

ANNEX B - DFO FCSAP Expert Support Science Support Priorities

Theme	Focus Area	Documentation Science Needs	Possible Deliverable
Site Characterization	Sampling	Development of standardized aquatic sampling protocols to adequately characterize the risk at a contaminated site including guidance on: <ul style="list-style-type: none"> • Minimum sample requirements for site assessment and characterization and statistical sampling methods • Methods for quantifying uncertainty • Define quality assurance/quality control (QA/QC) objectives • Low detection level methods 	Guidance document
	Short term monitoring	Monitoring protocols (i.e. rate of colonization of eelgrass, benthic community structure, fish growth rate, etc.) to characterize risk at a contaminated site	Guidance document
	Background Sediment Concentrations	Guidance on the development of site specific guidelines	Guidance document
		National database on background geochemical concentrations	Database
Northern Sites	Site Assessment	Guidance document on the identification of sampling techniques, validation of field analytical and alternative investigation methods for site assessment (for Aquatic sites)	Guidance document
	Receptor Characteristics	Reference manual of receptor characteristics applicable to Northern specific Canadian Federal Contaminated Sites (FCS) for use in ecological risk assessment	Reference document
	Toxicity Reference Values (TRVs)	Reference manual of scientifically defensible Toxicity Reference Values (TRVs) for Northern specific Canadian aquatic species for use in ecological risk assessment	Reference document
	Productivity/Productive Capacity	Habitat metrics tool to measure aquatic habitat health, productivity, net gain/loss in northern conditions	Guidance document
Ecological Risk Assessment	Federal Approach to ERA	Guidance on Ecological Risk Assessments: <ul style="list-style-type: none"> • When reviewing from custodians • Best practices or preferred approach for aquatic environments 	Guidance document for expert support
		Development of a framework that includes guidance on: <ul style="list-style-type: none"> • Screening level ERA • Population/community effects ERA • Northern communities • Harbour management strategies 	Guidance document for custodians

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Ecological Risk Assessment	Federal Approach to ERA	Development of contaminated site specific pathways of effects (PoE's) or generic Conceptual Site Models (CSMs)	Reference Document
	Chemical Speciation	Inventory of the most common contaminants and their properties (i.e. solubility, bioavailability, bioaccumulation/biomagnifications potential, toxicity, toxic level of concern, etc.)	Database Fact Sheets
	Receptor Characteristics	Reference manual of receptor characteristics applicable to Canadian FCS	Reference document
	Toxicity Reference Values (TRVs)	Reference manual of scientifically defensible Toxicity Reference Values (TRVs) for Canadian Specific aquatic species	Reference document
	Contaminant Bioaccessibility	Guidance document on the interpretation of bioavailability or bioaccessibility data in ERA	Guidance document
	Biomagnification	Guidance on how to conduct ERAs for contaminants that bio-magnify	Guidance document
	Productivity/Productive Capacity	Habitat metrics tool to measure aquatic habitat health, productivity, net gain/loss.	Guidance document
Remediation	Evaluation of Remedial Technologies	Evaluation of the effectiveness of various remediation techniques/technologies (i.e. benefits/limitations, conditions/environments suitable for use including northern specific climates, etc.) Immediate specific remediation options research for waters impacted by: <ul style="list-style-type: none"> • PAH's • VOC's • Petroleum Hydrocarbons • Metals (Selenium, Arsenic) • PCBs • Dioxins/furans 	Technical summary Literature review Cost/Benefit analysis
		Evaluation of innovative remedial technologies including modeling of contaminant fate and transport to allow evaluation of different remedial technologies	Literature review Technical Summary
		Development of case history database of remedial options for aquatic sites	Database
	Impact of Remediation on the health of the aquatic environment	Adaptation of current/create new guidance documents on mitigation measures that can be applied for specific remediation activities (i.e. dig and dump, dredging and capping, bank stabilization, water treatment, sediment remediation/treatment, etc.)	Guidance documents

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Remediation	Confirmatory testing	Guidance on confirmatory/verification testing following remediation specific to remedial option chosen including monitoring and measurement tools to assess the effectiveness of remediation	Guidance document/ Policy Statement
		Database of post-remedial confirmatory test results	Database
	Sustainability Assessment Tool	Definition of sustainable remediation	Technical summary Literature review Cost/Benefit analysis
		Development of appropriate metrics Evaluation of tool (beta-test on existing case histories)	
Life Cycle Impact Assessment (LCIA)	Definition of Impact Categories relative to FCS Development of Metrics for LCIA	Technical Summary	
Monitoring	Long term monitoring	An overarching monitoring framework for contaminated sites (Short and Long term monitoring recommendations for the aquatic environment) <ul style="list-style-type: none"> • Guidance on long-term monitoring programs (for aquatic sites) • Guidance on monitored natural attenuation (for aquatic sites) • Determination and monitoring of contaminants in sediment, & impacts to fish and fish habitat 	Framework document
	Residual Risk Analysis	Definition of site closure: Scientific position on how long is enough for long term monitoring/when is the risk adequately characterized; sampling effort; standards/criteria to compare sample results with (i.e. species/timing, etc.)	Guidance document
		Framework for residual Risk Analyses	Framework document

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Theme	Focus Area	Specific research or science objectives identified	Possible Deliverable
Ecological Risk Assessment	Receptor Characteristics	Research on receptor characteristics applicable to Canadian FCS including emphasis on northern specific aquatic species	Receptor characteristic data
	Aquatic-Plant Uptake Factors	Development of standardized aquatic-plant uptake factors for a wide range of Canadian conditions including emphasis on northern specific aquatic species	Aquatic plant uptake values
	Toxicity Reference Values (TRVs)	Ecotoxicological studies to develop scientifically defensible toxicity reference values (TRVs) including emphasis on northern specific aquatic species Other ecotoxicological studies on the impacts of metals/contaminants to early developmental stages of fish to be built into the ERA model.	TRV values for CoCs
	Contaminant Bioaccessibility	Modification, standardization, and validation of methods as appropriate for priority contaminants in conjunction with the development of scientifically defensible TRVs for Canadian specific fish species	Bioaccessibility Methods
	Productivity/Productive Capacity	At what level a change in benthic communities associated with the contamination could represent a decrease in productivity / productive capacity of fish habitat? The development of biomarkers of vulnerability, identify the most vulnerable life stages and populations, etc. to manage vulnerability of aquatic ecosystems to toxic chemicals	Research Study
Remediation	Impact of Remediation on the health of the aquatic environment	Chronic and behavioural effects of contamination in fish (i.e. physiology, effects on life history (size at age, size at maturity, etc.) once remediation has occurred	Research paper / Long-term study
Education Needs	Training	Development of scientifically-based education materials on the impacts specific contaminants of concern can have on fish and fish habitat	Courses Training Sessions Workshops