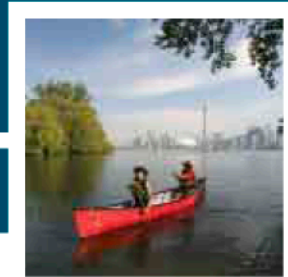


# Jackfish Bay Monitoring Update



**Kay Kim**  
**Environment and Climate Change Canada**  
**October 2016**

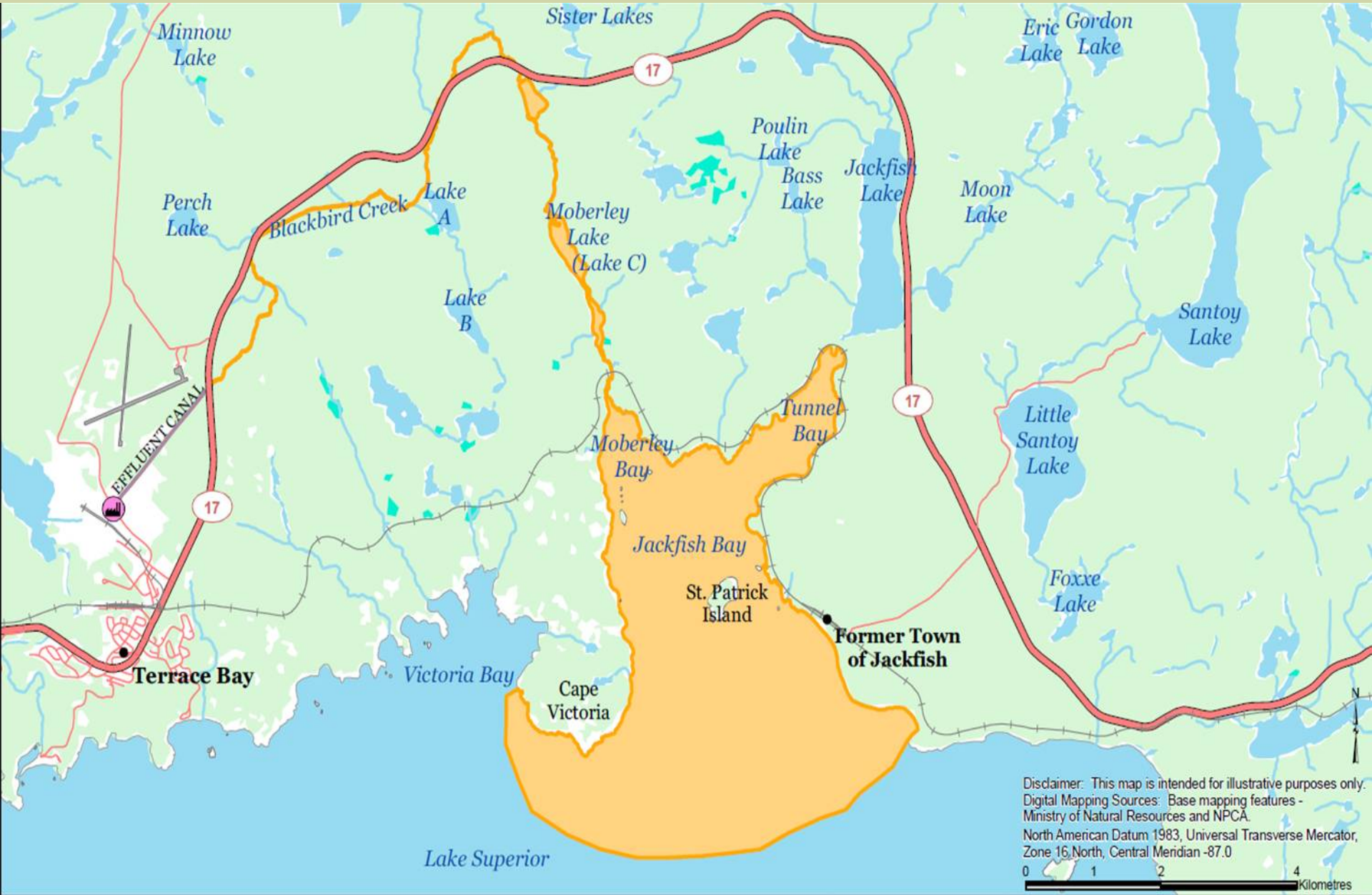
Canada

 Ontario

# Outline



- 1. Background**
- 2. ERA and EC Study Results**
- 3. Next Steps**



Disclaimer: This map is intended for illustrative purposes only.  
 Digital Mapping Sources: Base mapping features - Ministry of Natural Resources and NPCA.  
 North American Datum 1983, Universal Transverse Mercator, Zone 16, North, Central Meridian -87.0  
 0 1 2 4 Kilometres

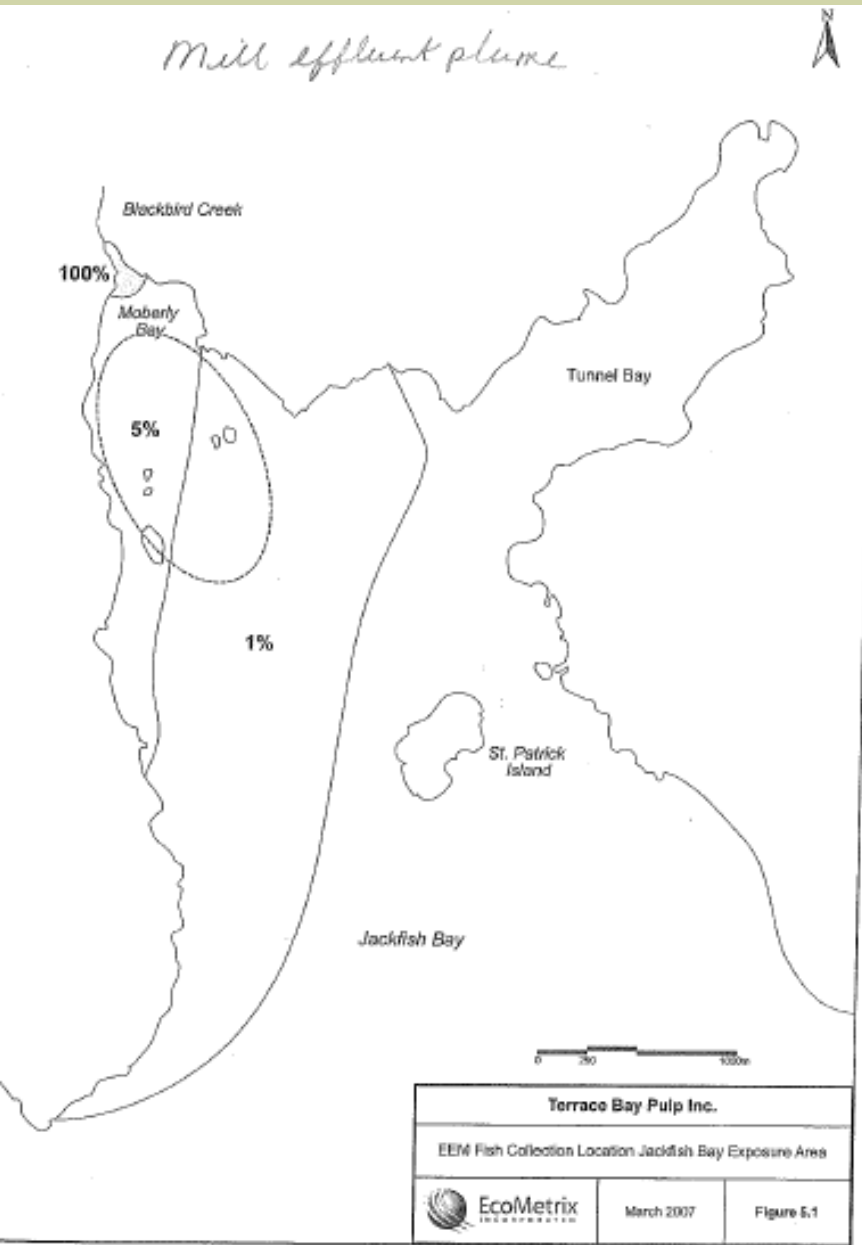
- Legend**
- Pulp Mill
  - Railway
  - AOC
  - Hydrology
  - Major Highways
  - Effluent Canal
  - Wetlands
  - Forest Cover
  - Roads
  - Airport



**Great Lakes  
Areas of Concern**

**Jackfish Bay Area of Concern**

## Mill Effluent Plume Study – EEM (2007)



- Shape of effluent plume is highly variable and influenced by wind and wave action.
- Effluent is generally diluted to 5:1 within 500m from the mouth of BB Creek.
- 20:1 dilution encompasses a narrow band along the western shoreline for a distance of approx. 3.5 km.
- 1% plume limited to JB, along the westerly shoreline extending as far as Cape Victoria.

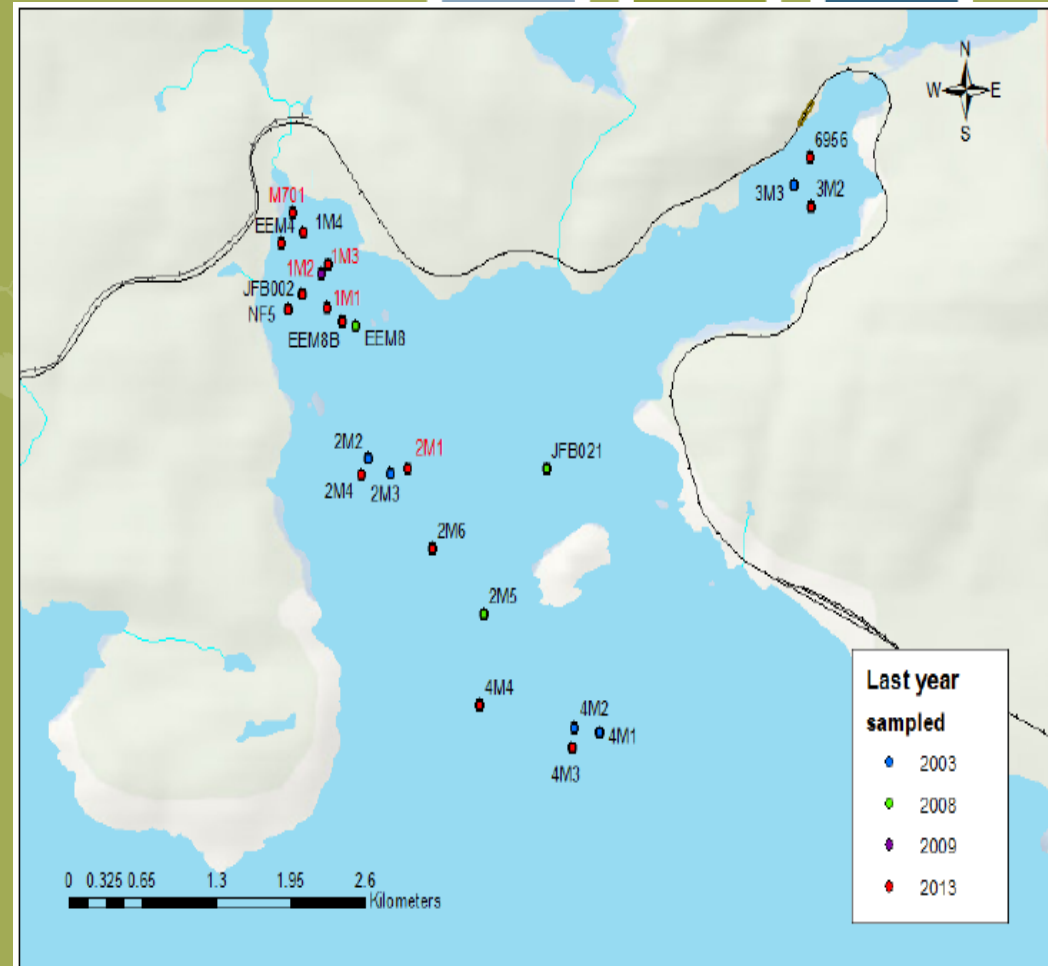
# Ecological Risk Assessment (ERA)



- ERAs are intended to predict what the effects of contaminants would be to species that could come into contact with them.
- ERAs are used where direct measurements of effects cannot be made, or where potential effects in the future need to be assessed.
- ERAs are not definitive predictions, but are educated guesses that are based on a number of assumptions. The predictions are only as good as the data available.
- If these assumptions are very conservative, risks may be predicted where none would actually be likely.

# Data used in ERA – EC's Sampling Locations

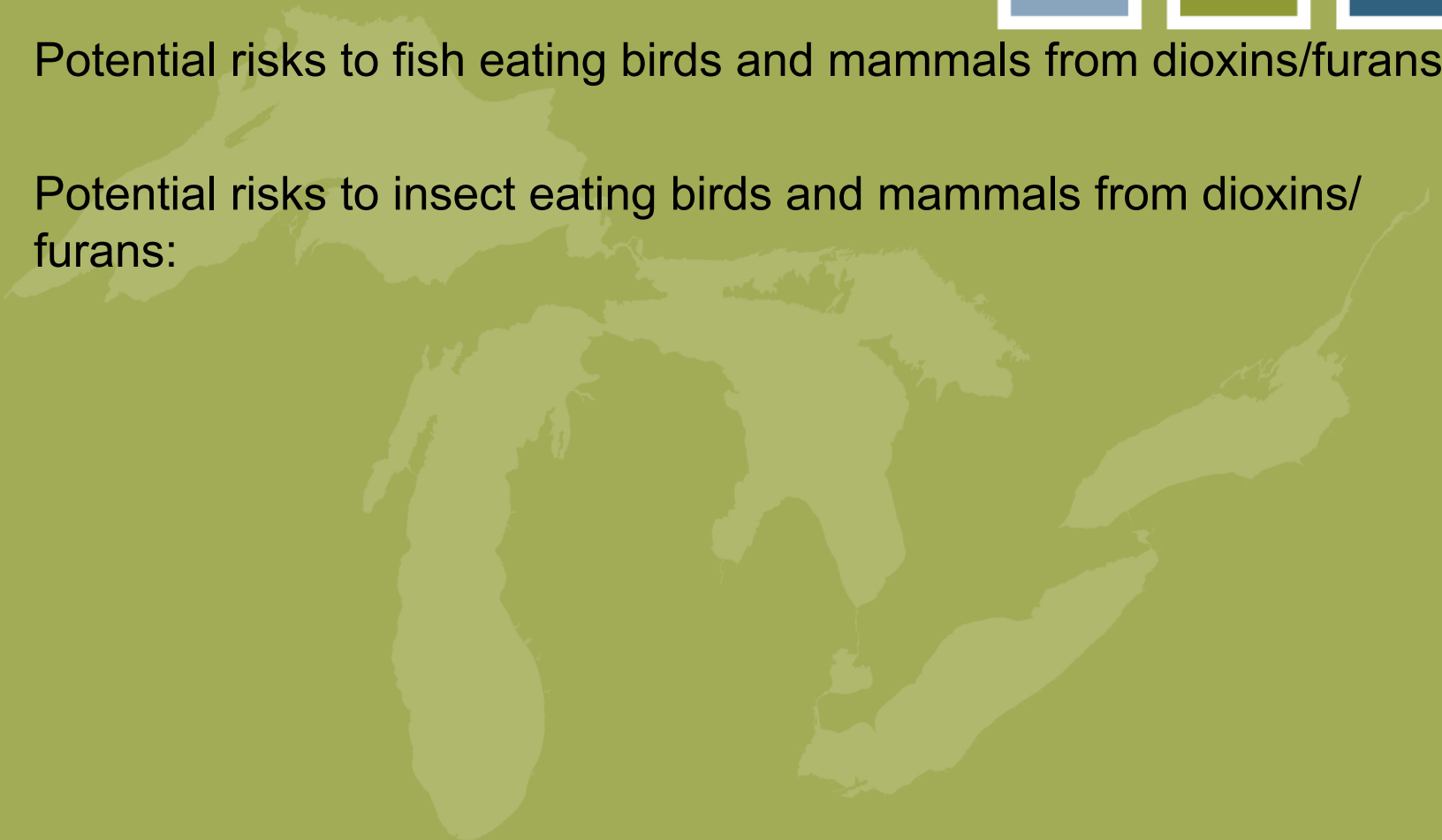
- All sampling years included sediment analysis, benthic community assessment, and sediment toxicity studies.
- Not all stations were sampled in every year. Sampling was focused in Moberly Bay.
- Three benthic species were collected for tissue analysis of dioxins and furans in 2008 and 2013.



# Key Findings from ERA

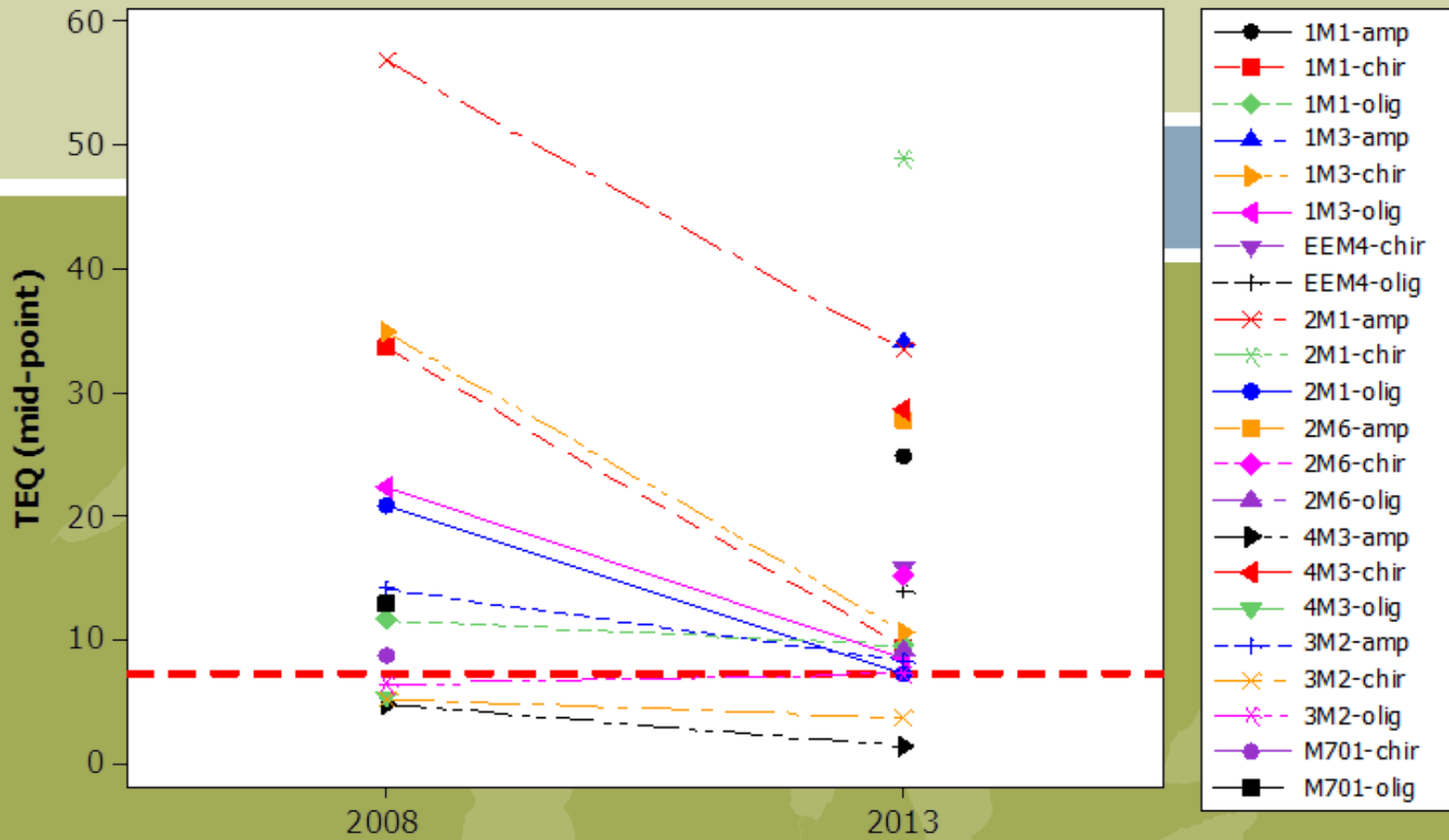


- Potential risks to fish eating birds and mammals from dioxins/furans
- Potential risks to insect eating birds and mammals from dioxins/furans:





## Benthic Tissue PCDD/F TEQ vs Site by Year



**Figure 11.** Temporal trends in Jackfish Bay invertebrate tissue dioxin and furan (PCDD/F) concentrations, expressed in toxic equivalents (TEQ) from 2008 to 2013. The TEQ was calculated using  $\frac{1}{2}$  the method detection limit for non-detects (mid-point TEQ). The red dashed line represents an avian Reference Concentration of 7.3 pg TEQ/g ww (see text for details).



# Sediment Trap Study



- Objective – to assess contaminant levels in suspended sediment
- Deployed sediment traps at two depths (8 m and 13 m from surface)
- traps were deployed Sept 22, 2013 and sample collected June 2014.
- The second set of data are from the refurbishment (June 2014) to October 2014. ↑
- **D/F detected in the trapped sediments.**

# Sedimentation Rate



- Approx. 2 mm/year (Dahmer et al 2015)
- Used top 2 cm of sediment and the results shows clean material is accumulating (Dahmer et al 2015)
  - The Dahmer data show that dioxin/furan concentrations are decreasing, and that monitored natural recovery is occurring through accumulation of newer, cleaner material.

# Overall Conclusions



- Sediment concentrations of dioxins and furans are decreasing with time. Recent sediment data show much lower concentrations of these substances at the top 2 cm.
- Benthic communities show signs of organic enrichment.
- D/F levels in benthic invertebrate tissue are decreasing but levels are above avian Reference Concentration and the maximum TEQ for Lake Superior reference sites indicating potential risk.

# Next Steps



- D/F detected in suspended sediment – assess the amount of D/F coming in from BB Creek if any
- Assess D/F in sediment at 2 cm interval to assess the quality of new sediment deposition.
- Assess how long it is going to take to recover to acceptable levels.

# Need more information?



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