2016 BAM Workplan

BAM's Project Structure and Larger Goals

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# Introduction

This document lays out the plans for work to be conducted by the Boreal Avian Modelling Project. It provides an overview of projects that are currently active, those we explicitly plan to work on in the near future, and those that are currently just ideas within our longer-term vision.

The focus is on work led by BAM team members, including staff, students, and contributing scientists. Some collaborative activities are also described.

### Organization of this Document

* BAM pursues **projects** in four parallel but inter-connected **domains**.
* Projects working towards the same end goal are clustered into a single **subtheme**.
* Similar subthemes are grouped into **themes**.
* This document follows that same hierarchical structure, with domains at the highest level and themes, subthemes, and projects nested within.

A list of other acronyms and important terminology is appended.

# Domain 1: Research and Monitoring

The majority of BAM’s time and effort is dedicated to Research and Monitoring. We design and conduct applied avian ecological research in an effort to facilitate conservation, management, and monitoring of birds in the boreal forest.

There are 11 themes in this domain: 1) Species Density, Population Size, and Trend; 2) Habitat Requirements; 3) Risk to Avian Populations; 4) Analytical Methods; 5) Survey Methods and Monitoring Design; 6) Full Annual Cycle; 7) Conservation Activities; 8) Natural Disturbance; 9) Avian Ecology; 10) Waterfowl; 11) Community Ecology

## Theme 1.1: Species Density, Population Size, and Trend

To make educated recommendations about avian conservation, we must know how species' populations vary in space and time. BAM quantifies species' densities, population sizes, and trends across boreal North America using the most appropriate data and methods available. Most of the projects in this Theme will yield Data Products for distribution.

There are 3 subthemes within this theme: 1) National Density Models and Population Estimates; 2) Identify Trends from BAM Data; 3) Status Assessments

### National Density Models and Population Estimates

**SUBTHEME GOAL:** The purpose of these projects is to build national/pan-continental models of bird species' density, with a focus on the boreal forest. The primary goal of these models is to create data products, with quantifying human impact as a secondary goal. We are in our third iteration of national density models, with the current round representing our most sophisticated methods and comprehensive biophysical covariates. 3 active, upcoming, stalled, or potential project(s) are/is related to this subtheme.

#### Projects

|  |  |  |  |
| --- | --- | --- | --- |
| Project.Objective | Lead | Anticipated.Completion | Status |
| In our third iteration of national density models, we are using the Poisson regression in a branching hierarchy framework with the most comprehensive avian and geospatial dataset available to date, with all choices informed from our methodological explorations to date. One outcome of these models is the creation of data products (density maps, population estimates, trend estimates). A secondary outcome will be quantification of the impact of human activities on bird populations. The analyses will be first demonstrated on Canada Warbler as a test species, and then expanded out to all species for which we have sufficient data. | Samuel Hache | 2016-10-01 | ACTIVE |
| Repeat a [previous analysis](file:///C:\Users\Kyle%20and%20Nicole\Dropbox\BAM\Workplanning\Workplan%202016\www.borealbirds.ca\index.php\density) with the newest database to estimate land cover-specific breeding densities for each combination of BCR and province. | Nicole Barker | 2016-08-01 | QUEUED |
| Quantify habitat associations using zero-inflated models built at national extent using climate and landcover covariates. The rationale for using ZI models is that separation of abundance from occurrence processes may improve the biological interpretation of habitat effects on species’ densities. An initial methodological exploration will be required to assess whether ZIs yield any improvement above the current density models not built with ZI methods. | Unassigned | NA | IDEA |

### Identify Trends from BAM Data

**SUBTHEME GOAL:** When conserving a species, it’s important to know whether its population is steady or declining, and if declining, at what rate. It’s difficult to estimate population trends for boreal birds because existing datasets have inadequate or non-representative spatial and temporal sampling. The North American Breeding Bird Survey (BBS) dataset has a long time series of data, but its sampling is not representative of the boreal forest and its roadside surveys may introduce additional biases. The BAM database includes more off-road surveys and covers more of the boreal forest, but it doesn’t have many repeated surveys in the same location, leading to low temporal coverage. Our goal is to combine the BAM and BBS datasets to obtain improved temporal and spatial coverage with which we can estimate trends. 1 active, upcoming, stalled, or potential project(s) are/is related to this subtheme.

#### Projects

|  |  |  |  |
| --- | --- | --- | --- |
| Project.Objective | Lead | Anticipated.Completion | Status |
| Use the temporally-sparse BAM data in conjunction of the spatially less representative but temporally-dense BBS data to estimate trends of songbird population abundance in the Boreal. The aim is to use BAM and BBS together to gain useful information; it’s not a contrast of BBS versus BAM. | Peter Solymos | 2016-10-01 | ACTIVE |

### Status Assessments

**SUBTHEME GOAL:** BAM team members have helped to write or revise species’ status assessments. 2 active, upcoming, stalled, or potential project(s) are/is related to this subtheme.

#### Projects

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| --- | --- | --- | --- |
| Project.Objective | Lead | Anticipated.Completion | Status |
| Write a status report for WEWP in Alberta by updating abundance / habitat selection models and summarizing all other relevant information on the species. | Tara Stehelin | 2016-07-01 | ACTIVE |
| Update the COSEWIC status report on OSFL, including information on: distribution, habitat, biology, population size and trend, threats, and other information. | Alana Westwood | 2016-11-01 | ACTIVE |

## Theme 1.2: Habitat Requirements

Knowledge of habitat associations and habitat suitability, whether relative or absolute, is needed for all birds to aid in predictive efforts as well as regulatory matters such as identifying Critical Habitat for Species at Risk. Most of our modeling efforts inform this question to some degree, but we are particularly interested in: 1) the value of various habitat definitions in terms of prediction accuracy for bird abundance and distribution; 2) the variance induced through using different definitions of habitat (i.e. Forest Resource Inventory data vs. remote sensed data); and 3) how habitat selection changes across spatial gradients. This work represents an evolving process as new data layers and data become available.

There are 3 subthemes within this theme: 1) Critical Habitat Identification; 2) Differential Habitat Selection; 3) Regional Models

### Critical Habitat Identification

**SUBTHEME GOAL:** Defining critical habitat is required to inform recovery strategies for species at risk. BAM has been involved in ECCC’s process to establish recovery strategies for Canada Warbler, Olive-sided Flycatcher, and Common Nighthawk in a few ways. In our first step, we built density models to map species’ distributions and abundances across Canada, as a first approximation of where important habitat might be. We are currently updating those models, as described above. In anticipated work that we hope to be facilitated by the addition of a new post-doctoral fellow, we will explore different modelling approaches that have the potential to inform critical habitat identification. We are working towards this larger goal through 5 BAM projects. 5 active, upcoming, stalled, or potential project(s) are/is related to this subtheme.

#### Projects

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| --- | --- | --- | --- |
| Project.Objective | Lead | Anticipated.Completion | Status |
| Develop national density and habitat association models for CAWA, OSFL, and CONI and explore their potential in identifying important habitat and therefore informing critical habitat identification within ECCC. Continue engaging with ECCC on advisory committees and wherever else is relevant to assist with the critical habitat identification process (ongoing). | Samuel Hache | NA | ACTIVE |
| Assess whether inter-annual variability in avian density can indicate habitat quality. We will use the BAM database to estimate temporal variance in avian abundance and evaluate the maximal density that different habitats could support. This approach could also identify areas of suitable habitat that are currently unoccupied, and areas of habitat that may become suitable in the future. We note that this cannot be a national study due to sparseness of data - instead, we will explore its potential with a series of regional studies. | Unassigned | NA | QUEUED |
| Methodological approach to move from SAR population targets to landscape specifications, and then identify landscapes satisfying such specifications? | Unassigned | NA | QUEUED |
| We will develop simulation tools to support identification of alternate definitions of high-quality habitat. We will identify landscape units that meet the needs of Species at Risk, and then estimate, by simulation, their ability to do so sustainably, taking account of natural disturbances and other factors. | Unassigned | NA | QUEUED |
| Model behavioural clustering processes using spatial autocorrelation techniques. Identify locations of clusters of species at risk, such as Canada Warbler. | Unassigned | NA | QUEUED |

### Differential Habitat Selection

**SUBTHEME GOAL:** Habitat selection is thought to vary geographically for some bird species (e.g., Black-throated Green Warbler, Canada warbler). Our goal is to identify whether there is differential habitat selection across the boreal region within the same species. There are four competing but not mutually-exclusive hypotheses that might explain the observed patterns of regional habitat selection: regionally-varying misclassification errors in remotely sensed habitat products, density-dependent habitat selection, genetic differences (e.g., species or sub-species differences), and real spatial variation in habitat selection. We are working towards this larger goal through 2 BAM projects. 3 active, upcoming, stalled, or potential project(s) are/is related to this subtheme.

#### Projects

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| --- | --- | --- | --- |
| Project.Objective | Lead | Anticipated.Completion | Status |
| Explore whether regional differences in habitat selection/abundances are driven by intra-specific differences in selection for specific tree species, species compositions, or stand structures. We will identify a biologically meaningful classification for FRI data that incorporates information on stand composition (rather than just dominant species) and compare it to a simple land cover/dominant tree class relationship. We will also explore the effects of stand structure while ignoring regional variation in tree species -- can we identify common structural profiles that make up important bird habitat? | Unassigned | 2017-03-01 | QUEUED |
| Compare regional (Alberta, Maritimes) models built for CAWA, OSFL, and other species to look for differential habitat selection patterns in eastern vs. western Canada. | Unassigned | 2017-03-01 | IDEA |
| After exploring the various aspects of differential habitat selection (including stand structure, species composition, dominant tree species, errors in variables, density-dependent habitat selection, and genetic differencs, among others) we will synthesize our findings and conclusions regarding regional habitat selection. | Unassigned | 2017-03-01 | IDEA |

### Regional Models

**SUBTHEME GOAL:** In addition to our national models, BAM is actively involved in regional modelling efforts. So far we have worked on or are working on density models for at least one species in: Alberta, Northwestern boreal, and the Maritimes. This work relies heavily on collaborations and external capacity, and is typically pursued through student projects. 3 active, upcoming, stalled, or potential project(s) are/is related to this subtheme.

#### Projects

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| --- | --- | --- | --- |
| Project.Objective | Lead | Anticipated.Completion | Status |
| Describe influence of fire and climate on OSFL and WEWP in north and west boreal region, examine inter-annual trends regionally (PhD project, T. Stehelin) | Tara Stehelin | 2017-10-01 | ACTIVE |
| Two objectives. First, to build habitat models for Canada Warbler (CAWA), Olive-sided Flycatcher (OSFL), and Rusty Blackbird (RUBL) within the Canadian Maritimes using similar data and the same methods as national models. Second, to determine the contribution of existing protected areas in Canada to available high-quality habitat for CAWA, OSFL, and RUBL (PhD project, A. Westwood) | Alana Westwood | NA | ACTIVE |
| Create regional density models within US and Canadian BCR4 | Steve Matsuoka | 2016-12-01 | QUEUED |

## Theme 1.3: Risk to Avian Populations

One of BAM’s primary goals is to understand the impacts of human activity on boreal bird abundance and distribution. This includes both land-use changes and climate change. To address this goal, we develop models to predict bird species and abundance based on habitat characteristics such as land cover and climate and then quantitatively explore how human activities affect bird populations by affecting the underlying covariates.

There are 4 subthemes within this theme: 1) Impacts of Land-use Change at National Extent; 2) Impacts of Land-use Change in the Alberta Oilsands Region; 3) Impacts of Climate Change; 4) Impacts of Forestry and Sustainable Forest Management Planning

### Impacts of Land-use Change at National Extent

**SUBTHEME GOAL:** One of our longer-term goals is to quantify the effects that land-use changes have had on bird populations at national extent. Some of our other projects also relate to this goal. 2 active, upcoming, stalled, or potential project(s) are/is related to this subtheme.

#### Projects

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| --- | --- | --- | --- |
| Project.Objective | Lead | Anticipated.Completion | Status |
| Estimate effects of human-caused forest loss on old forest bird density at local (100 m) and neighbourhoood (500 m) scales. | Alberto Suarez-Esteban | 2016-07-01 | ACTIVE |
| Exploration of non-linear models to test for thresholds in bird response to the cumulative amount of forest loss on songbird populations at national and regional scales | Alberto Suarez-Esteban | 2017-01-01 | QUEUED |

### Impacts of Land-use Change in the Alberta Oilsands Region

**SUBTHEME GOAL:** Quantify the past effects of anthropogenic activities (e.g., energy sector, agriculture, and forestry) on boreal bird populations, with a focus on the Alberta oilsands region. 9 active, upcoming, stalled, or potential project(s) are/is related to this subtheme.

#### Projects

|  |  |  |  |
| --- | --- | --- | --- |
| Project.Objective | Lead | Anticipated.Completion | Status |
| Determine the influence of landscape context, landcover, and Steam-Assisted Gravity Drainage (SAGD) disturbance on lowland boreal landbird abundance at the landscape and regional scales. | Lisa Mahon | 2016-04-01 | ACTIVE |
| Compare three wetland classification systems to determine which one improves habitat modeling and predictions of bird abundance and occupancy. Results will inform how we incorporate wetlands into our regional (JOSM) models of human impact. | Lionel Leston | 2016-07-01 | ACTIVE |
| Build habitat models for species within the JOSM area using disturbance and vegetation variables. Generate maps of breeding density and assess changes in bird abundance relative to what would have been expected in the absence of human development had not occurred. | Peter Solymos | 2016-08-01 | ACTIVE |
| Estimate species’ trends within the JOSM region, following findings from the national exploration of BAM & BBS trends. | Peter Solymos | 2016-08-01 | ACTIVE |
| Investigate if effects quantified at the local (individual point count) scale can predict boreal bird abundance at the landscape scale. Explore possible reasons for discrepancies. | Lionel Leston | 2016-08-01 | ACTIVE |
| Compare three different approaches used to model human impact on birds in the Oilsands area (1. local scale / control-impact, 2. additive dose-response, and 3. interactive dose-response), and discuss concordance. | Lionel Leston | 2016-10-01 | ACTIVE |
| Using simulations, estimate how future expansion of energy sector development in Alberta will affect habitats and populations of songbirds in the Oilsands region. | Unassigned | 2017-03-01 | QUEUED |
| Evaluate existing efforts by updating estimates of inter-annual variation and detection error and determining the influence they have on the statistical power to assess trends. | Unassigned | 2017-03-01 | QUEUED |
| Synthesize our findings to date concerning human impact on boreal birds in the JOSM area. | Unassigned | 2017-03-01 | QUEUED |

### Impacts of Climate Change

**SUBTHEME GOAL:** Quantify possible implications of climate change on boreal songbirds, including impacts on abundance and distribution, range expansion, and food availability. 4 active, upcoming, stalled, or potential project(s) are/is related to this subtheme.

#### Projects

|  |  |  |  |
| --- | --- | --- | --- |
| Project.Objective | Lead | Anticipated.Completion | Status |
| Projecting Alberta vegetation response to climate change and changes in natural disturbance regimes. Link with bird models to forecast bird response (PhD project, D. Stralberg). | Diana Stralberg | 2017-08-01 | ACTIVE |
| Forecast population responses to climate change in Alberta and Quebec based on realistic simulations (using LANDIS) of vegetation response considering natural and human disturbance (collaborative project with Yan Boulanger [NRCAN] and Junior Tremblay [ECCC]). | Diana Stralberg | NA | ACTIVE |
| Evaluate the Integrated Ecosystem Model for birds; forecast boreal bird response using future projections of climate and associated landscape changes from the IEM. | Steve Matsuoka | NA | QUEUED |
| Detect species’ range shifts over the last 20-30 years using the BBS dataset (proposed collaboration with Ilona Naujokaitis-Lewis [ECCC]). | Diana Stralberg | NA | IDEA |

### Impacts of Forestry and Sustainable Forest Management Planning

**SUBTHEME GOAL:** Quantify impacts of forestry on birds with the goal of informing and facilitating sustainable forest management (SFM) practices. By SFM, we mean maintaining economically viable harvest rates while preventing, minimizing, or mitigating human-induced population declines of avian species and supporting natural forest biodiversity in the long-term. 7 active, upcoming, stalled, or potential project(s) are/is related to this subtheme.

#### Projects

|  |  |  |  |
| --- | --- | --- | --- |
| Project.Objective | Lead | Anticipated.Completion | Status |
| Quantify the effects of forestry activities on important breeding habitat, abundance, and demography of Canada Warblers (M.Sc. project, A. Hunt). | Erin Bayne | 2016-10-01 | ACTIVE |
| Using empirical data and density models, validate COFI’s work assessing risk of incidental take in British Columbia (collaborative project with Mark Drever [ECCC] and Kari Stuart-Smith [COFI]). | Nicole Barker | 2016-10-01 | ACTIVE |
| Quantify threshold responses of avian species richness to local and landscape scale availability of forest plantations (collaborative project with Urs Kormann and Matt Betts [Oregon State University]). | Nicole Barker | 2016-12-01 | ACTIVE |
| Assess long-term effects of forestry on birds using the Calling Lake experimental forest dataset. | Lionel Leston | 2017-02-01 | ACTIVE |
| Forecast bird populations in response to natural disturbance (fire) and forest harvest by applying bird models built using forest inventory attributes to future landscapes produced by the Tardis landscape simulation tooI. | Unassigned | NA | QUEUED |
| Systematically review and compare commonly-used forest management planning tools; evaluate how bird simulation tools and bird models could work with them through forest inventory attributes. | Unassigned | NA | IDEA |
| In spring of 2016, BAM submitted a proposal for an NSERC Strategic Partnership Grant that will target sustainable forest management using simulation tools. If the proposal is successful (announcement expected in October 2016), BAM will expand our team by several students and post-docs and initiate a 3-year project on this topic in collaboration with researchers from U.Laval and UBC. | Steve Cumming | NA | IDEA |

## Theme 1.4: Analytical Methods

Since BAM’s inception, we have actively developed and tested quantitative methods to help us achieve our research goals. While this phase of our research is slowing, we continue some methodological explorations to help answer our own ecological and applied questions, and to recommend approaches for other research and management goals.

There are 3 subthemes within this theme: 1) Estimate and Account for Detectability; 2) Test Methods for Density Models; 3) Evaluate BAM Models and Products

### Estimate and Account for Detectability

**SUBTHEME GOAL:** Explore factors affecting the probability that a bird will be detected, it’s ‘detectability’, to further validate and improve our EDR/QPAD methods and our habitat models. 3 active, upcoming, stalled, or potential project(s) are/is related to this subtheme.

#### Projects

|  |  |  |  |
| --- | --- | --- | --- |
| Project.Objective | Lead | Anticipated.Completion | Status |
| Demonstrate the contribution of singing rate to detectability. | Peter Solymos | 2016-08-01 | ACTIVE |
| Investigate how various life history traits and phylogeny affect detectability as measured by EDR and singing rate. | Peter Solymos | 2016-08-01 | ACTIVE |
| Estimate spatial and temporal variation in peak singing times | Unassigned | NA | IDEA |

### Test Methods for Density Models

**SUBTHEME GOAL:** Explore how to improve density and habitat models through various techniques or datasets, with the goal of informing models used in other projects. 3 active, upcoming, stalled, or potential project(s) are/is related to this subtheme.

#### Projects

|  |  |  |  |
| --- | --- | --- | --- |
| Project.Objective | Lead | Anticipated.Completion | Status |
| Develop and test an analytical approach to modelling species' densities as a function of habitat, climate, and disturbance. Methodological considerations involve bagging, bootstrapping, and iterative model selection, as well as including data from on- and off-road survey, and data from ARUs. We also explored forms of covariates, such as quadratic vs. linear. The end result is a method that we can apply at regional and national extent to build habitat-based density models. | Peter Solymos | 2016-07-01 | ACTIVE |
| Build avian models at the largest extent possible that use forest resource inventory data. This will require exploration of how best to use CASFRI data. One outcome will be models that can be used in Tardis for landscape simulations. | Unassigned | NA | QUEUED |
| Determine if predictive habitat models of Canada Warbler are improved by including information from wet areas mapping. | Unassigned | NA | STALLED |

### Evaluate BAM Models and Products

**SUBTHEME GOAL:** Validate BAM's national models through comparison with other datasets (i.e., not point count, so not in the BAM dataset) and BAM regional models, among other things. Make recommendations on which products to use for different applications (e.g., importance of apples-to-apples national maps vs. finer resolution regional models) 3 active, upcoming, stalled, or potential project(s) are/is related to this subtheme.

#### Projects

|  |  |  |  |
| --- | --- | --- | --- |
| Project.Objective | Lead | Anticipated.Completion | Status |
| Validate density estimates obtained from models built using the BAM/BBS database and provide more robust estimates of edge avoidance using spot-mapping data. | Unassigned | NA | QUEUED |
| Examine the pros and cons of regional vs. national analyses, emphasizing differences in target audience and context. Contrast Maritime and Alberta models to national models. | Unassigned | NA | IDEA |
| Evaluate the potential of other data sources such as eBird for model input or validation data. Validate range limits determined from BAM models using eBird data. | Unassigned | NA | IDEA |

## Theme 1.5: Survey Methods and Monitoring Design

BAM explores the effects of sampling bird abundance using roadside surveys (e.g., BBS) and automated recording units, with the goals of: 1) incorporating these data into the BAM dataset; and 2) making recommendations on how to reduce variation and biases associated with these sampling methods. BAM can also evaluate gaps in sampling for population assessment and trend monitoring, with the aims of assisting resource managers, ensuring that collected data complement the BAM dataset, and allowing the creation of better habitat and density models.

There are 3 subthemes within this theme: 1) Roadside Bias; 2) ARUs; 3) Bias and Gaps in Boreal Bird Monitoring

### Roadside Bias

**SUBTHEME GOAL:** Quantify biases associated with roadside (e.g, BBS) surveys, to account for them in models using statistical methods, and to reduce them during future sampling. 2 active, upcoming, stalled, or potential project(s) are/is related to this subtheme.

#### Projects

|  |  |  |  |
| --- | --- | --- | --- |
| Project.Objective | Lead | Anticipated.Completion | Status |
| Using simulations and a comparative analysis of on- and off-road data, we seek to understand and quantify the complexity of roadside-related biases. | Peter Solymos | 2016-09-01 | ACTIVE |
| The purpose is to determine how detectability along roads may bias roadside surveys compared to forest interior surveys. This question is addressed using sound transmission experiments (Ph.D. project, D. Yip). | Erin Bayne | 2016-09-01 | PENDING |

### ARUs

**SUBTHEME GOAL:** Conduct research necessary to seamlessly incorporate ARUs into the BAM dataset, and to make recommendations on using ARUs for monitoring avian populations. 4 active, upcoming, stalled, or potential project(s) are/is related to this subtheme.

#### Projects

|  |  |  |  |
| --- | --- | --- | --- |
| Project.Objective | Lead | Anticipated.Completion | Status |
| Review and evaluate methods of integrating ARU counts with conventional point count surveys (with the goal of combining data from both surveys in unified habitat and density models). | Lionel Leston | 2016-10-01 | ACTIVE |
| Demonstrate the importance of ARUs for improving our understanding of CONI (M.Sc. project, E.Knight). | Peter Solymos | 2017-04-01 | ACTIVE |
| The purpose of this project is to identify standard for processing ARU data. For example, the most time-effective ways to sub-sample recordings of long durations to identify all species at a location. | Steve Van Wilgenburg | 2017-04-01 | ACTIVE |
| Summarize the potential information gain from including ARUs in the BAM dataset, given that ARUs sample different times (e.g., night) and different habitats (e.g., wetlands), than traditional point counts. | Lionel Leston | NA | QUEUED |

### Bias and Gaps in Boreal Bird Monitoring

**SUBTHEME GOAL:** Identify representativeness of sampling within the BAM/BBS database, and the implications this coverage might have on our models. Identify where additional sampling would improve habitat and density models via improved coverage of covariate or geographic space. Determine whether and how BAM will actively solicit data to fill these gaps. 4 active, upcoming, stalled, or potential project(s) are/is related to this subtheme.

#### Projects

|  |  |  |  |
| --- | --- | --- | --- |
| Project.Objective | Lead | Anticipated.Completion | Status |
| Examine alternative temporally-replicated sampling designs for the purpose of trend analysis and monitoring. The goal is to provide guidance regarding sampling that will yield efficient and minimally-biased estimation of population trends. | Steve Van Wilgenburg | 2016-09-01 | ACTIVE |
| Quantify the physical and geographic characteristics sampled by the current BAM database. Compare these characteristics to the distribution of those characteristics in the overall boreal region to characterize how representative our dataset is and what the implications might be in terms of bias, interpretations, and caveats. | Diana Stralberg | 2017-03-01 | QUEUED |
| Using model-based design methods, determine where additional sampling would be desired to complement BAM's current avian database. Decide whether and how to request sampling from those regions. | Samuel Hache | 2017-03-31 | QUEUED |
| Explore biases in spatial coverage of BBS. Essentially replicating Van Wilgenberg et al's 2015 (ACE-ECO) paper on spatial bias in BBS, but with a larger buffer size. | Unassigned | NA | IDEA |

## Theme 1.6: Full Annual Cycle

In 2013, after being rewarded our fourth NMBCA grant, we initiated a new research Theme looking at the full annual life cycle of boreal-breeding birds. We’re primarily exploring how factors outside of the breeding grounds affect breeding density. Since this funding terminated in the fall of 2015, our aim is to complete and publish initial results as soon as possible. We may revisit this topic in future years, as more data become available.

There are 1 subthemes within this theme: 1) Contribution of Wintering Grounds

### Contribution of Wintering Grounds

**SUBTHEME GOAL:** Quantify how birds’ density on the breeding grounds responds to factors operating on the wintering or staging grounds. 4 active, upcoming, stalled, or potential project(s) are/is related to this subtheme.

#### Projects

|  |  |  |  |
| --- | --- | --- | --- |
| Project.Objective | Lead | Anticipated.Completion | Status |
| Summarize all findings from various lines of evidence regarding migratory connectivity for boreal-breeding songbirds. Results may be a simple table or a geodatabase, as future needs require. | Diana Stralberg | 2016-07-01 | ACTIVE |
| Describe and explain spatial patterns of inter-annual variability in boreal bird breeding density, and how the patterns are affected by climate and other factors on the wintering and staging grounds. | Diana Stralberg | 2017-03-01 | ACTIVE |
| Determine overwintering areas and migratory routes of OSFL breeding in Yukon, NWT, Alaska and overwintering locations of WEWP breeding in Yukon (Ph.D. project, T.Stehelin) | Tara Stehelin | 2017-09-01 | ACTIVE |
| Examine the influence of forest loss in non-breeding areas on occurrence of target species on the breeding ground (Ph.D. Project, T.Stehelin). | Tara Stehelin | NA | IDEA |

## Theme 1.7: Conservation Activities

All of the products delivered by BAM may play a role in conservation planning. Some of our research efforts demonstrate examples and develop approaches that will allow resource managers involved in land-use planning to use our results most effectively. Much of our research in this theme operates through collaborations.

There are 2 subthemes within this theme: 1) Identify Priority Areas; 2) Evaluate and Support Spatial Prioritization Tools

### Identify Priority Areas

**SUBTHEME GOAL:** Explore and apply different approaches to mapping potential priority areas for birds within boreal Canada. 4 active, upcoming, stalled, or potential project(s) are/is related to this subtheme.

#### Projects

|  |  |  |  |
| --- | --- | --- | --- |
| Project.Objective | Lead | Anticipated.Completion | Status |
| Identify priority conservation areas for boreal landbirds in Canada, using Zonation software on BAM data products of current and forecasted boreal bird density (contract with CWS). | Diana Stralberg | 2016-07-01 | ACTIVE |
| Identify areas of high conservation value for Canada Warblers in the Canadian portion of BCR 14. Provide management guidelines on the species for this region (contract with Dan Lambert [Highbranch]). | Alana Westwood | 2016-10-01 | ACTIVE |
| A case study demonstrating an approach for identifying priority areas for select priority landbirds in BCR 6, using Marxan. | Lisa Mahon | NA | STALLED |
| Develop an operational definition of “priority area” that can allows BAM models to link with different targets (e.g. population size, habitat quality, resilience). This is part of a broader effort to inform and facilitate priority area identification. | Fiona Schmiegelow | NA | IDEA |

### Evaluate and Support Spatial Prioritization Tools

**SUBTHEME GOAL:** Evaluate and contribute insight regarding spatial conservation prioritization tools and approaches. 3 active, upcoming, stalled, or potential project(s) are/is related to this subtheme.

#### Projects

|  |  |  |  |
| --- | --- | --- | --- |
| Project.Objective | Lead | Anticipated.Completion | Status |
| Advance boreal bird conservation through application of BAM products to on-the-ground conservation planning efforts (ongoing collaboration with the BEACONs Project). | Fiona Schmiegelow | NA | ACTIVE |
| Compare potential protected areas networks created using methods that maximize the waterfowl population protected versus those created using the BEACONs ecosystem-based approach (Ph.D. project, N.Barker) | Nicole Barker | NA | STALLED |
| Compare the value of information of using density models vs. occurrence models (proposed collaboration with Ilona Naujokaitis-Lewis [ECCC]). | Diana Stralberg | NA | IDEA |

## Theme 1.8: Natural Disturbance

The boreal forest is naturally variable. Our goal is to evaluate how natural processes such as forest fire and insect outbreaks influence bird abundance.

There are 2 subthemes within this theme: 1) Impacts of Forest Fire; 2) Impacts of Insect Outbreaks

### Impacts of Forest Fire

**SUBTHEME GOAL:** Determine the potential population response of boreal-breeding birds to forest fires. 1 active, upcoming, stalled, or potential project(s) are/is related to this subtheme.

#### Projects

|  |  |  |  |
| --- | --- | --- | --- |
| Project.Objective | Lead | Anticipated.Completion | Status |
| Evaluate the potential effect of annual fire on bird populations via conversion of forested habitats to burns. | Nicole Barker | 2016-12-01 | STALLED |

### Impacts of Insect Outbreaks

**SUBTHEME GOAL:** Explore the effects of spruce budworm (and potentially other insects) on breeding populations of boreal birds. 1 active, upcoming, stalled, or potential project(s) are/is related to this subtheme.

#### Projects

|  |  |  |  |
| --- | --- | --- | --- |
| Project.Objective | Lead | Anticipated.Completion | Status |
| Compare impacts of budworm and fire disturbances on boreal bird communities, populations, and habitat (collaboration with Lisa Venier [CFS] and Marc Mazerolle [U.Laval]). | Nicole Barker | NA | STALLED |

## Theme 1.9: Avian Ecology

This theme captures research on avian ecology that isn’t easily placed in other Themes.

There are 3 subthemes within this theme: 1) Range Limits; 2) Behavioural Ecology; 3) Other Avian Ecology

### Range Limits

**SUBTHEME GOAL:** The delineation of species ranges is important for management purposes, as well as for methodological reasons. We aim to explore different methods of delineating ranges from BAM data or data products. 4 active, upcoming, stalled, or potential project(s) are/is related to this subtheme.

#### Projects

|  |  |  |  |
| --- | --- | --- | --- |
| Project.Objective | Lead | Anticipated.Completion | Status |
| Delineate the breeding ranges of OSFL and WEWP in the northwestern boreal region using new fine-scale occurrence data (Ph.D. project, T.Stehelin). | Tara Stehelin | 2016-09-01 | ACTIVE |
| Identify factors that have prevented boreal birds from crossing western Cordillera into Alaska in the past, and assess future potential for range shifts. | Diana Stralberg | 2016-07-01 | PENDING |
| Methodological exploration to delineate species' ranges from density maps from species’ abundance models (e.g., BRT, or other methods). Might include both songbirds and waterfowl. | Unassigned | 2017-03-01 | IDEA |
| Delineate species breeding ranges using the occurrence portion of zero-inflated distribution/abundance models built using climate. | Unassigned | NA | IDEA |

### Behavioural Ecology

**SUBTHEME GOAL:** While not BAM’s primary focus, some graduate student projects explore aspects of behavioural ecology that are relevant to BAM’s larger goals of informing conservation and management of boreal birds. 2 active, upcoming, stalled, or potential project(s) are/is related to this subtheme.

#### Projects

|  |  |  |  |
| --- | --- | --- | --- |
| Project.Objective | Lead | Anticipated.Completion | Status |
| Determine the arrival time and seasonal phenology of calling behavior of Olive-sided Flycatcher in Alberta and NWT from 2015 forward (M.Sc. project, E.Upham-Mills). | Erin Bayne | 2017-04-01 | ACTIVE |
| Investigate role of insect abundance, diversity, and emergence time on breeding phenology and relative breeding success of OSFL and WEWP (Ph.D. project, T.Stehlin). | Tara Stehelin | 2017-10-01 | ACTIVE |

### Other Avian Ecology

**SUBTHEME GOAL:** Some ideas or projects we have considered are not closely related to our other work and don’t have an easily-assigned subtheme. 1 active, upcoming, stalled, or potential project(s) are/is related to this subtheme.

#### Projects

|  |  |  |  |
| --- | --- | --- | --- |
| Project.Objective | Lead | Anticipated.Completion | Status |
| Identify population structure of COWA, with implications for conservation management within Canada. | Lionel Leston | NA | IDEA |

## Theme 1.10: Waterfowl

From 2010 through 2015, BAM executed waterfowl research through a Ph.D. project (N.Barker). BAM does not currently have the capacity to continue waterfowl research, but would consider collaborations if there were resources and additional capacity.

There are 1 subthemes within this theme: 1) Waterfowl Ecology

### Waterfowl Ecology

**SUBTHEME GOAL:** Pursue research concerning waterfowl ecology. 1 active, upcoming, stalled, or potential project(s) are/is related to this subtheme.

#### Projects

|  |  |  |  |
| --- | --- | --- | --- |
| Project.Objective | Lead | Anticipated.Completion | Status |
| Identify large-scale habitat selection by waterfowl within North America. A sub-goal is identifying duck species that are dependent on the boreal. | Nicole Barker | 2016-07-01 | ACTIVE |
| Identify large-scale habitat selection by waterfowl within North America. A sub-goal is identifying duck species that are dependent on the boreal. | Nicole Barker | 2016-07-01 | ACTIVE |

## Theme 1.11: Community Ecology

Pursue applied ecological research on at the community-level.

There are 1 subthemes within this theme: 1) Community-level Analyses

### Community-level Analyses

**SUBTHEME GOAL:** Execute community-level analyses. 0 active, upcoming, stalled, or potential project(s) are/is related to this subtheme.

#### Projects

No projects anticipated in the near future

# Domain 2: Data Development

To support BAM's research, we assembled and now maintain a comprehensive database of avian and biophysical data. Where possible, we summarize our research in data products such as maps and derived data tables. We distribute our data products to scientists, managers, and other interested parties in external groups with the goal of supporting conservation and management of boreal birds.

There are 2 themes in this domain: 1) BAM Data; 2) Data Products

## Theme 2.1: BAM Data

BAM's research relies on our extensive avian and biophysical databases. We solicit and seek out new point-count and biophysical data, and then quality-check, maintain, and update our avian, biophysical, and other databases on an ongoing basis.

There are 3 subthemes within this theme: 1) BAM Avian Database; 2) BAM Biophysical Database; 3) Internal Data Requests

### BAM Avian Database

**SUBTHEME GOAL:** Once per year, we incorporate new point count data acquired over the past year, including regular submissions from existing Data Partners. We use statistical offsets to harmonize point count data from various different sources so that they can be used in the same analysis despite their different methods. Periodically, we recalculate these statistical offsets with improved methods and the current dataset. Our Avian Database currently includes data from the BBS, the Breeding Bird Atlas, and data from ARUs, as well as hundreds of surveys from single-year or long-term research projects. 4 active, upcoming, stalled, or potential project(s) are/is related to this subtheme.

#### Projects

|  |  |  |  |
| --- | --- | --- | --- |
| Project.Objective | Lead | Anticipated.Completion | Status |
| Build a database of spot-mapping data to be used in various model applications | Erin Bayne | 2016-12-01 | ACTIVE |
| Expand temporal and spatial extent of Avian Database with new point count data from BBS, off-road surveys, and Atlas data. Maintain the database through quality-checking and fixing of errors (ongoing) | Trish Fontaine | NA | ACTIVE |
| Determine how to integrate ARU data into the BAM Avian Database in a way that enables seamless inclusion of ARU data with traditional point count data in unified analyses. | Unassigned | 2017-01-01 | QUEUED |
| Evaluate the potential of other data sources such as eBird for model input | Unassigned | NA | QUEUED |

### BAM Biophysical Database

**SUBTHEME GOAL:** We maintain our database of remotely sensed, climatic, and other geospatial products to be used in our modelling efforts. We expand, quality-check, and maintain this database with new or updated versions of existing spatial products on a regular basis. 3 active, upcoming, stalled, or potential project(s) are/is related to this subtheme.

#### Projects

|  |  |  |  |
| --- | --- | --- | --- |
| Project.Objective | Lead | Anticipated.Completion | Status |
| Maintain CASFRI database by incorporating recently-acquired data into CASFRI (housed at U.Laval). Maintian current documentation and archive (ongoing). | Unassigned | NA | ACTIVE |
| Update and maintain BAM’s copy of CASFRI data, queried for all BAM points (ongoing). | Trish Fontaine | NA | ACTIVE |
| Expand and maintain a library of spatial covariates to be used in modelling (ongoing) | Trish Fontaine | NA | ACTIVE |

### Internal Data Requests

**SUBTHEME GOAL:** Receive, track, and serve requests for data by BAM team members. 1 active, upcoming, stalled, or potential project(s) are/is related to this subtheme.

#### Projects

|  |  |  |  |
| --- | --- | --- | --- |
| Project.Objective | Lead | Anticipated.Completion | Status |
| Track and process all requests for avian and geospatial data from BAM Team Members (ongoing). | Trish Fontaine | NA | ACTIVE |

## Theme 2.2: Data Products

Wherever relevant, we strive to produce data products as tangible and transferable outcomes from our research, to be used by other individuals and groups doing conservation and management activities. Examples include maps, population estimates, images, and scripts.

There are 1 subthemes within this theme: 1) Data Products

### Data Products

**SUBTHEME GOAL:** Produce spatial data (maps, etc), derived datasets (in tabular format), and interactive tools and web-apps that depict BAM research findings, and may inform othe research and conservation activities. 4 active, upcoming, stalled, or potential project(s) are/is related to this subtheme.

#### Projects

|  |  |  |  |
| --- | --- | --- | --- |
| Project.Objective | Lead | Anticipated.Completion | Status |
| Produce spatial data products (e.g., raster maps, polygon products) from BAM research (ongoing). | Trish Fontaine | NA | ACTIVE |
| Produce derived datasets in table format from BAM research (ongoing). | Trish Fontaine | NA | ACTIVE |
| We would like to create a version of the BAM database that can be publicly distributed. To do this, we will work with BAM data partners to determine parameters of the database that satisfy data-sharing agreements (e.g., summarized to some coarser spatial scale, etc). | Diana Stralberg | 2017-01-01 | QUEUED |
| Produce interactive tools and web-apps depicting BAM research findings or informating conservation activities (ongoing). | Trish Fontaine | NA | IDEA |

# Domain 3: Collaboration and Communication

BAM extends the application of our work by collaborating with external groups and by communicating our research findings in various means to academics, government and NGOs scientists and managers, and the general public.

There are 2 themes in this domain: 1) External Collaborations; 2) Communication

## Theme 3.1: External Collaborations

BAM supports conservation and management of boreal birds through the many partnerships we’ve developed within the research and conservation community.

There are 1 subthemes within this theme: 1) Supporting Collaborations

### Supporting Collaborations

**SUBTHEME GOAL:** In addition to our efforts in the Research domain, we also pursue conservation by participating in conservation initiatives led primarily by external groups. Depending on our available capacity, we dedicate time to maintaining and serving such collaborations, reviewing data requests against BAM policies, etc. 2 active, upcoming, stalled, or potential project(s) are/is related to this subtheme.

#### Projects

|  |  |  |  |
| --- | --- | --- | --- |
| Project.Objective | Lead | Anticipated.Completion | Status |
| Track and process requests received from people external to BAM (ongoing). | Nicole Barker | NA | ACTIVE |
| Establish, nurture, maintain, and track collaborative partnerships with other individuals, research groups, and organizations (ongoing) | Nicole Barker | NA | ACTIVE |

## Theme 3.2: Communication

Disseminate the knowledge gained through BAM’s research to assist in boreal bird conservation and management objectives. Audiences include the greater scientific community, the BAM Technical Committee, BAM Data Partners, NGOs, and government-based resource managers, among others. Modes of communication include publication in the peer-reviewed literature, hosting of targeted webinars, meetings, and workshops, giving presentations at conferences, and keeping the BAM website updated. Often, our research projects (above) are expected to culminate in a peer-reviewed paper. This theme concerns other modes of communication.

There are 2 subthemes within this theme: 1) Webinars and Conferences; 2) Online Presence

### Webinars and Conferences

**SUBTHEME GOAL:** Present BAM research at conferences, via talks, posters, symposia, and workshops. Engage with the TC via webinars. 3 active, upcoming, stalled, or potential project(s) are/is related to this subtheme.

#### Projects

|  |  |  |  |
| --- | --- | --- | --- |
| Project.Objective | Lead | Anticipated.Completion | Status |
| Organize the Conservation of Boreal Birds workshop and subsequent special features issue of ACE-ECO. The goal is to improve boreal conservation efforts by increasing awareness and by facilitating communication and collaboration among researchers, managers, and policymakers concerned with the conservation of boreal birds and their breeding habitats. | Nicole Barker | 2016-07-21 | ACTIVE |
| Organize the Conservation of Boreal Birds workshop and subsequent special features issue of ACE-ECO. The goal is to improve boreal conservation efforts by increasing awareness and by facilitating communication and collaboration among researchers, managers, and policymakers concerned with the conservation of boreal birds and their breeding habitats. | Nicole Barker | 2016-07-21 | ACTIVE |
| Participate at NAOC and NACCB conferences through talks, workshops, and symposia. | Nicole Barker | 2016-08-20 | ACTIVE |
| Participate at NAOC and NACCB conferences through talks, workshops, and symposia. | Nicole Barker | 2016-08-20 | ACTIVE |
| Maintain connections with TC members, keeping them up to date with BAM's work and conveying any TC concerns back to StCo | Nicole Barker | NA | ACTIVE |
| Maintain connections with TC members, keeping them up to date with BAM's work and conveying any TC concerns back to StCo | Nicole Barker | NA | ACTIVE |

### Online Presence

**SUBTHEME GOAL:** Improve BAM’s web presence by updating and revising the website, and improving methods to distribute and showcase BAM's research, data, and spatial and other data products (i.e., Data Basin). 4 active, upcoming, stalled, or potential project(s) are/is related to this subtheme.

#### Projects

|  |  |  |  |
| --- | --- | --- | --- |
| Project.Objective | Lead | Anticipated.Completion | Status |
| Execute day-to-day updates of website (ongoing) | Nicole Barker | NA | ACTIVE |
| Share BAM data products to encourage public awareness and support education and research on boreal birds (ongoing) | Trish Fontaine | NA | ACTIVE |
| Critically review the current BAM website and assess how to improve, restructure, edit, etc. to better suit the needs of BAM and its users. | Nicole Barker | 2016-11-01 | QUEUED |
| Improve awareness of BAM and BAM's research through our website, social media, and other means (ongoing) | Nicole Barker | NA | QUEUED |

# Domain 4: Project Management

All BAM activities are supported by essential project management tasks, including the creation and revision of long-term institutional structure and legacy, coordination of team members and work plans, and other administrative duties.

There are 3 themes in this domain: 1) Workplanning; 2) Legacy; 3) Funding

## Theme 4.1: Workplanning

Track BAM’s progress, from big picture planning to individual project objectives and tasks.

There are 1 subthemes within this theme: 1) Workplanning

### Workplanning

**SUBTHEME GOAL:** Determine what should be worked on in which order. Work with team members to develop their own sequence of project tasks. Update SharePoint to facilitate these objectives. 2 active, upcoming, stalled, or potential project(s) are/is related to this subtheme.

#### Projects

|  |  |  |  |
| --- | --- | --- | --- |
| Project.Objective | Lead | Anticipated.Completion | Status |
| Determine the BAM vision - what projects should BAM be working on in the near and longer-term future (annual)? | Nicole Barker | 2016-07-01 | ACTIVE |
| Determine the BAM vision - what projects should BAM be working on in the near and longer-term future (annual)? | Nicole Barker | 2016-07-01 | ACTIVE |
| Determine the BAM vision - what projects should BAM be working on in the near and longer-term future (annual)? | Nicole Barker | 2016-07-01 | ACTIVE |
| Create workplans for circulation to external partners, and a set of individualized workplans to guide team members' work (ongoing). | Nicole Barker | 2016-07-01 | ACTIVE |
| Create workplans for circulation to external partners, and a set of individualized workplans to guide team members' work (ongoing). | Nicole Barker | 2016-07-01 | ACTIVE |
| Create workplans for circulation to external partners, and a set of individualized workplans to guide team members' work (ongoing). | Nicole Barker | 2016-07-01 | ACTIVE |

## Theme 4.2: Legacy

Create standardized protocols, policies, and infrastructure (SharePoint, backed-up file folders) to ensure transparency, consistency, accuracy, and documentation in data sharing, collaborations, internal procedures, and all other aspects of project management.

There are 1 subthemes within this theme: 1) Institutional Archive, Policies, and Protocols

### Institutional Archive, Policies, and Protocols

**SUBTHEME GOAL:** Redesign and maintain BAM’s SharePoint site as a tool to facilitate other team tasks, e.g., tracking grant promises/deadlines, sharing/collaborating on files, and workplanning. Establish and describe protocols and policies for external and internal data requests, project approval and lifecycle, etc. 3 active, upcoming, stalled, or potential project(s) are/is related to this subtheme.

#### Projects

|  |  |  |  |
| --- | --- | --- | --- |
| Project.Objective | Lead | Anticipated.Completion | Status |
| Create a system and workflow for tracking requests and collaborations, ensuring following up and delivery on promises | Nicole Barker | 2016-08-01 | ACTIVE |
| Review, update, edit, and finalize BAM’s Policy and Procedures related to data sharing | Nicole Barker | 2016-08-01 | ACTIVE |
| Build new architecture, revise old SharePoint structure, clean files, and teach team members how to navigate the site (ongoing) | Nicole Barker | NA | ACTIVE |

## Theme 4.3: Funding

Apply for funding, track promises made to various agencies, and write interim and final reports to agencies.

There are 1 subthemes within this theme: 1) Acquire New Funding and Manage Existing Funding

### Acquire New Funding and Manage Existing Funding

**SUBTHEME GOAL:** Seek out and apply for funding. Manage existing grants and funding sources, including annual reporting. 2 active, upcoming, stalled, or potential project(s) are/is related to this subtheme.

#### Projects

|  |  |  |  |
| --- | --- | --- | --- |
| Project.Objective | Lead | Anticipated.Completion | Status |
| Write grant proposals to solicit funding from applicable agencies (e.g., ECCC, NSERC, Mitacs, SFI, NMBCA) (ongoing). | Nicole Barker | 2016-09-01 | ACTIVE |
| Track promises made for active grants and associated deadlines. Write interim and final reports and submit to granting agencies (ongoing). | Nicole Barker | 2017-03-31 | ACTIVE |

# Acronyms and Terminology

Acronyms used in this document

|  |  |
| --- | --- |
| Acronym | Meaning |
| ABMI | Alberta Biodiversity Monitoring Institute |
| AlPac | Alberta Pacific Forest Industries Ltd. |
| BAM | Boreal Avian Modelling Project |
| BBS | Breeding Bird Survey |
| BCR | Bird Conservation Region |
| BTNW | Black-throated Green Warbler |
| CAS | Common Attribute Schema |
| CASFRI | Common Attribute Schema for Forest Resource Inventory |
| CAWA | Canada Warbler |
| CBFA | Canadian Boreal Forest Agreement |
| COFI | Council of Forest Industries |
| CONI | Common Nighthawk |
| CONW | Connecticut Warbler |
| COSEWIC | Committee on the Status of Endangered Wildlife in Canada |
| CRD | Collaborative Research and Development Grant |
| ECCC | Environment and Climate Change Canada |
| EDR | Estimated Detection Radius |
| FRI | Forest Resource Inventory |
| GFW | Global Forest Watch |
| GLM | Generalized Linear Model |
| JOSM | Joint Oil Sands Monitoring |
| LCC05 | Land Cover of Canada 2005 |
| NMBCA | Neotropical Migratory Bird Conservation Act |
| NSERC | Natural Sciences and Engineering Research Council of Canada |
| OSFL | Olive-sided Flycatcher |
| PIF | Partners in Flight |
| RUBL | Rusty Blackbird |
| SAGD | Steam assisted gravity drainage |
| SAR | Species at Risk |
| SFI | Sustainable Forestry Initiative |
| SPG | Strategic Partnership Grant |
| TC | Technical Committee |
| U.Alberta | University of Alberta |
| U.Laval | Université Laval |
| WEWP | Western Wood-Pewee |
| ZIP | Zero-inflated Poisson Model |
| QPAD | P (prob. singing) Q (prob. detected) Area Distance approach to estimate density |

Meaning of different project statuses

|  |  |
| --- | --- |
| Status | Meaning |
| ACTIVE | The project has been started. A lead has been identified, the purpose and scope of the project has been articulated. The project has been worked on in the last 6 months. |
| PENDING | A project where all research has been completed and only the final write-up / publication remains. It may also indicate projects where manuscripts are under review with journals. |
| QUEUED | The project is promised on a grant, has been discussed, and we have explicit plans to complete it in the future. We are waiting for someone to finish other work before switching to it, or we're waiting for someone to volunteer to lead the project. |
| STALLED | A project that was started but that hasn't progressed in the past 6 months. |
| IDEA | A project idea that has been discussed or proposed but does not have explicit plans or deadlines associated with it. Initiation of this project may be contingent on grant success, and at minimum requires Steering Committee approval. |