

# EI Monitoring in Canada's National Parks

Landscape Targets, Thresholds and EI Assessment

An aerial photograph showing a complex landscape. A winding river flows through a dense forest of evergreen trees. A road or path cuts through the forest, crossing the river. The terrain appears to be a mix of forested areas and open, possibly cleared or burned, land. The overall scene is a mix of natural and human-altered environments.

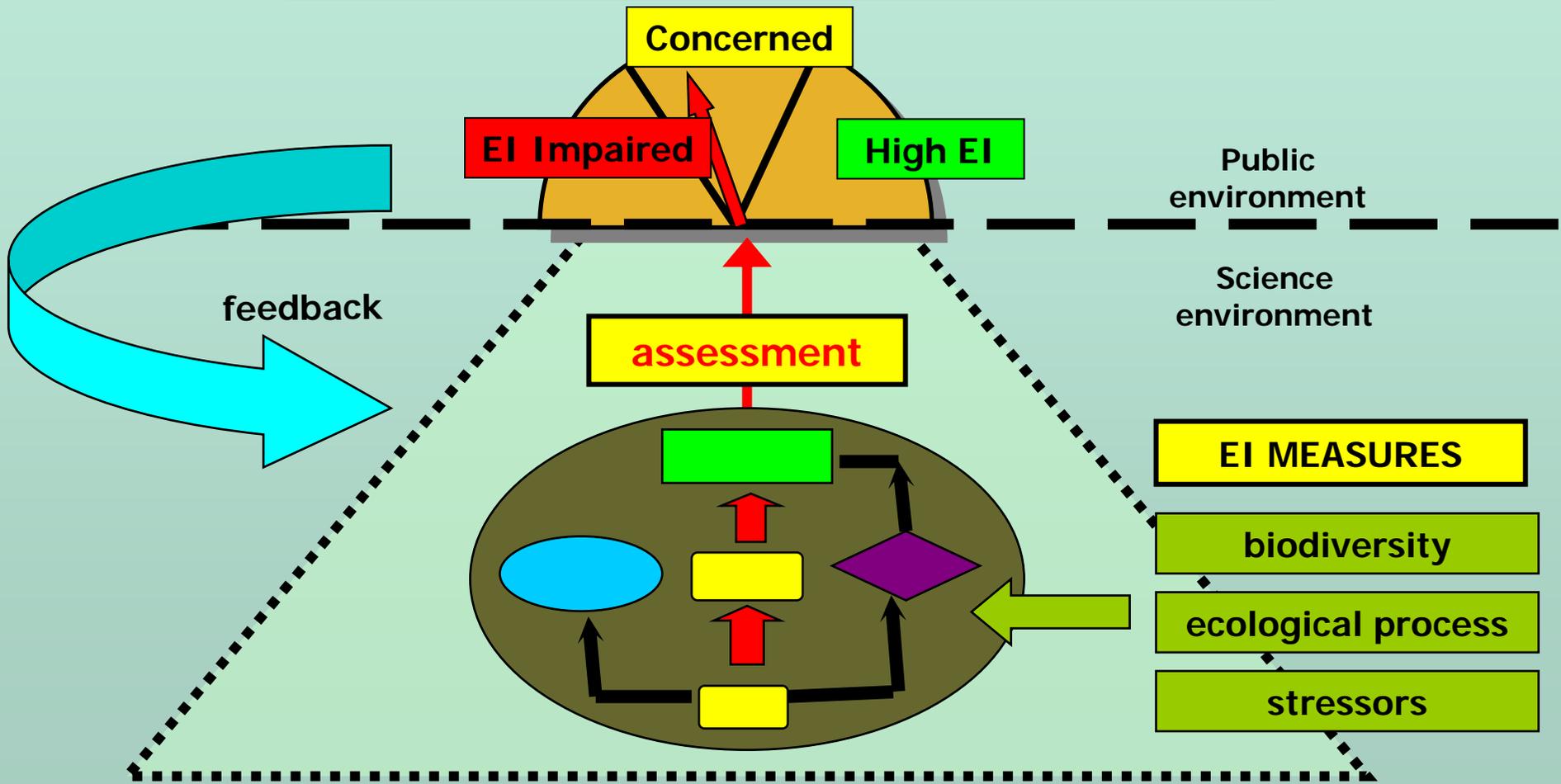
**"Pattern is easy to measure – hard to interpret"**

**NARSEC 2007**

Santa Fe, March 6-8, 2007

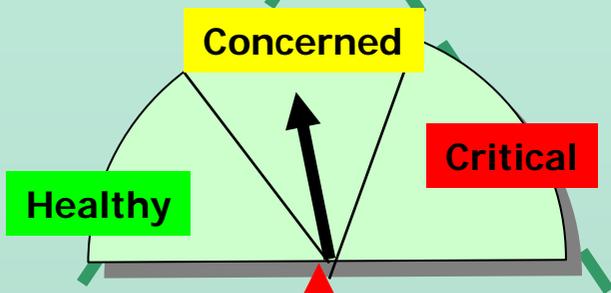


# EI Indicator 'Iceberg'





# Forest EI Indicator



## Stand Level Forest EI

## Landscape Level Forest EI

Models

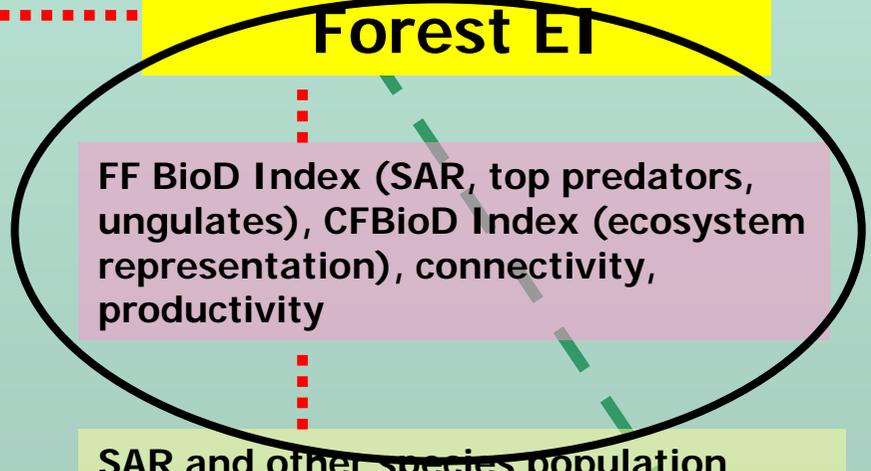


Measures



Data

tree productivity, songbird index, salamander populations change, foliar nutrient index, decomposition efficiency



FF BioD Index (SAR, top predators, ungulates), CFBioD Index (ecosystem representation), connectivity, productivity

dbh, canopy condition, species composition, chopstick dry weight loss, songbird/salamander density, relative soil arthropod abundance, foliar nutrient concentrations

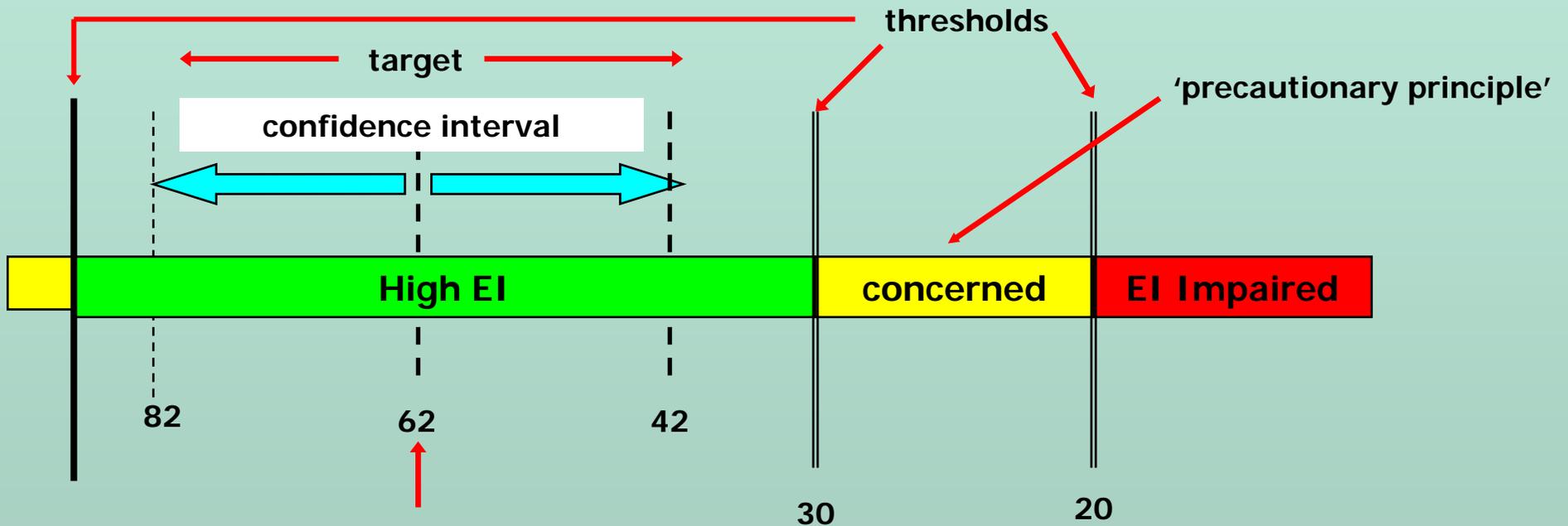
SAR and other species population assessments, relative ecosystem abundance, Fragstats, AVHRR

# Typical EI Measures – Terrestrial Landscapes

- **Habitat suitability:** for focal species or guilds, e.g., charismatic, major park ungulates and carnivores, indicators, keystones, species at risk - **desired states for landscape pattern**
- **Ecosystem representation:** rare ecosystems, old forests, structural stage targets
- **Landscape productivity:** within historical range of productivity as measured by NDVI or NPP
- **Landscape processes:** riparian ecosystems, flooding regimes, mass wasting rates
- **Operational and safety needs:** fire/fuel management, RoWs, roads and visitor access/use, etc



# Targets and Thresholds





# Greater Park Ecosystem

- **that area around a protected area that directly affects conservation objectives within the protected area**
- variable in size from several hundred metres (endangered turtles) to 100 km (red wolf)
- GPE effect may be large (small southern parks in rural/suburban environments) to medium (medium parks in industrial forested landscapes) to +/- absent (large parks in northern wilderness settings)
- challenge for EI monitoring is to measure and assess change in GPE landscapes in relation to park conservation objectives





# Developing Targets for Landscape Pattern

1. Pre-Columbian condition
2. Relative health/EI
3. Park-specific Management Goals





## PRE-COLUMBIAN CONDITION

1. disturbance regimes, landscape pattern, and landscape composition typical of that existing before extensive European colonization of NA
2. fire history reconstructions, surveyor's records, pollen record, historic air photos, soil archeology
3. Use prescribed fire and wildfire to restore historic fire return interval
4. Resulting landscape eventually moves to 'desired condition'
5. Compare present condition to this future desired condition to assess





# PRE-COLUMBIAN CONDITION - ISSUES

## Upside

1. Well supported concept by conservation community and public in general- 'pristine' - 'natural'

## Downside

1. restoration of pre-Columbian condition may not be realistic – southern Ontario, eastern US
2. historic fire regime may not be relevant to modern park context, e.g., scale of fire – scale of park,
3. Prescribed burning by indigenous people to manage for ungulates and food sources -- 'natural?'
4. Historic fire regime reflects 100 year climate preceding estimation period - relevant for the next 100 years?





## **'RELATIVE HEALTH'**

- 1. Assess broad, uniform geographic area, e.g., Ecozone, for selected landscapes measures, e.g., habitat supply, connectivity, for focal species, guilds or assemblages**
- 2. Establish gradient from low to high habitat supply and connectivity – divide in 3 equal segments**
- 3. Use the same methods to assess park GPE for habitat supply, connectivity, relative to focal species, guilds or assemblages**
- 4. Place GPE score along gradient to assess condition relative to regional gradient**





# 'RELATIVE HEALTH' - ISSUES

## Upside

1. Deals with identified park needs in existing ecological context
2. Feasible to carry out – costs low , doable
3. Knowledge needs reasonable – species profiles
4. Transferable across parks; park species – park buy in

## Downside

1. Scale depends on condition of regional forest at time of assessment
  - end points/scale may not be the same at different assessment dates
  - 'good' end point may not represent a 'desired condition'





# **PARK-SPECIFIC MANAGEMENT GOALS**

- 1. Identify key trans-boundary conservation management issues for focal species, e.g., charismatic species, major park ungulates and carnivores, species-at-risk**
- 2. Establish optimum habitat needs for focal species**
- 3. Assess GPE for habitat for focal species**
- 4. Compare existing habitat to optimal habitat needs for focal species to determine landscape habitat condition**





# PARK SPECIFIC MANAGEMENT GOALS - ISSUES

## Upside

1. Deals directly with park management needs –valued ecosystem components
2. Provides clear targets for restoration, consultation
3. Permanent target – no sliding scale

## Downside

1. Optimal habitat needs may be difficult to determine
2. Developing optimal habitat targets may be expensive

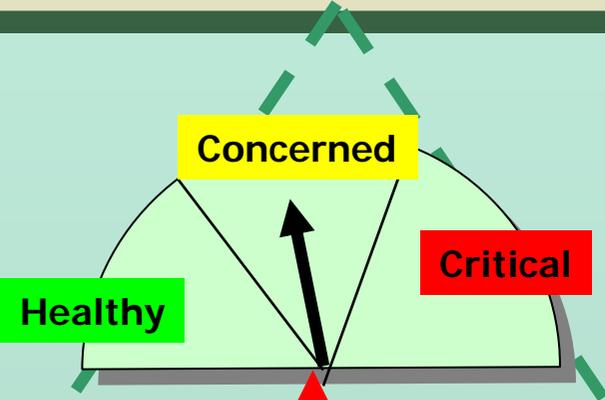


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# Forest EI Indicator



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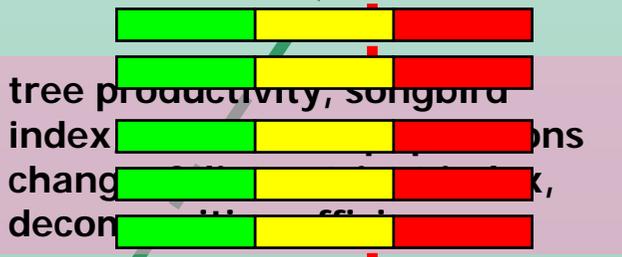
## Landscape Level Forest EI

assessment

Models

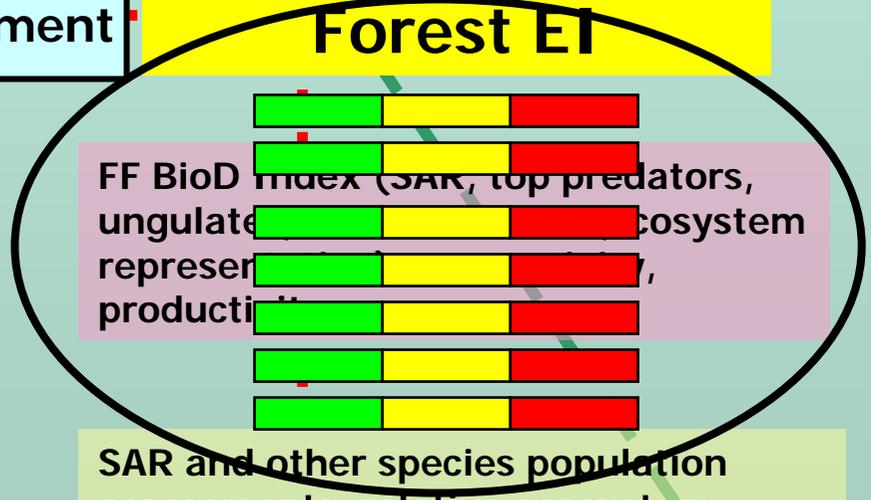
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## CONTEXT FOR ASSESSMENTS

1. There is no '**correct**' answer. Challenge is to develop a defensible and comprehensive assessment.
2. Assessment process needs to be **transparent and repeatable**
3. Important to **engage science community** as widely as possible -
4. Results need to be **clearly communicated** to a wide audience





# State of the Park Report Summary

## Gros Morne National Park

Indicator: Ecosystem Type	Percentage of Park Area	Condition and Trend	Rationale
Forest	44		High moose density - regeneration affected. Habitat loss from forestry. High percentage non-native mammals
Barrens	35		Woodland caribou decline. Increasing human use. Increasing non-native species
Wetland	11		Damage from snowmobiles. Woodland caribou declines.
Freshwater	8.8		Healthy fish and invertebrate populations. Atlantic salmon, brook trout concerns
Seacoast	0.2		Recovering from historic grazing, trampling and human use. Seabird populations healthy
Marine	1		Over-exploitation of fish species, pollution, garbage





# Climate Change – the Joker in the Deck



1. What's an 'invasive' species?
2. What is 'natural'?
3. What is the 'natural area' the park was established to represent?
4. What does 'losing species' mean?
5. Is higher productivity and diversity 'lower' EI?





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# Forest Landscape Conceptual Model

