Environment and Climate Change Canada | Environnement et Changement climatique Canada

ENVIRONMENTAL QUALITY GUIDELINES

Georgia Strait Alliance
May 12, 2021

Presenter

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Canada

THE PROBLEM

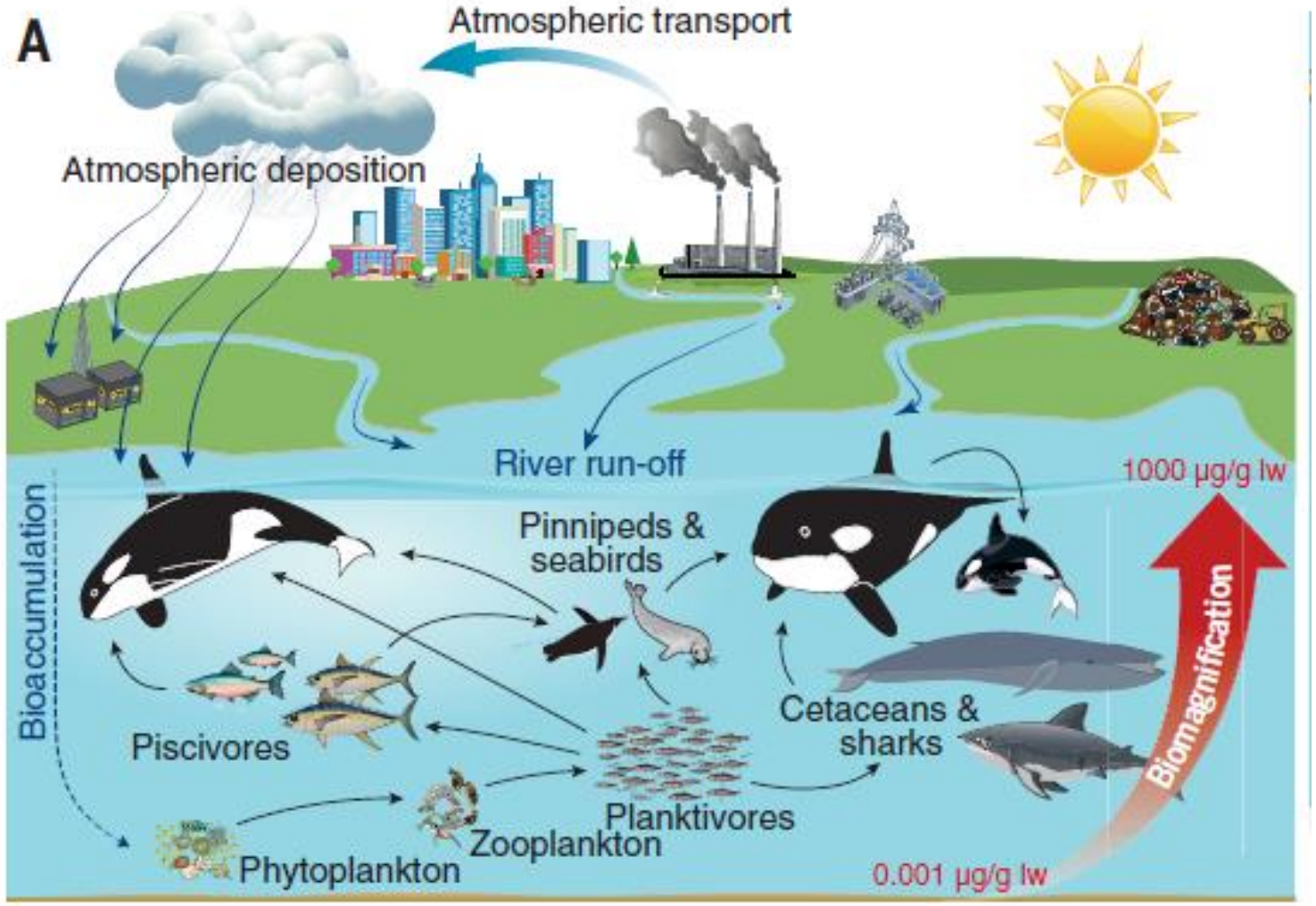

Fig. 1. Global PCB concentrations in killer whales. (**A**) Conceptual model of PCB bioaccumulation and magnification, leading to elevated PCB concentrations in killer whale populations. (**B**) Global overview of PCB concentrations in killer whale blubber (ppm, parts per million).

From: Desforges et al. 2018

Food intake is the primary source of Persistent Organic Pollutant (POP) exposure for marine mammals

THE GOAL

Protect the environment from the effects of these contaminants

→ Identifying ‘safe’ levels in the environment can aid this effort

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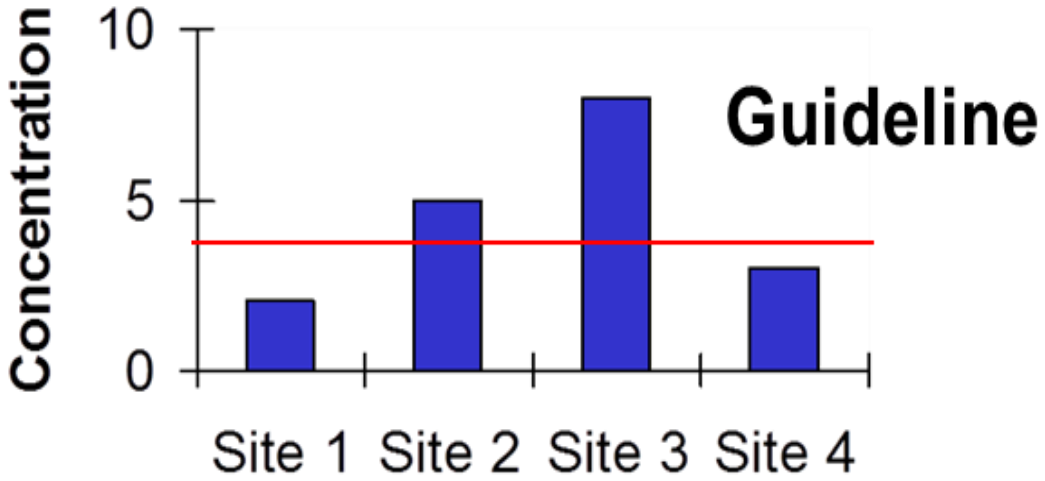
WHAT ARE ENVIRONMENTAL QUALITY GUIDELINES?

- Science-based thresholds for environmental protection
- Based purely on toxicity data
- Voluntary unless prescribed in permits or other regulatory tools, but create expectations
- Protective and preventative
- Publically available

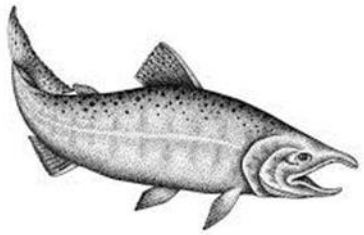


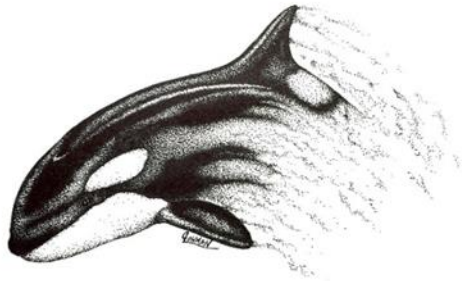
THE ROLE OF ENVIRONMENTAL QUALITY GUIDELINES

One tool in the toolbox – to be used within a decision-making framework

We can use them to:

CONSIDERATIONS





- Two ‘receptors’ of concern
  - Orcas and prey (i.e. chinook)
- Many contaminants of concern
  - Some non-bioaccumulative and some bioaccumulative
- Guidelines exist for most but not all contaminants
- Existing guidelines protective of prey, but none developed specifically for the protection of apex marine mammals (like orcas) from bioaccumulative substances

Environmental Quality Guidelines Spreadsheet

Recommended Environmetal Quality Guidelines for the Protection of Southern Resident Killer Whales and their Prey

Legend: Interim

line no	Substance	CUP?	Bio-accumulative ?	Chemical of Concern Tier (Alisha's List)	Compartment	Reference	Value	units	Method	Comments	Recommended Value	Rationale/R
1	Atrazine	Yes	No	Chinook- tier 1	Freshwater	CCME 1989	1.8	µg/L	derived by multiplying the lowest MATC (based on NOEL and LOEL of model ecosystem study) of 17.9 µg·L-1 by a safety factor of 0.1		1.8 µg/L	CCME guideline an any reason to belie different in salt wate as well.
2	Atrazine	Yes	No	Chinook- tier 1	Sediment (Fresh W)	EPA, 2004	6.62	µg/kg dw	Values derived from the EqP method with Region 3 marine values (2004) and log Kow values from Karickhoff and Long (1995).		6.62 µg/kg dw	More conservative approach. Indicate sediment but can p marine as well.
3	BPA	No	No	Chinook- tier 1	Diet	ECCC 2018 (FEQG)	660	µg/kg ww	Geomean of LOAEL and NOAEL for systemic toxicity (reduced growth) of rats adjusted by a SF of 100 and the largest		660 µg/kg ww	Up-to-date FEQG
4	BPA	No	No	Chinook- tier 1	Fresh and Marine Water	ECCC 2018 (FEQG)	3.5	µg/L	CCME Type A- 5th percentile of no effect SSD. Three spine stickleback= most senstive		3.5 µg/L	Up-to-date FEQG
5	BPA	No	No	Chinook- tier 1	Sediment (marine and fresh)	ECCC 2018 (FEQG)	25	µg/kg dw	equilibrium partitioning method using FWQG (3.5 ug/L) and Koc (708 L/kg) and normalizing the value to 1% organic carbon		25 µg/kg dw	Up-to-date FEQG
6	Chlorpyrifos	No	Yes	Chinook- tier 1	Water (Fresh and Marine)	CCME 2008	0.002	µg/L	CCME Type B2 guideline. Based on LC50 of 0.04µg/L for H. azteca + safety factor of 20	"Vertebrates are generally more tolerant of short-term and long-term exposure	0.002 µg/L	Follows CCME meth date, most conserv exposure through f

59 guidelines have been recommended for **17** substance/groupings

AVAILABLE ONLINE

https://www.canada.ca/en/environment-climate-change/services/wildlife-habitat/conservation-funding-success-stories/reducing-contaminants-threat-southern-resident-killer-whales.html

On website, click here to download the Excel spreadsheet

Reducing the threat of contaminants to Southern Resident Killer Whales

The iconic Southern Resident Killer Whale is celebrated by British Columbians and all Canadians and holds significant cultural meaning for coastal First Nations.

However, these whales are at risk. The population is declining and they are exposed to serious threats.

The three key threats to these whales are:

- limited availability of their prey (Chinook salmon)

Find out more

- Recommended Environmental Quality Guidelines for the Protection of Southern Resident Killer Whales and Their Prey

DATA GAPS

1. Guidelines protective of apex marine mammals (e.g orcas) from bio accumulative substances

   - Vulnerable populations
   - High trophic level
   - Long-lived
   - Low reproductive output


C Miles Ritter CC

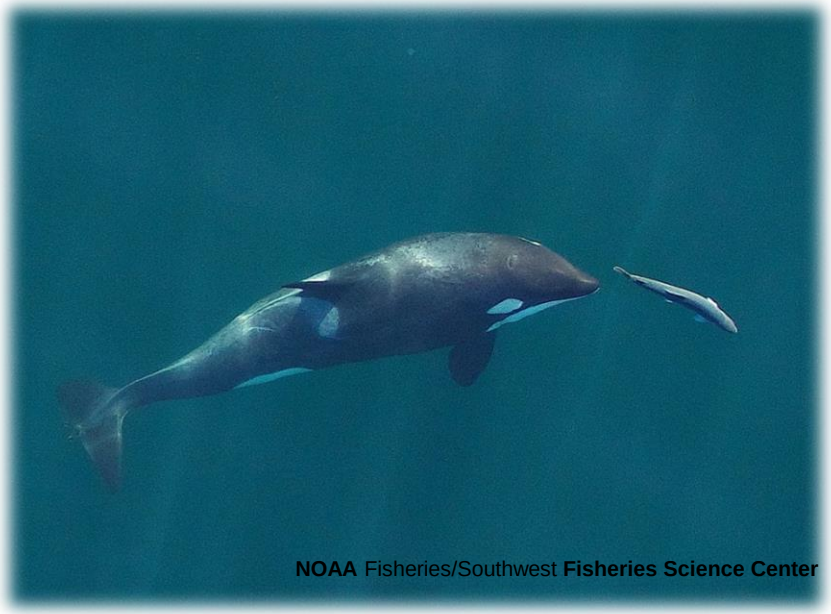
2. Where EQGs are either not available or are not sufficiently protective of receptors

1. PROTOCOL DEVELOPMENT

- Under development
- Collaborative effort between BC ENV, DFO, ECCC, and expert researchers
- Applicable to all apex marine mammals in Canada
- Human health approach
  - Protect individuals
- Ecosystem modelling approach
  - Orca tissue→ prey tissue→ water → sediment

BC ENV- British Columbia's Ministry of Environment and Climate Change Strategy
DFO- Fisheries and Oceans Canada
ECCC- Environment and Climate Change Canada

2. GUIDELINE DEVELOPMENT



PCBs

- Protective of apex marine mammals, first guideline following new protocol
- Collaborative effort (BC ENV, DFO, ECCC, various researchers)

PFOA

- Suite of guidelines currently under development by ECCC

Triclocarban and Metformin

- Pharmaceuticals and Personal Care Products (PPCPs)
- Guidelines currently under development by ECCC

https://www.canada.ca/en/health-canada/services/chemical-substances/fact-sheets/federal-environmental-quality-guidelines.html

IN SUMMARY,

1) Recommend environmental quality guidelines for contaminants of concern to protect the SRKWs and their prey
2) Identify and start to fill data gaps where EQGs are either not available or are not sufficiently protective
3) Co-develop a new protocol outlining how to derive EQGs protective of apex marine mammals

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THANK YOU

Questions?

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