



2023-2024 OSM WORK PLAN APPLICATION

This form will be used to assess the merits of the proposed work plan and its fit with the Oil Sands Monitoring (OSM) Program mandate and strategic priorities. Applicants must complete the form in its entirety. Applicants that fail to use this form and complete all sections in the timeframe will not be considered.

OSM Work Plan Submission Deadline: The deadline for submission of proposed work plans is October 31, 2022 at 4:30 PM Mountain Standard time . Late submissions will not be accepted.	October 31, 2022 4:30 PM MST
Decision Notification	Mid to Late March 2023

WORK PLAN COMPLETION

Please **Enable Macros** on the form when prompted.

The applicant is required to provide information in sufficient detail to allow the evaluation team to assess the work plan. Please follow the requirements/instructions carefully while at the same time being concise in substantiating the project's merits. The OSM Program is not responsible for the costs incurred by the applicant in the preparation and submission of any proposed work plan.

Privacy: The OSM Program is governed by the Freedom of Information and Protection of Privacy Act (FOIP) and may be required to disclose information received under this Application, or other information delivered to the OSM Program in relation to a Project, when an access request is made by anyone in the public. Applicants are encouraged to familiarize themselves with FOIP. All work plans are public documents.

Technical Requirements: When working on this form, please maintain Macros compatibility by always saving your draft and your final submission as a **Microsoft Word Macro-Enabled Document**, failure to do so will result in loss of form functionality. This form was created using Microsoft word 2016 on a PC and may not have functionality on other versions of Microsoft on PC or MACS.

Government Lead/Coordinator: All work plans under the OSM Program require either a government lead or a government coordinator. This will ensure that the financial tables (for Alberta Environment and Parks & Environment and Climate Change Canada) are completed accurately for work plan consideration. **However**, if an **Indigenous community, environmental nongovernmental organization** or any other **external partner** is completing a work plan proposal, they would **only** complete the **grant or contract budget component** of the **Human Resources & Financials Section** for their project. The government coordinator within Alberta Environment & Parks would be responsible for completing the remaining components of the Human Resources and Financial Section of this Work Plan Application, as they are responsible for contract and grant facilitation of successful submissions. All other sections outside of **Human Resources & Financials Section** of this work plan proposal are to be completed in full by all applicants.

Supplemental Materials: The OSM Program recognizes that majority of work planning submissions are a result of joint effort and monitoring expertise. Should the applicant wish to submit supplemental materials in addition to their application additional resources are available in the Work Planning Package accessible here: [2023-24 Work Planning Package \(Ctrl+CLICK\)](#)

Should you have any **questions** about completing this work planning form or uploading your final submission documents, please send all inquiries by email to: OSM.Info@gov.ab.ca.



WORK PLAN SUBMISSION

Upon completion of this application, please submit the appropriately named work plan (**Microsoft Word Macro-Enabled Document**) and all supporting documents to the link provided below. Failure to follow the naming convention provided may result in oversight of your application.

Please upload (by drag and dropping) the **WORK PLAN SUBMISSION & ALL SUPPORTING DOCUMENTS** here:

[**WORK PLAN SUBMISSION LINK \(CTRL+CLICK HERE\)**](#)

Please use the following file naming convention when submitting your **WORK PLAN**:

202324_wkpln_WorkPlanTitle_ProjectLeadLastNameFirstName

Example:

202324_wkpln_OilSandsResiduesinFishTissue_SmithJoe

If applicable, please use the following file naming convention when submitting your **supplementary or supporting files**. Please number them according to the guidance and examples provided:

202324_sup##_WorkPlanTitle_ProjectLeadLastNameFirstName

Examples:

202324_sup01_OilSandsResiduesinFishTissue_SmithJoe

202324_sup02_OilSandsResiduesinFishTissue_SmithJoe

.

.

.

202324_sup10_OilSandsResiduesinFishTissue_SmithJoe

Do not resave your work plan or documents under any other naming conventions. If you need to make revisions and resubmit before the work planning deadline of October 31, 2022, **DO NOT** rename your submission. When resubmitting, simply resubmit with the exact naming convention so that it replaces the original submission. **DO NOT** add any additional components such as versioning or dates to the file naming convention. Please direct any questions regarding the submission or naming of submissions to OSM.Info@gov.ab.ca.



WORK PLAN APPLICATION

PROJECT INFORMATION	
Project Title:	Core Long-Term Fish Monitoring
Lead Applicant, Organization, or Community:	Mark McMaster Environment and Climate Change Canada
Work Plan Identifier Number: <i>If this is an on-going project please fill the identifier number for 22/23 fiscal by adjusting the last four digits: Example: D-1-2223 would become D-1-2324</i>	Click or tap here to enter text.
Project Region(s):	Oil Sands Region
Project Start Year: <i>First year funding under the OSM program was received for this project (if applicable)</i>	2012
Project End Year: <i>Last year funding under the OSM program is requested Example: 2024</i>	Click or tap here to enter text.
Total 2023/24 Project Budget: <i>For the 2023/24 fiscal year</i>	\$1,505,312.00
Requested OSM Program Funding: <i>For the 2023/24 fiscal year</i>	\$1,515,312.00
Project Type:	Longterm Monitoring
Project Theme:	Surface Water
Anticipated Total Duration of Projects (Core and Focused Study (3 years))	Year 4
Current Year	Focused Study: Choose an item.
	Core Monitoring: Year 4

CONTACT INFORMATION	
Lead Applicant/ Principal Investigator: <i>Every work plan application requires one lead applicant. This lead is accountable for the entire work plan and all deliverables.</i>	Mark McMaster
Job Title:	Research Scientist
Organization:	Environment and Climate Change Canada
Address:	867 Lakeshore Road, Burlington, ON L7S 1A1
Phone:	905-319-6906
Email:	Mark.McMaster@ec.gc.ca

PROJECT SUMMARY

Should your application be successful, The OSM Program reserves the right to publish this work plan application. Please check the box below to acknowledge you have read and understand:

I acknowledge and understand

In the space below please provide a summary (300 words max) of the proposed project that includes a brief overview of the project drivers and objectives, the proposed approach/methodology, project deliverables, and how the project will deliver to the OSM Program objectives. The summary should be written in plain language.

This work plan serves the mandate of the OSM program by addressing the three key questions for aquatic ecosystems. Are changes occurring to aquatic ecosystems? Are changes to aquatic ecosystems caused by oil sands development activities? What is the contribution of oil sands development activities to changes to aquatic ecosystems, within the context of cumulative effects? The work plan content is at the direction of the Surface Water TAC, with contributions from the ICBMAC and incorporates content from the TAC scope of work document. Continuing, long-term "core" monitoring, evaluation, and reporting for fish are led and executed by AEP and ECCC scientific and technical staff. New community-based monitoring (CBM) projects that address community questions and contribute to the long-term fish core program are supported by this workplan with the team developing SOPs for community use as well as training and collaboration on programs when requested by the communities. Fish Health Monitoring: The long-term cyclical fish health program rotates on a three-year cycle between mainstem (Athabasca, Peace and Clearwater Rivers), and the Athabasca tributaries including the southern tributaries using an Environmental Effects Monitoring (EEM) fish health approach combined with a hybrid fish assemblage/inventory assessment on tributaries. The design of the EEM sampling on the mainstem Athabasca and Clearwater Rivers of white sucker and trout-perch, and on the Peace River of longnose sucker and trout-perch follows a surveillance program once every three years after the initial three-year current baseline period. Tributary sample design has merged the EEM fish health approach with the fish assemblage protocol. The assemblage protocol will be used at each tributary site with the sentinel species collected for that site being kept for the EEM fish health sampling. At sites where sufficient numbers of a sentinel species cannot be captured, the assemblage data will be used to evaluate health in that watershed. These sites are also in the long-term program, will be sampled every three years and have been divided into groups to maximize our understanding (all sculpin sites sampled in the same year) and minimize the number of sites requiring sampling in any one year. Contaminant sampling continues with large bodied fish on each mainstem river using a species consumed by communities. Focused studies will be prioritized based on analyses of previous data and the specific study design. We have developed tiers and triggers in the fish health program for use in the adaptive nature of the program with exceedences of triggers resulting in changed frequency of sampling or implementation of cause and effects of change studies. We have also triggered back into the core program, two additional fish community surveys, the Spring Athabasca River Fish Inventory following confirmation of change using historic data as well as the Muskeg River Fish fence and McKay River spring trap net surveys.

1.0 Merits of the Work Plan

All work plans under the OSM Program must serve the mandate of the program by determining (1) if changes in indicators are occurring in the oil sands region and (2) if the changes are caused by oil sands development activities and (3) the contribution in the context of cumulative effects. In the space below please provide information on the following:

- Describe the key drivers for the project identifying linkages to Adaptive Monitoring framework particularly as it relates to surveillance, confirmation and limits of change (as per OC approved Key Questions).
- Explain the knowledge gap as it relates to the Adaptive Monitoring that is being addressed along with the context and scope of the problem as well as the Source – pathway – Receptor Conceptual Models .
- Describe how the project meets the mandate of the OSM Program or areas of limited knowledge is the work being designed to answer with consideration for the TAC specific Scope of Work Document (attached) and the Key Questions (attached)?
- Discuss results of previous monitoring/studies/development and what has been achieved to date. Please identify potential linkages to relevant sections of the State of Environment Report.

This work plan serves the mandate of the OSM program by addressing the three key questions (above) for aquatic ecosystems. The work plan content is at the direction of the Surface Water TAC, with contributions from the ICBMAC and incorporates content from the TAC scope of work document. The long-term fish program has been developed following the EEM framework set out in the Integrated Monitoring Plan for the Oil Sands (ECCC, 2011). Current baseline conditions have been determined at all sites and all are now in a once every three year sampling surveillance program (Arciszewski et al. 2017, 2021; Kilgour et al., 2017; Tetreault et al., 2019; McMaster et al., 2018a,b, 2020). The fish health core program has set limits of change for fish health endpoints to adapt the program when change is confirmed that exceeds these limits (Munkittrick et al., 2009; Environment Canada 2012). Data within species is being evaluated to develop species specific limits of change that may be more powerful than existing limits (Kilgour et al., 2017). Incorporation of flow, temperature and other sources of concern (sewage) has identified the input of sewage altering fish health on the mainstem Athabasca (Arciszewski and McMaster, 2020) but also potential change due to sources from deposition related to industry. Detailed investigation of cause work on two major tributaries has demonstrated links of change to both atmospheric inputs (Tetreault et al., in prep) and land change (Archiszewski et al., 2022). These changes are not outside of our limits of change but are being used to predict change due to increased development into the future. Fish assemblage monitoring on tributaries is continuing and comparisons of responses in communities (Wynia et al., 2022.) to EEM responses (Archiszewski et al., 2022) is being done at sites where both can be executed to develop triggers of change for fish assemblage monitoring programs where EEM fish health cannot be conducted (Southern Operators and smaller northern tributaries). Continuing, long-term "core" monitoring, evaluation, and reporting of fish is led and executed by ECCC and AEP scientific and technical staff. New community-based monitoring (CBM) projects that address the three key questions of the OSM program and community questions are being integrated into the fish core program such as the elders Lake whitefish health in the PAD in collaboration with MCFN/ACFN/Fort Chipewyan Metis under the guidance of ICBMAC. The long-term core fish program supports all ICBM work plan fish programs with Dr. Erin Ussery of ECCC and Dr. Keegan Hicks of AEP coordinating these collaborations. We have developed SOPs in collaboration with the ICBMFC for use by communities interested in fish including a fish questionnaire (Dersch et al., 2021) to aid communities in selecting questions of concern and SOPs to address them including fish health (Ussery et al., 2021), fish assemblage (Wynia et al., 2021), fish histology (Cunningham et al., 2021), fish fence and trap netting (Clark et al., in prep). Over time, these CBM fish programs will form part of the core OSM fish program.

2.0 Objectives of the Work Plan

List in point form the Objectives of the 2023/24 work plan below

The overall objectives of the 23/24 work plan for OSM long-term Fish Monitoring include:
 1- Continue monitoring, evaluating and reporting activities for "core" components of fish health and fish

assemblages.

II- Continue engagement and capacity building activities with Indigenous and local communities to implement ICBM projects that address both the OSM mandate and community questions related to Oil Sands developments and fish.

III- Contribute to develop a "core" component for lake monitoring of fish that meets information needs of the OSM program and stakeholders.

For objective I, sub-objectives for "core" fish monitoring include:

The long term fish health program is now in a three-year cycle with all the sites separated into three groups to maximize efficiency and decision making.

1) In 2023/24 we were to conduct surveillance monitoring of large bodied fish health in the Athabasca River including Walleye for contaminants in a fish consumed by locals. Baseline data was collected from 2012-15 from these sites with additional data collected in 2018 as part of the core monitoring and in 2019 and 2021 as part of the enhanced monitoring program. We are working with the enhanced monitoring program to incorporate the 2019 and 2021 data into the baseline fish health. No new collections are planned this year and will be moved to 2024-25. Comparisons will be made within sites between years for evidence of change. If change exceeds established triggers, the program will be adapted and those sites sampled again the following year to confirm the change identified.

2) Clearwater spring community sampling will be conducted along with Clearwater fall fish health and contaminant sampling. Three transects on the Clearwater will be electrofished during May and all species captured identified, measured and released. During September, white sucker and trout perch will be collected from the same three transects and sampled for fish health. Northern pike will be collected and sampled for contaminant analysis. Data will be compared between sites in 2023 and within sites compared to baseline collected previously.

3) Tributary sampling occurs mostly on the east site of the Athabasca River at tributary sites using the slimy sculpin as the sentinel species as part of the three-year cyclical surveillance sampling program. This sampling will consist of both the fish assemblage monitoring program as well as fish health using EEM methods wherever sufficient number of sentinel species are collected. With existing data from other tributaries where both EEM and FAM are conducted we are using this data to develop limits of change for the FAM program. This is an important aspect of the fish program as to date assemblage monitoring would only identify the loss of a species which is often too late to adapt and make change.

4) We were to conduct the Muskeg River fish fence this spring as part of the three-year cycle. Due to high water levels we were not able to install the fence so we have postponed this portion of the program to the 2023/24 field season. The McKay River trap net sampling was conducted in place of the Muskeg fish fence (due to occur in 2023-24) so the two programs were shifted for one another.

4) To establish linkages between fish health, fish assemblages, benthic invertebrate communities and water quality within the oil sands development region and downstream receiving environments using existing data such as recent publications from our group.

5) Work with Community Based Monitoring program leads around capacity building and training opportunities (ICBM Facilitation Center) as well as participate in fish related sampling efforts within each of their programs incorporated into the core ICBM program.

For objective II, sub-objectives for integration with CBM projects include:

1) Community engagement: Develop collaborative and participatory projects with communities, based on (i) OSM_ICBMAC_Fish Program questionnaire (ii) ICBMAC guidelines (see "Ethical Expectations", "Integration Expectations", and "Data Sharing and Use Approach" in Information Sheet)

2) Capacity building: Provide training in collaboration with ICBM Facilitation Center in western science-based monitoring, and data management. ICBMAC will also provide guidance. OSM Program Office staff, AEP and ECCC scientific and technical staff, and partners will provide training opportunities.

3) Implementation: For communities that have co-developed CBM projects based on OSM_ICBMAC_Fish Monitoring questions and ICBMAC guidelines our long-term core program will participate wherever needed.

For objective III, sub-objectives for developing a "core" lake component for fish monitoring include:

1) Work with water quality, benthic and ICBM community OSM leads as well as AEP fish biologists, the University of Calgary team and interested communities to identify lakes in the Oil Sands region.

2) In a design consistent with the draft provincial lentic MER plan as well as community concerns, select



lakes (i) To develop a science-based framework for the monitoring and assessment of the environmental health of the Alberta Oil Sands Region lakes through the use of fish health assessments, fish community based monitoring, fish community assessments, and fish contaminant assessments.

3.0 Scope

Evaluation of Scope Criteria (Information Box Only- No action required)

Your workplan will be evaluated against the criteria below. A successful workplan would:

- be in scope of the OSM Program (e.g., regional boundaries, specific to oil sands development, within boundaries of the Oil Sands Environmental Monitoring Program Regulation)
- consider the TAC-specific Scope of Work document and the key questions
- integrate western science with Indigenous Community-Based Monitoring)
- address the Adaptive Monitoring particularly as it relates to surveillance, confirmation and limits of change as per approved Key Questions.
- have an experimental design that addresses the Pressure/Stressor, Pathway/Exposure, Response continuum
- produce data/knowledge aligned with OSM Program requirements and is working with Service Alberta
- uses Standard Operating Procedures/ Best Management Practices/ Standard Methods including for Indigenous Community-Based Monitoring

3.1 Sub Theme

Please select from the dropdown menu below the theme(s) your monitoring work plan relates to:

Surface Water

3.2 Core Monitoring or Focused study

Please select from the dropdown menu below if the monitoring in the work plan is "core monitoring" and/or a "focused study". Core monitoring are long term monitoring programs that have been in operation for at least 3 years, have been previously designated by the OSM program as core, and will continue to operate into the future. Focused studies are short term projects 1-2 years that address a specific emerging issue. For the purposes of 2023/24 work planning all Community Based Monitoring Projects are Focused Studies.

Core Monitoring

3.3 Sub Theme Key Questions

Please select from the dropdown menus below the sub-theme(s) your monitoring work plan relates to and address the Key Questions:

3.3.1 Surface Water Theme

3.3.1.1. Sub Themes:

Biological

3.4.1.2 Surface Water Key Questions

Explain how your surface water monitoring program addresses the key questions below.

1. Has baseline been established? Have thresholds or limits of change been identified?

For objective I, "Core" Monitoring:
 Baseline has been established at all fish health monitoring sites on the Athabasca, Clearwater and Peace Rivers including tributaries of the Athabasca and Southern Oil Sands area. Limits of change from the Environmental Effects Monitoring (EEM) program have been selected based on their demonstrated effectiveness in identifying sites where impacts have occurred and where management changes (new regulations) have resulted in improvement in fish health.

Changes have been documented in fish health both in the mainstem Athabasca and tributaries of the Athabasca River. These changes are not outside limits of change so do not require adaptation of the frequency of sampling or investigation of cause, but were confirmed. Additional information and studies on the mainstem Athabasca indicate alterations in fish health due to inputs from the Fort McMurray Municipal wastewater treatment plant as well as additional change due to deposition from industrial activity in white sucker. Although suggestive of industrial input, these changes are very small and need to be monitored using the surveillance portion of the adaptive monitoring program design. Detailed evaluation of tributary data indicates input from both aerial deposition and developmental footprint on fish health in two of the major tributaries in the developmental area. These changes are small and are also being monitored in the three year surveillance monitoring program using new predictive modelling of change. Athabasca tributary sites are also identifying PAH profiles in fish tissue specific to sites downstream of development relative to those of natural bitumen exposure. For all fish health baseline data, we are using environmental variables and other sources of change to help understand fish health variability. These models allow development of predictive relationships for cumulative effects assessment.

For objective II, integration with ICBM projects:
 The OSM program effectively utilizes AEP and ECCO to deliver a robust Fish monitoring program. In reality, however, we cannot measure everything, everywhere, all the time. The new operational framework integrates Indigenous and local communities into addressing the OSM mandate, as well as addressing additional community concerns. With "surface water" the integration focus for 23/24, we will continue engagement, capacity building, and implementation of ICBM projects through use of SOPs for fish that we have developed for use by the ICBMFC. These projects will result in understanding changes in (subsistence) resources of importance to Indigenous and local communities, whether changes are due to oil sands development activities, and the context within cumulative effects. We are working directly with the various communities that have developed work plans of their own to deliver on this as well as communities new to the program incorporated into the aquatic ICBM core program (Hicks and Ussery).

For objective III, developing a "core" lake component for fish monitoring:
 The Surface Water TAC agreed that there is not a program that can answer the three key OSM questions for lakes – and thus the impetus for developing a "core" component for lake monitoring. The fish core team will work with this group to develop over time a core lake program.

2. Are changes occurring in water quality, biological health (e.g., benthos, fish) and/or water quantity/flows relative to baseline? If yes, is there evidence that the observed change is attributable to oil sands development? (Describe source-pathway-receptor and/or conceptual models and what is the contribution in the context of cumulative effects?)

The fish program follows the EEM decision trees developed over many years of use and with multiple different species. With the increased data collected we are developing normal variability for the fish health endpoints in the species used in our program. Change has been demonstrated and has either not been confirmed or does not exceed our CES so surveillance monitoring continues on a three-year cycle. For our studies on the mainstem Athabasca, the majority of the additional variability in white sucker health endpoints is attributable to increased nutrients from the FMM municipal sewage discharge. A very small level of variability may be accounted for by wet and dry deposition on the landscape that enters the river via precipitation. We will continue to monitor for increased change on the system in our 3-year cycle. On one tributary (Ells) we have indicated some fish variability may be accounted for by development and we plan to continue to monitor these predictions with increased development in that watershed.

3. Are there unanticipated results in the data? If yes, is there need for investigation of cause studies?

At this point in time, the data and CES indicates there is no need to conduct investigation of cause studies. We continue to evaluate data in order to help predict change moving into the future with increased development and potential cumulative effects.

4. Are changes in water quality and/or water quantity and/or biological health informing Indigenous key questions and concerns?

Fish health and contaminant data is very important in informing indigenous communities about the health of their rivers, lakes and environment. Fish incorporate the environment over time and are considered great indicators of the health of the local environment. Contaminant data is provided to Alberta Health that then is used to inform communities about consumption limits. We have supported the MCFN/ ACFN Elders Whitefish program over the last five years and have incorporated it into the long-term core fish program in collaboration with the local communities. We are working with ICBMAC and the new ICBM Facilitation Center related to fish. Our team has provided input into the development of a OSM_ICBMAC_Fish Program questionnaire to be used by communities for assessing CBM fish program requirements and we have also worked with MCFN on the development of both a Lake Whitefish Sampling SOP and a fish health sampling video. We are also working with the new ICBM Facilitation Center to continue development of community capacity within OSM. We also participated in 2 ice fish camps (Chipewyan Prairie Dene FN and Willow Lake Metis Nation) as well as a training program at Cold Lake FN with 6 communities. These training and learning opportunities will continue in 2023-24 with the core fish team.

5. Are data produced following OSM Program requirements and provided into the OSM Program data management system?

To date all of the fish health and fish assemblage monitoring program data had been loaded to the Federal Government Oil Sands Portal. It is now also being loaded to the new Provincial Oil Sands Monitoring portal. All publications and reports also are approved by the OSM secretariat publication process prior to publication.

6. Do methodologies use relevant Standard Operating Procedures/ Best Management Practices/ Standard Methods?

Fish health studies follow Standard Operating Procedures developed through the Federal Governments Environmental Effects Monitoring Program at <http://www.ec.gc.ca/eseeeeem/default.asp?lang=En&n=4B14FBC1-1>, Fish assemblage monitoring follows the SOP found at <http://www.rampalberta.org/ramp/design+and+monitoring/components/fish+populations> and collections of fish follow AESRD Standards for sampling of small streams in Alberta and AESRD

Standard for Sampling Small-Bodied Fish in Alberta.
 Further Standards and Protocols are available on the EMSD website:
<http://environmentalmonitoring.alberta.ca/resources/standards-and-protocols/>

For objective II, integration with CBM projects: The ICBMAC information sheet for integration provides clear instruction for methodology. For CBM projects that involve western science, it is a requirement to use methods or SOPs consistent with those used for core monitoring. This requirement will be strictly adhered to for the implementation of CBM projects. We have developed an MCFN-CBM Step by Step Whitefish Protocol SOP as well as the OSM_ICBMAC_Fish Program questionnaire. A Lake Whitefish health and tissue sampling video was also produced for use in CBM fish programs. In collaboration with the ICBMFC, we have developed SOPs for the fish program including a fish questionnaire (Dersch et al., 2021) to aid communities in selecting questions of concern and SOPs to address them including fish health (Ussery et al., 2021), fish assemblage (Wynia et al., 2021), fish histology (Cunningham et al., 2021), fish fence and trap netting (Clark et al., in prep). Over time, these CBM fish programs will form part of the core OSM fish program. All analyses also use standard methods so that data is comparable site to site and year to year. These SOPs and videos are being provided to the ICBM Facilitation Center for use in ICBM capacity building.

7. How does the monitoring identify integration amongst projects, themes or with communities?

The long-term core fish monitoring program in this work plan is integrated with the surface water quality core program and the benthic invertebrate community core program on both the mainstem rivers and tributaries. The core surface water program was originally designed with all three components having overlapping site locations specifically to allow this type of integration. We are also integrated with cross cutting focused studies that are developing tools to separate effects documented in fish between natural bitumen and development. It also integrates with the air program as snow deposition of contaminants potentially impacts fish health and deformities in tributaries and mainstem rivers. Fish health is also of great concern to communities downstream of the oil sands deposits. We have worked directly with MCFN, ACFN and Chipewyan Metis Nation at the Elders whitefish camp and the development of a fish health program in the PAD. We are also collaborating directly with the new ICBM core program incorporating fish studies with Fort Smith FN, Chipewyan Prairie Dene FN, Cold Lake FN, Fort McKay FN and Metis Nation, Willow Lake Metis Nation, Beaver Lake Cree Nation, Athabasca Landing Metis Nation, Metis Nation of Alberta, Owl River Metis Nation, Peavine Metis Settlement, as well as other communities coming forward in 2023/24. We have also had community participatory support in the fish health program in numerous locations to date and hope to expand those collaborations.

8. With consideration for adaptive monitoring, where does the proposed monitoring fit on the conceptual model for the theme area relative to the conceptual model for the OSM Program?

The fish health program incorporates aspects of pressures, stressors, pathways and responses from the conceptual model. Stressors are measured in the tissues of fish from the program and resulting responses are measured. Pathways and pressures are used in the investigation of cause attempting to identify pathways and pressures responsible for the responses. Assessment of baseline data on the Peace and Athabasca River indicate that fish health is within predicted historical variability on the Peace but outside of that predicted historical baseline at different times all at sites within the deposit on the Athabasca. Additional analysis indicates sewage and precipitation alter fish health including that from industrial development. Core program endpoints for fish contribute to the completion and understanding of the conceptual model.

9. How will this work advance understanding transition towards adaptive monitoring?

The long-term core fish program has been developed following the EEM framework set out in the Integrated Monitoring Plan for the Oil Sands (2011). Baseline conditions have been determined at all sites and all are now in a surveillance program. The fish health core program has set limits of change for fish health endpoints to adapt the program when change is confirmed that exceeds these limits. No sites have exceeded the critical effect sizes developed or are getting worse. The program is now developing predictive models assessing cumulative effects within the basin and will be able to predict change moving forward with potential increased development or discharge of treated OSPW.



10. Is the work plan contributing to Programmatic State of Environment Reporting? If yes, please identify potential linkages to relevant sections of the State of Environment Report.

Click or tap here to enter text.



3.3.2 Groundwater Theme

3.3.2.1 Sub Themes:

Choose an item.

3.3.2.2 Groundwater Key Questions

Explain how your groundwater monitoring program addresses the key questions below.

1. Has baseline been established? Have thresholds or limits of change been identified?

Click or tap here to enter text.

2. Are changes occurring in groundwater quality and/or quantity relative to baseline? If yes, is there evidence that the observed change is attributable to oil sands development? (*Describe source-pathway-receptor and/or conceptual models*) and what is the contribution in the context of cumulative effects?

Click or tap here to enter text.

3. Are there unanticipated results in the data? If yes, is there need for investigation of cause studies?

Click or tap here to enter text.

4. Are changes in groundwater quality and/or quantity informing Indigenous key questions and concerns Indigenous concerns and health?

Click or tap here to enter text.

5. Are data produced following OSM Program requirements and provided into the OSM Program data management system?

Click or tap here to enter text.

6. Do methodologies use relevant Standard Operating Procedures/ Best Management Practices/ Standard Methods?

Click or tap here to enter text.

7. How does the monitoring identify integration amongst projects, themes or with communities?

Click or tap here to enter text.

8. With consideration for adaptive monitoring, where does the proposed monitoring fit on the conceptual model for the theme area relative to the conceptual model for the OSM Program?

Click or tap here to enter text.

9. How will this work advance understanding transition towards adaptive monitoring?

Click or tap here to enter text.

10. Is the work plan contributing to Programmatic State of Environment Reporting? If yes, please identify potential linkages to relevant sections of the State of Environment Report.

Click or tap here to enter text.



3.3.3 Wetlands Theme

3.3.3.1 Sub Themes:

Choose an item.

3.3.3.2 Wetlands - Key Questions

Explain how your wetlands monitoring program addresses the key questions below.

1. Has baseline been established? Have thresholds or limits of change been identified?

Click or tap here to enter text.

2. Are changes occurring in wetlands due to contaminants and hydrological processes? If yes, is there evidence that the observed change is attributable to oil sands development? (Describe source-pathway-receptor and/or conceptual models) and what is the contribution in the context of cumulative effects?

Click or tap here to enter text.

3. Are there unanticipated results in the data? If yes, is there need for investigation of cause studies?

Click or tap here to enter text.

4. Are changes in wetlands informing Indigenous key questions and concerns?

Click or tap here to enter text.

5. Are data produced following OSM Program requirements and provided into the OSM Program data management system?

Click or tap here to enter text.

6. Do methodologies use relevant Standard Operating Procedures/ Best Management Practices/ Standard Methods?

Click or tap here to enter text.

7. How does the monitoring identify integration amongst projects, themes or with communities?

Click or tap here to enter text.

8. With consideration for adaptive monitoring, where does the proposed monitoring fit on the conceptual model for the theme area relative to the conceptual model for the OSM Program?

Click or tap here to enter text.

9. How will this work advance understanding transition towards adaptive monitoring?

Click or tap here to enter text.

10. Is the work plan contributing to Programmatic State of Environment Reporting? If yes, please identify potential linkages to relevant sections of the State of Environment Report.

Click or tap here to enter text.



3.3.4 Air Theme

3.3.4.1 Sub Themes:

Choose an item.

3.3.4.2 Air & Deposition - Key Questions

Explain how your air & deposition monitoring program addresses the key questions below.

1. Has baseline been established? Have thresholds or limits of change been identified?

Click or tap here to enter text.

2. Are changes occurring in air quality? If yes, is there evidence that the observed change is attributable to oil sands development? (Describe source-pathway-receptor and/or conceptual models) and what is the contribution in the context of cumulative effects?

Click or tap here to enter text.

3. Are there unanticipated results in the data? If yes, is there need for investigation of cause studies

Click or tap here to enter text.

4. Are changes in air quality informing Indigenous key questions and concerns?

Click or tap here to enter text.

5. Are data produced following OSM Program requirements and provided into the OSM Program data management system?

Click or tap here to enter text.

6. Do methodologies use relevant Standard Operating Procedures/ Best Management Practices/ Standard Methods?

Click or tap here to enter text.

7. How does the monitoring identify integration amongst projects, themes or with communities?

Click or tap here to enter text.

8. With consideration for adaptive monitoring, where does the proposed monitoring fit on the conceptual model for the theme area relative to the conceptual model for the OSM Program?

Click or tap here to enter text.

9. How will this work advance understanding transition towards adaptive monitoring?

Click or tap here to enter text.

10. Is the work plan contributing to Programmatic State of Environment Reporting? If yes, please identify potential linkages to relevant sections of the State of Environment Report.

Click or tap here to enter text.



3.3.5 Terrestrial Biology Theme

3.3.5.1 Sub Themes:

Choose an item.

3.3.5.2 Terrestrial Biology - Key Questions

Explain how your terrestrial biological monitoring program addresses the key questions below.

1. Has baseline been established? Have thresholds or limits of change been identified?

Click or tap here to enter text.

2. Are changes occurring in terrestrial ecosystems due to contaminants and landscape alteration? If yes, is there evidence that the observed change is attributable to oil sands development? (Describe source-pathway-receptor and/or conceptual models) and what is the contribution in the context of cumulative effects?

Click or tap here to enter text.

3. Are there unanticipated results in the data? If yes, is there need for investigation of cause studies?

Click or tap here to enter text.

4. Are changes in terrestrial ecosystems informing Indigenous key questions and concerns?

Click or tap here to enter text.

5. Are data produced following OSM Program requirements and provided into the OSM Program data management system?

Click or tap here to enter text.

6. Do methodologies use relevant Standard Operating Procedures/ Best Management Practices/ Standard Methods?

Click or tap here to enter text.

7. How does the monitoring identify integration amongst projects, themes or with communities?

Click or tap here to enter text.

8. With consideration for adaptive monitoring, where does the proposed monitoring fit on the conceptual model for the theme area relative to the conceptual model for the OSM Program?

Click or tap here to enter text.

9. How will this work advance understanding transition towards adaptive monitoring?

Click or tap here to enter text.

10. Is the work plan contributing to Programmatic State of Environment Reporting? If yes, please identify potential linkages to relevant sections of the State of Environment Report.

Click or tap here to enter text.



3.3.6 Cross-Cutting Across Theme Areas

3.3.6.1 Sub Themes:

Choose an item.

If "Other" was selected from the drop down list above please describe below:

Click or tap here to enter text.

3.3.6.2 Cross-Cutting - Key Questions

Explain how your cross-cutting monitoring program addresses the key questions below.

1. Is data produced following OSM Program requirements and provided into the OSM Program data management system?

Click or tap here to enter text.

2. Do methodologies use relevant Standard Operating Procedures/ Best Management Practices/ Standard Methods?

Click or tap here to enter text.

3. How does the monitoring identify integration amongst projects, themes or with communities?

Click or tap here to enter text.

4. With consideration for adaptive monitoring, where does the proposed monitoring fit on the conceptual model for the theme area relative to the conceptual model for the OSM Program?

Click or tap here to enter text.

5. How will this work advance understanding transition towards adaptive monitoring?

Click or tap here to enter text.

6. Is the work plan contributing to Programmatic State of Environment Reporting? If yes, please identify potential linkages to relevant sections of the State of Environment Report.

Click or tap here to enter text.

4.0 Mitigation

Evaluation of Mitigation Criteria (Information Box Only- No action required)

Your workplan will be evaluated against the criteria below. A successful workplan would potentially inform:

- efficacy of an existing regulation or policy
- an EPEA approval condition
- a regional framework (i.e., LARP)
- an emerging issue

Explain how your monitoring program informs management, policy and regulatory compliance. As relevant consider adaptive monitoring and the approved Key Questions in your response.

Existing changes in fish health are used to inform adaptations of monitoring frequency and could then lead to management decisions. When differences exceed Critical effect sizes and are getting worse decisions may be made to change management. Existing fish health data is also being compiled to help inform development of new Federal and Provincial effluent regulations. Fish health will be a tool used to assess the efficacy of new regulations if they are implemented. The fish program is also collaborating with the Enhanced Monitoring program to developed detailed baseline data prior to approval of potential release of treated mine waters. As part of the fish program, collection of fish data contributes to EPEA approval conditions. We are working with Chris Teichreb (AER) within the surface water TAC to identify linkages for the fish core program and EPEA requirements.

5.0 Indigenous Issues

Evaluation of Indigenous Issues Criteria (Information Box Only- No action required)

Your workplan will be evaluated against the criteria below. A successful workplan would potentially:

- Investigate Indigenous communities key questions and concerns
- Includes culturally relevant receptor(s) and indicator(s)
- Include or be driven by Indigenous communities (participatory or collaborative)
- Develop capacity in Indigenous communities
- Include a Council Resolution or Letter of Support from one or more Indigenous communities
- Describe how ethics protocols and best practices regarding involvement of Indigenous peoples will be adhered to
- Provide information on how Indigenous Knowledge will be collected, interpreted, validated, and used in a way that meets community Indigenous Knowledge protocols

Explain how your monitoring activities are inclusive and respond to Indigenous key questions and concerns and inform the ability to understand impacts on concerns and inform Section 35 Rights

Fish health and contaminant levels in fish are some of the most relevant indicators for Indigenous communities in the Oil Sands Area. We often hear, “can we drink the water? and can we eat the fish”? The fish health monitoring program addresses these concerns directly and our fish community assessments also support healthy fish communities. We have included community participation in the fish program to date and are moving forward with a number of community based programs in this work plan that will include collaborative CBM programs and increased participatory involvement. We have worked directly with the MCFN/ACFN/Chipewyan Metis CBM teams to incorporate lake whitefish health into the core fish program. These programs are designed to develop and increase capacity in Indigenous communities throughout the OSM area. We are working directly with communities and community representatives to ensure IK is collected, interpreted, validated and used in a way that meets each communities protocols. We have worked with ICBMAC to develop a OSM_ICBMAC_Fish Program questionnaire for use by communities to see if and where their concerns fit within the core fish program. We have developed SOPs for fish health and tissue sampling with MCFN and a sampling video for use by CBM groups. We are also working directly with the new ICBM Facilitation Center to move forward in developing capacity within the program and have submitted additional SOPs on fish health, fish contaminants, fish assemblages, fish histology, and fish fences and trap netting.

Does this project include an Integrated Community Based Monitoring Component?

Yes

If YES, please complete the [ICBM Work Plan Forms](#) and submit using the link below

Please note that completion of the ICBM template is mandatory if yes is indicated above and must be submitted along with each work plan that includes an integrated CBM component

[ICBM WORK PLAN SUBMISSION LINK \(CTRL+CLICK HERE\)](#)





5.1 Alignment with Interim Ethical Guidelines for ICBM in the OSM Program

1. Are there any community specific protocols that will be followed?

Click or tap here to enter text.

2. Does the work plan involve methods for Indigenous participants to share information or knowledge (e.g. interview, focus group, survey/structured interview), or any other Indigenous participation? If yes, describe how risks and harms will be assessed, and the consent process that will be used.

Click or tap here to enter text.

3. Do the activities include any other collecting/sharing, interpreting, or applying Indigenous knowledge? Please describe how these activities will be conducted in alignment with the Interim Ethical Guidelines, and any community-based protocols and/or guidelines that may also apply.

Click or tap here to enter text.

4. Indicate how Indigenous communities / Indigenous knowledge holders will be involved to ensure appropriate analysis, interpretation and application of data and knowledge.

Click or tap here to enter text.

5. How are Indigenous communities involved in identifying or confirming the appropriateness of approach, methods, and/or indicators?

Click or tap here to enter text.

6. How does this work plan directly benefit your community? How does it support capacity building in your community?

Click or tap here to enter text.

7. How is the information from this work plan going to be reported back to your community in a way that is accessible, transparent and easy to understand?

Click or tap here to enter text.

6.0 Measuring Change

Evaluation of Measuring Change Criteria (Information Box Only- No action required)

Your workplan will be evaluated against the criteria below. A successful workplan would potentially:

- assess changes in environmental conditions compared to baseline (e.g., validation of EIA predictions)
- report uncertainty in estimates and monitoring is of sufficient power to detect change due to oil sands development on reasonable temporal or spatial scales
- include indicators along the spectrum of response (e.g., individual, population, community)
- focus on areas of highest risk (where change is detected, where change is greater than expected, where development is expected to expand (collection of baseline))
- measure change along a stressor gradient or a stressor/reference comparison

Explain how your monitoring identifies environmental changes and how can be assessed against a baseline condition. As relevant, consider adaptive monitoring, the TAC specific Scope of Work document and the Key Questions in your response.

The Core Long-Term Fish health monitoring program was designed together with the surface water quality program and the benthic programs to ensure integration of the monitoring program. Fish health was designed to collect three years of baseline data at all sites identified in a stressor gradient design. Sites were chosen to focus on areas of highest risk and are added where development is expected to expand. We have completed that baseline collection and have now moved the Long-Term Fish Core program into a three-year cycle of surveillance monitoring within the EEM Framework. We are currently assessing change compared to baseline using critical effect sizes (limits of change) developed through the Environmental Effects Monitoring programs in Canada, but are working with experts to assess baseline data within species to improve decision triggers for individual species collected in different areas of the OSM program. We ensure study design is of sufficient power to detect levels of change we have determined significant enough to trigger changes in monitoring frequency. We are incorporating environmental variables into predictive models of fish health and fish assemblages to reduce variability in fish health endpoints increasing our power to detect change. Where possible we are also incorporating other potential sources of change such as municipal sewage and industrial development (precipitation, conductivity/alkalinity relationships) to identify factors responsible for altered fish health. These tools are now being used to predict cumulative effects with increased development or possible release of treated OSPW.

7.0 Accounting for Scale

Evaluation of Accounting for Scale Criteria (Information Box Only - No action required)

Your workplan will be evaluated against the criteria below. A successful workplan would potentially be:

- appropriate to the key question and indicator of interest
- relevant to sub-regional and regional questions
- relevant to organism, population and/or community levels of biological organization
- where modelled results are validated with monitored data
- where monitoring informs on environmental processes that occur at a regional scale. e.g. Characterizing individual sources to gain a regional estimate of acid deposition and understand signal from individual contributing sources.

Explain how your monitoring tracks regional and sub-regional state of the environment, including cumulative effects. As relevant, consider adaptive monitoring, the TAC specific Scope of Work document and the Key Questions in your response.

Fish health monitoring program design was set up to monitor tributary fish health upstream outside of the deposit, within the deposit upstream of development and within the deposit downstream of development. This design assesses change in fish health indicators within site, between sites and between years within tributary. Regional reference sites are also sampled to aid in the interpretation of sub-regional or tributary site differences and help with decision making on magnitude of change. Similar designs are used for mainstem fish health and reference site variability in health endpoints are used to establish triggers of change. Fish health endpoints include sub organismal, organismal, population and community level endpoints. Predictive relationships are being developed with fish health endpoints and natural and anthropogenic factors in order to estimate cumulative effects of future development. We are also using conductivity/alkalinity relationships to identify historical baselines for fish health and are comparing our baseline developed through this program to those historical predictions. We are also now able to use these tools to predict change with increased development or potential discharge of treated OSPW into the future.

8.0 Transparency

Evaluation of Transparency Criteria (Information Box Only - No action required)

Your workplan will be evaluated against the criteria below. A successful workplan would potentially include:

- a plan for dissemination of monitoring data, including appropriate timing, format, and aligns with OSM program data management plan
- demonstrated transparency in past performance
- identified an annual progress report as a deliverable
- reporting of monitoring results occurs at timing and format that is appropriate for recipient audience.

Explain how your monitoring generates data and reporting that is accessible, credible and useful. As relevant, consider adaptive monitoring, the TAC specific Scope of Work document and the Key Questions in your response.

All OSM fish health monitoring data is on the Federal Government Oil Sands portal demonstrating transparency in past performance of our work. We are also now posting all of our data on the new Provincial portal and are working with Dr. Keegan Hicks to have all earlier data also linked to or loaded on this Provincial portal. We have published a number of scientific manuscripts over the last number of years as well as contributed to reports for Indigenous communities (Elders Whitefish Camp reports) and made presentations of our work to COSIA, the OSPW Science team and the SWTAC including baselines, changes detected, and investigation of cause for those changes. Publications have gone through the OSM secretariat publication process. We have identified an annual progress report for this fish core monitoring program. We will also be involved in reports for all community based monitoring programs integrated into our core program this year through the new ICBMFC and will conduct many engagements and training sessions with Indigenous communities. We also completed the recent State of the Environment reporting for the OSM Fish Monitoring in the Oil Sands and will continue to contribute additional data and sites to the report. In response to the updated reporting required by the SWTAC, we will work with the TAC to present baseline data, with rationale for continuing our 3 year monitoring cycle, analysis of baseline data showing bounds of natural variability, and results of more recent data collection and how they compare to current baseline

9.0 Efficiency

Evaluation of Efficiency Criteria (Information Box Only- No action required)

Your workplan will be evaluated against the criteria below. A successful workplan would include:

- appropriately addressed a risk-informed allocation of resources
- identified the role and justification for each staff member on the proposed work plan
- identified in-kind and leveraged resources (e.g., resources and approaches are appropriately shared with other OSM projects where possible)
- established partnerships (value-added) and demonstrated examples of coordinated efficiencies (e.g., field, analytical)
- identified co-location of monitoring effort
- demonstrated monitoring activities and information collected are not duplicative
- considered sampling/measurement/methods compatibility to other data sources (e.g., AER)

Explain how your monitoring is integrated with other OSM projects and incorporates community-based participation and/or engagement in proposed monitoring activities. As relevant, consider adaptive monitoring, the TAC specific Scope of Work document and the Key Questions in your response.

The long-term core Fish Monitoring program was designed together with the surface water quality and benthic invertebrate community monitoring programs. This program was initially designed with co-location of study sites for study efficiency and maximum power which continues in this work plan. Water quality samples for the benthic and fish programs are collected and submitted as part of the surface water program to maximize efficiencies, costs and comparability. In terms of the EEM framework, we have triggers of change developed for all three programs. As the fish program is in a three-year cycle of data collection and reporting, if either the water quality or benthic invertebrate core programs identifies changes significant enough to trigger change in their programs, it will also trigger change in the fish program. For example if the fish program is sampling in the Peace River in 2024 and the benthic program identifies change at a site on the Athabasca River, that change will trigger a change in the fish program and the schedule will be adapted to sample this site in the following 2025 sampling year. This program was also asked to integrate with Community Based Monitoring programs where it made sense. In the 2021/22 study plan we included three separate CBM programs all in phase 1 of community involvement. These work plans included community meetings, engagement, training and potential initial sample collection or fish camps. In 2022-23 we have worked with and trained a number of communities and continue to develop relationships with these communities. We have worked with MCFN/ACFN and Chipewyan Metis over the last four years first developing a Lake whitefish health program, then collecting three years of baseline data. This program is now part of the long-term core fish program conducted by those communities. All collaborative CBM fish programs increase the efficiency of the OSM program with samples collected through the ICBM core work plans directly adding to the long-term core fish program. We hope to continue to work with communities identifying lakes of concern for fish related issues to incorporate into the development of an OSM core lake program.

10.0 Work Plan Approach/Methods

10.1 List the Key Project Phases and Provide Bullets for Each Major Task under Each Project Phase *

Fish health monitoring is now in a three-year cycle of monitoring with sites and areas split to maximize understanding and efficiencies.

Year 1 (2023-24) samples the Clearwater River for white sucker, trout-perch and northern pike and all sculpin tributaries on the east and south of the Athabasca River and conducts the spring Muskeg River fish fence and Clearwater River inventory.

Year 2 (2024-25) samples Trout-perch, Longnose sucker and Walleye on the Peace River and the Southern Operators for fish assemblages.

Year 3 (2025-26) samples Athabasca mainstem for white sucker and walleye, and all of the west tributaries for fish assemblage and EEM fish health. During the spring conducts the McKay River trap net survey and the Athabasca mainstem Spring fish inventory sampling.

10.2 Describe how changes in environmental Condition will be assessed *

Fish health changes are used to assess environmental condition using critical effect sizes (limits of change) developed through the Environmental Effects Monitoring program. We are examining variability in baseline data within species and developing new more detailed effect sizes for fish health endpoints within species to help make more informed decisions. For Fish Assemblage monitoring we are using sites where we can obtain both EEM fish health and fish assemblage data to develop triggers of change for FAM endpoints. We will then be able to use these triggers for tributaries too small to conduct EEM fish health studies. Fish contaminant data is compared to consumption guidelines.

10.3 Are There Benchmarks Being Used to Assess Changes in Environmental Condition? If So, Please Describe, If Not, State "NONE" *

The fish health program has developed tiers and triggers for adaptive management of the monitoring program. The decision framework is designed in tiers and is cyclical so when an effect is detected the first thing that is required is the confirmation of that effect. A statistical difference is used to detect this effect. If effects are confirmed, effect sizes are compared to critical effects sizes developed for each fish health endpoint. If effects are below CES, monitoring moves to an extent and magnitude examination. If effects are above CES this triggers investigation of cause. If effects are greater than CES and getting worse, this triggers a management decision. We are also now using reference condition from baseline collections to develop improved CES within species to increase meaning of our decisions. We are also working with the core water quality and benthic invertebrate community programs so that if their programs exceed a threshold it can trigger a change in the frequency of sampling within the core fish program. We have also moved towards change within site over time as a very sensitive tool to investigate cause of change within site. Our recent publication on the mainstem Athabasca and papers on the Steepbank and Ells rivers use data within site over time to indicate influence of industrial development on change in fish health endpoints. Change is small, but allows for more detailed tracking of change over time with increased development or release of treated OSPW. In this way we can predict cumulative effects into the future with increased development or climate changes.

(e.g., objectives, tiers, triggers, limits, reference conditions, thresholds, etc.)

10.4 Provide a Brief Description of the Western Science or Community-Based Monitoring Indigenous Community-Based Monitoring Methods by Project Phase *

All fish health monitoring methods follow guidance developed for the Environmental Effects Monitoring (EEM) programs for the pulp and paper and metal mining regulations. Community-Based Monitoring

programs integrated into the core plan will use IK for site selection etc. but will utilize the Western Science methods to evaluate fish health together with IK endpoints, input and interpretation. From previous community meetings, community fisherman utilize similar tools to evaluate fish health. Fish community assemblages and fish community assessments are also part of the Western Science fish program and are utilized by community based monitoring programs already. We have developed an OSM_ICBMAC_Fish Program questionnaire for use by communities to assess their concerns related to fish. It helps the ICBM team evaluate which fish SOPs will be most useful in assessing community concerns in fish as well as contribute to the Core Fish Program and address the three OSM questions. The long-term core fish program supports all ICBM work plan fish programs with Dr. Erin Ussery of ECCC coordinating these collaborations with Dr. Keegan Hicks of AEP. We have developed SOPs in collaboration with the ICBMFC for use by communities interested in fish including a fish questionnaire (Dersch et al., 2021) to aid communities in selecting questions of concern and SOPs to address them including fish health (Ussery et al., 2021), fish assemblage (Wynia et al., 2021), fish histology (Cunningham et al., 2021), fish fence and trap netting (Clark et al., 2021). Over time, these CBM fish programs will form part of the core OSM fish program. We have also worked with MCFN/ACFN to develop indigenous triggers of change for fish.

10.5 List the Key Indicators Measured, If Not Applicable, State N/A *

Fish weight, length, age, gonad weight, liver weight, condition factor, gonadosomatic indices, liver somatic indices, EROD activity, muscle PACs and alkylated PACs, Hg, metals, abnormalities, fish assemblage, total abundance, taxa richness, diversity and evenness.

11.0 Knowledge Translation

In the space below, please provide the following:

- Describe the plan for knowledge transfer and distribution of learnings from the project. This could include workshops, publications, best practice documentation, marketing plan, etc.
- Demonstrate that the knowledge transfer plan is appropriate for the intended end-users.

Over the past several years, standard operating procedures have been developed to sample fish health and tissues as well as fish assemblages and the collection of supporting variables as appropriate such as water chemistry, and habitat variables that alter fish communities. These documents can be used by other monitoring groups to ensure consistency in sampling regimes and data used to assess change in fish in the Oil Sands Areas of Alberta. We have published integration documents from the first 3 years of JOSM that include chapters on fish health as well as an integration chapter for water quality, benthic invertebrates, sediments, groundwater etc (McMaster et al., 2018, Culp et al., 2021). A number of peer reviewed scientific documents have been published as well as reports for collaborative community based monitoring programs such as the MCFN/ ACFN Elders whitefish camp (McMaster et al., 2018, 2020; Archiszewski et al., 2017, 2021; Tetreault et al., 2019; Kilgour et al., 2017, Evans et al., 2019). We have also produced an OSM_ICBMAC_Fish Program Questionnaire for communities to use to help develop their specific ICBM Fish program that addresses both their concerns related to fish and contributes to answering the three OSM questions. We have also developed a CBM Whitefish Sampling Protocol in collaboration with MCFN as well as a Sampling Video for use by CBM communities in the Oil Sands Area.

For objective II, integration with CBM projects: We will look to ICBMAC for guidance for knowledge translation with the program. We contribute to collaborative community based monitoring reports and videos such as the MCFN/ACFN Elders whitefish camp.

For objective III, developing a "core" lake component for fish monitoring: If a monitoring plan is develop through the SW TAC in collaboration with the University of Calgary team, AEP fisheries biologists and local communities, fish will be a part of that overall plan. We will then work on knowledge translation within that program.

12.0 External Partners

List by project or project phase each component that will be delivered by an external party (including analytical laboratories) and name the party. Describe and name the associate work plan/grant/contract for these services. * state none if not required

Partners for "core" monitoring components include:
 University of Calgary (contact Kelly Munkittrick, CAIP Chair in Ecosystem Health Assessment). A grant to support evaluation and reporting of fish data.
 University of Guelph (contact Dr. Lorna Deeth, Professor, Department of Mathematics and Statistics). A grant to support evaluation and reporting of fish data.
 North South Consultants, Winnipeg, Manitoba. Aging Analysis

Partners for Fish CBM projects include and will appear in the ICBM study proposals:
 AEP Fisheries (contact Rebecca Baldwin)
 Chipewyan Prairie Dene First Nation (contact Ave Dersch)
 Cold Lake First Nations (contact Fin MacDermid)
 Fort McKay Metis Nation (contact Adi Adele)
 LICA (contact Erin Ritchie)
 Owl River Metis (contact Hansee Dai)



Smith's Landing First Nation (contact Kristielyn Jones)
Athabasca Landing Metis Community Group (Diane Scoville)
Metis Nation of Alberta (James Glasier)
Willow Lake Metis Nation (Destiny Martin)

*To ensure complete work plan proposal submission, all grants and contracts listed in this section should also be captured in Grants & Contracts.

13.0 Data Sharing and Data Management

For 2022-23 the following approach will be taken by the OSM Program related to data sharing.

For all work plans of a **western science** nature funded under the OSM Program, data sharing is a condition of funding and must align with the principle of "**Open by Default**". In this case, all data is to be shared with the OSM Program as directed by the OSM Program Data Management work plan.

For all work plans involving **Indigenous Knowledge** as defined below and funded under the OSM Program, data sharing is a condition of funding and the Indigenous Knowledge components of the work plan must align with the principle of "**Protected by Default**". In this case, all data as defined as Indigenous Knowledge, are to be retained by the Indigenous community to which the Indigenous Knowledge is held.

Indigenous Knowledge is defined as:

"The knowledge held by First Nations, Inuit and Métis peoples, the Aboriginal peoples of Canada. Traditional knowledge is specific to place, usually transmitted orally, and rooted in the experience of multiple generations. It is determined by an Aboriginal community's land, environment, region, culture and language. Traditional knowledge is usually described by Aboriginal peoples as holistic, involving body, mind, feelings and spirit. Knowledge may be expressed in symbols, arts, ceremonial and everyday practices, narratives and, especially, in relationships. The word tradition is not necessarily synonymous with old. Traditional knowledge is held collectively by all members of a community, although some members may have particular responsibility for its transmission. It includes preserved knowledge created by, and received from, past generations and innovations and new knowledge transmitted to subsequent generations. In international or scholarly discourse, the terms traditional knowledge and Indigenous knowledge are sometimes used interchangeably."

This definition was taken from the Canadian Government's Tri-council Policy Statement for Ethical Research involving Humans (Chapter 9, pg. 113) and is an interim definition specific to the Oil Sands Monitoring Program.

Data Sharing and Data Management *Continued*

13.1 Has there, or will there be, a Data Sharing agreement established through this Project? *

YES

13.2 Type of Quantitative Data Variables:

Both

13.3 Frequency of Collection:

Annually

13.4 Estimated Data Collection Start Date:

2023-05-01

13.5 Estimated Data Collection End Date:

2024-03-31

13.6 Estimated Timeline For Upload Start Date:

2024-04-01

13.7 Estimated Timeline For Upload End Date:

2025-03-31

13.8 Will the data Include traditional knowledge as defined by and provided by an Indigenous representative, Community or Organization?

NO

TABLE 13.9 Please describe below the Location of Data and Data Type:

Add a Data Source by clicking on the table and then clicking on the blue "+" symbol on the bottom right side of table

Name of Dataset	Location of Dataset (E.g.: Path, Website, Database, etc.)	Data File Formats (E.g.: csv, txt, API, accdb, xls, etc.)	Security Classification
<i>Mainstem Fish Health</i>	ECCC Data Catalogue AEP Data Catalogue	csv	Open by Default
<i>Tributary Fish Health</i>	ECCC Data Catalogue AEP Data Catalogue	csv	Open by Default
<i>Athabasca and Clearwater spring inventory/Fish Fence and Trap Nets</i>	ECCC Data Catalogue AEP Data Catalogue	csv	Open by Default



<i>Tributary Fish Assemblage</i>	ECCC Data Catalogue AEP Data Catalogue	csv	Open by Default
----------------------------------	---	-----	-----------------

14.0 2023/24 Deliverables

Add an additional deliverable by clicking on the table and then clicking on the blue "+" symbol on the bottom right side of table.

Type of Deliverable	Delivery Date	Description
Key Engagement/Participation Meeting	Q1	Engagement meetings with Aquatic ICBM core team, ICBMFC and participating communities to coordinate participation of Core Fish team.
Key Engagement/Participation Meeting	Q2	Engagement meetings with Aquatic ICBM core team, ICBMFC and participating communities to coordinate participation of Core Fish team.
Key Engagement/Participation Meeting	Q3	Engagement meetings with Aquatic ICBM core team, ICBMFC and participating communities to coordinate participation of Core Fish team.
Other (Describe in Description Section)	Q2	Work with TAC demonstrating baseline criteria met, including post baseline monitoring at sites including presentation of results of investigation of cause studies at sites used to understand stressors involved in fish health variability. Work with TAC to ensure fish program is working in an adaptive nature and addressing OSM questions.
Conference Presentation	Q3	Society of Environmental Toxicology and Chemistry and/or Canadian Ecotoxicity Workshop presentations by Ussery, McMaster, Tetreault, Hicks.
Key Engagement/Participation Meeting	Q3	Participation in CBM fish camps as required delivering on components that support the core fish program.
OSM Program Annual Progress Report (required)	Q4	Annual progress report on fish monitoring.
Key Engagement/Participation Meeting	Q4	Participation in fish camps as required by ICBM core aquatics program.



Condition of Environment Report	Q4	Contribute to State of Environment reporting as required.
---------------------------------	----	---

15.0 Project Team & Partners

In the space below please provide information on the following:

- Describe key members of the project team, including roles, responsibilities and expertise relevant to the proposed project.
- Describe the competency of this team to complete the project.
- Identify any personnel or expertise gaps for successful completion of the project relative to the OSM Program mandate and discuss how these gaps will be addressed.
- Describe the project management approach and the management structure.

Fish Health (ECCC; in-kind & VNR)

Mark McMaster – Research Scientist – Core Fish Health study lead, Surface Water TAC co-lead, Community Based Monitoring Coordination

Erin Ussey – Research Scientist – Fish Health and Fish Lead on Community Based Monitoring and Engagement

Gerald Tetreault – Research Scientist – Fish Community and Fish Health

Thomas Clark: Research Technician – Technical support: field logistics, fish collections, EROD analysis, circulating steroids

Jessie Cunningham: Research Technician – Technical support: field collections, data analysis and histology, and community based monitoring support.

Abby Wynia: Research Technician – Technical support: field collections, fish assemblage analysis and EROD analysis

Jason Miller: Research Technician – Technical support: field collections

Amy Sett: Research Technician – Technical support: field collections

Richard Frank: Research Scientist – Support of fish program and Scientist for focused studies

Sheena Campbell: Research Technician – Technical support: field collections

C- Fish Health AEP

– Fish Biologist – AEP Study Lead

– Fish Biologist – ICBM Core Monitoring Lead

– Research Scientist – Data assessment

– Aquatic Ecologist – Athabasca River and tributary Benthic Lead

– Aquatic Ecologist – Cold Lake and Peace River Benthic Lead

- WQ1 Water Quality Technician supporting fish collections

– WQ2 – Water Quality Technician supporting fish collections

- WQ3 – Water Quality Technician supporting fish collections

- WQ4 – Water Quality Technician supporting fish collections

16.0 Project Human Resources & Financing

Section 16.1 Human Resource Estimates

Building off of the competencies listed in the previous section, please complete the table below. Add additional rows as necessary. This table must include **ALL staff involved** in the project, their role and the % of that staff's time allocated to this work plan. The AEP calculated amount is based on an estimate of \$120,000/year for FTEs. This number cannot be changed. The OSM program recognizes that this is an estimate.

Table 16.1.1 AEP

Add an additional AEP Staff member by clicking on the table and then clicking on the blue "+" symbol on the bottom right side of table. The total FTE (Full Time Equivalent) is Auto Summed (in Table 16.2.1) and converted to a dollar amount.

Name (Last, First)	Role	% Time Allocated to Project
Senior Fish Biologist (Noddin, Fred)	Monitoring, evaluation and reporting	100%
Senior Fish Biologist (Keegan Hicks)	Monitoring, evaluation and reporting	70%
Fish Scientist (Tim Arcizewski)	Evaluation and reporting	100%

Table 16.1.2 ECCC

Add an additional ECCC Staff member by clicking on the table and then clicking on the blue "+" symbol on the bottom right side of table. The total FTE (Full Time Equivalent) is Auto Summed in Table 16.2.2

Name (Last, First)	Role	% Time Allocated to Project
McMaster, Mark	Fish Health Study Lead (In Kind)	75%
Ussery, Erin	Fish Health Scientist, Community Based Monitoring Lead (VNR)	75%
Tetreault, Gerald	Fish Community Scientist (In Kind)	40%
Clark, Thomas	Research Technician (In Kind)	50%
Cunningham, Jessie	Research Technician (In Kind)	50%



<i>Wynia, Abby</i>	Research Technician (VNR)	50%
<i>Miller, Jason</i>	Research Technican (In Kind)	10%
<i>Sett, Amy</i>	Research Technican (In Kind)	10%
<i>Khan, Hufsa</i>	Research Technician (In Kind)	10%
<i>Frank, Richard</i>	Research Scientist (In Kind)	10%
<i>Campbell, Sheena</i>	Research Technician (In Kind)	10%
<i>Evans, Marlene</i>	Research Scientist (In Kind)	10%

The tables below are the financial tables for Alberta Environment & Parks (AEP) and Environment & Climate Change Canada. All work plans under the OSM Program require either a government lead or a government coordinator.

Section 16.2 Financing

The OSM Program recognizes that many of these submissions are a result of joint effort and monitoring initiatives. A detailed "PROJECT FINANCE BREAKDOWN" must be provided using the Project Finance Breakdown Template provided, accessible here (ctrl + click the link below). Please note that completion of this Project Finance Breakdown Template is mandatory and must be submitted along with each workplan.

[PROJECT FINANCE BREAKDOWN TEMPLATE \(CTRL+CLICK HERE\)](#)

Table 16.2.1 Funding Requested BY ALBERTA ENVIRONMENT & PARKS

Organization – Alberta Environment & Parks ONLY	Total % time allocated to project for AEP staff	Total Funding Requested from OSM
Salaries and Benefits <i>(Calculated from Table 16.1.1 above)</i>	270.00%	\$324,000.00
Operations and Maintenance		
Consumable materials and supplies		\$100,800.00
Conferences and meetings travel		\$0.00
Project-related travel		\$30,250.00
Engagement		\$0.00
Reporting		\$20,000.00
Overhead		\$0.00
Total All Grants <i>(Calculated from Table 16.4 below)</i>		\$50,000.00
Total All Contracts <i>(Calculated from Table 16.5 below)</i>		\$279,375.00
Sub- TOTAL <i>(Calculated)</i>		\$804,425.00
Capital*		\$35,000.00
AEP TOTAL <i>(Calculated)</i>		\$839,425.00

* The Government of Alberta Financial Policies (Policy # A600) requires that all **capital asset** purchases comply with governmental and departmental legislation, policies, procedures, directives and guidelines. **Capital assets** (Financial Policy # A100, Government of Alberta, January 2014) are tangible assets that: have economic life greater than one year; are acquired, constructed, or developed for use on a continuing basis; are not held for sale in ordinary course of operations; are recorded and tracked centrally; have a cost greater than \$5,000.

Some **examples of capital asset equipment include:** laboratory equipment, appliances, boats, motors, field equipment, ATV's/snowmobiles, stationary equipment (pier/sign/weather), fire/safety equipment, pumps/tanks, heavy equipment, irrigation systems, furniture, trailers, vehicles, etc. (Financial Policy # A100, Government of Alberta, January 2014).

Table 16.2.2 Funding Requested BY ENVIRONMENT & CLIMATE CHANGE CANADA

Organization – Environment & Climate Change Canada ONLY	Total % time allocated to project for ECCC staff	Total Funding Requested from OSM
Salaries and Benefits FTE		
<i>(Please manually provide the number in the space below)</i>		
Salaries and Benefits		\$254,832.00
Operations and Maintenance		
Consumable materials and supplies		\$258,000.00
Conferences and meetings travel		\$20,000.00
Project-related travel		\$80,000.00
Engagement		\$10,000.00
Reporting		\$5,000.00
Overhead		\$38,055.00
ECCC TOTAL		\$665,887.00
<i>(Calculated)</i>		

* ECCC cannot request capital under the OSM program. Any capital requirements to support long-term monitoring under the OSM program should be procured by Alberta and captured in that budget table.

Table 16.3

Complete ONE table per Grant recipient.

Add a Recipient by clicking on the table and then clicking on the blue "+" symbol on the bottom right side of table. The total of all Grants is Auto Summed in Table 16.2.1

GRANT RECIPIENT - ONLY: Name	Dr. Kelly Munkittrick
GRANT RECIPIENT - ONLY: Organization	CAIP Research Chair in Ecosystem Health Assessment, University of Calgary.
Category	Total Funding Requested from OSM
Salaries and Benefits	\$20,000.00
Operations and Maintenance	
Consumable materials and supplies	\$22,000.00
Conferences and meetings travel	\$0.00
Project-related travel	\$0.00
Engagement	\$0.00
Reporting	\$0.00
Overhead	\$8,000.00
GRANT TOTAL <i>(Calculated)</i>	\$50,000.00

Table 16.4

Complete ONE table per Contract recipient.

Add a Recipient by clicking on the table and then clicking on the blue "+" symbol on the bottom right side of table. This section is only to be completed should the applicant intend to contract components or stages of the project out to external organizations. The total of all Contracts is Auto Summed in Table 16.2.1

CONTRACT RECIPIENT - ONLY: Name	Click or tap here to enter text.
CONTRACT RECIPIENT - ONLY: Organization	North South Consultants
Category	Total Funding Requested from OSM
Salaries and Benefits	\$0.00
Operations and Maintenance	
Consumable materials and supplies	\$23,450.00
Conferences and meetings travel	\$0.00
Project-related travel	\$0.00
Engagement	\$0.00
Reporting	\$0.00
Overhead	\$0.00
CONTRACT TOTAL <i>(Calculated)</i>	\$23,450.00
CONTRACT RECIPIENT - ONLY: Name	Click or tap here to enter text.
CONTRACT RECIPIENT - ONLY: Organization	Helicopter Standing Offer
Category	Total Funding Requested from OSM
Salaries and Benefits	0
Operations and Maintenance	
Consumable materials and supplies	\$113,080.00
Conferences and meetings travel	0
Project-related travel	0
Engagement	0
Reporting	0
Overhead	0
CONTRACT TOTAL <i>(Calculated)</i>	\$113,080.00
CONTRACT RECIPIENT - ONLY: Name	Click or tap here to enter text.
CONTRACT RECIPIENT - ONLY: Organization	North South Consulting Aging Fish
Category	Total Funding Requested from OSM
Salaries and Benefits	\$12,270.00
Operations and Maintenance	
Consumable materials and supplies	\$0.00
Conferences and meetings travel	0
Project-related travel	\$0.00
Engagement	0
Reporting	0

Overhead	0
CONTRACT TOTAL <i>(Calculated)</i>	\$12,270.00
CONTRACT RECIPIENT - ONLY: Name	Click or tap here to enter text.
CONTRACT RECIPIENT - ONLY: Organization	AXYS - PACs
Category	Total Funding Requested from OSM
Salaries and Benefits	\$96,825.00
Operations and Maintenance	
Consumable materials and supplies	0
Conferences and meetings travel	0
Project-related travel	0
Engagement	0
Reporting	\$0.00
Overhead	0
CONTRACT TOTAL <i>(Calculated)</i>	\$96,825.00
CONTRACT RECIPIENT - ONLY: Name	Click or tap here to enter text.
CONTRACT RECIPIENT - ONLY: Organization	University of Alberta Hg
Category	Total Funding Requested from OSM
Salaries and Benefits	\$9,750.00
Operations and Maintenance	
Consumable materials and supplies	\$0.00
Conferences and meetings travel	0
Project-related travel	0
Engagement	0
Reporting	0
Overhead	0
CONTRACT TOTAL <i>(Calculated)</i>	\$9,750.00
CONTRACT RECIPIENT - ONLY: Name	Click or tap here to enter text.
CONTRACT RECIPIENT - ONLY: Organization	Bureau Veritas- Metals
Category	Total Funding Requested from OSM
Salaries and Benefits	\$21,300.00
Operations and Maintenance	
Consumable materials and supplies	0
Conferences and meetings travel	0
Project-related travel	0
Engagement	0
Reporting	0
Overhead	0
CONTRACT TOTAL <i>(Calculated)</i>	\$21,300.00
CONTRACT RECIPIENT - ONLY: Name	Click or tap here to enter text.
CONTRACT RECIPIENT - ONLY: Organization	BASL isotopes



Category	Total Funding Requested from OSM
Salaries and Benefits	\$2,700.00
Operations and Maintenance	
Consumable materials and supplies	0
Conferences and meetings travel	0
Project-related travel	0
Engagement	0
Reporting	0
Overhead	0
CONTRACT TOTAL <i>(Calculated)</i>	\$2,700.00

Table 16.5 GRAND TOTAL Project Funding Requested from OSM Program

The table below is auto calculated, please do not try to manually manipulate these contents.

Category	Total Funding Requested from OSM
Salaries and Benefits <i>Sums totals for salaries and benefits from AEP and ECCC ONLY</i>	\$578,832.00
Operations and Maintenance	
Consumable materials and supplies <i>Sums totals for AEP and ECCC ONLY</i>	\$358,800.00
Conferences and meetings travel <i>Sums totals for AEP and ECCC ONLY</i>	\$20,000.00
Project-related travel <i>Sums totals for AEP and ECCC ONLY</i>	\$110,250.00
Engagement <i>Sums totals for AEP and ECCC ONLY</i>	\$10,000.00
Reporting <i>Sums totals for AEP and ECCC ONLY</i>	\$25,000.00
Overhead <i>Sums totals for AEP and ECCC ONLY</i>	\$38,055.00
Total All Grants (from table 16.2.1 above) <i>Sums totals for AEP Tables ONLY</i>	\$50,000.00
Total All Contracts (from table 16.2.1 above) <i>Sums totals for AEP Tables ONLY</i>	\$279,375.00
Sub- TOTAL	\$1,470,312.00
Capital* <i>Sums total for AEP</i>	\$35,000.00
GRAND PROJECT TOTAL	\$1,505,312.00

Some **examples of capital asset equipment include:** laboratory equipment, appliances, boats, motors, field equipment, ATV's/snowmobiles, stationary equipment (pier/sign/weather), fire/safety equipment, pumps/tanks, heavy equipment, irrigation systems, furniture, trailers, vehicles, etc. (*Financial Policy # A100, Government of Alberta, January 2014*).



17.0 FINANCIAL MANAGEMENT

The OSM Program reserves the right to reallocate project funding during the current fiscal year on the basis of project performance and financial overspend or underspend.

Please check this box to acknowledge you have read and understand

In the space below please describe the following:

- Discuss how potential cost overruns and cost underruns will be managed.
- If this is a continuing project from last year, identify if this project was overspent or underspent in the previous year and explain why.
- Describe what risks and/or barriers may affect this project.

Click or tap here to enter text.



18.0 Alternate Sources of Project Financing – In-Kind Contributions

Table 18.1 In-kind Contributions

Add an In Kind Contribution by clicking on the table and then clicking on the blue "+" symbol on the bottom right side of table.

DESCRIPTION	SOURCE	EQUIVALENT AMOUNT (\$CAD)
Scientific Expertise	ECCC	\$182,972.00
TOTAL		\$182,972.00



19.0 Consent & Declaration of Completion

Lead Applicant Name

Mark McMaster

Title/Organization

Environment and Climate Change Canada

Signature

Click or tap here to enter text.

Date

2022-10-28

Government Lead / Government Coordinator Name (if different from lead applicant)

Click or tap here to enter text.

Title/Organization

Click or tap here to enter text.

Signature

Click or tap here to enter text.

Date

Click or tap to enter a date.



PROGRAM OFFICE USE ONLY

Governance Review & Decision Process

this phase follows submission and triggers the Governance Review

TAC Review (Date):

Click or tap to enter a date.

ICBMAC Review (Date):

Click or tap to enter a date.

SIKIC Review (Date):

Click or tap to enter a date.

OC Review (Date):

Click or tap to enter a date.

Final Recommendations:

Decision Pool:

Choose an item.

Notes:

Click or tap here to enter text.

Post Decision: Submission Work Plan Revisions Follow-up Process

This phase will only be implemented if the final recommendation requires revisions and follow-up from governance

ICBMAC Review (Date):

Click or tap to enter a date.

SIKIC Review (Date):

Click or tap to enter a date.

OC Review (Date):

Click or tap to enter a date.

Comments:

Decision Pool:

Choose an item.

Notes & Additional Actions for Successful Work Plan Implementation:

Click or tap here to enter text.