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Ecological Integrity Monitoring at Parks Canada

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Parks Canada Parcs Canada

Canada

A little about Parks Canada

- 125 years of parks, 100 years of Parks Canada
- Parks Canada manages:
  - 140 National Historic Sites (10%)
  - 42 National Parks (3% of Canada)

Parks Canada Mandate

- *On behalf of the people of Canada, we **protect** and **present** nationally significant examples of Canada's natural and cultural heritage, and foster public understanding, appreciation and enjoyment in ways that ensure the ecological and commemorative integrity of these places for present and future generations.*

Why monitor?

Monitoring tells us the…

status (where are we?)

&

trend (where are we going?)

of …

What we monitor

- Ecological integrity
- Cultural integrity
- Visitor experience
- Public awareness and understanding

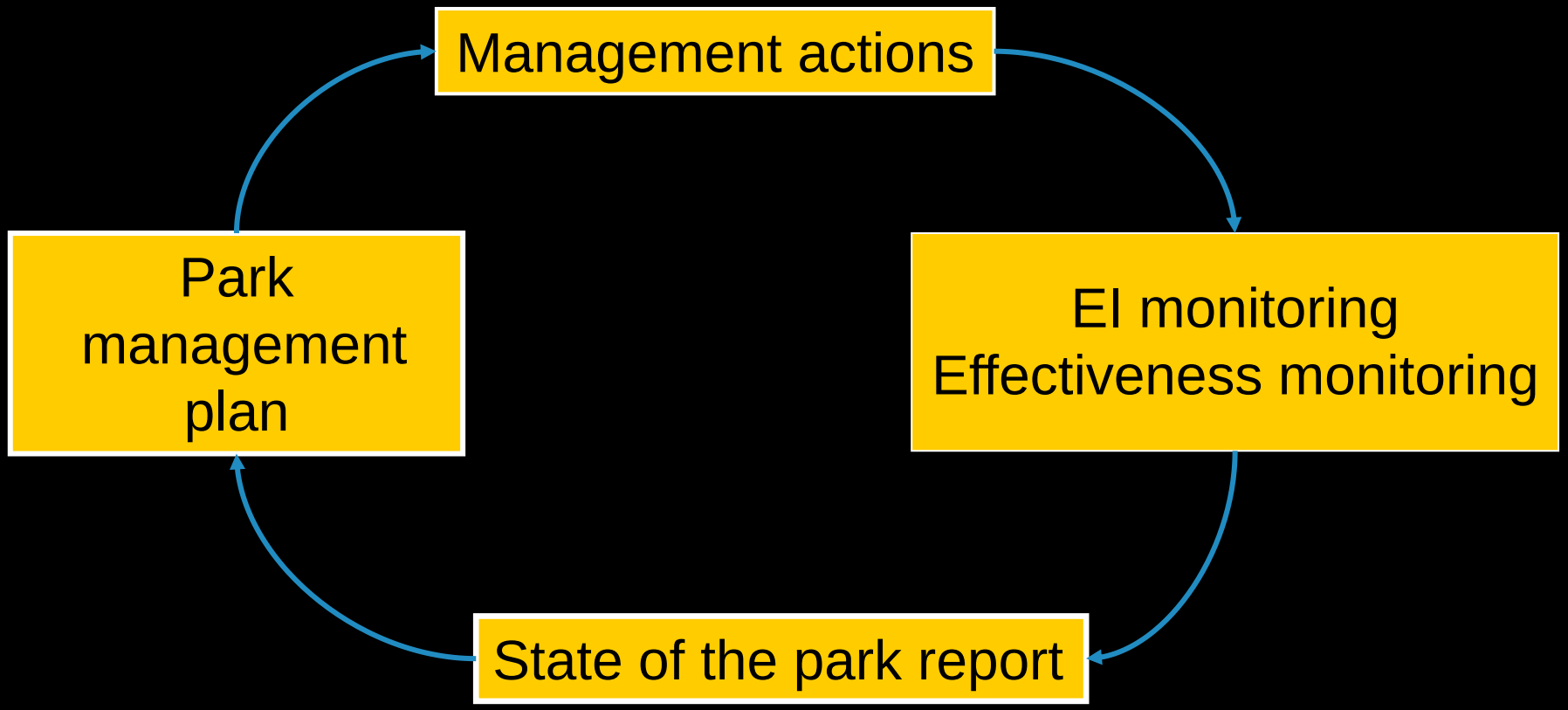
What drives monitoring at Parks Canada?

Legislation & policy
- report to parliament every two years

Management evaluation
- are our projects effective?

Moral
- guardians/steward role

Planning Cycle



Program Design

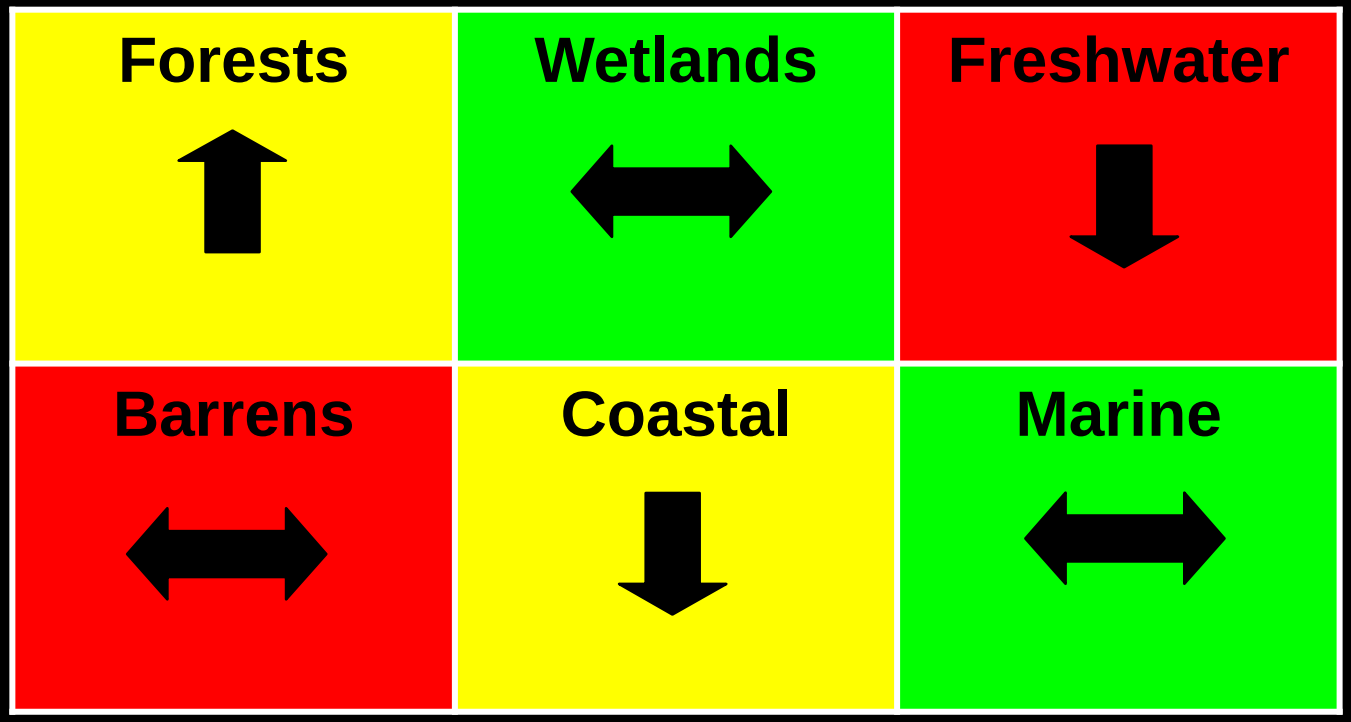
Criteria

- Comprehensive
- Useful
- Sustainable
- Engaging
- Credible

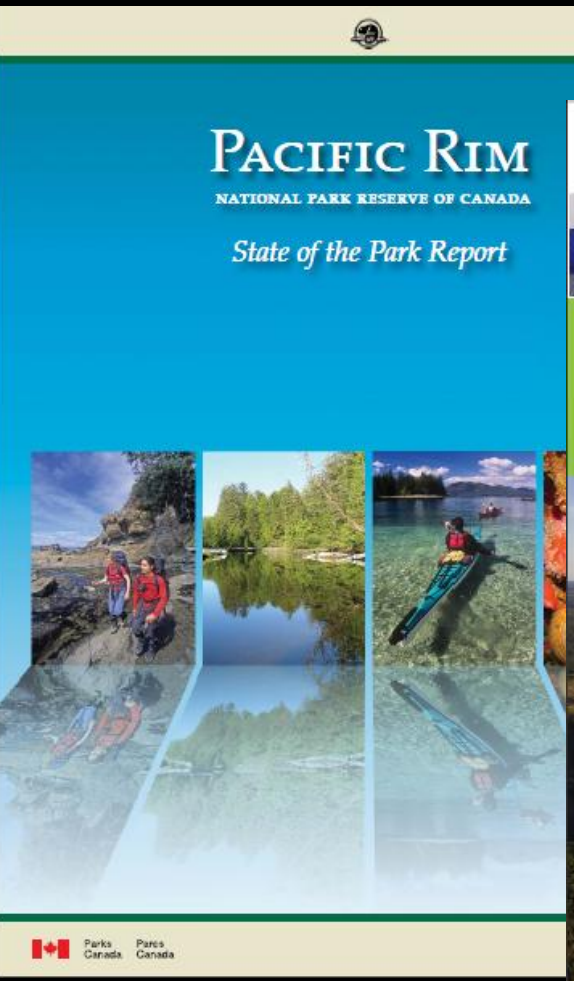
Indicators
ecosystems

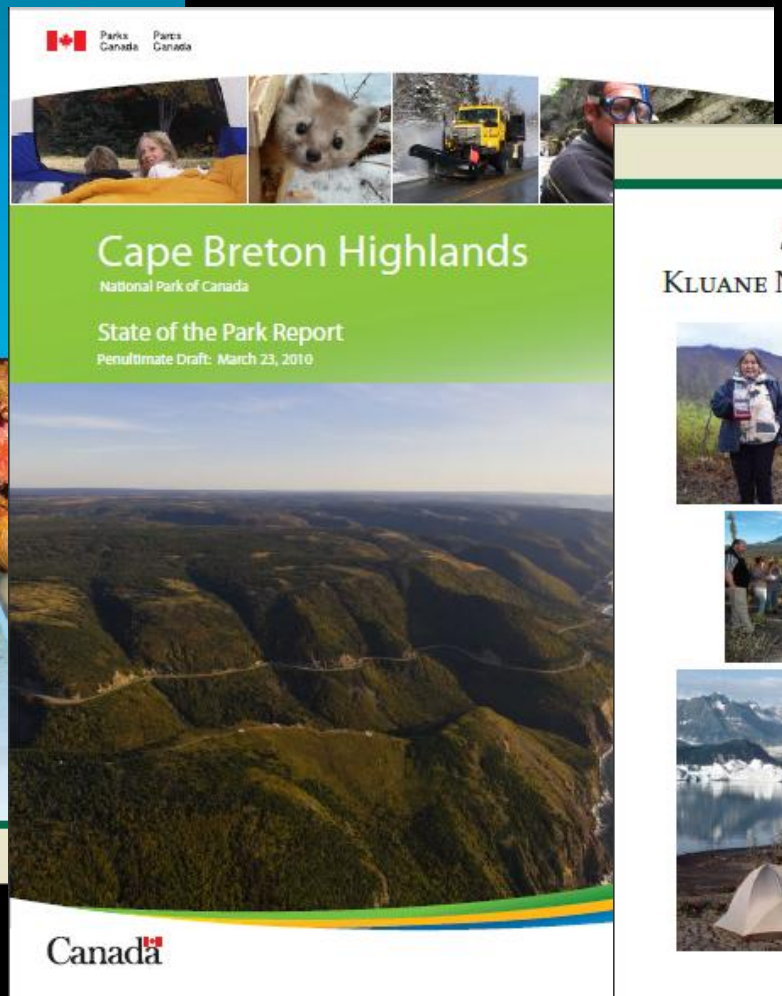
Forests	Wetlands	Freshwater
Barrens	Coastal	Marine

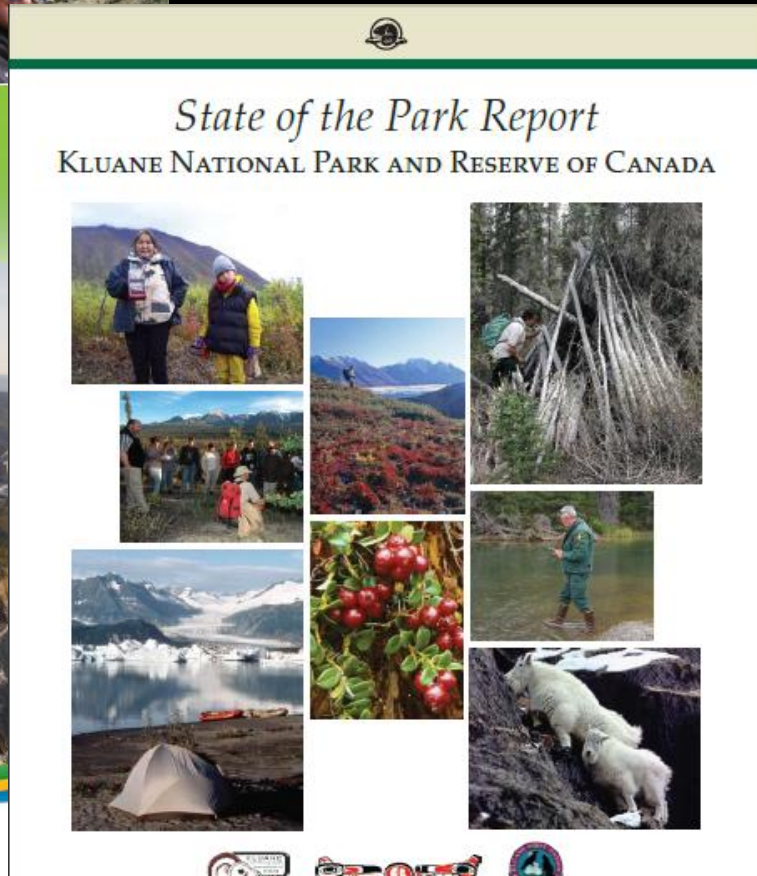
Indicators and assessment
ecosystems, colours, arrows



State of the Park Report – every 5 years

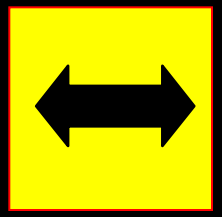






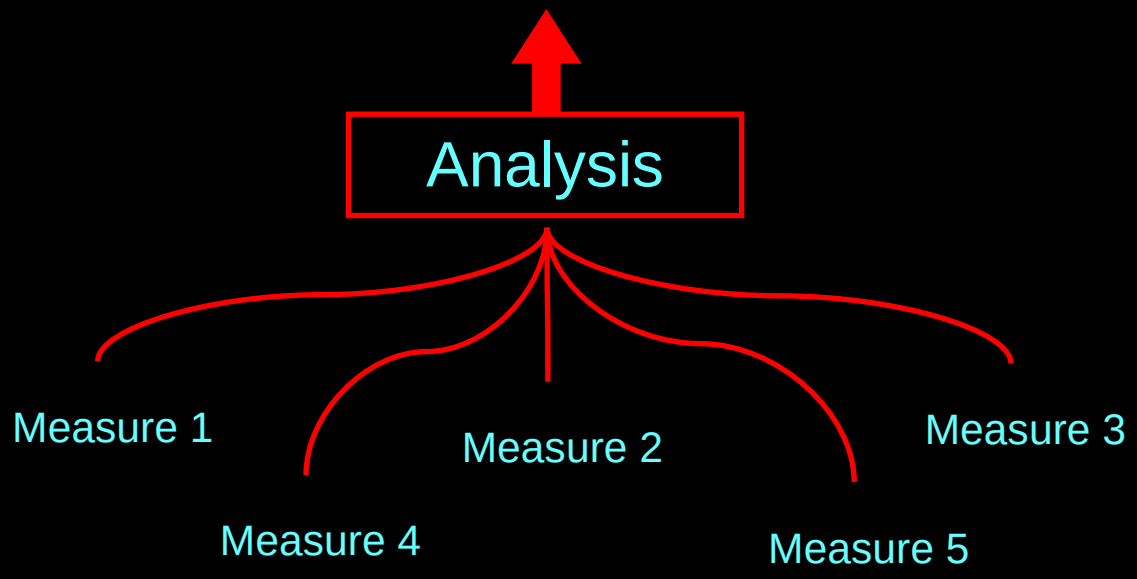
Developing monitoring

Ecosystem

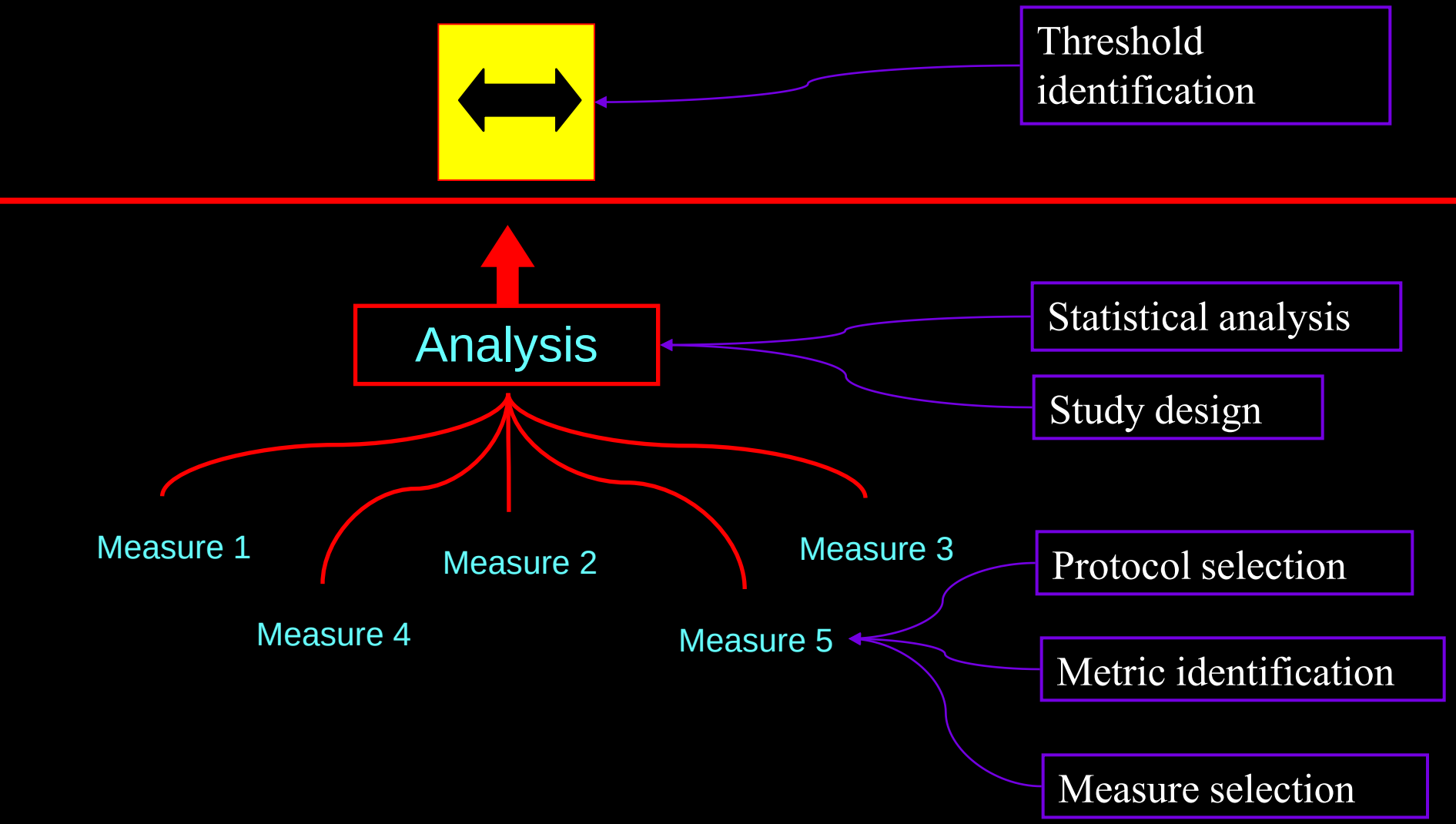


Public environment

Science environment



Developing monitoring



Measure selection

- Stakeholder consultation
- Conceptual ecosystem models
- Availability of protocols
- Historical data availability
- etc…

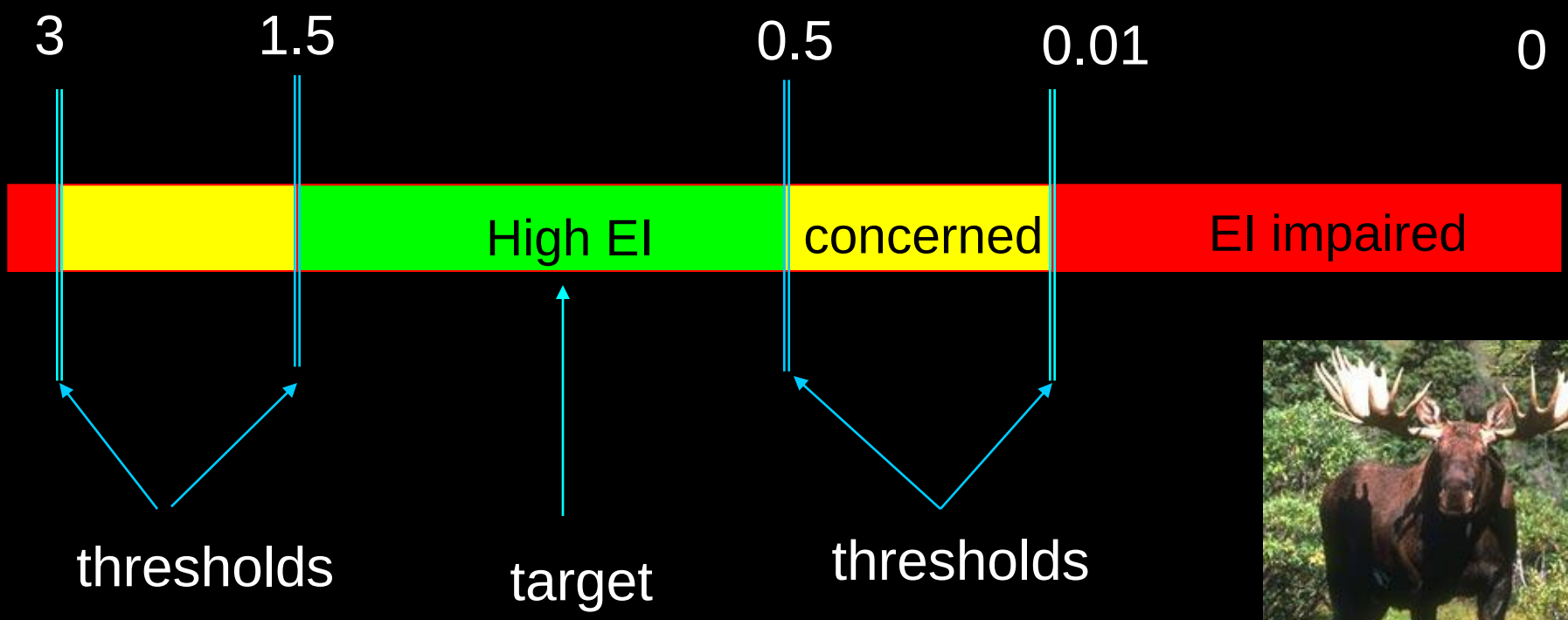


Measure examples in Atlantic NP's

- Piping plover
- Bank swallows
- Greater yellowlegs
- Tern
- Otter
- St. Lawrence aster
- Soft-shell clams
- Eel grass
- Green crab
- Saltmarsh vegetation
- Intertidal community
- Estuarine IBI
- Shorefast ice
- Coastal erosion
- Infrastructure footprint
- Unauthorized dune trails
- Dune movement
- Saltmarsh surface area

Each measure needs interpretation

Moose density (#/km^2)



Threshold derivation

Thresholds are points of management concern

- Blend scientific information and human values

  continuum: PVA to common sense.

- Risk management – how serious is being wrong?

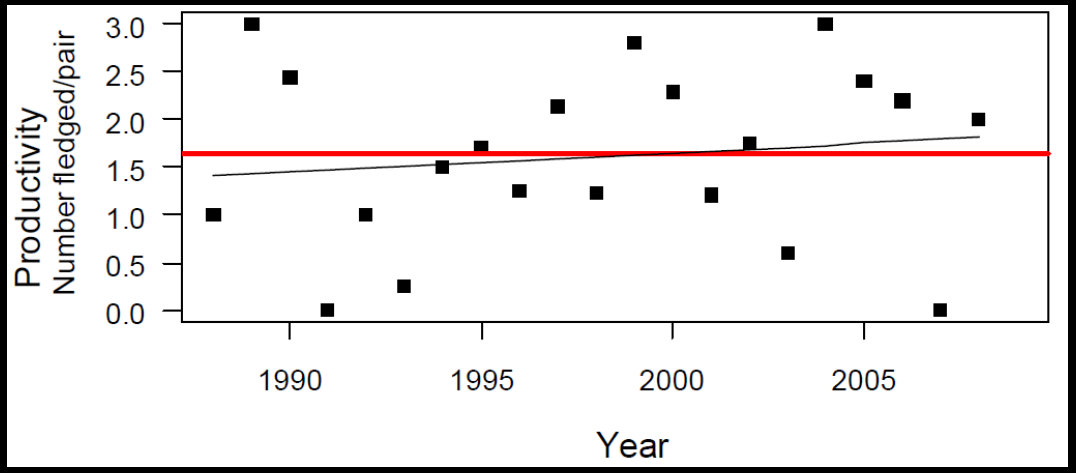
Threshold approaches

- Published
- Expert opinion
- Stress gradient
- Natural variability
- Common sense

Thresholds from published work

Example: Piping plover fledging success.

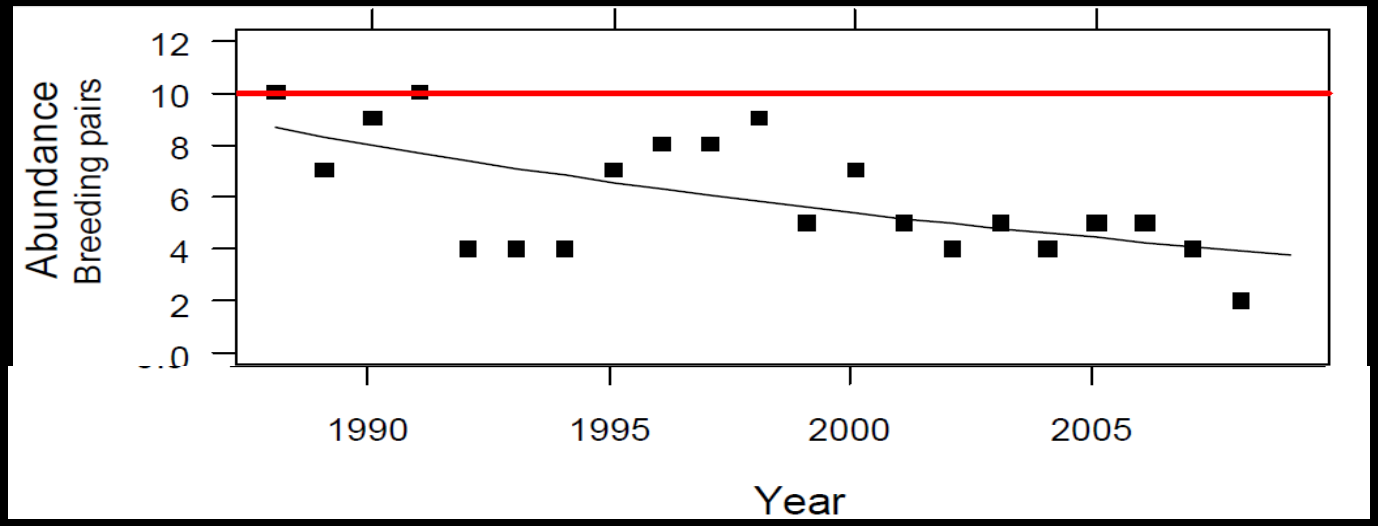
The recovery team promotes a fledgling success rate of 1.65 fledglings./breeding pair in order to meet ten-year recovery goals.



Thresholds from expert opinion

Example: Piping plover adult abundance

Based on expert assessment of habitat, it is expected that >10 pairs could be supported. 10 pairs is the maximum observed in the past 20 years.



Thresholds from stress gradient

Example: Lichen index of air purity (IAP)

Provincial database grouped into urban, sub-urban and wilderness sites.

Table 2. Mean Index of Air Purity scores for plots across a gradient of air quality (from unpublished data from Nova Scotia Department of Environment).

Plot type	Location	n	Mean IAP	SE
Urban	Within 10km of center of major towns	8	0.092	0.065
Sub-urban	10-25km from major towns	11	0.510	0.09
Wilderness areas	>25km from major towns	16	0.716	0.113

Table 3. Thresholds for lichen species richness and Index of air purity at Kejimkujik.

Measure	Thresholds		
	Poor	Fair	Good
Index of Air Purity	<0.209	0.209-0.613	>0.613

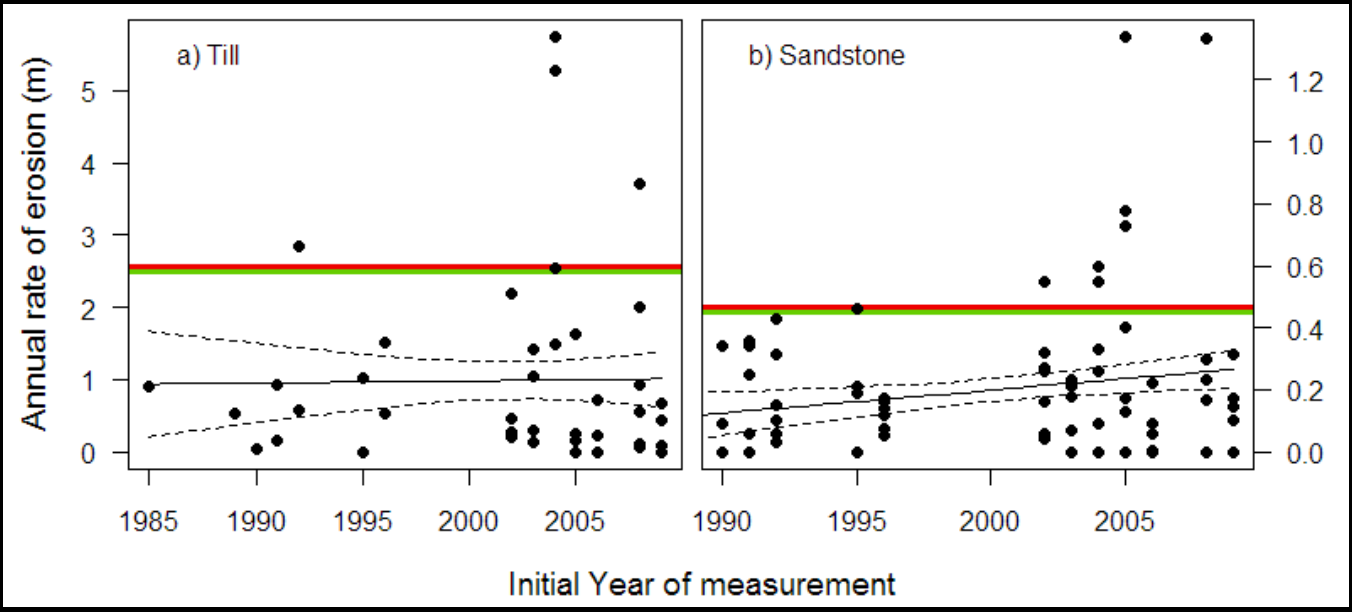
Thresholds from natural variability

- >80% of thresholds
- What is natural?
- In the absence of a trend, assume current condition is “good”
- If reference data contains a mix of poor and good sites, use the EPA 75/25 rule. (be in the top quartile).

Thresholds from natural variability

Example: coastal erosion

- Twenty years of erosion rate data.
- Threshold based on 90th percentile (assume that 10% of years represent anomalies)



Thresholds from natural variability

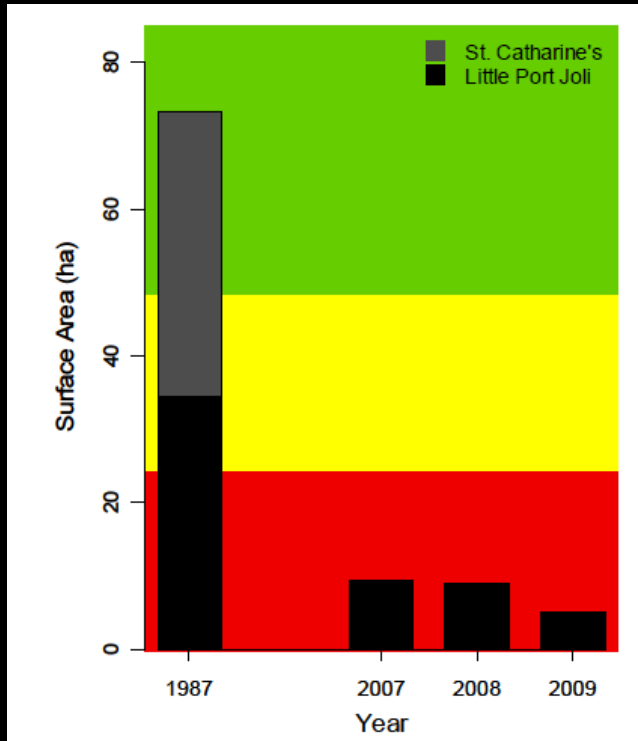
Example: Eel grass extent

- For Kejimkujik, historical map at the time of park establishment defines “best” condition in hectares.
- What represents the fair and poor condition?

  1/3 rule.

Table 1. Thresholds for eelgrass extent at Kejimkujik.

Measure	Thresholds		
	Poor	Fair	Good
Eelgrass extent	>66% decline in area from baseline reference condition	>33-66% decline in area from baseline reference condition	Within 33% of baseline reference condition



Common sense thresholds

Example: # of unauthorized dune trails

- Goal is to have zero, what about fair/poor zones?
- No theory or case studies to use.
- Numbers chosen by group consensus, but appear arbitrary.

Rolling up sub-measures

Table 1. Thresholds for Piping plover population status at Kejimkujik Seaside.

Abundance (# breeding pairs)	Productivity (# young fledged/pair)	
	≥1.65	<1.65
≥10	Good	Fair
<10	Fair	Poor

Table 1. Sub-measures of the Soft-shell clam Population Condition Index.

Sub-measure	Monitoring question	Score	
		0	1
Density of Juvenile Clams (10-30 mm)	Is the mean density of juvenile clams ≥ 7.37 clams/m^2?	No	Yes
Density of Young Adult Clams (>30-50 mm)	Is the mean density of young adult clams ≥5.32 clams/m^2?	No	Yes
Density of Older Adult Clams (>50 mm)	Is the mean density of older adult clams ≥ 5.63 clams/m^2?	No	Yes

Questions?

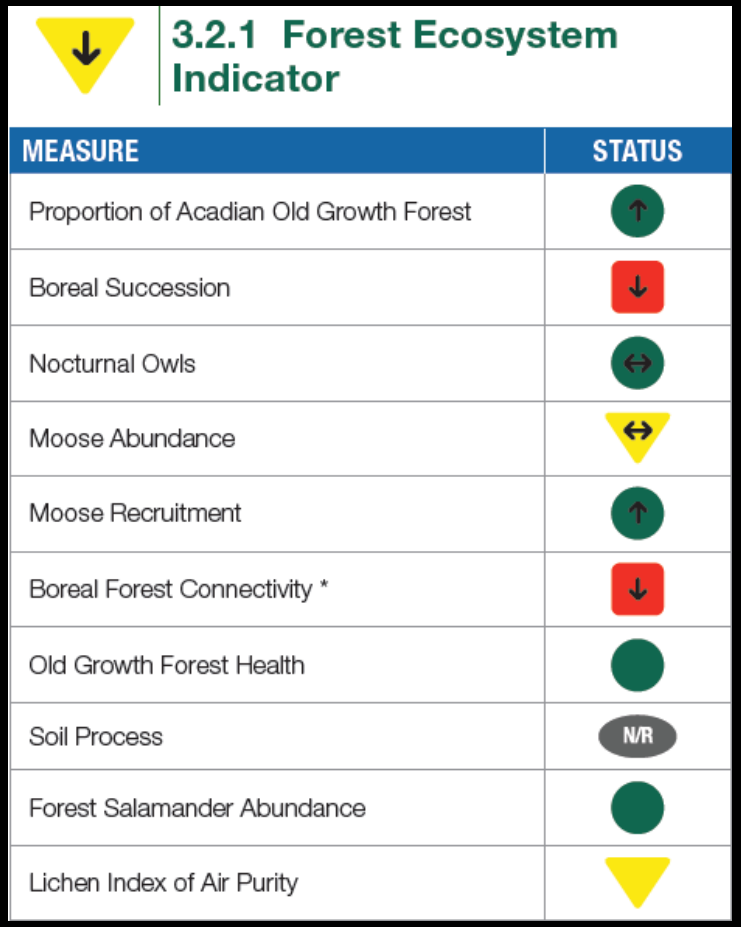
Monitoring challenge:
many expectations

- Park managers
- Science community
- Local stakeholders
- NGOs
- Parliament (broad public)

Each National Park has sought out its own balance of these competing interests

First hiccups

- What does “comprehensive” really mean?
- How do we monitor something we don’t fully understand?
- Can a small set of measures “represent” an ecosystem?
- How do we select measures?



3.2.1 Forest Ecosystem Indicator

MEASURE	STATUS
Proportion of Acadian Old Growth Forest	↑
Boreal Succession	↓
Nocturnal Owls	↔
Moose Abundance	↔
Moose Recruitment	↑
Boreal Forest Connectivity *	↓
Old Growth Forest Health	●
Soil Process	N/R
Forest Salamander Abundance	●
Lichen Index of Air Purity	▼