



Monitoring
Priority Area



The role for alternative perspectives for looking at deposition patterns, potential sources and data gaps from recent oil sands monitoring studies



Recent CBC article related to US election



Social media is blinding us to other points of view
Everyone saw a different reality during the U.S. election, depending on their own opinions


“we need to actively work to understand complexity, respectfully engage people where they’re at, and build the infrastructure to enable people to hear and appreciate different perspectives. This is what it means to be truly informed.”



COSIA Perspective

- ♦ What I am going to try to do today is provide a perspective on the lens that COSIA looks through data at
 - What should companies pay attention to?
 - Is company “X” producing a discernable effect or is it a broader issue?
- ♦ Work at the interface between the regional and the site-specific
 - Trying to understand changes to practices to collectively or individually make improvements
- ♦ Be careful to not only look through one lens
 - Trigger workshop*

- Key becomes – What is the question you are asking?



Not a new discussion...



Prior to COSIA worked for 25 years on the government and academic science side looking at pulp mill impacts



Not a new discussion...

CHAPTER 4.1
Ecological Assessment of Pulp Mill Impacts: Issues, Concerns, Myths, and Research Needs

Kelly R. Mankitnick, Olof Sundström

Abstract: The types of ecological assessments that are being conducted near pulp mill discharges have changed over the past decade, largely as a result of discussion between industry, government, and academic researchers. In spite of the adjustments in the study designs, there are still some differences in perspective that affect the interpretation of studies. The differences stem largely from a justified reluctance to make process decisions or regulatory adjustments based on traditional academic, hypothesis-driven evidence. However, the differences in perspectives can strongly affect the design of ongoing studies. There are some limitations associated with how hypotheses are being formulated, and there are problems with study design and interpretation that can affect the confidence with which results are interpreted. The major issues affecting hypothesis structure are the tendency to accept a null hypothesis related to chemistry or individual chemicals alone. The issues surrounding study design relate to the wide acceptance of approval hypotheses regarding a number of factors, including responses to secondary treatment, reductions in chlorine use, and the identification of the responsible compounds. Interpretation can be biased by the selection of reference sites and by the issues of natural variability and the ecological relevance of measured responses. Many of the (Södergren 1989) been confirmed a dominant concern some effluents to fish. Impacts on the gonadal the secondary set the laboratory (K the field (Chapter 5-1). The impacts appear to operate through changes in the ability of fish to control their production of steroid hormones (Van Der Kraak et al., 1988). The field responses have been recorded, so far, only in studies conducted in Canada, Sweden, and at sites in the U.S. exposed to high concentrations of effluent. There are no identified reasons to expect the impacts to be geographically limited, but there is a paucity of reproductive-based studies in other regions.


Written in 1997 from a gov't scientist position trying to understand differences between gov't, academic and industry scientists and how they look at data



Major lesson learned


My years in pulp mill studies taught me I needed to understand industry questions & terminology if I wanted uptake

- A better understanding of facilities, activities would help in many cases
 - Lack of awareness of past activities and potential influences
 - Processes and equipment incorrectly described
 - Upgraders mis-plotted on maps on COSIA wall and in many studies




Major lesson learned [CONT]

- Improving the awareness of the process would help
 - There are a lot of waters *confused* with OSPW- connate water, fine fluid tailings release water, extraction waters, dyke drainage and seepage collection waters, transport water, mine site run-off water, depressurization water, etc...
 - SAGD vs CSS vs CHOPs
 - Delayed coking, fluid coking, solvent deasphalting
 - Naphthenic versus low temperature paraffinic versus high temperature froth treatment
 - Hydroconversion, hydrotreating, and hydrocracking
 - *Don't have to become an engineer, but need to be aware of the terminology so you can describe what you are doing and where you are working in language industry understands*



We need to focus on making the outcome of the science ACTIONABLE


- JOSM was meant to get more sensitive monitoring into the oil sands
 - Lots of good data coming out
 - Work through a series of examples
 - How we at COSIA look at data and why it is important to understand how we look at it
 - Equally important to understand how other stakeholders look at it



We look for change

What should companies pay attention to and when should they alter within fence line monitoring?

- Try to define change and to separate
 - Expected from unexpected
 - Stable or getting worse
 - Change which is stable is a question of acceptability
 - Does someone have to fix it?
 - Change which is getting worse is a question of sustainability
 - After some time or at some level, degradation is likely to affect something important
 - Is it site-specific, local or regional



The ultimate goal:
A monitoring system capable of finding site-specific, local and regional change that is unusual

USGS Current Water Data for the Nation

Daily Streamflow Conditions

Selection: Texas

Monday, November 04, 2013 10:56:57

Explanation

- > 90th percentile
- 70th - 90th percentile
- 50th - 70th percentile
- 30th - 50th percentile
- < 30th percentile
- No rank

The colored dots on this map depict streamflow conditions as a percentile, which is compared from the period of record for the current day of the year. Only stations with at least 20 years of record are used. The same colors indicate other stations that reported ranked or percentiles either because they have fewer than 20 years of record or because they report parameters other than streamflow. Some stations, for example, measure stage only.

Tiered and triggered to focus attention

What does it mean?

Environ Monit Assess (2016) 188:542

PAC mass deposition (kg)

Year

Adapted from Manzano et al. 2016

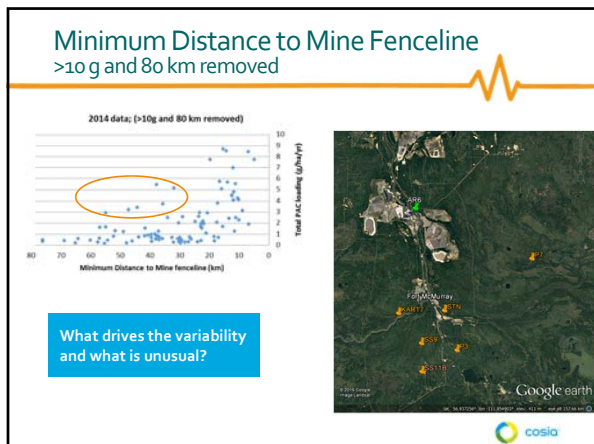
- What is driving the variability?
 - Amount of wind?
 - Timing of wind?
 - Production?
 - ????

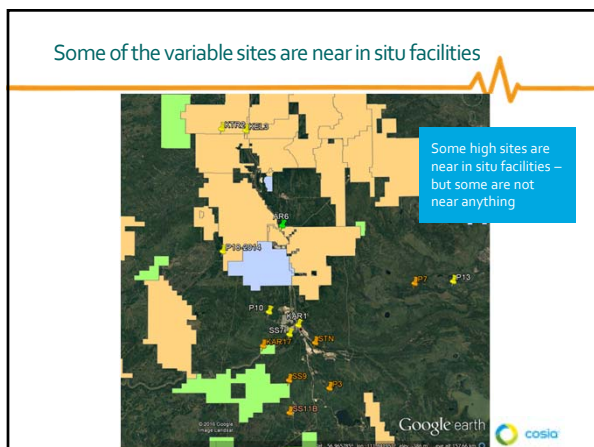
If we understand what drives variability, we can make predictions?

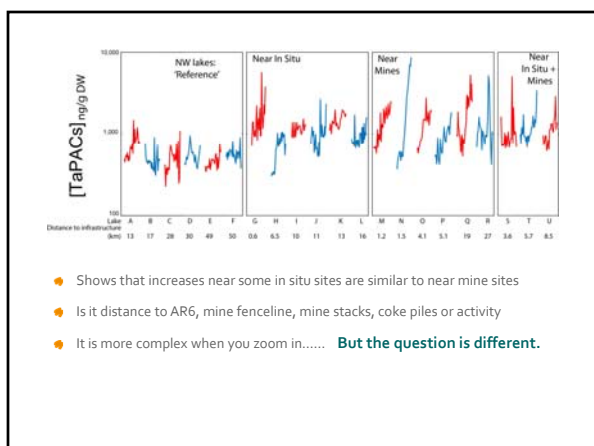
What do we do with data?

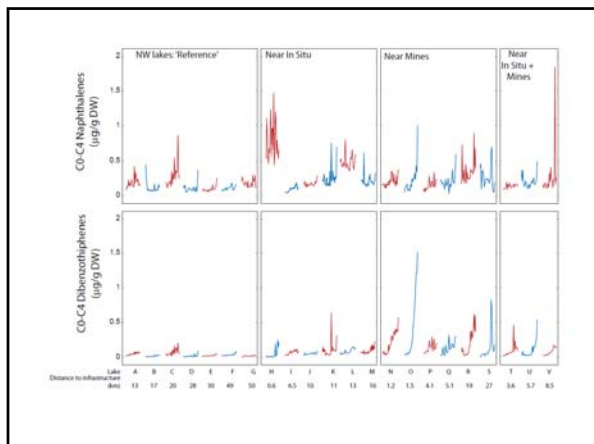
- Screening
- Test assumptions
- Develop triggers and look for change outside of normal
- Look for context
 - Integrate across studies
- Our scientific ignorance can be a blessing – no preconceptions

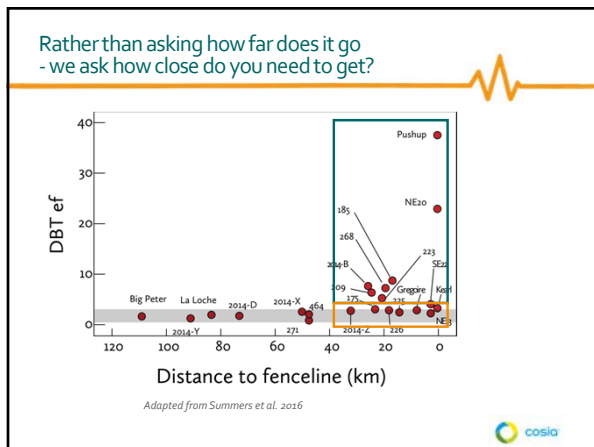
cold eyes

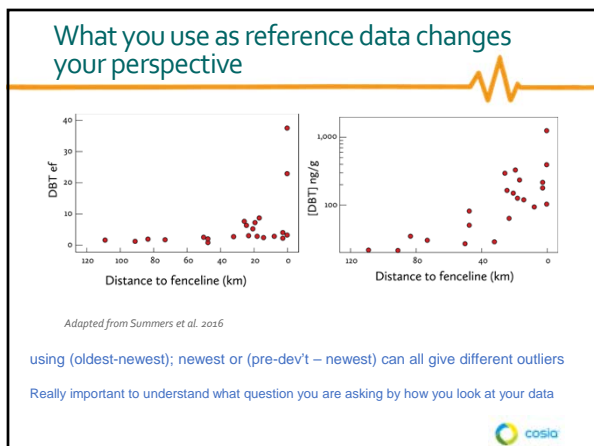




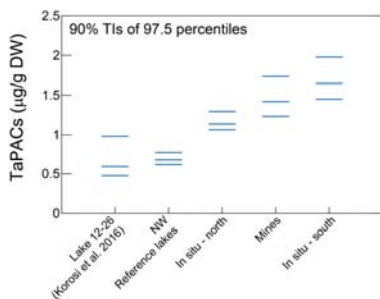








Baseline and triggers can provide context



Adapted from Korosi et al. 2016 and Brooks et al. 2015



- Understanding change at site-specific, local and regional levels using standardized triggers and a tiered approach can provide testable hypotheses, logical next steps, and the focus needed to provide actionable outcomes
- Understanding variability allows you to make predictions



Thoughts

- Interpretation is affected by the question you are asking and can be affected by the approach and assumptions used for visualizing and analyzing data, the baseline used for comparison, and the tools used for determining significance
- Developing testable hypotheses for future work within a tiered framework could be improved by
 - a structured interpretation framework
 - better integration across components
 - an improved understanding of the layout and location of facilities and specific activities
- A structured framework and tiered approach can evaluate consistency, variability, and relevance, and focus attention on potential areas of concern
- Different perspectives and approaches applied to the same data can generate productive conversations to bring a broader understanding of data