Habitat Availability for Amur Tiger and Amur Leopard under Changing Climate and Disturbance Regimes

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The Study R[egion]

Primorsky Krai has a large systems of reserves and protected areas. Tigers are wide ranging animals and are not necessarily contained by these reserves.

Potential/Present AmurTiger Distribution

Evidence of tigers in Chiina (tracks/interview data)

Sikhote-Alin - Wandashan Tiger Population

Tumen River Tiger Population

TIGER HABITAT
Current or potential tiger habitat
Tiger range, 1900

NATIONAL GEOGRAPHIC MAPS
SOURCES: ERIC DINERSTEIN, WWF; PETER JACKSON, IUCN; JOHN MACKINNON, ABC; DALE MIQUELLE, HORNOCKER WILDLIFE INSTITUTE; JOHN ROBINSON, WCS; JOHN SEIDENSTICKER

Tigers are Siberian Tiger species now restricted worldwide. Yellow is the Primorsky 1900; red is current or potential habitat, Far East (with possible few the Amur Tiger (*Panthera Northeatatrica*) the world's largest "big cat".

The Species of *Panthera*

Amur Leopard (*P. pardus orientalis*)

Amur Tiger (*Panthera tigris altaica*)

The home range territory needed depends on the density of prey.

Status: Critically endangered (less than 50 in the wild)
Females: 62 – 132 lbs;
Males: 82 – 198 lbs
Diet: Roe deer (*Capreolus pygargus*), Sika Deer, Wild Boar, Hares, other small mammals
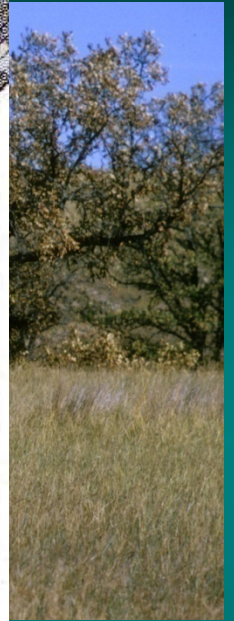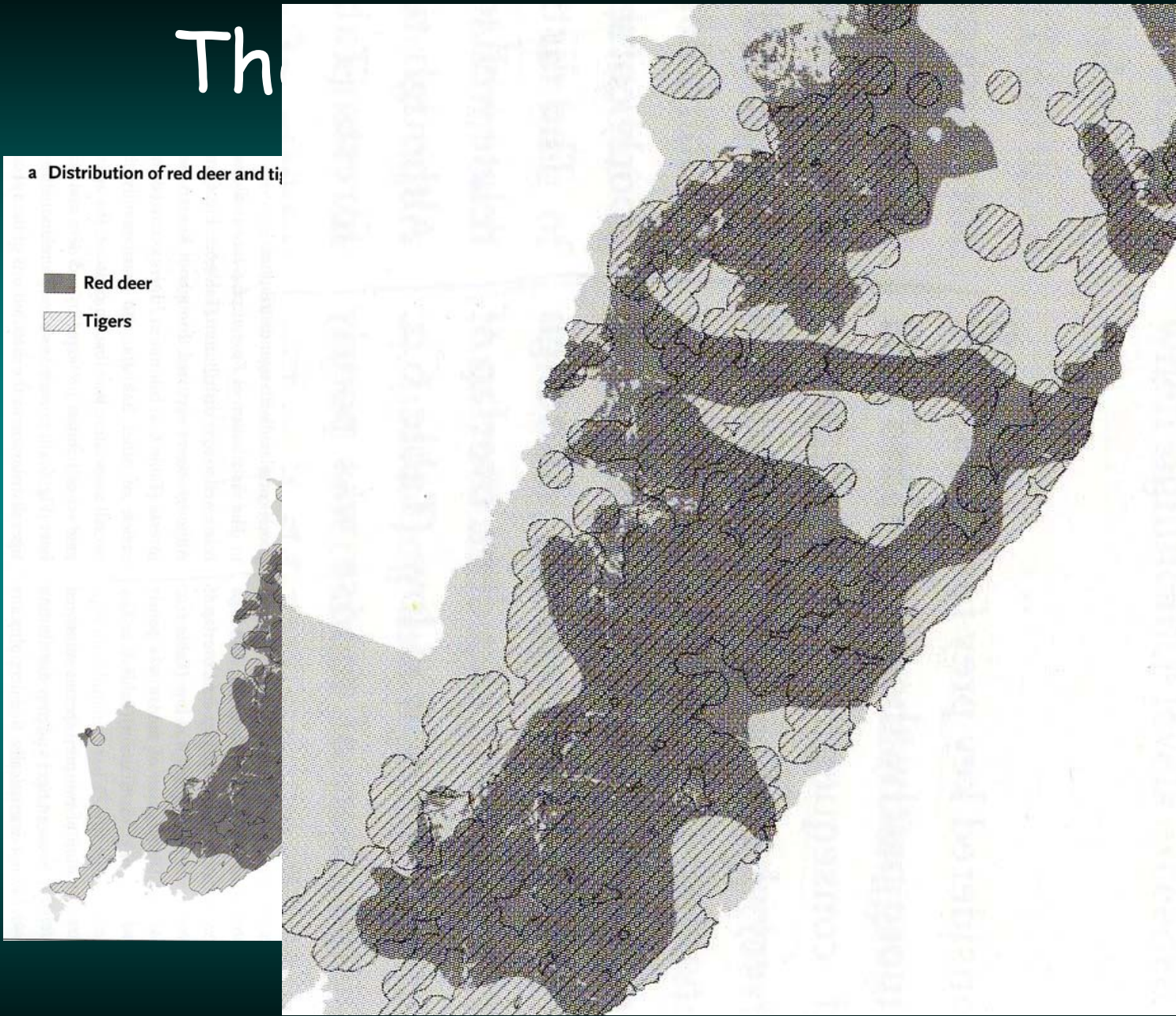
Status: Critically endangered (less than 400 in the wild)
Females: Avg. about 350 lbs., to 500 lbs.;
Males: Avg. about 500 lbs., to 800 lbs.
Key prey: Red Deer (*Cervus elaphus*), Wild Boar (*Sus scrofa*), Sika Deer (*Cervus nippon*), small mammals
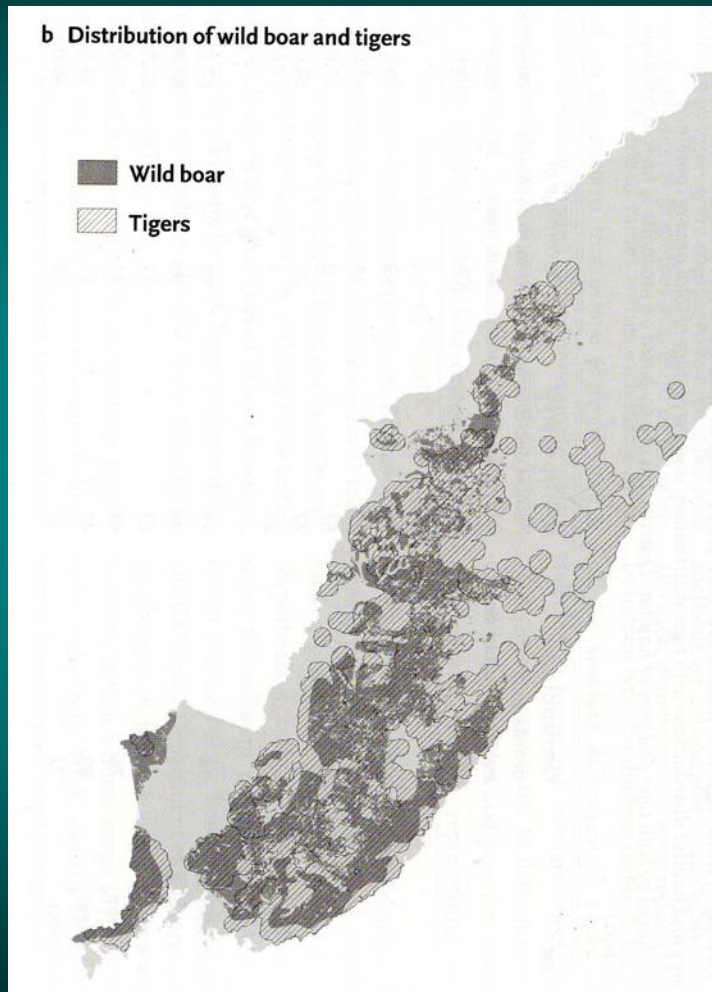
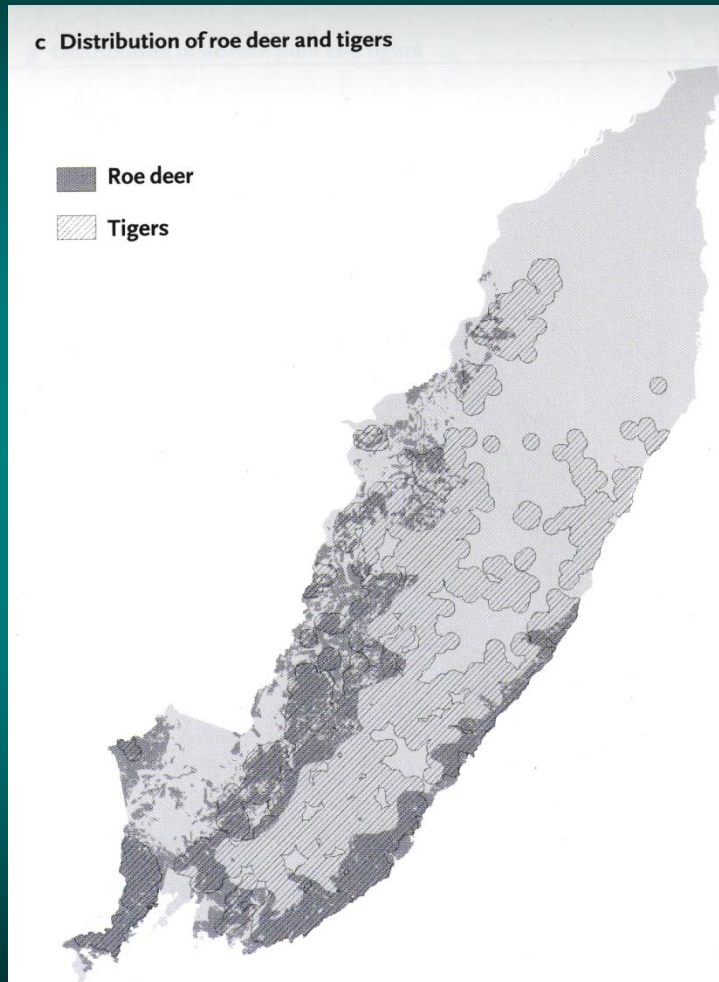The

a Distribution of red deer and ti...

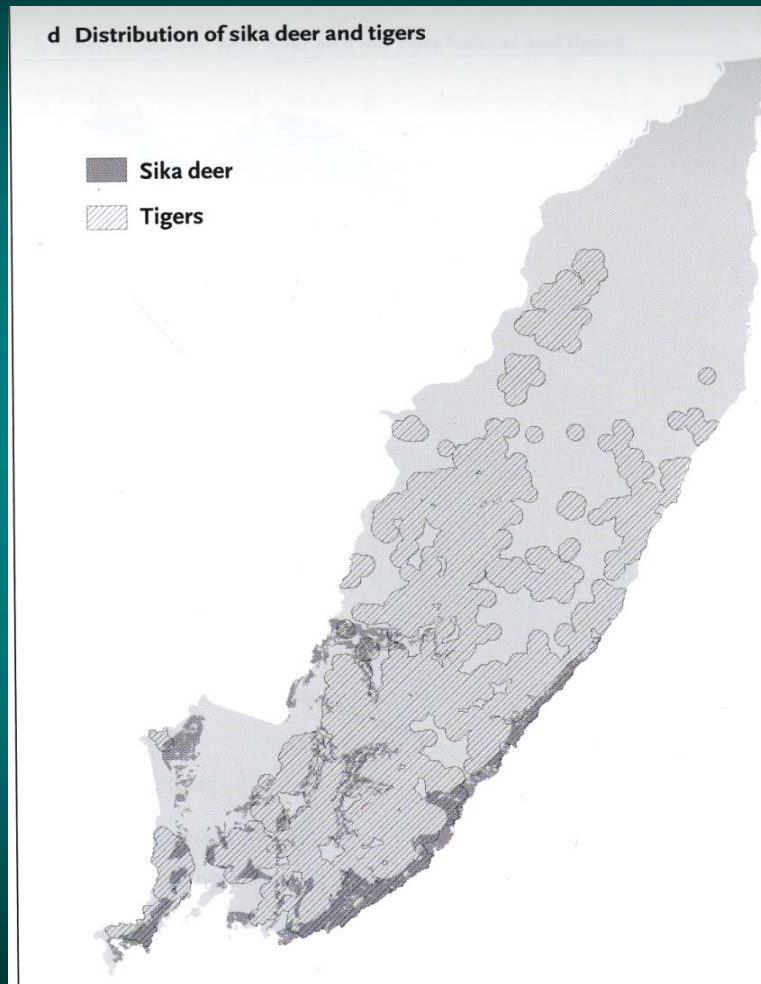Red deer
Tigers

...aphus)
...the US.

The Prey of *Panthera*

b Distribution of wild boar and tigers

Wild boar

Tigers

Wild Boar (*Sus scrofa*)

The Prey of *Panthera*

c **Distribution of roe deer and tigers**

Roe deer

Tigers

Roe deer (*Capreolus pygargus*)

The Prey of *Panthera*

d Distribution of sika deer and tigers

Sika deer
Tigers

Sika Deer (*Cervus nippon*)

Amur Tigers also feed occasionally on Moose (*Alces alces*). Moose mostly are distributed north of the Tiger's range.

Differential Presence of Prey in Different Habitats

Vegetation type	Species of Prey				
	Red Deer	Wild Boar	Sika Deer	Roe Deer	Moose
Riverine (oak-birch, Korean pine-deciduous, spruce-fir)	+			+	-
Oak			+	+	-
Birch/aspen			-		
Pine-deciduous			-	-	-
Korean pine		+	-	-	-
Larch	-	-	-	-	+
Fir	-	-	-	-	+

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Larch	-	-	-	-	+
Fir	-	-	-	-	+

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Korean pine		+	-	-	-
Larch	-	-	-	-	+
Fir	-	-	-	-	+

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Larch	-	-	-	-	+
Fir	-	-	-	-	+

Our study attempts to project the future distribution and success of the Amur Tiger and the Amur Leopard in response to follow-on changes due to climate change. Our principal foci are change in wildfire regime and change in regional vegetation pattern. This involves:

1. Characterization of the distribution of Tigers and Leopards with current vegetation and prey species distribution.
2. Develop capability to predict changes in wildfire features with climate change.
3. Develop capability to simulate regional vegetation changes with climate and recovery from fires.
4. Synthesis of the three elements above

This talk will discus our initial efforts on the first three of these topics.

Study Objectives

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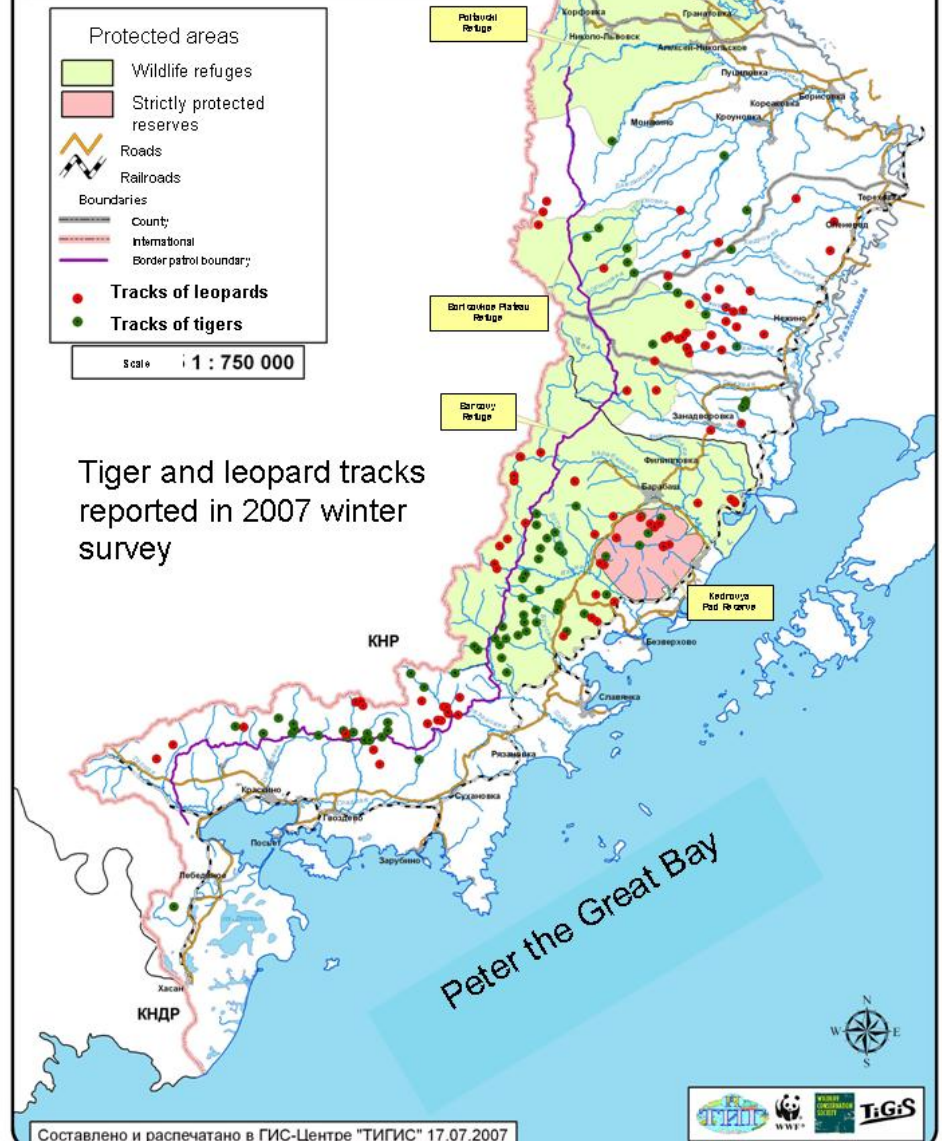
Installing camera traps in Primorsky Krai, Russia

Amur (Siberian) Tiger photographed using a camera trap with a passive infrared motion detector.

Results of the 2007 winter survey of Far Eastern leopards and Amur tigers in Southwest Primorski Krai, Russia

Protected areas

Wildlife refuges

Strictly protected reserves

Roads

Railroads

Boundaries

County

International

Border patrol boundary

● Tracks of leopards

● Tracks of tigers

Scale 1 : 750 000

Tiger and leopard tracks reported in 2007 winter survey

Peter the Great Bay

Collection of Forest Structure and Composition Data

For model testing and remote sensing calibration

This field work was conducted September 18, 2007 to October 22, 2007 and produced a data set of measured tree and sapling statistics in ten 30-meter diameter circles at 12 sites, for a total of 120 study locations.

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Vegetation Types across the Study Area

From: Loboba, T.V. and I.A. Csiszar. 2007. Assessing the risk of ignition in the Russian Far East within a modeling framework of fire threat. *Ecological Applications* 17:791-805.
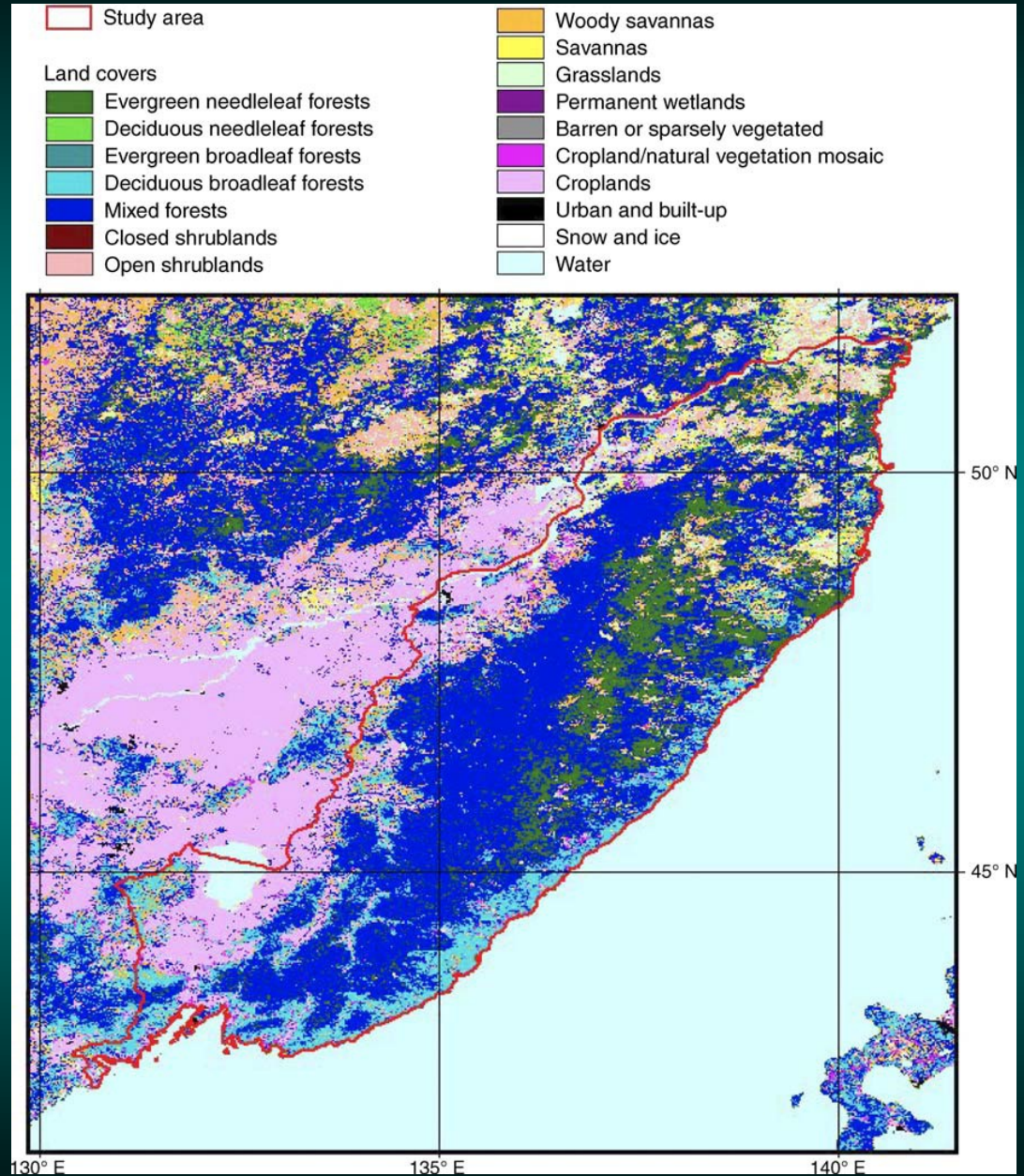
Spatial distribution of fire ignitions by seasons for 2001–2004

Fire ignitions, 2001–2004
- Winter
- Spring
- Summer
- Fall
- Lake Khanka
- Roads
- Railroads
- Settlements

From: Loboba, T.V. and I.A. Csiszar. 2007. Assessing the risk of ignition in the Russian Far East within a modeling framework of fire threat. *Ecological Applications* 17:791-805.
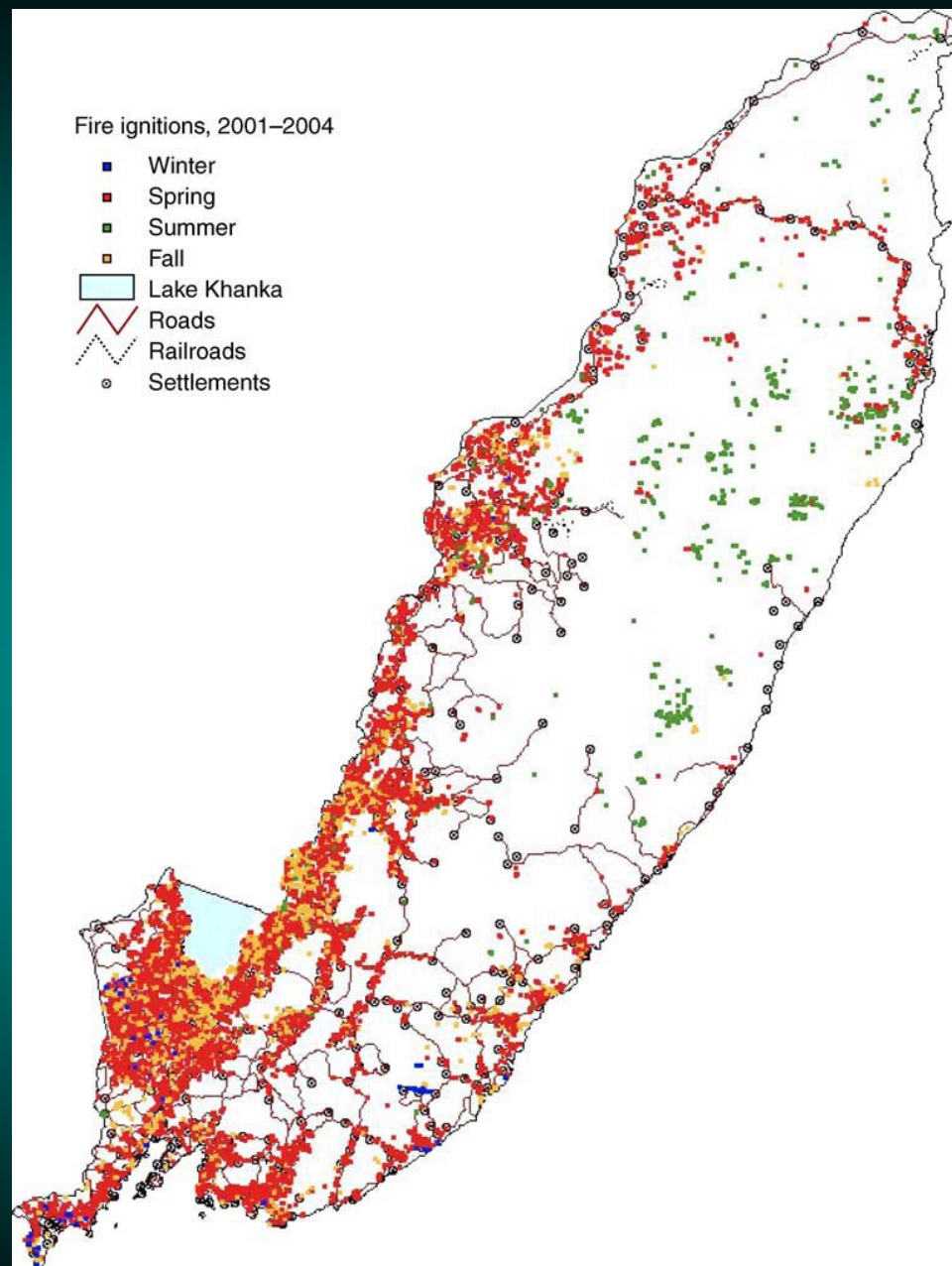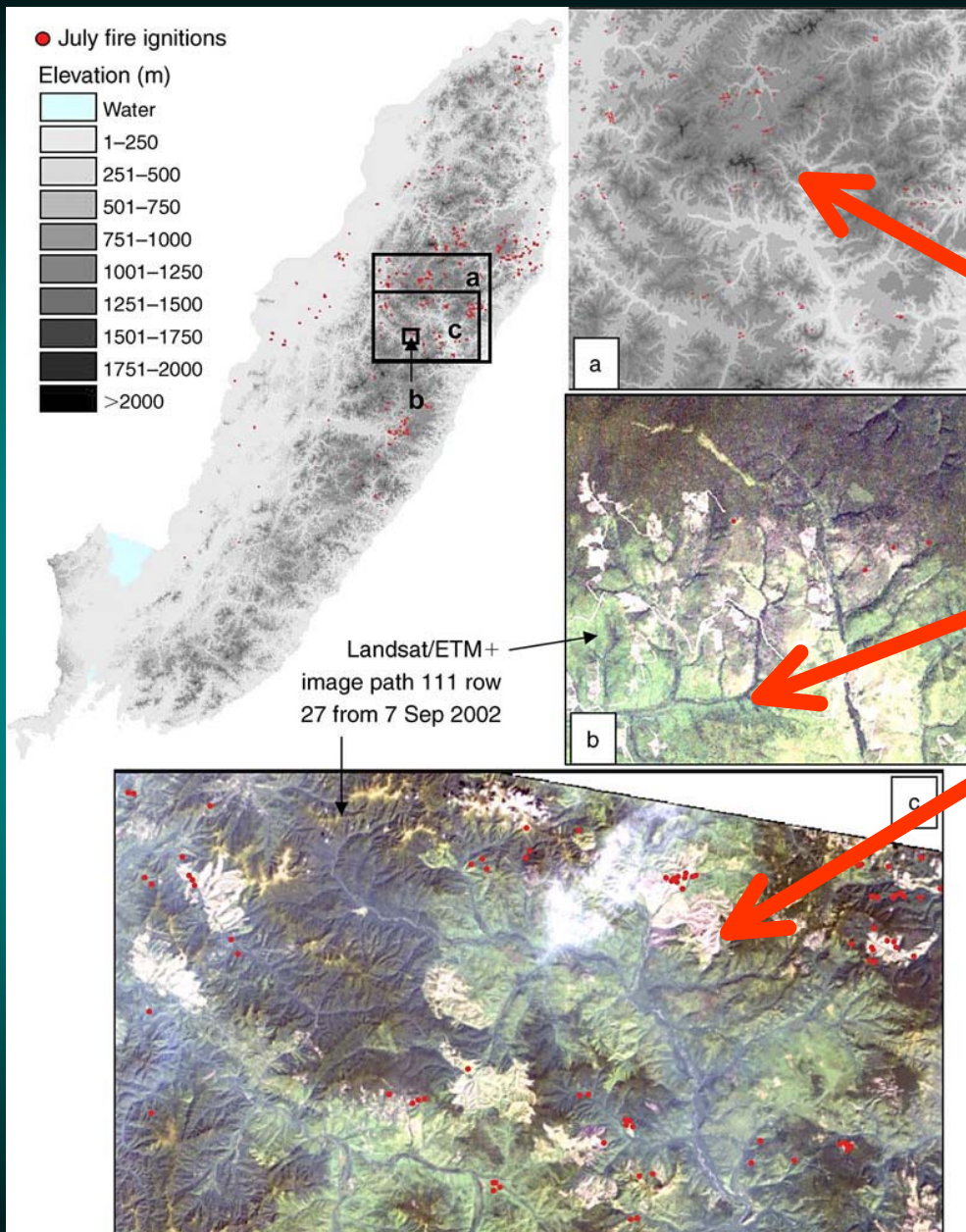
Examples of July spatial occurrence of July 2003 fire ignitions as a factor of:
(a) elevation and proximity to large streams,
(b) proximity to logging sites, and
(c) proximity to previously disturbed areas.

From: Loboba, T.V. and I.A. Csiszar. 2007. Assessing the risk of ignition in the Russian Far East within a modeling framework of fire threat. *Ecological Applications* 17:791-805.

Percent change in fire danger values under SRES A2 and B1 scenarios by mid- and end of the 21st century compared to the fire danger levels at the end of the 20th century.

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FAREAST: A Boreal Forest Simulator

Growth:
- Available Light
- Soil Moisture
- Site Quality
- Growing-Degree Days
- Depth of Thaw
- Diameter
- Age
- Height

Mortality:
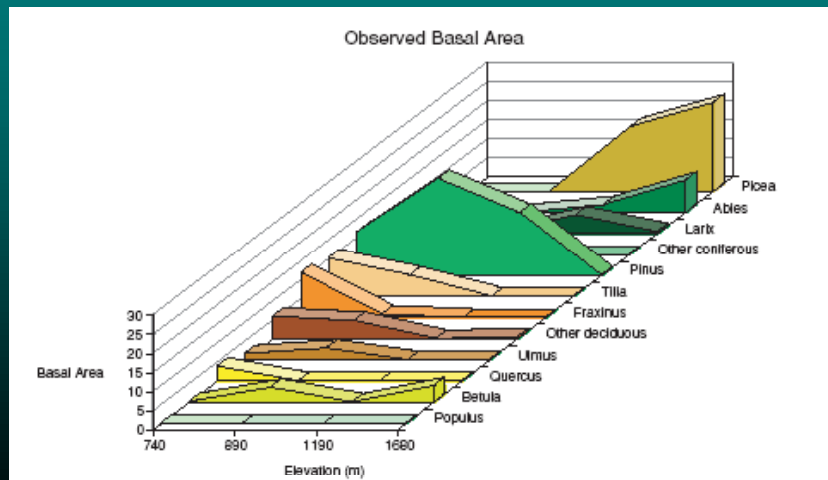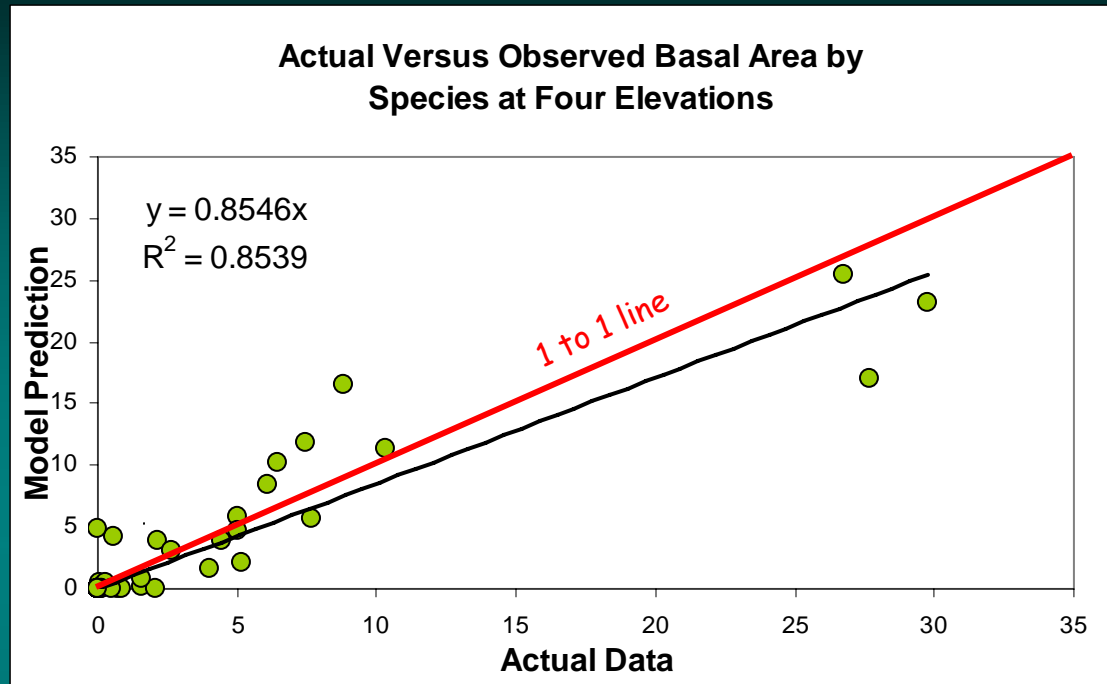- Stress
- Fire
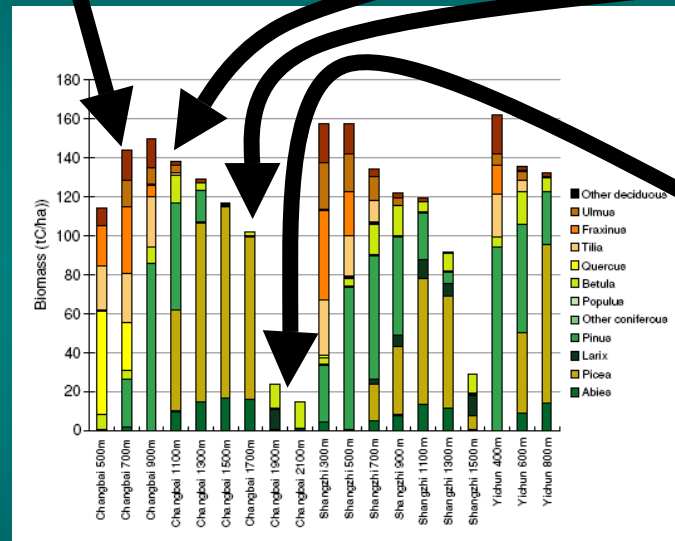- Insects
- Age

Regeneration:
- Available Light
- Soil Moisture
- Site Quality
- Depth of Thaw
- Seed Bed
- Seed Availability
- Sprouting
- Layering

Chang Bai Shan
Northern China

Tests of the FAREAST Model on Changbai Shan Gradients

Actual Versus Observed Basal Area by Species at Four Elevations

$y = 0.8546x$

$R^2 = 0.8539$

1 to 1 line

Model Prediction

Actual Data
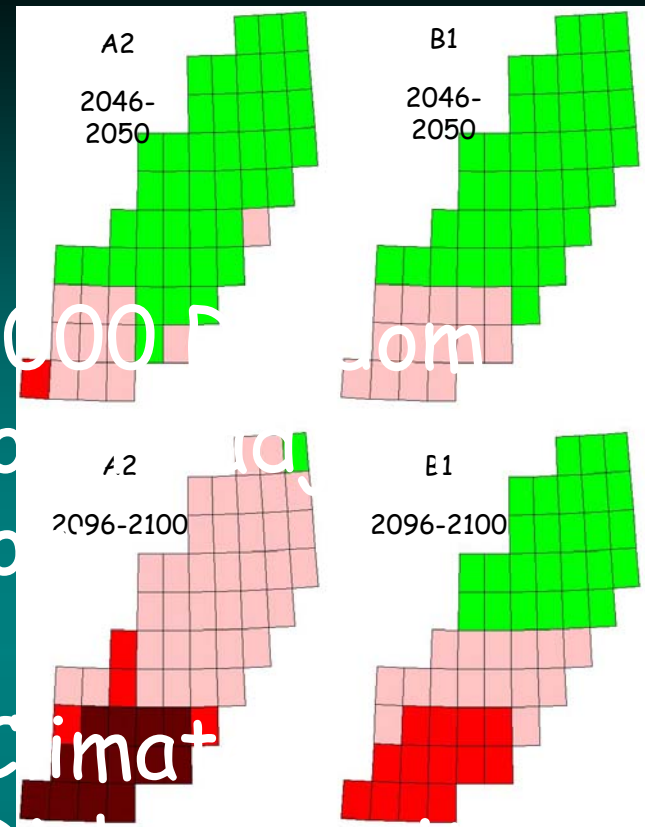

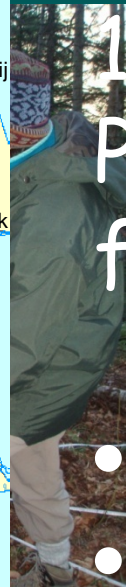Observed Basal Area

Simulated Basal Area
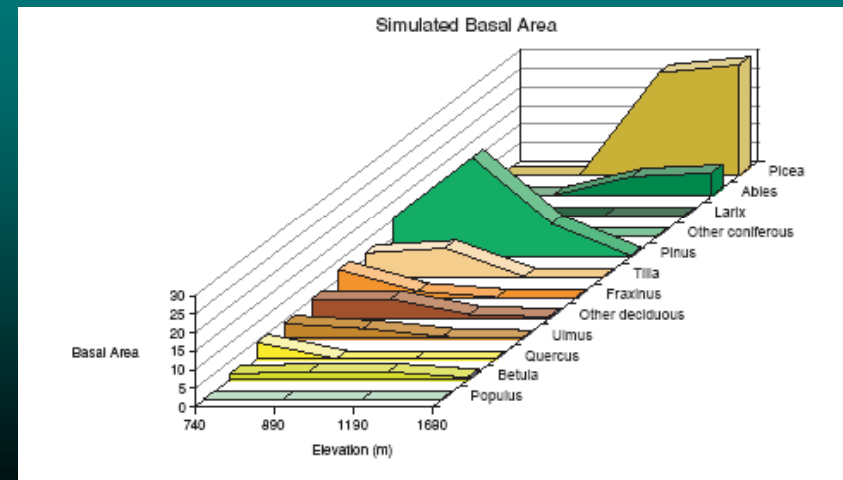
The simulated forest species composition dynamics by Biomass (tC/ha) originated from clear-cutting bare floor for: a. Yichun site (Xiaoxing'an Mountain), 400m in elevation; b. Shangzhi site (Zhangguangcai Mountain), 700m in elevation; c. Changbai Mountain, 1500m in elevation; d. Huma site, 179 m in elevation (same as altitude as the meteorological station); e. Mohe (Daxing'an Mountain) site, 500m in elevation.

Running the FAREAST model (200 simulated plots for 700 years starting with an open plot) for 234 weather stations across the former Soviet Union.
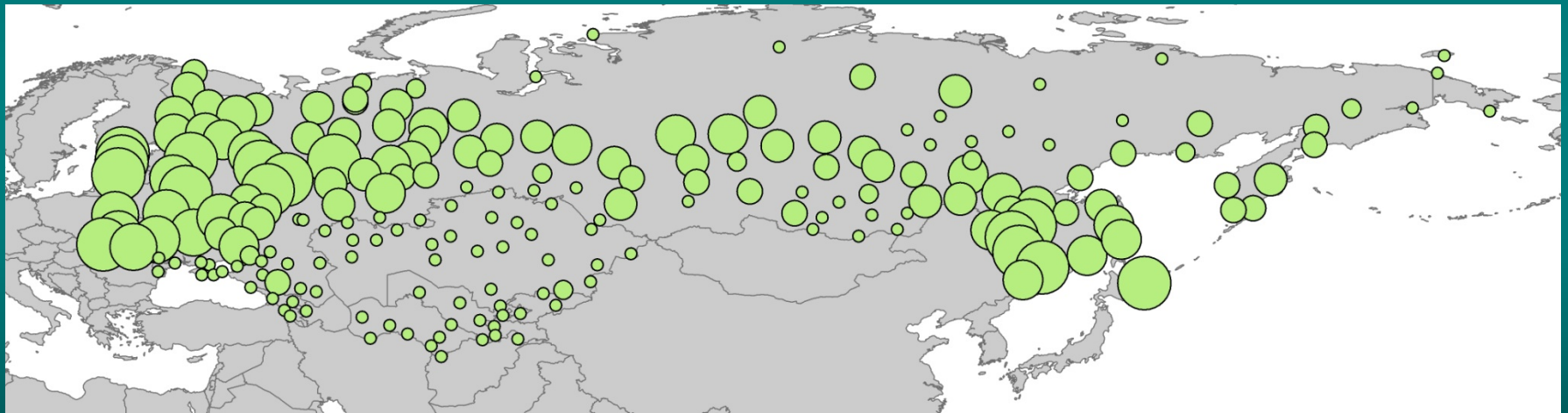
Size of circles indicates the biomass of mature forests.

Where are we going next:

1,000 random Po..... ...
fo...

- Climat...
- Risk of Ignition
- Elevation

A2 2046-2050
B1 2046-2050
A2 2096-2100
B1 2096-2100

Percent change from 1996-2000

- -5% to -1%
- -1% to 1%
- 1% to 5%
- 5% to 10%
- 10% to 15%