

# Natural Disturbance in Forests

Inside Education Beginning Teacher Ecotour

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Hinton, Alberta

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# Foothills Model Forest

- Who we are
- What we do
- How we do it

# CANADA'S MODEL FOREST PROGRAM

## FOREST REGIONS OF CANADA

- Boreal - Predominantly Forest
- Boreal - Forest and Grassland
- Boreal - Forest and Barren
- Great Lakes - St. Lawrence
- Montane
- Coast
- Columbia
- Deciduous
- Subalpine
- Acadian
- Grassland
- Tundra



## CANADIAN MODEL FOREST NETWORK

- 1 McGregor Model Forest
- 2 Foothills Model Forest
- 3 Prince Albert Model Forest
- 4 Manitoba Model Forest
- 5 Lake Abitibi Model Forest
- 6 Eastern Ontario Model Forest
- 7 Waswanipi Cree Model Forest
- 8 Bas-Saint-Laurent Model Forest
- 9 Fundy Model Forest
- 10 Nova Forest Alliance
- 11 Western Newfoundland Model Forest
- 12 Forestry Centres and Headquarters of the Canadian Forest Service



Natural Resources  
Canada

Ressources naturelles  
Canada

Canada

# SPONSORING PARTNERS



Natural Resources  
Canada

Ressources naturelles  
Canada



Parks  
Canada

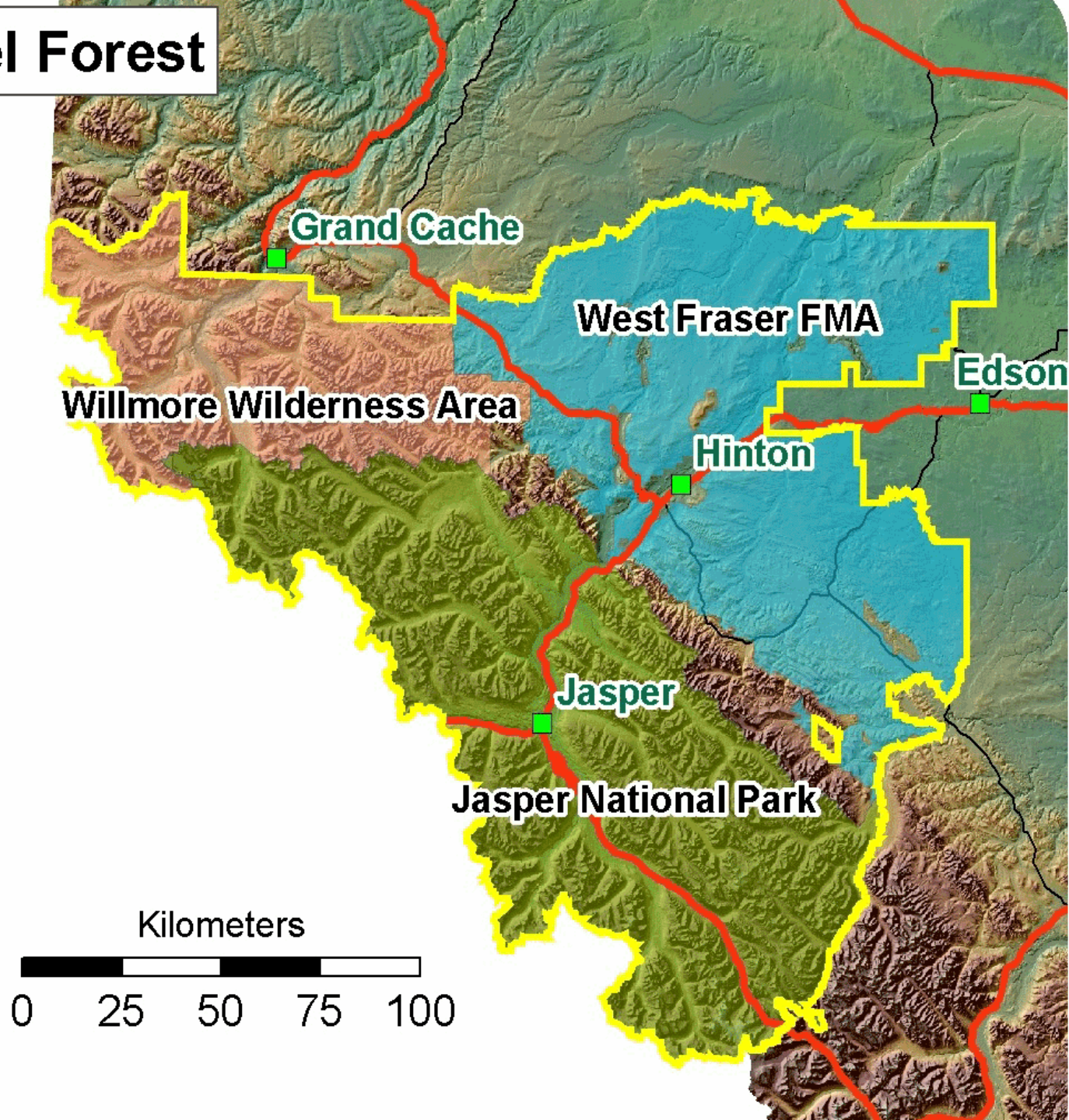
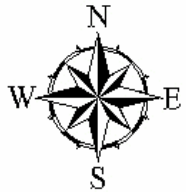
Parcs  
Canada



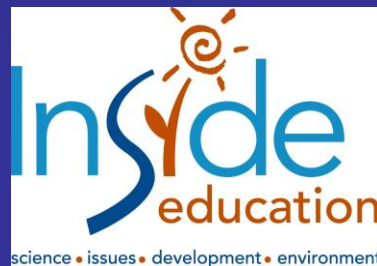
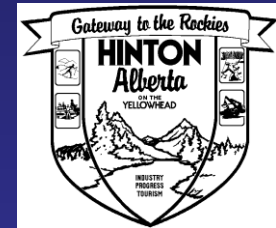
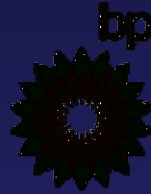
Contribute \$1,000,000/year.

Leverage a further \$3,400,000/year.

# Foothills Model Forest



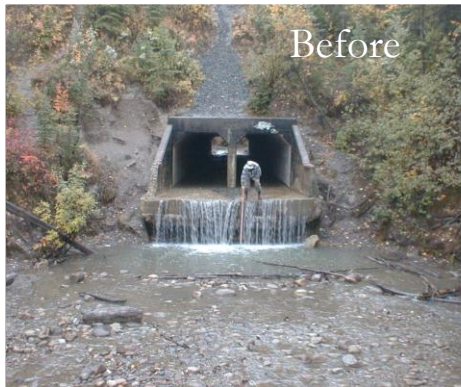
# PARTNERS Cont.



# How we do it...

- ❑ Strong governance
- ❑ Strong and vibrant partnership
- ❑ High quality applied and relevant research
- ❑ Knowledge transfer – Getting tools into the hands of users

# Core Programs



FireSmart – ForestWise

Grizzly Bear Research

Local Level Indicators

Natural Disturbance

Fish & Watershed

Aboriginal Involvement

Social Sciences

Adaptive Forest Management

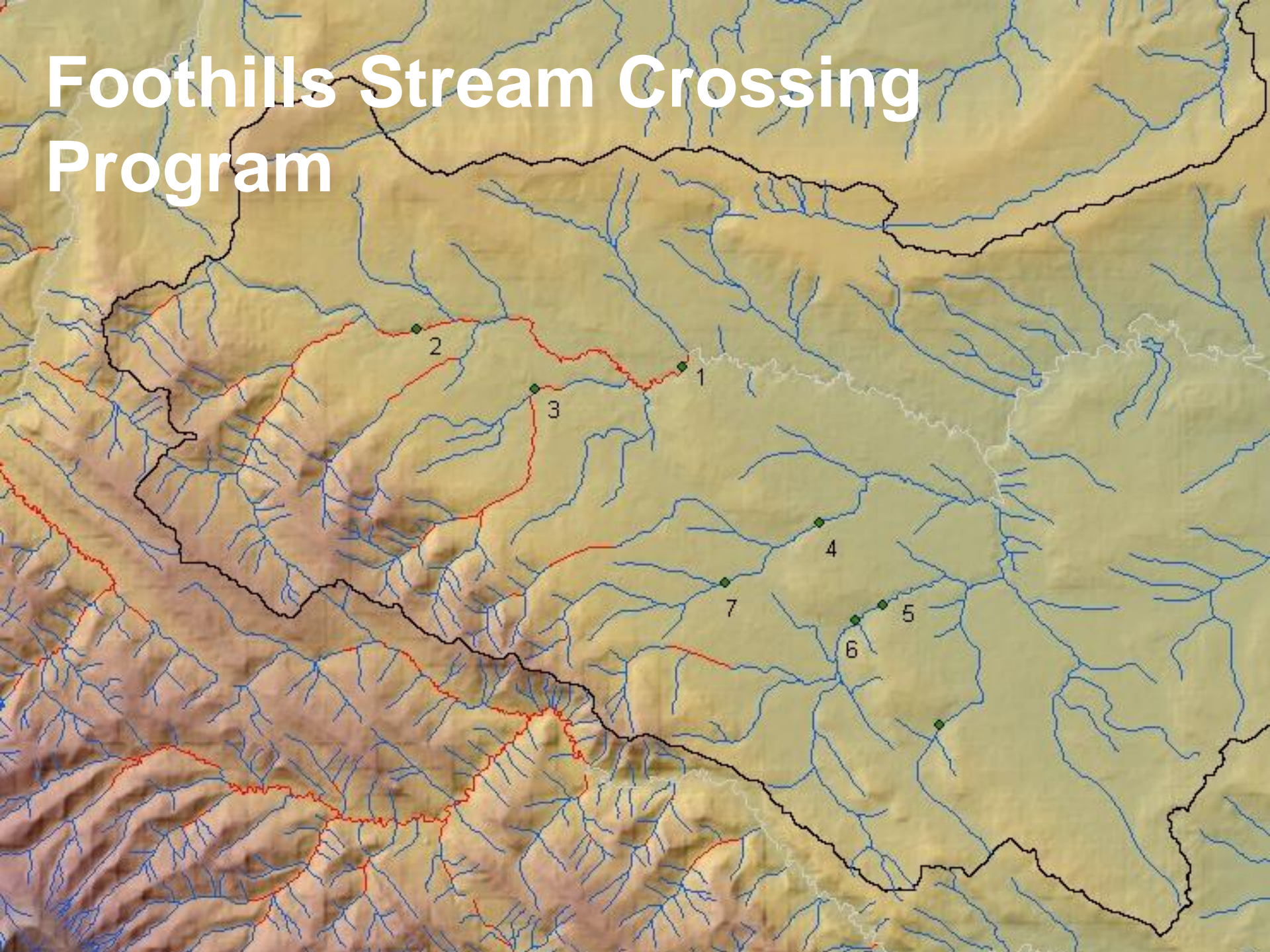
Communications

GIS





# Foothills Stream Crossing Program





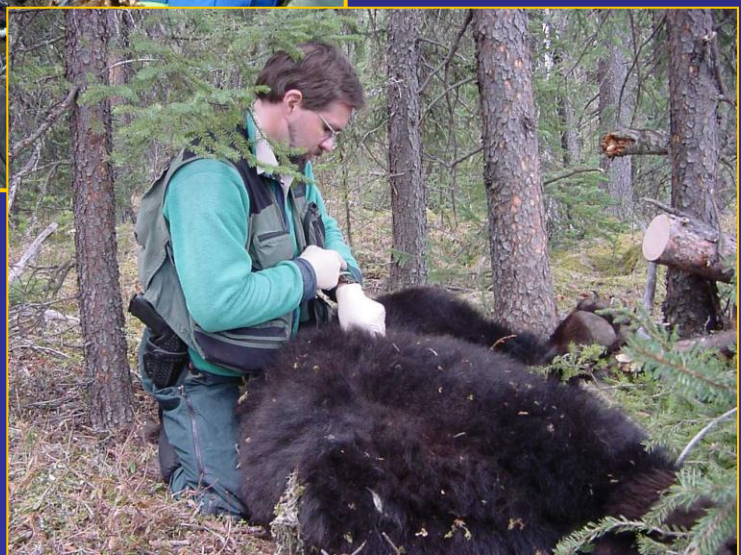
SEPT 1/01 XING 486 INFLOW



**Department of Fisheries and Oceans  
interested in this program being  
replicated across the Province of Alberta,  
perhaps the Prairies.**

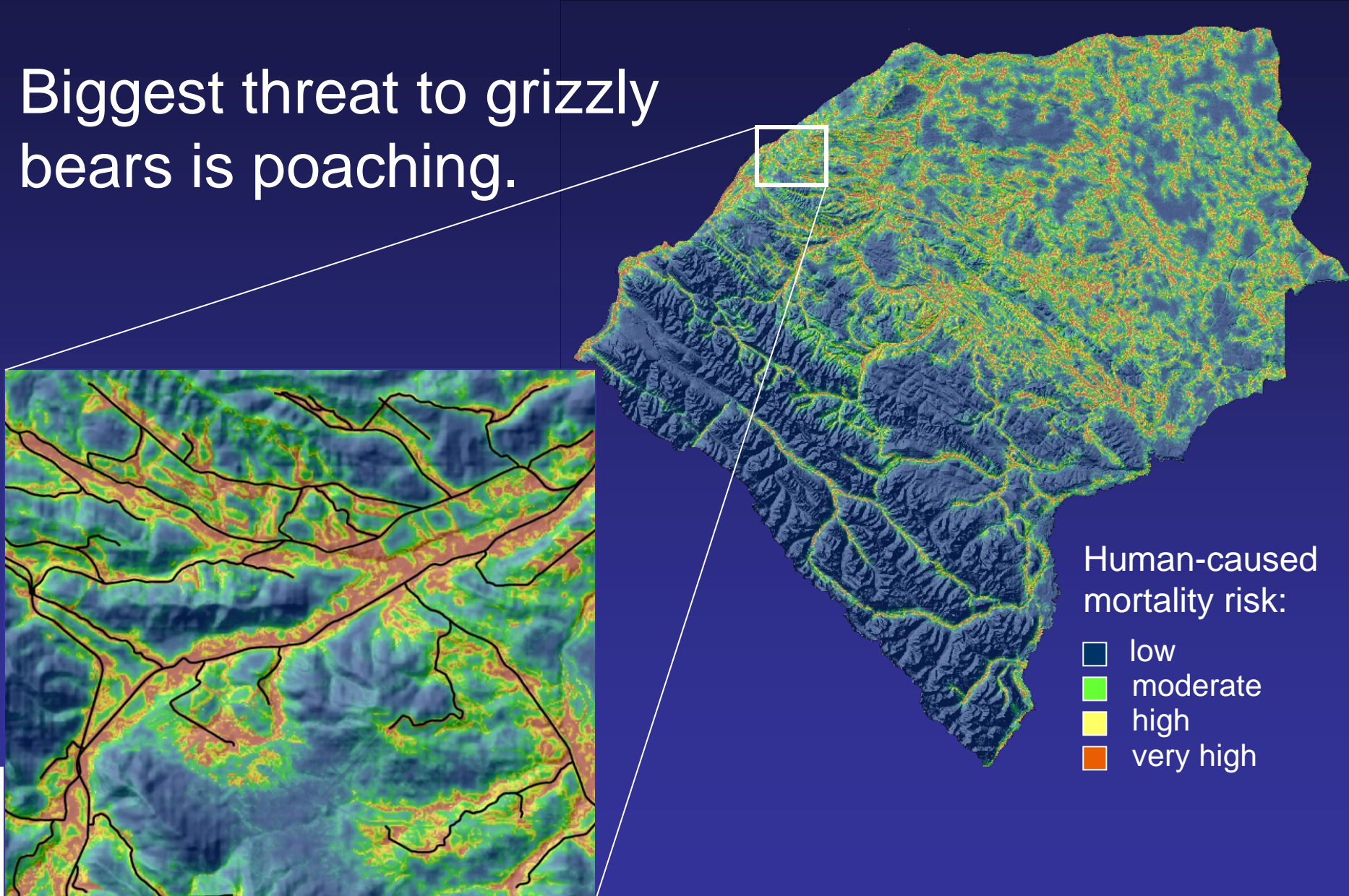
# Grizzly Bear Program





# Tools...

Biggest threat to grizzly bears is poaching.

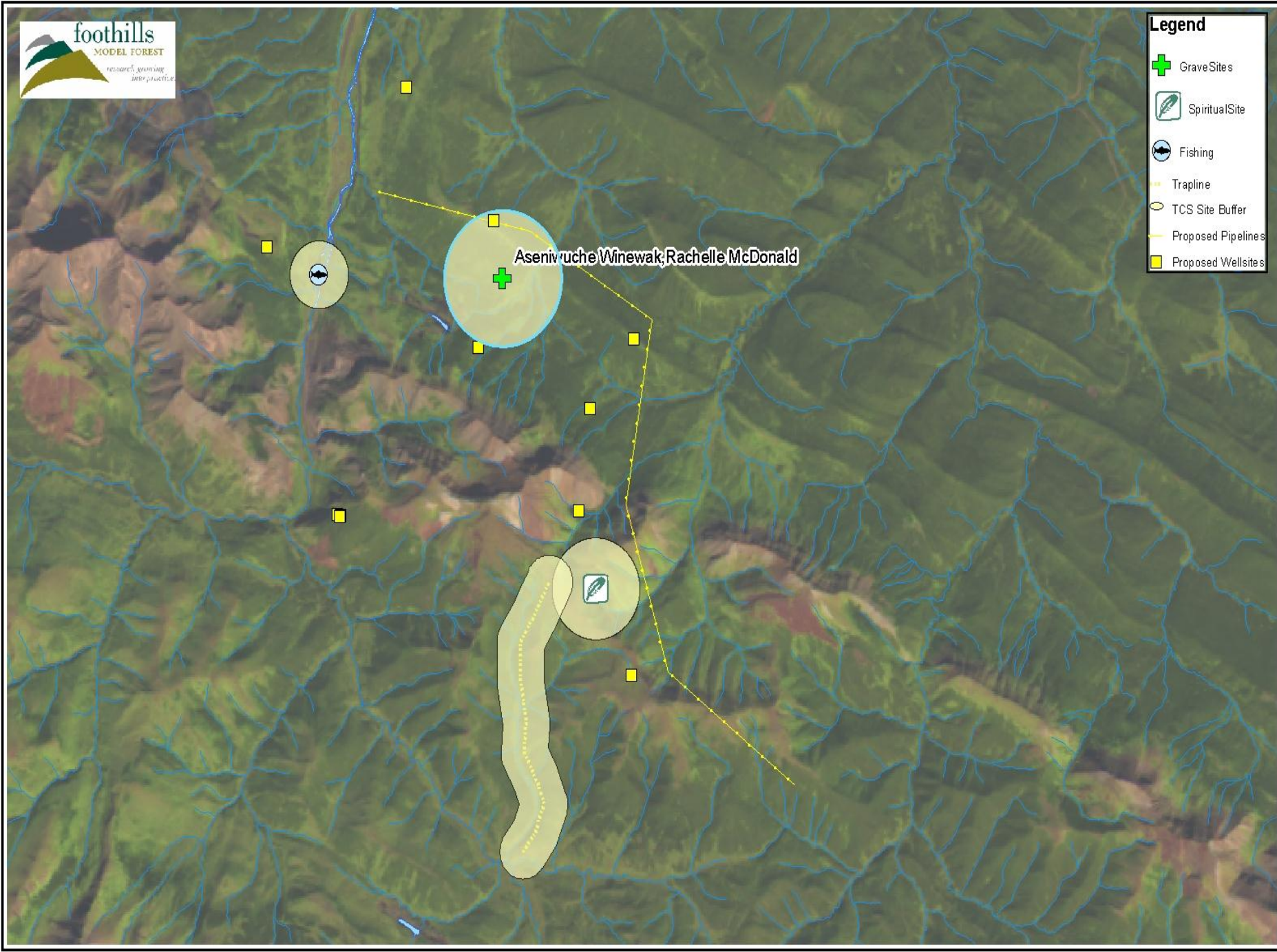


# W



**Legend**

- GraveSites
- SpiritualSite
- Fishing
- Trapline
- TCS Site Buffer
- Proposed Pipelines
- Proposed Wellsites



Asenivruche Winewak, Rachelle McDonald

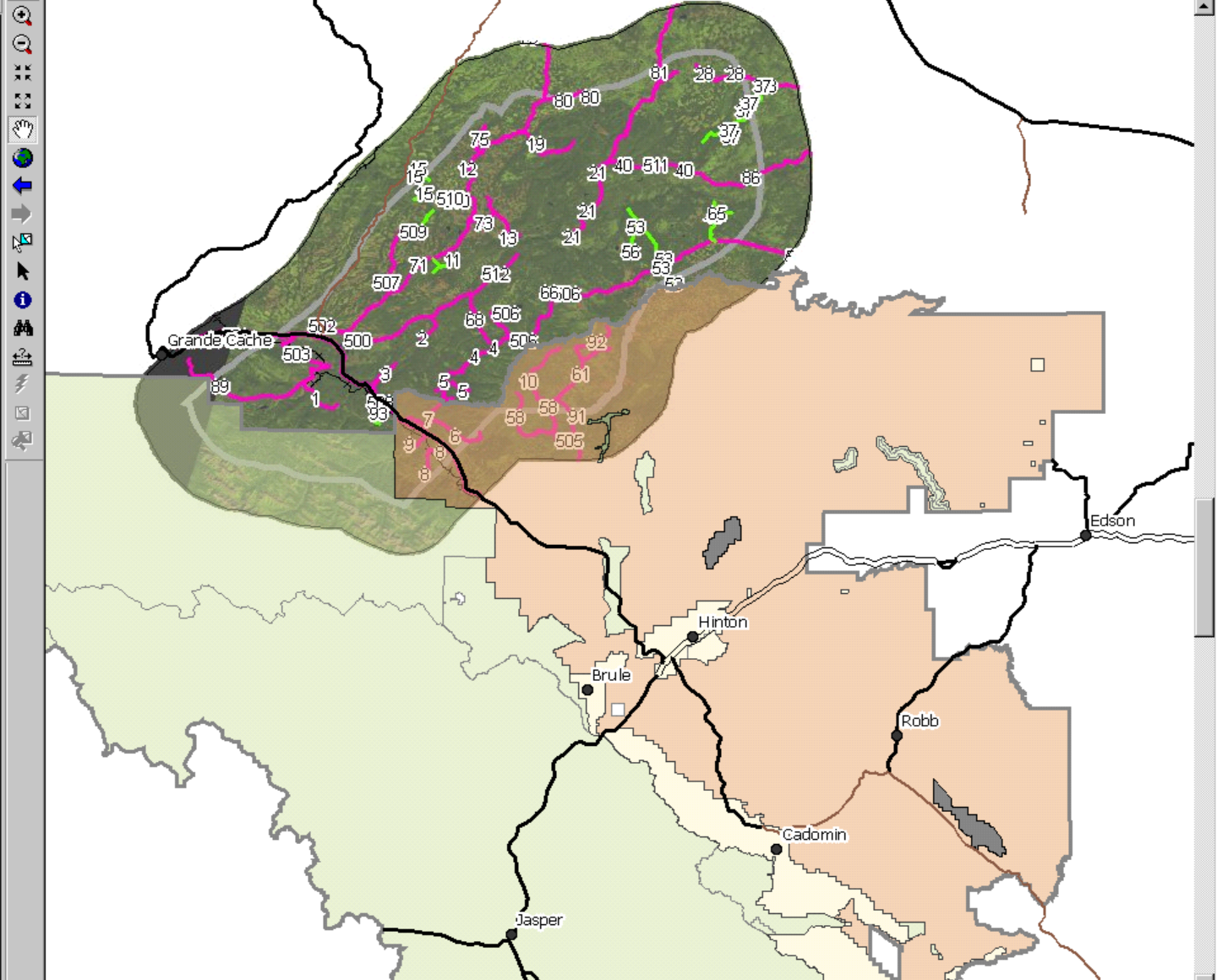
# Caribou Landscape Management Association





**Layers**

- Local GIS Layers
- FTMF Internet Server
  - Access Barriers
    - BuildStatus
    - Existing Barriers
    - Planned Barriers
  - Energy Road Corridors (Planned)
  - Forestry Road Corridors (Planned)
  - Existing Roads
  - Railways
  - Streams
  - Township/Range/Meridian
  - Wellsites (Nov 2005)
  - Pipelines (Nov 2005)
  - Forest Management Areas (FMAs)
  - CLMA Planning Area (Little Smoky)
  - IRS2001
  - Caribou RSF Summer 2004
    - Value
    - High : 10
    - Low : 1
  - Caribou RSF Winter 2005
    - Value
    - High : 10
    - Low : 1
  - Terrain- Slope Percent



# What is “Natural Disturbance”?

**An abrupt unpredictable event  
that changes function and  
structure of a natural system.**

# What is “Natural Disturbance”?

- Forest Fires
- Floods
- Wind Storms
- Insect and Disease
- Landslides
- Browse
- .....etc.

# What are Forest Fires?

## *Perception #1: A Threat*

A menace that destroys natural resources and ecosystems, and threatens life and property.



*Perception #2: A Process*

Soil temp

Light

Seedbed

Micro-climate

Biomass - nutrients

Soil nutrient availability

Downed woody debris

Injured trees

Dead standing trees

Vegetation Species

# A Fire “Regime”

- What?
- How Much?
- How Often?
- How Big?
- How Severe?

# A Fire “Regime”

- What?

**“Stand-Replacing” Fire**

# A Fire “Regime”

- What?
- How Much?



# Comparison of Forest Fire Burn Area

**ALBERTA**

Full Protection  
Productive Forest  
33 million ha.  
23.3 million m3 aac

**Saskatchewan**

Limited Action  
Productive Forest  
28 million ha.  
7.1 million m3 aac

- 1988 - 1996 fires
- 1980 - 1988 fires
- 1970 - 1979 fires
- 1960 - 1969 fires
- 1950 - 1959 fires
- 1945 - 1949 fires

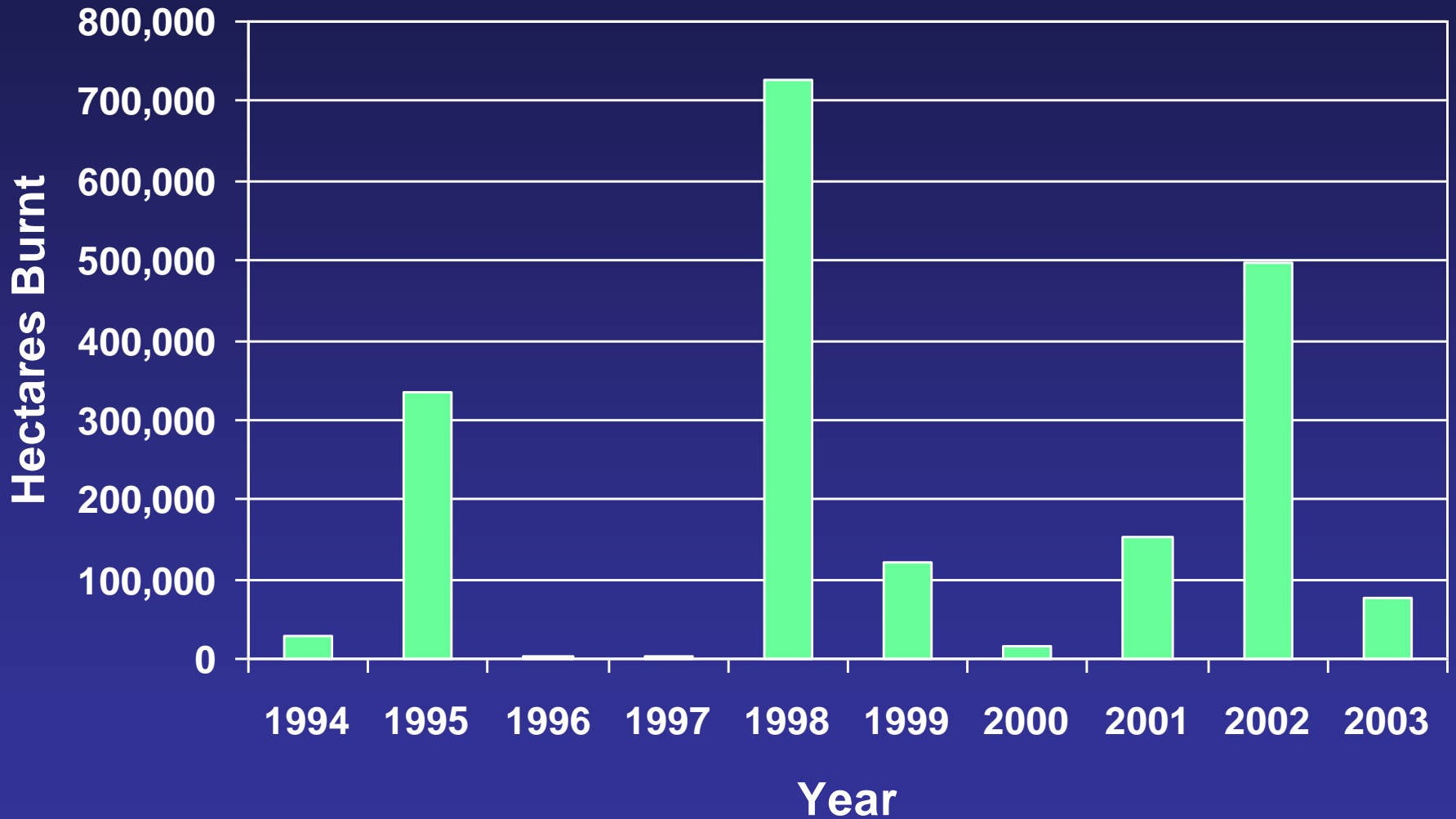
Note: Only fires greater than 1000ha. are depicted

**Then: Every 70-120 Years**  
**Now: Every 3-500 Years**

# A Fire “Regime”

- What?
- How Much?
- How Often?

# Annual Area Burnt in Alberta (1994 - 2003)



# A Brief History of Forest Fire Activity on the West Fraser FMA

## - Upper Foothills (UF) Area -

1930-1949 2% burnt

1910-1929 8% burnt

1890-1909 22% burnt

1870-1889 51% burnt

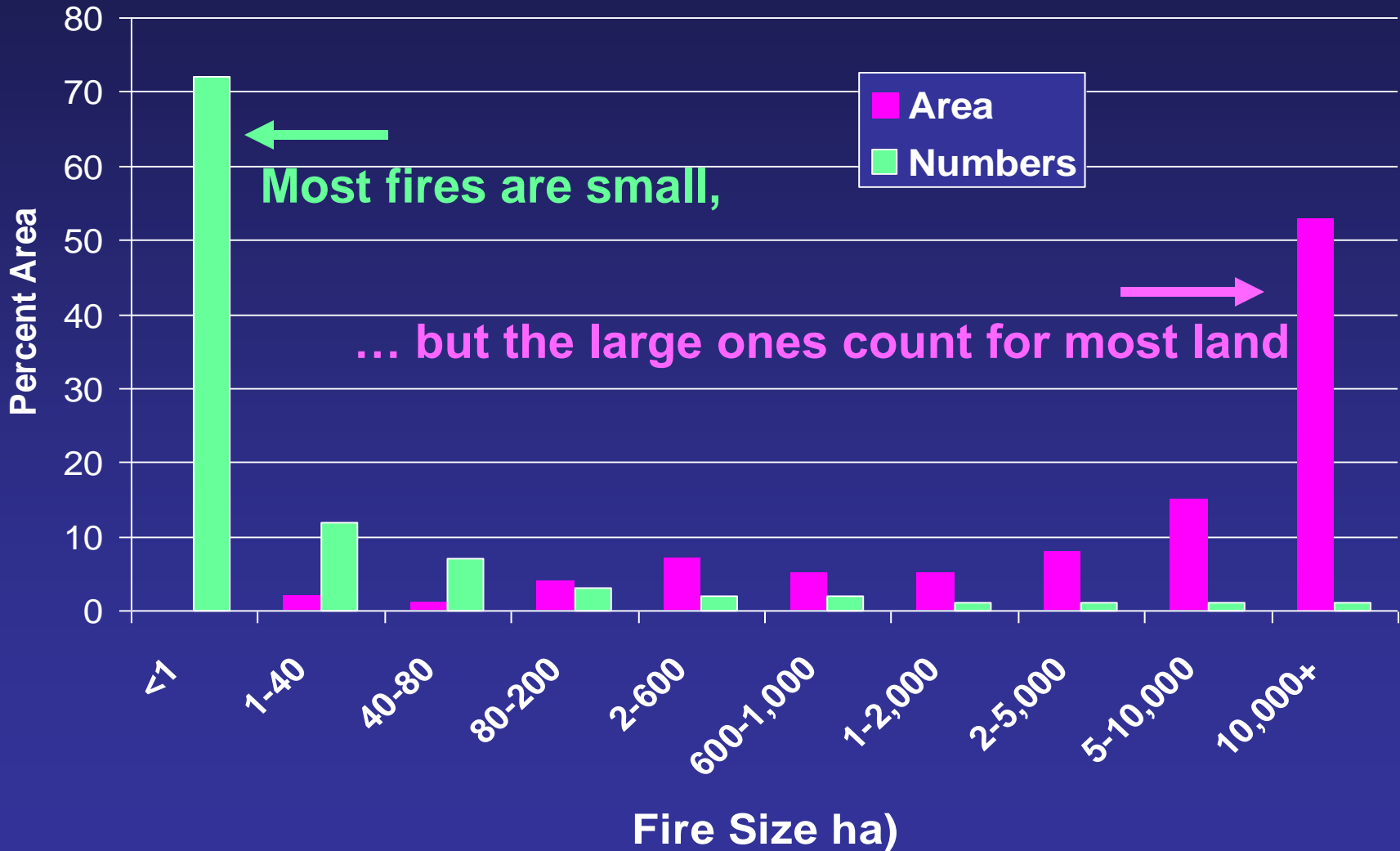
1850-1869 36% burnt

1830-1849 47% burnt

# A Fire “Regime”

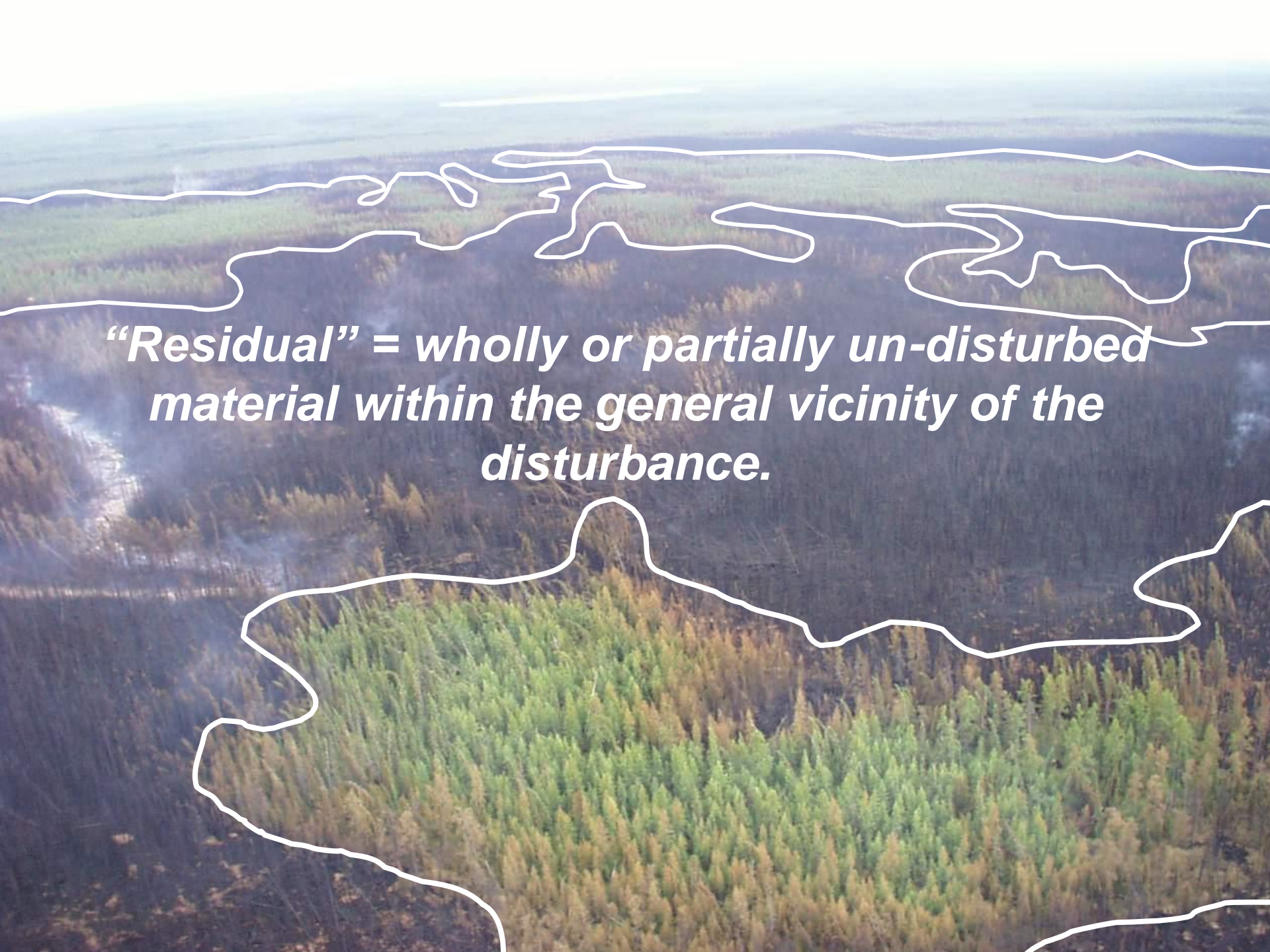
- What?
- How Much?
- How Often?
- **How Big?**

# Fire Sizes & Fire Numbers



# A Fire “Regime”

- What?
- How Much?
- How Often?
- How Big?
- How Severe?

An aerial photograph of a forest landscape. A white, irregular outline highlights a specific area in the foreground and middle ground, which appears to be a forest with a mix of green and brown trees. The background shows a vast, flat forest extending to the horizon under a hazy sky. The text is overlaid on the image, centered in the middle ground.

***“Residual” = wholly or partially un-disturbed material within the general vicinity of the disturbance.***



# What Happens if We Deviate From a Historical “Fire Regime”?

- What?
- How Much?
- How Often?
- How Big?
- How Severe?



# What Happens if We Deviate From a Historical “Fire Regime”?

- What?
- How Much?
- How Often?
- How Big?
- How Severe?

**Before Fire Control**



**After Fire Control**



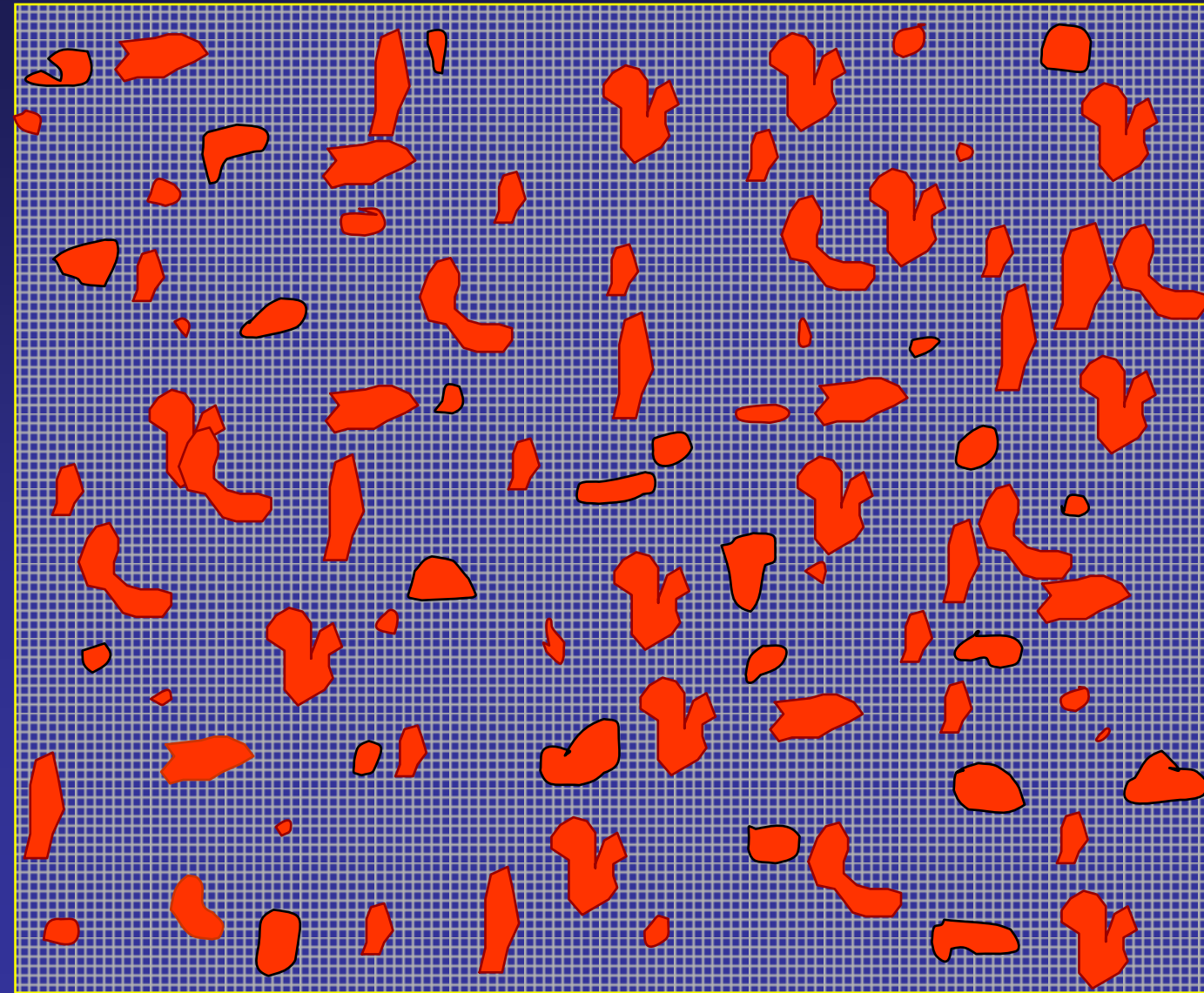


# What Happens if We Deviate From a Historical “Fire Regime”?

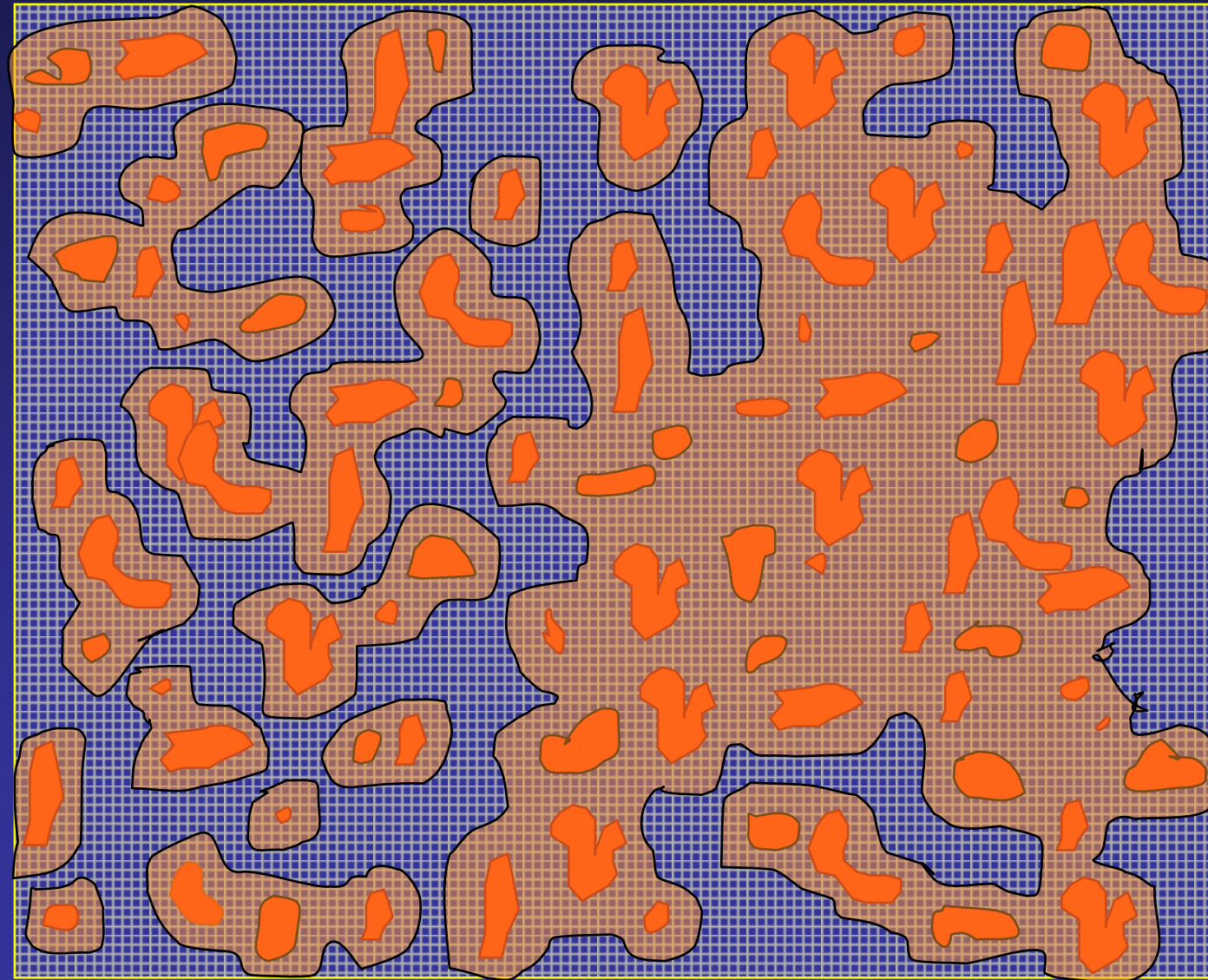
- What?
- How Much?
- How Often?
- **How Big?**
- How Severe?

# Small Dispersed Blocks

**15% by Area  
Disturbed**



# Small Dispersed Blocks



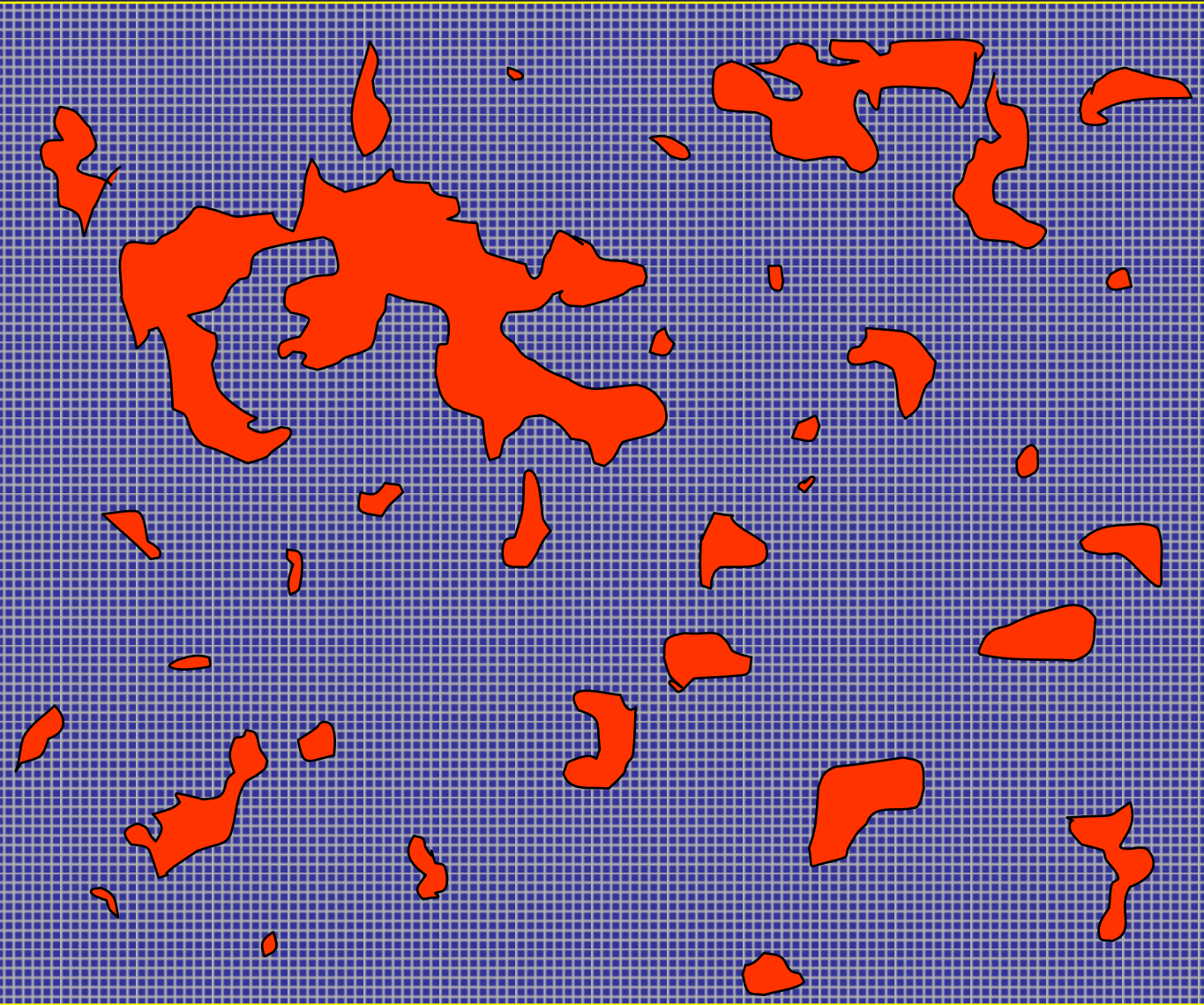
**15% by Area  
Disturbed**

**25% Interior  
Forest  
Remaining**

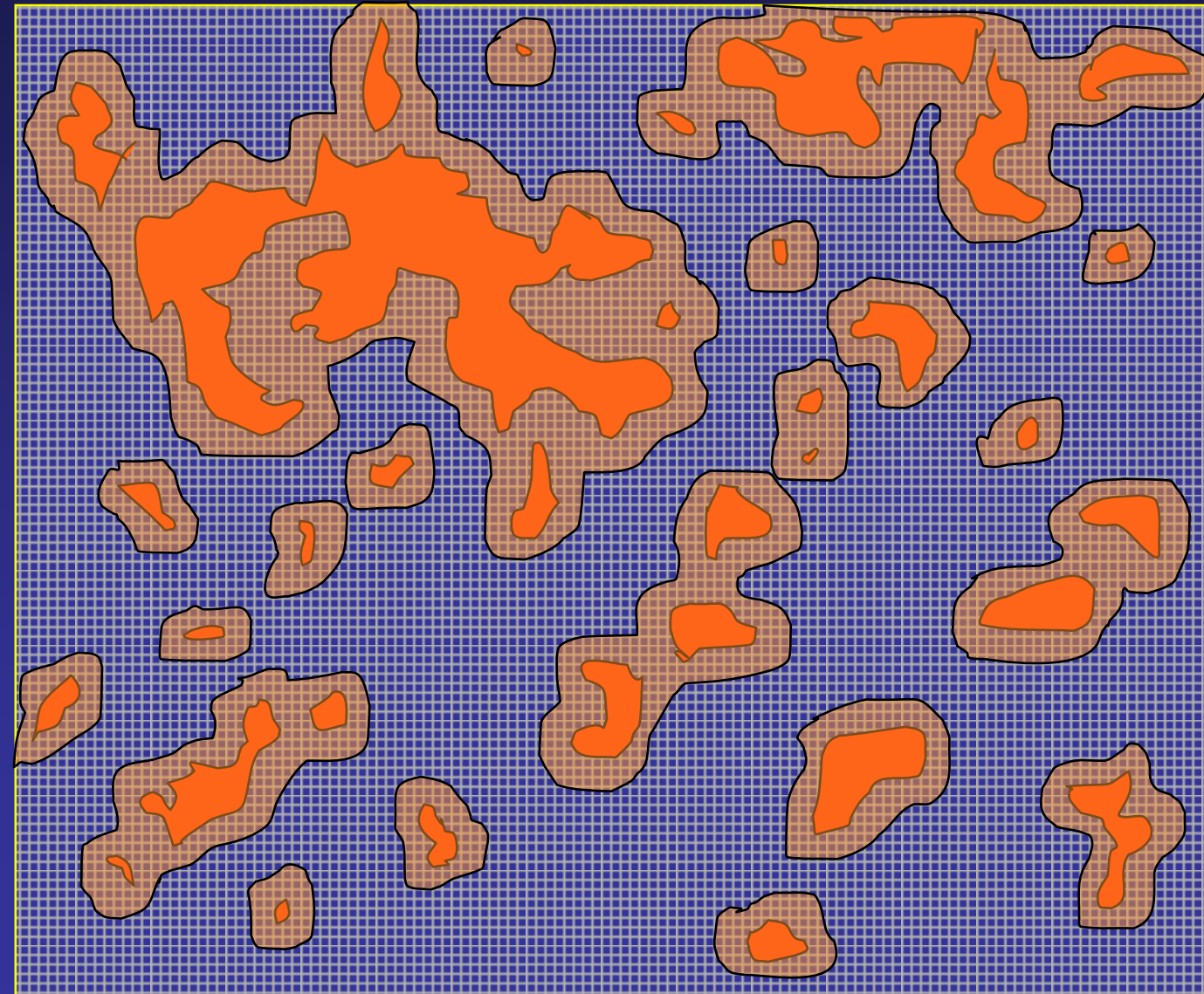


# Variable Sized Dispersed Blocks

15% by Area  
Disturbed



# Variable Sized Dispersed Blocks



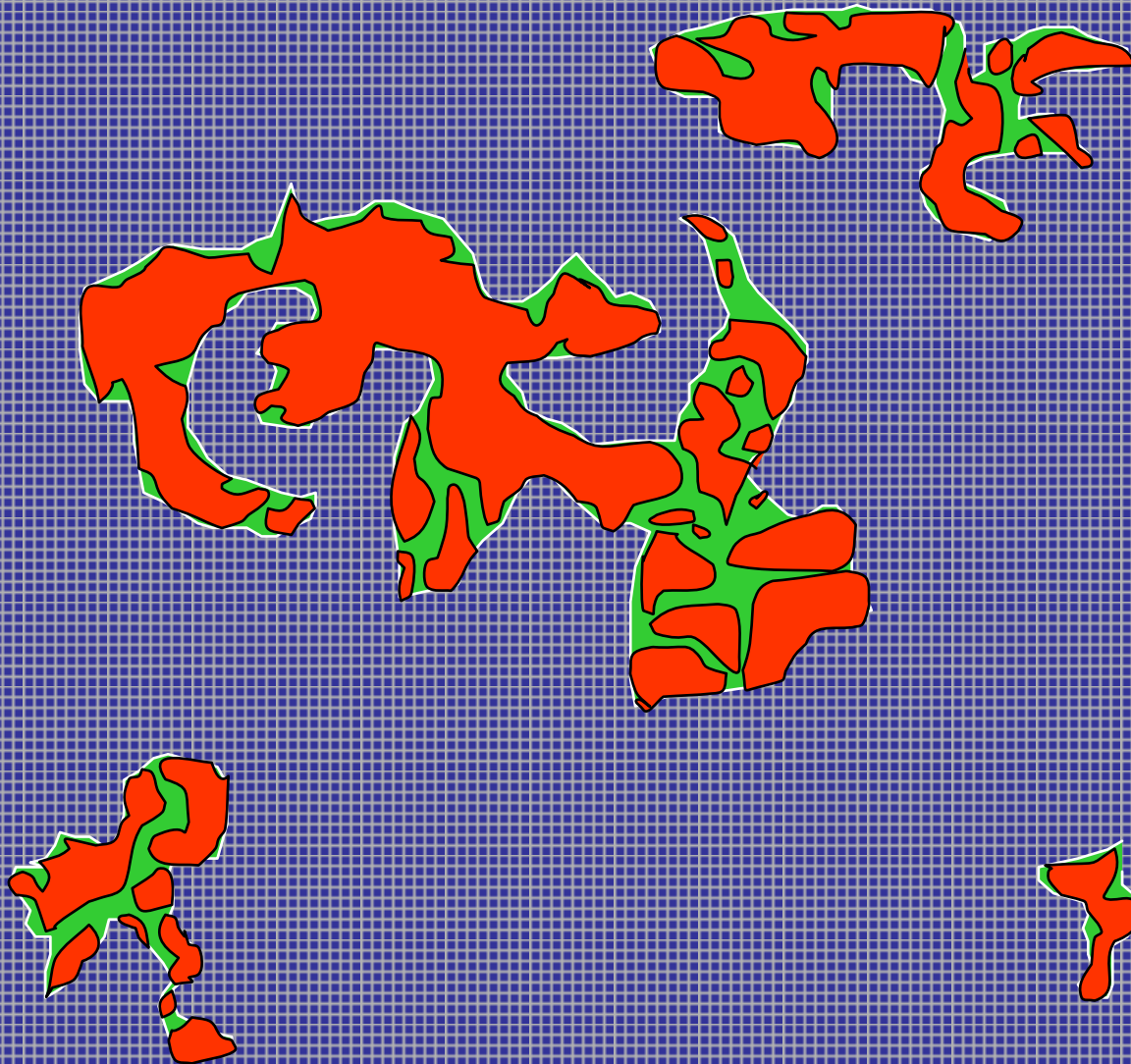
**15% by Area  
Disturbed**

**45% Interior  
Forest  
Remaining**

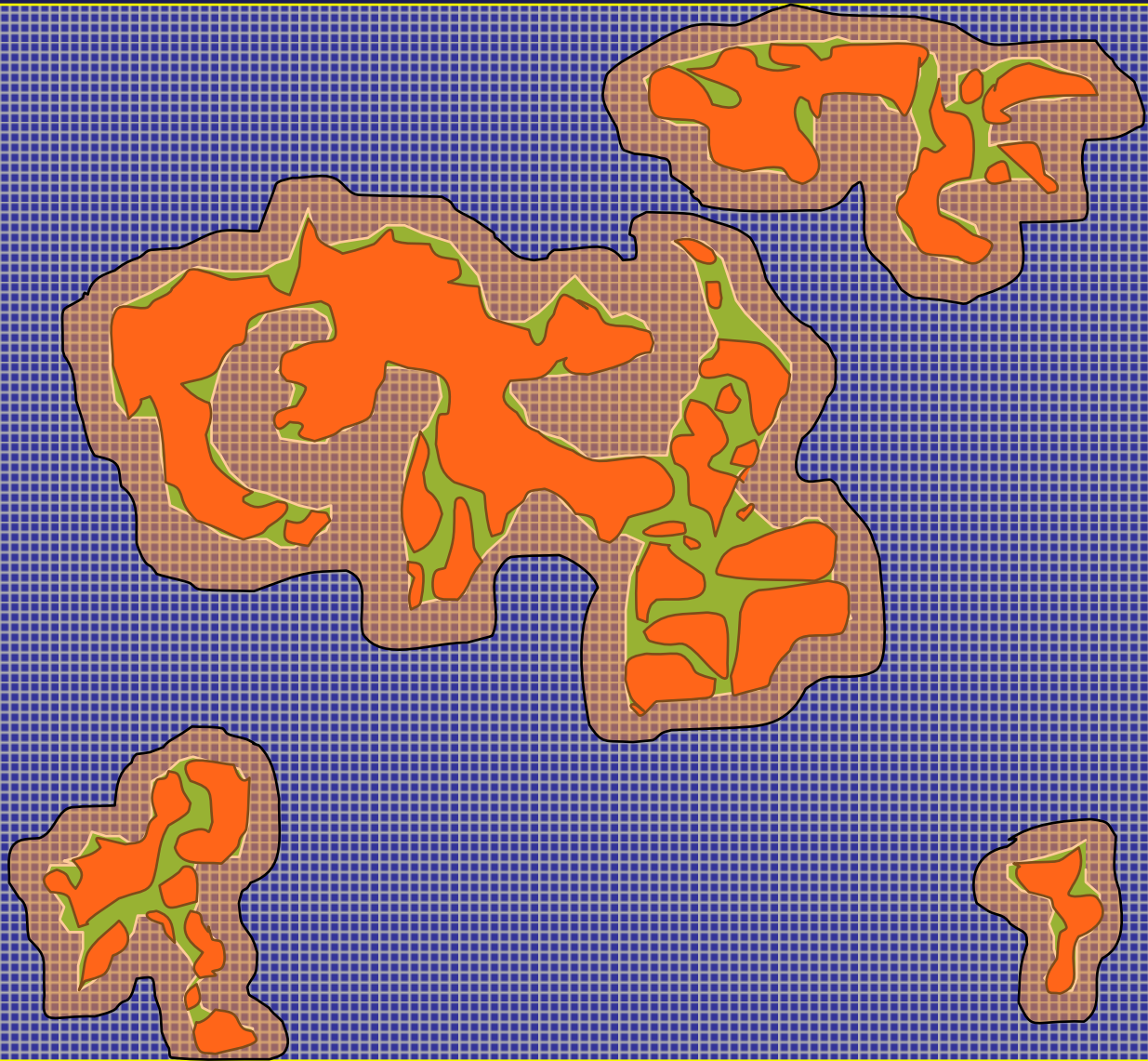
# Variable-Sized Clustered Blocks

15% by Area  
Disturbed

“Event” areas  
are outlined in  
green



# Variable-Sized Clustered Blocks



**15% by Area  
Disturbed**

**65% Interior  
Forest  
Remaining**

Current

“Natural”

Patch sizes similar



Patch sizes variable

Less core forest

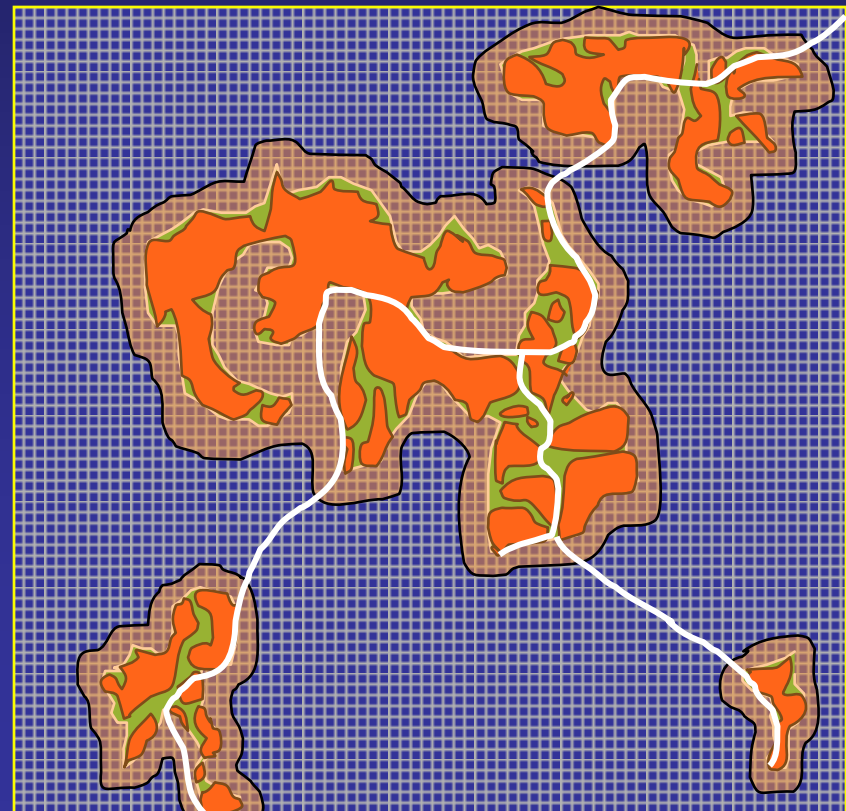
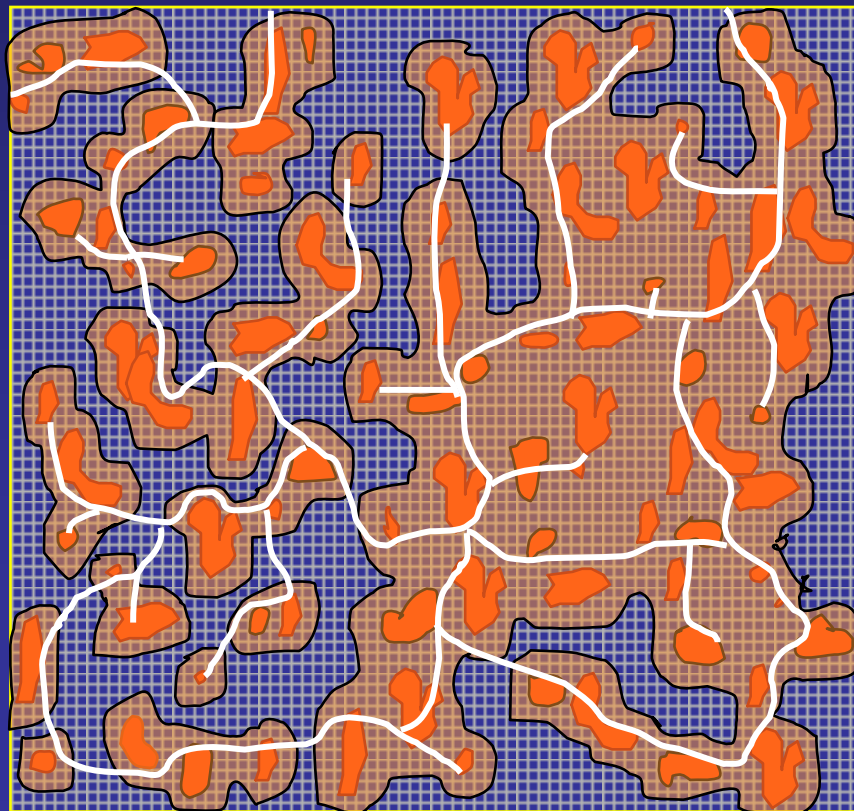


More core forest

More roads



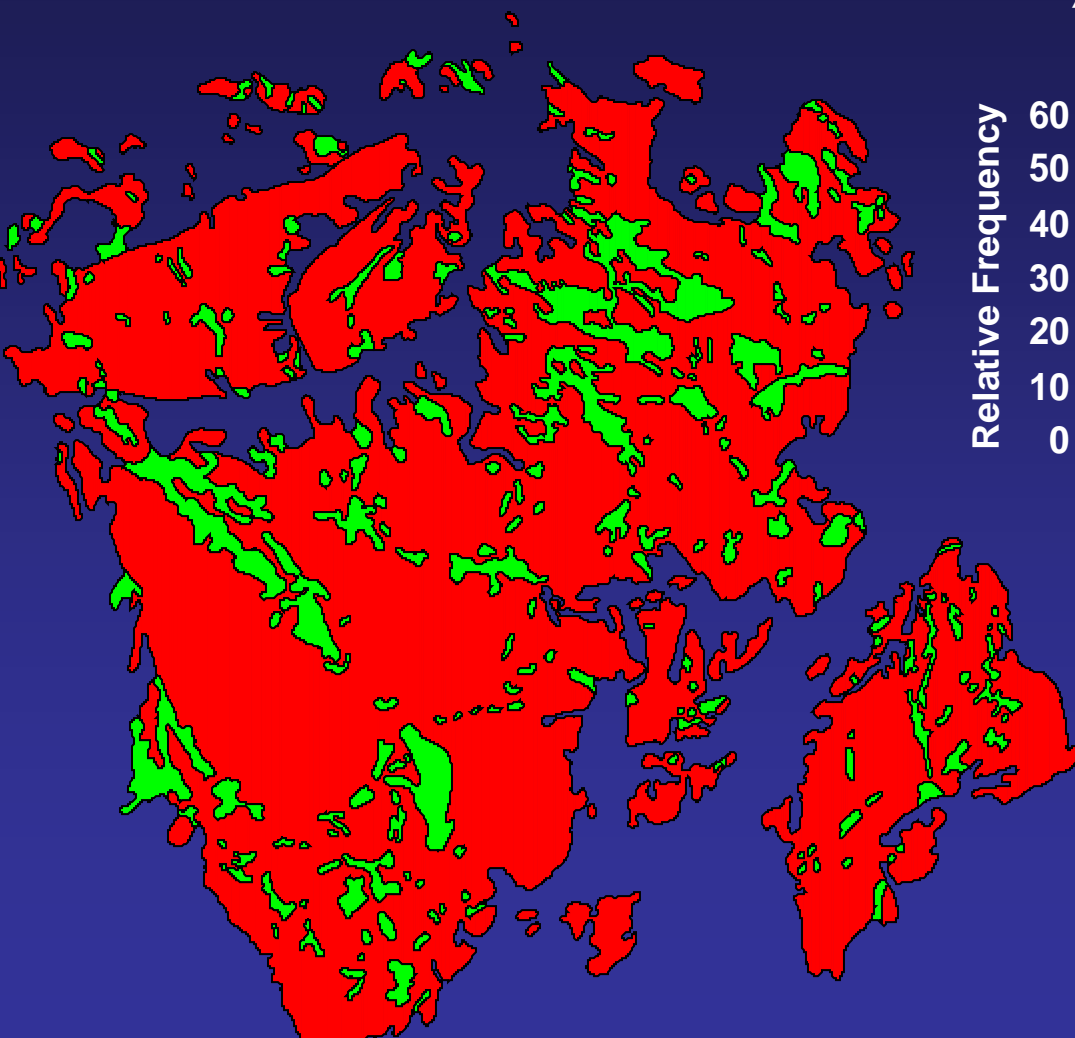
Less roads



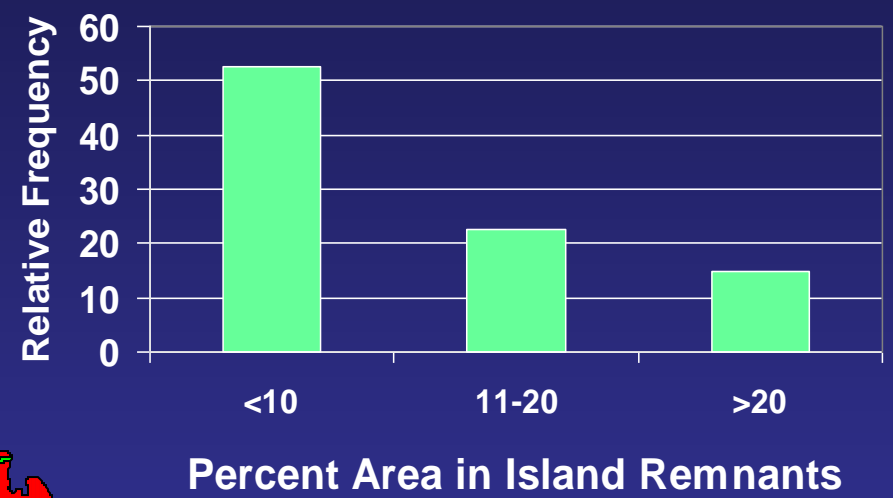
# What Happens if We Deviate From a Historical “Fire Regime”?

- What?
- How Much?
- How Often?
- How Big?
- How Severe?

# 16% of 680 ha Fire (1950) Exist as “Island Remnants”

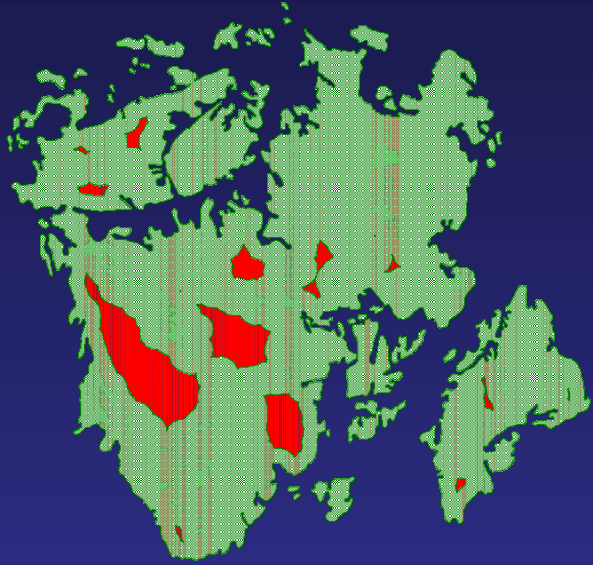


% of Disturbed Areas in Island Remnants

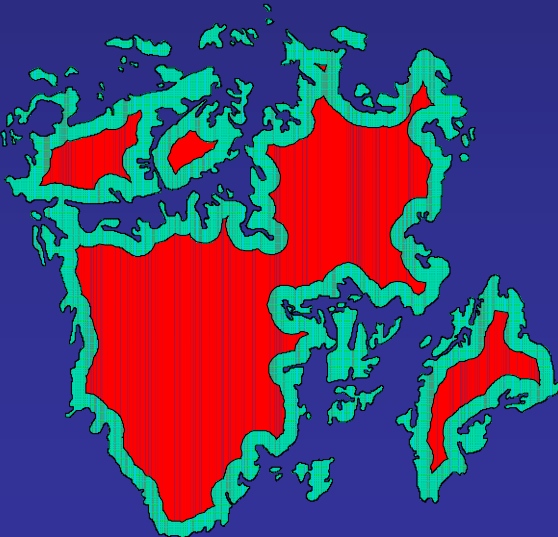


# Are Islands Really Necessary?

(680 ha Fire)



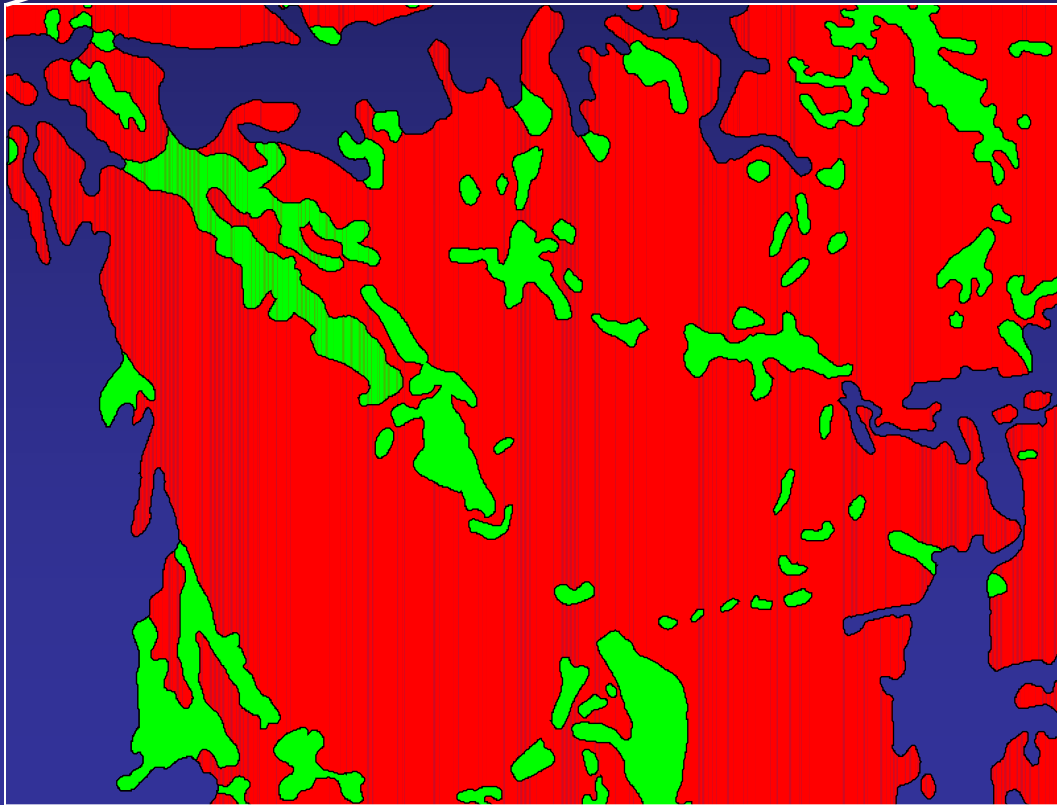
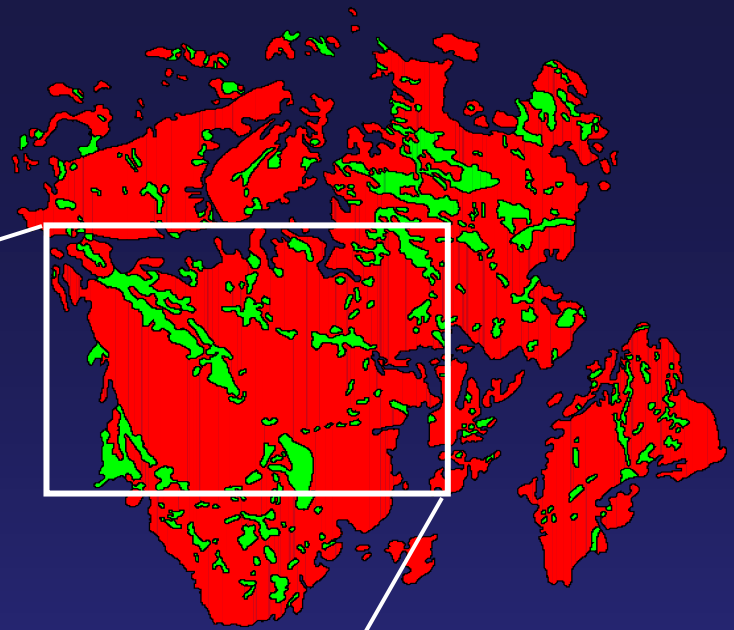
**92% area within 100m of  
unburnt forest with  
islands.**

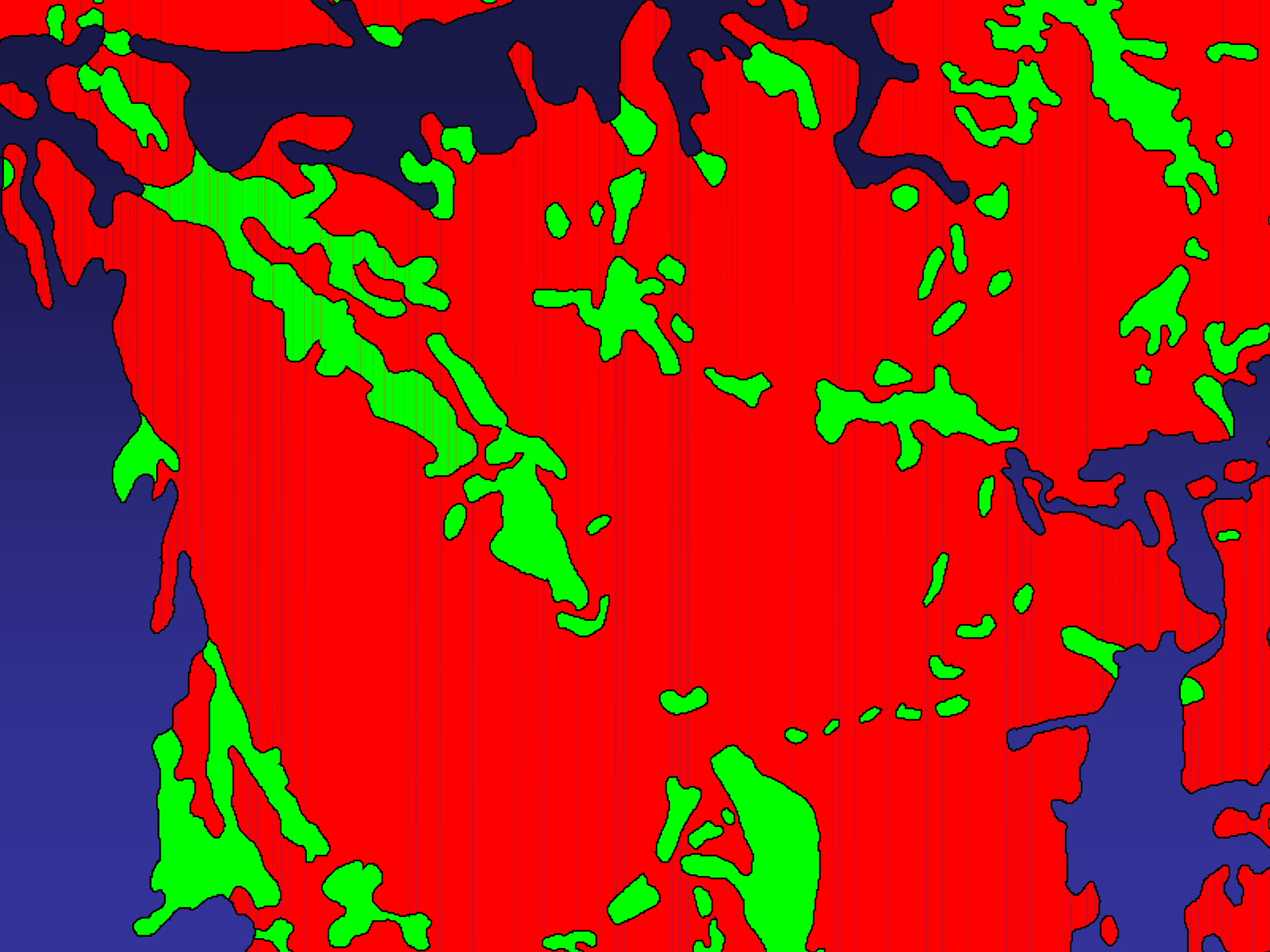


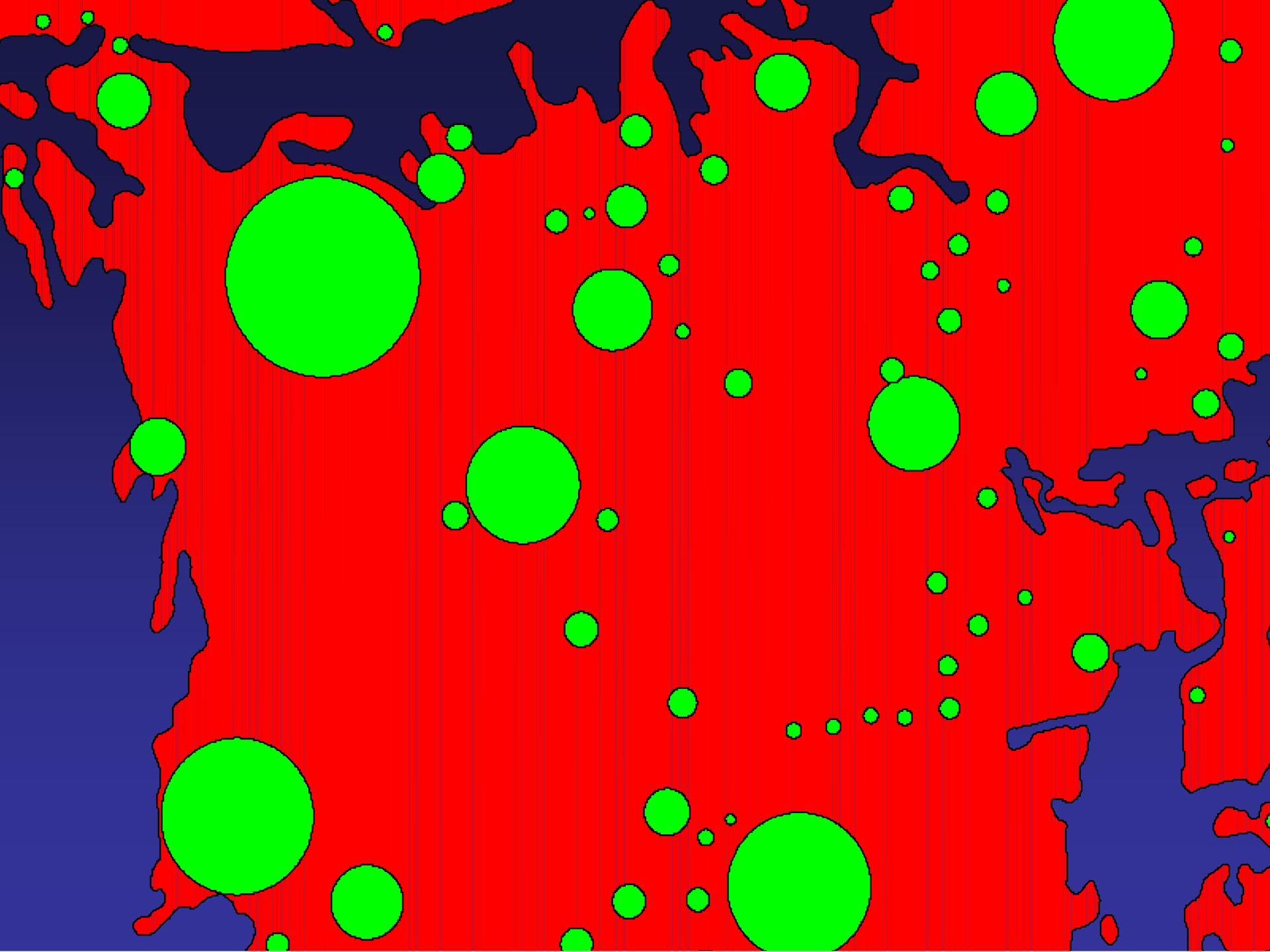
**49% area within 100m of  
unburnt forest without  
islands.**

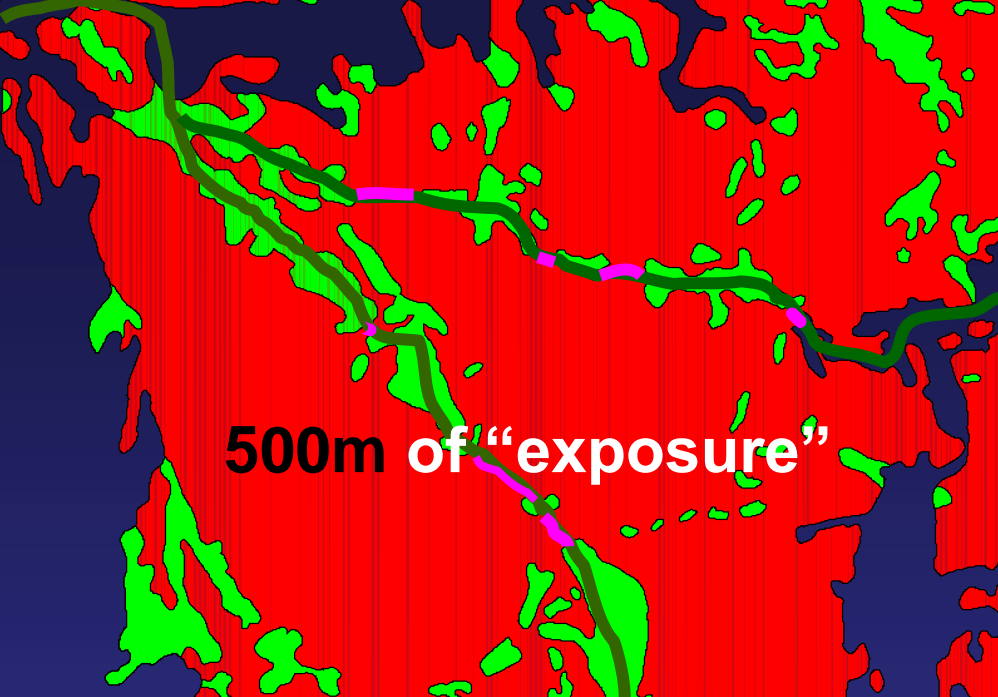


# What About Spatial Orientation?

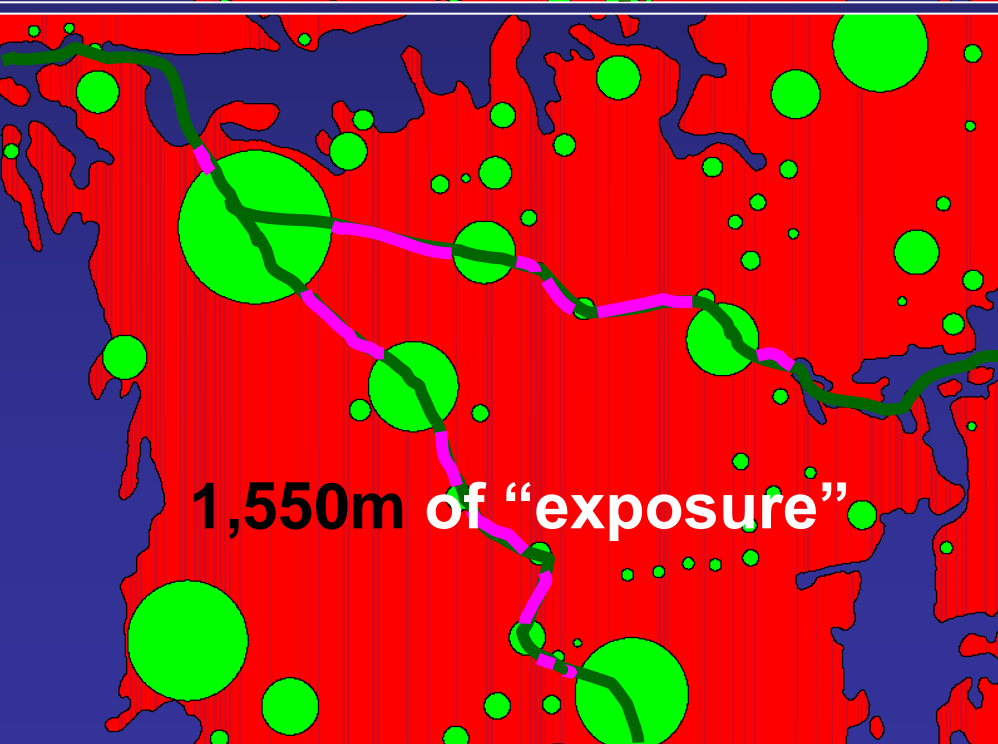






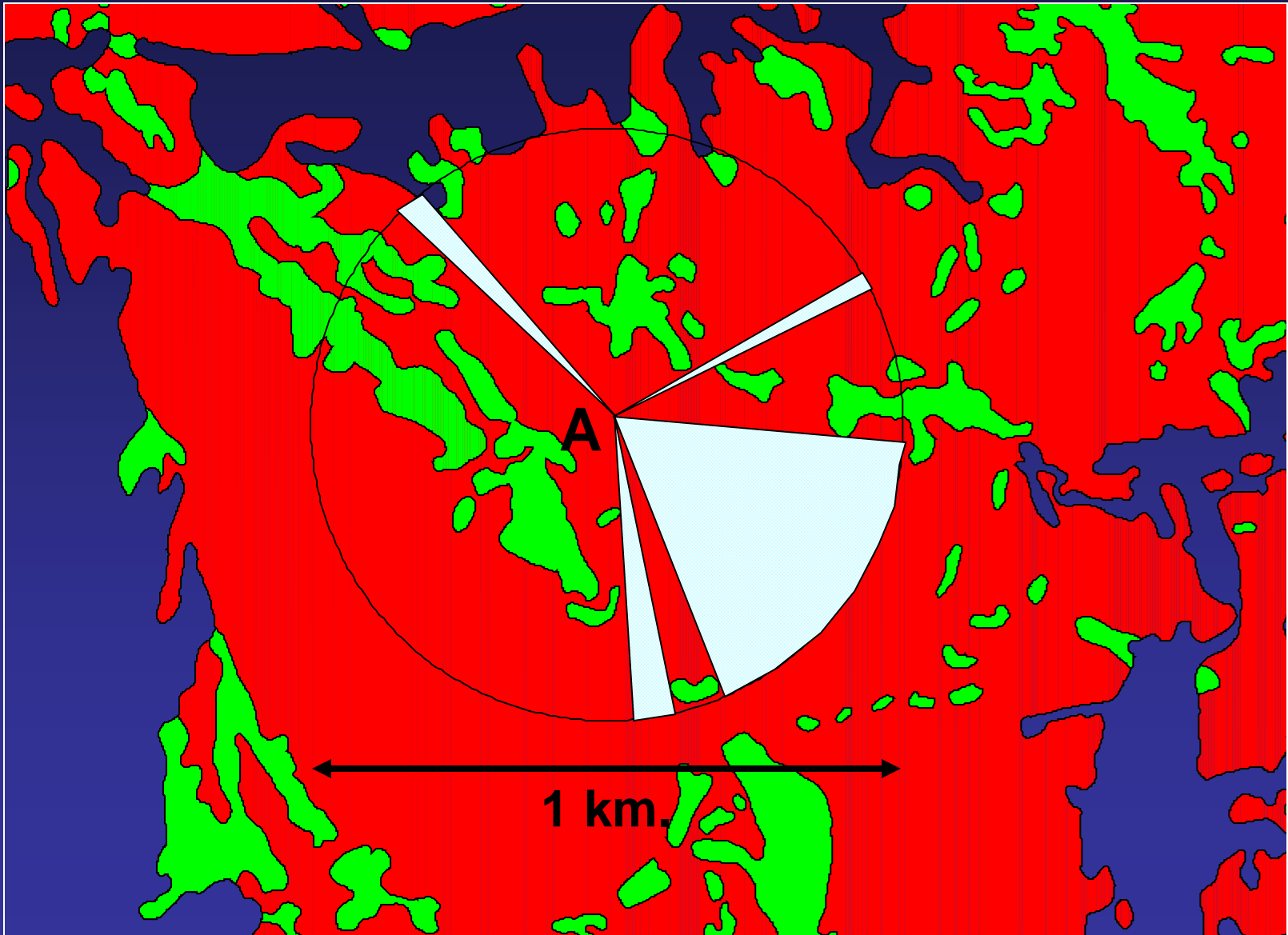


What is the safest, most protected path, (of least resistance) from one side of the disturbance to the other?

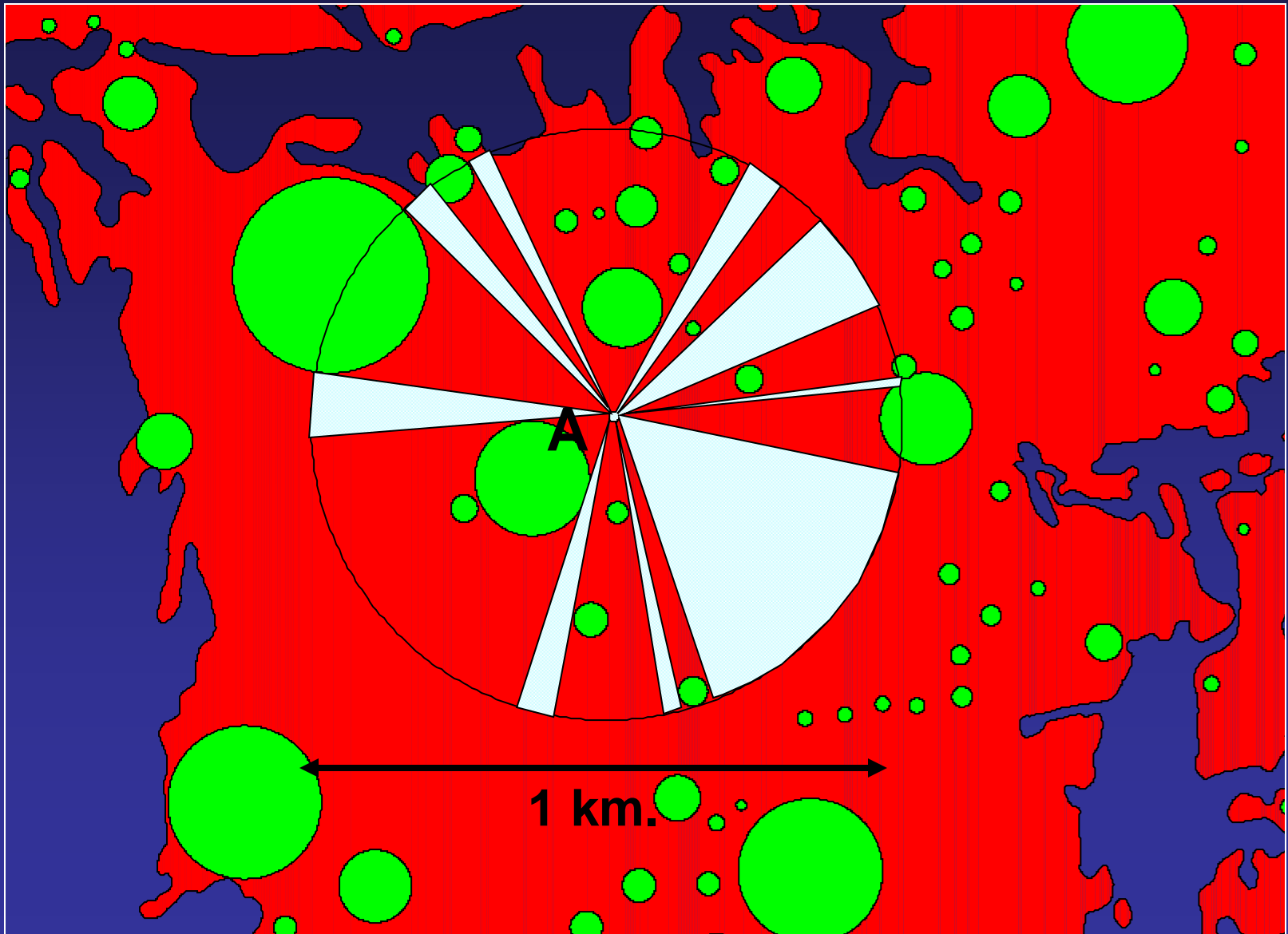


How risky is it? (e.g. degree and time of exposure)

**22% of the perimeter of a 500m radius circle is visible from point A.**



**34% of the perimeter of a 500m radius circle is visible from point A.**



**Does it really matter where  
islands are?**

# Are Residuals Related to Riparian Zones?

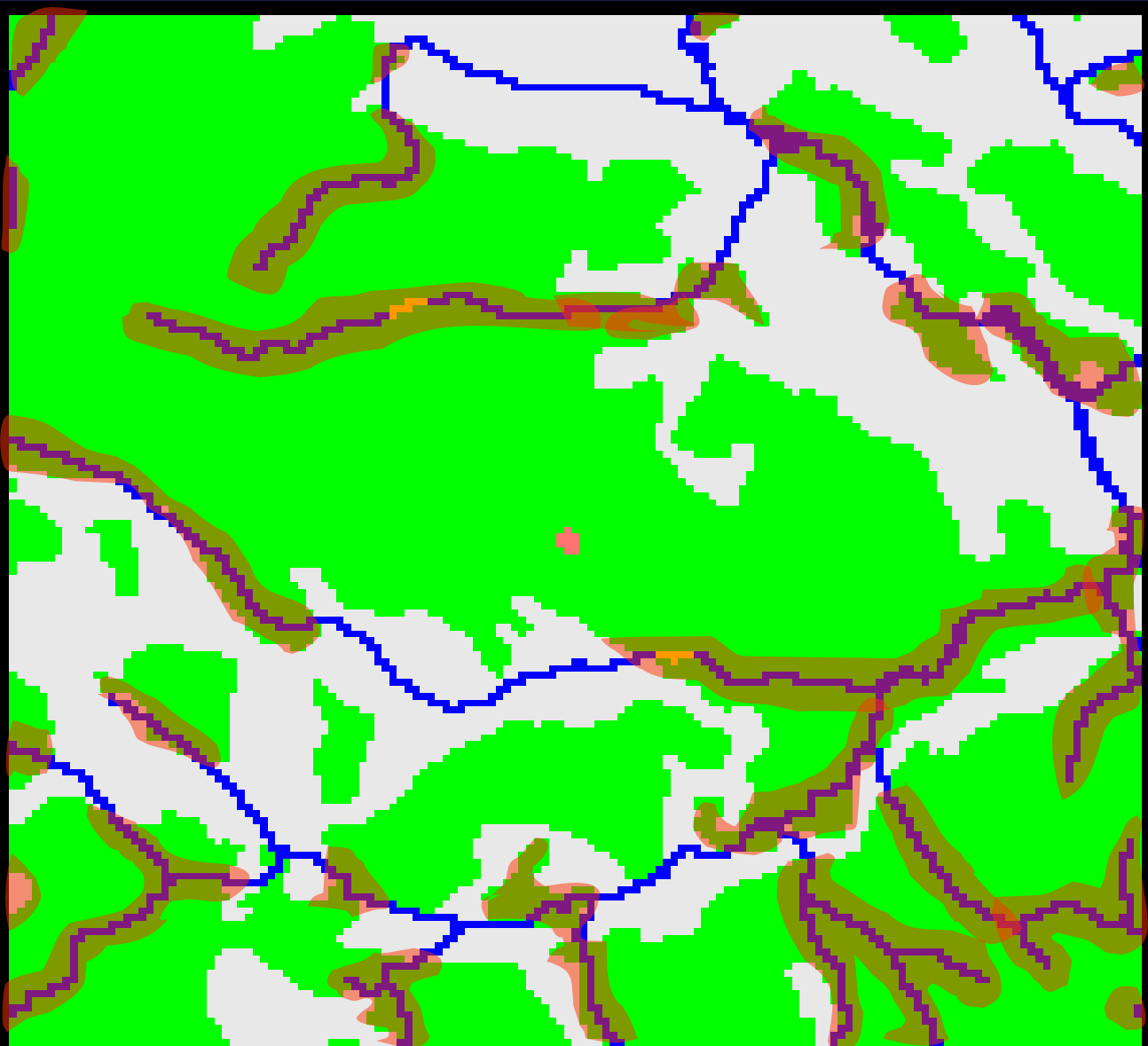


Not significantly.

But What is the Harm?



# Old Growth High-Grading



We protect all riparian zones.

Riparian zones tend to be spruce dominated.

Therefore, riparian zones become “old growth”.

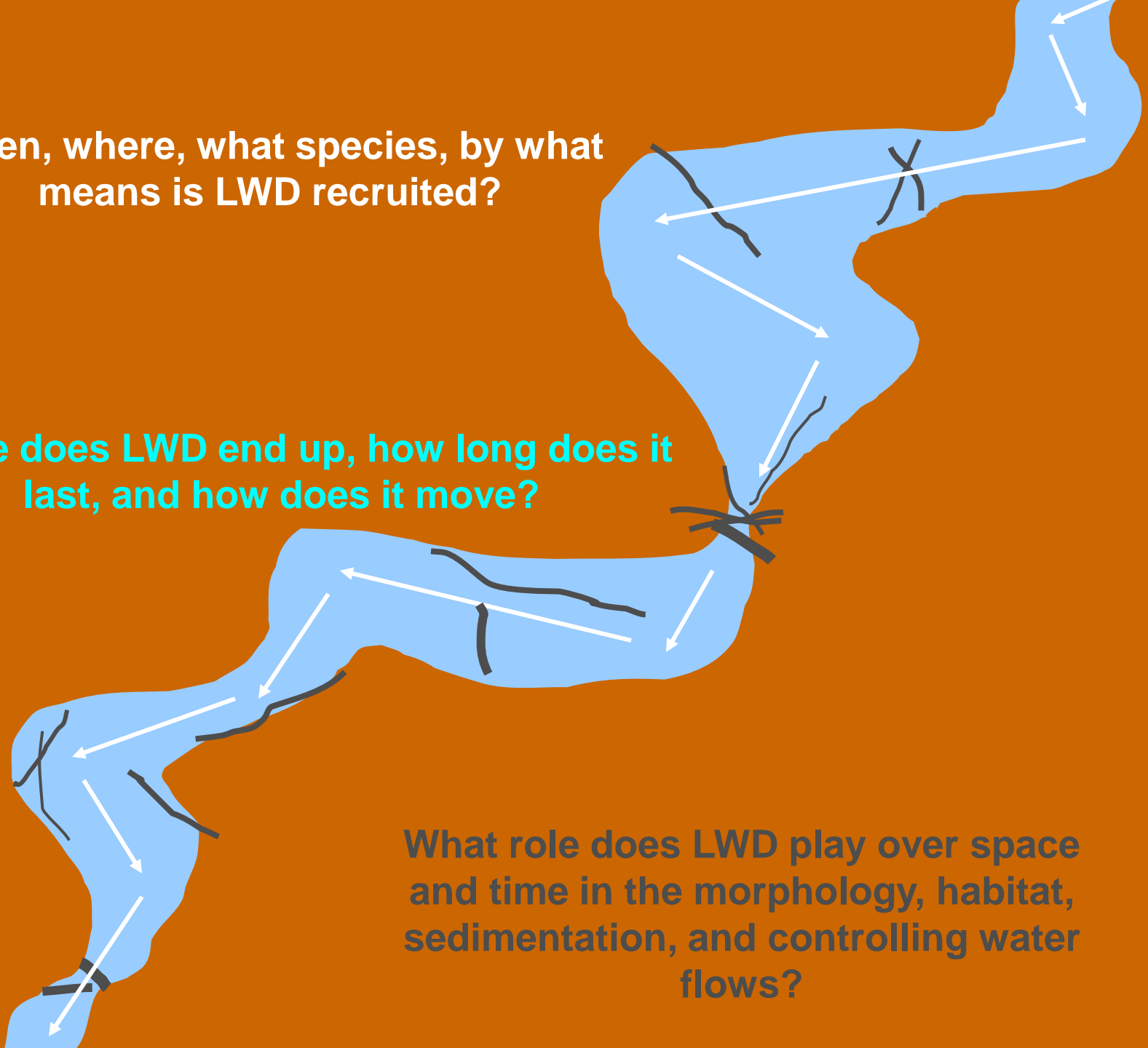
...but what about upland, non-spruce-dominated “old” forest?



**When, where, what species, by what means is LWD recruited?**

**Where does LWD end up, how long does it last, and how does it move?**

**What role does LWD play over space and time in the morphology, habitat, sedimentation, and controlling water flows?**





Died in 1954.



A photograph of a stream with a blue ribbon tied to a branch and a white arrow pointing to a rock in the water.

**Died in 1897**

**Where did this piece start its' LWD life?**

# How Can We Use This Knowledge?

Our impact on forest landscapes is predominantly as an agent of *disturbance*.

- Agriculture.
- Build towns, cities, roads, trails, seismic lines, power lines, well-sites, pipelines, etc.
- Forest fire prevention.
- Forest harvesting activities.

**So maybe we should be concentrating  
more on how to manage our disturbance  
activities...**

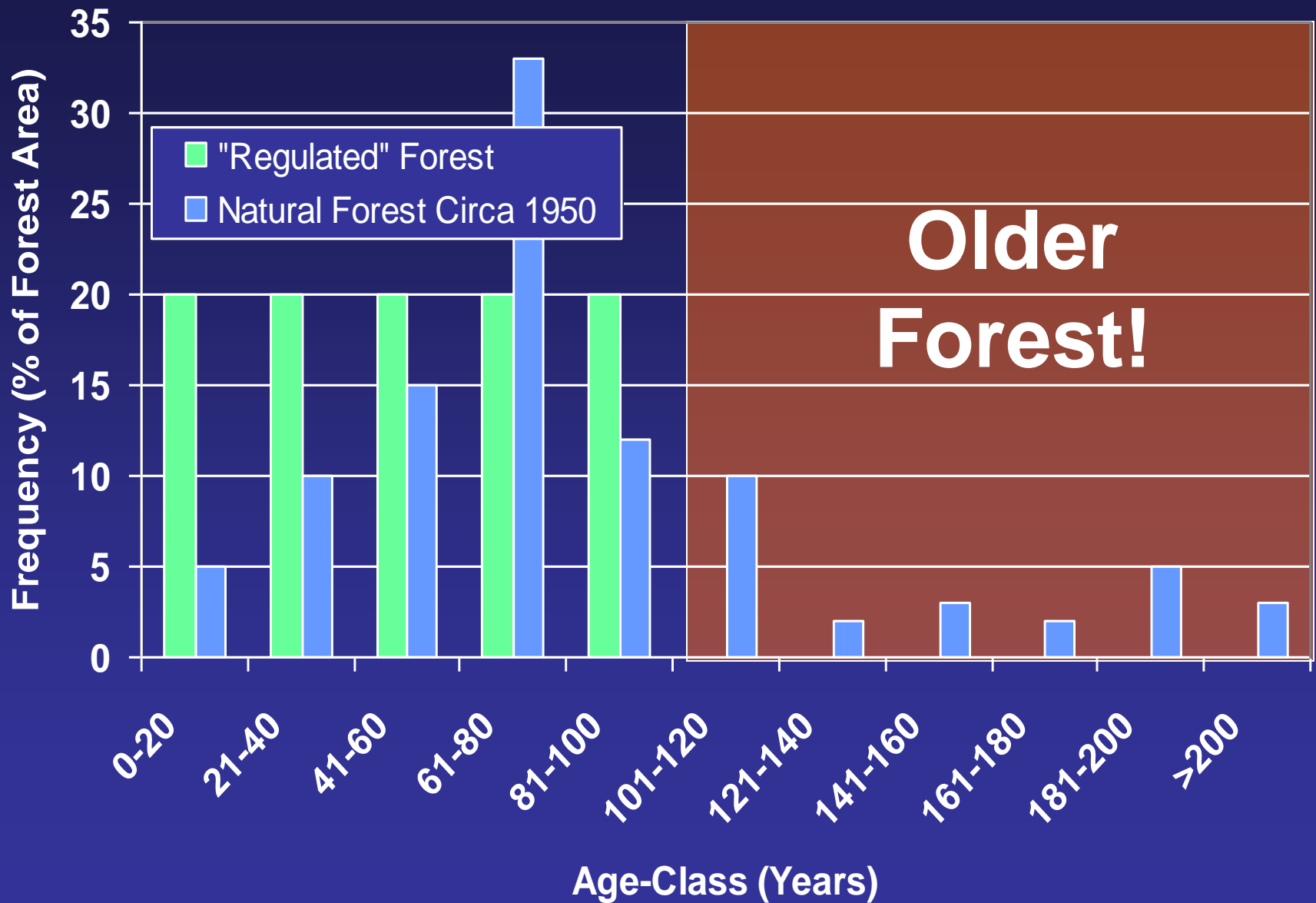
**...to correspond more closely to those of  
Mother Nature....**

**...in an effort to better manage for  
biodiversity values.**



# How Often Does Mother Nature Disturb Forests?

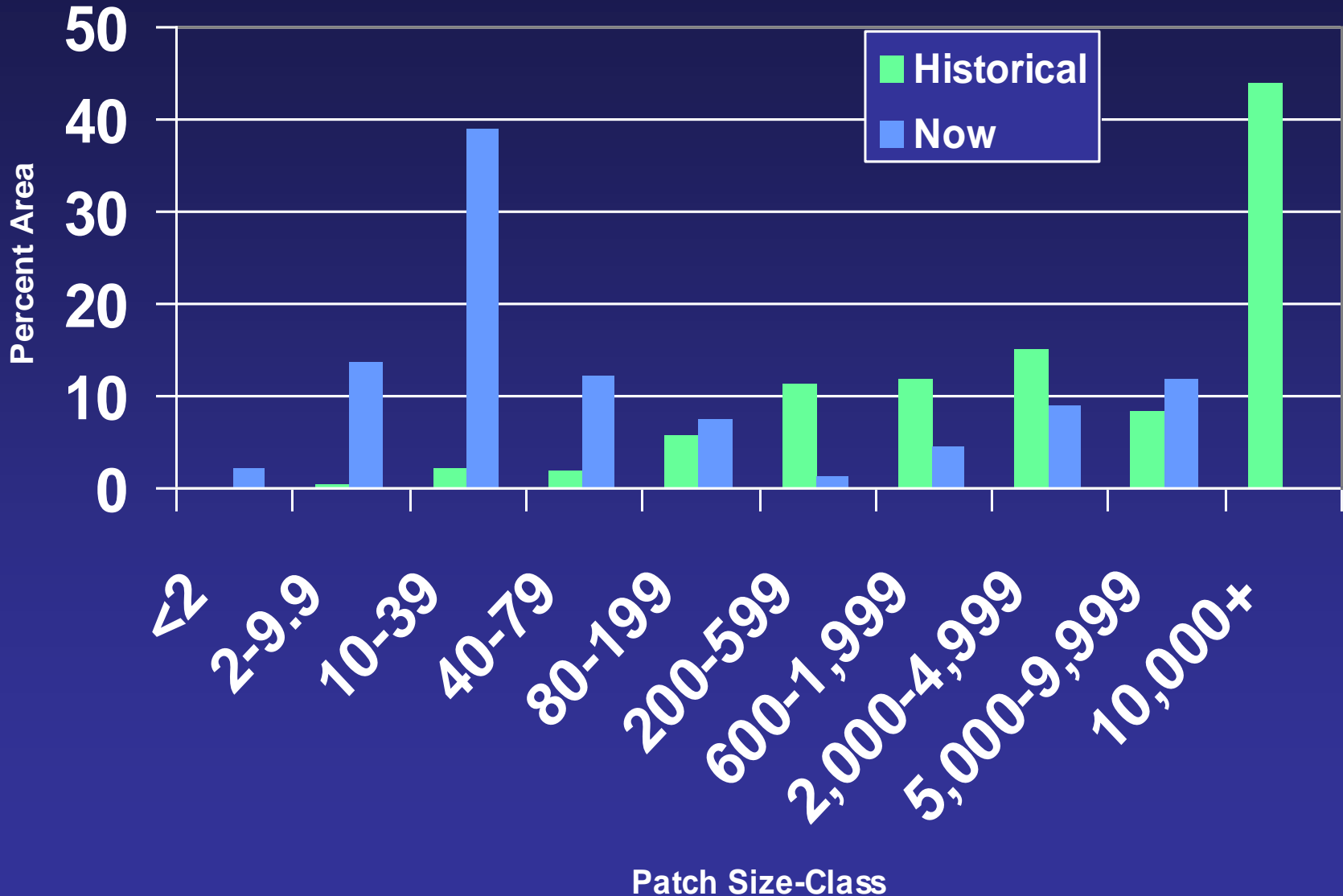
# Forest Ages for the Weldwood Landscape



An aerial photograph of a forest landscape. A large, irregularly shaped area in the upper center is cleared of trees, appearing as a light brownish-green field. The surrounding forest is dense, with a mix of green and brownish-orange trees, suggesting a fire impact. The text "How Large Are Forest Fires?" is overlaid in yellow on the right side of the image.

# How Large Are Forest Fires?

# Disturbance Sizes on Weldwood Landscapes



# How Severe are Historical Fires?



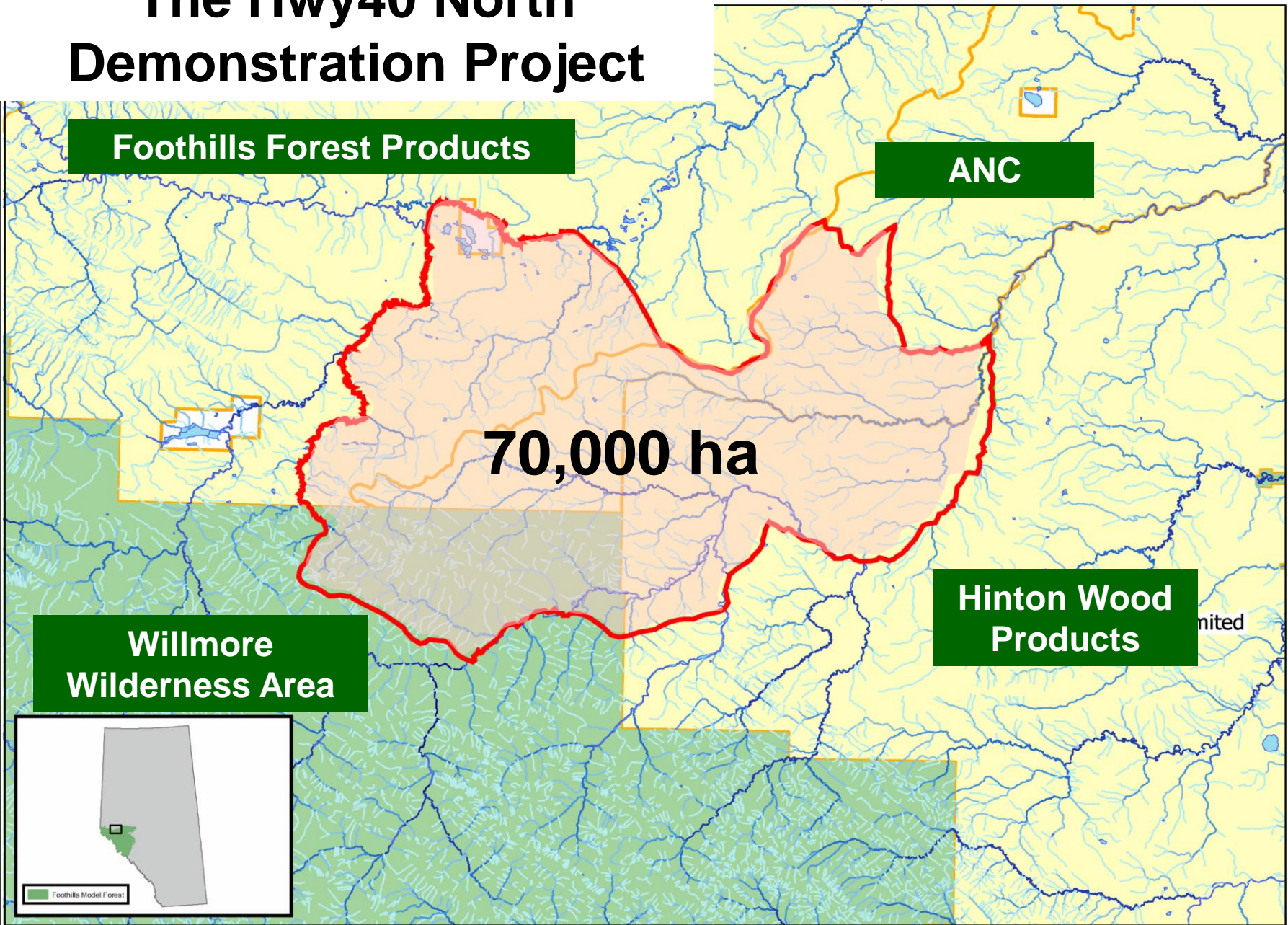
**If you get the disturbance patterns right,  
it will go a long way to providing  
sustainable solutions for biodiversity.**



# The Hwy40 North Demonstration Project

0 2 4 8 Kilometers  
1:288,494

02-May-2002



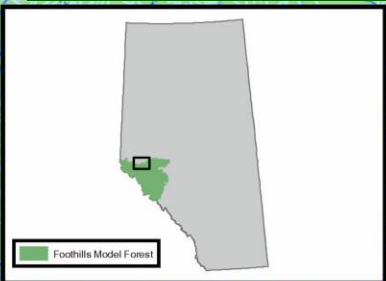
Foothills Forest Products

ANC

70,000 ha

Hinton Wood Products

Willmore  
Wilderness Area



Foothills Model Forest

## **The Team:**

**West Fraser  
ANC**

**Foothills FP  
Willmore**

**ASRD Regulator**

**ASRD F&W**

**ASRD Fire**

**Alberta Energy**

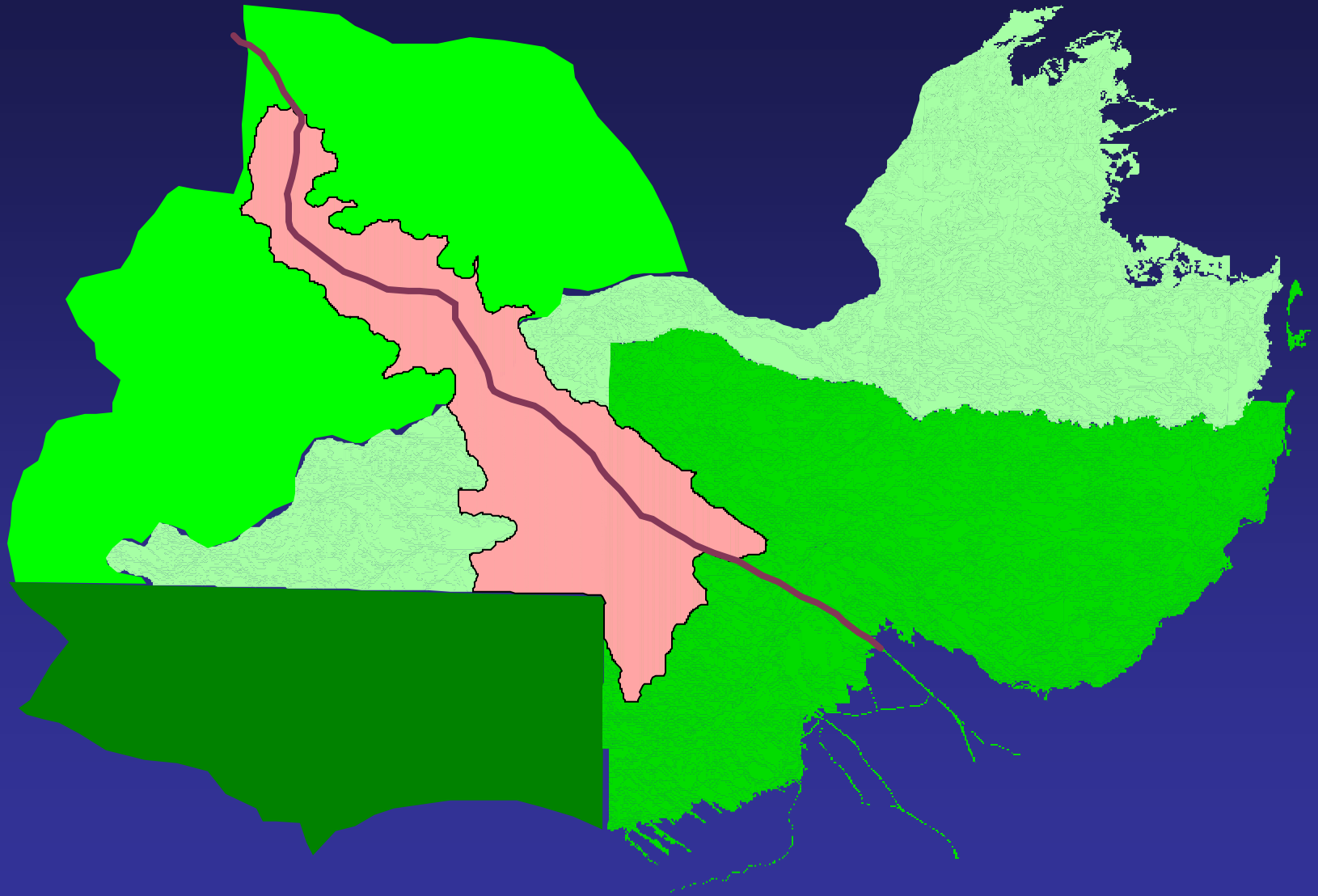
**CAPP**

**FMF Disturbance Expert**

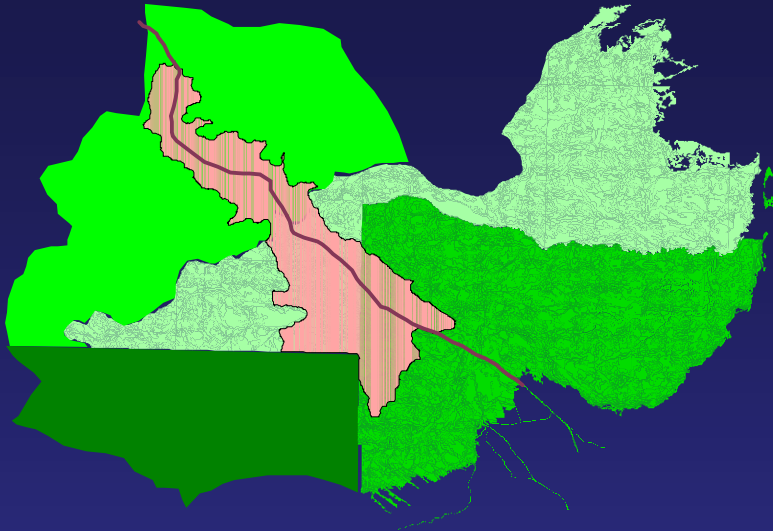




# The Plan (so far)



# Why here?



Good timber values

Barrier to eastward movement of fire AND mountain pine beetle

Great visibility and education opportunity

Reduces new roads

Covers existing oil and gas development

Leaves lots of remaining old forest intact

# Foothills Model Forest Natural Disturbance Program

## *Sound science*

What are the patterns and processes of natural disturbance?

## *...put into practice*

Committed to finding integration solutions to make best use of our new knowledge.

## *...by all partners through collaboration.*

Directed by a team of collaborators, including companies, government, parks, and others.