Hutchinson
Environmental Sciences Ltd.

Watershed Health Indicators – Muskoka River Watershed

Presentation of Results
August 24, 2022

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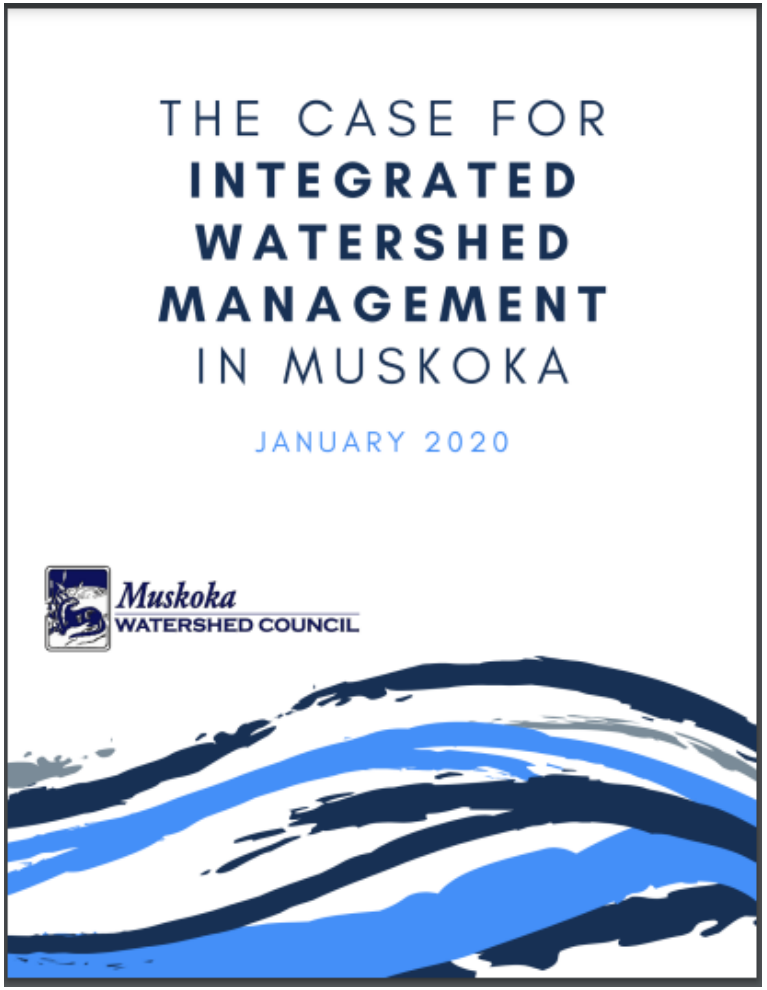
Agenda

- Background on Project
- Health of the Muskoka River Watershed
- Summary of Public Consultation
- Approaches to Monitoring Watershed Health in Other Jurisdictions
- Longlist of Indicators
- Recommendations

Integrated Watershed Management

- Integrated Watershed Management (IWM) needed to address unprecedented challenges in the watershed
- Province of Ontario funding in 2021 to support IWM initiatives to reduce flooding impacts and protect watershed health
- Projects include
  - hydrological modelling
  - floodplain mapping
  - natural capital inventory
  - shoreline erosion survey
  - water quality indicators
  - watershed health indicators



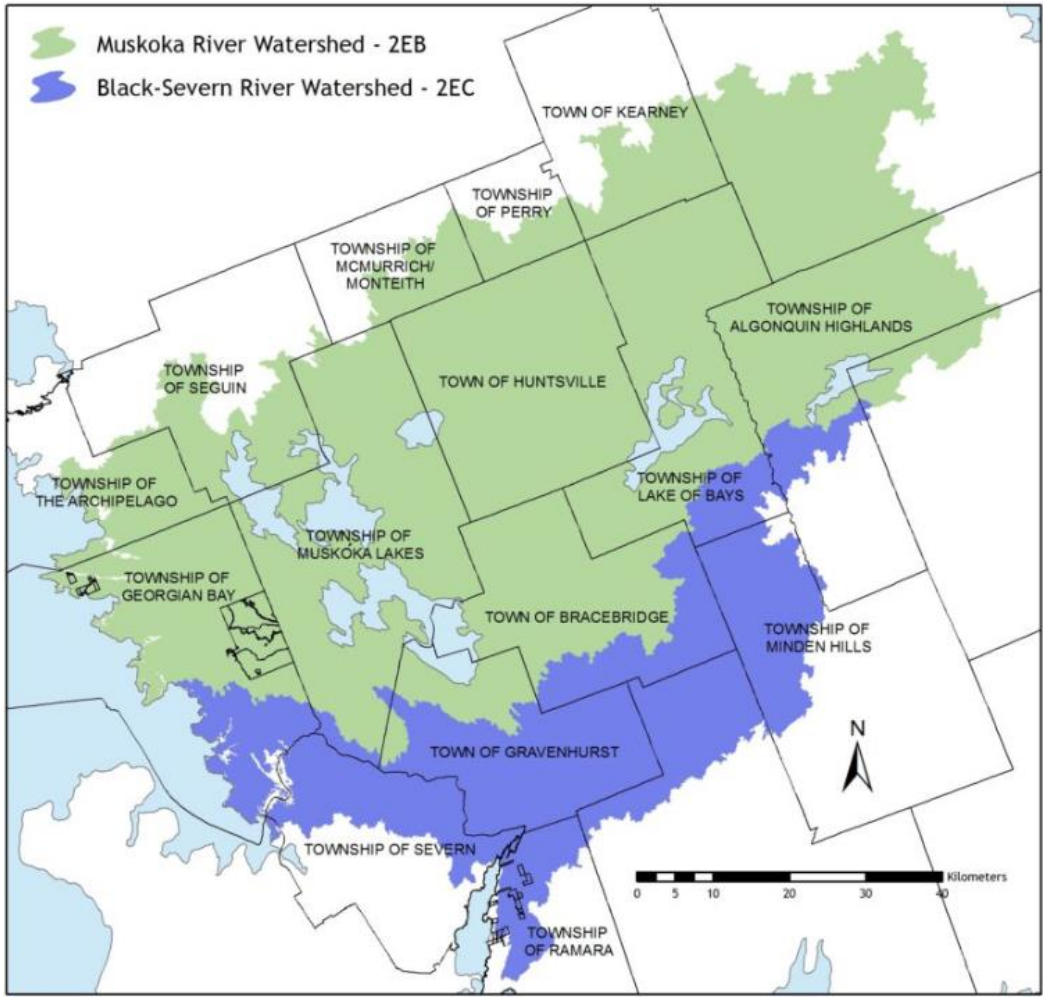
Watershed Health Indicators Project

- Build on existing information and studies to identify environmental and ecological metrics for monitoring watershed health in the Muskoka River Watershed

1. Review of Muskoka River Watershed
2. Jurisdictional Review
3. Consultation with CRT, Community and Scientific Contacts
4. Comprehensive Summary Report
5. Presentation of Results

What is a Watershed?

- Area of land that drains to a river, lake or stream
- Watersheds are environmentally meaningful units



What is Watershed Health?

- The ability to support the natural biological, physical and chemical features, processes and conditions within the watershed
- A healthy watershed provides
  - Dynamic hydrologic and geomorphologic processes within their natural range of variation,
  - Habitat of sufficient size and connectivity to support native species, and
  - Physical and chemical water quality conditions that support healthy biological communities.

Benefits of Watershed Health

- Ecological Health
  - Conserves water, promotes streamflow, supports sustainable streams, rivers, lakes and groundwater sources
  - Conserves healthy soil
  - Provides habitat for plants and animals
- Human Health
  - Provides safe drinking water and food
  - Mitigates climate change impacts
  - Provides natural areas for enjoyment and recreation
- Economic Health
  - Provides energy and supplies
  - Prevents and mitigates climate change impacts (e.g., flooding, drought)
  - Contributes to tourism, fisheries, agriculture etc.

Measuring Watershed Health

- Indicators
  - Simplified representations of more complex ecological states and processes
  - Document baseline conditions and track changes over time and space
  - Target values and threshold levels can be identified
  - Measurable, comparable, consistent, relevant

Examples of Indicators

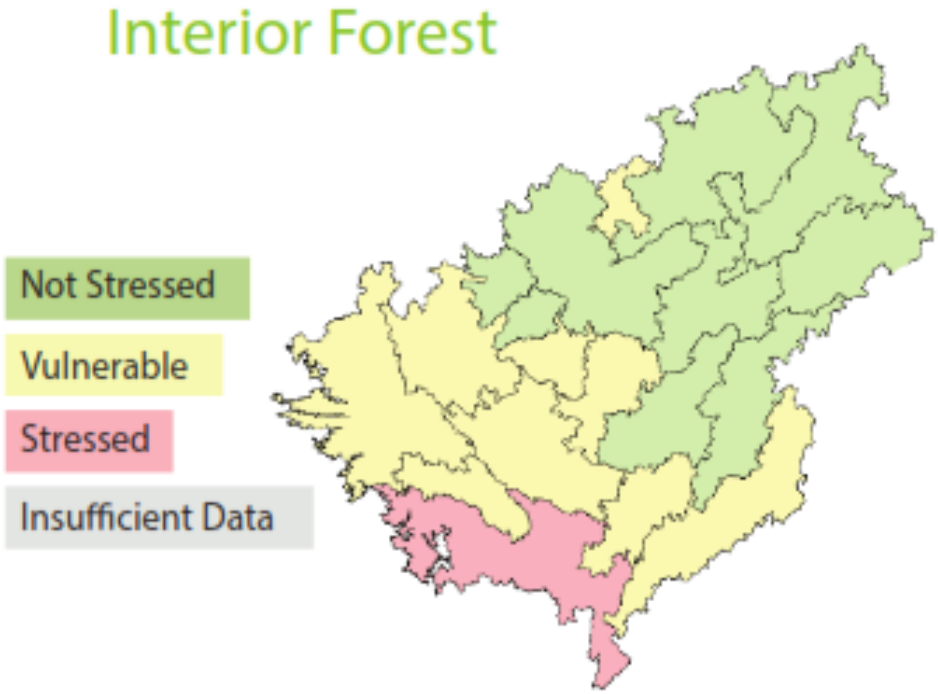
- Muskoka Watershed Report Card (2018)

Health

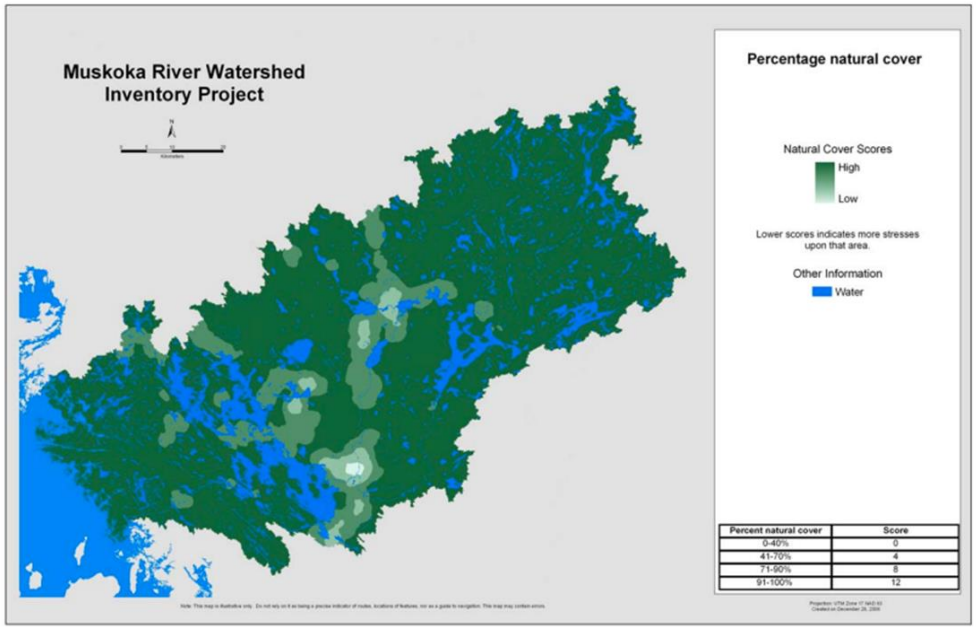
- Total Phosphorus
- Calcium
- Benthic Macroinvertebrates
- Interior Forest

Threats

- Climate Change
- Species at Risk
- Invasive Species
- Fragmentation

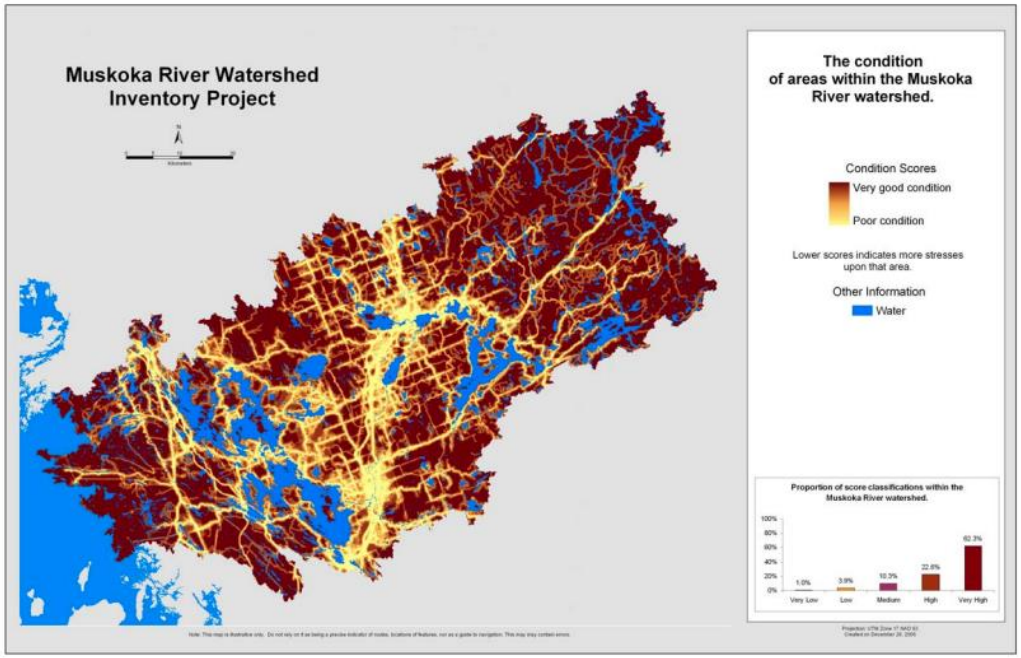


Health of the MR Watershed



- Much of watershed under natural cover
- Vast expanses of interconnected high quality habitat
- >50% of land protected vs. <10% aquatic systems

Health of the MR Watershed



- Watershed generally in very good condition
- Influence of roads, trails, agriculture, golf courses, and urban centres

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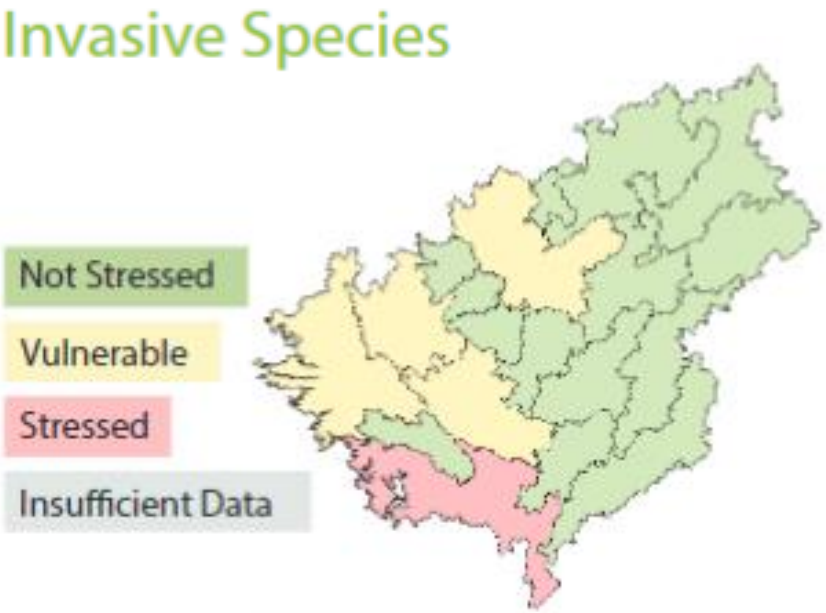
Health of the MR Watershed

- Muskoka Watershed Report Cards (2004–2018)
  - Watershed in relatively good shape
  - Water quality above provincial guidelines
  - High levels of natural cover
  - Many intact wetlands

  - Climate change
  - Invasive species
  - Species at risk
  - Calcium decline



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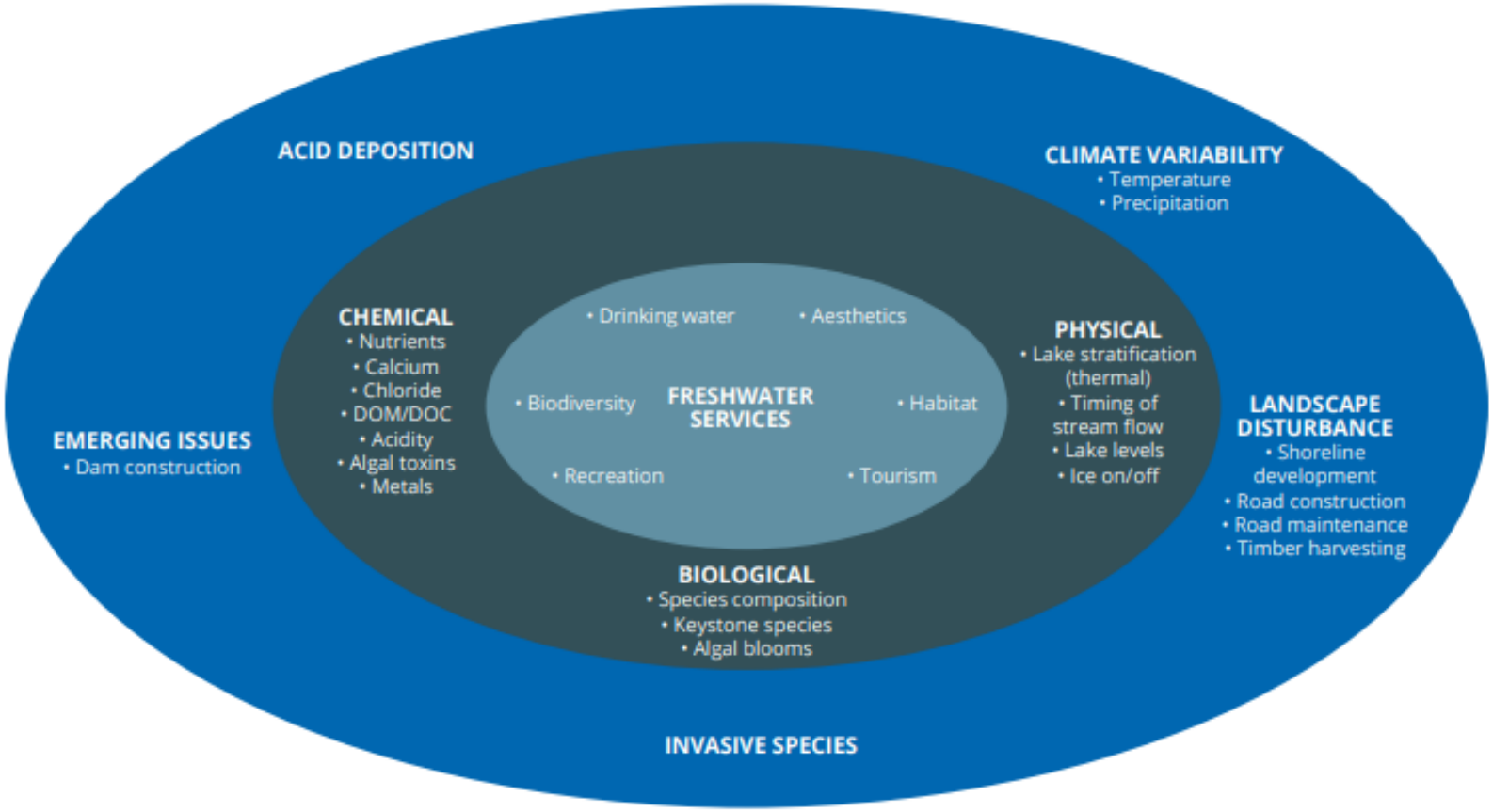

(From Eimers 2016)

Summary of Public Consultation

- *What are key features of the watershed?*

- A jewel that needs preserving
- Vast beautiful natural areas
- Intact forests and clean lakes that support tourism and economy
- Home to many cultures, including First Nations
- Eclectic mix of natural areas, small towns, and overdeveloped waterfront

Summary of Public Consultation

- *What are important issues of concern?*
  - Climate change: wildfire, flooding, algal blooms
  - Status quo land use planning and development
  - Affordable housing
  - Shoreline protection
  - Invasive species
  - Water quality
  - Cumulative effects: climate change, road salt, calcium decline

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Summary of Public Consultation

- *What indicators should be considered?*
  - Road density
  - Water quality
  - Biodiversity
  - Shoreline erosion
  - Forest health
  - Ice conditions
- Baseline information from Indigenous knowledge systems
- Citizen science and training of youth

Jurisdictional Review

- Conservation Ontario and 4 conservation authorities
- City of Greater Sudbury
- Ottawa Riverkeeper
- Government of Alberta
- US EPA

Conservation Authority Indicators

- Surface water quality (total phosphorus, chloride, E. coli, benthic macroinvertebrates)
- Forest condition (% forest cover, % forest interior, % forest riparian zone)
- Groundwater quality (nitrite + nitrate, chloride)
- Optional indicators: metals, calcium, iron (water quality), % wetland cover, groundwater quantity

Conservation ONTARIO
Natural Champions

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Ottawa Riverkeeper Indicators

- 14 indicators selected:
  - Biological: benthic macroinvertebrates, fish species richness
  - Hydro-morphological: water flow
  - Chemical and physical: total phosphorus, dissolved oxygen, water temperature, chlorophyll-a, water mercury
  - Threats to water quality: combined sewer overflows, blue-green algal blooms
  - Threats to habitat and biota: riparian connectivity, invasive species
  - Threats to water quantity, water quality, and habitat and biota: land use change
  - Climate change: timing of ice on/off

Indicator Selection

- Longlist of 28 indicators
  - Water quality: 11 indicators
  - Water quantity: 1 indicator
  - Forest condition: 6 indicators
  - Wetland condition: 1 indicator
  - Shoreline condition: 1 indicator
  - Development and land use change: 4 indicators
  - Climate change: 1 indicator
  - Species at risk: 1 indicator
  - Invasive species: 1 indicator
  - Cumulative effects: 1indicator

Indicator Selection

- Water Quality
  - Total phosphorus
  - Dissolved organic carbon
  - Dissolved oxygen
  - Calcium
  - Chloride
  - Total suspended solids
  - Water temperature
  - E. coli
  - Benthic macroinvertebrates
  - Blue-green algal blooms
  - Fish species richness

Indicator Selection

- Water Quantity
  - Water flow (minimum and maximum river flows, ratio of maximum to minimum flow)
- Forest Condition
  - Soil acidity
  - Calcium
  - Tree photo archive
  - % Forest cover
  - % Forest interior
  - % Forest riparian zone
- Wetland Condition
  - % Wetland cover

Indicator Selection

- Shoreline Condition
  - Riparian photo archive
- Development and Land Use Change
  - Riparian connectivity
  - % Land cover
  - Road density
  - Fragmentation
- Climate Change
  - Time of ice on/off

Indicator Selection

- Species at Risk
  - Number of species at risk
- Invasive Species
  - Number of invasive species
- Cumulative Effects
  - Muskoka River water quality

Considerations for Shortlist (and Beyond)

- Use a standardized approach to narrow down longlist based on consultation with CRT, local scientific experts, and other stakeholders
- Investigate development and use of indices

Considerations for Shortlist (and Beyond)

- Engage and collaborate with local Indigenous communities to identify indicators, gather baseline information, and involve youth in monitoring
- Involve citizen scientists in monitoring

Thank you!