

NEPTUNE Training Session:

Part 2: Wildfire Patterns

*Foothills Model Forest Natural
Disturbance Program*

September, 2006

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Outline:

1. Natural patterns of wildfires.
2. NEPTUNE origins.
3. Natural vs. cultural disturbance patterns.

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?

What are the patterns and processes of natural disturbance?

(How) Are natural disturbance dynamics critical to other known, important ecological processes?

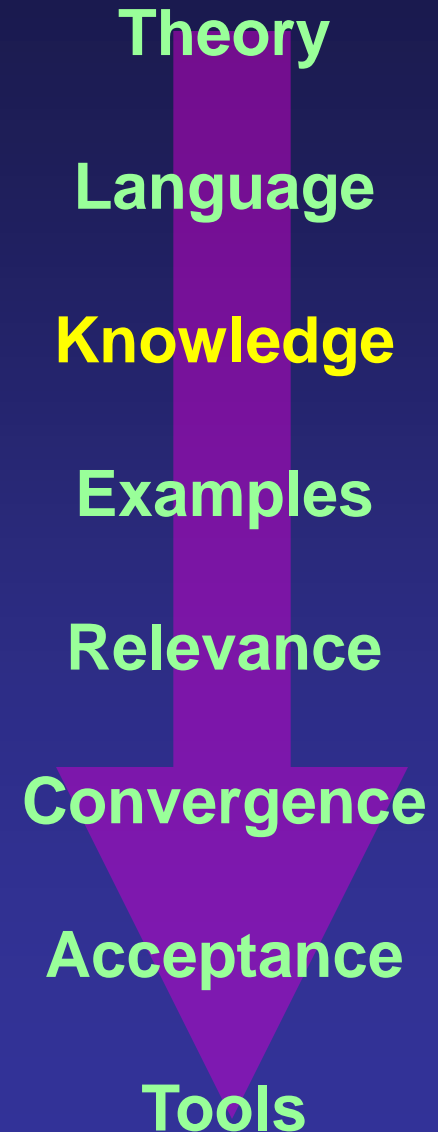
Give me some working examples of what a natural pattern-inspired disturbance plan looks like.

(How) Do natural-inspired disturbance patterns fit with other economic and social values?

Will our current system / budget allow natural patterns to happen?

How do patterns of past, current, and future cultural disturbances compare to those of wildfires?

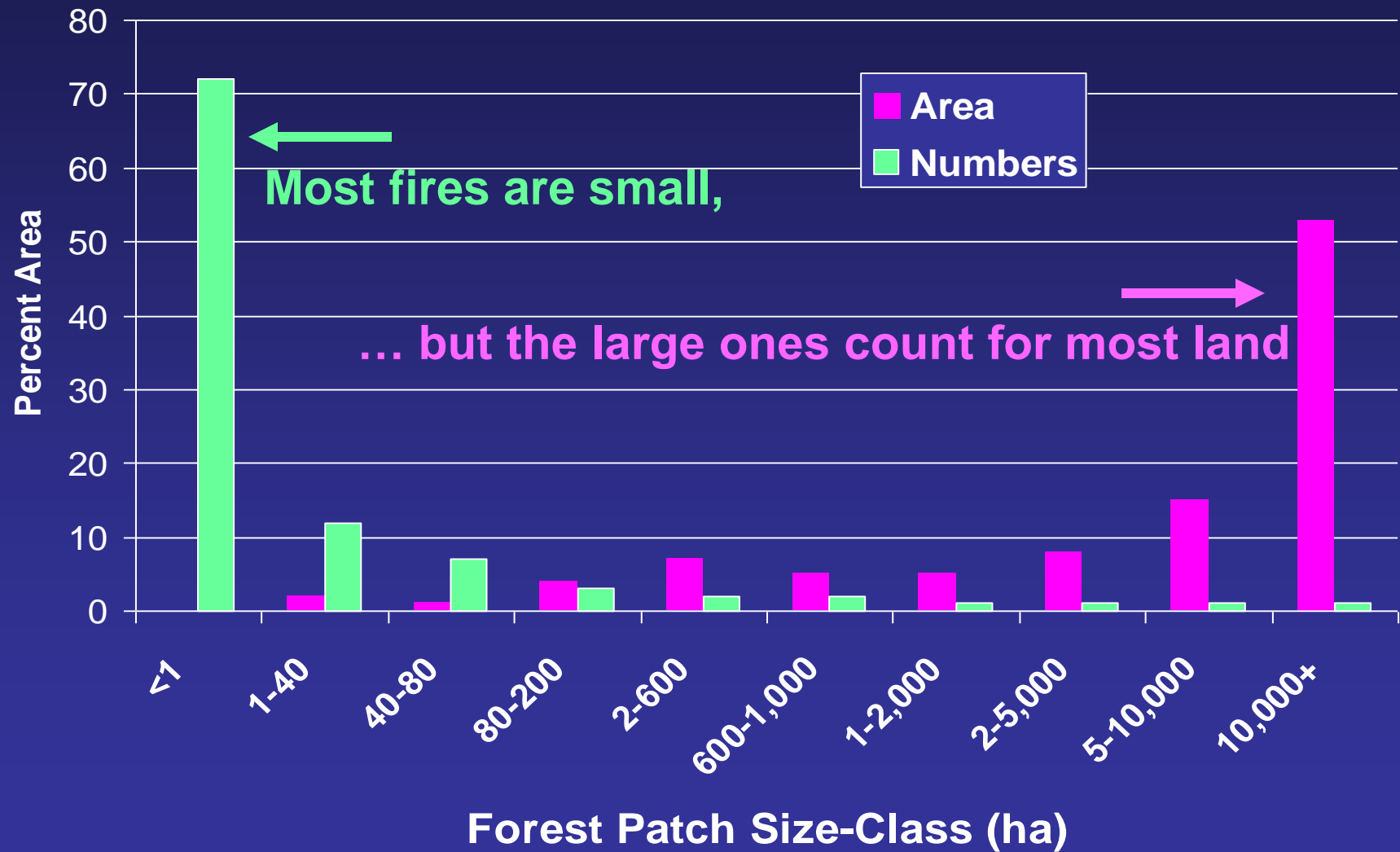
Give me some operational tools with which to help me design landscapes with natural patterns in mind.

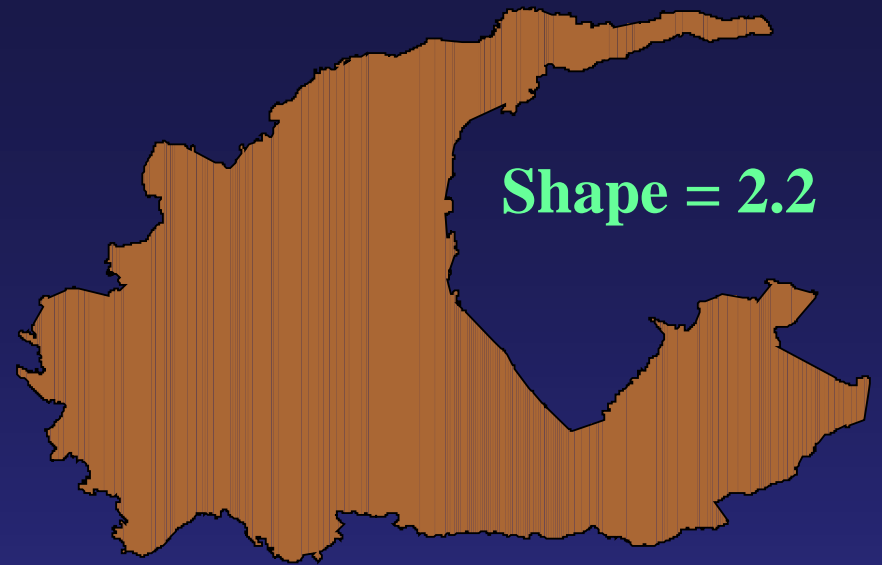


**What are the patterns and
processes of natural
disturbance?**

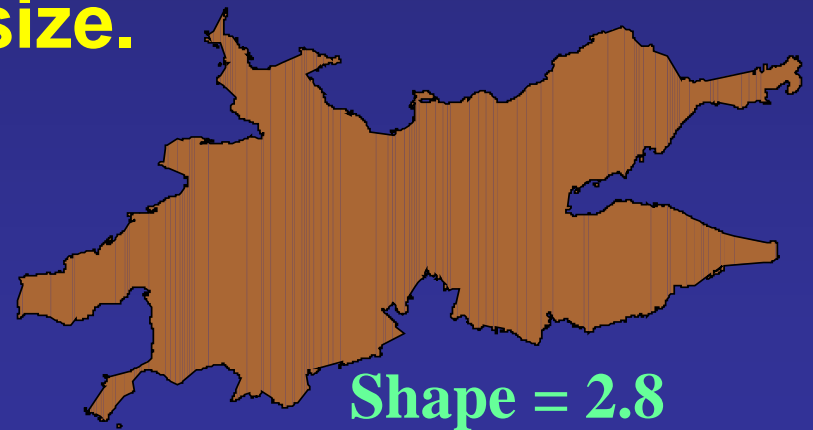
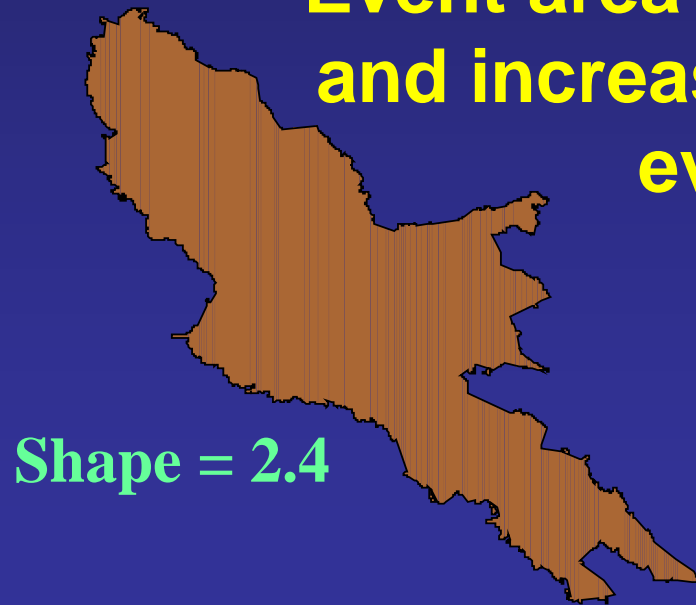
... at intermediate scales?

Disturbance Sizes & Disturbance Numbers (In the Alberta Foothills)





**Event area shapes are simple
and increase with increasing
event size.**



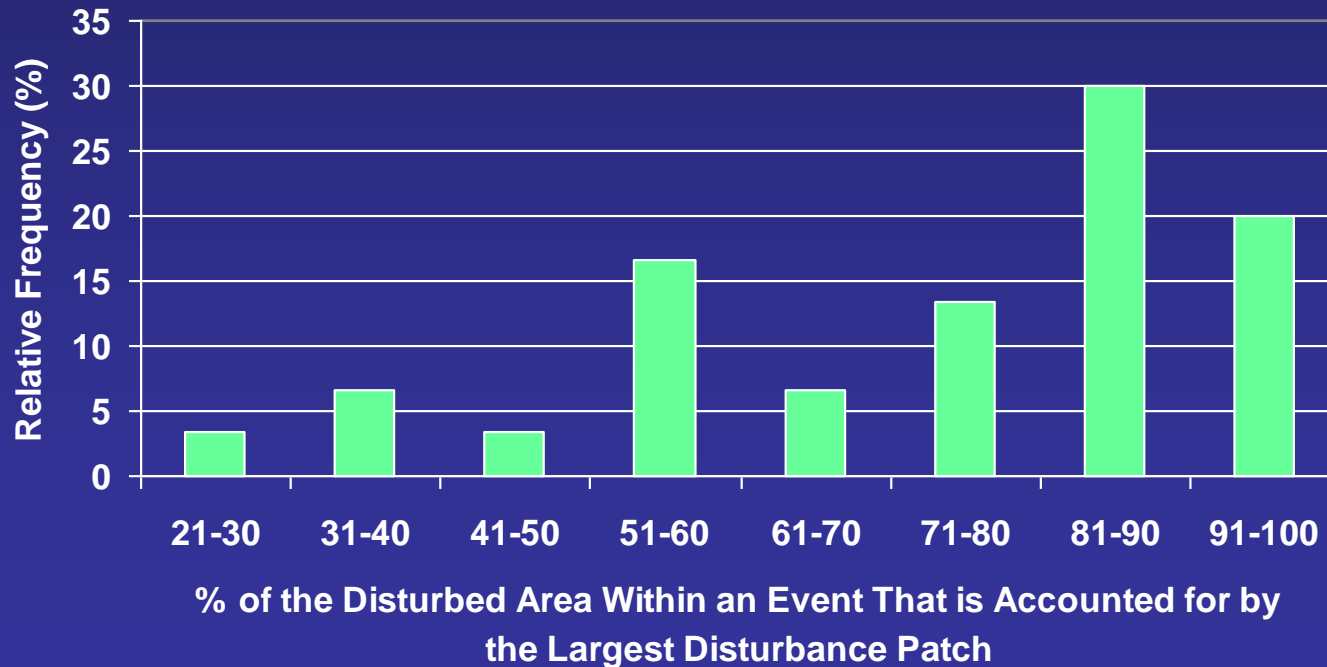
How Many Disturbed Patches are in an Event?

<u>Event Size</u>	<u>WC Alta.</u>	<u>Sask.</u>
<200 ha	3	1
200-1,000 ha	13	3
>1,000 ha	30	10

Disturbed Patches

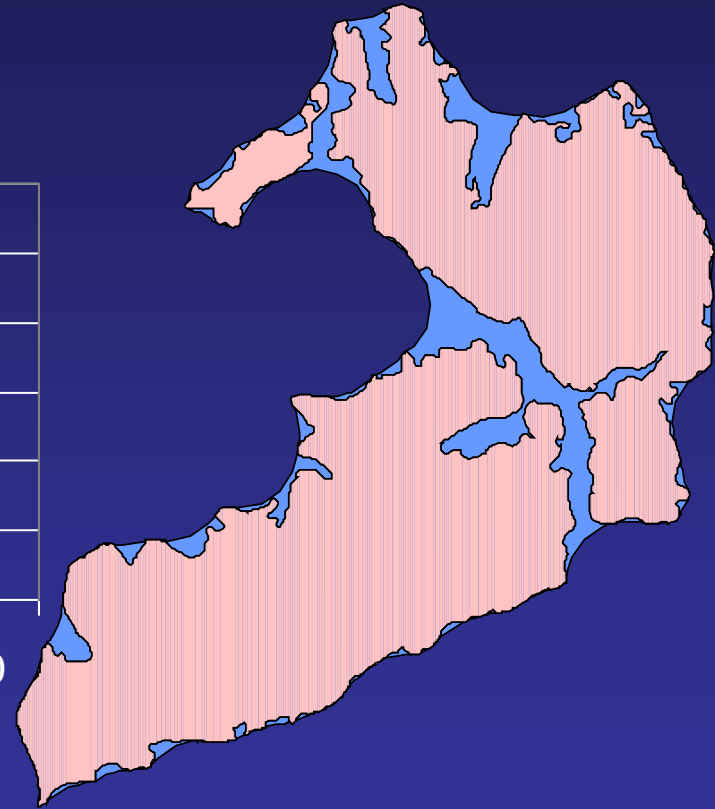
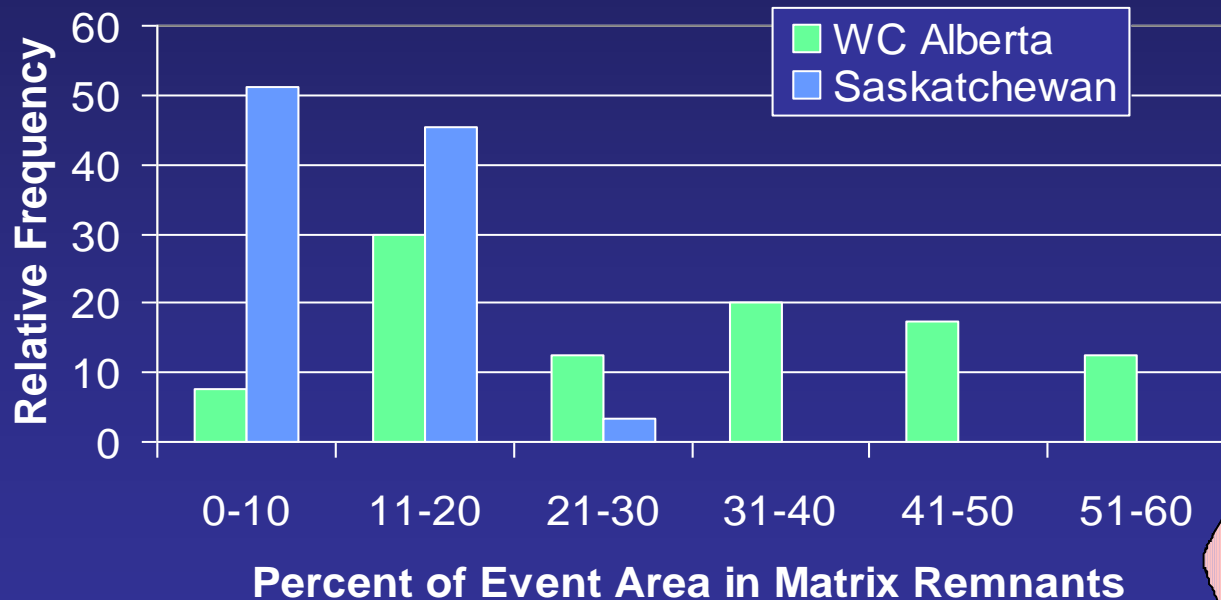
- There is almost always one HUGE patch.
 - Alberta average 73%

Figure 13. Size of the Largest Disturbance Patch as a Percentage of Net Disturbed Area in Multi-Patch Events



How Much Event Area is Matrix Remnants?

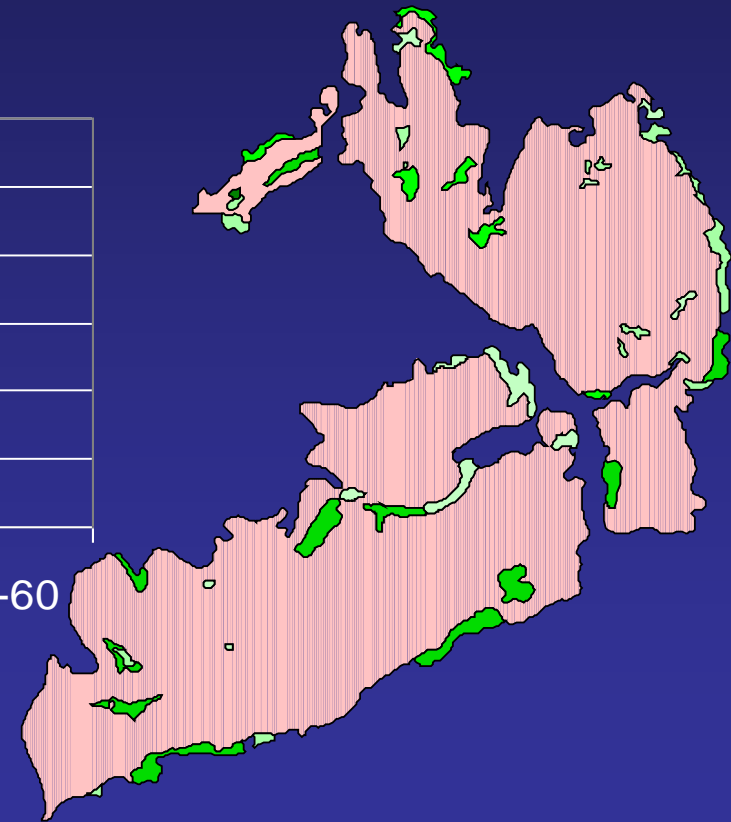
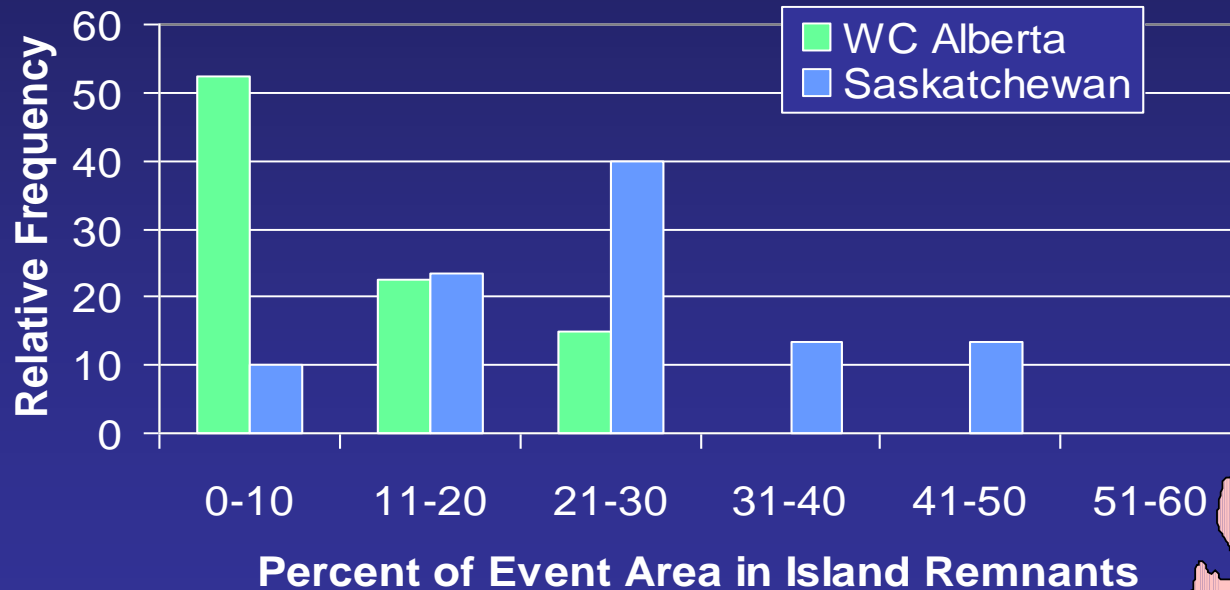
Event Area in Matrix Remnants for WC Alberta and Saskatchewan



NO RELATIONSHIP TO EVENT SIZE!

How Much Event Area is Island Remnants?

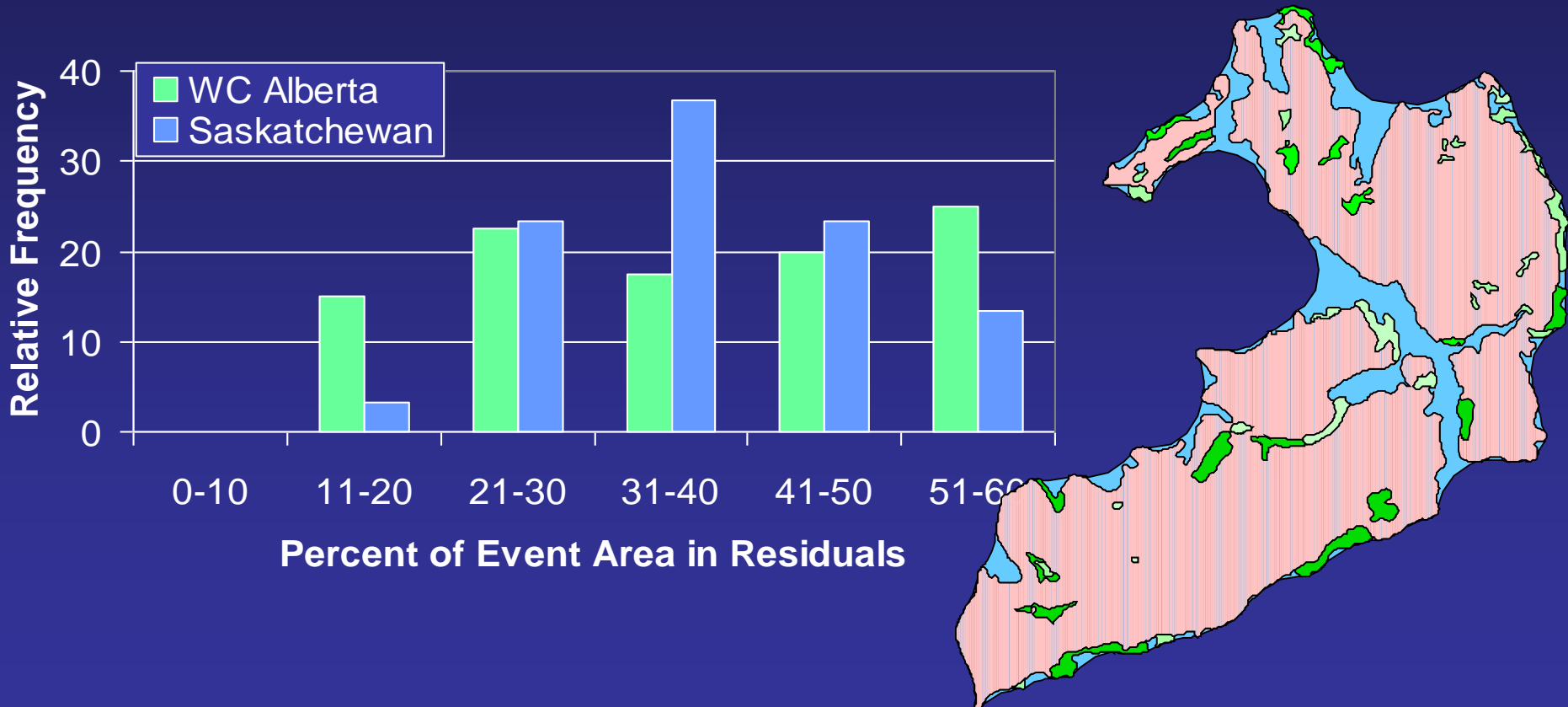
Event Area in Island Remnants for WC Alberta and Saskatchewan



NO RELATIONSHIP TO EVENT SIZE!

How Much Event Area is Total Residuals?

Event Area in Residuals for WC
Alberta and Saskatchewan

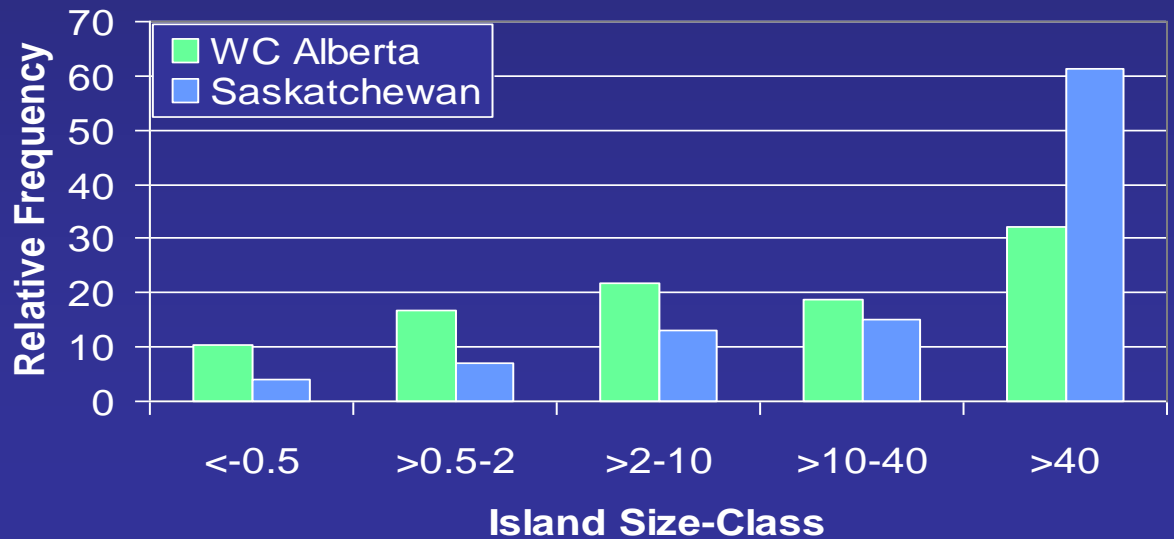


NO RELATIONSHIP TO EVENT SIZE!

Island Density by Size for WC Alberta and Saskatchewan



Island Area by Size for WC Alberta and Saskatchewan



Small Fires Have Higher Levels of Small Island Area

Breakdown of the Area of Island Remnants of Different Sizes by Disturbance Patch Size

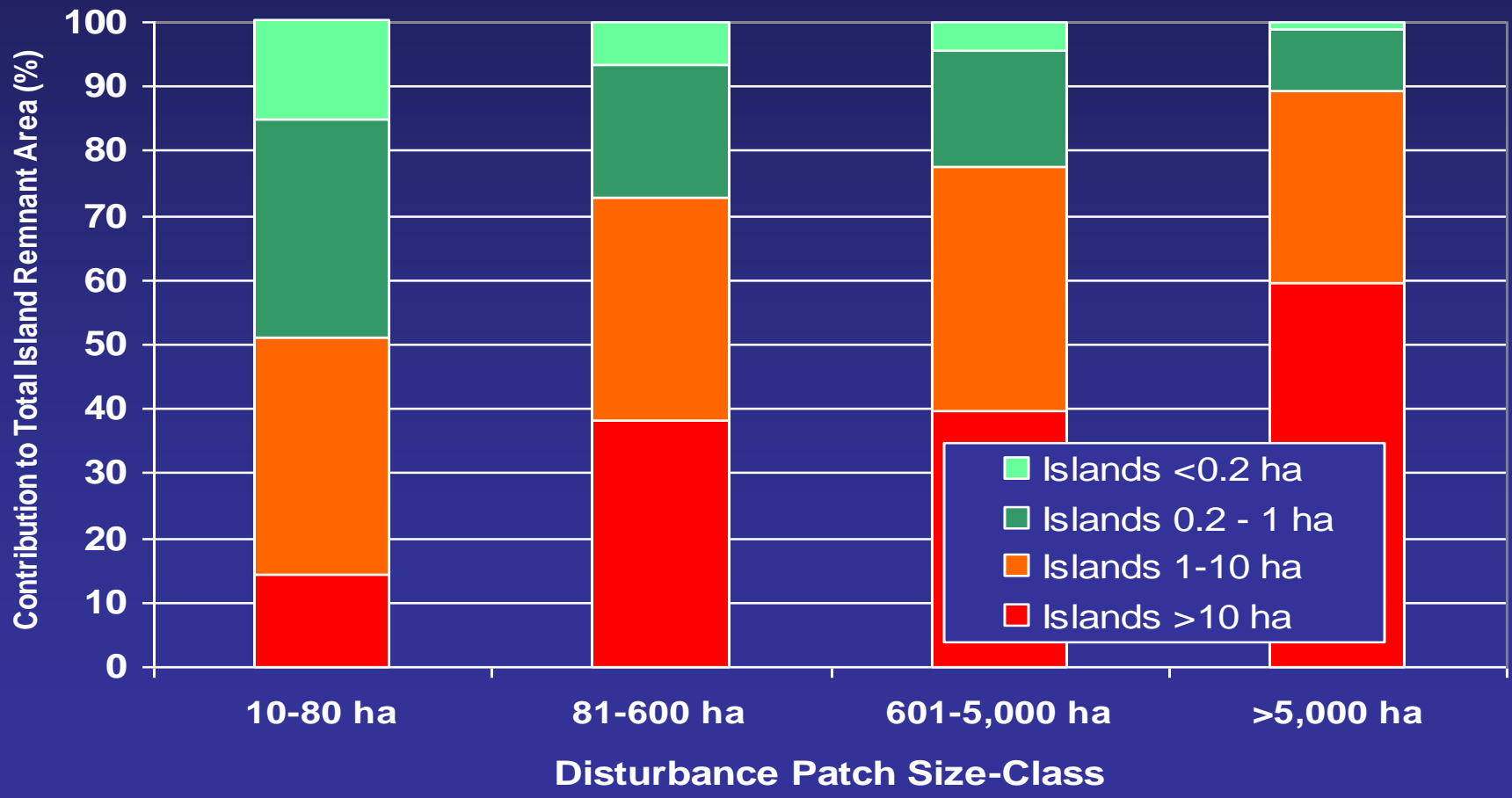
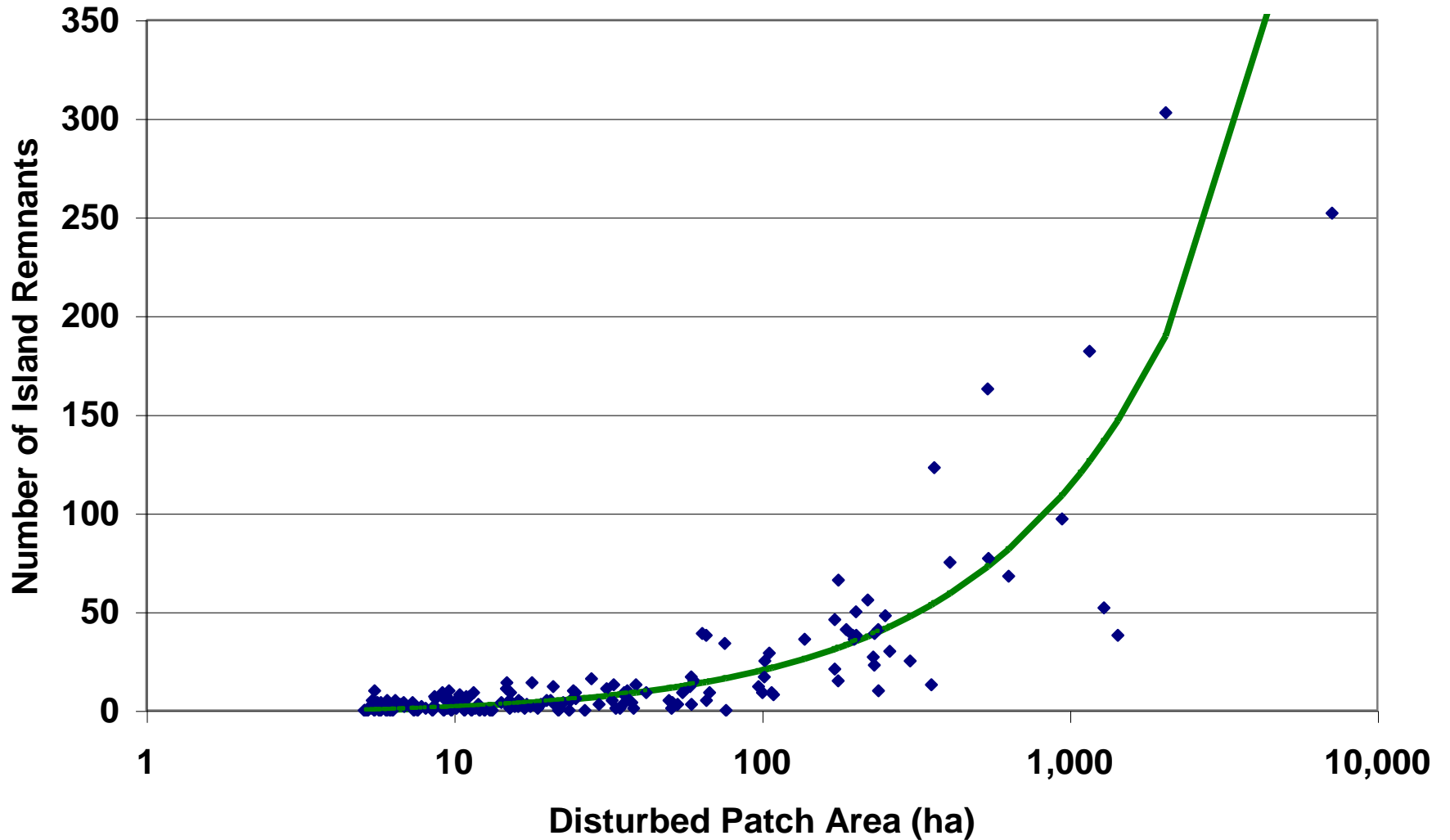
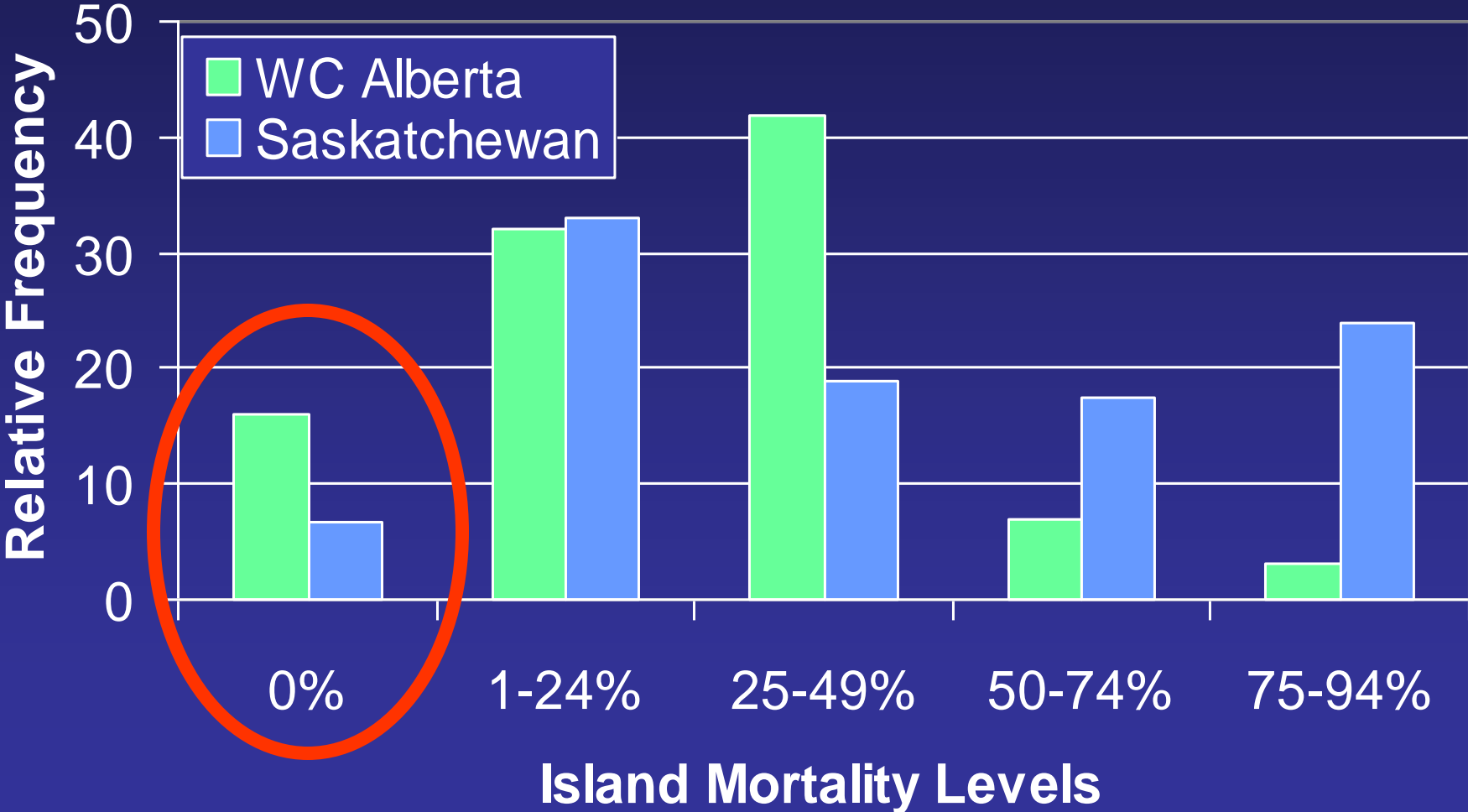


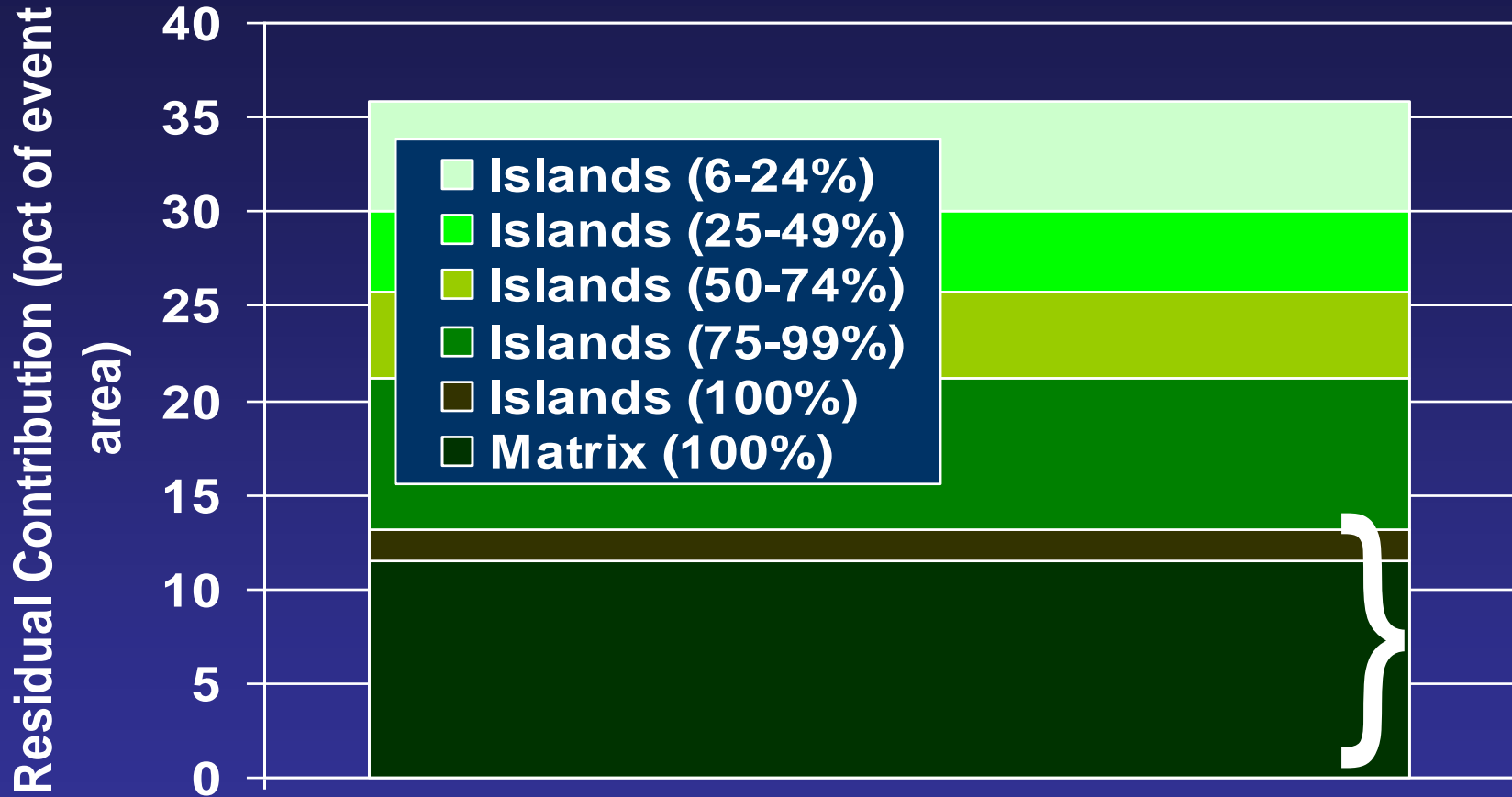
Figure 18. Number of Island Remnants per Disturbed Patch



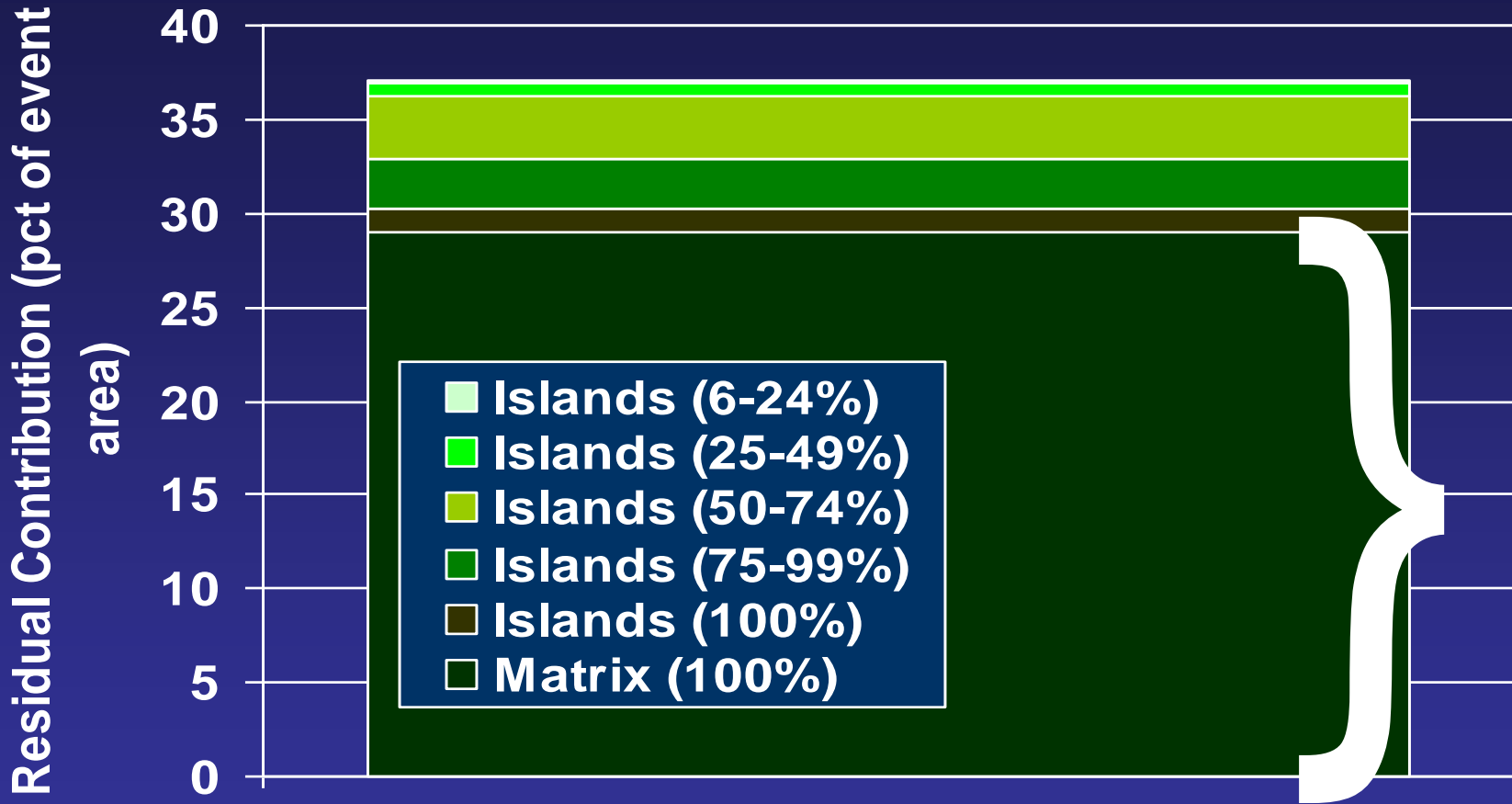
Island Mortality Levels for WC Alberta and Saskatchewan



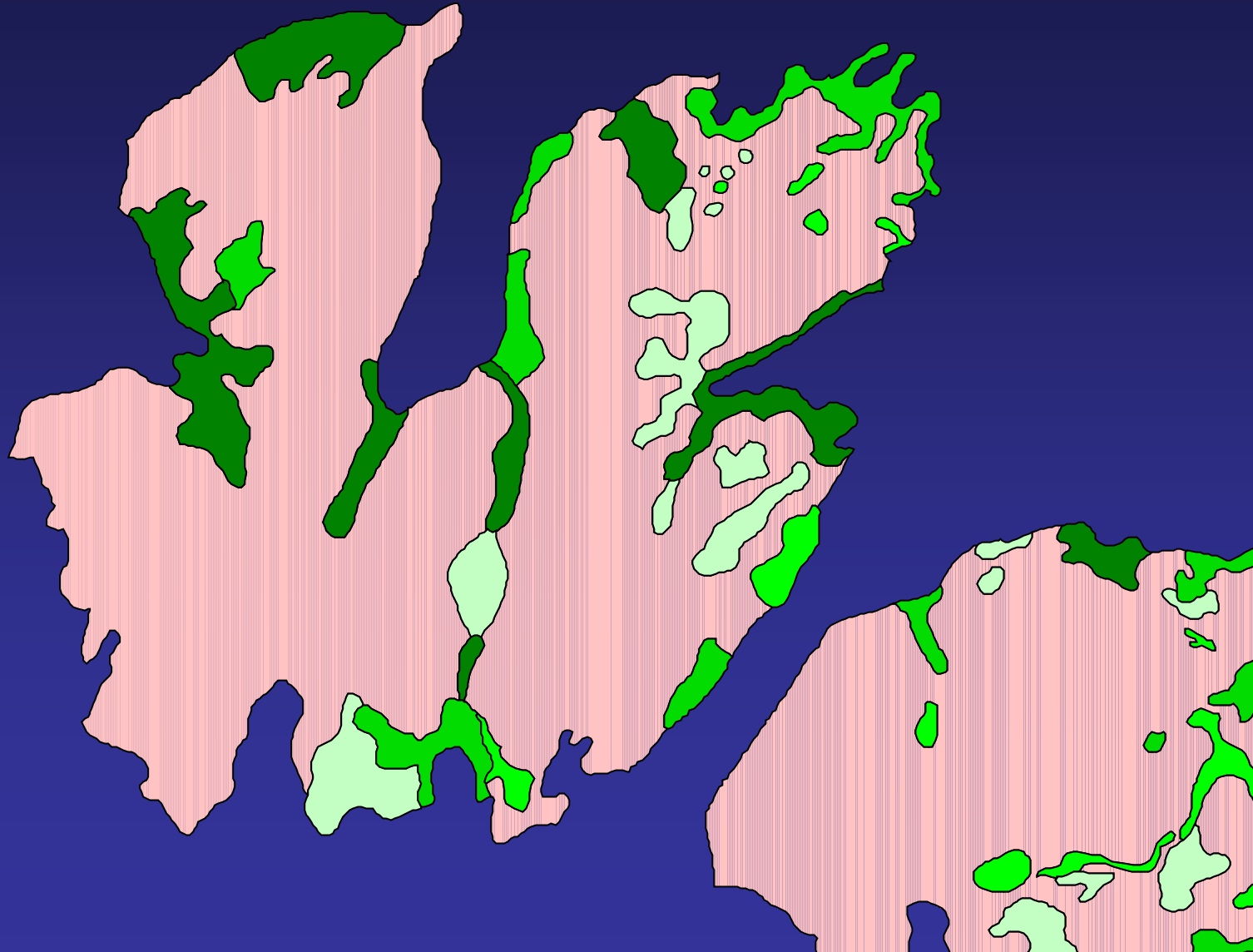
Anatomy of Residuals in Saskatchewan



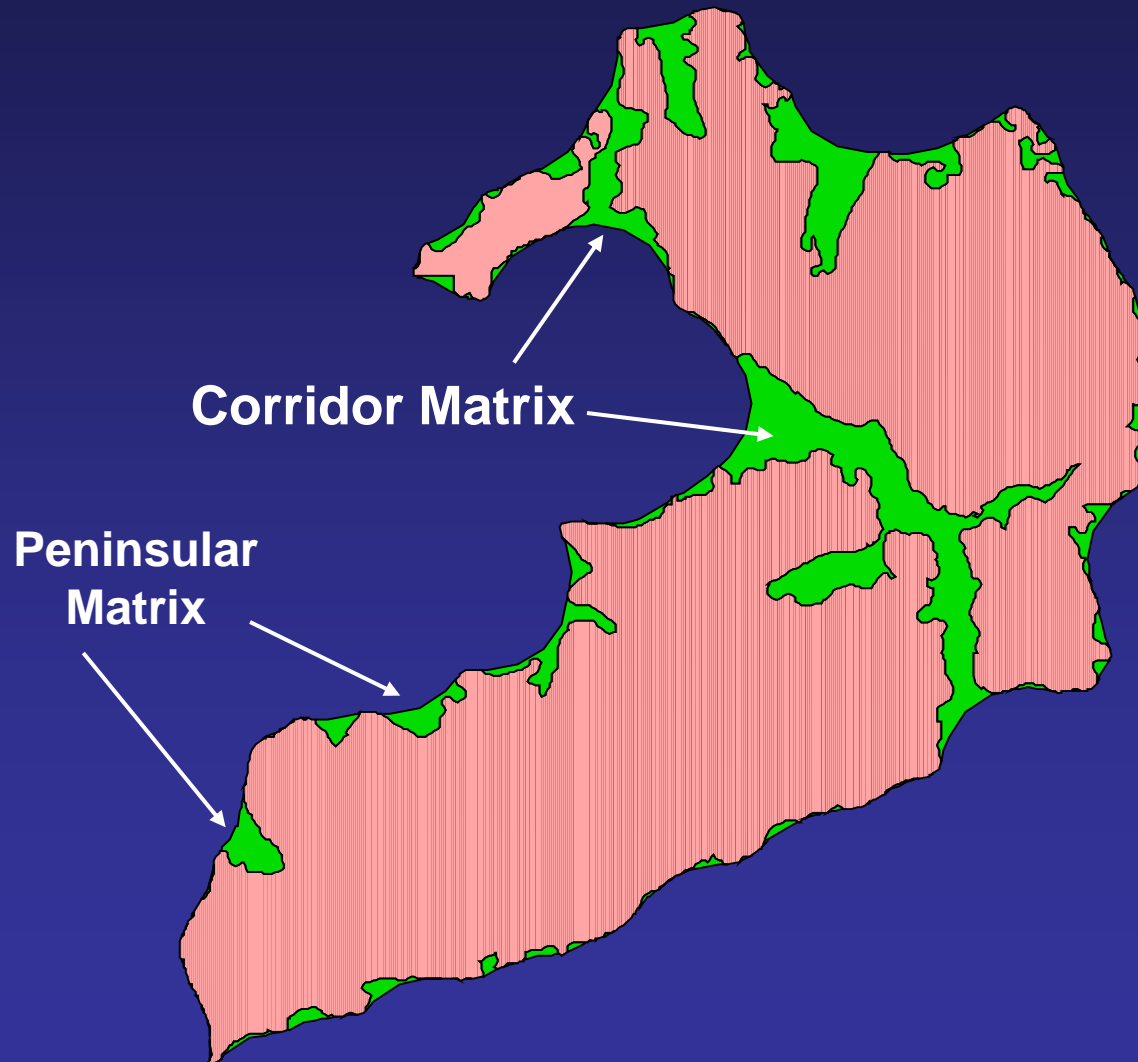
Anatomy of Residuals in WC Alberta



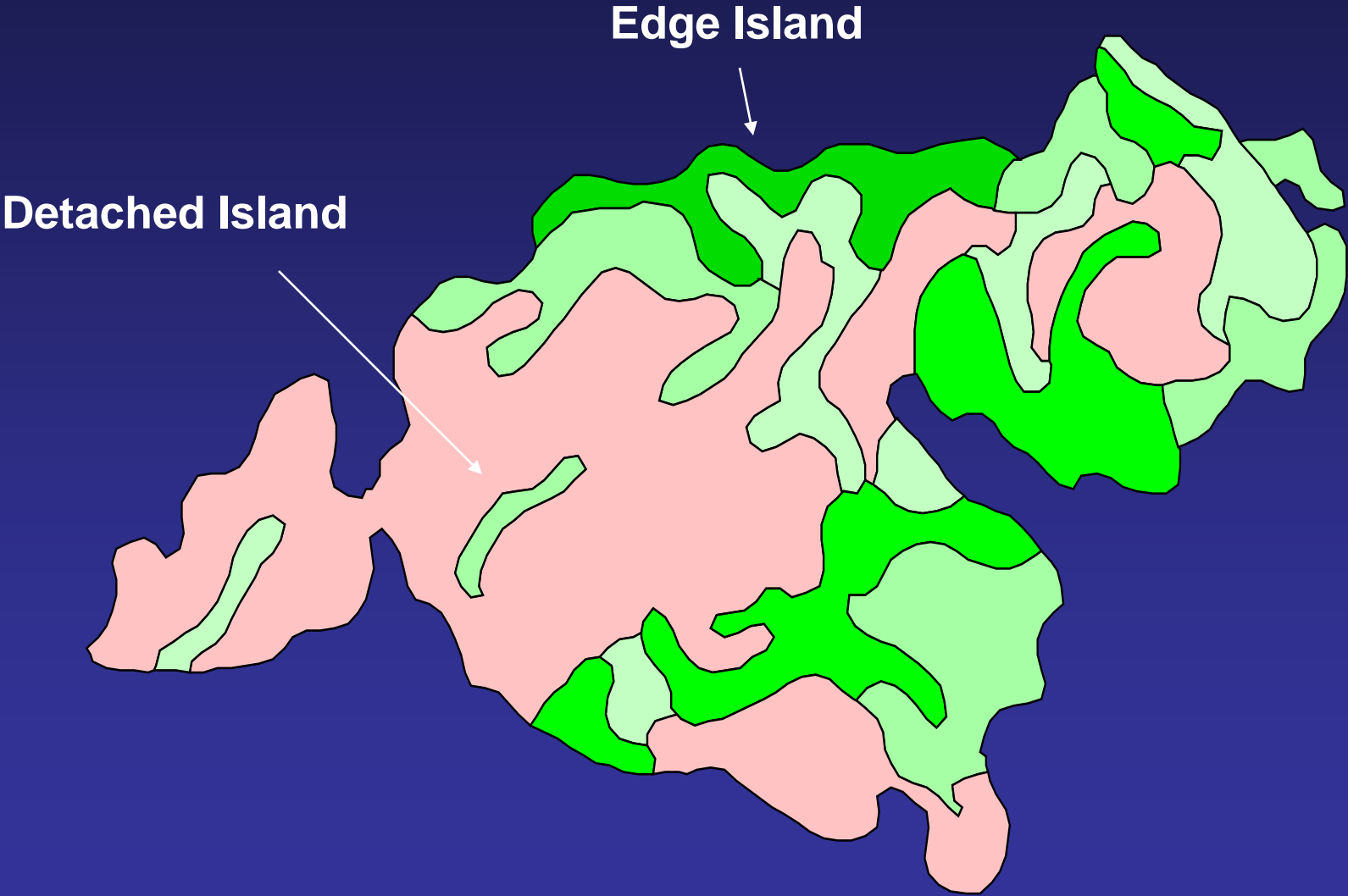
Islands That Also Form Corridors – 21% (in Sask).



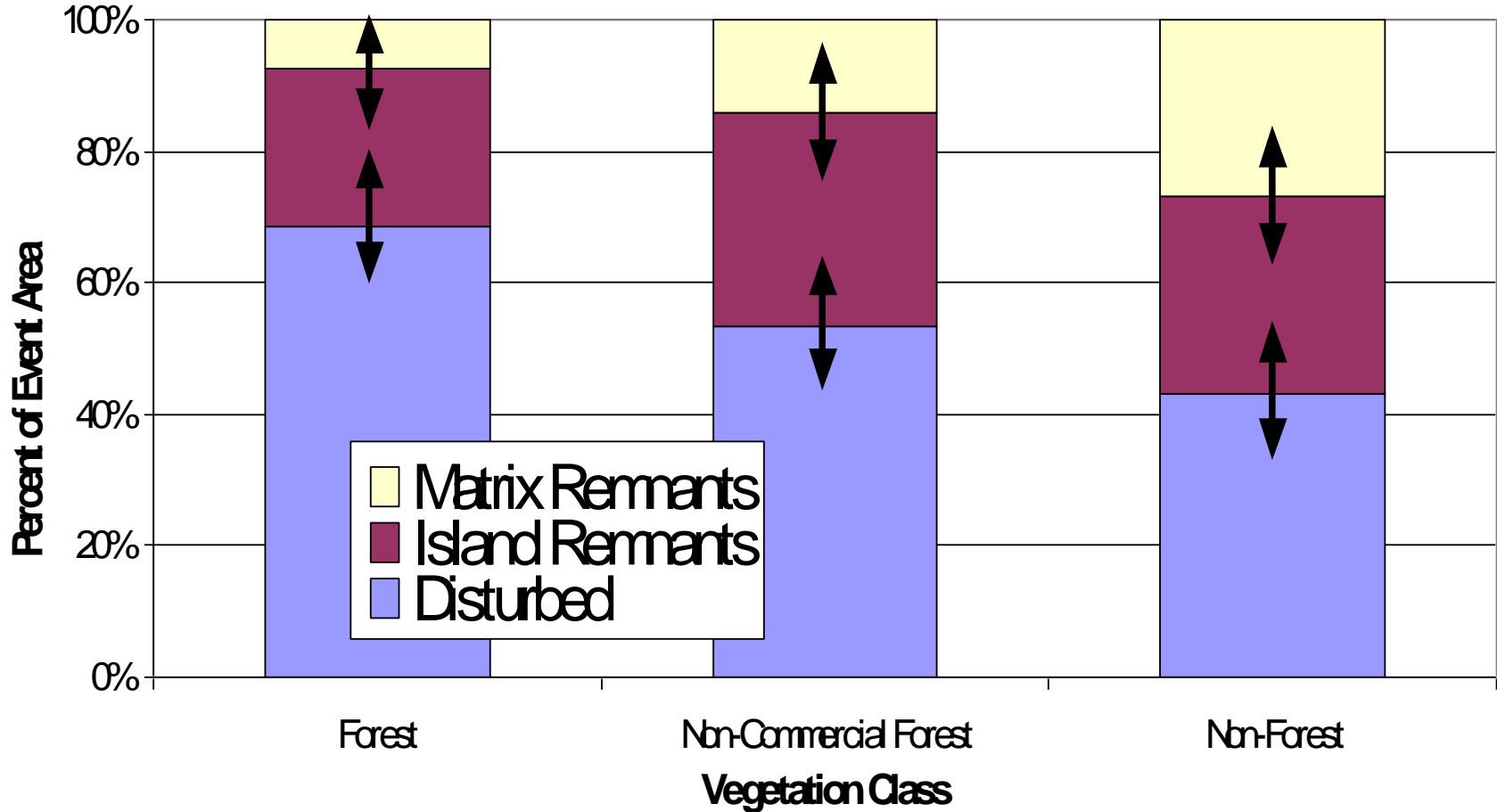
Matrix That Also Form Corridors – 28% (in Sask)



Edge Island Area – 56% (Alberta)



Average Contribution of Event Components by Vegetation Class For Saskatchewan



64% of Event Area Burns

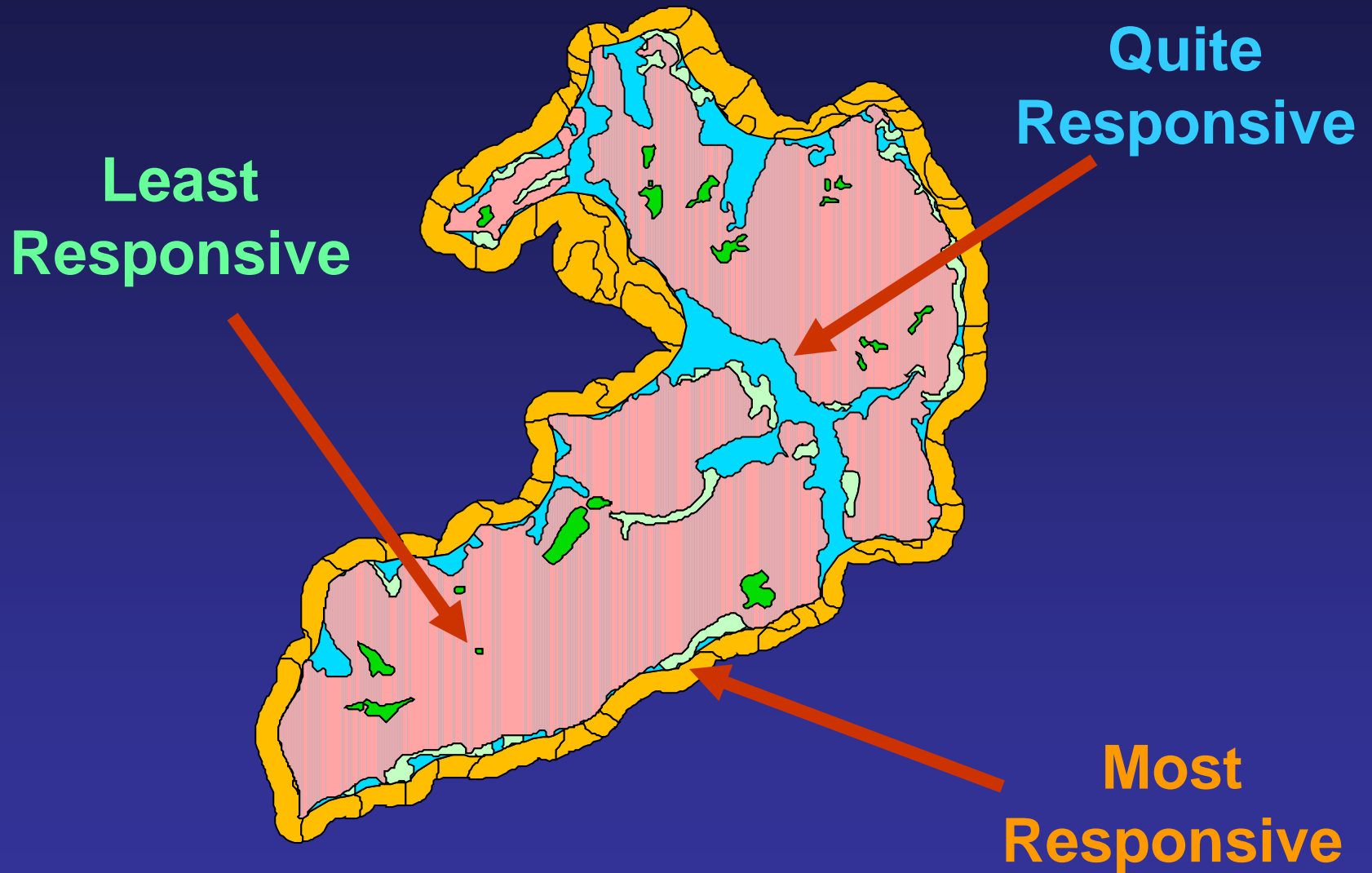
68% of Commercial Forest Burns

53% of Non-Contributing Forest Burns

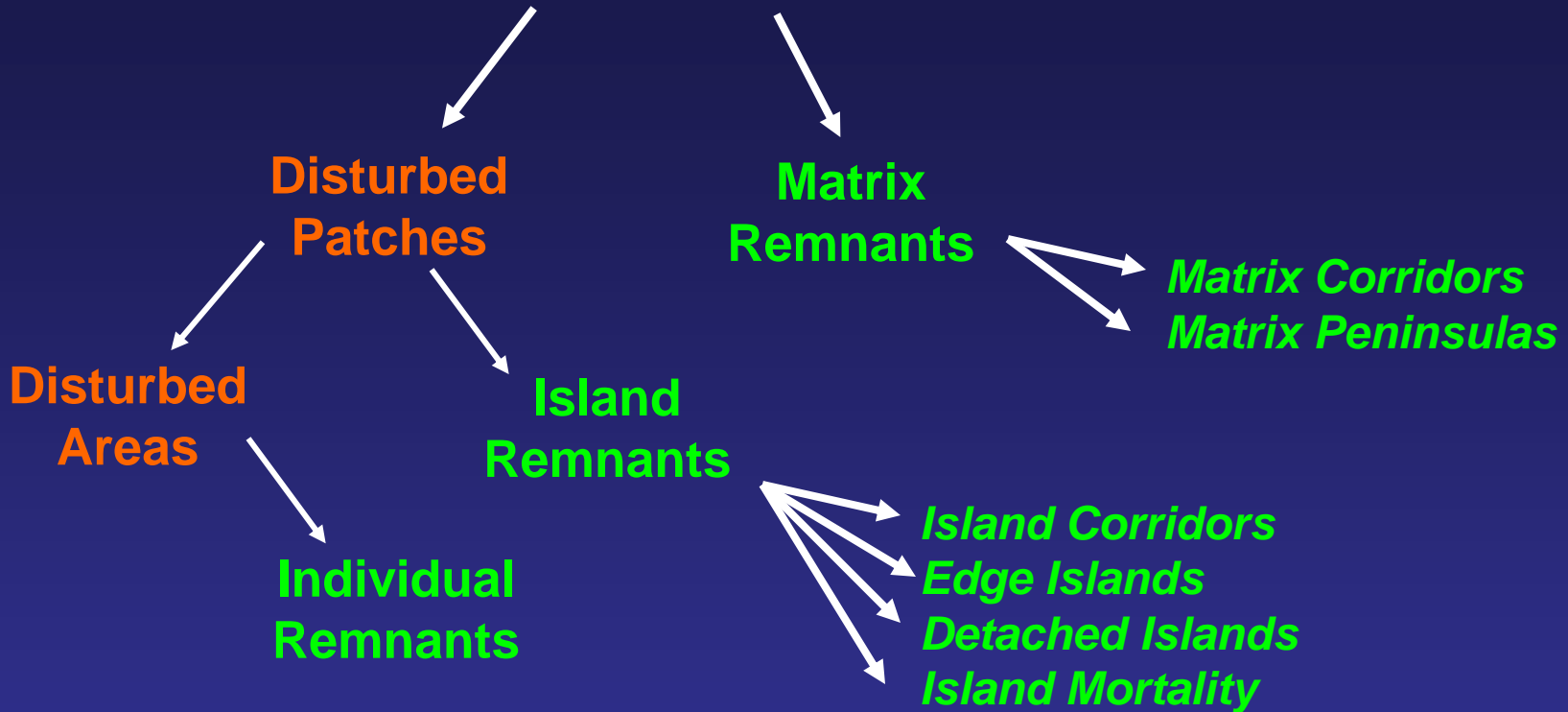
43% of Non-Forest Burns

	<u>In The Event</u>	<u>Burnt</u>
Comm. Forest	100 ha (x 68%)	68 ha
Non-Contr. Forest	25 ha (x 53%)	13 ha
Non-Forest	5 ha (x 43%)	2 ha
<hr/>		
Total	130 ha (64%)	83 ha

How Do Different Residuals Respond?



Disturbance Events



***Who Needs a Standardized
Language or Methods??***

Areas in Island Remnants by Fire Area for 3 Alberta Studies

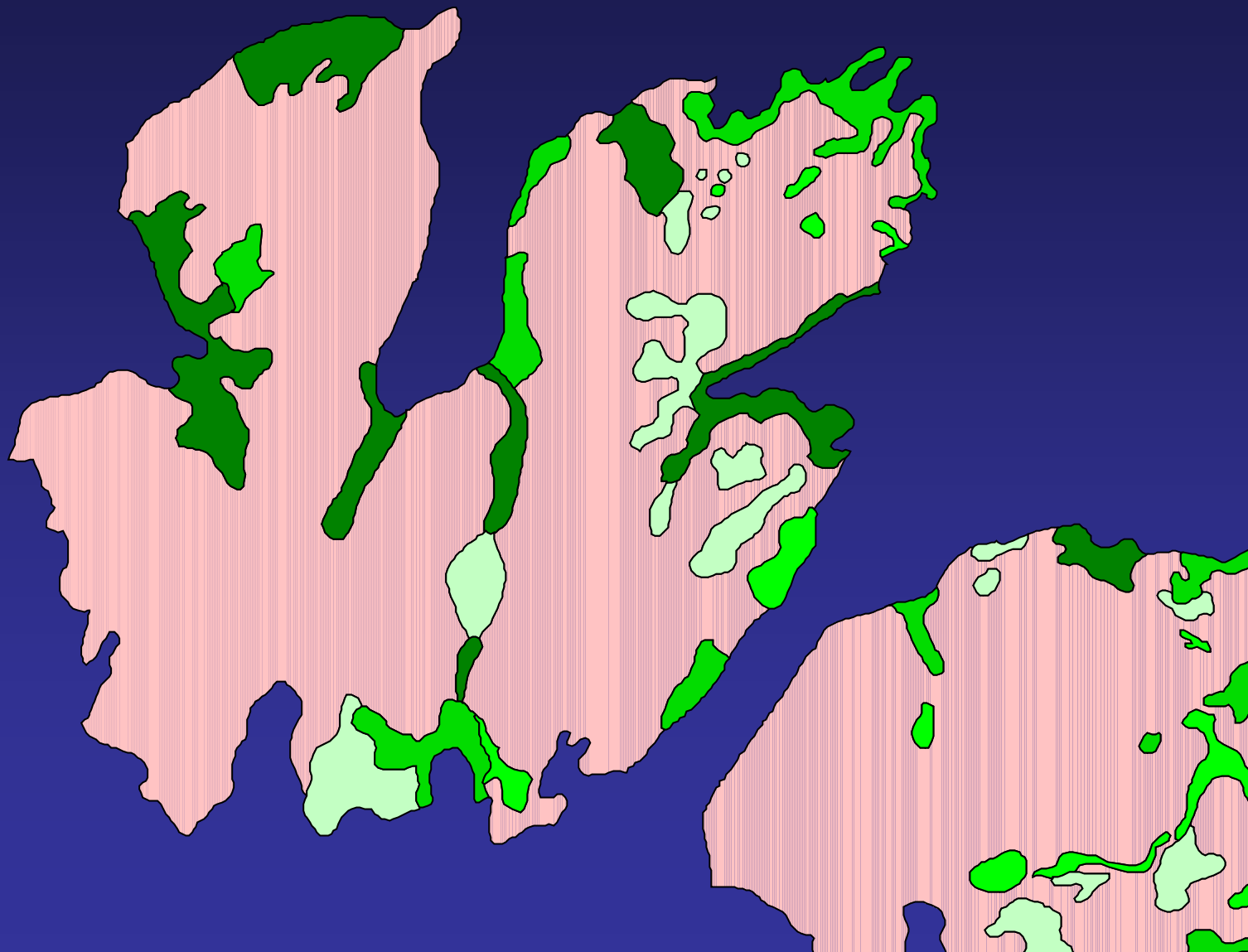


Delong & Tanner
recent aerial photos
of older fires in sub-
boreal BC and a
narrow def'n of
"island".

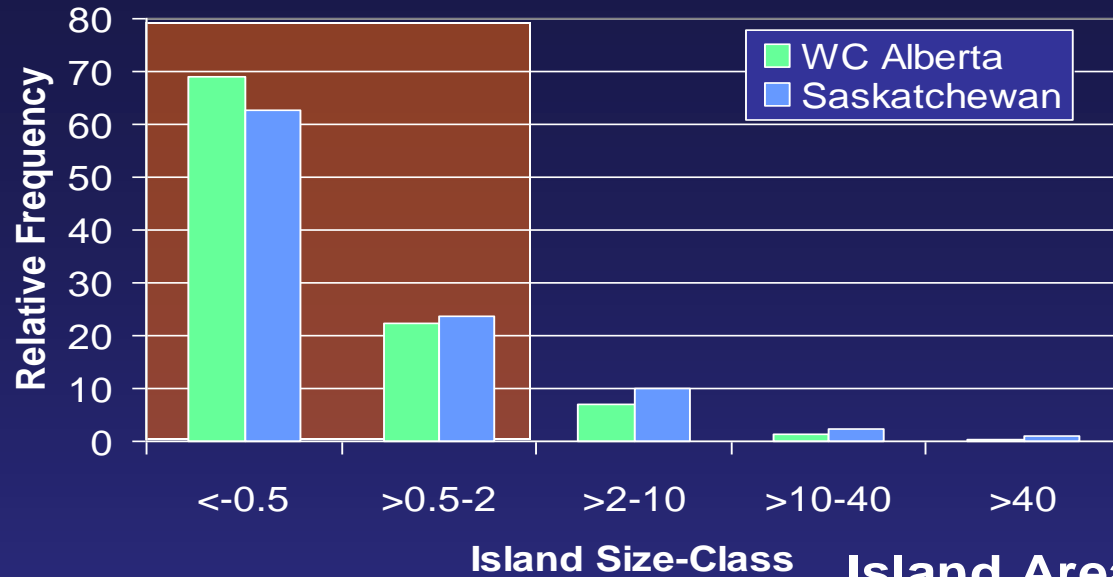
Eberhart and Woodard
aerial photos taken
right after recent fires
in Alberta, at a
minimum resolution of
2 ha, and inexact def'n
of "residual"

FMF ND Program
aerial photos taken
right after the fire of
only older fires, a
minimum resolution of
0.01 ha, and a broad
def'n of "residual".

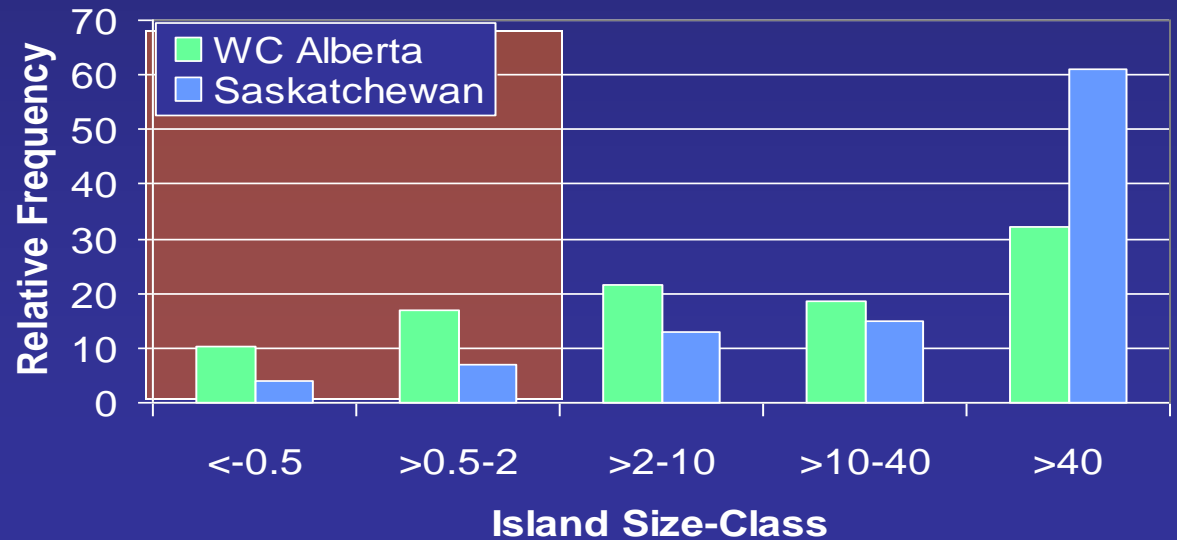
Name That Polygon.



Island Density by Size for WC Alberta and Saskatchewan

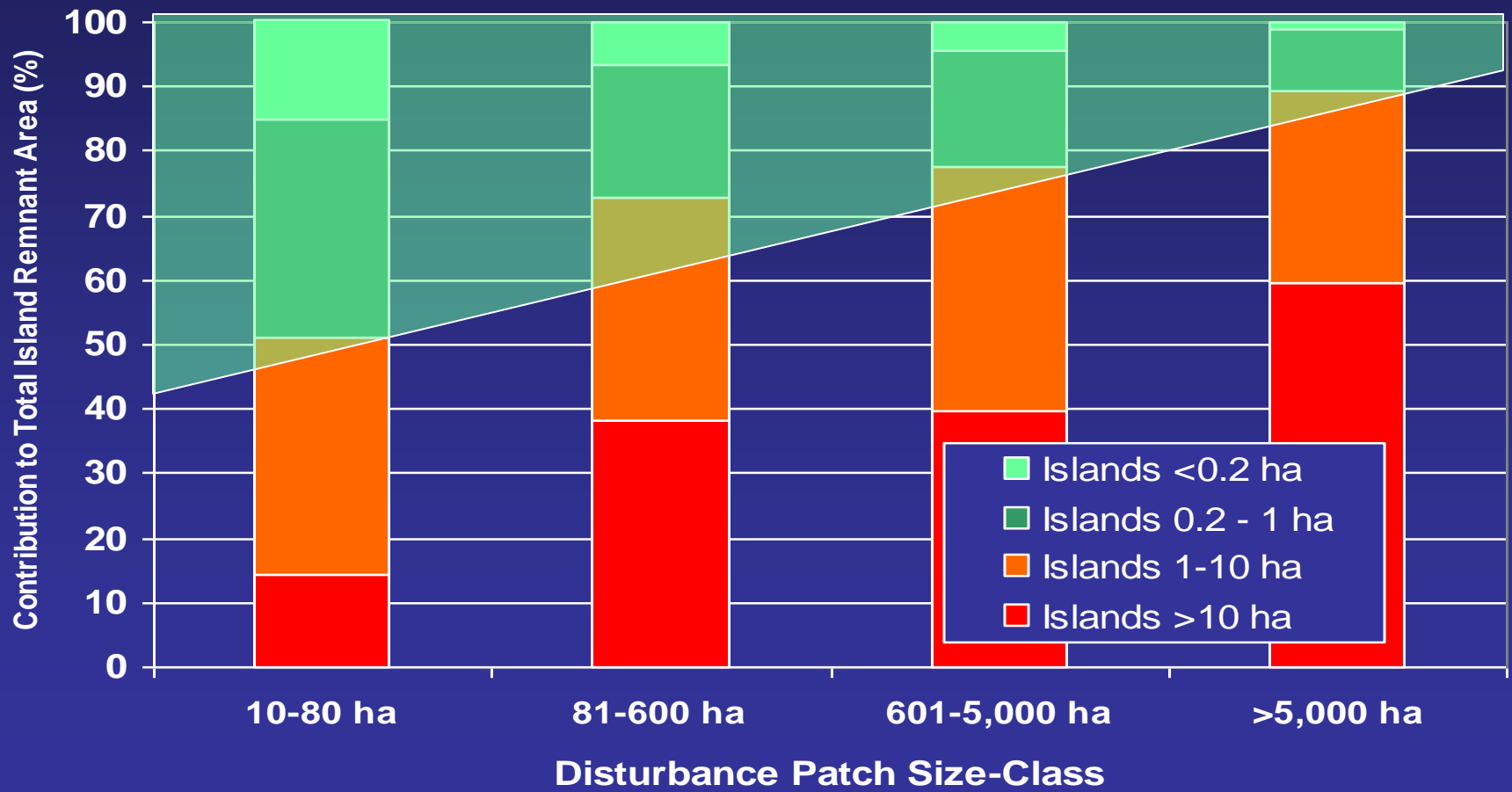


Island Area by Size for WC Alberta and Saskatchewan

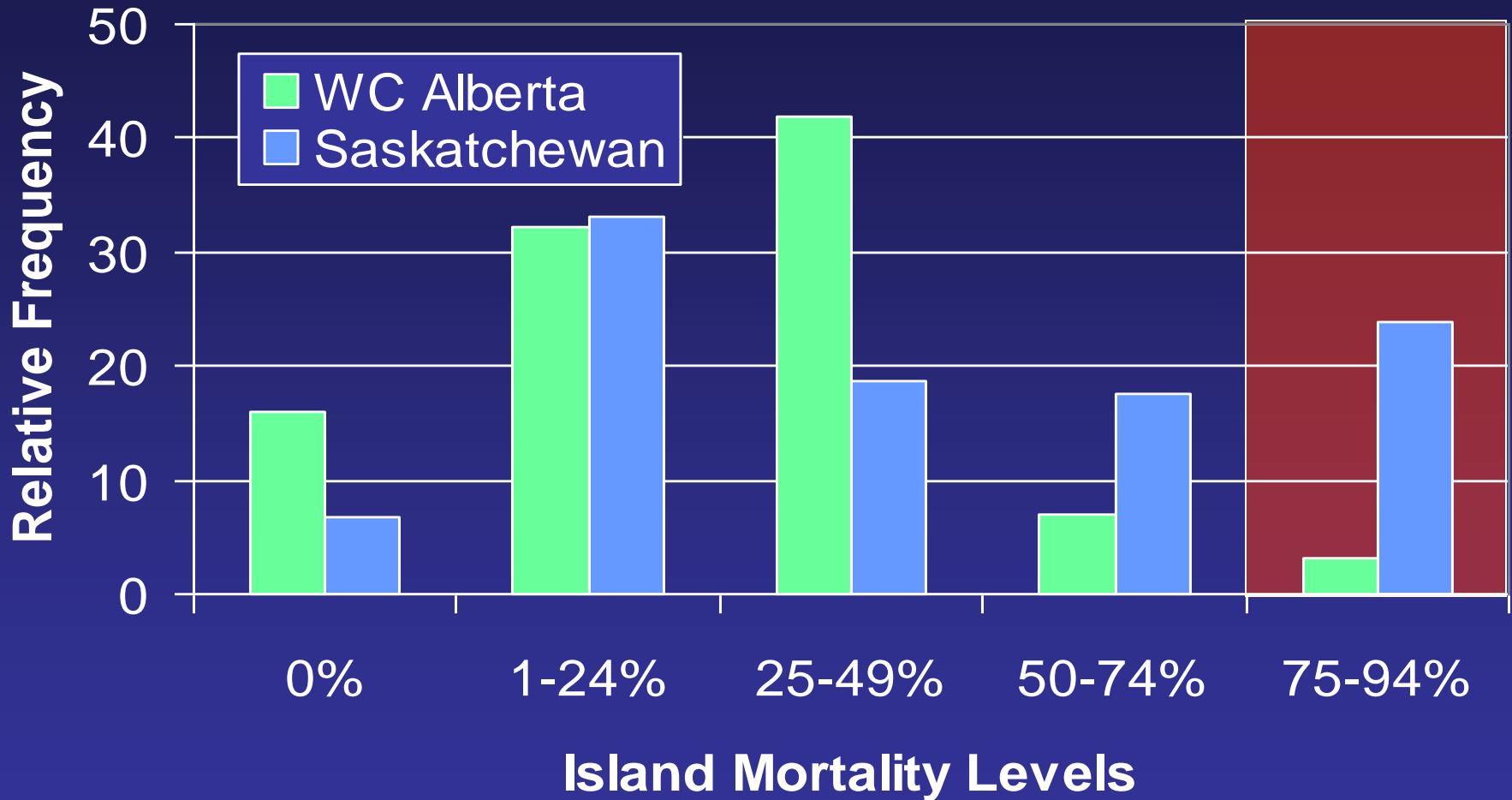


Small Fires Have Higher Levels of Small Island Area

Breakdown of the Area of Island Remnants of Different Sizes by Disturbance Patch Size

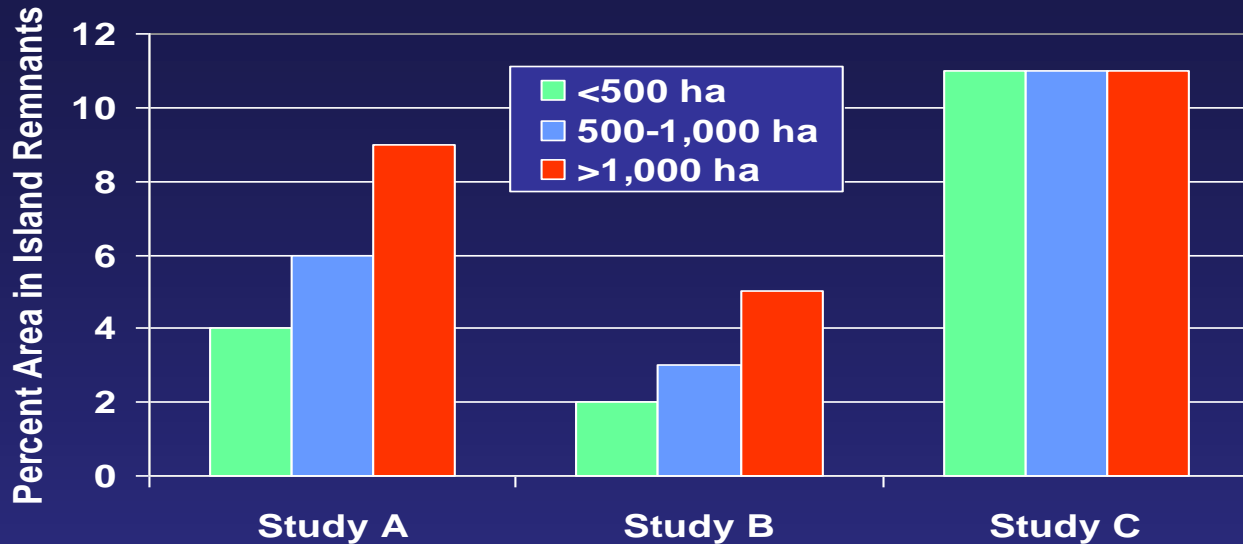


Island Mortality Levels for WC Alberta and Saskatchewan



... and large events have more island area with high levels of mortality.

Areas in Island Remnants by Fire Area for 3 Alberta Studies



Small Islands	in	out	in
“Natural” Fires	yes	no	yes
Partial Burns	no	yes	yes
Matrix Remnants	no	yes	yes

All 3 are “right”, but applied 3 different methods, and 3 different sets of definitions.

The Desire for a Tool for Disturbance Event Planning

- 10 years of research!
- Comfortable with the concept
- The confidence that it is accepted, and here to stay.
- Desire to understand how current disturbances differ from historical.
- The spatial language is more involved and less directly applicable than originally imagined.
- Eager get more involved with the nuts and bolts.

A Hierarchy of Needs

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(How) Are natural disturbance dynamics critical to other known, important ecological processes?

(How) Do natural-inspired disturbance patterns fit with other economic and social values?

Will our current system / budget allow natural patterns to happen?

How do patterns of past, current, and future cultural disturbances compare to those of wildfires?

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

Theory

Language

Knowledge

Examples

Relevance

Convergence

Acceptance

Tools

Tool Design is Everything

Recall:

- If we build it, will they come?
- Is the past a model for the future?
- It is a new science:
 - Red flag check
 - Temporal high grade check
 - Spatial high grade check
 - Cherry-picking check

NEPTUNE

ArcGIS Tool that automates the conversion of shapefiles of disturbances into the new spatial language, and compares patterns to NRV for:

- *Event size*
- *Event shape*
- *No. of disturbed patches*
- *Size of largest disturbed patch*
- *Disturbed patch shape*
- *Pct area in matrix remnant*
- *Pct area in island remnant – by event*
- *Pct area in island remnant – by dist. patch*
- *Pct area in total residuals*
- *Island sizes*

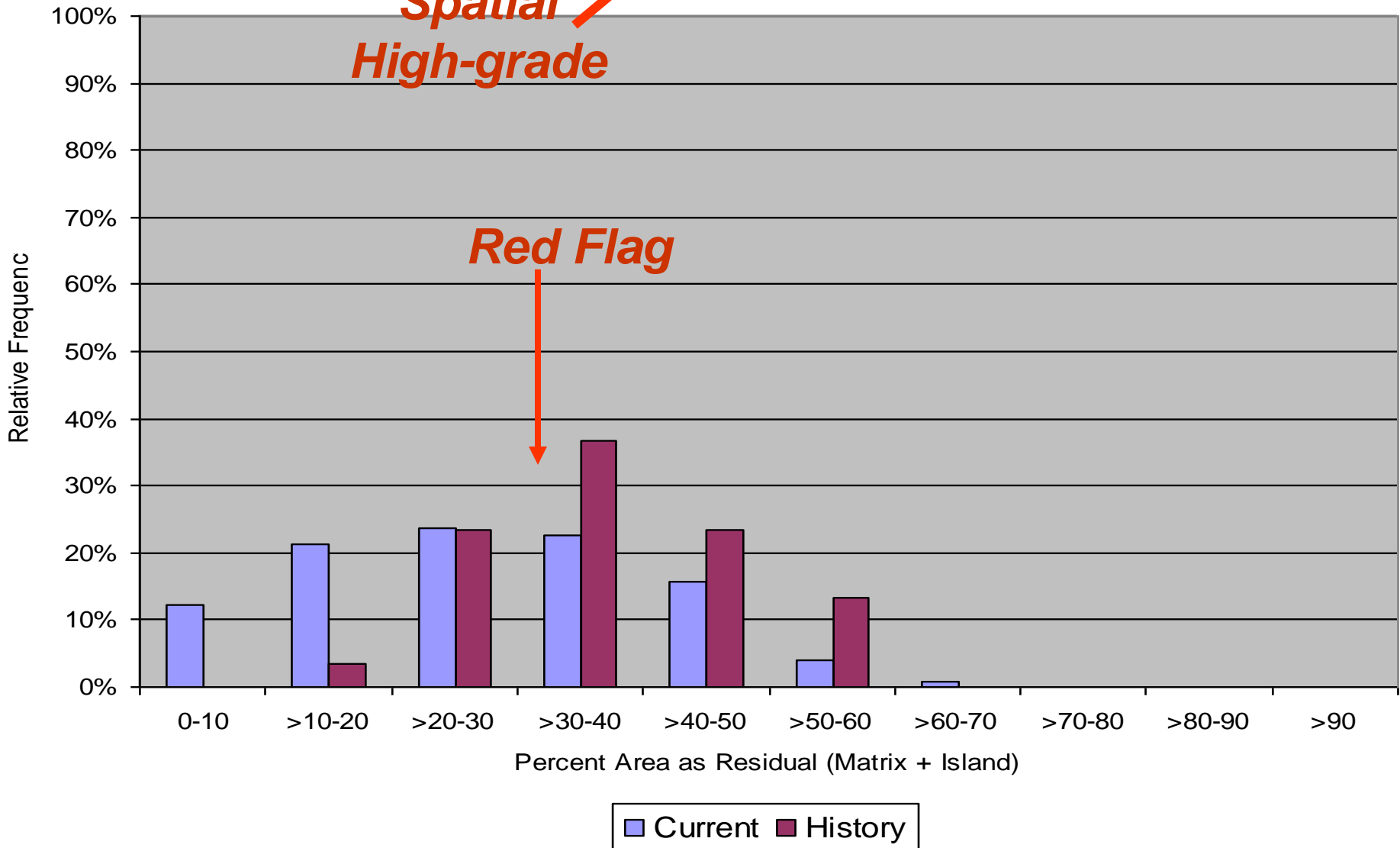
Cherry-picking

Mistik Full FMA (1988-2005)
Comparison with Historical Natural Disturbance Patterns
Percent Area of Event as Residual Remnants (Matrix + Island)
(Event Count: 597 events analyzed)

**Temporal
High-grade**

**Spatial
High-grade**

Red Flag



NEPTUNE

Temporal High-grading

- Output saved, stored, and compared as shapefiles and Excel spreadsheets.
- Does not make decisions or suggestions.
- The only output format is frequency distributions.
- Currently calibrated for WC Alberta and western Saskatchewan.
- Partner list; ASRD, HWP, ANC, Mistik Management, + ? more?

NEPTUNE is Just a Model

(So Be Careful)

- It will almost always give you an “answer”.
- It must simplify the messy world.
- There is no right or best solution.
- It is impact / value-neutral.

“DECISION-SUPPORT”

NRV Does Not Translate Perfectly to CRV

(So Be Even More Careful)

- **Linear disturbances**
- **Timelines**
- **Permanency**
- **Overlapping disturbance events**
- **Conventions vs. spatial language**
- **Resolution**

NEPTUNE *Can Help* Address These Gaps:

- What does a natural pattern inspired plan look like?
- (To what degree) Will the current “system” allow it to happen?
- Are there economic or social barriers / convergences?
- How does NRV compare to current practices (CRV)?
- Help me design a more natural disturbance plan.

Potential NEPTUNE Uses

- Learning.
- Communicating.
- Operational harvest planning.
- Prescribed burn planning.
- Harvest / PB monitoring.
- Strategic planning – “state of the forest”
- Assistance for regulators.
- Administration / accounting.
- Hypothesis generation for issue-based questions.
- ???