NEPTUNE Training Session:

Part 1: Background

Foothills Model Forest Natural Disturbance Program

September, 2006

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BANDALOOP
LANDSCAPE-ECOSYSTEM SERVICES

foothills
MODEL FOREST
research growing into practice.

New

Emulation

Planning

Tool for

Understanding

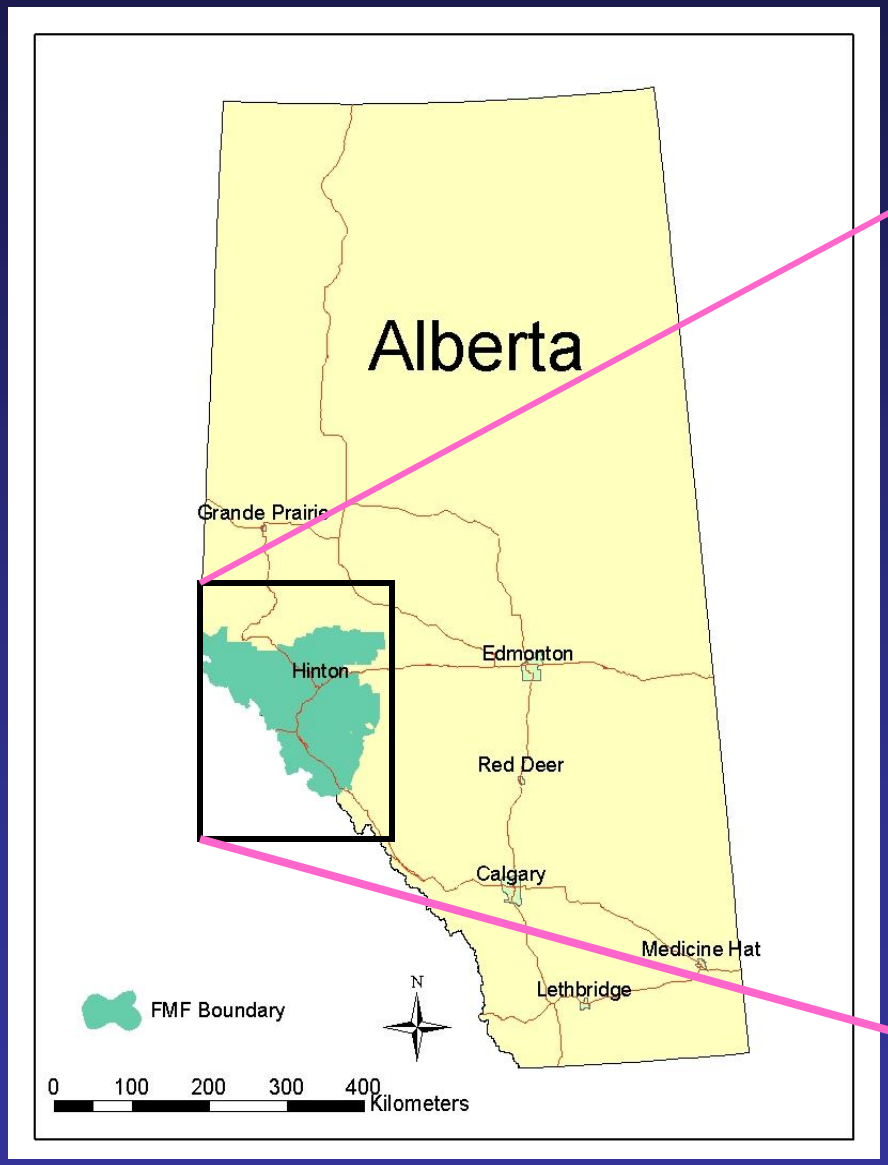
Natural

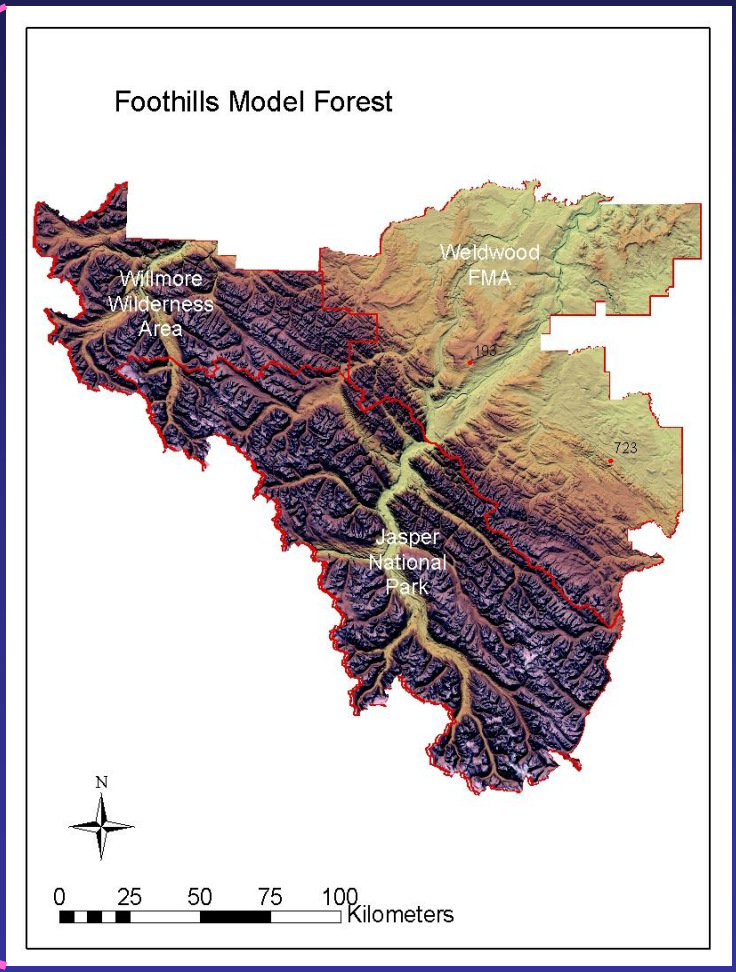
Events

Outline:

1. The FMF Natural Disturbance Program
2. The Natural Pattern Concept
3. A New Spatial Language

Foothills Model Forest





The FMF Natural Disturbance Program

- **Understand and integrate into forest land management the patterns and process of natural disturbance.**
- **Partner-driven, science-based and solution oriented.**
- **Long-term vision / plan.**
- **3 Main Classes of Projects:**
  - ***Research***
  - ***Integration***
  - ***Communication / Education***

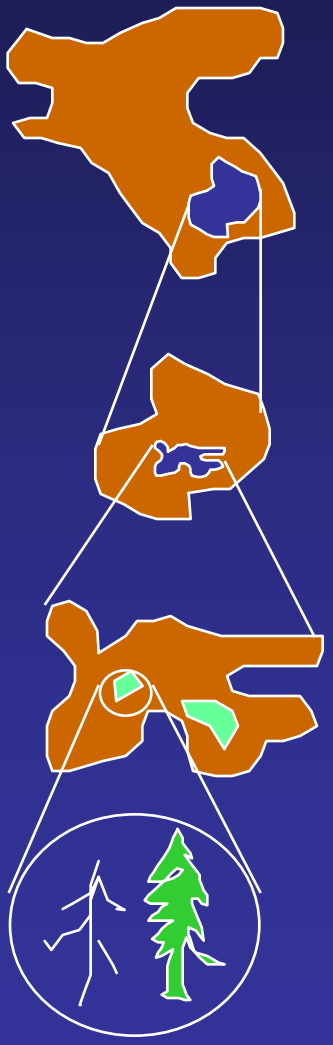
Research Group Question: **What are the patterns and processes of natural disturbances?**

- research.

Model Forest Question: **What are the patterns and processes of ND's *and the most relevant issues pertaining to the integration and use of the natural pattern strategy*?**

- research + education + communication + demonstration + integration + facilitation.

The ND Program Scope Spans All Spatial Scales



Region - Foothills Model Forest

Landscape - Upper Foothills Natural Sub-region

Disturbance - Gregg River Burn

Stand - Remnant island

NDP Program Partners

- **Hinton Wood Products – West Fraser**
- **Jasper National Park**
- **Alberta Sustainable Resource Development**
- **Alberta Newsprint Co.**

Project Partners:

- **Weyerhaeuser**
- **Blue Ridge**
- **Sundre Forest Products**
- **Millar-Western**
- **U. of Alberta**
- **U. of BC**
- **etc…**

The FMF Natural Disturbance Program: *Why?*

A common desire among partners to *maintain biodiversity* by adopting a strategy of emulating natural, historical patterns of disturbance.

= defining some "coarse" filters for decision-making.

A Hierarchy of Needs

What is the natural pattern concept all about, and (how) is it relevant to my world?

Do I need to learn new terminology to understand or use natural patterns?

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Give me some working examples of what a natural pattern-inspired disturbance plan looks like.

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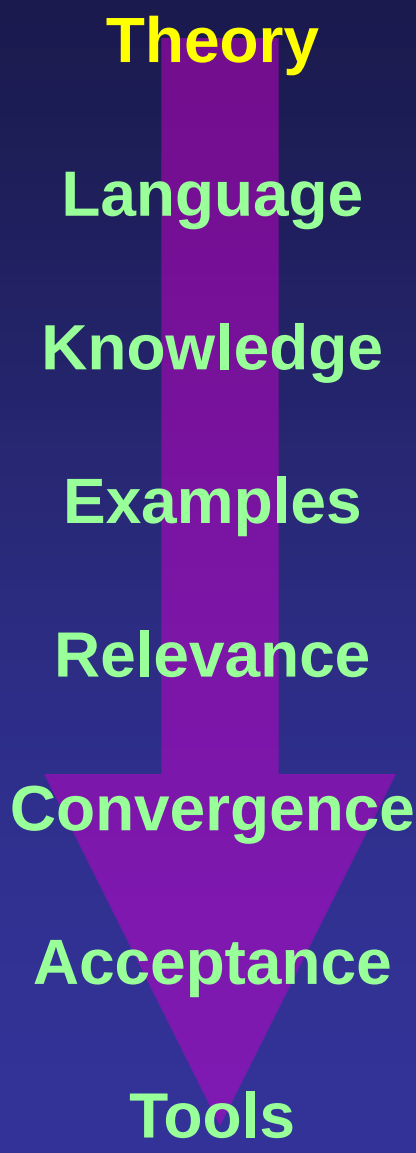
Give me some operational tools with which to help me design landscapes with natural patterns in mind.



Where did the Natural Disturbance Model Come From?

- A strategy to ***maintain biodiversity.***

How Does One Maintain Biodiversity?

Option 1: Leave. Move out, stop harvesting, and let natural processes take over.

Option 2: "Manage" for biodiversity values. A) issue-based vs. B) coarse filter approaches.

A. Issue-Based

We are most familiar and comfortable dealing with specific and direct issues, such as species extinctions, soil erosion, or old growth.

= “Issue-Based Approach”

(which to some = “fine filter”)


Ecological Issue #1: Pine Marten
Ecological Issue #2: Moose
Ecological Issue #3: Soil erosion
Ecological Issue #4: Productivity
……etc
Mgmt. Objectives
Economic Issue #1: Woodflow
Economic Issue #2: Local jobs
Economic Issue #3: Outfitters
Economic Issue #4: Reduce waste
…. etc
Social Issue #1: Recreation
Social Issue #2: Hunting opp.
Social Issue #3: Local jobs
Social Issue #4: TEK
…. etc

Advantages to the Issue-Based Approach

- Long history of research
- Target most important issues
- Aids species understanding
- Concepts easily grasped

Weakness of the Issue-Based Approach

- **Selective & subjective.**

- Several million species in Canada, of which we have only named a fraction.

- Are the ones we have not yet found / studied / named important???


Who is “in”?
Who is more important?

Weakness of the Issue-Based Approach

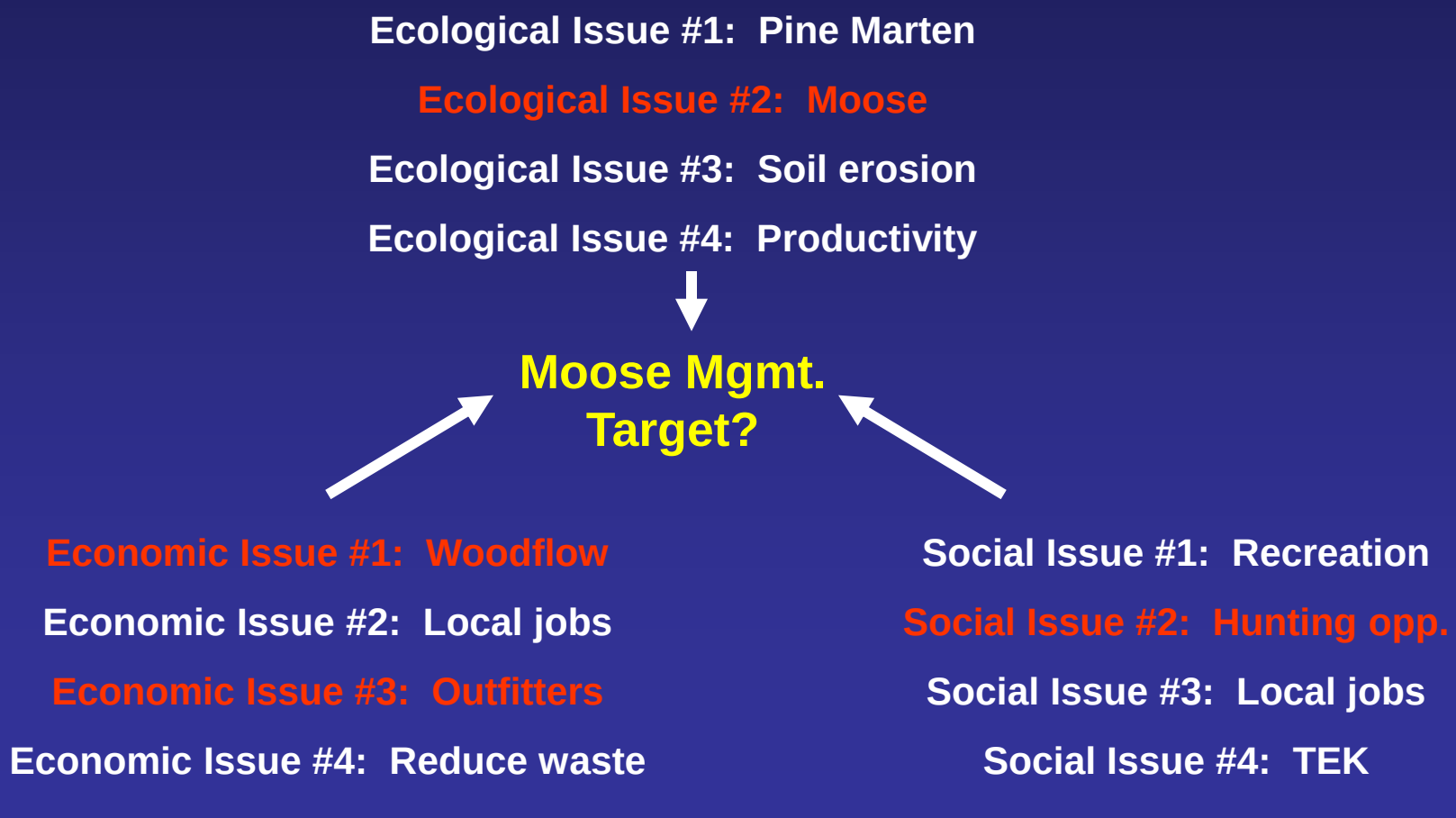
- Targets, goals are subjective

- How many Caribou are “good” or “sustainable”?

- What happens below or above that level? (predators, food supply, breeding, ….)

Weakness of the Issue-Based Approach

- Forces "tradeoff" mentality



B. Coarse Filter

We can also think of ecological considerations from a more holistic viewpoint.

What historical patterns and structures maintained natural levels of the ***entire suite*** of issues - known, named, or otherwise?

= "Coarse Filter Approach"

Often associated with the "Natural Range of Variation" (**NRV)**

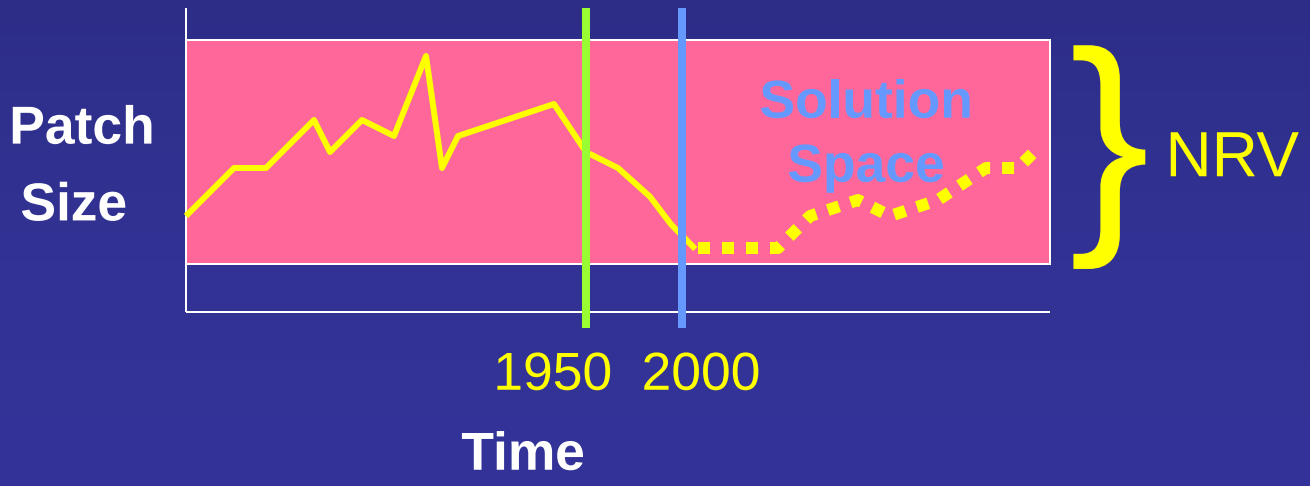
Note: "Coarse" does not refer to scale!

Advantages to the Coarse Filter Approach

- **Study cause vs. effect**

  (ie, no interpretations).

- **Quantifiable (ranges)**
- **Objective**
- **Solution-space oriented**



Weakness of the Coarse Filter Approach

- **Is the past a model for the future?**

- Will climate change change everything?

- How far back do we go for benchmarks?

Weakness of the Coarse Filter Approach

- **If we build it, will they come?**

- *Assumes* that there is a direct relationship between patterns and ecological responses.

- *Assumes* that coming close is good enough.

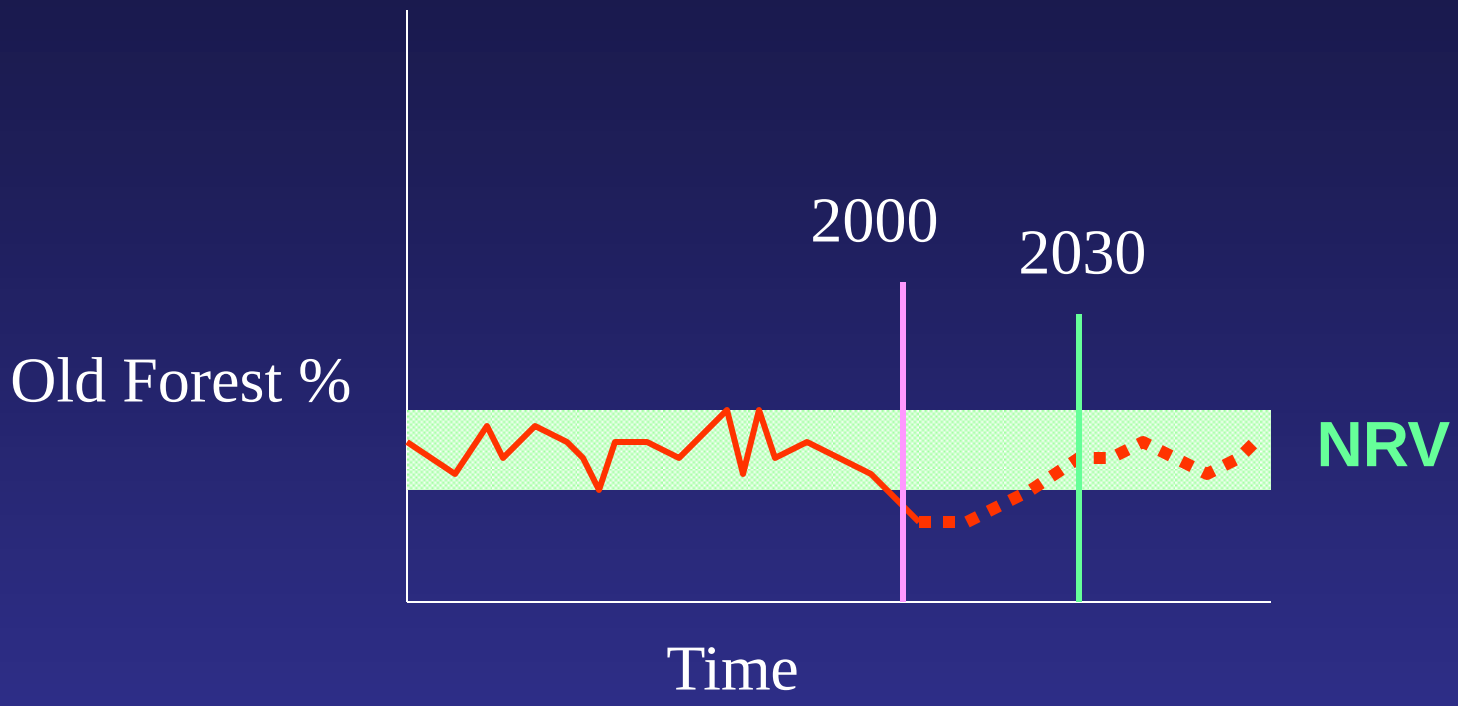
Weakness of the Coarse Filter Approach

- It is a new science.

- how do we know when we are “doing it”?

Dave’s 4 Rules of NRV:

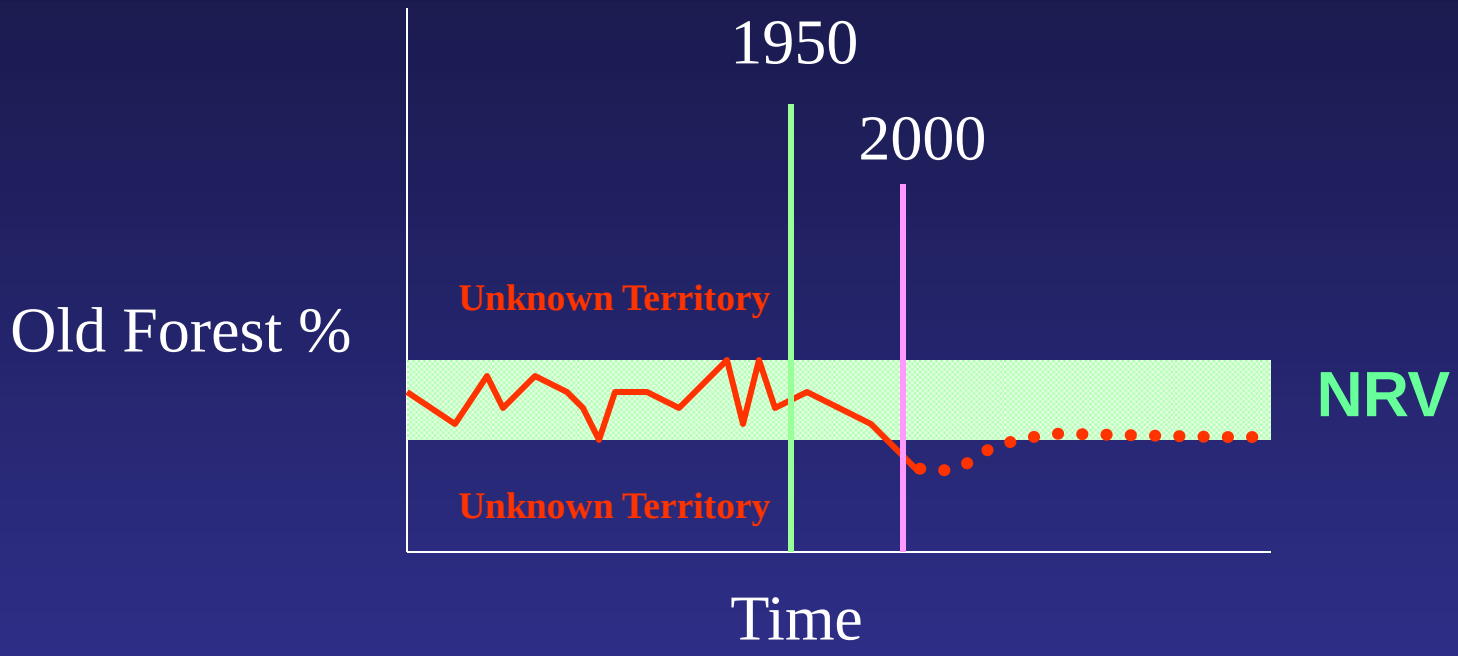
QUESTION 1:



Are we now, or in the future, staying within "natural range of variation" benchmarks, *at any one point in time*?

Red Flag check

QUESTION 2:



Are we representing the full range of natural variation *over time*? … or just hanging around the bare minimums?

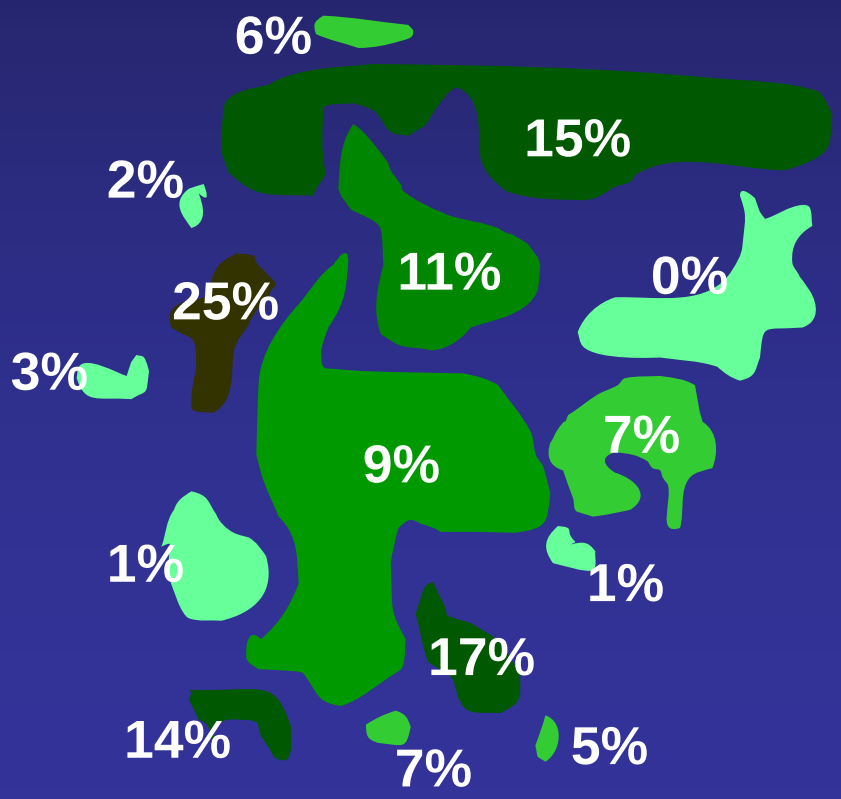
Temporal High-Grade check

QUESTION 3:

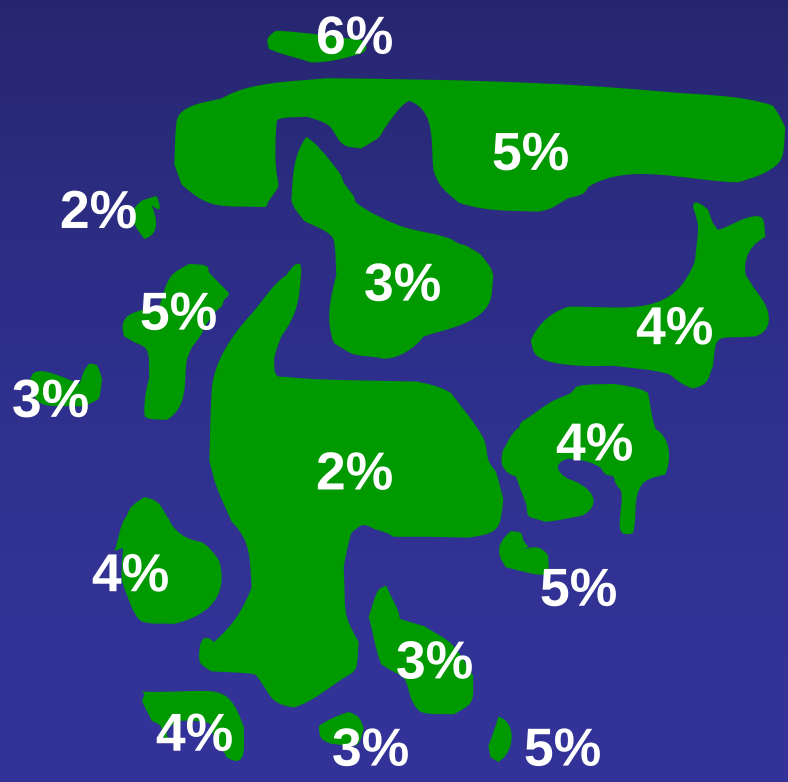
Are we representing the full range of natural variation *over space*?

Spatial High-Grade Check

A "natural" distribution of island remnants %



Island remnants % left by harvesting



Disturbance frequency
Seral-stage percentages
Old growth spatio-temporal tendencies
Disturbance types / severity
Disturbance event sizes
Patch size distribution
Patch shape distribution
Event mosaics
Area of island remnants
Numbers of island remnants
Island remnant locations
Edge architecture
Within patch heterogeneity
Coarse woody debris
Dead & live standing individuals
Mineral soil exposure
Biomass loads
Soil nutrients
Soil compaction
Disturbance probabilities
Water temperatures
Water flows
Water nutrients

QUESTION 4:

Are we *considering* a complete list of natural patterns……
…or just a select few?

Cherry-Picking check

Coarse filter *vs.* Issue Based?

No. They are the perfect complement.

Issue-base Weaknesses:

- coverage of species.
- subjectivity.

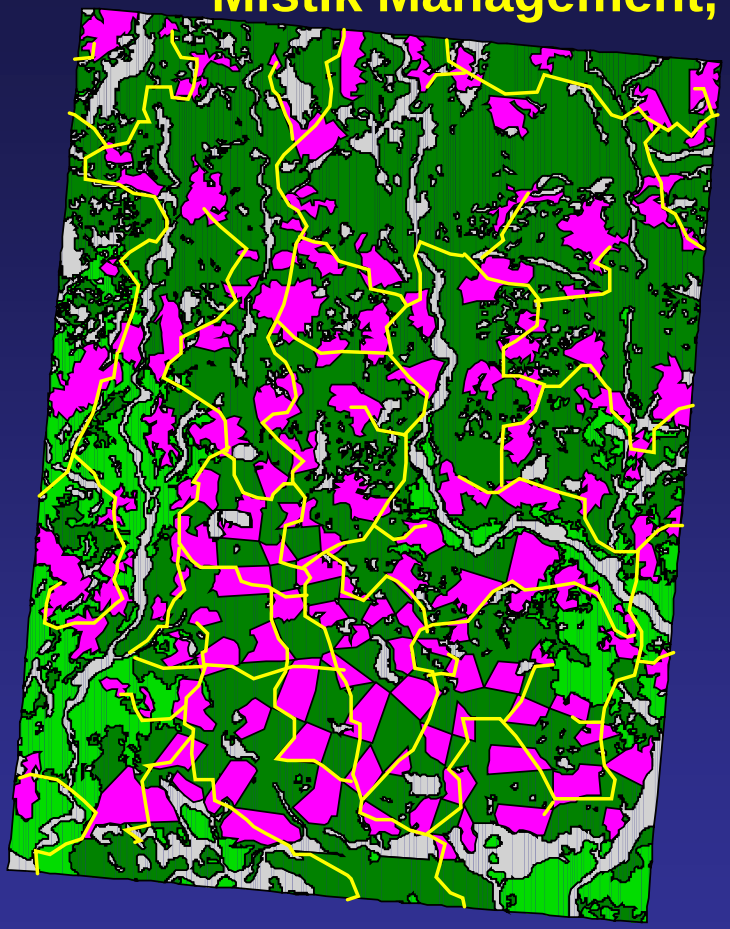
Coarse-filter weaknesses:

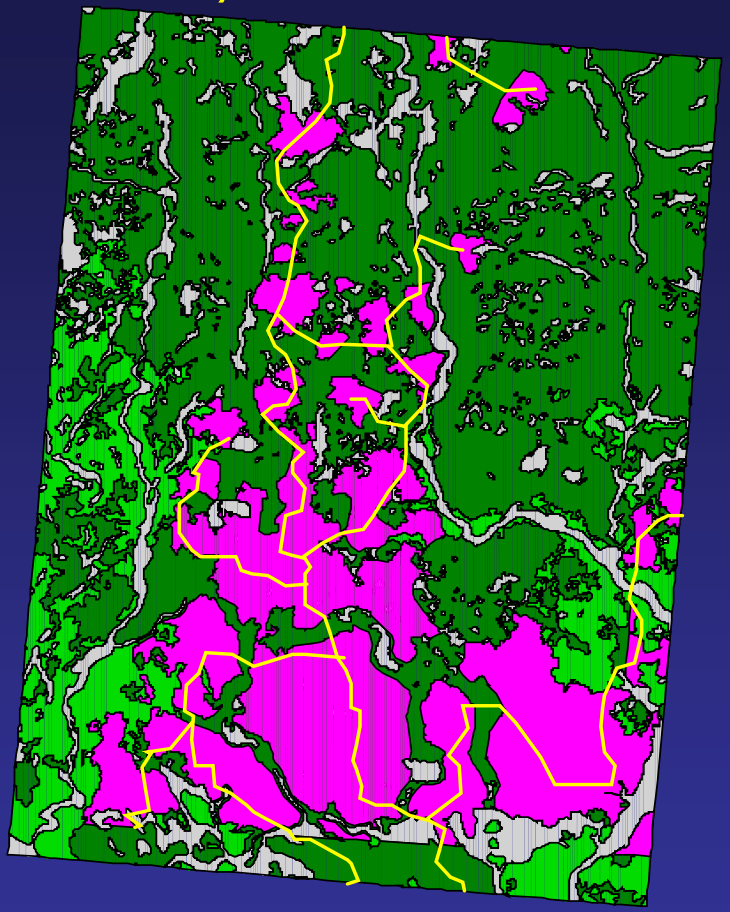
- ecological response assumptions.
- the past as a model for the future.

Patterns Within Wildfires

The Mistohay Experiment:

Mistik Management, Meadow Lake, Saskatchewan





Traditional Plan

2,680 ha harvested in 129 blocks.
Ave. patch size = 21 ha (3 – 65 ha range)
Total disturbance edge = 326 km.
122 km of roads.

Actual "Natural" Plan

2,678 ha harvested in 31 blocks.
Ave. patch size = 84 ha (1 – 1,104 ha range)
Total disturbance edge = 167 km.
50 km of roads

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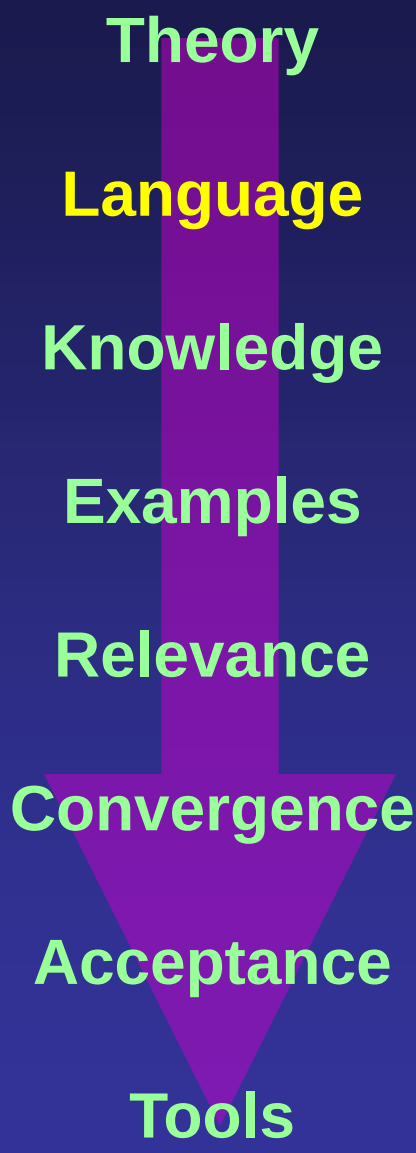
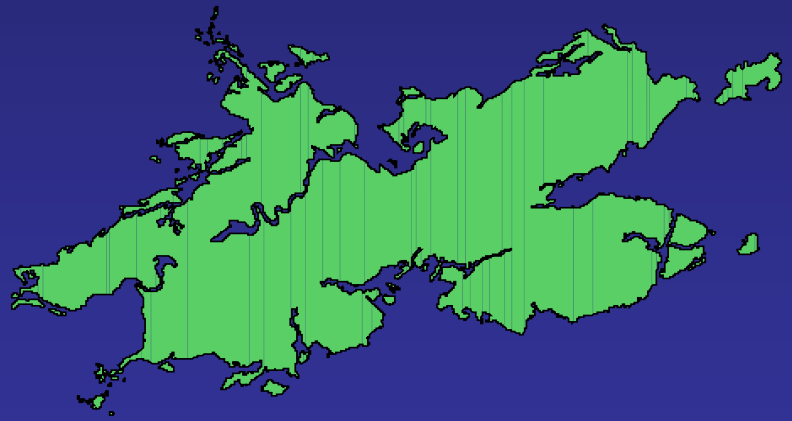


15 Patches 28 ha

13 Patches 8,886 ha

Wildfires are patchy,

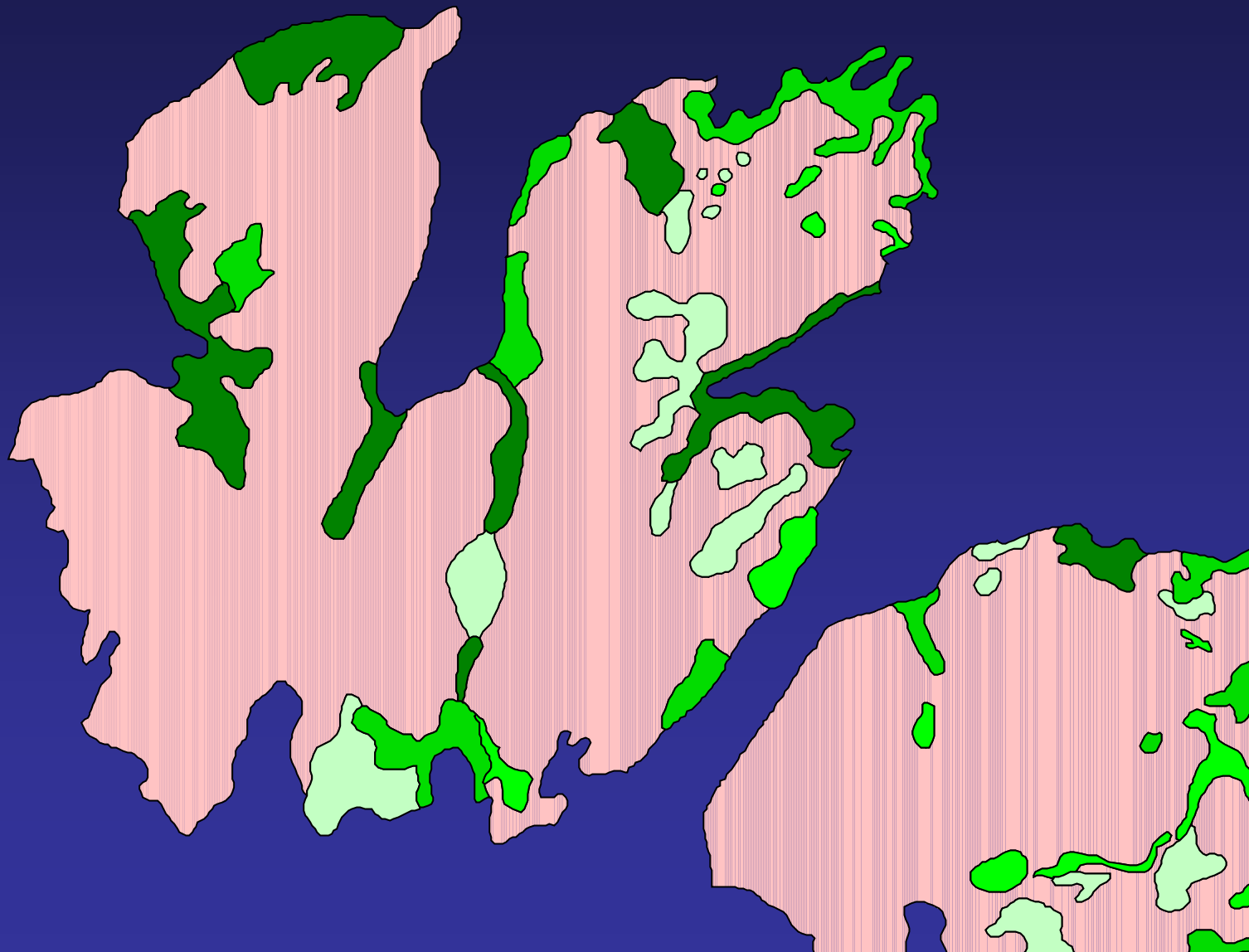
54 Patches 697 ha



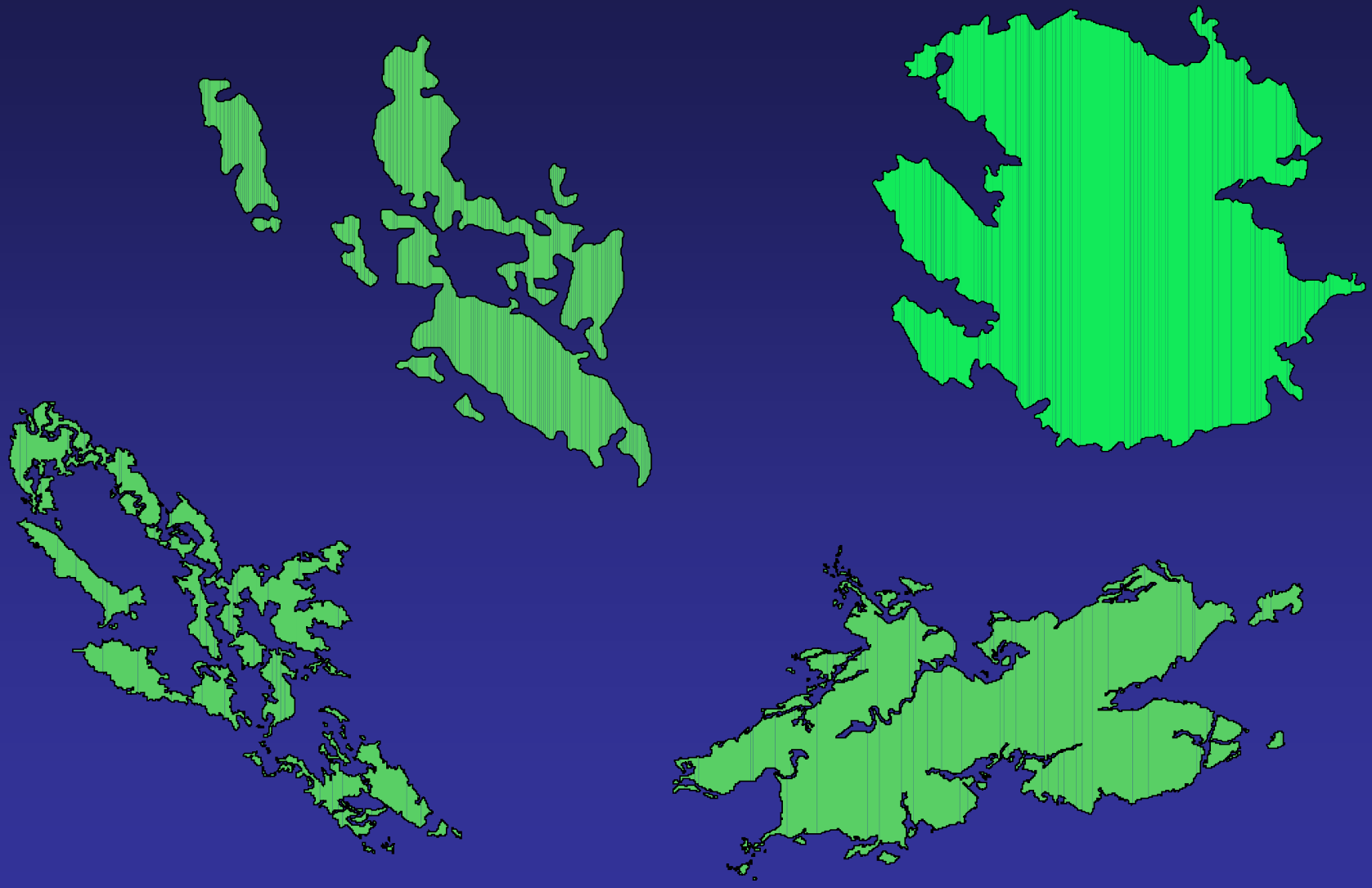
76 Patches 1,163 ha


…residuals are not orderly,

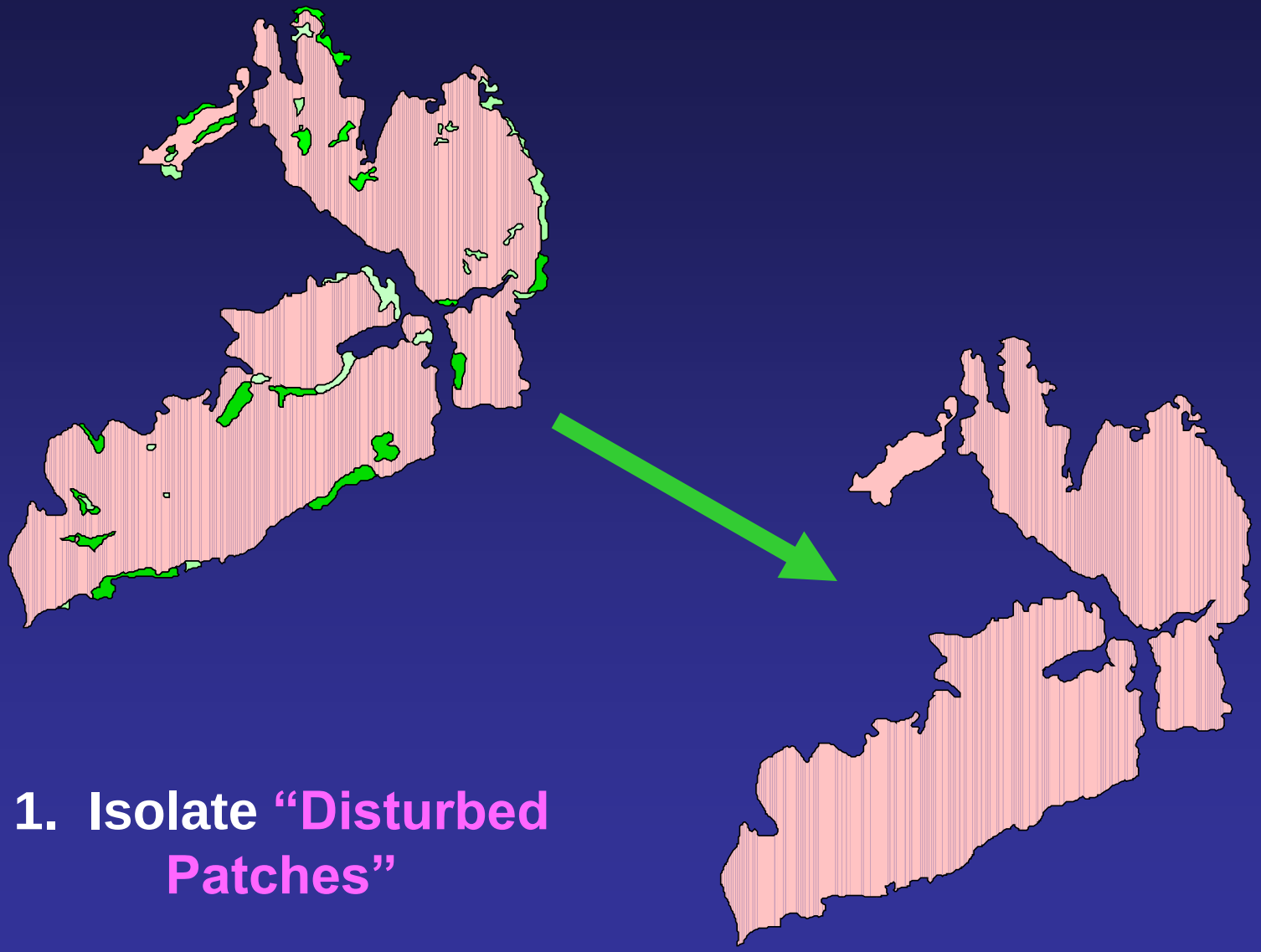
…and many spatial features are ambiguous.



First Priority: What is a “Wildfire”?

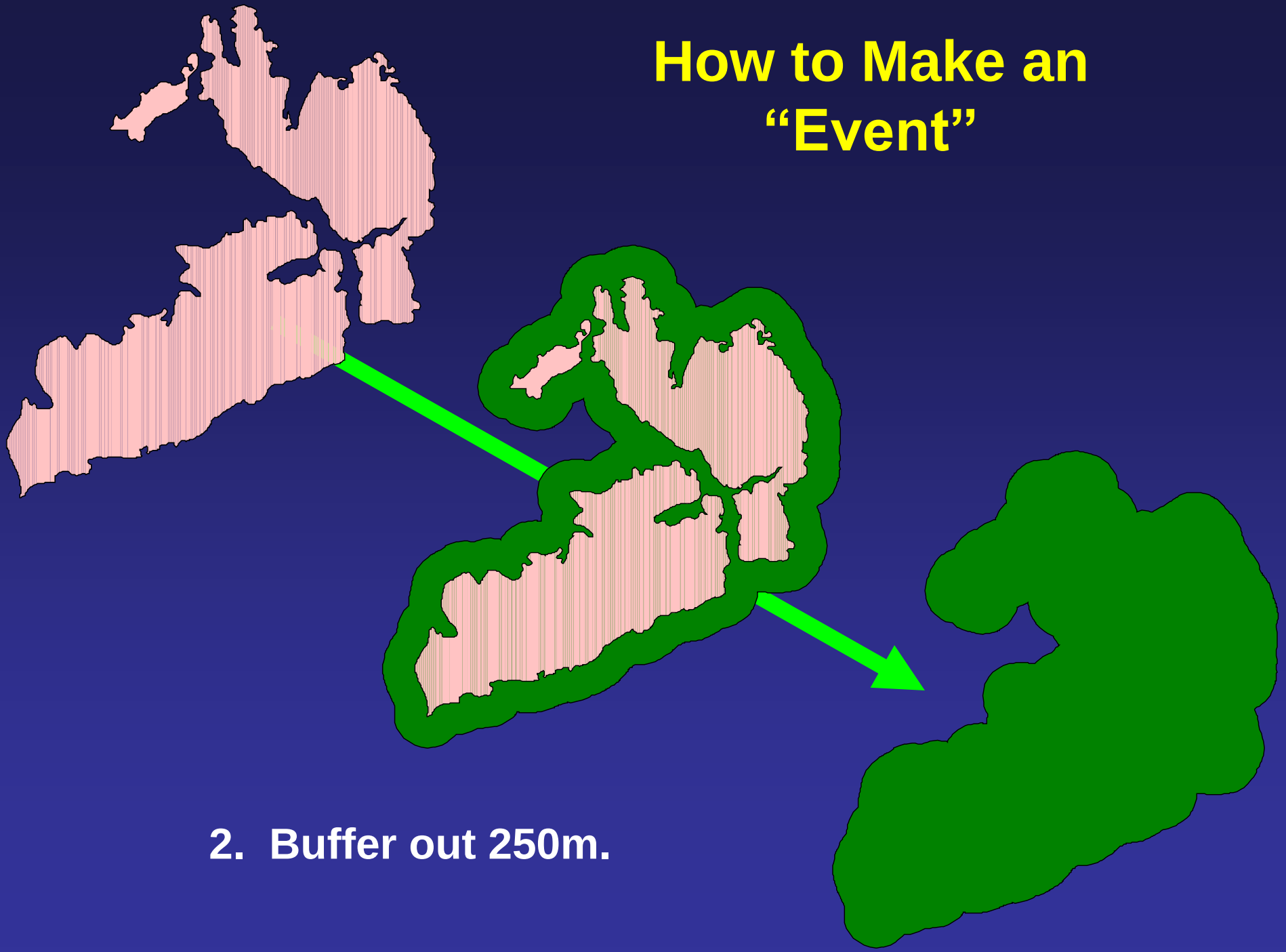


How to Make a Disturbance Event



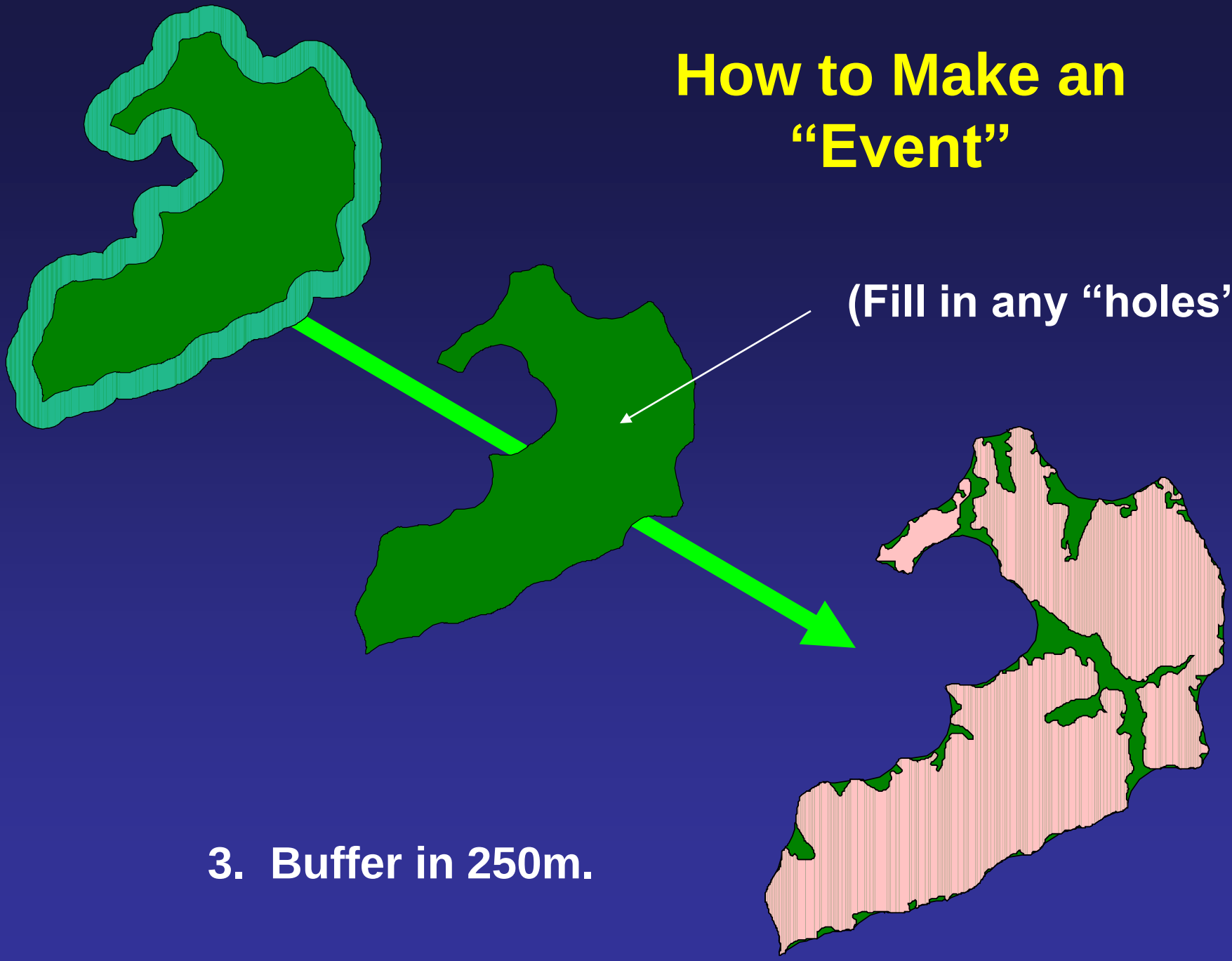
1. Isolate “Disturbed Patches”

How to Make an "Event"



2. Buffer out 250m.

How to Make an "Event"

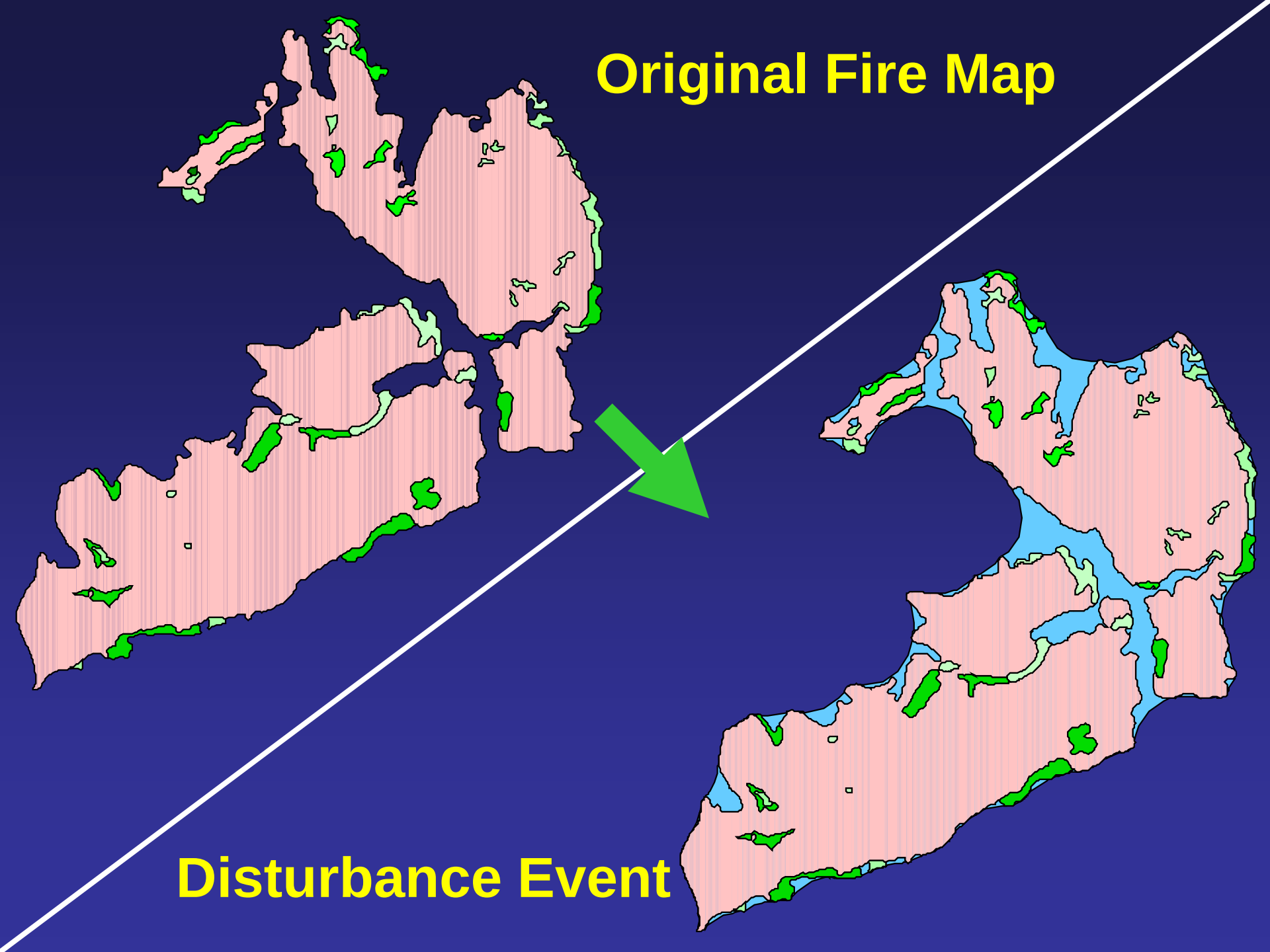


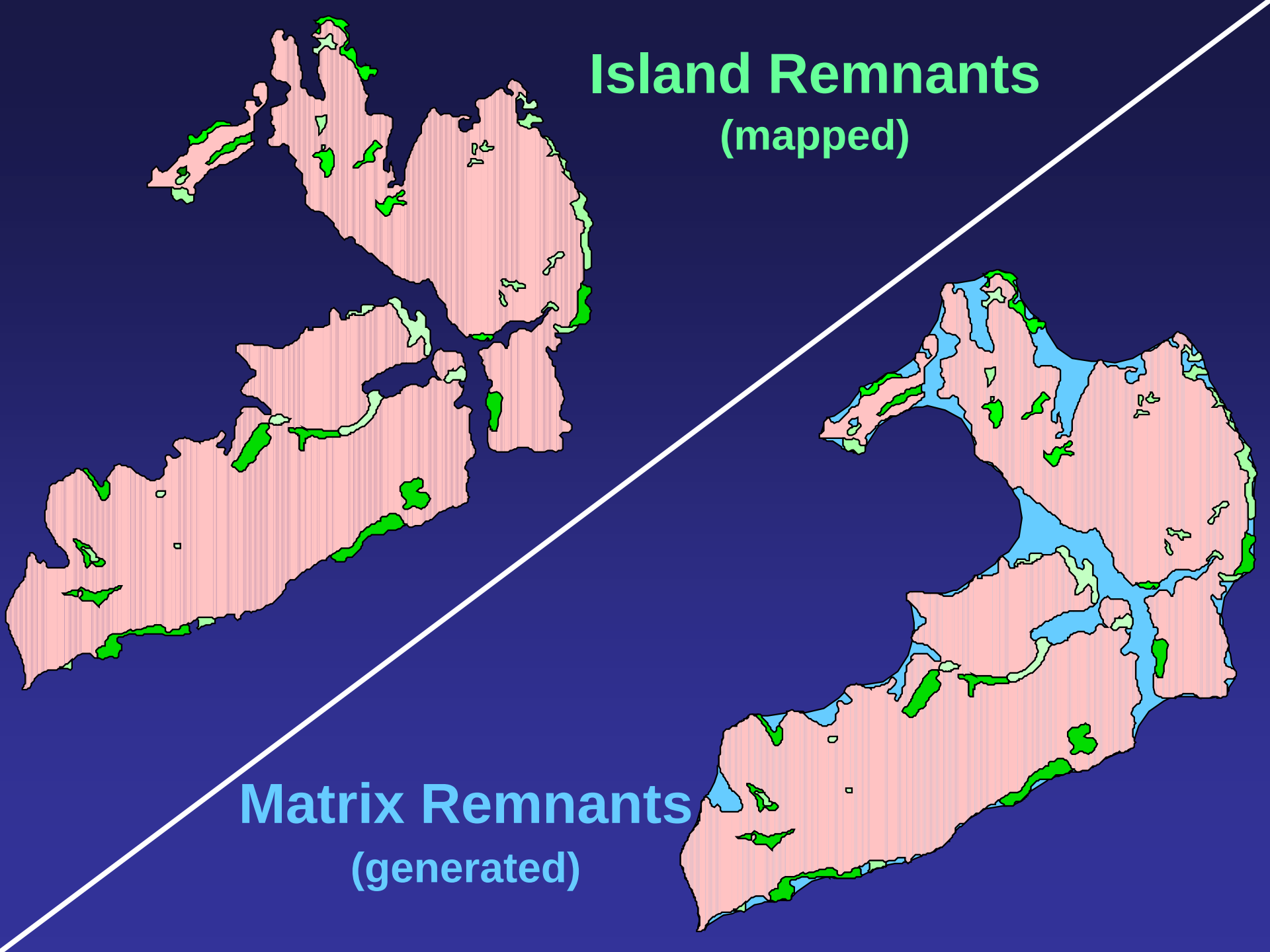
3. Buffer in 250m.

Why use buffering?

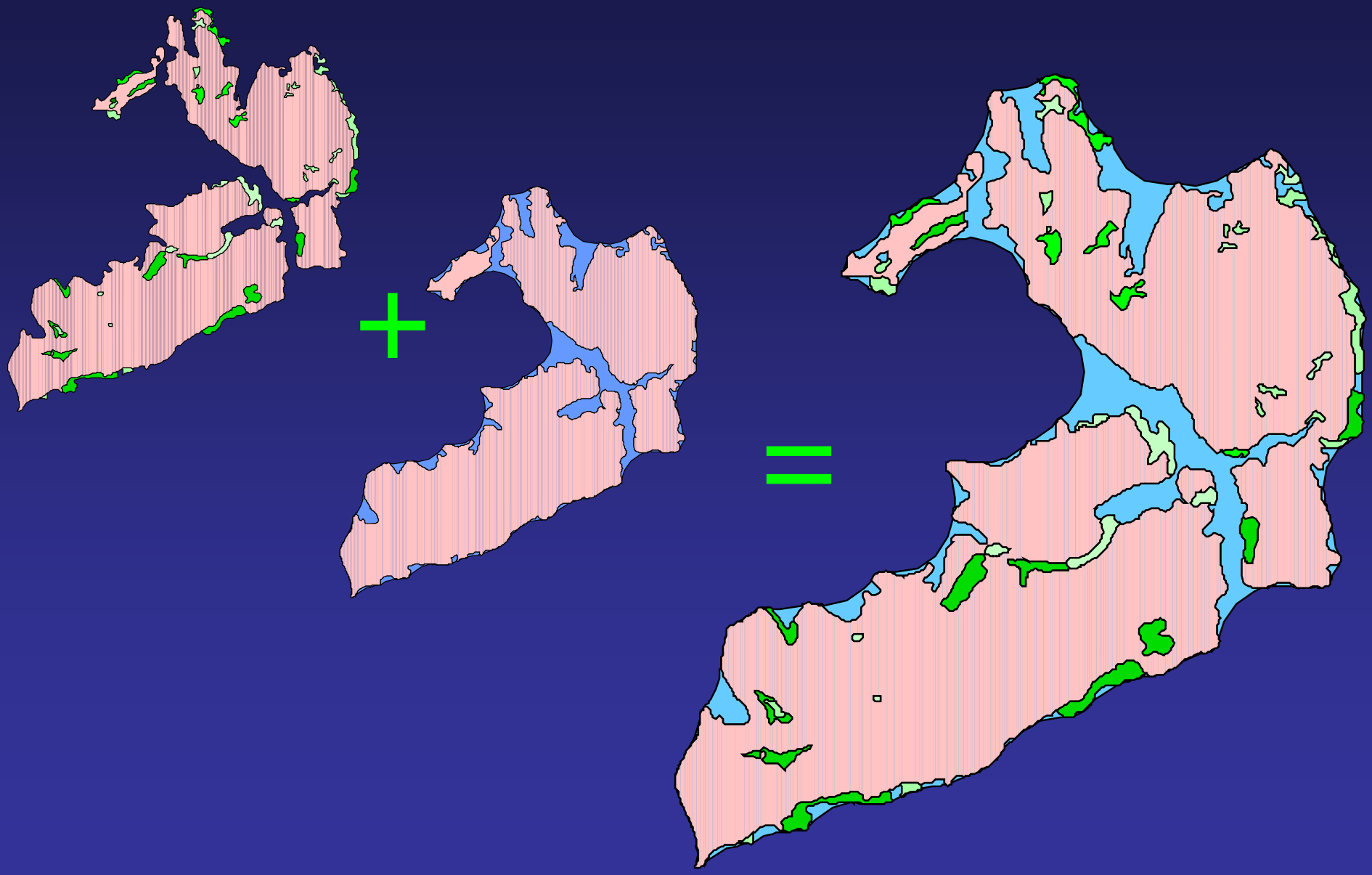
Why 250m?

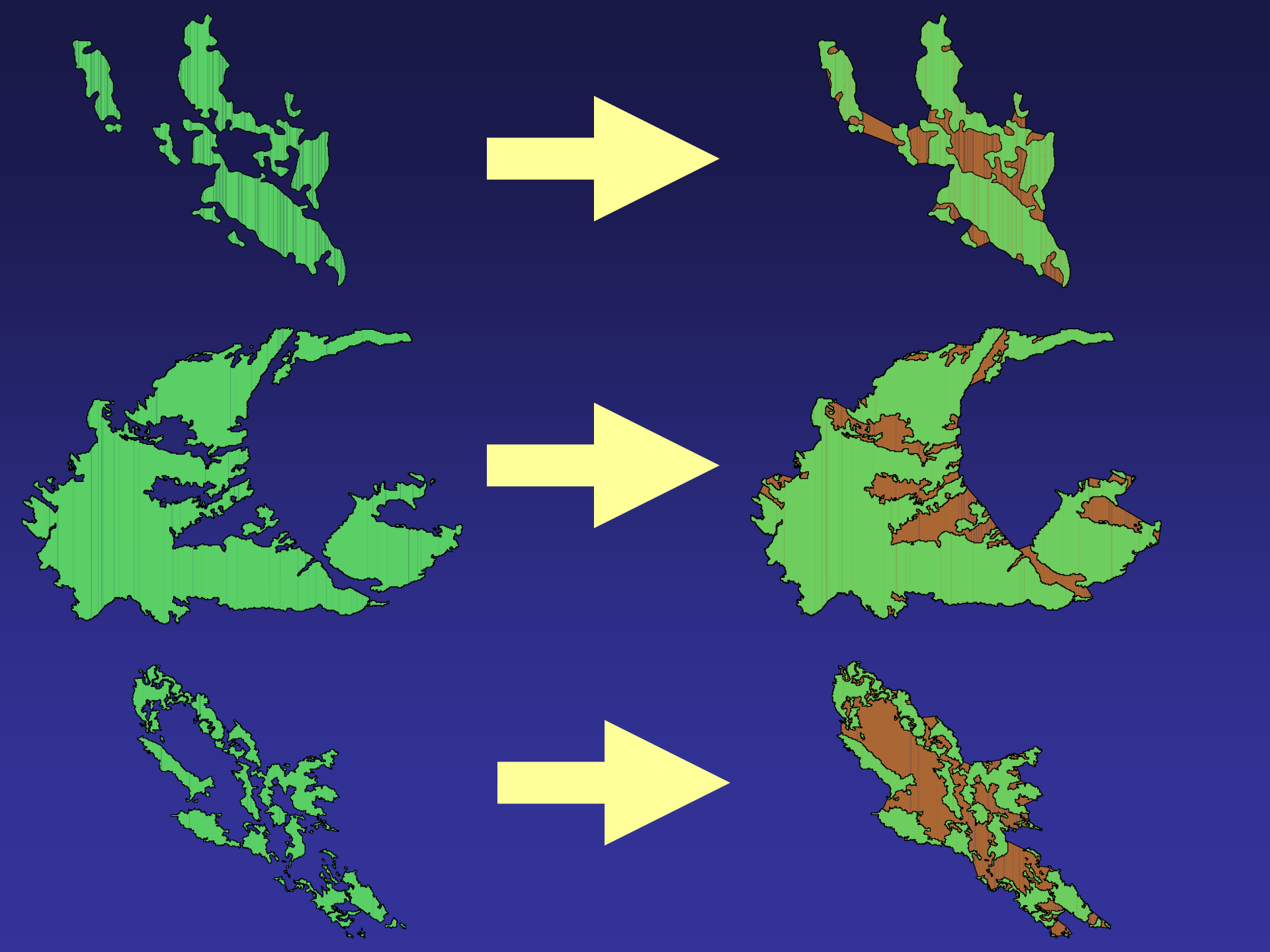
- Consistency
- Simplicity
- Repeatability
- Representative
- Well Tested


Original Fire Map
Disturbance Event

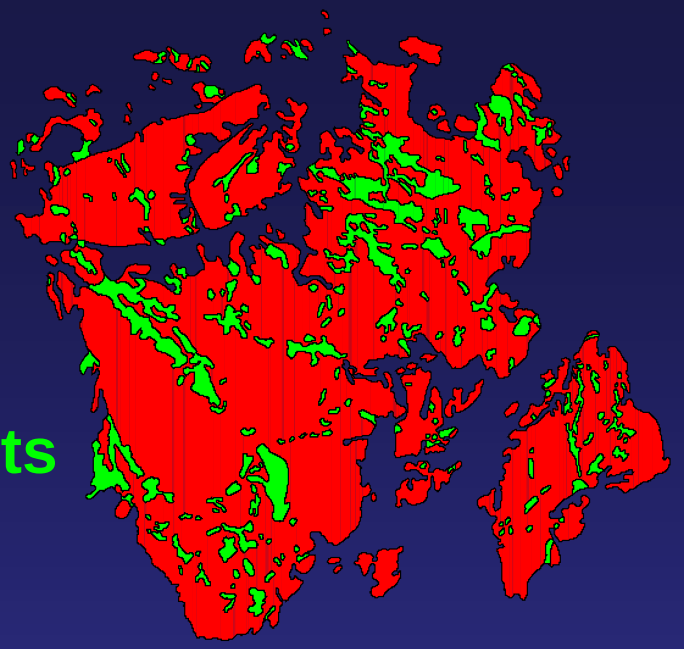

Island Remnants
(mapped)
Matrix Remnants
(generated)

Islands + Matrix = Residuals

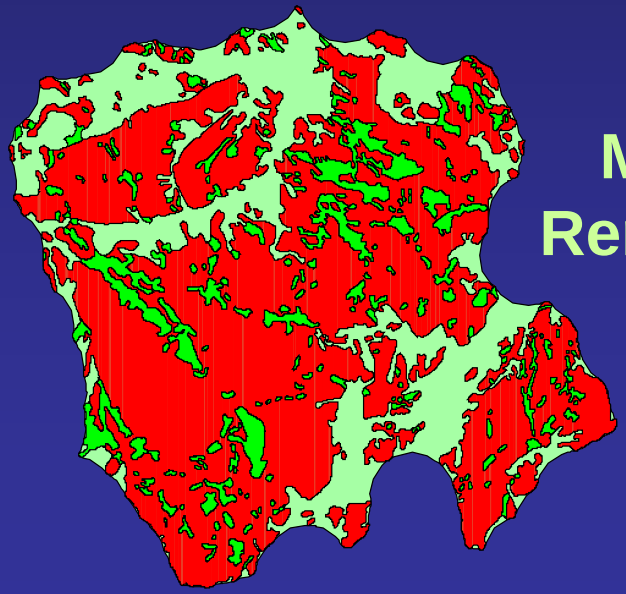




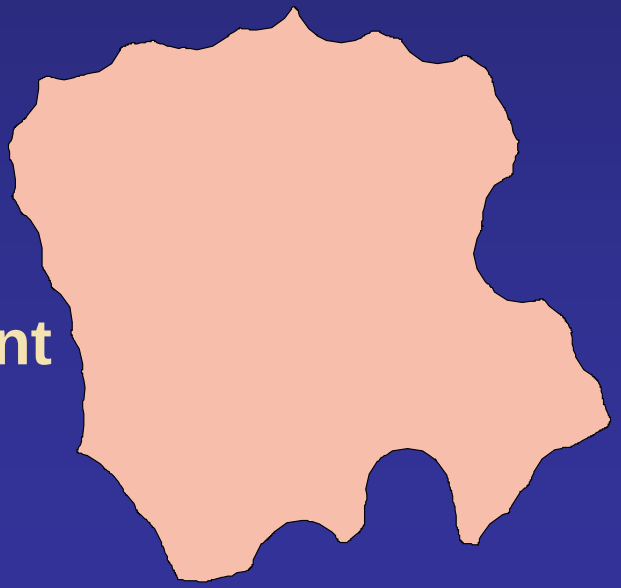
Disturbed Patches



Island Remnants



Matrix Remnants



Event

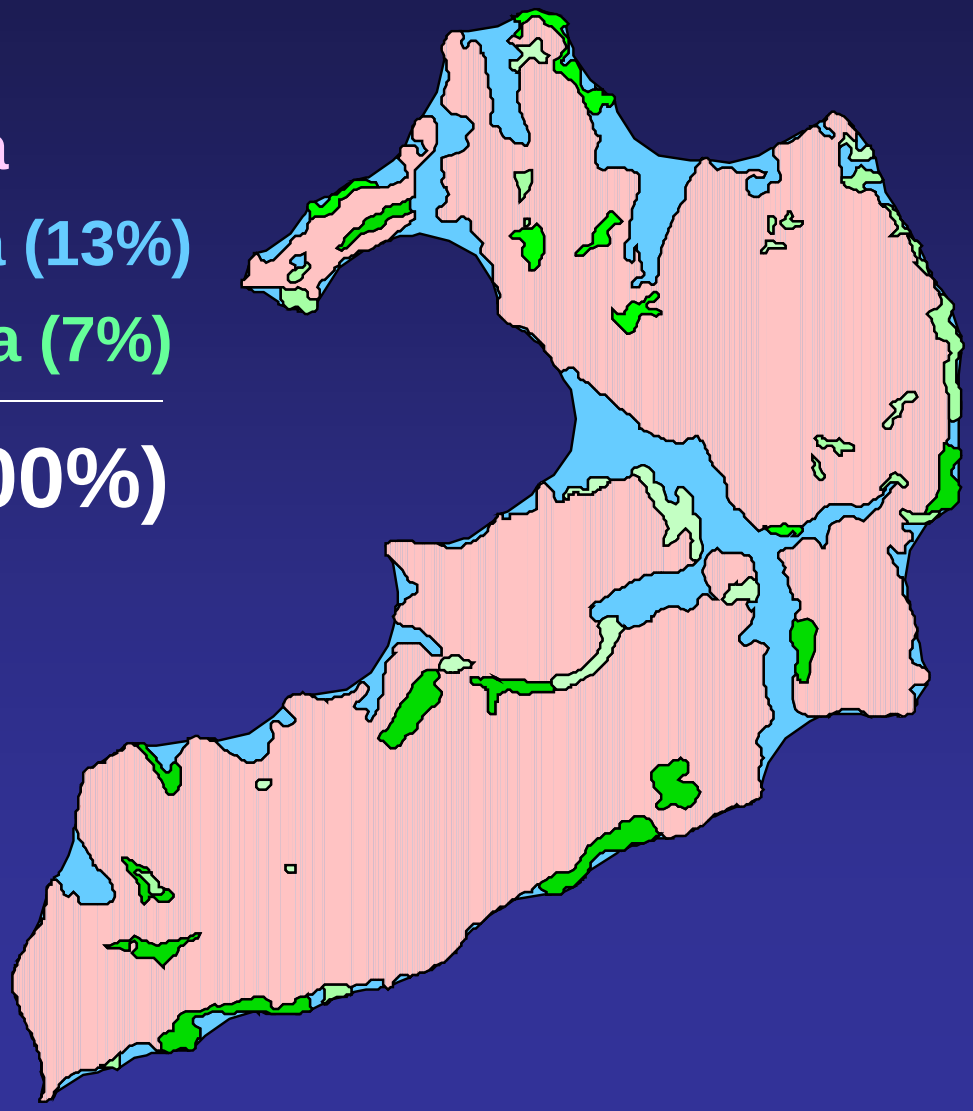
Bear River Fire (1974)

Disturbed = 412 ha

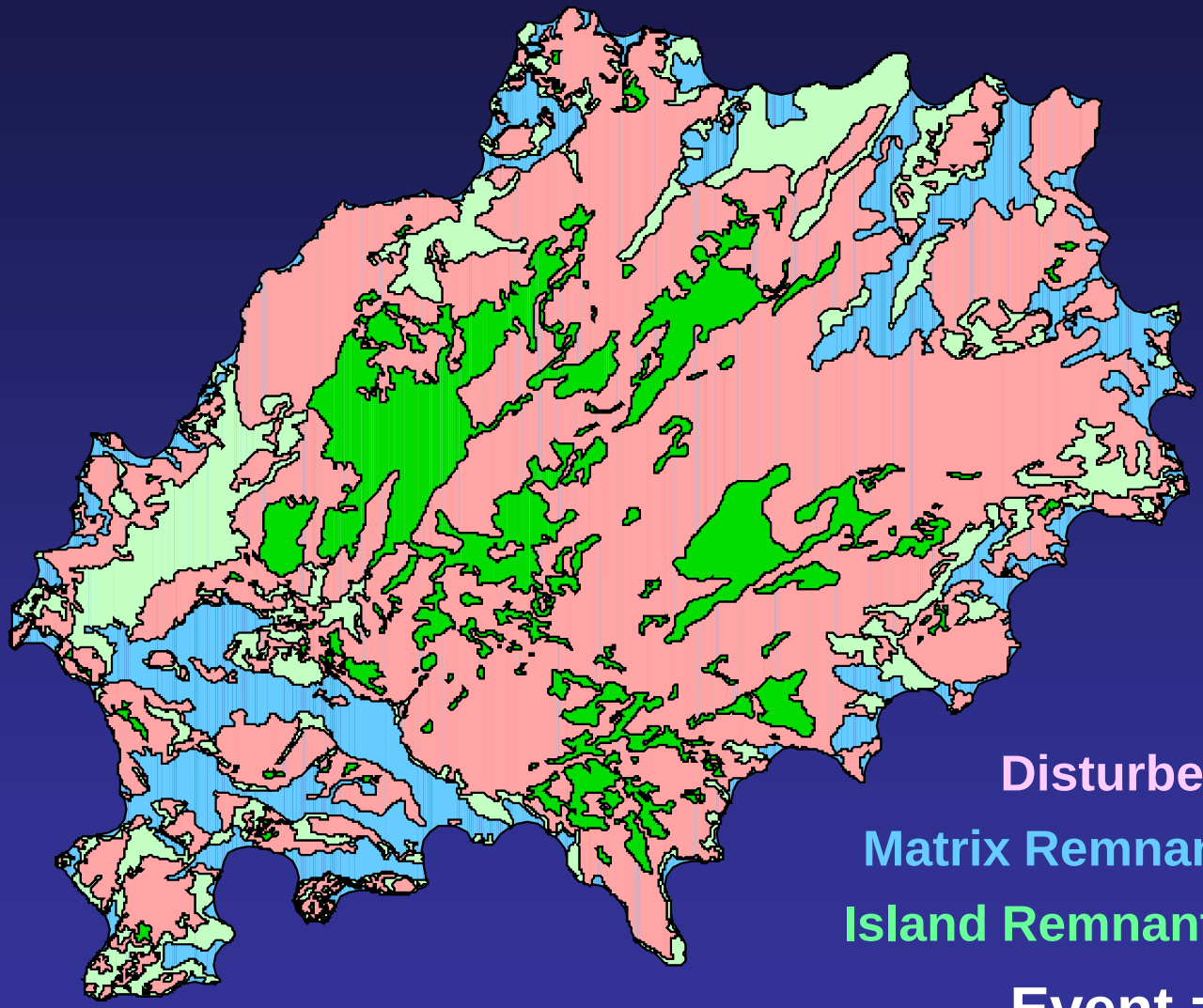
Matrix Remnants = 62 ha (13%)

Island Remnants = 33 ha (7%)

Event = 507 ha (100%)



Falling Horse Fire (1979)



Disturbed = 5,819 ha

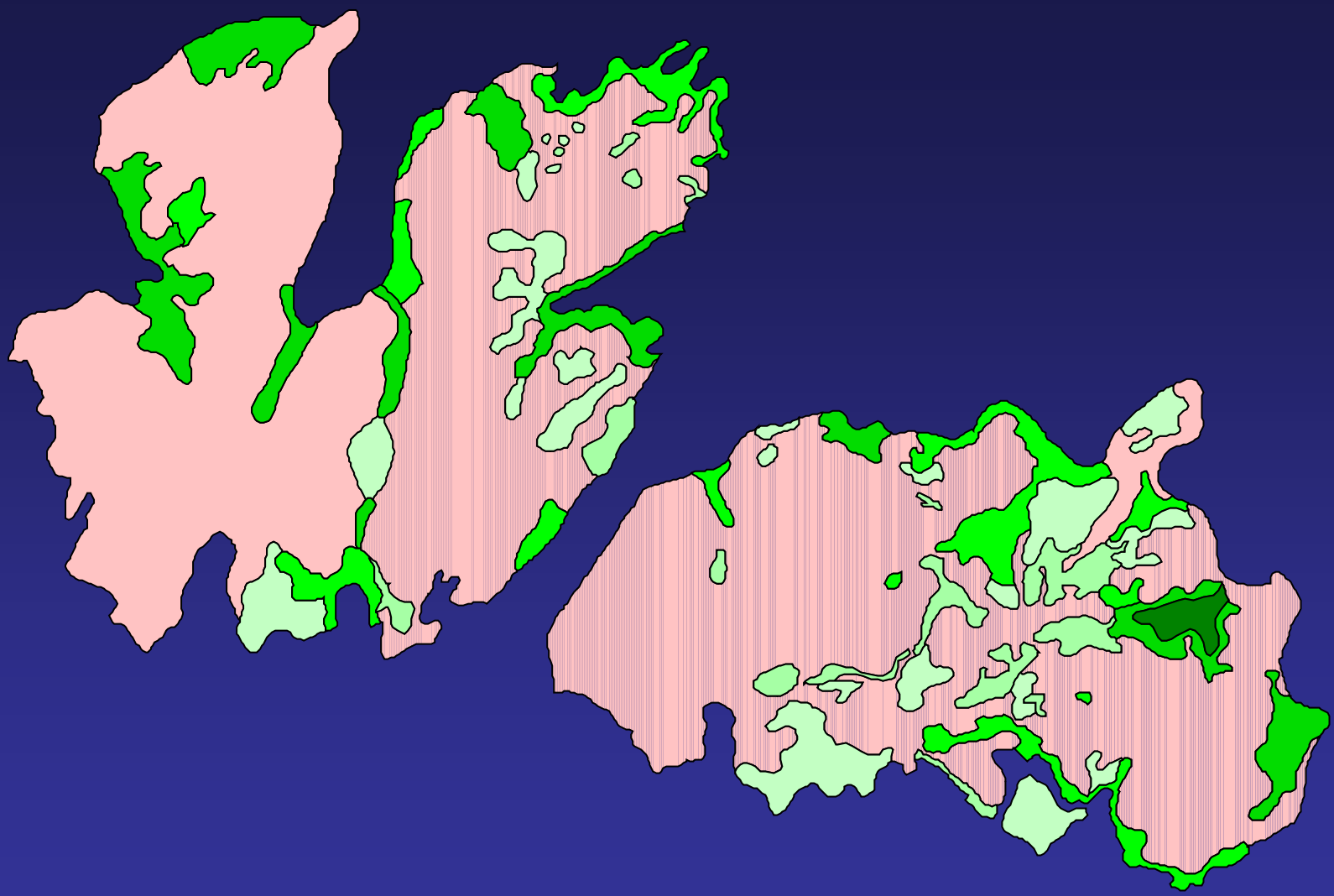
Matrix Remnants = 872 ha (13%)

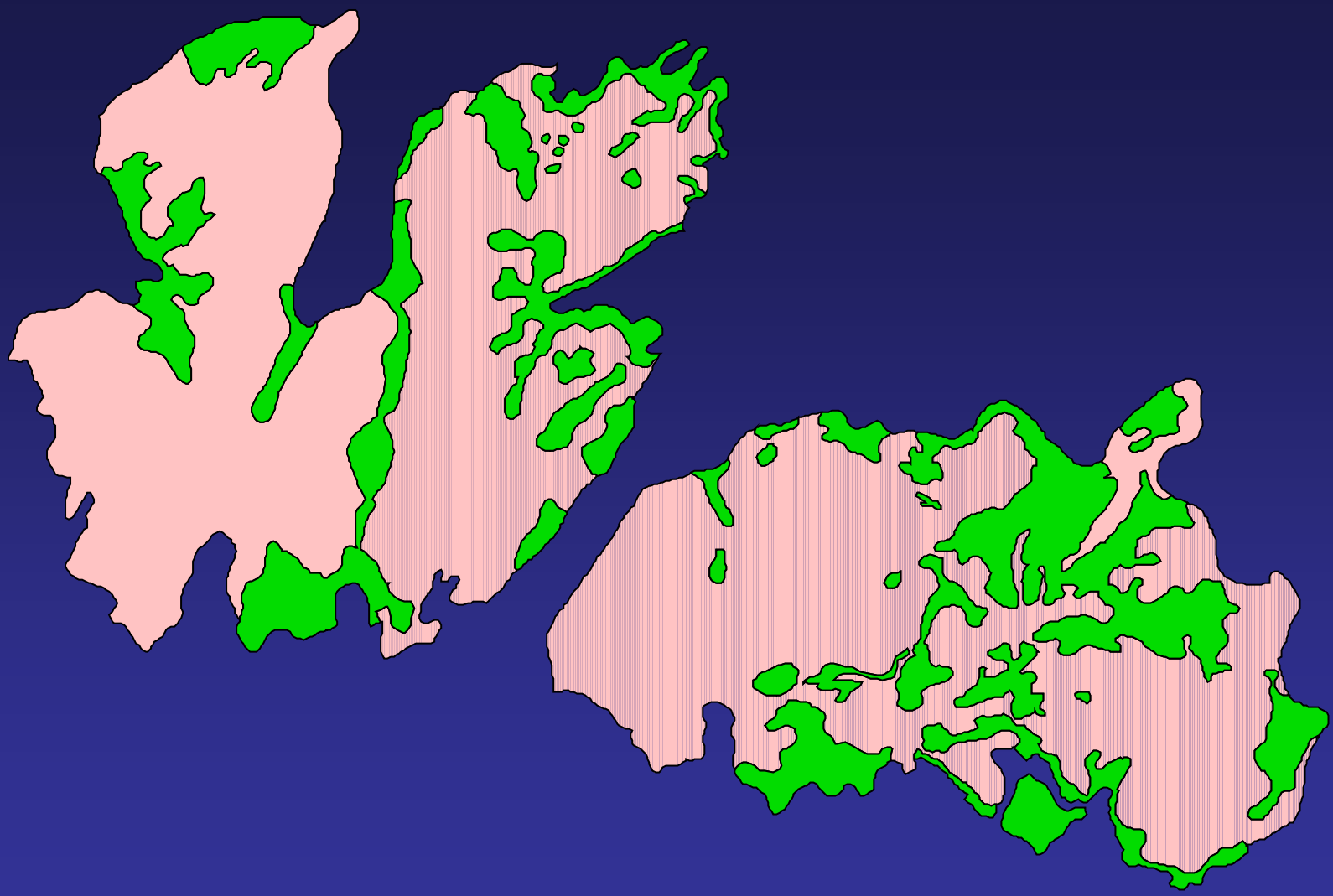
Island Remnants = 1,844 ha (28%)

Event = 6,691 ha

Undisturbed Islands

Partially Disturbed Islands





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