



Modernizing BC's Sediment Standards: Prioritizing Approaches & Options

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Why Modernize BC's Sediment Standards?



Evolving Scientific Understanding

Scientific knowledge of sediment contamination and its ecological impacts continues to advance rapidly, creating opportunities for improvement.



Emerging Contaminants

New chemicals and complex mixtures pose challenges not addressed by current standards.



Site-Specific & Risk-Based Approaches

Modern frameworks offer more flexible, site-specific assessment methods that can be integrated into our standards.



Ecosystem Protection

We must ensure our standards remain protective, practical, and aligned with the best available science.



Key Areas for Modernizing the Sediment Standards Framework



Tiered, Site-Specific Approach

Moving beyond fixed standards to adaptable, risk-based assessments that account for local conditions.



Matrix Sediment Standards Framework

Protecting ecological organisms, as well as people, from direct and food toxicity.



Emerging Contaminants / Mixtures

Addressing non-scheduled substances of concern and their combined effects on ecosystems.



Data Availability

Developing collaborative studies to address prioritized data gaps such as determining regional background levels, co-located sampling, and area-based Indigenous Knowledge & Science.



Feasibility & Prioritization Framework

Develop a systemic approach for considering feasibility and data availability/reliability to support strategic planning.





Tiered Approach: Site-Specific Sediment Standards



Tier 1: Screening Level Numerical Assessment

Conservative, generic standards for initial site characterization. Quick identification of sites needing further assessment.



Tier 2a: Refined Numerical Assessment

Follow procedures and use models (e.g., Cause-Effect) in Protocol 2 to derive site-specific sediment standards, predominantly for bioavailability adjustments.



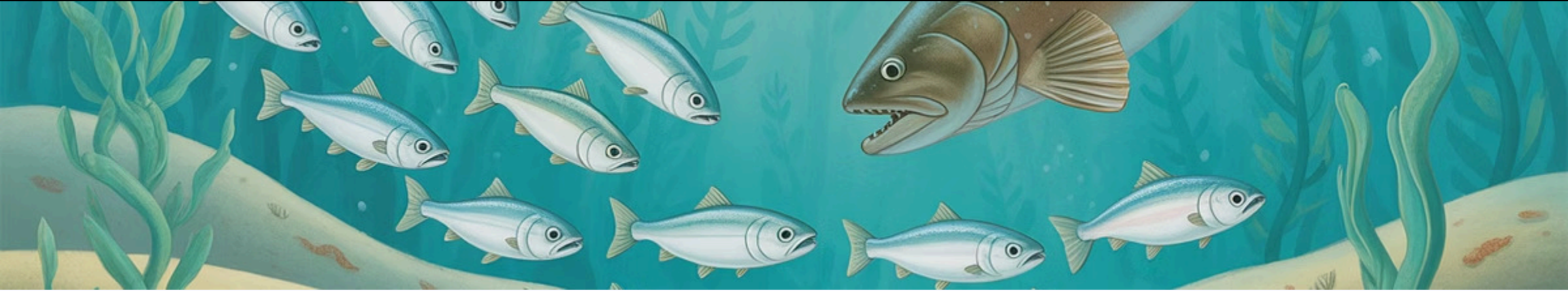
Tier 2b: Screening-Level Risk-Based Assessment

Similar to Tier 2a, with an additional option for using prescribed lines of evidence such as community analysis as part of habitat assessment (Protocols 2 & 13).



Tier 3: Detailed Risk-Based Assessment

Detailed risk assessment using site-specific factors and multiple lines of evidence such as community analysis (Protocols 1 & 20).



Matrix Sediment Standards (SedS) Framework

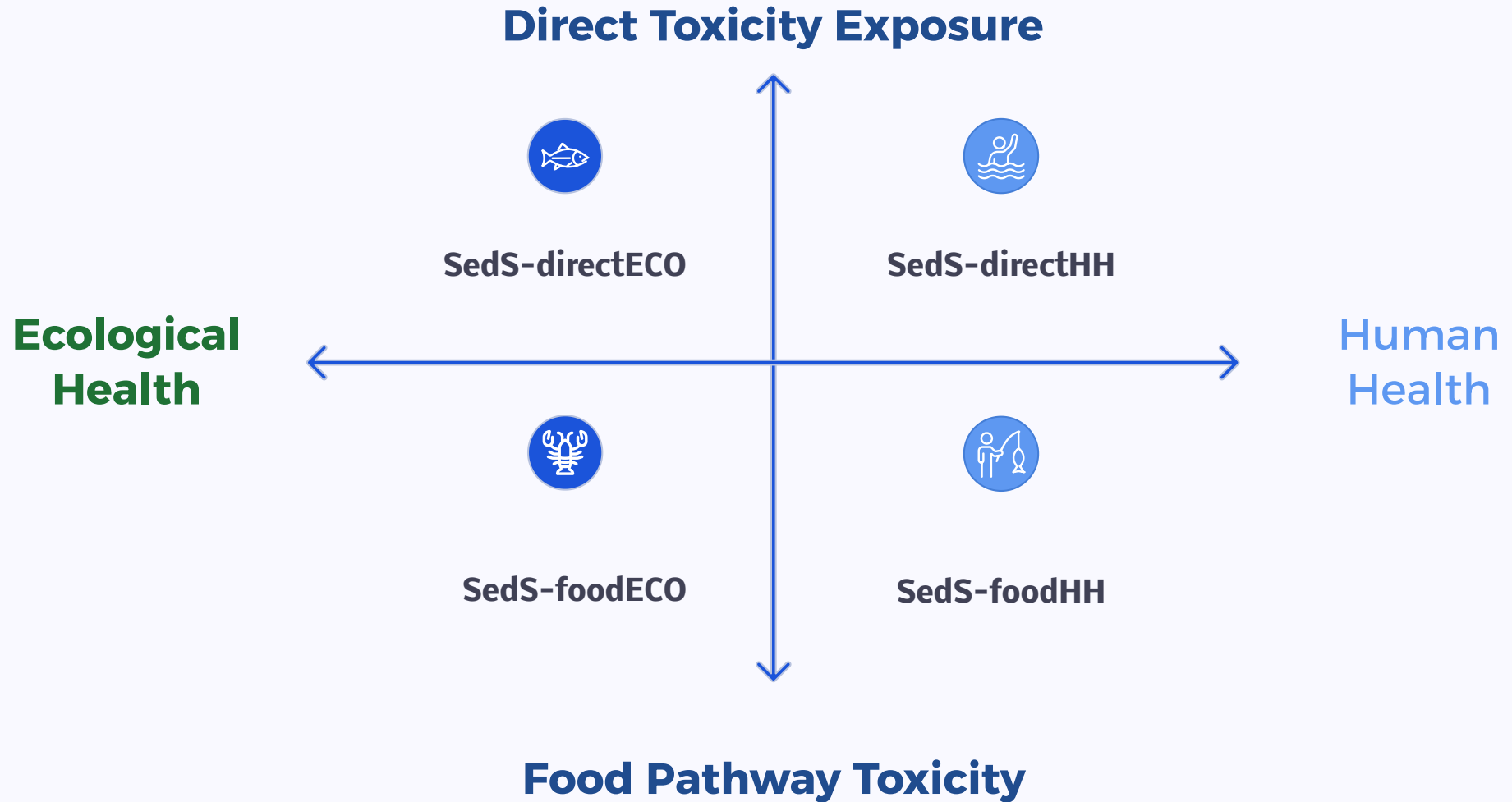
Direct Toxicity (SedS-direct)

- **SedS-directECO**
 - Protect aquatic organisms from direct exposure from contaminants in sediment.
- **SedS-directHH**
 - Protects people from direct contact risks (e.g., incidental ingestion, dermal contact) during recreational or cultural activities.

Food Pathway Toxicity (SedS-food)

- **SedS-foodECO**
 - Protects piscivorous wildlife (e.g., otters, eagles, orcas) from the bioaccumulation and biomagnification of contaminants through the food chain.
- **SedS-foodHH**
 - Protects human consumers of fish, shellfish, and other aquatic foods.

Matrix Sediment Standards (SedS) Framework





Emerging Contaminants & Mixtures

The chemical landscape is constantly changing, requiring proactive approaches to address new threats to environmental health as they are identified.

Non-scheduled Substances

Develop standards for unregulated contaminants (e.g., pharmaceuticals, personal care products, and new industrial chemicals)

Complex Mixtures

Address the combined effects of chemical mixtures, which can impact aquatic life in ways not predicted by single-substance tests

Adaptive Frameworks

Create flexible regulatory tools that can rapidly incorporate new science to keep standards relevant

Proactive Hazard Identification

Develop the scientific and regulatory tools to proactively address new chemical threats as they are identified.

Data Gap, Feasibility & Prioritization Framework

Data Gaps

Development of collaborative research to address prioritized data gaps such as determining regional background levels, co-located sampling, and area-based Indigenous Knowledge & Science.

Feasibility

Develop a systemic approach for evaluating feasibility.

Prioritization

Develop a framework for prioritization of research to address data gaps.

Collaboratively develop a framework for identifying data gaps, feasibility and prioritization to support strategic research planning.



Modernization Priorities: Feasibility

Please rank these potential feasibility criteria to help inform the development of a prioritization framework (1 = highest):



[60s entry + 30s results discussion]

- 1) Adequacy and reliability of available data for key research topics
- 2) Need for new or specialized technologies
- 3) Level of complexity and corresponding expertise and resource requirements
- 4) Level of likelihood/uncertainty in successful completion of project or meeting research goals



Modernization Priorities: Timeframe

Please rank these timeframe considerations for developing a prioritization framework and strategic planning for research to support modernizing BC's sediment standards (1 = highest):



[60s entry + 30s results discussion]

- 1) Outcome-driven priority, regardless of timeframe (i.e., disregard timeframe when prioritizing research)
- 2) Focus on short-term progress (e.g., identify opportunities to quickly address regulatory gaps)
- 3) Focus on progressing the highest potential impact, following a clear long-term strategic goal, avoiding convenient short-term efforts if they will distract from the goal and divert resources away from more meaningful progress.
- 4) Consistent progress prioritized, with a balance of short- and long-term research efforts.

Modernization Priorities: Approaches

Based on Today's discussion and your experience, please rank these four areas for modernization priority in BC's sediment standards (1 = highest):

[60s entry + 30s results discussion]



- 1) Development of a Scientific Framework for Deriving Site-Specific Sediment Standards (Bioavailability Adjustment)
- 2) Development of a Matrix Sediment Standards Framework - Focus on Ecological Protection
- 3) Development of a Matrix Sediment Standards Framework - Focus on Human Health Protection
- 4) Develop Sediment Standards for Non-scheduled Contaminants & Mixtures

Modernization Priorities: Mixtures

When considering contaminant mixtures, rank the following approaches from most to least scientifically defensible and practically achievable for BC's regulatory framework (1 = highest):



[60s entry + 30s results discussion]

- 1) A simple additive model (e.g., hazard index)
- 2) A weighted approach based on toxicological similarity
- 3) Site-specific toxicity testing for all complex mixtures
- 4) The development of new, mixture-specific standards



Modernization Priorities: Mid-term Research

Within a medium-term (3-5 year) research plan, rank the following scientific objectives from most to least critical for modernizing BC's sediment standards?



[60s entry + 30s results discussion]

- 1) Developing a robust framework for assessing the bioavailability of metals and metalloids.
- 2) Establishing standardized analytical methods for a priority list of contaminants of emerging concern (CECs).
- 3) Creating a predictive model for contaminant mixture toxicity based on concentration addition.
- 4) Generating sufficient toxicity data to derive new guidelines for 3-5 high-priority legacy contaminants.

Modernization Priorities: Long-term Research

To support long-term (5+ years) strategic goals, please rank the following foundational research areas in order of importance for creating a more adaptive and forward-looking regulatory framework. (1 = highest importance)



[60s entry + 30s results discussion]

- 1) Research into the ecosystem-level impacts of chronic, low-level contaminant exposure
- 2) Development of advanced in-vitro and high-throughput screening methods for rapid hazard assessment
- 3) Investigating the toxicological impacts of climate change variables (e.g., temperature, hypoxia) on sediment contaminant toxicity
- 4) Building a comprehensive, open-access database of sediment chemistry and toxicology data for all of BC

Modernization Priorities: Bioavailability

Incorporating bioavailability was identified as a top priority from survey responses. Which scientific approach to bioavailability holds the most promise for practical and defensible application in BC's regulatory framework?



[60s entry + 30s results discussion]

- 1) Equilibrium partitioning models (e.g., based on organic carbon content).
- 2) Normalization using Acid-Volatile Sulfides and Simultaneously Extracted Metals (AVS/SEM)
- 3) Application of the Biotic Ligand Model (BLM) for sediments
- 4) Direct measurement using passive sampling devices (PSDs)



Modernization Priorities: Contaminants

Emerging, non-scheduled contaminants were identified as a top priority. Which class of compounds presents the most pressing need for the development of new sediment toxicity data and assessment methods?



[60s entry + 30s results discussion]

- 1) Per- and polyfluoroalkyl substances (PFAS)
- 2) Microplastics and their associated chemical additives
- 3) Current-use pesticides and herbicides
- 4) Pharmaceuticals and personal care products (PPCPs)



Modernization Priorities: Mixtures

For the Hazard Index / Concentration Addition approach to mixture assessment, what is the single greatest scientific research gap that must be addressed before it can be reliably implemented?



[60s entry + 30s results discussion]

- 1) A lack of high-quality toxicity data for many individual components of common mixtures
- 2) Poor understanding of the modes of action for many contaminants to justify grouping them
- 3) Difficulty in validating model predictions with whole sediment toxicity testing results
- 4) The inability of current models to account for significant synergistic or antagonistic interactions



Your Input: Guiding the Tiered Framework

Today's Discussion

Your expertise will directly aid the development of scientifically defensible and practical standards for ecological protection

Scoping Plan

Roadmap for future research to support the collaborative development of a modern framework for sediment standards



SSTAC White Paper

High-level summary of the Sediment Standards Project (Phase 1), including a synthesis of your input

Thank You!



Your Contributions Matter

Your expertise is vital as we work to modernize BC's sediment standards for comprehensive ecosystem protection.



Protecting Our Aquatic Ecosystems

Together, we're developing standards that safeguard aquatic ecological organisms and the predators that depend on them.



Contact SSTAC

For questions or additional input, please reach out to us. We appreciate your engagement in this important work.