2022-2023 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 5, 2021 at 4:30 PM Mountain Standard time.***	***October 5, 2021*** *4:30 PM MST*
Decision Notification	*Mid to Late January 2022*

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.

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.*

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.

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.*

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 Form and Distribution Package, accessible here: **Work Planning Form and Distribution Package**

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:

202223_wkpln_WorkPlanTitle_ ProjectLeadLastNameFirstName

Example:

202223_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:

202223_sup##_WorkPlanTitle_ ProjectLeadLastNameFirstName

Examples:

202223_sup01_OilSandsResiduesinFishTissue_SmithJoe

202223_sup02_OilSandsResiduesinFishTissue_SmithJoe

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202223_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 5, 2021, **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: *If this is an on-going project please fill the identifier number for 20/21 fiscal by adjusting the last four digits:* ***Example:*** *D-1-2020 would become D-1-****2022***	W-LTM-S-5-2122
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: 2022***	Click or tap here to enter text.
Total 2022/23 Project Budget: *For the 2022/23 fiscal year*	$1,627,931.00
Requested OSM Program Funding: *For the 2022/23 fiscal year*	$1,627,931.00
Project Type:	Longterm Monitoring
Project Theme:	Surface Water
Anticipated Total Duration of Projects (Core and Focused Study (3 years))	Year 5
Current Year	**Focused Study:** Choose an item.
	Core Monitoring: Year 5

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 Canada
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. Continuing, long-term "core" monitoring, evaluation, and reporting for fish are led and executed by ECCC and AEP 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. Communities, AEP and ECCC scientific and technical staff, the ICBMAC, and the ICBM Facilitation Centre will work collaboratively to (1) develop collaborative and participatory projects, based on community questions related to Oil Sands developments and ICBMAC guidelines, (2) build capacity / provide training in project management, monitoring, and data management, analysis, and interpretation, and (3) implement monitoring.

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 used in the last year of JOSM (RAMP, 2016). 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. If sufficient numbers of the sentinel are not capture during the assemblage sampling, additional fishing will occur to obtain sufficient numbers of fish. 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 core 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. 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 investigation of cause and effects 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 the EEM 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 EEM framework 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*
- *Discuss results of previous monitoring/studies/development and* what has been achieved to date.

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 core 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, 2010). Data within species is being used 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, 2021) 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., in prep). Fish assemblage monitoring on tributaries is continuing and comparisons of responses in communities (Wynia et al., submitted) to EEM responses (Archiszewski et al., in prep) 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 under the guidance of ICBMAC. The long-term core fish program supports all ICBM work plan fish programs with Dr. Erin Ussery of ECCC 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., 2021). 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 2022/23 work plan below

The overall objectives of the 22/23 work plan for OSM core 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 CBM projects that address both the OSM mandate and community questions related to Oil Sands developments and fish.
III- Contribute to the development of 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 2022/23 we conduct surveillance monitoring of the small bodied trout-perch health in the Athabasca. Baseline data was collected from 2009-11 from these sites with three year cyclical collections in 2015, 2018. Data will be compared to the baseline fish health between sites within 2022 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. This data is critical for collection due to the development of new effluent discharge regulations for treated Oil Sands Mine Waters due in 2025.
2) Tributary sampling occurs mostly on the west side of the Athabasca River at tributary sites using both lake chub and longnose dace as sentinel species as part of the three-year cyclical sampling program. This sampling will consist of both the fish assemblage monitoring program as well as fish health using EEM methods wherever sufficient numbers of sentinel species are collected. With this data we are developing 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.
3) We were to conduct the Muskeg River fish fence in 2021-22 as part of the three-year cycle. Due to COVID concerns we postponed this portion of the program to the 2022/23 field season. This program monitors the species that use the Muskeg River for spawning of interest to both communities in the area and the core program.
4) The spring mainstem Athabasca River fish community studies are also scheduled for the continuation in the three year cycle. All sites sampled previously in the RAMP program that identified changes in the size of white sucker and walleye spawning will be assessed for continued improvement identified in 2018.
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.
5) Work with ICBMAC and the ICBMFC around capacity building and training opportunites as well as participate in fish related sampling efforts when asked.

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 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.
4) Continued engagement/collaboration/participation with communities with both established and new CBM programs to continue the braiding of Traditional Knowledge (TK) and Western Science (WS) and to engage with Indigenous youth.
5) Assist in the analysis of data collected from the CBM programs to help communities and the OSM program understand the current health of fish and to build baseline data to help track potential future change.

Communities involved this fiscal 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, Beaver Lake Cree Nation, Lakeland Métis Community Association, Peerless Trout First Nation, Willow Lake First Nation and Conklin Resource Development Advisory Committee (on behalf of Conklin Métis Local 193).

For objective III, sub-objectives for developing a "core" lake component for fish monitoring include:
1) Work with the Lakes Data Analysis work plan leads, water quality, benthic and community OSM leads as well as AEP fish biologists 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;
(ii) Collection of baseline information on fish populations required for establishing predictive relationships for assessing potential cumulative effects and monitoring longterm trends at the regional scale.
(iii) To establish linkages between fish health, fish assemblages and benthic invertebrates within the oil sands development region and downstream receiving environments, to assess status and trends, and to support integration of results with the Lower Athabasca Water Management Framework."
(iv) 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.

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)
- integrate western science with Indigenous Community-Based Monitoring
- addresses the EEM framework 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 2022/23 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. Are changes occurring in water quality, biological health (e.g., benthos, fish) and/or water quantity/flows, to what degree are changes attributable to oil sands activities, and what is the contribution in the context of cumulative effects?

For objective I, "Core" Monitoring:
Changes have been documented in fish health both in the mainstem Athabasca and tributaries of the Athabasca River. Additional 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 (Arciszewski and McMaster, 2021). Although suggestive of industrial input, these changes are very small and need to be monitored using the survillence portion of the adaptive monitoring program design. Detailed evaluation of tributary data indicates input from both aerial depositon and developmental footprint on fish health in two of the major tributaries in the developmental area (Tetreault et al., in prep; Acriszewskie et al., in prep). These changes are small and are also being monitored in the three year survillence monitoring program using new predictive modelling of change. Fish Health on the Peace River is within predicted historical baseline variability (Prioux et al., 2021 submitted). Data was collected in 2021 on the Peace River and evaluations will determine if data falls within predicted historical baseline variability. Athabasca tributary sites are also identifying PAH profiles in fish tissue specific to sites downstream of development relative to those of natural bitumen exposure (Evans et al., 2019). 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 ECCC to deliver a robust Fish monitoring program. In reality, however, we cannot measure everything, everywhere, all the time. The OSM program has underutilized Indigenous and local communities that want to contribute to the OSM mandate, as well as address community questions. With "surface water" the integration focus for 22/23, we will begin 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 activies, and the context within cumulative effects. Similar to Theme 1, data collected from the communities will be used to assess the baseline health of fish and the aquatic environment so that communities can track any future changes potentially due to development. Where available we will also integrate IK on fish health and fish communities to compare to current baseline conditions. This baseline data will help understand change and fish health variability. We are working directly with the various communities that have developed work plans of their own to deliver on this. Communities involved this fiscal 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, Beaver Lake Cree Nation, Lakeland Métis Community Association, Peerless Trout First Nation, Willow Lake First Nation and Conklin Resource Development Advisory Committee (on behalf of Conklin Métis Local 193).

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. We will work directly with the leads of the Lakes Data Analysis workplan to move forward in this direction.

2. 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 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 four years, participated in Cold Lake First Nation winter fish camps, and supported other communities such as Chipewyan Prairie Dene and Smith's Landing First Nations in the development of their fish camps. We have incorporated some of these 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 (Dersch et al., 2021) 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 which were successfully used during a fish camp and have been shared with other communities. We are also working with the new ICBM Facilitation Center to continue development of community capacity within OSM and additional fish SOPs. Additionally, we have supported communities in the analysis of the data collected from fish camps to help communities and scientists understand the health of fish in their communities.

3. 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. All publicatrions and reports also are approved by the OSM secretariat publication process prior publication.

4. 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 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., 2021). 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 will be provided to the CBM Facilitation Center for use in CBM capacity building.

5. 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 componets 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. We have worked directly with MCFN and ACFN at the Elders whitefish camp and the development of a fish health program in the PAD. Last fiscal, we collaborated directly with communites though the Aquatic Ecosystem Health Integrated Community Based Monitoring (AEHICBM) core program to support fish studies with Fort Smith FN, Chipewyan Prairie Dene FN, Cold Lake FN, Fort McKay FN and Metis Nation. This fiscal, we will continue to collaborate with communities both directly and/or through the ICBM Facilitation Center 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, Beaver Lake Cree Nation, Lakeland Métis Community Association, Peerless Trout First Nation, Willow 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.

6. 7.6. Where does the monitoring fit on the conceptual model within the EEM framework for the theme area and relative to the conceptual model for the OSM Program theme area? How will this work advance understanding transition towards of the conceptual model EEM framework?

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 all at sites within the deposit on the Athabasca (Prioux et al., submitted). Additional analysis indicates sewage and precipitation alter fish health including that from industrial development (Archiszewski and McMaster, 2021). Core program endpoints for fish contribute to the completion and understanding of the conceptual model.

7. Is the work plan contributing to Programmatic State of Environment Reporting?

The Core Fish Monitoring Program has contributed to the Programmatic SOE reporting. In 2021 we produced an introductory chapter on objectives and study design, chapters on mainstem fish health, tributary fish health, mainstem fish community and tributary fish assemblage studies. We plan to update this reporting with new data as the program evolves.

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.Are changes occurring in groundwater quality and/or quantity, to what degree are changes attributable to oil sands activities, are changes affecting other ecosystems, and what is the contribution in the context of cumulative effects?

Click or tap here to enter text.

2. 2. 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.

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

Click or tap here to enter text.

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

Click or tap here to enter text.

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

Click or tap here to enter text.

6. Where does the monitoring fit within the EEM framework and relative to the theme area? How will this work advance transition towards the EEM framework?

Click or tap here to enter text.

7. Where does the monitoring fit on the conceptual model for the theme area and relative to the conceptual model for the OSM Program? How will this work advance understanding of the conceptual model?

Click or tap here to enter text.

8. Is the work plan contributing to Programmatic State of Environment Reporting?

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 Wetland - Key Questions

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

1. Are changes occurring in wetlands due to contaminants and hydrological processes, to what degree are changes attributable to oil sands activities, and what is the contribution in the context of cumulative effects?

Click or tap here to enter text.

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

Click or tap here to enter text.

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

Click or tap here to enter text.

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

Click or tap here to enter text.

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

Click or tap here to enter text.

6. Where does the monitoring fit within the EEM framework and relative to the theme area? How will this work advance transition towards the EEM framework?

Click or tap here to enter text.

7. Where does the monitoring fit on the conceptual model for the theme area and relative to the conceptual model for the OSM Program? How will this work advance understanding of the conceptual model?

Click or tap here to enter text.

8. Is the work plan contributing to Programmatic State of Environment Reporting?

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. Are changes are occurring in air quality, to what degree are changes attributable to oil sands emissions, and what is the contribution in the context of cumulative effects?

Click or tap here to enter text.

2. Are changes informing Indigenous key questions and concerns?

Click or tap here to enter text.

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

Click or tap here to enter text.

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

Click or tap here to enter text.

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

Click or tap here to enter text.

6. Where does the monitoring fit within the EEM framework and relative to the theme area? How will this work advance transition towards the EEM framework?

Click or tap here to enter text.

7. Where does the monitoring fit on the conceptual model for the theme area and relative to the conceptual model for the OSM Program? How will this work advance understanding of the conceptual model?

Click or tap here to enter text.

8. Is the work plan contributing to Programmatic State of Environment Reporting? (Answer Box)

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. Are changes occurring in terrestrial ecosystems due to contaminants and landscape alteration, to what degree are changes attributable to oil sands activities, and what is the contribution in the context of cumulative effects?

Click or tap here to enter text.

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

Click or tap here to enter text.

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

Click or tap here to enter text.

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

Click or tap here to enter text.

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

Click or tap here to enter text.

6. Where does the monitoring fit within the EEM framework and relative to the theme area? How will this work advance transition towards the EEM framework?

Click or tap here to enter text.

7. Where does the monitoring fit on the conceptual model for the theme area and relative to the conceptual model for the OSM Program? How will this work advance understanding of the conceptual model?

Click or tap here to enter text.

8. Is the work plan contributing to Programmatic State of Environment Reporting?

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. Where does the monitoring fit within the EEM framework and relative to the theme area? How will this work advance transition towards the EEM framework?

Click or tap here to enter text.

5. Where does the monitoring fit on the conceptual model for the theme area and relative to the conceptual model for the OSM Program? How will this work advance understanding of the conceptual model?

Click or tap here to enter text.

6. Is the work plan contributing to Programmatic State of Environment Reporting?

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 give consideration for the EEM framework and the approved Key Questions.

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. Exisiting 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 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.

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 AEHICBM 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 CBM programs and increased participatory involvement within the communities through the engagement of Elders, Indigenous youth, and community members. 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 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 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 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 (Ussery et al.,), fish assemblages (Wynia et al.,), fish histology (Cunningham et a.,), and fish fences and trap netting (Clark et al.,). 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?

Yes

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 can be assessed against a baseline condition. As relevant give consideration for the EEM framework and the approved Key Questions.

The Core 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 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 OSMW. As well, data from ICBM projects (current and new) will help us understand the current health of fish (baseline) so that communities can track any future changes potentially due to continued development of the oil sands or with potential release of treated OSMW as well as to compare to IK of fish health and fish communities.

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 give consideration for the EEM framework and the approved Key Questions.

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 OSMW into the future. Additionally, with the increased involvement of communities within the oil sands region, we will be able to further increase our knowledge of the health of fish in the region/across Alberta incorporating IK. This additional data will help communities and scientists track any future changes potentially due to continued development of the oil sands or with potential release of treated OSMW.

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 give consideration for the EEM framework and the approved Key Questions.

All OSM fish health monitoring data is on the Federal Government Oil Sands portal demonstrating transparency in past performance of our work. 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 the OSPW and OSMW Science teams. 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 submitting 6 chapters on the core fish program.

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 give consideration for the EEM framework and the approved Key Questions.

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 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 2021 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 those sites in the following 2022 sampling year. This program was also asked to integrate with Community Based Monitoring programs where it made sense. In the 2020/21 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. We have worked with MCFN/ACFN 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. All collaborative CBM fish programs increase the efficiency of the OSM program with samples collected through the ICBMFC direction, all adding to the long-term core fish 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 samples Athabasca mainstem for trout-perch, and all the west tributaries for fish assemblage and EEM fish health. Due to COVID we have moved the Muskeg River fish fence and the Athabasca Spring fish community sampling to 2022-23.
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 McKay River spring trap netting.
Year 3 samples trout-perch, longnose sucker and walleye on the Peace River and the southern operators for fish health and assemblages.

10.2 Describe how changes in environmental Condition will be assessed *

Fish health changes are used to assess environmental condition using criticial effect sizes 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.

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 (Arciszewski and McMaster, 2021) and papers on the Steepbank and Ells rivers (Tetreault et al., in prep; Arciszewski et al., in prep) 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 OSMW.

(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 guideance 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 WS methods to evaluate fish health together with IK endpoints, input and interpretation, thus braiding IK and WS for a more robust way to help us understand fish health. 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. 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.

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, 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, 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 (Dersch et al., 2021). 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 and 4 other fish SOPs for use in the ICBM program.

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 contributed to collaborative community based monitoring reports that have been used during engagement with Elders, Indigenous youth and community members, and have helped produce videos such as the MCFN/ACFN Elders whitefish camp. We will continue to work to develop SOPs, training documents and videos, and will continue to engage in person with communities to help facilitate knowledge transfer both from a WS perspective, but also so that we learn IK and traditional ways of investigation and understanding.

For objective III, developing a "core" lake component for fish monitoring: We will work with the leads of the Lake Data Evalutation work plan and if a monitoring plan is develop through the SW TAC in collaboration with 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 and support of MSc student.
University of Guelph (contact Dr. Lorna Deeth, Professor, Department of Mathematics and Statistics).
North South Consultants, Winnipeg, Manitoba. Aging Analysis
Hatfield Consultants, Vancouver, British Columbia. Southern Operators fish collections

Partners for Fish CBM projects include and will appear in the ICBM study proposals:
AEP Fisheries (contact Rebecca Baldwin)
Mickisew Cree First Nation, Athabasca Chipewyan First Nation (contact Bruce Maclean)
Chipewyan Prairie Dene First Nation (contact Ave Dersch)
Cold Lake First Nations (contact Fin MacDermid)

Fort McKay Metis Nation (contact Sanil Sivarajan)
LICA (contact Erin Ritchie)
Owl River Metis (contact Hansee Dai)
Smith's Landing First Nation (contact Kristielyn Jones)
Willow Lake First Nation (contact Keely Winnitoy)

*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:

2022-05-02

13.5 Estimated Data Collection End Date:

2023-03-31

13.6 Estimated Timeline For Upload Start Date:

2023-04-03

13.7 Estimated Timeline For Upload End Date:

2024-03-29

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, xlsx, etc.)	Security Classification
Click or tap here to enter text. Mainstem Fish Health	Click or tap here to enter text. ECCC Data Catalogue	Click or tap here to enter text. csv	Open by Default
Click or tap here to enter text. Tributary Fish Health	Click or tap here to enter text. ECCC Data Catalogue	Click or tap here to enter text. csv	Open by Default
Click or tap here to enter text. Athabasca Spring Inventory/Fish Fence/Trap Nets	Click or tap here to enter text. ECCC Data Catalogue	Click or tap here to enter text. csv	Open by Default

Click or tap here to enter text. Tributary Fish Assemblage	Click or tap here to enter text. ECCC Data Catalogue	Click or tap here to enter text. csv	Open by Default

14.0 2022/23 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 ICBM team, ICBM Facilitation Center and participating communities.
Key Engagement/Participation Meeting	Q2	Engagement meetings with ICBM team, ICBM Facilitation Center and participating communities.
Key Engagement/Participation Meeting	Q3	Engagement meetings with ICBM team, ICBM Facilitation Center and participating communities.
Key Engagement/Participation Meeting	Q4	Engagement meetings with ICBM team, ICBM Facilitation Center and participating communities.
Conference Presentation	Q3	Society of Envrionmental Toxicology and Chemistry presentations by Ussery, McMaster, Tetreault, Hicks.
OSM Program Annual Progress Report (required)	Q4	Annual progress report on fish monitoring.
Peer-reviewed Journal Publication	Q4	Manuscript A Spatial and Temporal Comparison of Fish Assemblages of a Lower Athabasca River Tributaruy
Peer-reviewed Journal Publication	Q4	Manuscript on fish health in the Ells River.
Peer-reviewed Conference Proceeding	Q4	Draft manuscript on histological responses in fish in the Ells River.

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 Ussery – Research Scientist – Fish Health and Fish Lead on Community Based Monitoring and Engagement
Gerald Tetreault – Research Scientist – Fish Community and Fish Health
Marlene Evans - Research Scientist – Fish Contaminants
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
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
- Proposed Fish Biologist - TBD
– 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 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	Monitoring, evaluation and reporting	100%
Senior fish biologist	Monitoring, evalution and reporting	50%
Fish scientist	Evalution and reporting	100%
Click or tap here to enter text.	Click or tap here to enter text.	0
Aquatic Biologist (TBA)	Evalution and reporting	50%
Click or tap here to enter text.	Click or tap here to enter text.	0

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
Mark McMaster	Fish Health Study Lead (In Kind)	75
Erin Ussery	Fish Health Scientist, Community Based Monitoring Lead (VNR)	75

Gerald Tetreault	Fish Community Scientist (In Kind)	40
Thomas Clark	Research Technician (In Kind)	50
Jessie Cunningham	Research Technician (In Kind)	50
Abby Wynia	Research Technician (VNR)	50
Jason Miller	Research Technician (In Kind)	10
Richard Frank	Research Scientist (In Kind)	10
Sheena Campbell	Research Technician (In Kind)	10
Marlene Evans	Reseach 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 *(Calculated from Table 16.1.1 above)*	**300.00%**	**$360,000.00**
Operations and Maintenance		
Consumable materials and supplies		$100,000.00
Conferences and meetings travel		$0.00
Project-related travel		$55,000.00
Engagement		$3,000.00
Reporting		$20,000.00
Overhead		$25,000.00
Total All Grants *(Calculated from Table 16.4 below)*		**$50,500.00**
Total All Contracts *(Calculated from Table 16.5 below)*		**$268,438.00**
Sub- TOTAL *(Calculated)*		**$881,938.00**
Capital*		$100,000.00
AEP TOTAL *(Calculated)*		**$981,938.00**

* 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)*		
Salaries and Benefits		$254,832.00
Operations and Maintenance		
Consumable materials and supplies		$302,000.00
Conferences and meetings travel		$20,000.00
Project-related travel		$80,000.00
Engagement		$10,000.00
Reporting		$5,000.00
Overhead		$39,859.00
ECCC TOTAL *(Calculated)*		**$711,691.00**

* 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 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	$10,000.00
Operations and Maintenance	
Consumable materials and supplies	$11,000.00
Conferences and meetings travel	$0.00
Project-related travel	$0.00
Engagement	$0.00
Reporting	$0.00
Overhead	$4,200.00
GRANT TOTAL *(Calculated)*	**$25,200.00**
GRANT RECIPIENT - ONLY: Name	Dr. Lorna Deeth
GRANT RECIPIENT - ONLY: Organization	University of Guelph Statistics Department
Category	**Total Funding Requested from OSM**
Salaries and Benefits	$22,000.00
Operations and Maintenance	
Consumable materials and supplies	0
Conferences and meetings travel	0
Project-related travel	0
Engagement	0
Reporting	0
Overhead	$3,300.00
GRANT TOTAL *(Calculated)*	**$25,300.00**

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 Consulting (Fish Fence Installation)
Category	**Total Funding Requested from OSM**
Salaries and Benefits	$0.00
Operations and Maintenance	
Consumable materials and supplies	$23,449.65
Conferences and meetings travel	$0.00
Project-related travel	$0.00
Engagement	$0.00
Reporting	$0.00
Overhead	$0.00
CONTRACT TOTAL *(Calculated)*	**$23,449.65**
CONTRACT RECIPIENT - ONLY: Name	Click or tap here to enter text.
CONTRACT RECIPIENT - ONLY: Organization	Helicopter contract (TBD)
Category	**Total Funding Requested from OSM**
Salaries and Benefits	0
Operations and Maintenance	
Consumable materials and supplies	$164,480.00
Conferences and meetings travel	0
Project-related travel	0
Engagement	0
Reporting	0
Overhead	0
CONTRACT TOTAL *(Calculated)*	**$164,480.00**
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	$11,958.00
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 *(Calculated)*	**$11,958.00**
CONTRACT RECIPIENT - ONLY: Name	Click or tap here to enter text.
CONTRACT RECIPIENT - ONLY: Organization	SGS-AXYS (PAC analysis)
Category	**Total Funding Requested from OSM**
Salaries and Benefits	$57,450.00
Operations and Maintenance	
Consumable materials and supplies	$0.00
Conferences and meetings travel	$0.00
Project-related travel	$0.00
Engagement	$0.00
Reporting	$0.00
Overhead	$0.00
CONTRACT TOTAL *(Calculated)*	**$57,450.00**
CONTRACT RECIPIENT - ONLY: Name	Click or tap here to enter text.
CONTRACT RECIPIENT - ONLY: Organization	University of Alberta (Hg Analysis)
Category	**Total Funding Requested from OSM**
Salaries and Benefits	$11,100.00
Operations and Maintenance	
Consumable materials and supplies	$0.00
Conferences and meetings travel	$0.00
Project-related travel	$0.00
Engagement	$0.00
Reporting	$0.00
Overhead	$0.00
CONTRACT TOTAL *(Calculated)*	**$11,100.00**

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 AEP and ECCC ONLY***	$614,832.00
Operations and Maintenance	
Consumable materials and supplies *Sums totals for AEP and ECCC ONLY*	$402,000.00
Conferences and meetings travel *Sums totals for AEP and ECCC ONLY*	$20,000.00
Project-related travel *Sums totals for AEP and ECCC ONLY*	$135,000.00
Engagement *Sums totals for AEP and ECCC ONLY*	$13,000.00
Reporting *Sums totals for AEP and ECCC ONLY*	$25,000.00
Overhead *Sums totals for AEP and ECCC ONLY*	$64,859.00
Total All Grants (from table 16.2.1 above) *Sums totals for AEP Tables ONLY*	$50,500.00
Total All Contracts (from table 16.2.1 above) *Sums totals for AEP Tables ONLY*	$268,438.00
Sub- TOTAL	$1,593,629.00
Capital* *Sums total for AEP*	$100,000.00
GRAND PROJECT TOTAL	$1,693,629.00

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.*

Risks on program delivery will again be dependant on potential limitations on travel from Ontario due to COVID concerns. We have conducted a number of video related meetings during this fiscal and could continue some of that in 2022-23 but is of limited use for CBM related meetings and training. We have continued to film sampling processes to develop video's for use by communities during sampling.

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

2021-10-05

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.