5- YEAR LONG-TERM MONITORING OR OPERATIONAL ACTIVITY WORK PLAN

Changes to this Work Plan are only accepted via an Approved Addendum.

General Information		
Monitoring Category: *(From OSM long-term plan; choose from drop-down menu)*	Biotic Response Monitoring	
Strategic Monitoring Objective: *(From OSM long-term plan; choose from drop-down menu)*	Objective: Detect and report biotic response in relation to Oil Sands Developments Objective: Detect and report changes in wetland ecosystem in relation to Oil Sands Developments and related Point and Non-point source emissions Objective: Investigate the causal mechanisms of a known important biotic relationship in relation to Oil Sands Developments	
Work Plan Unique Identifier:	*B-LTM-E-3-1718*	
Monitoring Activity Title:	**Biotic Response of Focal Wildlife to Habitat Disturbance**	
Geographic Location (*choose from drop-down menu, if Project Location is in more than one area choose from second drop-down***)**	Athabasca Oil Sands Region Cold Lake Oil Sands Deposit Peace River Oil Sands Region	More than 2 Locations (Described in Monitoring Schedule
Monitoring Site(s) Coordinates *(latitude and longitude)*	N/A	
Monitoring Organization and Responsible Manager:	Environment and Climate Change Canada	Samantha Song Principle Investigators: Judith Toms, ECCC, Boreal Avian Modelling Project (BAM) Erin Bayne, University of Alberta Bioacoustics Unit (BU), Boreal Avian Modelling Project (BAM)
Date Monitoring initiated:	**2012**	
Specific Monitoring Objective: *(State the monitoring objective addressed through this monitoring)*	1. Status and trend estimates of focal wildlife species in oil sands areas by monitoring high-priority rare, listed and difficult-to-monitor birds. 2. Effects assessment of habitat disturbances by oil sands activity on focal birds, amphibians and mammals. For selected species groups, provide effects assessment of other documented	

	stressors (noise, light and vegetative recovery). 3. Continued development of existing and new methodologies to improve both status and trend and effectiveness monitoring for focal species.
Deliverables (Annual): *What Data Reports will be produced and when?*	1. Status and trend assessment of focal species in oil sands areas: a. Estimates of risks to populations for high-priority rare, listed and difficult-to-monitor bird (ECCC, UofA-BU; YR1-5), mammal (UofA-BU; YR2-5) and amphibian species (UofA-BU; YR1-5). b. Empirical estimates of trend for bird populations, produced every 2 years starting in YR1 (ECCC, UofA-BAM). c. Updated power analysis to assess ability to detect trend in bird populations, produced every five years (i.e., YR5) or more frequently as required (ECCC, UofA-BAM). d. Updated regional status reports (trend, abundance, distribution, habitat use and threats, as feasible) for federal Species at Risk (UofA-BU): Olive-sided Flycatcher, YR1; Common Nighthawk, YR3; Rusty Blackbird, YR5; next priority species of concern, YR5. e. Human observer-based point count dataset (ECCC). Uploaded to JOSM portal annually. f. Automatic recording unit dataset (UofA-BU). Raw data is stored on servers at the University of Alberta. Interpreted data are uploaded into a standardized database also used for ABMI data. Data are publicly available, subject to publication embargos. 2. Effects assessment of the impacts of oil sands exploration and development: a. Models and results quantifying responses of bird populations to the individual and cumulative effects of physical disturbances through time (regional scale ECCC, UofA-BU; landscape scale UofA-BU). YR1-5. b. Models and results quantifying behavioural responses of birds (ECCC; YR1, YR2, YR4) and mammals (UofA-BU; YR2, YR4, YR5) to specific disturbance features (e.g., seismic lines, well pads), including responses to local-scale best-practices (e.g., reclamation of well pads, narrowing of linear features) and regeneration of disturbance features. c. Models and results that disentangle the effects of climate, energy-sector disturbances and forestry land use on trends in birds (UofA-BU, BAM, YR4), amphibians (UofA-BU, YR5) and mammals (UofA-BU, YR5). d. Human observer-based point count dataset (ECCC). Uploaded to JOSM portal annually. e. Automatic recording unit dataset (UofA-BU). Raw data is stored on servers at the University of Alberta. Interpreted data are uploaded into a standardized database also used for ABMI data. Data are publicly available, subject to publication

	embargos. f. Digital images from cameras and extracted data, starting in 2018-19 (UofA-BU). Images and data will be stored on servers at the University of Alberta. Data will be publicly available, subject to publication embargos. g. Breeding landbird territory mapping dataset (ECCC). Uploaded to OSM portal when each sub-project is complete. 3. Methodological improvements: a. Statistical models that can be used to integrate acoustic recording data and visual data from Ducks Unlimited Canada's waterfowl monitoring program (WE1-1-3), with application to improve estimates of waterfowl distribution and abundance (UofA-BU, DUC). YR1. b. Improved and extended statistical models to standardize data collected using different methodologies, that will be used to: – Integrate camera and audio recording data of vocalizing mammals (UofA-BU). YR3. – Integrate bird data collected by automatic recording units and human observers (UofA-BAM, BU). YR1. – Optimize methods to automate species identification in audio recording data (UofA-BU, BAM). YR5. c. Assessment of the relative costs and benefits of using automated radio-telemetry, automated recording units and human observers to monitor behavioural responses of landbirds to specific disturbance features (ECCC, UofA-BU). YR5. All deliverables are expected to result in both public presentations and submission of papers to peer-reviewed journals.

Monitoring Plan Summary: *Please summarize the monitoring including relevant information such as background, objectives, monitoring area, methods/monitoring design, assumptions, outcomes, and references. These should align with the information provided in Appendix 1: Annual Monitoring Schedule.*

Work plan history and linkages

This work plan represents integration of three associated wildlife monitoring projects: Status and trend monitoring of listed, rare, and difficult-to-monitor landbirds; Cause effects assessment of oil sands activity on migratory landbirds – these were merged into B1-1-3-1617 in 2016-17; and Wetland Condition and Biodiversity, WE1-1-2-1617. This project continues past monitoring efforts (most monitoring was initiated in 2012) and is enhanced with two extensions: integration of acoustic monitoring data for waterfowl with that collected by Ducks Unlimited Canada (WL-LTM-E-3-1718 Waterfowl Effects-based Assessment), and addition of cameras to monitor mammals at existing sampling sites (starting in 2018-19). After some turnover, the monitoring project has returned to historic staffing levels from years prior to 2016-17. The 5-year budget for this project ramps back to historical funding levels in 2018-19, with minor increases thereafter to maintain pace with staffing costs.

This project complements monitoring by the Alberta Biodiversity Monitoring Institute (B-LTM-E-10-1718 Monitoring Targeted Biodiversity) by identifying and addressing gaps relevant to assessment of impacts of oil sands activity.

Project framework

The goal of this project is to monitor the responses (positive, negative or neutral) of terrestrial wildlife (including species associated with vegetated wetlands) to activities associated with economic development of oil sands.

The project includes both a status and trends monitoring component to document changes in the distribution and abundance of species, and an effects assessment monitoring component to identify causal mechanisms (why things are changing; National Research Council 1995, Mulder et al. 1999, Stadt et al. 2006, Haughland et al. 2010, Gardner 2010, Burton et al. 2014). The focal wildlife species monitoring project follows the principles of adaptive monitoring (e.g., Burton et al. 2014).

For status and trend assessment, the project has focused on ensuring that high-priority, rare and listed species are adequately monitored. The ABMI's monitoring project uses a systematic design that provides trend monitoring for common species of birds, mammals and other taxa. However, it was not designed to provide adequate monitoring of rarer species, rarer habitats or species not easily detected by standard monitoring protocols (e.g., clustered species, nocturnal species, irregularly or non-vocalizing species; AITF et al. 2012, Huggard 2013). This project addresses these monitoring gaps by (1) evaluating performance through power analysis, and (2) developing and implementing designs for priority species. Species were prioritized for monitoring based on regulatory commitments, current monitoring status, likelihood of being impacted by oil sands development, expected sensitivity to oil sands development, and cultural and ecological values (Ball et al. 2014a). To date, two groups of birds have been selected for monitoring (old-forest associates and vegetated wetland associates; Ball et al. 2014a). We will continue to evaluate the potential to integrate monitoring of other high priority groups into this project in the future.

For effects assessment monitoring, we focus on taxa that (1) have strong evidence of individual and cumulative impacts of land disturbance from oil sands activity, such as birds and mammals (Bayne et al. 2005a, Machtans 2006, Habib et al. 2007, Bayne et al. 2008, Van Wilgenburg et al. 2013, Tigner et al. 2014, Nelitz et al. 2015, Sólymos et al. 2015, Tigner et al. 2015, Toews 2016, Holloway et al. in review); (2) are indicators for condition and function of forest ecosystems; and, (3) exhibit a broad range of sensitivities to habitat disturbance. For focused studies, we target species with a range of sensitivity to impacts of oil sands activity (i.e., vulnerable to

robust species). We use field techniques that allow us to monitor multiple species, so we can simultaneously assess community-level responses and responses of individual species. Where field efficiencies exist, we will also incorporate camera-trapping surveys for mammals into our sampling protocols to provide more data for collaborative work with the ABMI (starting in 2018-19). We will continue to evaluate the potential to expand monitoring to other taxa in the future.

Effects assessment monitoring focuses on habitat disturbances (e.g., roads, pipelines, seismic lines, well pads) due to their documented influence on bird populations (Nelitz et al. 2015), but for selected species groups, monitoring extends to other documented stressors such as sound (owls, landbirds and bats; Habib et al 2007, Bayne et al 2008, Francis and Barber 2013, Bunkley et al. 2015), light (bats and amphibians; Wise 2007, Longcore and Rich 2004), hydrological changes (wetland species; Bocking 2015) and vegetative recovery (landbirds and mammals; Lankau et al. 2013, Tigner et al 2014). We emphasize assessment of the effects of SAGD developments because the ecological footprint of *in situ* development greatly exceeds that of surface mining (Jordan et al. 2009, ERCB 2010). In order to understand the total impact of multiple stressors and predict their effects in future developments, we assess both the impacts of individual stressors as well as their combined impact, because multiple stressors can interact synergistically (Holloway et al. in review).

Previous work under this monitoring project has produced numerous statistical models of focal wildlife species' responses to stressors (e.g., Mahon 2014, Sólymos et al. 2015, Holloway et al. in review, Leston et al. in review). These models are continually being reassessed and improved upon as additional data are collected (e.g., we are currently working on the third iteration of analyses to estimate power to detect trends in landbird species).

The project also includes methodological improvements, which will be used to expand and improve the efficiency of monitoring for this and other projects.

Status and trends monitoring

This project targets priority species in under-sampled habitats, sites where selected species have previously been detected (to increase sampling of rare species), and additional survey periods (to sample species not well detected using standard protocols). Monitoring has been ongoing since 2012.

We will regularly provide empirical assessments of status and trend of focal wildlife species (preliminary assessment of trend for some bird species in 2017-18, with regular updates as we collect additional data). The ABMI's monitoring project will require up to 20 years before it will be able to produce reliable estimates of trend for any but the most common bird species (AITF et al. 2012, Huggard 2013). Our project revisits previous survey locations (Cumming et al. 2010) because temporally-repeated samples give much greater power to assess trend compared to additional samples at novel locations. In addition, they can be used to assess how land-use changes from oil sands affect bird communities (see next section). This analysis framework could be used to rapidly estimate trend for other taxa where similar data exist from historical or future supplemental sampling (e.g., collation and resampling of camera trapping sites for mammals).

We also provide regular updates of the power to detect trend in bird populations under current monitoring designs. We are currently updating this analysis (AITF et al. 2012, Huggard 2013), prompted by changes in sampling design, methodologies and ARU technologies, as well as newer data that can be used to improve estimates of key variables (e.g., inter-annual variability) in the power analysis. Power analyses will be updated every five years, or more frequently if needed to assess future planned changes in sampling design or protocols. Power analyses will be used to inform and improve design of monitoring projects and reassess species prioritizations.

Effects assessment monitoring

We conduct long-term effects assessment monitoring across the entire region (Athabasca, Peace River and Cold Lake oil sands areas). Effects assessment monitoring is long-term (i.e., repeated) so we can assess whether relationships hold under new environmental conditions and levels of disturbance (e.g., as oil sands exploration continues and subsequent regeneration occurs). Monitoring spans disturbance gradients, and models both the impacts of individual stressors and the combined effects of multiple stressors (e.g., Mahon 2014, Sólymos et al. 2015, Holloway et al. in review). Sampling occurs at many more sites than ABMI's targeted sampling (B-LTM-E-10-1718), but surveys only birds and other vocalizing taxa. Monitoring has been ongoing since 2012.

We also conduct long-term effects assessment monitoring on entire landscapes (40 km^2) to directly quantify the cumulative impact of typical energy-sector disturbance patterns on bird and mammal populations. Landscapes are selected to cover a spectrum of energy-sector disturbances and include fully-developed SAGD sites, sites that are likely to become developed by SAGD in the near future, and areas that we do not expect to be developed (e.g., parks) as controls. Monitoring has been ongoing since 2014.

Focused studies assess the behavioural response of landbirds (and mammals starting in 2018-19) to specific disturbance features, including responses to local-scale best-practices (e.g., narrowing of linear features) and regeneration of disturbance features. Data on behavioural responses of landbirds and mammals will give us a better understanding of the mechanisms that affect population-level responses, and could explain some of the complex results seen in studies to date (e.g., Bayne et al. 2008, Lankau et al 2013, Tigner et al. 2015, Carpenter et al. in prep). Some historical data exists for landbirds (compiled by the Boreal Avian Modelling project), but it is biased to certain habitat types (mature and old deciduous forest) and was not designed to assess the effects of energy-sector disturbances. Additional sampling for birds focuses on collecting data from under-sampled habitats (e.g., lowland and regenerating forests) to complement the historical data collection.

Methodological improvements

We will develop statistical models to integrate data from this focal species monitoring project with data from WL-LTM-E-3-1718 Waterfowl Effects-based Assessment (Ducks Unlimited Canada). In 2016-2017, we initiated a collaborative study to compare waterfowl detections from automated recording units with detections on helicopter surveys. We will complete this project in 2017-18.

We will continue to develop ways to better integrate data collected using different sampling methodologies and designs in order to further improve estimates of status and trend (e.g., integrate camera surveys with mammalian detections on automated recording units, further develop methods for integrating human based point counts with automated recording units).

We will also assess the potential of new technologies (networks of automated recording units and automated radio-telemetry towers) to collect data on behavioural responses of landbirds to specific disturbance features (starting in 2018-19). Such technology would allow us to carry out such surveys in habitats that are difficult for human surveyors to work in (e.g., wetlands, dense forests). We will also conduct a cost-benefits analysis to determine whether these technologies might be cost-effective across a broader range of habitat types (i.e., in habitats where it is feasible to use standard human-based survey techniques).

Appendix 1 – Annual Monitoring Schedule

(Please provide detailed information on the specifics of your monitoring schedule including – **locations, schedule, methods**, **SOPs, QA/QC data release**, **references**)

Sampling Locations/Sites	**Sampling Schedule** (*timing/frequency)*	**Compounds to be Analyzed**	**SOPs to be Consulted** (*hyperlinks accepted*)	**QA/QC Complete & Date Data to be Released**
Human-based point counts for birds, across the three oil sands areas	Annually, May and June		Ball et al. 2014b Bruinsma et al 2014a, 2014b	Q4 (ECCC)
ARU-based point counts for birds and vocalizing amphibians, across the three oil sands areas	Annually, March – November		Lankau 2015a, 2015b Lankau et al. 2015 Camera trapping SOP for mammals to be developed (BU)	Q3 (BU)
Territory mapping surveys for birds, focused in one region in any given year but moving between years	Annually, May - July		Carpenter and Toms 2016 Toms and Carpenter 2016a, 2016b, 2016c Lankau 2015c SOP for radio-telemetry to be developed (ECCC) SOP for ARU arrays to be developed (BU)	Q4 (ECCC)

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Appendix 2 – Detailed Multi-Year Financial Breakdown: if changes are to be made then an Addendum must be Complete and Approved.

(Complete the following detailed financial breakdown; add or delete categories as required)

Overall budget: all collaborators combined

Budget requirements	Year 1 (2017- 2018)		Year 2 (2018- 2019)		Year 3 (2019- 2020)		Year 4 (2020- 2021)		Year 5 (2021- 2022)	
	OSM Funding	External Funding	OSM Funding	External Funding	OSM Funding	External Funding	OSM Funding	External Funding	OSM Funding	External Funding
1) Salaries and benefits										
a) Appendix 3 – Totals	$820,522	$325,520	$1,000,728	$259,040	$1,061,267	$214,540	$1,064,984	$214,540	$1,067,807	$229,280
2) Operations and Maintenance										
a) Vehicles and Transportation	$45,418	$19,600	$61,885	$21,420	$65,534	$22,491	$68,703	$23,616	$72,032	$24,796
b) Helicopter	$0	$0	$89,260	$0	$94,949	$0	$99,457	$0	$104,197	$0
c) Lab analysis	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
d) Data management	$4,303	$10,000	$5,951	$10,000	$6,330	$10,000	$6,630	$10,000	$6,946	$10,000
e) Field work	$121,424	$10,073	$243,956	$15,537	$218,162	$16,314	$228,562	$17,129	$239,494	$17,986
f) Capital expenses	$63,000	$20,778	$63,000	$30,250	$63,000	$24,139	$63,000	$24,139	$63,000	$24,139
3) Consumable Materials and supplies										
a) Batteries, SD cards, external hard drives	$11,055	$11,055	$11,607	$11,607	$12,188	$12,188	$12,797	$12,797	$13,437	$13,437

4) Travel										
a) Conferences and meetings	$22,958	$7,000	$22,900	$6,500	$23,977	$6,500	$24,831	$6,500	$25,728	$6,500
b) Field work - travel	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
c) Project-related travel	$3,000	$0	$3,000	$0	$3,000	$0	$3,000	$0	$3,000	$0
5) External Contracts										
a) ARU transcription; spot-mapping software; page charges	$46,194	$1,836	$49,472	$2,000	$26,783	$3,537	$27,985	$3,537	$29,249	$3,537
Grand Total	$1,137,872	$405,861	$1,551,760	$356,354	$1,575,189	$309,708	$1,599,949	$312,258	$1,624,889	$329,675

Budget for Environment and Climate Change Canada only

Budget requirements	Year 1 (2017- 2018)		Year 2 (2018- 2019)		Year 3 (2019- 2020)		Year 4 (2020- 2021)		Year 5 (2021- 2022)	
	OSM Funding	External Funding	OSM Funding	External Funding	OSM Funding	External Funding	OSM Funding	External Funding	OSM Funding	External Funding
6) Salaries and benefits										
b) Appendix 3 - Totals	$498,042	$0	$631,768	$0	$647,807	$0	$651,524	$0	$661,087	$0
7) Operations and Maintenance										
g) Vehicles and Transportation	$25,818	$0	$40,465	$0	$43,043	$0	$45,087	$0	$47,236	$0
h) Helicopter	$0	$0	$89,260	$0	$94,949	$0	$99,457	$0	$104,197	$0
i) Lab analysis	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
j) Data management	$4,303	$0	$5,951	$0	$6,330	$0	$6,630	$0	$6,946	$0
k) Field work	$111,351	$0	$228,420	$0	$201,849	$0	$211,433	$0	$221,508	$0
l) Capital expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
8) Consumable Materials and supplies										
b) (*Describe Consumable Supply*)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
9) Travel										
d) Conferences and meetings	$17,458	$0	$16,900	$0	$17,977	$0	$18,831	$0	$19,728	$0
e) Field work - travel	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
f) Project-related travel	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
10) External Contracts										

b) ARU transcription; spot-mapping software	$43,029	$0	$46,472	$0	$25,320	$0	$26,522	$0	$27,786	$0
Grand Total	$700,000	$0	$1,059,236	$0	$1,037,274	$0	$1,059,484	$0	$1,088,488	$0

Budget for the Boreal Avian Modelling Project only

Budget requirements	Year 1 (2017- 2018)		Year 2 (2018- 2019)		Year 3 (2019- 2020)		Year 4 (2020- 2021)		Year 5 (2021- 2022)	
	OSM Funding	External Funding	OSM Funding	External Funding	OSM Funding	External Funding	OSM Funding	External Funding	OSM Funding	External Funding
11) Salaries and benefits										
c) Appendix 3 - Totals	$72,500	$32,500	$72,500	$32,500	$105,000	$0	$105,000	$0	$105,000	$0
12) Operations and Maintenance										
m) Vehicles and Transportation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
n) Helicopter	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
o) Lab analysis	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
p) Data management	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
q) Field work	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
r) Capital expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
13) Consumable Materials and supplies										
c) (*Describe Consumable Supply*)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
14) Travel										

g) Conferences and meetings	$2,500	$0	$2,500	$0	$2,500	$0	$2,500	$0	$2,500	$0
h) Field work - travel	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
i) Project-related travel	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
15) External Contracts										
c) (*Describe External Contractor*)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grand Total	$75,000	$32,500	$75,000	$32,500	$107,500	$0	$107,500	$0	$107,500	$0

Budget for the Bioacoustics Unit only

Budget requirements	Year 1 (2017- 2018)		Year 2 (2018- 2019)		Year 3 (2019- 2020)		Year 4 (2020- 2021)		Year 5 (2021- 2022)	
	OSM Funding	External Funding	OSM Funding	External Funding	OSM Funding	External Funding	OSM Funding	External Funding	OSM Funding	External Funding
16) Salaries and benefits										
d) Appendix 3 - Totals	$249,980	$293,020	$296,460	$226,540	$308,460	$214,540	$308,460	$214,540	$301,720	$229,280
17) Operations and Maintenance										
s) Vehicles and Transportation	$19,600	$19,600	$21,420	$21,420	$22,491	$22,491	$23,616	$23,616	$24,796	$24,796
t) Helicopter	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
u) Lab analysis	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
v) Data management	$0	$10,000	$0	$10,000	$0	$10,000	$0	$10,000	$0	$10,000

w) Field work	$10,073	$10,073	$15,537	$15,537	$16,314	$16,314	$17,129	$17,129	$17,986	$17,986
x) Capital expenses	$63,000	$20,778	$63,000	$30,250	$63,000	$24,139	$63,000	$24,139	$63,000	$24,139
18) Consumable Materials and supplies										
d) Batteries, SD cards, external hard drives	$11,055	$11,055	$11,607	$11,607	$12,188	$12,188	$12,797	$12,797	$13,437	$13,437
19) Travel										
j) Conferences and meetings	$3,000	$7,000	$3,500	$6,500	$3,500	$6,500	$3,500	$6,500	$3,500	$6,500
k) Field work - travel	$0	$0								
l) Project-related travel	$3,000	$0	$3,000	$0	$3,000	$0	$3,000	$0	$3,000	$0
20) External Contracts										
d) Page charges	$3,165	$1,836	$3,000	$2,000	$1,463	$3,537	$1,463	$3,537	$1,463	$3,537
Grand Total	$362,872	$373,361	$417,524	$323,854	$430,415	$309,708	$432,965	$312,258	$428,902	$329,675

Appendix 3 – Staffing Plan

(Complete the following detailed staffing plan; add or delete categories as required)

Overall staffing plan: all collaborators combined

	Year 1 – Budget Allocation		Year 2 – Budget Allocation		Year 3 – Budget Allocation		Year 4 – Budget Allocation		Year 5 – Budget Allocation	
Responsible Role	OSM Funding	External Funding	OSM Funding	External Funding	OSM Funding	External Funding	OSM Funding	External Funding	OSM Funding	External Funding
Science Expertise	$459,385	$310,520	$525,353	$247,040	$573,891	$214,540	$582,763	$214,540	$585,586	$229,280
Technical/Field Staff	$331,137	$12,000	$435,376	$12,000	$447,376	$0	$442,221	$0	$442,221	$0
Administrative and Program Coordination	$30,000	$0	$40,000	$0	$40,000	$0	$40,000	$0	$40,000	$0
Grand Total (*inserted into Appendix 2*)	$820,522	$322,520	$1,000,728	$259,040	$1,061,267	$214,540	$1,064,984	$214,540	$1,067,807	$229,280

Overall staffing plan for Environment and Climate Change Canada only

	Year 1 – Budget Allocation		Year 2 – Budget Allocation		Year 3 – Budget Allocation		Year 4 – Budget Allocation		Year 5 – Budget Allocation	
Responsible Role	OSM Funding	External Funding	OSM Funding	External Funding	OSM Funding	External Funding	OSM Funding	External Funding	OSM Funding	External Funding
Science Expertise (PI, two assistant wildlife biologists, all FT)	$327,405	$0	$368,893	$0	$384,931	$0	$393,803	$0	$403,366	$0
Technical/Field Staff (6-9 summer field techs)	$170,637	$0	$262,876	$0	$262,876	$0	$257,721	$0	$257,721	$0
Administrative and Program Coordination	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grand Total (*inserted into Appendix 2*)	$498,042	$0	$631,768	$0	$647,807	$0	$651,524	$0	$661,087	$0

Overall staffing plan for the Boreal Avian Modelling Project only

	Year 1 – Budget Allocation		Year 2 – Budget Allocation		Year 3 – Budget Allocation		Year 4 – Budget Allocation		Year 5 – Budget Allocation	
Responsible Role	OSM Funding	External Funding	OSM Funding	External Funding	OSM Funding	External Funding	OSM Funding	External Funding	OSM Funding	External Funding
Science Expertise (0.5 FTE data analyst, FT postdoc)	$72,500	$32,500	$72,500	$32,500	$105,000	$0	$105,000	$0	$105,000	$0
Technical/Field Staff	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Administrative and Program Coordination	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grand Total (*inserted into Appendix 2*)	$72,500	$32,500	$72,500	$32,500	$105,000	$0	$105,000	$0	$105,000	$0

External funding sources: ABMI, Mitacs

Overall staffing plan for the Bioacoustics Unit only

	Year 1 – Budget Allocation		Year 2 – Budget Allocation		Year 3 – Budget Allocation		Year 4 – Budget Allocation		Year 5 – Budget Allocation	
Responsible Role	OSM Funding	External Funding	OSM Funding	External Funding	OSM Funding	External Funding	OSM Funding	External Funding	OSM Funding	External Funding
Science Expertise (0.5 FTE PI, 4-5 M.Sc. and 4-5 Ph.D. students)	$59,480	$278,020	$83,960	$214,540	$83,960	$214,540	$83,960	$214,540	$77,220	$229,280
Technical/Field Staff (2 FT staff, 6 summer field techs)	$160,500	$12,000	$172,500	$12,000	$184,500	$0	$184,500	$0	$184,500	$0
Administrative and Program Coordination (0.5 FTE program coordinator)	$30,000	$0	$40,000	$0	$40,000	$0	$40,000	$0	$40,000	$0
Grand Total (*inserted into Appendix 2*)	$249,980	$290,020	$296,460	$226,540	$308,460	$214,540	$308,460	$214,540	$301,720	$229,280

External funding sources: University of Alberta, ABMI, AlPac, NSERC

Appendix 4 – Approvals

Project Submitted by:		
Name: Samantha Song		
Organization: Environment and Climate Change Canada	Signature:	Date:

Project Approved by:		
Dr. Monique Dubé (AEP)		**Dr. Kevin Cash (ECCC)**
Signature 		Signature 
Date		Date