MONITORING AQUATIC ENVIRONMENTS

Using Indigenous Knowledge and Western Science in Conjunction

Session 6

Richard Nesbitt, Neil Hutchinson
Hutchinson Environmental Sciences Ltd.

Heidi Klein
Sanammanga Solutions Inc.

Luis Manzo
Kivalliq Inuit Association

Inuu'tuti: Baker Lake Aquatic Cumulative Effects Monitoring Program

Overall Goal: Establish a strong aquatic cumulative effects monitoring program for the Kivalliq region that includes Traditional Knowledge and Western Science approaches – "One Voice"

Science Questions

- Are current conditions acceptable?
  - *If not what are the causes?*
- Is the Baker Lake watershed changing?
  - *If so, what are the causes?*

Community Questions

- Is the water safe to drink?
- Are the fish good to eat?

Approach

Year 1: 2015-2016	Year 2: 2016-2017	Year 3: 2017-2018
Identify **key VECs** in the aquatic environment and **traditional Inuit uses** associated with each	Confirm **key Inuit uses** associated with each VEC	**Coordinate** collecting of TK observations and scientific measurements.
Determine **TK measurement indicators** associated with each VEC	Refine **TK measurement indicators** of determine **common indicators** between the two knowledge systems	**Correlate measurements** collected by each knowledge system to determine how measurements collected by one is represented by the other
Identify conceptual thresholds for continuation of each use.	Identify **characteristics of water and fish** that are desirable and undesirable, and the **locations** where they occur.	Define **normal conditions**, and those indicating degradation or a **divergence** from them. Identify TK **thresholds** for discontinuing traditional uses

Approach

Interviews and literature

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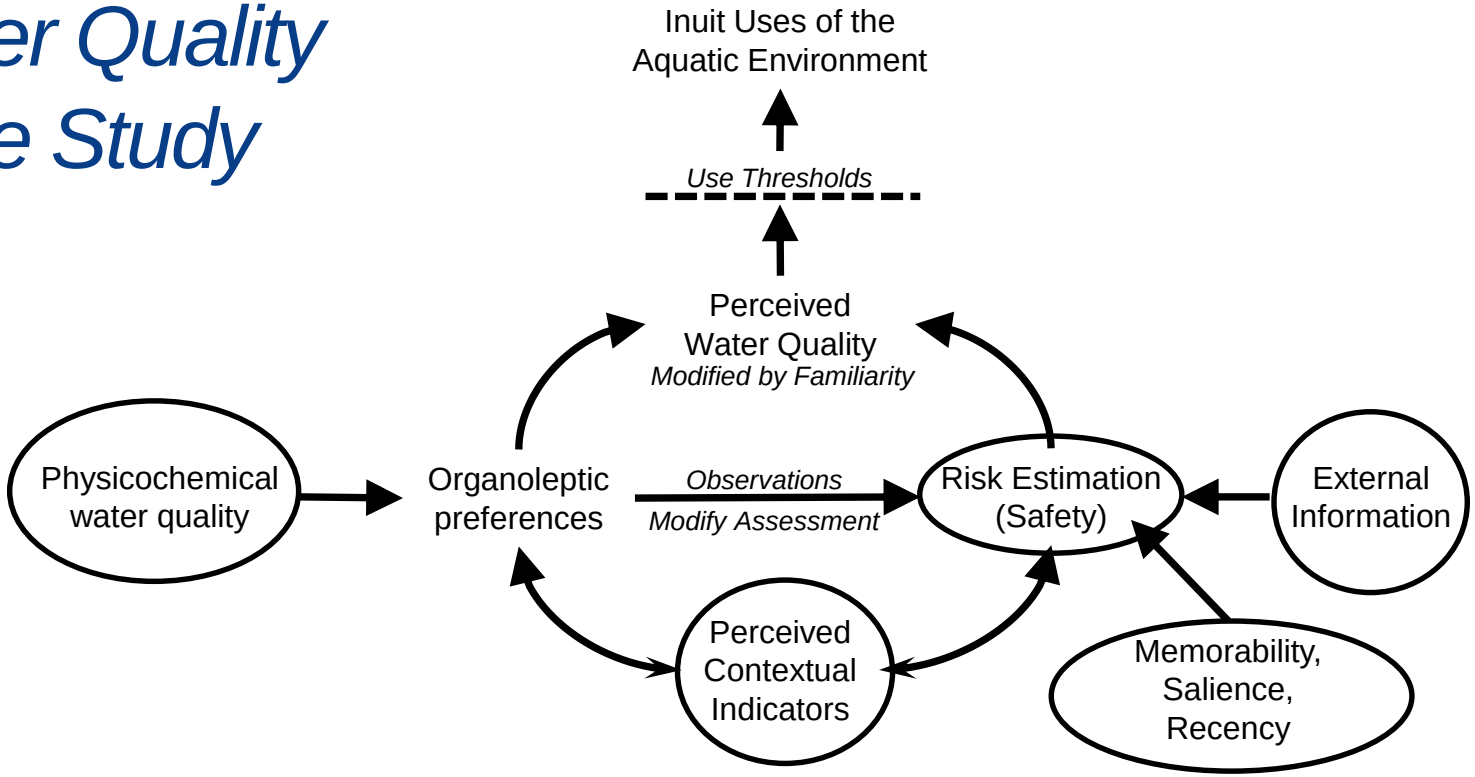
Key VECs and Uses

VEC	Water Quantity	Water Quality	Fish
Inuit Use	• Transportation by boat • Access to traditional routes	• Hot beverages (tea, coffee) • Drinking water • Cooking water • Washing	• Harvesting fish • Consuming fish
Conceptual Threshold	Changing methods of transportation and altered route access	No longer acceptable for consumption or washing	Significant decline in catch per unit effort. Undesirable size, condition, fat content or appearance.

- Each use is assessed through TK indicators
- These can be linked to western science indicators and complimented by western science evaluations

Evaluations

Water Quality Case Study



- Measurement indicators which can be measured through both TK and western science are **Common Indicators**

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Common Indicators

Indicator Types	TK Measurement Indicators	Western Science Measurement Indicators	
Taste & smell (Organoleptics)	Taste of “land”	Organic carbon	Nutrient concentrations
		pH	Chlorophyll a
		Conductivity	
	Saltiness	Conductivity	Hardness
		Salinity	Alkalinity
		Chloride, sodium	
	Fishy smell	Specific algal community	Chlorophyll a
		Nutrient concentrations: nitrogen species, phosphorus	
	Water is "refreshing"	Salinity	Chloride, sodium
		pH	Temperature
		Copper, iron, manganese, sodium	Hardness
		Total suspended solids	Turbidity
		Total dissolved solids	Flow

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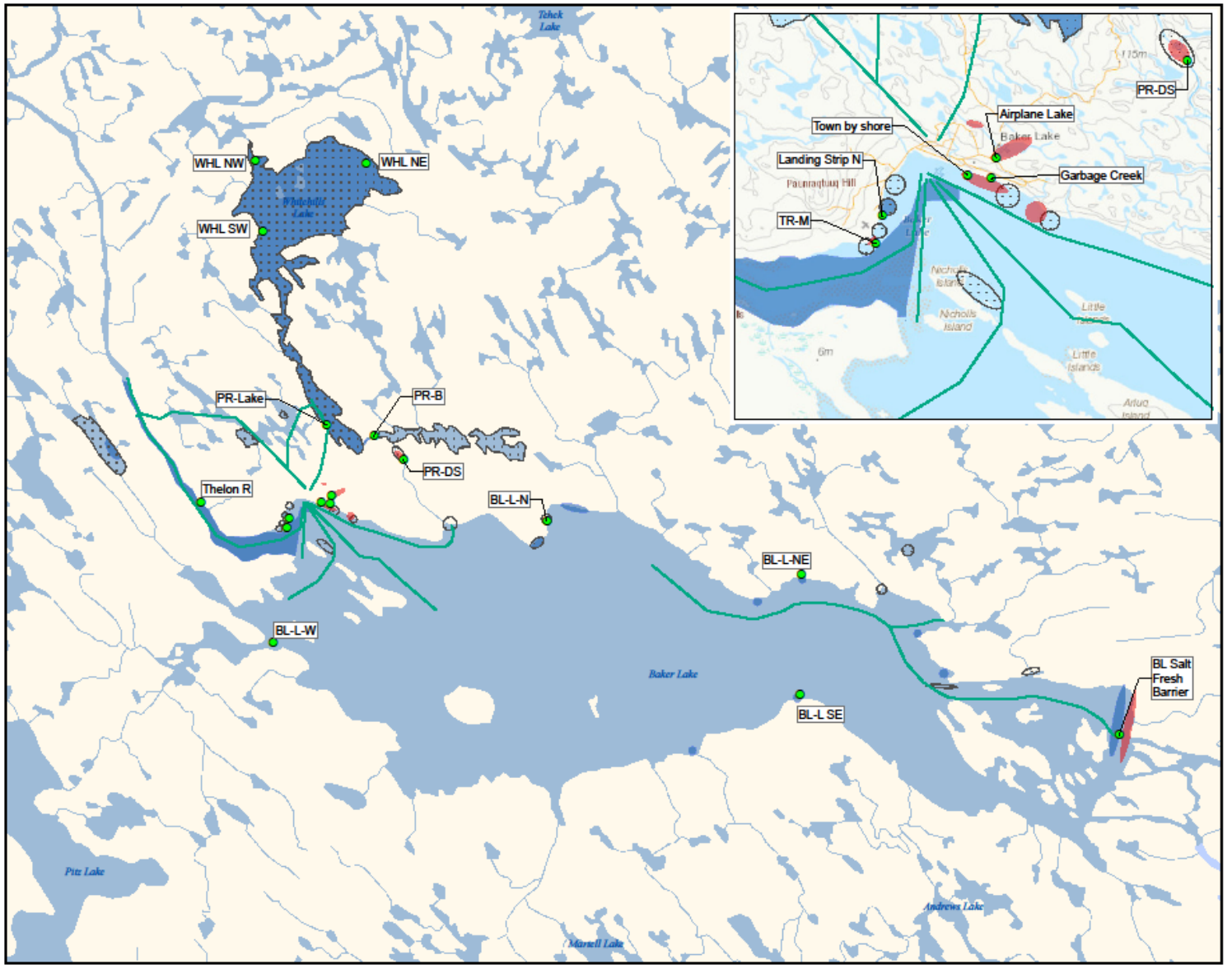

Figure 1:
One Voice Field Sites

- Sample Location
- Waterbody and Stream

Drinking
- High Quality Drinking water Areas
- Degraded Drinking Water Areas

Fishing
- High Quality Fishing Areas
- Degraded Fishing Areas

Travel
- Travel Routes

0 2 4 8 12 16 km

Prepared by: Eric Dilligeard
Data Source: HESL, CBM, Geogratis
Coord. System: Canada Lambert Conformal Conic

Project Lead: Richard Nesbitt
Project: One Voice
Project#: J170068

February 2017

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Approach

Interviews and Field Samples

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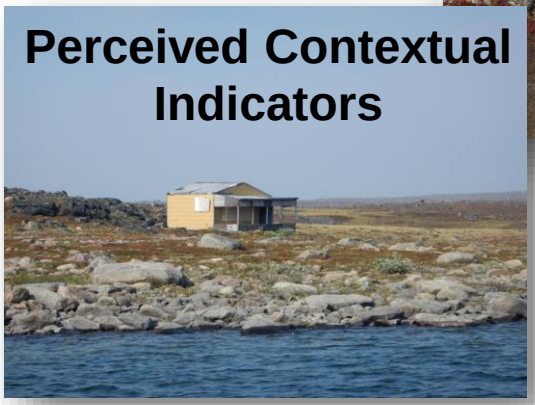
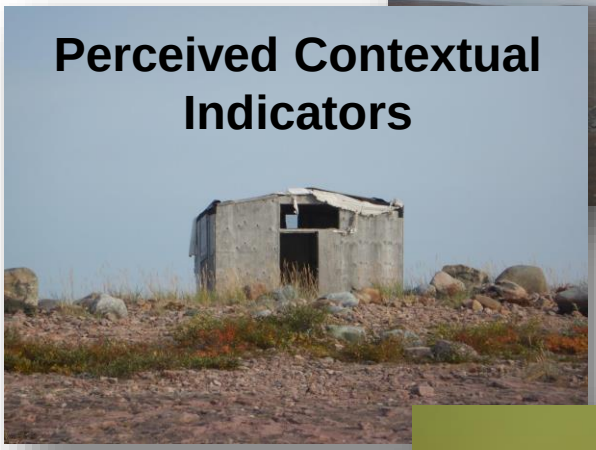
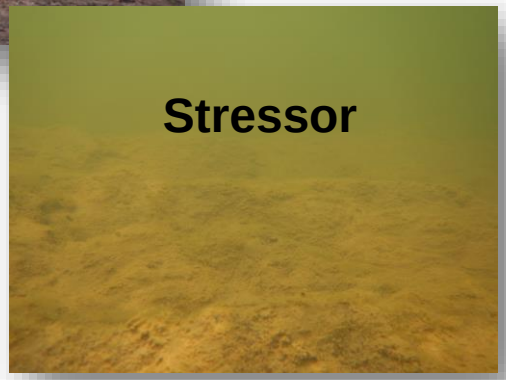
Site Types

Acceptable



Unacceptable





Site Types

Acceptable

- No taste
- With a taste
- Greater proportion of parameters above detection limit

Unacceptable

- Stressor linked

- Perception

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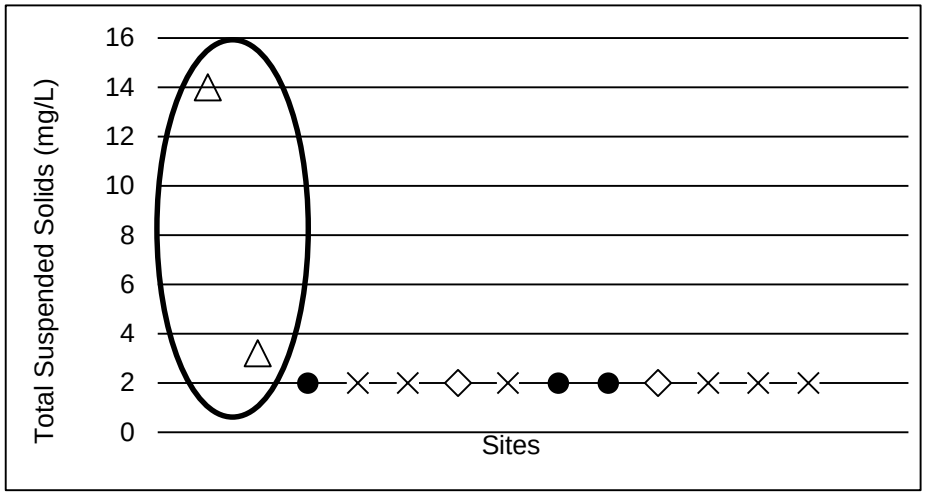
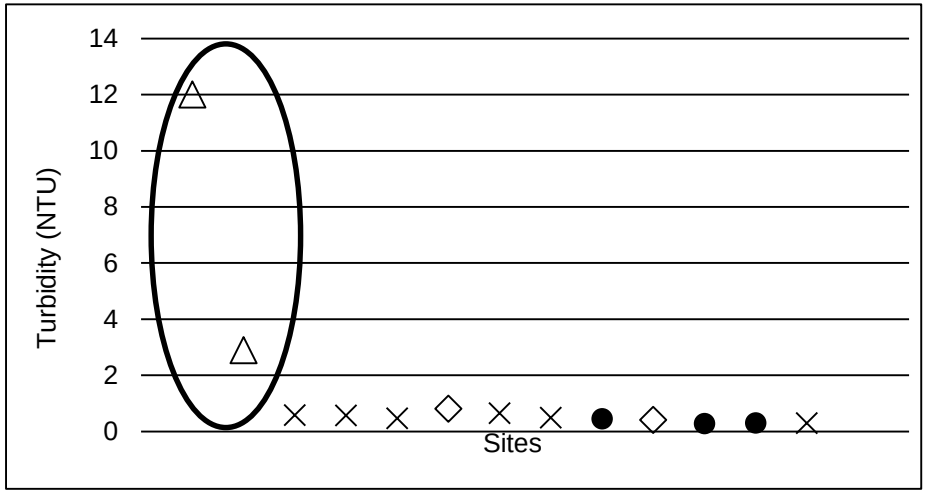
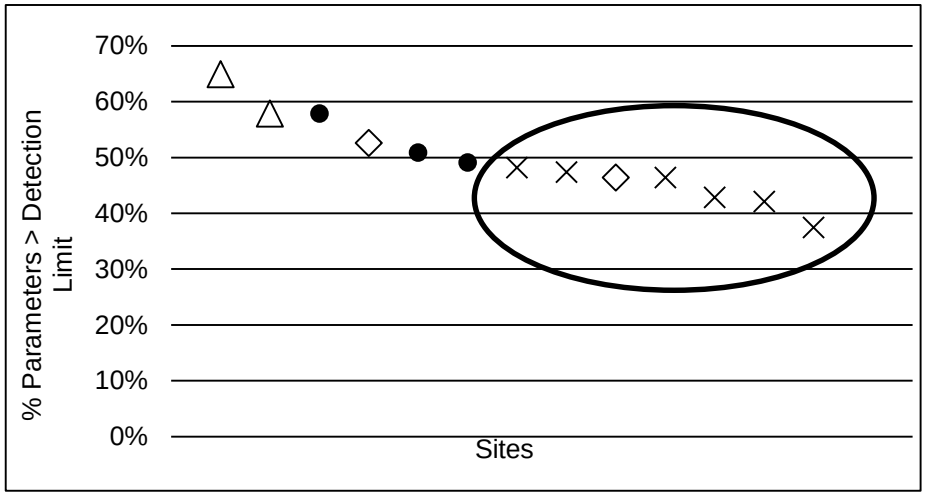
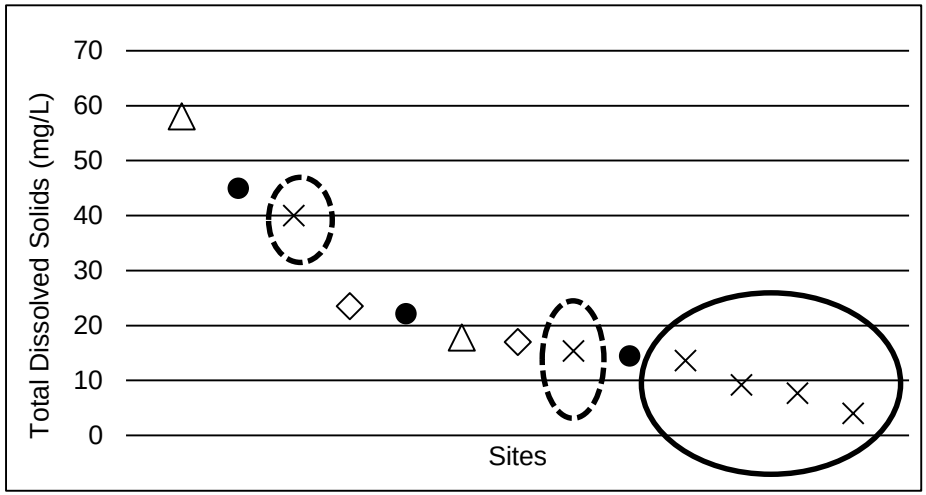
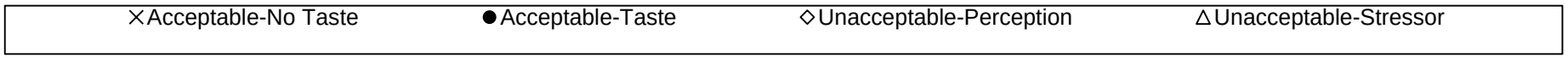
TK-Science Correlations











Interpretations: TK Baseline Monitoring

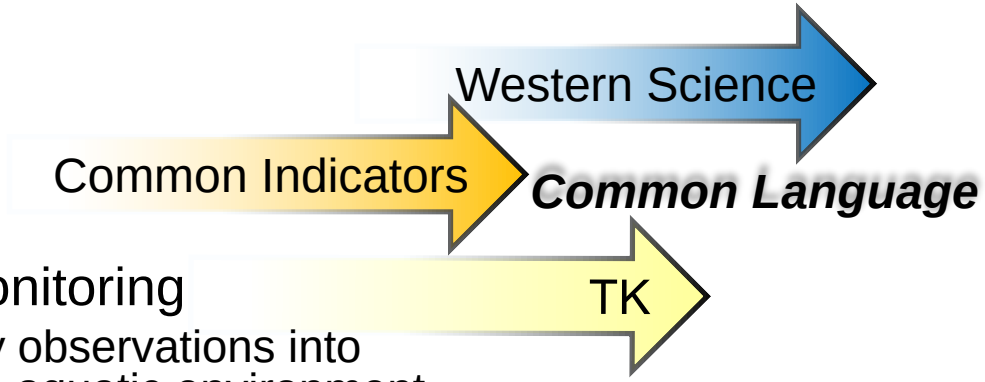
- Difficult to link individual parameters to reported taste
  - Organoleptic preferences vary by individual and region
  - Confounds are prevalent
  - Difficult to establish consistent thresholds

- Reports on intensity of taste are more consistent
  - Lack of taste indicates generally lower concentrations
  - Presence of taste indicates an increase in concentrations
  - Some parameters are known organoleptics

- Small changes in turbidity/TSS can be distinguished

- Observed changes are salient memories
  - Changes in where people use the environment
  - Changes in where taste is or isn’t noticed

Applications



- Community Based Monitoring
  - Incorporate community observations into monitoring plans of the aquatic environment
- Education and New Translations
  - Develop translations for modern concepts
  - Facilitate improved understanding of interactions between potential project activities and the environment
- Improved Consultations
  - Regulatory: specifically address parameters influencing local organoleptic preferences and risk evaluation
    - Discharge criteria
    - Monitoring parameter suites
    - Require mitigation measures
  - Land Use Planning: Full impact of management decisions
    - What aspects the aquatic environment can be permitted to change?
    - Can we have a land use that doesn't impair the aquatic environment?

FUNDING

POLAR Knowledge Canada

Nunavut General Monitoring Plan
Nunavunmi Tamainni Takuurivangnikkut Parnaiyautaanni
Plan de surveillance générale du Nunavut

KIA

Hutchinson
Environmental Sciences Ltd.

Neil Hutchinson, Ph.D. | Principal Scientist
Neil.Hutchinson@environmentalsciences.ca

Richard Nesbitt, M.Sc. | Aquatic Scientist
Richard.Nesbitt@environmentalsciences.ca