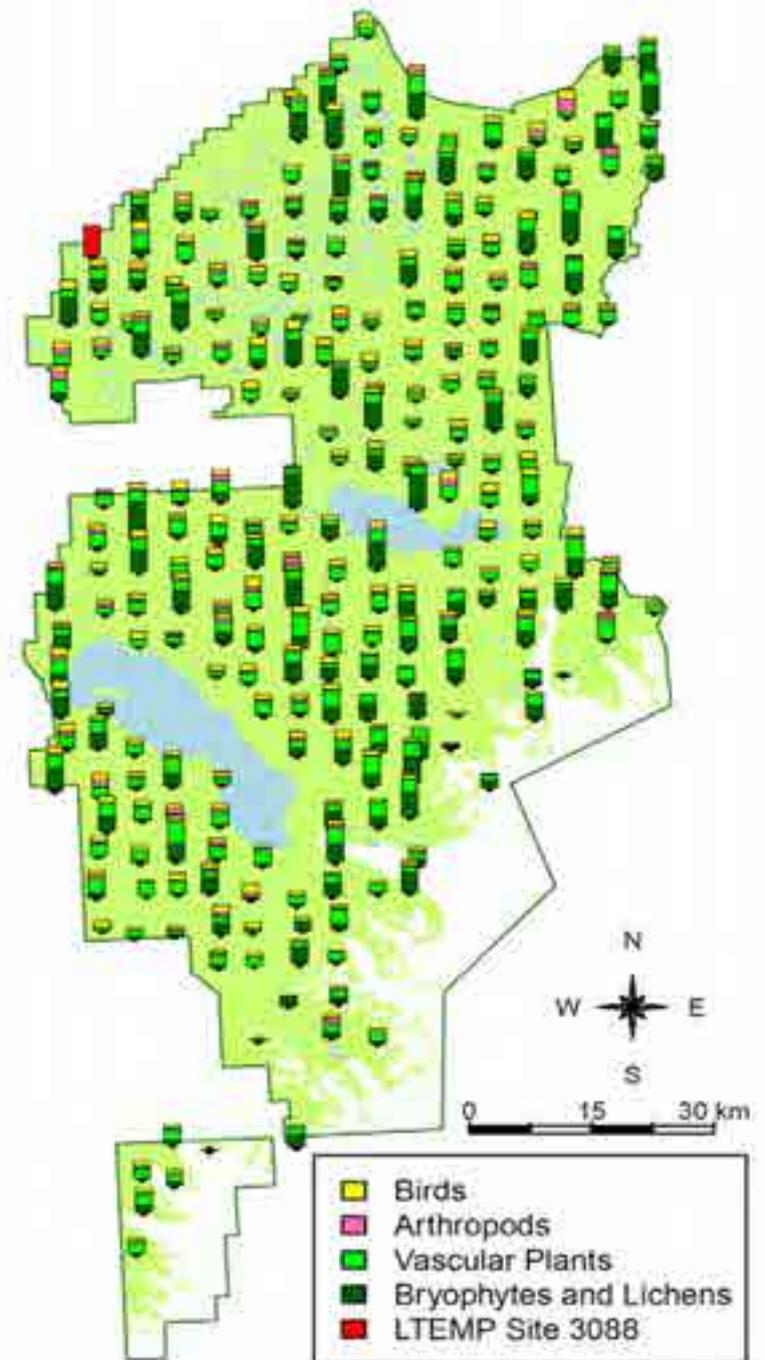
44% of 1,037 native species are unique to one of 10 landcover types

86 birds

333 vascular plants

477 nonvascular plants

141 arthropods



In a worst case scenario, > 400 native species are on a trajectory for extirpation from the Kenai Peninsula by 2099!

Land cover Type	2009 (Ha)	2099 (Min Ha)	Trend	Unique Species
Alpine	556,419	0	-	170
Black Spruce	188,406	0	-	56
Mixed Forest	249,209	0	-	86
Shrub	330,011	0	-	57
White-Sitka Spruce	230,408	0	-	38
Deciduous	38,401	37,601		21
Herbaceous	48,001	65,202	+	15
Mixed Conifer	79,603	330,411	+	1
Mountain Hemlock	34,401	109,604	+	10
Snow or Ice	550,410	50,803		8



> 138 exotic species of flora (108) and fauna (30) occur on the Kenai Peninsula and are poised to fill novel assemblages



2 questions we need to ask ourselves....



What's the risk of doing nothing?

What's the risk of doing something wrong?

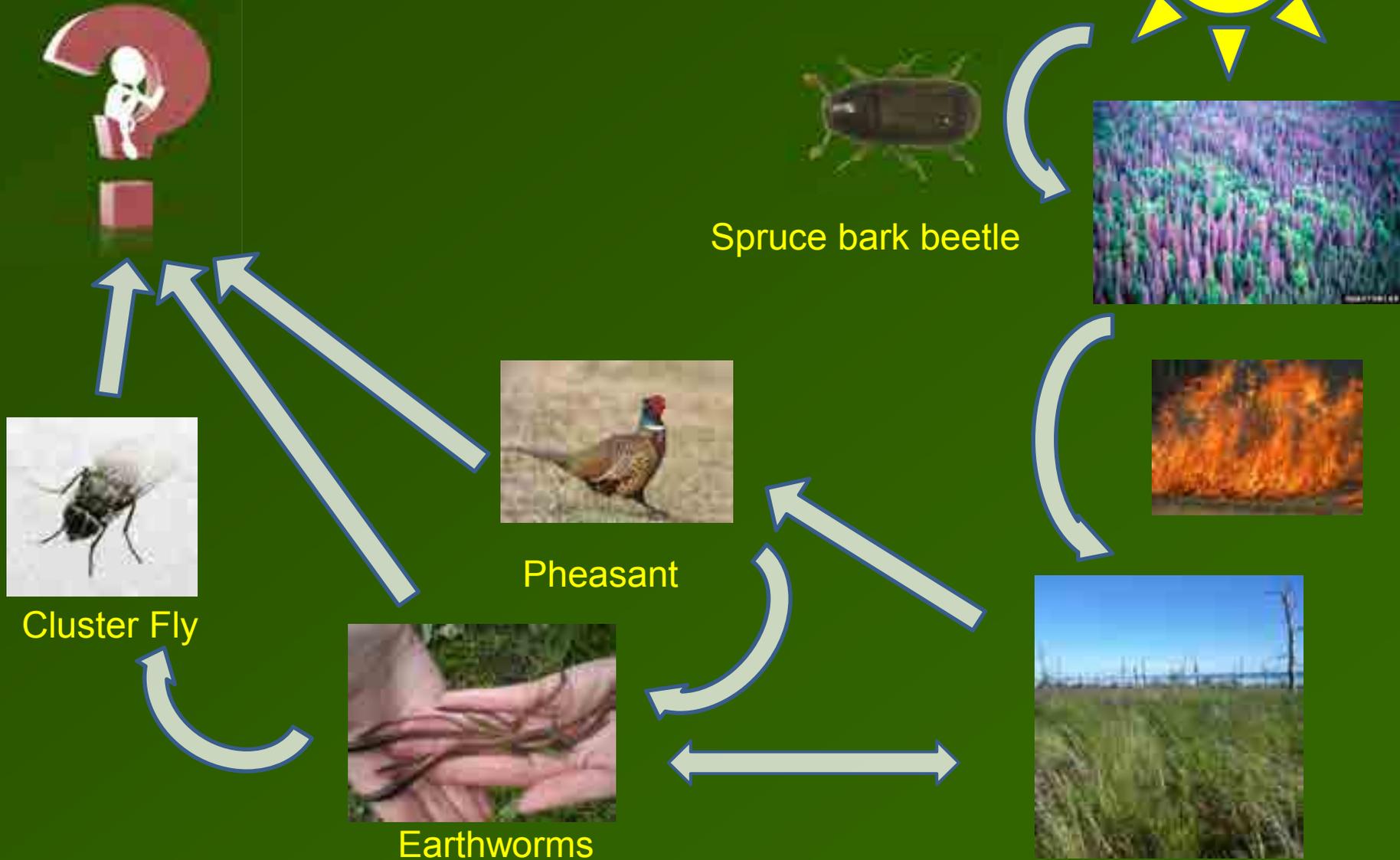
----Rosa Meehan

10 Feb 2010

What is the risk of doing nothing?

- ✓ Kenai Peninsula is already responding to a changing climate and forecasted to continue doing so
- ✓ Novel assemblages ≠ simple re-shuffling of native flora and fauna
- ✓ Many extant native species are on a trajectory for extirpation
- ✓ Many exotic species already introduced and more enroute
- ✓ Are we willing to steward these outcomes?

A human-mediated system on the Kenai with an unknown outcome....



2 questions we need to ask ourselves....



What's the risk of doing nothing?

What's the risk of doing something wrong?

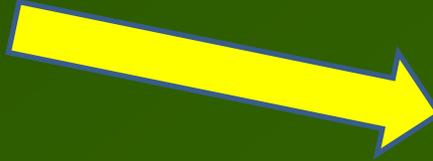
----Rosa Meehan

10 Feb 2010

**Same climate forecast
but potentially
different outcomes....**

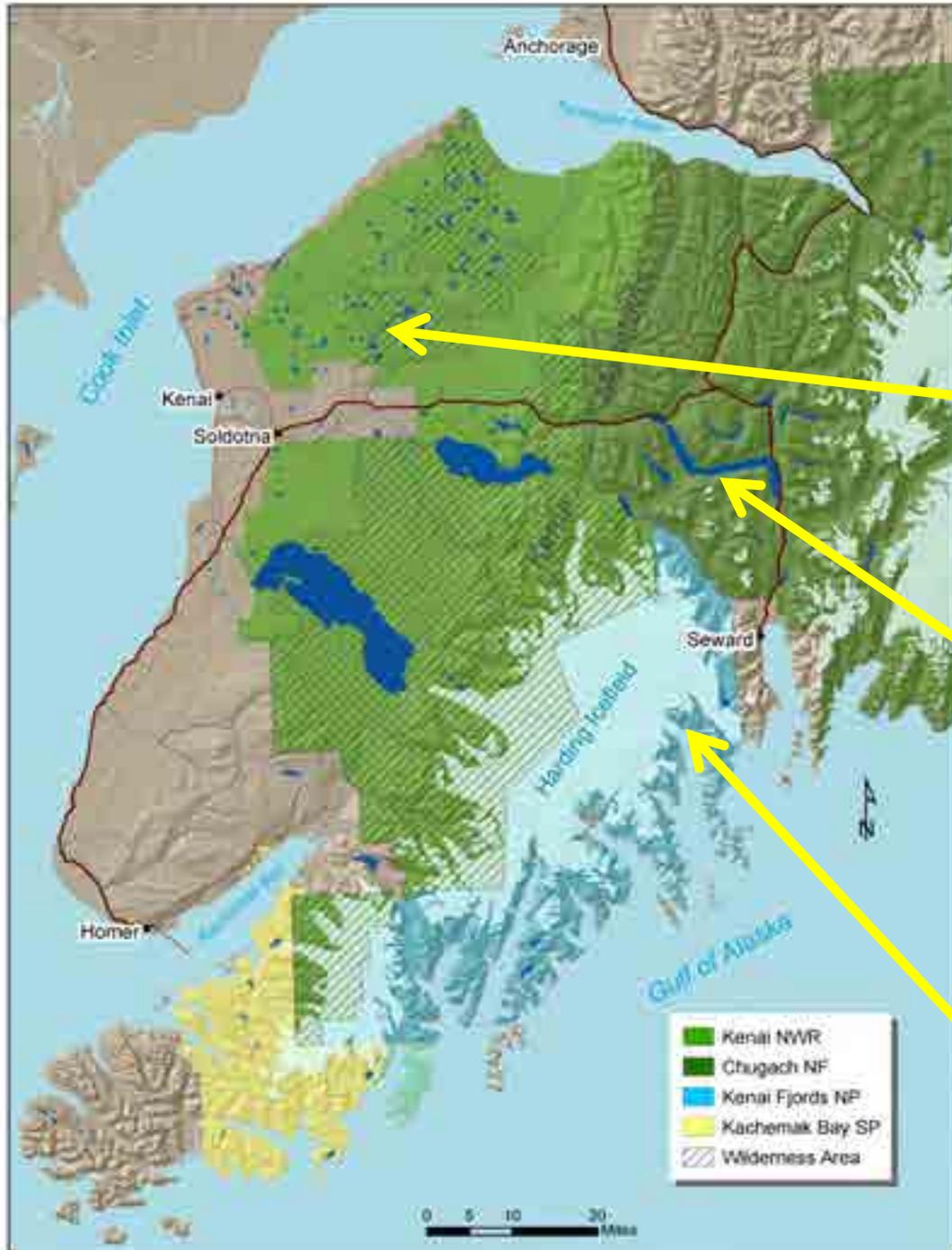


Boreal Transitional



**We are already
making choices!**

Competing mandates among Federal agencies...



Kenai National Wildlife Refuge

conserve fish & wildlife populations and habitats in their natural diversity...

Chugach National Forest

Vegetation results from natural processes. Selected locations altered by management activities...to restore degraded conditions. Fish and wildlife flourish in their current abundance with stable populations and abundant habitat.

Kenai Fjords National Park

Maintain unimpaired the scenic and environmental integrity of the Harding Icefield...to protect seals, sea lions, other marine mammals...to maintain their hauling and breeding areas in their natural state, free of human activity which is disruptive to their natural processes..."

How we are maintaining/preparing for future adaptation options?

- ✓ **Change wilderness management policy**
 - ▬ (prescribed fire, case study for facilitated adaptation)
- ✓ **Persistent community dialogue**
 - ▬ (Climate Change in our Backyard, Refuge Notebook)
- ✓ **Eradicate novel exotic species**
 - ▬ (Elodea)
- ✓ **Continuing climate change research**
 - ▬ (grassland conversion, common garden experiments)
- ✓ **Sustaining landscape connectivity**
 - ▬ (Kenai Mountains to Sea, highway mitigation)



Questions????