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: If this is an on-going project please fill the identifier number for 24/25 fiscal by adjusting the last four digits: **Example:** D-1-2425 would become D-1-**2425**	W-LTM-S-5-2425
Project Region(s):	Oil Sands Region
Project Start Year: First year funding under the OSM program was received for this project (if applicable)	2012
Project End Year: Last year funding under the OSM program is requested **Example: 2024**	
Total 2024/25 Project Budget: From all sources for the 2024/25 fiscal year	$1,430,399.00
Requested OSM Program Funding: For the 2024/25 fiscal year	$1,430,399.00
Project Type:	Long Term Monitoring
Project Theme:	Surface Water
Anticipated Total Duration of Projects (Core and Focused Study (3 years))	Year 3
Current Year (choose one):	Focused Study: -Select One-
	Core Monitoring: Year 1 of 3

Contact Information

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

Project Summary

In the space below, please provide a summary 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 and **should not exceed 300 words**.

This work plan serves the mandate of the OSM program by addressing the three key questions for aquatic ecosystems. The work plan content is at the direction of the Surface Water TAC, with contributions from the ICBMAC and integration with the other surface water core programs. Indigenous community-based monitoring (ICBM) projects with Indigenous indicators that address community questions and contribute to the long-term fish core program are being integrated in collaboration with the ICBM work plan.
The long-term fish program rotates on three-year cycles between mainstem (Athabasca, Peace and Clearwater Rivers), and Athabasca and southern tributaries using an EEM fish health approach. The design of the EEM sampling on the mainstem rivers of a sucker species and trout-perch, Walleye or Northern Pike for contaminants follows a surveillance program once every three years, comparing to current baseline. Tributary sample design has merged the EEM fish health approach with fish assemblage monitoring. The assemblage protocol is used at each tributary site with the sentinel species collected for the EEM fish health. At sites where sufficient sentinels cannot be captured, the assemblage data is used to evaluate health in that watershed. These sites are also in surveillance phase of monitoring, and divided into groups to maximize our understanding (all sculpin sites sampled together). 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 exceedances of triggers resulting in changed frequency of sampling or cause and effects studies. We have also triggered back into the core, the Athabasca River Fish Inventory following confirmation of change using historic data and the Muskeg River Fish fence and McKay River trap net surveys of community concern.

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. The long-term fish program has been developed following the EEM framework set out in the Integrated Monitoring Plan for the Oil Sands (2011). Current 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. Incorporation of flow, temperature and other sources of concern (sewage) has identified the input of sewage altering fish health but also potential change due to sources from deposition related to industry. Additional studies have predicted changes in fish health with increased development in the Ells River watershed that will be monitored through the surveillance program. Continuing, long-term “core” monitoring, evaluation, and reporting of fish are led and executed by AEPA and ECCC 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 lake whitefish health in the PAD in collaboration with MCFN/ACFN and Fort Chipewyan Metis under the guidance of ICBMAC. This work is also incorporating Indigenous indicators of change and Indigenous baselines. 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 AEPA.

As this is a field driven program in a remote location, health and safety of personnel is of utmost importance. Teams are kept up to date in the training required to complete this such a program.

2.0 Objectives of the Work Plan

List in point form the objectives of the 2024/25 work plan below

The overall objectives of the 24/25 work plan for OSM long-term Fish Monitoring include:
I- 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 the develop a “core” component for lake monitoring of fish that meets information needs of the OSM program and stakeholders.
IV- Contribute to the newly established Integrated Contaminants Effects (ICE) working group incorporating fish contaminants from the core fish program.

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

The long term fish health program is in a three-year cycle of surveillance monitoring with all the sites separated into three groups to maximize efficiency and decision making for this core component of the OSM monitoring program.
1) In 2024/25 we will conduct surveillance monitoring of large bodied (longnose sucker) and small bodied (trout-perch) fish health in the Peace River including Walleye for contaminants in a fish consumed by locals. Baseline data was collected from 2015-17 from these sites. Data will be compared to the baseline

fish health between sites within 2024/25 and 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) Tributary sampling occurs in the Southern operators in 2024-25, also as part of the three-year cyclical surveillance sampling program. This sampling will consist only of the fish assemblage monitoring program as previous sampling efforts determined fish communities are limited and insufficient for EEM sampling purposes. With existing data from other tributaries where both Environmental Effects Monitoring (EEM) and Fish Assemblage Monitoring (FAM) are conducted, we are using this data to develop limits of change for the FAM program. This program has been adapted already as sites with no fish have been dropped from the assessment. We are also working with all tributary fish data (historic and OSM collected) evaluating the use of condition indices for decision making at these sites (Manuscript in preparation).
3) To establish linkages between fish health, fish assemblages, benthic invertebrate communities, water quality and water quantity within the oil sands development region and downstream receiving environments using existing data such as recent publications from our group.
4) Work with Indigenous Community Based Monitoring program leads around capacity building and training opportunities (ICBMAC) 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 questionarre (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 ICBMAC in western science-based monitoring, and data management. ICBMAC will also provide guidance. OSM Program Office staff, AEPA and ECCC scientific and technical staff, and partners will provide training opportunities.
3) Implementation: For communities that have co-developed ICBM 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 the surface water TAC lakes subgroup, water quality, benthic community OSM leads as well as ICBM programs to identify data gaps that exist in monitoring lakes in the Oil Sands region.
2) In a design consistent with the draft provincial lentic MER plan as well as Indigenous 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;
(ii) To establish baseline fish contaminant levels in fish consumed by the public to allow comparison to levels in the future with increased development in the oil sands region.

For objective IV, to participate and contribute fish contaminant data to the newly formed Integrated Contaminant Effects working group.

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 Theme

Please select the theme(s) your monitoring work plan relates to:

- [ ] Air
- [ ] Groundwater
- [x] Surface Water
- [ ] Wetlands
- [ ] Terrestrial Biology
- [ ] Data Management Analytics & Prediction
- [ ] Cross Cutting

3.2 Core Monitoring, Focused Study or Community Based Monitoring

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.

Long Term Monitoring

Themes

Please select the theme from the options below. Select all that apply.

- [ ] Air
- [ ] Groundwater
- [x] Surface Water
- [ ] Wetland
- [ ] Terrestrial
- [ ] Cross-Cutting

3.3.1 Surface Water Theme

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

3.3.1.2 Surface Water Key Questions:

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

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

Current baseline has been established at all core fish health sites in the program including the Athabasca, Clearwater and Peace Rivers. Current baseline fish health on tributaries has been established where fish populations allow these tools. We have adapted the fish assemblage design on smaller tributaries so are collating existing data as well as completing 3 years current baseline using the advanced protocol for the future. We are also conducting an in depth analysis of all existing tributary fish data evaluating condition indices established using both lethal and non lethal surveys to establish baseline fish condition for potential use moving forward in our adaptive monitoring program on the tributaries. The fish program is now on a 3-year cycle of surveillance monitoring with sites determined based on location and similar species for comparative reasons. Working with Indigenous communities we are also collecting 3 years of current baseline fish data that is being incorporated into the core fish program. We have been working with ICBMAC on historical baselines using Indigenous Knowledge for the ICBM program as well as incorporating Indigenous indicators.

We continue to use the well-established critical effect sizes (CES) developed over many years of development in the EEM programs (pulp and paper and metal mining). These CES have been used in all different environments and have identified situations that required additional information or investigation of cause at a number of locations within the other programs. With improved treatment at pulp mill sites etc. these effects have returned to normal indicating that the CES's are useful for re-focusing studies and prompting management responses reducing ecological harms once the source is removed or improved. This approach will focus resources where largest effects are detected within the OSM program. Similar CES's are being used to assess ICBM western science fish data with Indigenous knowledge being used developing baseline and limits of change for Indigenous indicators. The fish program leads also participated in the recent Surface Water TAC workshop on conceptual models, limits of change and reporting. We will continue to work with the SWTAC on these components adapting our program where needed.

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 expanding our understanding of natural variability for the fish health endpoints in the species used in our program for the Oil Sands Area. Change has been demonstrated both between sites within year and within sites between years but has not been confirmed and/or does not exceed CES's, so surveillance monitoring continues on a three-year cycle. We are working with the SWTAC in the assessment of limits of change and incorporating Indigenous limits of change to the program and expanding our the conceptual model to follow change when detected.

For our studies on the mainstem Athabasca where change was identified, environmental variables including river flow and temperature account for most of the variability or change identified. The majority of the additional variability seen in white sucker health endpoints is attributable to increased nutrients from the Fort McMurray municipal sewage discharge (Arciszewski and McMaster, 2021). A very small level of variability may be accounted for by wet and dry deposition on the landscape by way of development that

enters the river via precipitation. We continue to monitor for change in this system using our 3-year surveillance cycle. On the Ells River where change was identified, environmental variables of flow and temperature again accounted for most of the variability identified in fish health (Arcizewski et al. 2022) and fish assemblage (Wynia et al. 2022). Small amounts of remaining variability may be accounted for by development and we plan to continue to monitor these predictions of cumulative effects with increased development in that watershed using our surveillance monitoring study design. Using our understanding of fish health, stressors in the system and pathways of effects we have been able to predict change in fish health with increased changes in climate and future development (Kilgour et al. 2019; Arciszewski et al. 2022; Marshall, 2023). Our team continues to monitor change using the 3-year surveillance monitoring program.

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

There are no unanticipated results to date. We have used detailed examination of the surface water conceptual framework, stressors and pathways to identify potential environmental and industrial variables responsible for change identified (see references above). With these understandings of the fish data, we are able to make predictions of change that will be followed with our surveillance monitoring study design. The IOC studies conducted to date used existing fish health data collected by our core program, incorporating environmental variables from the water quantity program, the water quality program, the air program and industrial data (Municipal sewage discharge and Oil Sand Industrial data) to understand spatial and temporal differences in fish health observed.

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

The long-term core fish program participates in many ICBM programs that have a concern with fish. We have developed SOPs for use by communities with similar questions and concerns and have worked with ICBMAC in developing Indigenous baselines. The MCFN/ACFN, Athabasca Chipewyan Metis whitefish health program has developed current baseline for MCFN and some ACFN traditional fishing areas. We have worked closely with the communities and are using western science endpoints to understand the increased refusal of fish for use in dry fish making (Ussery et al. 2023). We have also worked with CPDFN and CLFN to understand historical changes in fish populations in a lake used by both communities in a focused fish study (Lopez et al. 2023). We are also working with Fort McKay Metis, reducing duplication in studies on the McKay River as well as supporting training and capacity building within communities. We participated in the ICBMFC training sessions in Cold Lake in 2022 and in Beaver Lake in 2023 and hope to have Indigenous students participate in the ICBM core program if possible.

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 have been loaded to the Federal Government Oil Sands Portal. We are also working with Service Alberta providing links to the Federal site and adding data if requested. All publications and reports also are approved by the OSM secretariat publication process prior publication.

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/eseeeem/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 ICBM projects: The ICBMAC information sheet for integration provides

clear instruction for methodology. For ICBM 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 ICBM projects. We have developed an MCFN-ICBM 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 ICBM 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., 2021), fish contaminant analysis (Ussery et al., 2023) and are finishing up an Environmental Effects Monitoring (Ussery et al., 2023) SOP. Over time, these ICBM 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 have been provided to the ICBMAC for use in ICBM capacity building.

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 and quantity core programs 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 intergration. 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 as many of these communities depend on fish for subsistence diets as with communities on a number of lakes in the Oil Sands Area. We have worked directly with MCFN/ACFN and Fort Chipewyan Metis at the Elders whitefish camp and the development of a fish health program in the PAD. Last fiscal, we collaborated directly with communities though the ICBM FC and the ICBM surface water core program to support fish studies with Fort Smith FN, Chipewyan Prairie Dene FN, Cold Lake FN, Fort McKay FN and Fort McKay Metis Nation, Athabasca Landing Metis Community Association, and Willow Lake Metis and participated in the Beaver Lake three day training program. This fiscal, we will continue to collaborate with communities both directly and/or through the ICBM core program to support fish studies. Thus far these communities include Chipewyan Prairie Dene First Nation, Mikisew Cree First Nation, Athabasca Chipewyan First Nation, Smith's Landing First Nation, Athabasca Landing Métis Community Association, Métis Nation of Alberta, Willow Lake Métis Nation, Cold Lake First Nation, Peavine Metis, Beaver Lake Cree Nation, Lakeland Métis Community Association, Peerless Trout First Nation, Dunkin Lake First Nation, and Conklin Resource Development Advisory Committee (on behalf of Conklin Métis Local 193). We have also had community participatory support in the fish health program in numerous locations to date and hope to expand those collaborations.

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 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. 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 OSMW. 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 at sites within the deposit on the Athabasca River

(Marshall, 2023). Incorporation of environmental variables such as flow and temperature reduce site and year variability in fish health. Additional analysis indicates sewage and precipitation alter fish health including that from industrial development on the Athabasca River (Arciszewski and McMaster, 2021) and industrial development (industrial footprint, aerial deposition) on the Ells River watershed (Arciszewski et al., 2022). Core program endpoints for fish contribute to the completion and understanding of the conceptual model for the program overall.

How will this work advance understanding transition towards adaptive monitoring?

All core fish health sites have sufficient current baseline (3 years) so we have moved the program into a cyclical three-year rotation. No sites have exceeded the critical effect sizes developed or were getting worse over time. Those sites are in surveillance in the adaptive monitoring framework and contribute to expanding our baseline if within predicted values. Work within our team has started preliminary IOC on the Athabasca, the Ells and Steepbank Rivers with existing data even though they have not been triggered by exceeding CES. Analysis has identified natural stressors of temperature and flow accounting for a great deal of variability in fish health responses. Some oil sands-related stressors such as land disturbance and aerial deposition also account for a small amount of the variability identified. These locations will continue to be monitored on a 3-year cycle of surveillance monitoring following the increased development in the watersheds. Sufficient power exists in the design to detect these changes.
Studies on IOC include Arciszewski and McMaster, Arciszewski et al., Wynia et al. Tetreault et al., McMillan et al., (all published through the OSM manuscript review process and are available). Any focused studies are with data already collected within the program and aid in predicting cumulative effects moving forward.

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.

The Long-Term Core Fish Monitoring Program has contributed to the Programmatic SOE reporting. We produced an introductory chapter on objectives and study design, chapters on mainstem fish health, tributary fish health, mainstem fish communities and tributary fish assemblage studies. We plan to update this reporting when asked by the program office.

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 management decisions. When differences exceed critical effect sizes and are getting worse decisions may be made to change management styles. 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 when or 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 in both the Athabasca and Peace River areas. Investigation of cause studies that we have conducted with existing long-term core fish data indicate environmental variables are significant sources of variability in fish health endpoints. Industrial development activity does account for small amounts of fish variability and our core surveillance program will continue to monitor change with increased development and possible release of treated process water. Our studies also allow prediction of change in fish health with changes in climate and with increased development and the cumulative nature of all stressors.

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

This workplan (following last fiscal's ICBM surface water core workplan), continues to target/close a gap in the OSM program: being inclusive and responding to Indigenous concerns regarding fish health and the aquatic ecosystem. 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 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 ICBM programs and increased participatory involvement within the communities through the engagement of Elders, Indigenous youth, and community members. We hope to move forward with potential hiring of Indigenous students to help with our core ICBM aquatics program. We have worked directly with the MCFN/ACFN and Fort Chipewyan Metis ICBM 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 community's 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 then help to support communities in the development of their monitoring programs to answer their concerns about fish health and the aquatic environment. We have developed SOPs for fish health and

tissue sampling with MCFN and a sampling video for use by ICBM groups. We are also working directly with the ICBMAC to move forward in developing capacity within the program and have submitted additional SOPs on fish health (Ussery et al., 2021), fish assemblages (Wynia et al., 2021), fish histology (Cunningham et a., 2021), and fish fences and trap netting (Clark et al., 2023), contaminant sampling (Ussery et al., 2023) and Environmental Effects Monitoring (Ussery et al., in prep). We will continue to support communities interested in monitoring fish health within in the OSM program with (1) developing collaborative and participatory projects, based on community concerns related to Oil Sands development, (2) help build community capacity and provide training for project management, monitoring, and data management, analysis and interpretation wherever support is needed, and (3) support the implementation of monitoring wherever needed.

Does this project include an Integrated Community Based Monitoring Component?

No

If YES, please complete the ICBM Abbreviated Work Plan Forms and submit using the link below

ICBM WORK PLAN SUBMISSION LINK

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

Are there any community specific protocols that will be followed?

Long-term core fish PI's have worked with ICBMFC staff and contractors developing Interim Ethical Guidelines for ICBM. They participated in the Exploring Ethics in Indigenous Community Based Monitoring" workshop held online July 12, 2023, hosted by the ICBM Facilitation Centre. Dr. McMaster was selected to present their experiences in considering/applying ethics in fish monitoring with others in the OSM Program. The core fish program has been involved with many communities developing fish programs, working with ICBM leads to follow community specific protocols.

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.

In the long-term core fish program we have worked with communities at core fish sites that occur in or near to communities territories (Muskeg River fish fence, McKay River trap nets, Athabasca River core health sites, Athabasca Spring fish inventory, Peace River mainstem sites). We have worked with community guardians from Fort McKay FN and Fort McKay Metis Nation on our spring fish fence, trap net and Athabasca fish community survey. We are also working with Fort McKay Metis Nation to eliminate duplication in effort on fish surveys in the McKay River. We have worked directly with Community representatives to arrange these collaborations. We also work with MCFN/ACFN community based monitoring teams in the delivery of the whitefish health program in the PAD. The core team has also participated in training sessions in Cold Lake and Beaver Lake over the last two years working with a number of communities demonstrating techniques and answering community questions. We have participated with communities involved in the ICBM core aquatics program on fish camps with Willow Lake Metis Nation, Chipewyan Prairie Dene First Nation, Cold Lake First Nation, Athabasca Landing Community Association and aided other communities requesting help in work plan development.

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.

We have recently published a paper with CPDFN and CLFN on historical studies of fish communities in a lake of interest to both communities (Lopez et al. 2023). The work was part of a focused study funded through the OSM program to the ICBM surface water core program in collaboration with University of Victoria. We work with Dr. Ave Dersch and Finlay MacDermid to ensure activities are conducted in alignment with the Interim Ethical Guidelines and Fish Core PIs have also participated in the development of the Interim guidelines. We are also working directly with MCFN/ACFN and Fort Chipewyan Metis Nation to identify Indigenous specific indicators for fish health and fish communities as well as incorporating Western Science indicators of tissue quality to help understand the increased refusal of whitefish for dry fish making in the PAD and other locations.

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

All of the work that the long-term core fish team conducts with Indigenous communities is conducted in collaboration with the leads of each of the ICBM teams. We work directly with ICBMAC and community leads to ensure Indigenous communities and knowledge holders are involved in the most appropriate way incorporating interpretation and application of data and knowledge. We take these responsibilities very seriously and appreciate all of the relationships we have developed to date and look forward to those moving forward.

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

We have worked with community leads such as Bruce McLean (MCFN), Lori Cyprien (ACFN), Ave Dersch (CPDFN) and Findlay MacDermid (CLFN) in the development of Indigenous indicators for use in our collaborative fish programs. We have worked with ICBMAC to develop a questionnaire for use by communities to identify their concerns related to fish and also developed SOPs to help communities answer those questions. The ICBM core aquatics program also provides access to contract laboratories for

sample analysis to ensure communities data is comparable between years of collection and between different communities that share similar concerns.

How does this work plan directly benefit Indigenous communities? How does it support building capacity in Indigenous communities?

The long-term core fish program has participated in all aquatic training programs for Indigenous communities. We continue to support ICBM programs in which fish are of interest or concern for communities. We continually support building capacity in Indigenous communities through work with ICBMAC and we hope to start hiring Indigenous students to help in hands on field work and to participate in coordinating the ICBM core program. We also invite Indigenous communities to participate in our core fish program (Fort McKay FN and Metis, Duncan's FN).

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

The long-term core fish program continues to report as required by the OSM program. We support presentation of the core program to Indigenous communities that are interested. This may be in the works for 2024/25 as communities discussed this possibility during the training sessions in Beaver Lake in October of 2023.

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 Fish health monitoring program was designed together with the surface water quality and quantity programs and the benthic programs to ensure integration of the aquatics 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 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 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. As we collect more data in the surveillance program, it is now possible to conduct temporal comparisons within site over time. This has increased our ability to interpret environmental variables impact of fish health endpoints, reducing variability and increasing the power to detect change with development.

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 working with our AEPA collaborators and Service Alberta to ensure links to data are incorporated into the 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), a manuscript with CPDFN and CLFN on historical fish populations in a lake of interest and made presentations of our work to the OSPW Science team. Publications have gone through the OSM secretariat publication process. We have identified an annual progress report for this fish core monitoring program and are working with the SWTAC to deliver on reporting requirements following recent funding conditions. We will also be involved in reports for all community based monitoring programs integrated into our core surface water ICBM program this year and will conduct many engagements and training sessions with Indigenous communities. We also completed the State of the Environment reporting for the OSM Fish Monitoring in the Oil Sands and will contribute further when requested by the program office. We understand reporting of the program is key to its success and will work with the SWTAC to ensure the fish program meets these requirements.

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, quantity 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 thee-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 2024/25 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 2025/26 sampling year. This program was also asked to integrate with Community Based Monitoring programs where it made sense. In the 2024/25 study plan we will continue to participate with core ICBM programs such as the MCFN/ACFN,

Chipewyan Metis Nation whitefish program, will work with Fort McKay Metis Nation to eliminate duplication of the programs on the McKay River and will participate in all ICBM programs included in the Core Surface Water ICBM program that would like help in developing their fish programs. These work plans included community meetings, engagement, training and potential initial sample collection or fish camps. All collaborative ICBM 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.

10.0 Work Plan Approach/Methods

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 samples Athabasca mainstem for trout-perch, and all the west tributaries for fish assemblage and EEM fish health and the McKay River spring trap net.
- Spring work with Fort McKay Metis Nation and Fort McKay FN to install McKay River trap net to understand if development has changed the species of fish that use the McKay River to spawn in the spring time.
- Fall, collect trout-perch from 9 sites on the Athabasca including one within Wood Buffalo National Park with Parks Canada including fish health and contaminants.
- Fall collection of west tributaries of the Athabasca for lake chub fish health, contaminants and fish assemblages.
- Fall participation in MCFN/ACFN Fort Chipewyan Metis elders whitefish camp.
- Fall participation in ICBM core community fish camps as requested.
- Winter participation in ICBM core community fish camps as requested.
Year 2 samples Athabasca mainstem for white sucker and walleye, the Clearwater River white sucker, trout-perch and northern pike and all sculpin tributaries on the east and south of the Athabasca River and conducts the Muskeg River spring fish fence and Athabasca River spring fish community inventory.
- Spring work with Fort McKay FN and Fort McKay Metis to install fish fence on the Muskeg River to understand the impact of development on fish that use the Muskeg River to spawn in the spring time.
- Spring fish community survey on the Athabasca River to continue assessment of the impacts of reduced commercial fishing in Lake Athabasca on fish length in spawning white sucker and walleye
- Fall white sucker fish health assessments on the Athabasca River and corresponding collection of walleye for contaminants to asses potential impacts on consumption.
- Fall collection of white sucker, trout-perch and northern pike on the Clearwater River.
- Fall collection of slimy sculpin from tributaries on the east side of the Athabasca river and reference tributaries for fish health, contaminants and fish assemblages.
- Fall participation in MCFN/ACFN Fort Chipewyan Metis elders whitefish camp.
- Fall participation in ICBM core community fish camps as requested.
- Winter participation in ICBM core community fish camps as requested.

Year 3 samples trout-perch, longnose sucker and walleye on the Peace River and the southern operators for fish health and assemblages.
- Fall collection of trout-perch, longnose sucker and walleye for fish health and contaminants.
- Fall fish assemblage collections on tributaries of the Southern Operators.
- Fall participation in MCFN/ACFN Fort Chipewyan Metis elders whitefish camp.
- Fall participation in ICBM core community fish camps as requested.
- Winter participation in ICBM core community fish camps as requested.

Describe how changes in environmental Condition will be assessed

Fish health changes are used to assess environmental condition using critical effect sizes developed through the Environmental Effects Monitoring program. We are examining variability in baseline data within species and developing 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. We are also evaluating all of the tributary fish data collected over the last 30 years to determine whether condition indices for lethal and non lethal sampling can be used to evaluate health of fish in the tributaries. We are also working with Indigenous communities to define historical baseline using traditional knowledge which will aid in the assessment of change in environmental condition.

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.

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

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 indicators, 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 AEPA. 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., 2023), contaminant sampling (Ussery et al., 2023) and Environmental Effects Monitoring (Ussery et al., in prep). Over time, these ICBM fish programs will form part of the core OSM fish program in collaboration with Indigenous communities.

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, isotopes, fish assemblage, total abundance, taxa richness, diversity and eveness.

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 at the MCFN/ ACFN Elders whitefish camp (McMaster et al., 2018, 2020; Archiszewski et al., 2017, 2022; Arciszewski and McMaster, 2021; Tetreault et al., 2019; Kilgour et al., 2017, Evans et al., 2019; Wynia et al., 2022). 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 ICBM Whitefish Sampling Protocol in collaboration with MCFN as well as a Sampling Video for use by ICBM 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. We have developed SOPs for use in ICBM programs that incorporate fish into their programs. These provide consistency in ICBM programs that are answering similar questions of concern for communities.

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).

University of Alberta (contact Dr. Maricor Arlos, Assisstant Professor, Faculty of Engineering) Grant for analysis with Post Doctoral student.

University of Guelph (contact Dr. Lorna Deeth, Professor, Department of Mathematics and Statistics).

North South Consultants, Winnipeg, Manitoba. Aging Analysis, fish fence deployment.

Hatfield Consultants, Vancouver, British Columbia.

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 Adiele)
MCFN (contact Bruce Maclean)
ACFN (contact Lori Cyprien)
Willow Lake Metis Nation (contact Destiny Martin)

Metis Nation of Alberta (contact Kimberley Mosicki)
ICA (contact Erin Ritchie)
Owl River Metis (contact Hansee Dai)
Smith’s Landing First Nation (contact Kristielyn Jones)

*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 2024-25 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.

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:

Apr 29, 2024

13.5 Estimated Data Collection End Date:

Mar 31, 2025

13.6 Estimated Timeline For Upload Start Date:

Apr 1, 2025

13.7 Estimated Timeline For Upload End Date:

Mar 31, 2026

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 add row 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, xlsx, etc.)	Security Classification
Mainstem Fish Health	ECCC Data Catalogue	csv	Open by Default
Tributary Fish Health	ECCC Data Catalogue	csv	Open by Default
Athabasca Spring Inventory/Muskeg Fish Fence/McKay Trap Net	ECCC Data Catalogue	csv	Open by Default
Tributary Fish Assemblage	ECCC Data Catalogue	csv	Open by Default

14.0 2024/25 Deliverables

Add an additional deliverable by clicking on the add row on the bottom right side of table

Type of Deliverable	Delivery Date	Description
Key Engagement/Participation Meeting	Q1	Engagement meetings with ICBM team and participating communities.
Key Engagement/Participation Meeting	Q2	Engagement meetings with ICBM team and participating communities.
Key Engagement/Participation Meeting	Q3	Engagement meetings with ICBM team and participating communities.
Key Engagement/Participation Meeting	Q4	Engagement meetings with ICBM team and participating communities.
Conference Presentation	Q3	Presentation at Society of Environmental Toxicology and Chemistry, Ussery, McMaster
OSM Program Annual Progress Report (required)	Q4	Annual monitoring report on fish monitoring.
Condition of Environment Report	Q4	Contribute to COE when asked by OS program office.
Peer-reviewed Journal Publication	Q4	Draft manuscript on histological responses in fish in the Ells River.
Peer-reviewed Journal Publication	Q4	Draft manuscript on fish health in tributaries using condition indices.
Other (Describe in Description Section)	Q4	Delivery of report to TAC on 2024-25 field program.

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, Fish Assemblage and ICBM collabortion (ECCC; in-kind & VNR)
Mark McMaster – Research Scientist – Core Fish Health study lead, Surface Water TAC, Indigenous Community Based Monitoring Coordination
Erin Ussery – Research Scientist – Fish Health and Fish Lead on Indigenous Community Based Monitoring and Engagement
Gerald Tetreault – Research Scientist – Fish Assemblage and eDNA tools
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
Abby Wynia: Research Technician – Technical support: field collections, fish assemblage analysis and EROD analysis
Hufsa Khan: Research Technician - Technical support: field collections
Jason Miller: 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 – Enhance 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

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 AEPA 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 AEPA

Add an additional AEPA Staff member by clicking on the add row below the 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
Noddin, Fred	Monitoring, evaluation and reporting	100
Hicks, Keegan	Monitoring, evaluation and reporting	50
Arciszewski, Tim	Evaluation and reporting	100

Table 16.1.2 ECCC

Add an additional ECCC Staff member by clicking on the add row below the table. The total FTE (Full Time Equivalent) is Auto Summed (in Table 16.2.2) and converted to a dollar amount.

Name (Last, First)	Role	%Time Allocated to Project
McMaster, Mark	Fish Health Study Lead (In Kind)	75
Ussery, Erin	Community Based Monitoring Lead and Fish Health Scientis(VNR)	75
Tetreault, Gerald	Fish Community Scientist (In Kind)	20
Clark, Thomas	Research Technician (In Kind)	50
Cunningham, Jessie	Research Technician (In Kind)	50
Wynia, Abby	Research Technician (VNR)	50
Miller, Jason	Research Technician (In Kind)	10
Frank, Richard	Research Scientist (In Kind)	10
Campbell, Sheena	Research Technician (In Kind)	10
Evans, Marlene	Research Scientist (In Kind)	10

The tables below are the financial tables for Alberta Environment & Protected Areas (AEPA) 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. Please note that completion of this Project Finance Breakdown Template is mandatory and must be submitted along with each workplan.

PROJECT FINANCE BREAKDOWN TEMPLATE

Table 16.2.1 Funding Requested BY ALBERTA ENVIRONMENT & PROTECTED AREAS

Organization - Alberta Environment & Protected Areas ONLY	Total % time allocated to project for AEPA staff	Total Funding Requested from OSM

Salaries and Benefits (Calculated from Table 16.1.1 above)	250	$300,000.00
Operations and Maintenance		
Consumable materials and supplies		$93,850.00
Conferences and meetings travel		
Project-related travel		$20,500.00
Engagement		
Reporting		$20,000.00
Overhead		
Total All Grants (Calculated from Table 16.4 below)		$60,000.00
Total All Contracts (Calculated from Table 16.5 below)		$270,160.00
Sub-Total (Calculated)		$764,510.00
Capital*		
AEPA TOTAL (Calculated)		$764,510.00

* 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 (Please manually provide the number in the space below)		$254,834.00
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 (Calculated)		$665,889.00

* 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 add table below the table. The total of all Grants is Auto Summed in Table 16.2.1

GRANT RECIPIENT - ONLY: Name	
GRANT RECIPIENT - ONLY: Organization	University of Alberta
Category	Total Funding Requested from OSM
Salaries and Benefits FTE	$45,000.00
Operations and Maintenance	
Consumable materials and supplies	$0.00
Conferences and meetings travel	
Project-related travel	
Engagement	
Reporting	
Overhead	$15,000.00
GRANT TOTAL (Calculated)	$60,000.00

Table 16.4

Complete ONE table per Contract recipient.

Add a Recipient by clicking on add row below the 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	
CONTRACT RECIPIENT - ONLY: Organization	Bureau Veritas
Category	Total Funding Requested from OSM
Salaries and Benefits	
Operations and Maintenance	
Consumable materials and supplies	$20,000.00
Conferences and meetings travel	
Project-related travel	
Engagement	
Reporting	
Overhead	
CONTRACT TOTAL (Calculated)	$20,000.00
CONTRACT RECIPIENT - ONLY: Name	
CONTRACT RECIPIENT - ONLY: Organization	Biogeochemical Analytical Services Laboratory
Category	Total Funding Requested from OSM
Salaries and Benefits	
Operations and Maintenance	
Consumable materials and supplies	$12,600.00
Conferences and meetings travel	
Project-related travel	
Engagement	
Reporting	
Overhead	
CONTRACT TOTAL (Calculated)	$12,600.00
CONTRACT RECIPIENT - ONLY: Name	

CONTRACT RECIPIENT - ONLY: Organization	TBD - new contract for stable isotope analysis
Category	Total Funding Requested from OSM
Salaries and Benefits	
Operations and Maintenance	
Consumable materials and supplies	$15,000.00
Conferences and meetings travel	
Project-related travel	
Engagement	
Reporting	
Overhead	
CONTRACT TOTAL (Calculated)	$15,000.00
CONTRACT RECIPIENT - ONLY: Name	
CONTRACT RECIPIENT - ONLY: Organization	North/South Consulting
Category	Total Funding Requested from OSM
Salaries and Benefits	
Operations and Maintenance	
Consumable materials and supplies	$9,000.00
Conferences and meetings travel	
Project-related travel	
Engagement	
Reporting	
Overhead	
CONTRACT TOTAL (Calculated)	$9,000.00
CONTRACT RECIPIENT - ONLY: Name	
CONTRACT RECIPIENT - ONLY: Organization	TBD one of three helicopter companies on the Standing Offer with AEPA water quality
Category	Total Funding Requested from OSM
Salaries and Benefits	

Operations and Maintenance	
Consumable materials and supplies	$102,800.00
Conferences and meetings travel	
Project-related travel	
Engagement	
Reporting	
Overhead	
CONTRACT TOTAL (Calculated)	$102,800.00
CONTRACT RECIPIENT - ONLY: Name	
CONTRACT RECIPIENT - ONLY: Organization	SGS AXYS
Category	Total Funding Requested from OSM
Salaries and Benefits	
Operations and Maintenance	
Consumable materials and supplies	$110,760.00
Conferences and meetings travel	
Project-related travel	
Engagement	
Reporting	
Overhead	
CONTRACT TOTAL (Calculated)	$110,760.00

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 Sums totals for salaries and benefits from AEPA and ECCC ONLY	$554,834.00
Operations and Maintenance	
Consumable materials and supplies Sums totals for AEPA and ECCC ONLY	$351,850.00
Conferences and meetings travel Sums totals for AEPA and ECCC ONLY	$20,000.00
Project-related travel Sums totals for AEPA and ECCC ONLY	$100,500.00
Engagement Sums totals for AEPA and ECCC ONLY	$10,000.00
Reporting Sums totals for AEPA and ECCC ONLY	$25,000.00
Overhead Sums totals for AEPA and ECCC ONLY	$38,055.00
Total All Grants (from table 16.2.1 above) **Sums totals for AEPA Tables ONLY**	$60,000.00
Total All Contracts (from table 16.2.1 above) **Sums totals for AEPA Tables ONLY**	$270,160.00
SUB-TOTAL (Calculated)	$1,430,399.00
Capital* **Sums total for AEPA**	
GRAND PROJECT TOTAL	$1,430,399.00

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.

We were slightly underspent last fiscal as we were unable to make a capital purchase for an AEPA sampling trailer. We have not included any capital in the work plan this year so should have better control of budget delivery.

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 add row on the bottom right side of table.

Description	Source	Equivalent Amount ($CAD)
ECCC salaries	In Kind	$207,369.00
	TOTAL	$207,369.00

19.0 Consent & Declaration of Completion

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.

Lead Applicant Name

Mark McMaster

Title/Organization

Environment and Climate Change Canada

Signature

McMaster, Mark

Digitally signed by McMaster, Mark
Date: 2023.11.02 15:15:25 -04'00'

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

Title/Organization

Signature

Please save your form and refer to the instructions page for submission link.

Program Office Use Only

Governance Review & Decision Process

this phase follows submission and triggers the Governance Review

TAC Review (Date):

ICBMAC Review (Date):

SIKIC Review (Date):

OC Review (Date):

Final Recommendations:
Decision Pool:

Notes:

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):

SIKIC Review (Date):

OC Review (Date):

Comments:
Decision Pool:

Notes & Additional Actions for Successful Work Plan Implementation:

Signature