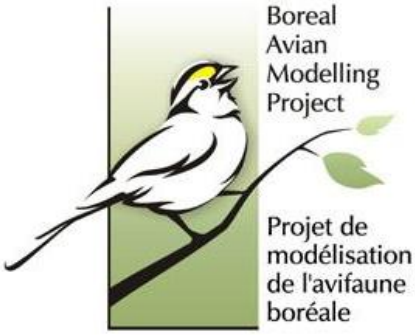

Data Policies and Request Procedures

MARCH 2017

1 EXECUTIVE SUMMARY

This document outlines policies of the Boreal Avian Modelling Project (hereafter BAM) regarding fair, consistent, and transparent use and distribution of *data* and *data products*.

BAM was established in 2004 to address critical knowledge gaps challenging the management and conservation of boreal birds in Canada. BAM's analyses draw on a powerful database created by collating and harmonizing *data* from individual research and monitoring efforts conducted in the Canadian and US boreal & hemi-boreal forest.

The policies presented here encompass *data* contributed to BAM as well as *data products* produced and shared as results of BAM analyses. These policies also cover procedures for submitting and approving requests for *data* and *data products*, for determining authorship of publications that use Project-related *data* and *data products*, and for appropriately acknowledging BAM products in projects with *collaborators*. This document will be updated from time to time reflecting relevant changes in project governance and activities.

See section 11 for definitions of italicized terms.

1.1 Overview of key points

- BAM's over-arching mission is to support the conservation and management of boreal birds via a data-driven and model-based understanding of their ecology (section 3.1.1).
- BAM's *Project Team* is a diverse combination of academics, government scientists, Project staff, and graduate students. BAM is also connected to *Data Partners*, a *Technical Committee*, and *collaborators* (section 3.3).
- BAM has created a large, harmonized Avian Database from point-count survey and automated recording unit *data* submitted to BAM (section 4).
- BAM seeks to protect *Data Partner* interests in all uses of their *data* contributed to BAM:
    - Use of *data* contributed by *Data Partners* to BAM is governed by existing data-sharing agreements (section 4.1.1);
    - BAM *Team Members* have access to the BAM Database to pursue BAM projects (section 4.1.1);
    - BAM does not currently entertain requests for the full dataset from *Outside Parties*;
    - Subsets of raw *data* will not be shared outside BAM unless it they are to be used in a highly *collaborative* project (section 4.1.4) that is consistent with *Data Partner* interests (section 4.1.1), and

follows any restrictions regarding spatial extent or purpose of the intended research (sections 4.1.2 and 4.1.3); this includes the publication of *data* to accompany scientific journal articles (section 4.2).

- BAM produces *data products* via research and analysis of the BAM Avian Database (section 5); these products are available for use by academics, managers, and other conservationists. Many are publicly available on the BAM website (www.borealbirds.ca) or Data Basin portal (borealbirds.databasin.org), and others may be requested from BAM.
- Requests for *data* and *data products* follow a similar process (section 6).
    - Step 1. A proposal is submitted
    - Step 2 and 3. The proposal screened, then evaluated against several criteria
        - *Collaborative* intent of project
        - Project objectives
        - Adherence to *Data Partner* constraints
        - Spatial extent
        - BAM team capacity
    - Step 4. The proposal is granted or turned down. The proposal may be revised and resubmitted.
    - Step 5. If granted, a collaboration and data-sharing agreement is established
- For all collaborations, a collaboration agreement outlines accountability of *collaborators* to BAM and vice versa, *Metadata* and/or methods used to obtain the *data*/ *data products*, and suggested text to ensure appropriate attribution and credit (section 7).
- BAM expects individuals and BAM itself to receive appropriate credit during *collaborative* projects and when BAM *data products* or *data* are used (section 7).
- BAM expects all authors on a paper or presentation to have contributed significantly to the work, and that the order of authorship reflects their contribution (section 8).
- Detailed recommendations for citing BAM *data products* are described in section 9.
- BAM is currently outlining a possible new framework for data requests (section 10).

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3 INTRODUCTION

3.1 BAM History and Mission

The Boreal Avian Modelling Project (BAM) was established in 2004 to address critical knowledge gaps challenging the management and conservation of boreal birds in Canada. Recognizing the potential for model-based approaches to fill those gaps, BAM develops predictive statistical models to address the ecology, management, and conservation of boreal birds.

BAM's work draws on a powerful database created by collating and harmonizing *data* from individual research and monitoring efforts conducted in the Canadian and US boreal & hemi-boreal forest, in conjunction with an extensive library of regional and national *biophysical data*. Using these *data*, we develop statistical models of avian distribution, abundance, and habitat relationships at regional, national, and international scales. Models are used to understand the drivers of bird populations and predict the responses of species populations to environmental factors, including effects of human activities that alter or convert forest habitats.

The results of our quantitative analyses are positioned to inform a range of management actions including conservation planning, identification of priority habitats, environmental assessments, monitoring efforts, and regulatory requirements associated with the management of migratory birds. In recent years, we have produced *data products* that are applied to many aspects of boreal bird management and conservation, including migratory bird monitoring, population estimation, habitat determinations, assessment and recovery planning for Species at Risk (SAR), environmental assessment, identification of priority wildlife areas, protected areas design, and land-use planning.

3.1.1 BAM Objectives

1. ASSEMBLE, harmonize, archive, and maintain the most complete and current repository of spatially-referenced *avian abundance data* for boreal birds, and provide standards for abundance sampling and *data* management protocols.
2. DEVELOP or refine statistical methods to analyze these *data*, to:
    3. PROVIDE reliable information on boreal bird distributions, abundances, trends, and habitat associations;
    4. FORECAST population consequences of human activities and climate change in the context of natural disturbances;
    5. CONTRIBUTE to conservation, management, and monitoring of boreal avifauna and their habitats.
6. BUILD SUPPORT for avian conservation in academia, industry, governments, NGOs, and the public.
7. ENCOURAGE further development and testing of boreal bird population models by generating testable hypotheses about key mechanisms driving observed patterns.
8. ENCOURAGE public awareness and support education by providing accessible scientific information regarding boreal bird populations.

3.2 Need for Policies and Procedures

BAM's Avian Database includes data from over 150 projects. While many of these datasets are publicly-available, many are not. When Data Partners contribute data from their individual research projects to the BAM dataset, they typically communicate expectations about how the data can and cannot be used. *Data Partners* retain *intellectual property* rights over their *data* and BAM must provide careful stewardship of those *data*. However, as has become apparent since the project's inception, potential applications of the *data* accumulated by BAM extend beyond the expectations initially communicated by many *Data Partners*. Further, BAM has received several requests from people with varying degrees of connection to the *BAM Team* for access to all or part of the BAM database.

Beyond *data*, BAM's analyses have produced many *data products* that may aid conservation and management initiatives. Capacity-permitting, we make these products available on an online data portal. However, online updates lag behind *data products* production, and we regularly receive requests for *data products* that are not yet available online.

This document establishes policies and a systematic procedure for submitting assessing requests, and it outlines conditions under which BAM will share assembled and archived *data*, derived *data products*, and other information. The purpose of these policies and procedures is to ensure that collaborations, publications, or presentations involving BAM adhere to consistent and transparent approaches that are fair to *Data Partners*, BAM *Team Members*, and those collaborating with BAM.

The policies and procedures described herein reflect the currently-used process. See section 10 for a description of our future vision for data sharing.

3.3 Structure of the BAM Team

The BAM *Project Team* is comprised of academic researchers and government scientists, project staff, and graduate students. BAM collaborates with federal and provincial governments, academics, industry, and non-governmental organizations (NGOs) with interests in the development and application of science to support bird conservation and management. The *collaborative*, international nature of BAM is reflected in its structure (**Error! Reference source not found.**).

Project Team Members are those leading or collaborating on one or more studies on BAM's workplan, and are also active, ongoing contributors to the scientific development and implementation of BAM. The following list of *Team Members* is current to March 31, 2017.

3.3.1 Steering Committee

Steering Committee Members are responsible for Project oversight, and have decision-making power on collaborations, *data* use and sharing, and project scope.

- Erin Bayne, Professor, University of Alberta
- Steve Cumming, Associate Professor, Université Laval
- Fiona Schmiegelow, Professor, University of Alberta
- Samantha Song, Manager, Wildlife and Habitat Assessment Section, Canadian Wildlife Service, Environment and Climate Change Canada

3.3.2 Project Staff

Staff members are employed by the University of Alberta to support BAM in specific capacities.

- Nicole Barker, Coordinating Scientist, University of Alberta
- Trish Fontaine, Database Coordinator, University of Alberta
- Peter Solymos, Biostatistician, University of Alberta
- Diana Stralberg, Ecologist, University of Alberta

3.3.3 Post-doctoral Fellows

Post-doctoral fellows are typically hired to complete specific projects on the BAM workplan, and are directly supervised by one or more Steering Committee members. Individuals may also approach BAM with financial support and project ideas.

- Lionel Leston, Forest management impacts, University of Alberta
- Alberto Suarez-Esteban, Land-use impacts, University of Alberta
- Francisco Denes, Habitat for Species at Risk, University of Alberta
- TBD, Avian models to support landscape simulation, University of Alberta

3.3.4 Graduate Students

Graduate students have one or more of the *Steering Committee* Members on their committees, typically as a Supervisor. The research project is relevant to BAM objectives.

- Tara Stehelin, PhD candidate with Fiona Schmiegelow, University of Alberta

3.3.5 Contributing Scientists

Contributing Scientists are active members of BAM, participating from his or her existing position. They attend weekly meetings, actively contribute to discussions regarding BAM projects, and participate in research collaborations with other BAM *Team Members* in their specific areas of interest. They are not financially supported by BAM. Examples include scientists from government agencies whose time spent on BAM projects constitute in-kind contributions from those agencies.

- Samuel Haché, Landbird Biologist, Environment and Climate Change Canada
- C. Lisa Mahon, Regional Program Wildlife Habitat Biologist, Environment and Climate Change Canada
- Steve Matsuoka, Research Wildlife Biologist, US Geological Service Alaska Science Center
- Judith Toms, Wildlife Biologist, Environment and Climate Change Canada
- Steve Van Wilgenburg, Boreal Ecologist, Environment and Climate Change Canada
- Alana Westwood, Avian Ecologist, Independent

3.4 Interacting with BAM

There exist several means of interacting with BAM, depending on the duration, level of engagement, and potential for mutual benefits. The following list highlights the most common forms, though we note that many situations encompass multiple roles.

3.4.1 Technical Committee

The *Technical Committee*, composed of established avian researchers across boreal North America, serves to provide independent scientific advice to BAM.

- Marcel Darveau, Ducks Unlimited Canada / Université Laval
- André Desrochers, Université Laval
- Pierre Drapeau, Université du Québec à Montréal
- Charles Francis, Environment and Climate Change Canada
- Colleen Handel, United States Geological Survey
- Keith Hobson, Environment and Climate Change Canada
- Craig Machtans, Environment and Climate Change Canada
- Julienne Morissette, Ducks Unlimited Canada
- Gerald Niemi, University of Minnesota – Duluth
- Rob Rempel, Ontario Ministry of Natural Resources / Lakehead University
- Stuart Slattery, Ducks Unlimited Canada
- Phil Taylor, Acadia University
- Lisa Venier, Canadian Forest Service
- Pierre Vernier, University of Alberta / Boreal Ecosystems Analysis for Conservation Networks
- Marc-André Villard, Université de Moncton

3.4.2 Collaborations

Where conservation and scientific priorities align, BAM forms ad hoc collaborations with outside researchers or managers based in universities and other research institutions, or in Aboriginal, non-governmental, and government agencies responsible and/or concerned for the conservation of boreal birds in the Americas.

3.4.3 Use of BAM Data Products

Various products resulting from BAM's research are available for application to conservation and management of boreal birds. See section 6 for more details.

3.4.4 Users of BAM Expertise

At times, BAM *Team Members* are contacted for advice on specific ecological, methodological, or applied problems. Reasonable efforts will be made to respond to requests for information or advice from BAM *Team Members* or the team as a whole to inform conservation of boreal birds. However, ultimately the ability to respond to such requests are subject to the capacity of the BAM Team. See section 6 for more details.

3.4.5 Data Partners

BAM relies on *Data Partners*, academic researchers, government agencies (including crown corporations), non-governmental organizations, consultants, and private-sector corporations from across Canada, Alaska, and the hemiboreal region of the northern US that have contributed *data* to BAM database. Most of the members of the *Technical Committee* and BAM *Team* have also contributed *data* and thus are also *Data Partners*. *Data Partners* includes both individuals and the institutions they represent.

The complete list of Data Partners is on the BAM website:
http://www.borealbirds.ca/index.php/data_partners

4 AVIAN DATA

This section of the policy aims to:

- clarify the intentions of the BAM *Steering Committee* with respect to the uses of *data* contributed to BAM by *Data Partners*; and
- outline BAM's protocols to protect the interests of *Data Partners*.

Data refers to avian *Point Count Data* ,whether collected by humans or by automated recording units, that are submitted by *Data Partners* to BAM and integrated into the standard BAM Avian Database format.

4.1 Access to the BAM Avian Database

Access to the BAM Avian Database depends on who is conducting the research, the spatial extent of the research, the purpose of the research, and the extent of collaboration.

4.1.1 Who is Conducting the Research

All BAM *Team Members* have access to the BAM Database to pursue projects initiated by the BAM Team and approved by the BAM *Steering Committee*.

Data Partners may request copies of their contributed datasets at any time. This may occur, for example, should the *Data Partner*'s own copy be lost or corrupted. *Data Partner*(s) may also wish to request their dataset(s) after harmonization into the standard Avian Database format. The supplementary information added to raw datasets may facilitate unification with datasets collected using other methods.

Potential *collaborators* must submit a formal *data* request (see section 6), and their projects must meet other conditions listed below. All *data* in the BAM Avian Database are governed by prior data-sharing agreements with Data Partners that may constrain the use and distribution of the contributed *data*. If a data-sharing agreement does not explicitly give permission to redistribute *data*, BAM will not redistribute *data* to a third party without obtaining permission from relevant Data Partner(s).

In general, the *BAM Team* has a very limited capacity to act as a *data* clearing house and has a duty to restrict how frequently our Data Partners receive requests for additional permissions.

4.1.2 The Spatial Extent of the Research

Studies using the full dataset at national extent do not require an additional filter.

Studies using spatial subsets of the *data* that meet the below conditions require the corresponding actions before the study can be conducted. *Steering Committee* will decide whether a given subset meets each condition based on a project proposal, exploratory *data* query, and any follow-up conversation with the project lead.

These steps are put into place to avoid duplicating research intended by *Data Partners*.

<table>
<tr><th>Condition</th><th>Action</th></tr>
<tr><td>The proposed analysis is conducted at the same or smaller geographic extent as a given local-scale study was conducted.

EXCEPTION: Steering Committee-sanctioned studies intended to account for the effects of sample design and sampling protocols within the entire BAM database.</td><td rowspan="2">Permission is obtained from the appropriate Data Partner(s). In addition, the Data Partner(s) will be given the opportunity to participate as co-investigators and/or authors, as per the authorship policy outlined in section 8 of this document.</td></tr>
<tr><td>Contributions from individual Data Partners constitute a significant portion of the data subset.

AND

The proposed analyses rely on specific characteristics of those contributions (e.g., sampling protocol, year, geographic location, or distribution of sampled habitats)</td></tr>
</table>

The proposed analysis is dependent on any specific *data* contribution to the extent that the result could not be published without access to that *data*.	

4.1.3 The Purpose of the Research

All projects initiated by the BAM Team and approved by the BAM *Steering Committee* can use the BAM Avian Database. Examples include: demography, annual variability, comparisons of habitat use among regions, detailed analyses of species at risk, climate change impacts, population or trend estimation, or analyses to facilitate regional land-use planning exercises such as forest management and spatial prioritization. These projects are described in BAM publications and reports that are posted on the BAM Website (www.borealbirds.ca/library/index.php/technical_reports).

Methodological: At times, BAM conducts methodological studies to develop statistical approaches to permit research on our workplan, e.g., accounting for differences in sampling protocols between *data* sources and to model detection probability (Sólymos et al. 2013). Such analyses are usually conducted by BAM *Team Members* working under *Steering Committee* supervision. However, in certain cases, the team may also work with *collaborators* from the statistical sciences community to develop or apply new methods to facilitate specific analyses. Such partnerships may use BAM *data* to validate the methodologies, but not to present explicit findings about boreal birds as such. Publications of such analyses will follow the authorship guidelines stated in section 8 of this document.

Conservation: Requests from potential *collaborators* to access BAM *data* will be considered if the goals of proposed project are consistent with BAM's overall mission and objectives (section 3.1.1). That is, they must contribute to boreal bird conservation and management or their habitats.

4.1.4 The Extent of Collaboration

Collaborative: Requests from potential *collaborators* to access BAM *data* will be considered if accompanying research project is *collaborative* in intent, with explicit involvement of one or more BAM *Team Members* during the planning, analytical, and writing stages.

4.2 Use of Data in Open Data Journal Publications

BAM recognizes the value of open *data* journals for improving access, integrity, and transparency of scientific research. These journals often require publication of *data* used in analyses, and may conflict with data-sharing agreements between BAM and *Data Partners*.

If any *Team Members* seek to publish research in an open *data* journal, BAM will ensure that data-sharing agreements are held paramount. Raw *data* will not be published without permission from *data* owners. *Data* will be released in aggregate, the spatial and temporal scale at which will be decided upon in collaboration with *Data Partners* as part of the revision of this data policy (see section 10). In cases where a suitable compromise cannot be achieved between *Data Partners* and journal requirements, BAM will seek alternate journals for publication.

4.3 Relationship Between BAM and Data Partners

The *BAM Team* wishes to ensure that *data* and *Data Product*s are shared and used fairly and appropriately. In a few cases, official data-sharing agreements have been signed between *Data Partners* and BAM, as represented by the *Steering Committee* acting on behalf of their home institutions. However, in most cases, the arrangements are

informal (e.g., an email record of mutual agreement to terms of use). The guidelines above aim to provide assurance of fair and appropriate *data* use in the absence of explicit and formal data-sharing agreements.

4.4 Submitting Avian Data to the BAM Database

We have established data-sharing agreements with over 50 partners, including boreal researchers from academic institutions, consulting firms, federal and provincial agencies, non-governmental organizations, and companies in forest products, mining and energy sectors. For a full list of our *Data Partners*, see our website.

At present, we welcome submissions of *Point Count Data*. This includes *data* from automated recording units that have been processed following a point count-like protocol. The steps to submit *data* are:

1. The potential *Data Partner* contacts the BAM Database Manager to express interest.
2. Via follow-up emails, the Database Manager confirms that the *data* meet certain basic requirements (e.g., GPS coordinates at a minimum, date and time preferred, sampling radius and sampling duration if available).
3. Data-sharing conditions are discussed and may be formalized in an agreement (see section 10).
4. The *Data Partner* transfers the *data* files and associated *Metadata* to the Database Manager.
5. Subsequent email conversation may occur as the Database Manager processes and integrates the *data* into the BAM Avian Database.

5 BAM DATA PRODUCTS

*Data Product*s are outputs from BAM research. They can be tabular, spatial *data* (e.g., rasters), or images such as maps or other figures. The most recent and comprehensive list of spatial *Data Product*s is included in our annual report from each year (posted to our website). Tabular and image *Data Product*s are displayed in species-specific results on our website.

Intent and Usage: BAM *Data Product*s are intended for wide application in avian science, conservation, and management. They may be used in analyses or may be presented as-is or in derived products (e.g., presentations, manuscripts, websites, etc).

5.1 Obtaining BAM Data Products

Products are usually publicly available via the BAM Project website or the Data Basin portal as primary venues. If a product is finalized and available online, it may be downloaded without submitting a formal request. If a given product is not available online, interested parties may submit a formal request (section 6). This applies to *Interim Data Product*s and *Final Data Product*s that are not currently publicly available.

5.2 Acknowledgement

We request that any use of our *Data Product*s is accompanied by appropriate acknowledgement, as described below (section 9). For publicly-available *Data Product*s, we have no way of enforcing this and rely on the users to follow these recommendations. For *Data Product*s that are not publicly available, *collaborators* must accept all conditions with respect to opportunities for authorship, acknowledgements in all resultant publications, and redistribution of *data* (as per section 7).

6 FORMAL REQUESTS

6.1 General Principles:

Our data request process is currently under revision, but the summary below represents our current policies, procedures, and decision-making process. Our vision of a future data request system will provide more transparency to data users and more control to the data partners – see section 10 for further.

1. Currently we do not entertain requests for the entire database.
2. Decisions regarding requests are made by the *Steering Committee* or its delegate, with the assistance of the broader *Technical Committee* if required.
3. BAM's ability to consider a proposal will be subject to the capacity of the Coordinating Scientist, Database Manager, and *Steering Committee*.
4. Individual *Steering Committee* and BAM *Team Members* are also required to submit formal requests when pursuing research projects that are part of individual programs related but external to BAM.

6.2 Request Procedure

The process for submitting and reviewing a request for *data*, *Data Product*s, or a collaboration is described in detail below, and summarized in

Figure 1.

6.2.1 Step 1: A proposal is submitted

A formal request is initiated when the requester submits a proposal to the BAM Coordinating Scientist. The proposal should be 1-2 pages, succinctly addressing the following items. Point form notes can be used:

1. Individuals involved in the study/project.
2. Geographic scope of the study/project.
3. Objectives of and rationale for the study/project.
4. Contribution and application of the study/project to boreal bird conservation and management.
5. Expected products of the study/project, including those that would be available to end-users managing boreal birds or their habitats.
6. Timelines, including delivery dates for products.
7. Project resources available to the BAM team (e.g., funded researchers or student positions; supporting grants held or applied for; institutional support).
8. Details of the request (e.g., species, *data* type, and timeframe for *data*, type of *Data Product*, or nature of collaboration, etc).
9. A BAM *Project Team Member* who will act liaison between *collaborators* and BAM.
10. The requested level of support or involvement from the BAM *Project Team* beyond simple provision of *data* or *data products*.

If clarification or additional detail is required for any of the questions, the requester will be asked for more information.

6.2.2 Step 2: The proposal is screened and categorized

The Coordinating Scientist classifies the request based on its type (*data*, product, collaboration), the spatial extent (and contribution of single datasets to the subset), and the nature of the research (conservation intent, *collaborative*). This step may require exploratory queries to the BAM Database to identify whether the *data* meet certain conditions (e.g., those described in section 4.1.2). If the request meets minimum requirements, it is brought to the *Steering Committee* for further review.

6.2.3 Step 3: The proposal is reviewed

The *Steering Committee* reviews the proposal against established criteria (below), making all reasonable attempts to respond in a timely fashion. Due to time constraints, proposals with high conservation and/or science impact may be prioritized. During their review, the *Steering Committee* may seek advice from the BAM *Technical Committee*, or consult with appropriate *intellectual property* offices.

Decision-making criteria include:

1. Objectives are consistent with the BAM mission without duplicating efforts (applies to all requests, except where noted):
    a. The proposed work should address a specific research question rather than simply assemble another database (applicable to *data* requests).
    b. The proposed work should provide and disseminate scientific findings that support the conservation of boreal birds. (see section 3.1.1)
    c. BAM is a not-for-profit research project that is intended to broadly benefit avian science and conservation. As such, requests for *data* or *Data Product*s from for-profit enterprises will be

entertained only when the primary motive for the request is conservation. Requests to support work with profit as a primary motive will not, in general, be entertained.

d. The proposed work should not duplicate or conflict with existing or proposed BAM efforts as stated in BAM workplan current at the time of proposal submission.

2. Adheres to *Data Partner* constraints (applies to requests for *data*):
    a. Does the proposal comply with or fit under existing data-sharing agreements between BAM and *Data Partners* that govern the specific *data* requested by the potential *collaborator*?
        i. If not, the potential *collaborator* may contact the *Data Partners* directly for permission to use the *data* as proposed. The potential *collaborator* is responsible for contacting individual *Data Partners* to obtain explicit permission for any *data* use. Approvals from *Data Partners* are forwarded to the Database Manager and Coordinating Scientist.
3. Sufficient capacity:
    a. Does the BAM *Project Team* have sufficient capacity to fulfill the proposal?

6.2.4 Step 4: Proposed request is granted or turned down

If the proposal satisfies all criteria, the proposal is granted and the *collaborator* is notified.

If the proposal required individual approval from *Data Partners*, the potential *collaborator* will forward all written approvals to the BAM Database Manager, who will verify them for completeness. The request is then approved.

If the proposal does not meet one or more of the above criteria, the proposal is turned down. The *Steering Committee* will specify why a proposal is not accepted. If appropriate, the potential *collaborator* may choose to modify the proposal and resubmit it. If not, the project does not proceed.

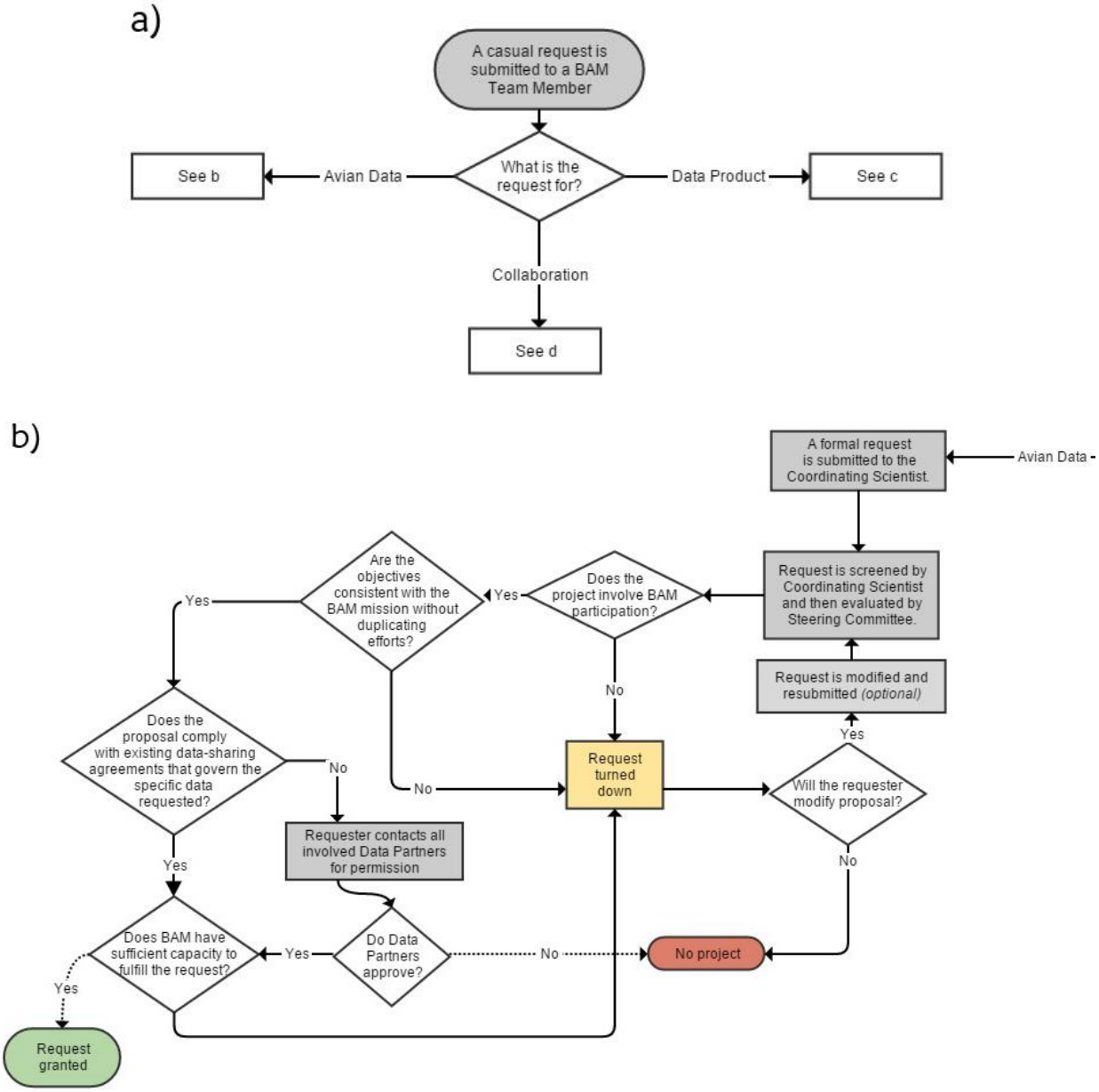
6.2.5 Step 5: Collaboration / data-sharing agreement is established

A collaboration agreement between the *collaborator* and BAM is established, describing conditions with respect to opportunities for authorship, acknowledgements in all resultant publications, and redistribution of *data* (see section 7). This document will also provide *Metadata* where applicable to requested *data* or *Data Product*s.

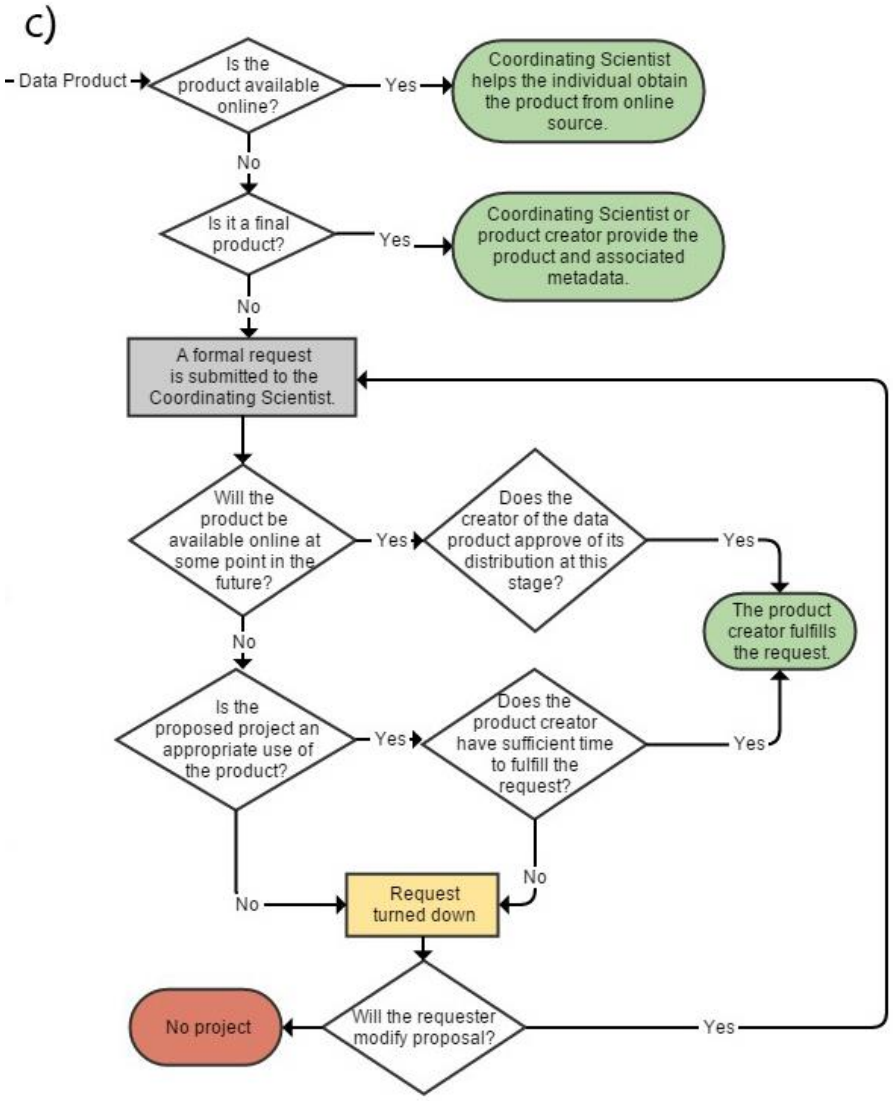
For publicly available *Data Product*s, a collaboration agreement is not strictly required, but may be created to summarize *Metadata* and suggested citations for the *Data Product*s.

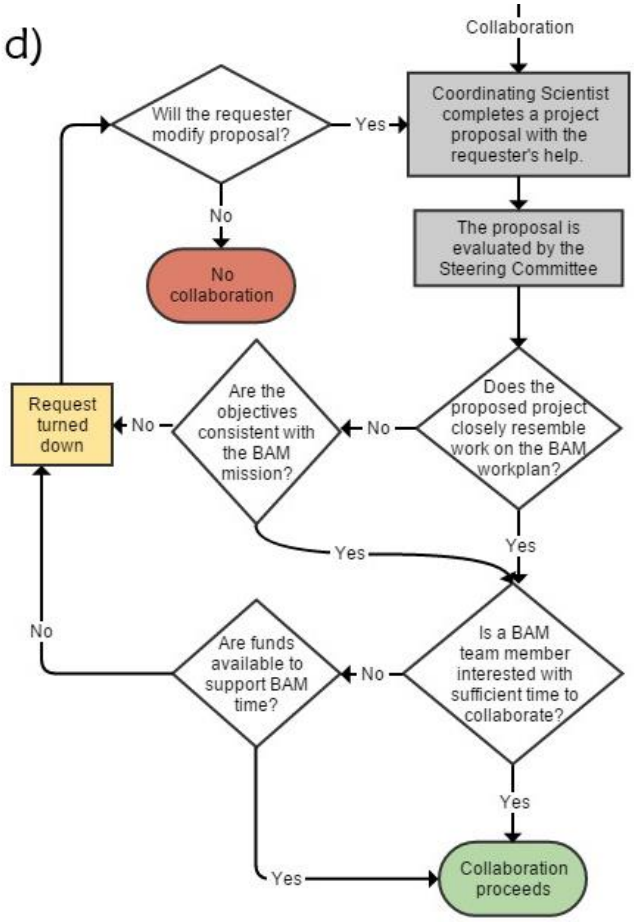
The release of *data* will be conditional on a signed Collaboration Agreement. The Database Manager arranges transfer of *data* or *Data Product*s to the *collaborator*. A BAM *Project Team Member* will be identified as a formal liaison between BAM and the *collaborators*.

Figure 1. *Process of submission and assessment of requests to BAM. Figure a shows the start of the request process, while b, c, and d, show the specific process for requests for data, data products, and collaborations, respectively. The process for a request for BAM expertise follows the same procedure as for a collaboration.*



c)


Data Product
Is the product available online?
Yes
Coordinating Scientist helps the individual obtain the product from online source.
No
Is it a final product?
Yes
Coordinating Scientist or product creator provide the product and associated metadata.
No
A formal request is submitted to the Coordinating Scientist.
Will the product be available online at some point in the future?
Yes
Does the creator of the data product approve of its distribution at this stage?
Yes
The product creator fulfills the request.
No
Is the proposed project an appropriate use of the product?
Yes
Does the product creator have sufficient time to fulfill the request?
Yes
No
No
Request turned down
Will the requester modify proposal?
Yes
No project


d)
Collaboration
Coordinating Scientist completes a project proposal with the requester's help.
Will the requester modify proposal?
Yes
No
No collaboration
The proposal is evaluated by the Steering Committee
Does the proposed project closely resemble work on the BAM workplan?
No
Are the objectives consistent with the BAM mission?
No
Request turned down
Yes
Yes
Is a BAM team member interested with sufficient time to collaborate?
No
Are funds available to support BAM time?
No
Yes
Yes
Collaboration proceeds

7 TERMS OF A COLLABORATION AGREEMENT

7.1 Background

A Collaboration Agreement is required for all approved uses of BAM Project *data*, and for approved uses of specialized *Data Product*s that are not available through the BAM website.

Parts 7.2 and 7.3 outline the terms of these agreements and the respective responsibilities and accountabilities of BAM members and *collaborators*.

7.2 Accountability of Collaborators to BAM

If the *Steering Committee* approves a proposal to use BAM *data* or specialized *Data Product*s, the *collaborator* will agree to adhere to the conditions of the established Collaboration Agreement as detailed below:

1. Ensure that *data* are securely stored and are not distributed for use to individuals/parties outside of the agreement without explicit permission from the *Steering Committee*. *Data* may only be used for purposes stated in the proposal and subsequent Collaboration Agreement.
2. Notify BAM liaison and BAM Spatial Database Manager of any errors or inconsistencies detected in the dataset provided to the *collaborator* (s).
3. Provide regular progress reports to BAM liaison, where written reports will be submitted annually (at minimum) and verbal or email contact will be made quarterly (at minimum).
4. Update BAM liaison to significant changes to project scope, objectives, timelines, outcomes, and end products.
5. Provide copies of resulting reports or peer-reviewed publications to BAM. BAM may use these materials in communications and/or funding materials such as grant proposals, reporting, and the BAM website.
6. Acknowledge the role of BAM in all communications, including peer-reviewed publications, presentations and websites, while adhering to the authorship conditions in section 9 of this policy.
7. Ensure that results of the study are useful to individuals or organizations directly involved in the management and conservation of boreal birds. Where possible, provide results in a database or map format that can be uploaded onto BAM website.

BAM describes active and completed collaborations in our annual reports, posted to our website (http://www.borealbirds.ca/library/index.php/technical_reports).

7.3 Accountability of the BAM Project Team to the Collaborative Research Study

The BAM *Project Team*, including the identified BAM Project liaison and other participants, will agree to:

1. Participate in the *collaborative* study in a timely manner, including prompt review of received proposals or documents (subject to *Project Team* time and capacity).
2. Assist *collaborators* in accessing large, complex datasets from BAM databases, including *data* retrieval, *data* analysis and in some case, database management (e.g., permissions).
3. Provide guidance on how results can be delivered to BAM in a useful form.
4. Ensure that all potential authors receive adequate notification of publication opportunities.
5. Circulate final versions of all publications to *collaborators*.

6. Deliver results or tools developed through the *collaborative* study via BAM Project mechanisms, such as the BAM website or announcements to partners.

8 THE BAM AUTHORSHIP POLICY

8.1 Background

The BAM authorship policy aims to ensure that publications based on BAM *data* or subsets of BAM *data* follow fair and consistent practices for determining authorship. The BAM authorship policy draws upon standards and guidelines developed by professional organizations and scientific journals as well as similar authorship policies used within other *collaborative* scientific entities, including:

- Ecological Society of America http://www.esa.org/esa/about/governance/esa-code-of-ethics.
- Journal of the American Medical Association (JAMA) http://jama.jamanetwork.com/public/InstructionsForAuthors.aspx.
- International Committee of Medical Journal Editors (ICMJE) http://www.icmje.org/recommendations/browse/roles-and-responsibilities/defining-the-role-of-authors-and-contributors.html.
- TropiDry Research Network http://tropi-dry.eas.ualberta.ca/pdf/Front/authorship_signed.pdf.

8.2 Components of Authorship

We recognize four components of authorship for peer-reviewed journals, technical reports, and other attributed publications:

1. ***Research Design and Management***: includes conceptualizing a specific hypothesis or specific question to be tested; deciding on and drafting the structure and methods for the research; directing pilot testing.
2. ***Research Execution and Data Collection:*** includes compiling measurements, observations, responses, or other quantifiable information sources; contributing new analytical tools.
3. ***Data Analysis and Interpretation:*** includes assessing the precision, accuracy, and relevance of the *data* and statistical analyses; reviewing literature for supporting and contradictory evidence; interpreting *data*.
4. ***Manuscript Preparation:*** entails contributing significant intellectual and textual content in the form of drafts or critical revisions to the manuscript, including organization, layout, selection of outlet, correspondence with editors, addressing reviewers' comments, approving the final version before publication.

8.3 Author Responsibilities

Each author should have participated sufficiently in the research being published to take responsibility for the contents of the publication or presentation and be able to clearly present and defend the major findings. Responsibility for specific errors or inaccuracies remains with individual author(s) contributing the component of text, *data*, or analysis containing the error(s). All authors will be considered jointly responsible for the introduction and conclusions conditional on the methods and results.

8.4 Conditions for Inclusion in Authorship

BAM has established the following conditions to ensure consistent, appropriate, and fair assignment of authorship to research papers and presentations that use BAM Project datasets.

1. All authors must make significant contributions to manuscript preparation as well as a significant contribution to at least one of the other three components of authorship (see section 8.2). The relative importance of the four components may vary among publications.
2. At the initiation of a study or publication based on BAM work or datasets, the project lead will circulate a short (less than 1 page) description of the proposed study or paper to the BAM *Steering Committee*. The *BAM Team* and *Technical Committee* members will be notified of this proposal via the *Steering Committee*, and those meeting the terms of section 8.4, as well as other researchers who potentially qualify for authorship under these terms, may indicate if they are interested in participating in the work or publication, subject to the conditions of this policy.
3. Potential co-authors should be identified and contacted before major analyses or writing begins. Agreements with respect to expected contributions, responsibility for different sections, timelines, and resulting authorship status should be reached in advance. If involvement changes through the course of paper development, the lead author is responsible for re-negotiating authorship.
4. Depending on the *data* requirements for the study, authors will extend an invitation to participate as a contributing author to relevant *Data Partners* whose datasets comprise a significant portion of the dataset to be analyzed, as per terms described in Part III of this document. Conditions of any prior *data* agreements (Part II) must be respected.
5. Manuscripts may not be submitted for publication without the knowledge and approval of all co-authors.
6. Co-authors who delay the drafting or editing timelines (as determined under V.D(iii), above) may lose authorship. The lead author(s) will be responsible for negotiating reasonable timelines for feedback with co-authors. The *Steering Committee* will adjudicate in such cases as necessary.
7. BAM acknowledges the value of single- or limited-author papers for major contributions by graduate student theses as an important step in professional development, and will make reasonable efforts to accommodate this on a case-by-case basis.
8. Participation solely in *data* collection or management, funding acquisition, or general supervision of the research group is insufficient for authorship. However, in virtue of these combined activities, *Steering Committee* members will be offered the opportunity to commit as authors under criterion V.B(iv), and under V.B(ii), and V.B(iii), as appropriate to their availability and expertise, with the exceptions of the specialized products identified in advance under points V.D(ii) or V.D(vii). *Steering Committee* members are not exempted from point V.D(v).
9. The *Steering Committee* will make a final determination in case of disputes about publication and authorship. However, in the event of a conflict of interest, the matter will be referred to the *Technical Committee*.

8.5 Order of Authors

1. Authorship order should generally reflect the relative contributions to the most intellectually critical aspects of the published work, except for the last author who may be the principle investigator. Authorship order may be random or alphabetical only when the implication of equal contributions can be justified.
2. The order of authorship must be approved with all involved authors and determined prior to first submission. This may occur in the final circulation of the draft before submission.

3. The number and order of authors may not be changed following this agreement except by mutual consent.
4. An author may, upon request, have his/her name removed from a research publication at any time prior to submission of final proofs.
5. Authors collectively must be able to justify the authorship order.

8.6 Acknowledgement

8.6.1 General Guidelines

1. Important contributions, such as funding, *data* submission, or technical or logistical support, will appear in an acknowledgements section.
2. Each publication, report, and written or oral presentation resulting from BAM or making use of the BAM database must include reference to the version of the database used in the study.
3. Publications and presentations must also include the following paragraph in the acknowledgment section or equivalent position:
   "This [publication or presentation or work] is a contribution of the Boreal Avian Modelling (BAM) Project, an international research collaboration targeting the ecology, management, and conservation of boreal birds. We acknowledge BAM's members, avian and *biophysical Data Partners*, and funding agencies (including Environment and Climate Change Canada and the U.S. Fish & Wildlife Service), listed in full at <www.borealbirds.ca/index.php/acknowledgements>."
4. Posters and presentations must include logos for BAM, Environment and Climate Change Canada, and the USFWS, plus any other funders on a case-by-case basis (e.g., aemera.org for Joint Oil Sands Monitoring). Logos can be obtained from the BAM Coordinating scientist. The acknowledgment text is therefore modified to:
   "This [presentation or poster] is a contribution of the Boreal Avian Modelling (BAM) Project, an international research collaboration on the ecology, management, and conservation of boreal birds. We acknowledge BAM's members, avian and *biophysical Data Partners*, and funding agencies, listed in full on the BAM website (www.borealbirds.ca)."

9 CITING BAM DATA PRODUCTS, PUBLICATIONS, AND OTHER PRODUCTS

BAM welcomes efforts by partners and individuals to share BAM's *Data Product*s, publications, website, or other materials. Beyond providing appropriate credit, attribution helps demonstrate BAM's contribution and value to boreal conservation and avian science.

For materials where *Data Product*s accompany a peer-reviewed publication, conventional rules and standard reference formats apply. This section suggests citation formats for less traditional research materials.

9.1 General Protocols

1. Please include the following general statement of acknowledgement where appropriate: "We acknowledge the contributions of the Boreal Avian Modelling (BAM) Project, avian and *biophysical Data Partners*, and funding agencies (including Environment and Climate Change Canada and the U.S. Fish & Wildlife Service) and *Technical Committee* members, listed in full at <www.borealbirds.ca/index.php/acknowledgements>."

2. An embedded link to the BAM website (www.borealbirds.ca) should accompany all mentions of the Boreal Avian Modelling Project and/or the BAM logo.
3. The BAMlogo should be presented alongside other logos on suitable acknowledgements slides/pages of presentations or reports using BAM *data* or *Data Product*s are used. Copies of the logo are available by contacting the Spatial Database Manager or Coordinating Scientist, or through the Contact Us link on the website.

9.2 The BAM Website

Sections of the BAM Website may be cited to reference particular methods, to give credit for static map images, or to reference a specific species' account.

9.2.1 Method

e.g., "BAM 2012. Density estimates. Boreal Avian Modelling Project. University of Alberta, AB, Canada. URL accessed November 23, 2015: www.borealbirds.ca/index.php/density"
or
"BAM 2012. Predicting species distributions and relative habitat suitability. Boreal Avian Modelling Project. University of Alberta, AB, Canada. URL accessed November 23, 2015: http://www.borealbirds.ca/index.php/species_distribution".

9.2.2 Map Image

e.g., "BAM 2012. Canada Warbler, *Cardellina canadensis*. Relative Density by Bird Conservation Region and Jurisdiction. Boreal Avian Modelling Project. University of Alberta, AB, Canada. URL accessed November 23, 2015: http://www.borealbirds.ca/files/results/relative_density_estimates/CAWA_Density_April30_2012.jpg"

9.2.3 Species' Account

e.g., "BAM 2012. Canada Warbler, *Cardellina canadensis.* Life History. Boreal Avian Modelling Project. University of Alberta, AB, Canada. URL accessed November 23, 2015: http://www.borealbirds.ca/avian_db/accounts.php/Cardellina+canadensis"

9.3 A Final BAM Product

BAM *Data Product*s downloaded from the BAM website or Data Basin portal should be cited following these general guidelines. If not provided as examples below, suggested citations will be included in the Collaboration Agreement.

9.3.1 Spatial Product

Within the body of a manuscript, website, report, or other work: "Current and future density predictions for forest landbirds were provided by the Boreal Avian Modelling Project (BAM 2014, Stralberg et al. 2015)".
Associated references:

- Stralberg, D., S. M. Matsuoka, A. Hamann, E. M. Bayne, P. Sólymos, F. K. A. Schmiegelow, et al. 2015. Projecting boreal bird responses to climate change: the signal exceeds the noise. Ecological Applications 25:52–69. http://dx.doi.org/10.1890/13-2289.1

- "BAM 2014. Species Density, Current and Under Climate Change. Boreal Avian Modelling Project, University of Alberta, Edmonton, AB, Canada. Accessed from Data Basin: http://borealbirds.*data*basin.org/galleries/143b56bbc7584bd7a44ba86119061b15"

9.3.2 Derived Data

1. Within the body of a manuscript, website, report, or other work: "Density estimates for forest landbirds were provided by the Boreal Avian Modelling Project (BAM 2012)". If an associated manuscript is mentioned on the BAM website for a *Data Product*, it should also be included.
   Associated reference:
   - "BAM 2012. Estimated breeding density by bird conservation region, jurisdiction, and land cover class. Boreal Avian Modelling Project, University of Alberta, Edmonton, AB, Canada. Online: http://www.borealbirds.ca/index.php/density"

9.4 BAM Data Products Presented on Other Locations

BAM *Data Product*s or products produced in association with BAM can presented on websites for other organizations. In this case, appropriate credit involves:

1. All maps produced by BAM should have the BAM logo.
2. General Protocols should be followed as outlined in Part VI.A.
3. Specific products should be credited as outlined above (VI.B & VI.C) or in the associated Collaboration Agreement.

End-users should contact BAM via the Coordinating Scientist to review their plan for attribution.

9.5 Other Mentions:

Attribution for other *data product*s or information will be determined on a case by case basis, and will be included in the Collaboration Agreement for said product.

10 MOVING FORWARD

The above document describes the procedures we follow in most cases. As part of on-going conversations within BAM, we are revisiting our data-sharing protocols. We appreciate input from our Data Partners, so we circulate this current version to provide context to that conversation.

Our current working idea for the future use and distribution of the BAM Database closely echoes the Avian Knowledge Network and CDC tiered permission framework. Levels of permissions are assigned by each Data Partner to each of their contributed datasets or subsets of those datasets. This provides flexibility to data partners while maximizing transparency and access to data.

Specific changes before the new system can be implemented:

- All datasets currently in the BAM Database must be retroactively assigned a permission level.
- All incoming datasets must be assigned a permission level by their contributing Data Partner.
- Data Requests: Information in a data request provides details necessary for BAM's database manager to filter the Avian Database based on permission level and other restrictions if applicable (e.g., spatial extent).

Permission levels are defined as follows (changes from previous level indicated in italics):

Level	Description
1	*Data are processed into BAM standard format.* *Data are available for use by the BAM Team (potentially with restrictions).*
2	Data are processed into BAM standard format. Data are available for use by the BAM Team (potentially with restrictions). *Basic metadata are available upon request to BAM.* *Data may be included in 4-km data summaries for general distribution (potentially with restrictions).* *Data must be requested directly from the data contributor.*
3	Data are processed into BAM standard format. Data are available for use by the BAM Team (potentially with restrictions). Basic metadata are available upon request to BAM. Data may be included in 4-km data summaries for general distribution (potentially with restrictions). *Data are available upon request to BAM, but distribution can be restricted to certain subsets or intended purposes.*
4	Data are processed into BAM standard format. *Data are available for use by the BAM Team without restriction.* Basic metadata are available upon request to BAM. *Data may be included in 4-km data summaries for general distribution without restriction.* *Data are available upon request to BAM without restriction.*

For levels 1-3, data contributors may restrict use or sharing of their data based on specific time intervals, spatial extents, or project uses. For example, to protect future publication opportunities, a data contributor may request that only certain years of data be distributed externally, or that BAM analyses of particular data be restricted to boreal-wide questions.

Other Examples:

- Data Partner A doesn't want her data publicly available, but is OK with data being aggregated to 4-km grid cells on an annual basis.
    - Level 3
- Data Partner B doesn't want his data publicly available, nor can data be aggregated to 4-km on an annual basis. Data can be aggregated into one single spatial layer, either by averaging over years, or by choosing a single year.
    - Level 3; Temporally-restricted

- Data Partner C wants her data publicly available.
    - Level 4
- Data Partner D wants his data used only by BAM, and only at scales above the provincial level.
    - Level 1; Spatially-restricted
- Data Partner E wants her data used only by BAM, and only for a specific applied research question.
    - Level 1: Purpose-restricted
- Data Partner F's data are freely available for any BAM purposes, but wants to be contacted for permission before BAM distributes the data further.
    - Level 2 Unrestricted

11 GLOSSARY

Avian abundance data*: *Data indicating the number of each species' observed at a given location during a given time period. *Data* are usually collected via point-count survey, but may also be extracted from Automated Recording Units. Typically archived in tables or database formats.

***BAM Team*:** The *BAM Team* consists of the *Steering Committee*, Staff, Graduate Students, and Contributing Scientists. All *Team Members* are leading or collaborating on one or more studies within BAM, and are also active, ongoing contributors to the scientific development and implementation of BAM. See Section 3.3.

***Biophysical data*:** Georeferenced *data* describing climatic, landscape, or other physical characteristics, typically derived from imagery or remote sensing products.

***Collaborative* (also: *Collaborative* intent):** A project is considered *collaborative* when all parties contribute to research design and management, *data* analysis, and interpretation of results (see Part V.B).

***Collaborator*:** An individual or institution engaged in an active research project with BAM, with both parties actively contributing research design, analyses, and interpretation. May include avian science, conservation, and management staff based in universities and other research institutions, as well as in Aboriginal, non-governmental, and government agencies responsible and/or concerned for the conservation of boreal birds in North America.

***Data*:** Raw *data*, either abundance *data* or *biophysical data*, acquired from *Data Partners*.

***Data Partner*:** An individual or institution that has contributed avian or biophysical data.

***Data Product*:** Any products that are processed and provide added value to the original contributed *data*. *Data Product*s include outputs from BAM analyses (e.g., tables, graphs, maps), derived datasets (e.g., densities, geospatial rasters), or methodologies developed by BAM.

***Final Data Product*:** A *Data Product* that has been approved by the *Steering Committee* and other co-authors for widespread distribution; it typically accompanies a peer-reviewed paper or final report. It may be available on BAM's website or Data Basin portal. Before a product is declared final, the *Steering Committee* or delegate consult with co-authors, relevant *Data Partners*, and the *Technical Committee* as required to ensure agreement.

***Intellectual property*:** property, *data*, objects, symbols, etc belonging to the institution or individual who created them. The creators of the *Intellectual property* retain ownership of said information, and determine which uses are acceptable, and when the information can be distributed.

***Interim Data Product*:** A *Data Product* that is not yet approved for public distribution, either because it is associated with preliminary analysis or awaiting publication of an accompanied paper. While BAM has limited capacity to respond to requests, requests for interim products are considered. Before a request for an interim product is granted, the *Steering Committee* or delegate consult with co-authors, relevant *Data Partners*, and the *Technical Committee* as required to ensure agreement.

***Metadata*:** Information accompanying *data*, describing methods, geographic extent, *data* collectors, and other features.

***Outside Party*:** An individual or institution with no prior *collaborative* tie to BAM. Outside parties may request *Data Product*s but not *data*, in adherence with BAM's agreements with *Data Partners*. Outside parties become *collaborators* once a collaboration agreement is signed for an approved *collaborative* project with BAM.

***Point Count Data*:** Recorded observations of birds conducted using point count methods, i.e. observations of sight and sound at a single location for a fixed period(s) of time and sometimes within fixed distance(s).

***Steering Committee*:** A four-member committee that guides BAM's strategic direction, makes decisions, and solicits funding for BAM projects.

***Team Members*:** Individuals who are on the *BAM Team*.

***Technical Committee*:** A team of scientists who agreed to act on BAM's *Technical Committee*. Envisioned roles include providing guidance on decisions should the *Steering Committee* request input, facilitating *data* sharing, and initiating collaborations with BAM.

12 REFERENCES

Sólymos, Péter, Steven M. Matsuoka, Erin M. Bayne, Subhash R. Lele, Patricia Fontaine, Steve G. Cumming, Diana Stralberg, Fiona K. A. Schmiegelow, and Samantha J. Song. "Calibrating Indices of Avian Density from Non-standardized Survey *Data*: Making the Most of a Messy Situation." *Methods in Ecology and Evolution* 4.11 (2013): 1047-058. Print.