Quality Assurance Standards for Wildlife Inventory Projects

QA Standards for Wildlife Inventory

Prepared by
Ministry of Environment
Ecosystems Branch
for the Resources Information Standards Committee
Resources Inventory Committee

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Preface

The Government of British Columbia provides funding for the work of the Resources Information Standards Committee (RISC), including the preparation of this document. To support the effective, timely and integrated use of land and resource information for planning and decision-making, RISC develops and delivers focussed, cost-effective, common provincial standards and procedures for information collection, management and analysis. Representatives on the Committee and its Task Forces are drawn from the ministries and agencies of the Canadian and British Columbia governments, as well as academic, industry and First Nations stakeholders.

RISC evolved from the Resources Inventory Committee (RIC), which received funding from the Canada-British Columbia Partnership Agreement on Forest Resource Development (FRDA II), the Corporate Resource Inventory Initiative (CRII), and Forest Renewal BC (FRBC). RIC addressed concerns of the 1991 Forest Resources Commission.

For further information about RISC, please access the RISC website at: http://www.ilmb.gov.bc.ca/risc/.

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The Resources Inventory Committee consists of representatives from various ministries and agencies of the Canadian and the British Columbia governments as well as from First Nations peoples. RIC objectives are to develop a common set of standards and procedures for the provincial resources inventories, as recommended by the Forest Resources Commission in its report “The Future of our Forests”.

For further information about the Resources Inventory Committee and its various Task Forces, please access the Resources Inventory Committee Website at:
http://www.ilmb.gov.bc.ca/risc

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Abbreviations

EIS	Ecosystem Information Section
FTP	file transfer protocol
GIS	geographic information system
GPS	geographic positioning system
MoE	Ministry of Environment
QA	quality assurance
RIC	Resources Inventory Committee
RISC	Resources Information Standards Committee
SPI	Species Inventory
WSI	Wildlife Species Inventory

1 Introduction

The principal users of these quality assurance (QA) procedures will be specialists who have been contracted to provide a QA review of wildlife inventory projects. However, we recommend that the data collection contractors use the checklists in this document as a framework for an in-house review before submitting any materials. Following these QA guidelines will expedite the review process and potentially improve overall data-collection consistency, accuracy and reliability.

1.1 Purpose

These standards outline the procedures for QA for the purpose of ensuring a minimum level of quality and consistency in data handling for all data housed in the provincial database, where they can be made accessible to scientists, resource managers, and members of the public. The Species Inventory (SPI) database has been created to store and provide access to wildlife species inventory data submitted to the province.

The aim of QA is to prevent problems through all stages of data collection and reporting. Early detection of errors is a critical preventative step in obtaining quality data. Therefore, it is important that QA personnel review the study design for the inventory project prior to the start of field data collection in order to be able to provide technical support and identify potential errors. “The most critical stage of implementing and completing an inventory or monitoring study is not data collection, presentation or interpretation, but rather design. Careful design will increase effectiveness, reduce costs and lead to improved interpretation” (Jones 1986).

1.2 Scope

These Wildlife Inventory QA procedures outline the required steps for completing a QA review of a wildlife inventory project. In order to achieve the provincial QA goals, these standards have been designed based on the standards set forth by the RISC, in particular the *Species Inventory Fundamentals* (RIC 1998).

1.3 General Approach

This document describes the QA auditor’s responsibilities for project evaluation. The QA auditor is responsible for reviewing projects to the best of his or her ability with the available tools such as the project plan, the RISC standards, and from his or her professional experience. Once the review has been completed, and the deliverables have been submitted, Ecosystem Information Section (EIS) staff will run validation routines on the data. If possible EIS staff will correct minor mistakes, however the Contractor is responsible for all required edits to ensure the data is successfully loaded into the SPI database.

Standard documentation of the quality assurance must accompany all deliverables. This shall comprise a report, signed by the Quality Assurance auditor, identifying that the inventory deliverables are complete, have been reviewed and meet the standards as outlined in this document. Any revisions required by the auditor as a result of the initial stages of QA must

be checked and confirmed to be complete by the auditor. The Quality Assurance auditor shall affix his or her professional seal to the final report with verification of the auditor's qualifications and professional independence from the inventory work. Documentation of QA shall also include an explanation for all errors or warnings identified in the QA report that are not correctable and a clear indication of which errors or warnings have been addressed.

For more information about the various roles and responsibilities in the QA process, refer to Appendix A.

1.4 Qualifications of the QA Auditor

Contractors who conduct QA on RISC-compliant data collection projects must have no role in the project other than QA. The QA contractor should not be involved in either the collection/interpretation of data or in the procedural monitoring of the data collection contract.

Minimum requirements for the quality assurance auditor are:

- At least three years as a project biologist and direct project experience in all phases of RISC standard wildlife inventory;
- Demonstrated knowledge and understanding of the species-specific RISC standards for the target taxa.
- Membership in a registered professional organization (i.e., RPBio, PAg, and/or RPF) - RPBio preferred.

1.5 Completing the QA Report

The steps for completing the QA report are as follows:

1. Download a copy of this Word document.

2. Type your comments directly into your version of the document. This will ensure that the comments are legible.

3. Each stage of the QA review must be returned to the contractor until all the results are "Yes" or "Acceptable". Each submission is recorded in the "Submission #" field on the QA Forms.

4. Only the final submission with full acceptance is to be submitted to the Ecosystem Information Section by the QA auditor.

1.6. Submitting the QA Report

The steps for submitting the QA report by the QA auditor are as follows:

1. **Sign the QA report.**
   Sign the completed QA report either by inserting a digital image of your signature in the sign-off forms, or by signing and affixing his or her professional seal to a hardcopy of the document. Note there are two forms where a signature is needed.

2. **Convert the QA report to PDF format.**
   a) If you have used a digital signature convert the signed Word document into a PDF document.
   b) If you have signed a hard copy, please scan the document (from Section 2 onwards) into a PDF document.

3. **Rename the digital file.**
   The digital files must be named with the SPI Project ID (or BAPID), obtained from the Proponent, as follows “wsi_####_qar.pdf”.

4. **Submit the signed QA report.**
   Send the signed QA report to WSI via SPI_Mail@gov.bc.ca and a WSI member will attach this document to the other project deliverables.

2. Quality Assurance Procedures

This section provides specific standards for QA of wildlife inventory projects. The goal of these procedures is to provide a means for determining acceptability of work to standards described in *Species Inventory Fundamentals* (RIC 1998) and other technical and species-specific standards listed at http://ilmbwww.gov.bc.ca/risc/pubs/tebiodiv/index.htm .

2.1. QA Procedure – Review Stages

The following QA procedures include assessing the study design and pre-field planning, field checking to ensure data are collected and recorded properly and checking the quality of deliverable products. QA of both the work plan and fieldwork are critical to the QA process and project success. Section 3 contains forms for QA of each phase of work. **All QA results must be "Yes" before a project is signed-off as acceptable.**

The QA process is carried out in three stages: pre-field QA, field QA, and reporting QA.

2.1.1. Pre-field QA

Pre-field QA is conducted on deliverables submitted prior to the start of field data collection for the inventory project. Prior to field sampling, a Project Plan is submitted. The Project Plan contains a summary of existing information, as well as the study design, data compilation and reporting aspects of the inventory project. The intent of QA at this stage is to ensure the existing data review is complete and accurate, and to approve the project plan and study design. **The Pre-field QA must be signed-off by the QA auditor before any fieldwork can begin.**

QA Deliverables: Wildlife Inventory QA forms 1 – 3.

2.1.2. Field QA

Note: *Field QA is not mandatory and is under review at this time. It is preferred that all wildlife inventory projects incorporate Field QA processes into the overall QA review.*

Field QA is conducted during field work to ensure that field data are collected and recorded following standards. Field visits with each field crew are essential to ensure individual field crews are collecting data consistently and as intended by the standard. Errors originating in the field are difficult, if not impossible, to identify if not detected in the field. If errors originating in field data collection are detected in the review of deliverable products, they are very expensive to correct. Field audits should be performed early in the field season, to ensure problems are detected and corrected before a significant amount of data is collected.

QA Deliverable: Wildlife Inventory QA forms 4 – 7.

2.1.3. Reporting QA

Reporting QA is conducted on final deliverable products upon project completion. Deliverables typically include complete Excel data capture templates, shapefiles of study area

boundaries, shapefiles of design components (i.e. transects or blocks), and final reports. The QA auditor must consult the original contract for the inventory to determine the complete description of deliverables. The QA procedures are to include checking the digital data that has been entered into the WSI Data Capture Templates[1]. These templates contain pre-defined fields and codes that can be loaded into the Species Inventory (SPI) database.

Routine errors such as missing data, data falling outside of acceptable ranges, and data using incorrect fields and codes are to be detected through the QA process. Inventory data entered in the appropriate Wildlife Species Inventory (WSI) Data Capture Template must be carefully checked by the QA auditor before submitting them to the province.

The intent of QA at this stage is to ensure that all products are prepared to acceptable standards, and that all data are provided in standard formats for loading into the provincial database. **There will be a zero tolerance for errors in data submitted to the province.**

QA Deliverable: Wildlife Inventory QA forms 4 – 7.

[1] available at http://www.env.gov.bc.ca/wildlife/wsi/index.htm

3. QA Forms

QA forms, complete with standard review questions and checklists, are provided in the following section and are to be used to document the QA comments and recommendations for each of the review stages. Each form provides a space for the submission number (e.g. the number of times particular inventory material has been submitted for review). There is also a separate field for the project name, the name of the QA auditor, and the name of the inventory contractors.

The forms include a series of simple yes/no questions intended to guide the review process. It is imperative that these review questions be supplemented with qualitative comments. Explanations should be provided to show how the Yes or No answer was determined and recommendations should be provided where appropriate based on these qualitative comments. Additional space for comments should be inserted as required. (Place cursor at the beginning of the last line and select from menu Table/Insert/Row Above).

The following forms are included for these standards:

- Wildlife Inventory QA Form 1: Prefield QA Checklist
- Wildlife Inventory QA Form 2: Prefield QA Summary
- Wildlife Inventory QA Form 3: Prefield Sign-off
- Wildlife Inventory QA Form 4: Field QA Checklist
- Wildlife Inventory QA Form 5: Reporting QA Checklist
- Wildlife Inventory QA Form 6: Field QA and Reporting QA Summary
- Wildlife Inventory QA Form 7: Project Sign-off

Wildlife Inventory QA Form 1: Prefield QA

Project Name:

SPI Project ID (BAPID):

Inventory Contractor:

Date of Submission: **Submission #:**

The intent of the Pre-field QA is to ensure the existing data review is complete and accurate, and to approve the project plan and study design. **The QA auditor must sign off the Pre-field QA before any fieldwork can begin.** Therefore, enough turnaround time must be provided between the Pre-field QA and the start of field work to allow any changes or modifications identified through the QA process to be completed without delaying the start of field work.

Summary of Existing Information

The intent of QA of existing data is to ensure that all relevant existing data have been used in the current inventory project. Known information can affect project needs and project planning.

1. Review of existing data sources (including interviewing local experts/species specialists) adequately covers the information known to be available for the species and project area or similar habitat, and, if relevant, has been used in the project plan. ❑Yes ❑No

   Comments/Recommendations:

Study Design

The intent of QA of the study design is to ensure that the design adequately covers the requirements and objectives of the inventory.

1. Study objectives are clearly defined, and appropriate given the Summary of Existing Information. ❑Yes ❑No

   Comments/Recommendations:

2. Level of intensity (Presence/Not Detected, Relative Abundance, and Absolute Abundance) is appropriate for the stated objectives. ❑Yes ❑No

   Comments/Recommendations:

3. Survey methods are appropriate for the objectives stated in the project plan and are provided in sufficient detail including an explanation and description of the sampling design, with the assumptions clearly stated and an explanation of how the sampling design will be applied (e.g., random, stratified, systematic, etc.). ❑Yes ❑No

   Comments/Recommendations:

4. Study area boundaries are appropriately outlined on maps. ❑Yes ❑No

   Comments/Recommendations:

5. Locations of design components have been mapped[2]. ❑Yes ❑No

   If this is not possible prior to fieldwork, the methods for determining locations in the field are appropriate. ❑Yes ❑No

   Comments/Recommendations:

6. Is stratification necessary? ❑Yes ❑No

   If no, a justification has been provided. ❑Yes ❑No

   If yes:

   The appropriate habitats have been properly stratified and identified for sampling and the stratification scheme used has been explained adequately. ❑Yes ❑No

   A pre-study field check has been conducted to confirm habitat stratification. ❑Yes ❑No

   The appropriate strata have been mapped. ❑Yes ❑No

   Comments/Recommendations:

[2] For an explanation of the survey design hierarchy, please see Section 2 in *Species Inventory Fundamentals* (RIC 1998).

7. Are the primary and secondary target taxa listed in the project plan? ❑Yes ❑No

   Comments/Recommendations:

8. The problems/questions and resulting hypotheses are clearly stated and sufficient data will be collected to test the hypothesis or provide meaningful conclusions. ❑Yes ❑No

   Comments/Recommendations:

9. Required sample size has been correctly calculated or method is in place to determine when sampling is complete. ❑Yes ❑No

   Comments/Recommendations:

10. Statistical tests of significance being used are appropriate for interpreting the final results. ❑Yes ❑No

    Comments/Recommendations:

11. Sources of bias have been identified and managed appropriately, measures of possible error have been used and appropriate levels of accuracy and precision have been identified. ❑Yes ❑No

    Comments/Recommendations:

12. Survey timing is appropriate for the species life history, survey objectives and project area characteristics (e.g. winter accessibility). ❑Yes ❑No

    Comments/Recommendations:

13. A contingency plan is in place for the field component (e.g. in case of access problems due to helicopter unavailability during fire season, poor weather conditions, difficult terrain, etc.). ❑Yes ❑No

    Comments/Recommendations:

Personnel and Equipment

The intent of QA on personnel and equipment is to ensure that the field crew has appropriate expertise as listed in the project plan, that the crew has the required permits, and that each crew member has the appropriate certifications and training.

1. Each member of the field crew has the appropriate expertise for the species to be inventoried. ❑Yes ❑No

   Comments/Recommendations:

2. Equipment being used is appropriate for the survey methods. ❑Yes ❑No

   Comments/Recommendations:

3. Pre-season testing and training has been completed on all equipment and for all techniques. ❑Yes ❑No

   Comments/Recommendations:

Data Form Preparation

The intent of the Data Form Preparation QA is to ensure that (1) field crews are equipped with a process for recording accurate, meaningful field data, regardless of whether they use hardcopy or electronic dataforms, and (2) the resulting data can be entered into an appropriate WSI Data Capture Template using appropriate data-fields and codes.

1. Do field crews have a dataform(s) containing data-fields relevant to their recording needs? ❑Yes ❑No

   Comments/Recommendations:

2. Do field crews have immediate access to all definitions of data-fields and codes? ❑Yes ❑No

   Comments/Recommendations:

3. If required by the contract requirements, do field crews have a dataform for recording incidental observations? For example, some contracts require that observations of any non-target red or blue-listed species encountered during an inventory must be recorded. ❑Yes ❑No

   Comments/Recommendations:

Wildlife Inventory QA Form 2: Prefield QA Summary

Project Name:
SPI Project ID (BAPID):
Inventory Contractor:
Date of Submission: **Submission #:**

Please provide a summary of the overall QA of the inventory and include any additional comments not covered in the forms above. If project deliverables are unacceptable, a new summary form must be completed for each subsequent submission, including the submission number, date of submission and comments as to whether or not the recommendations have been adequately incorporated.

Summary of Existing Information

❑ Acceptable ❑ Unacceptable (see recommendations below)

Comments/Recommendations:

Study Design

❑ Acceptable ❑ Unacceptable (see recommendations below)

Comments/Recommendations:

Personnel and Equipment

❑ Acceptable ❑ Unacceptable (see recommendations below)

Comments/Recommendations:

Data Form Preparation

❑ Acceptable ❑ Unacceptable (see recommendations below)

Comments/Recommendations:

Wildlife Inventory QA Form 3: Pre-field QA Sign-off

Project Name:

SPI Project ID (BAPID):

Inventory Contractor:

Date of Submission: **Submission #:**

The prefield preparations and study design are acceptable and field work can begin.

Print Name of QA Contractor Signature Date

Wildlife Inventory QA Form 4: Field QA Checklist

Project Name:

SPI Project ID (BAPID):

Inventory Contractor:

Date of Submission: **Submission #:**

The intent of the field QA is to detect and prevent potential errors in field data collection. Errors that occur in the field are difficult if not impossible to detect after the fact, and are extremely expensive to correct. In order to avoid cumulative errors in the data, the field QA should occur at the very beginning of the field season. The QA team should be able to arrange the field check on short notice in order to accommodate the inventory contract schedule and weather dependent field opportunities. Feedback from the **QA auditor** must be provided to the crew leader and contract monitor immediately if there are problems.

1. Data forms have been completed correctly using the correct codes and fields (according to the specifications in the WSI Data Capture Template). ❑Yes ❑No

   Comments/Recommendations:

2. Data have been collected using the proper methods and techniques including proper and accurate use of field equipment. ❑Yes ❑No

   Comments/Recommendations:

3. Experimental design has not been altered in the field (i.e. no statistical violations have been made). ❑Yes ❑No

   Comments/Recommendations:

4. Complete UTM coordinates based on NAD83 data have been recorded for all design components, and any wildlife observations, or attempted observations (i.e. Null observations). ❑Yes ❑No

   Comments/Recommendations:

5. If required by contract, encounters with non-target red or blue-listed species are being recorded (UTM coordinates, date, observer name) if observed in the field. ❑Yes ❑No

   Comments/Recommendations:

Wildlife Inventory QA Form 5: Reporting QA Checklist

Project Name:

SPI Project ID (BAPID):

Inventory Contractor:

Date of Submission: **Submission #:**

The QA team should review the final deliverables to ensure that all project requirements have been met and that all data and products are consistent and correct. This includes ensuring that the original data are received, that data are entered correctly into the WSI Data Capture Template, and that data are consistent between original data forms, data capture templates, maps and reports. To reduce the likelihood of major revisions being required on the final products, the contract monitor may wish to have the QA auditor review draft deliverables before reviewing the final deliverables. A review of the final report by an external reviewer (i.e. a peer review) is highly recommended.

Data Entry and Analysis

1. Electronic data are captured in the WSI Data Capture Template (Available from: http://www.env.gov.bc.ca/wildlife/wsi/index.htm). ❑Yes ❑No

   All mandatory columns have been filled out. ❑Yes ❑No

   All UTMs are based on the NAD 83 datum. ❑Yes ❑No

   All UTMs have a zone, easting and northing. ❑Yes ❑No

   Entered a Design Component[3] Label and UTM coordinates for each design component.

   All user-defined data-fields and codes have been described in the "New Field Definitions" worksheet. ❑Yes ❑No

   Any additional information required by the standards is included as separate spreadsheets in Excel, and final report has been included as a single PDF document. ❑Yes ❑No

   Comments/Recommendations:

   _____

   _____

2. Excel data capture templates have been compared with data forms for data entry errors, and have been found to be accurate. ❑Yes ❑No

   A total of _____ data forms have been checked to ensure accuracy.

[3] For an explanation of design components, please see Section 2.2.4 in *Species Inventory Fundamentals* (RIC 1998).

Comments/Recommendations:

3. All GIS spatial data complies with the specifications described in *Species Inventory Fundamentals, Errata No. 3* (RISC, 2008). ❑Yes ❑No

   Comments/Recommendations:

Final Report

1. The report presents a strong case in support of the conclusions reached. ❑Yes ❑No

   Comments/Recommendations:

2. There is sufficient background in the introduction to provide context including adequate background references. ❑Yes ❑No

   Comments/Recommendations:

3. There are references to similar methods that have been properly used and to which adequate comparisons have been made. ❑Yes ❑No

   Comments/Recommendations:

4. Methods are clearly explained and were not altered or modified. ❑Yes ❑No

   If altered or modified, the alteration/modification was explained and justified. ❑Yes ❑No

   Comments/Recommendations:

5. There is a clear presentation of results, and these results are clearly separated from discussion or conjecture. ❑Yes ❑No

   Comments/Recommendations:

6. Statements of method, literature references, or conjecture are in the appropriate section (i.e. not in the Results section when they should properly be a part of another section). ❑Yes ❑No

   Comments/Recommendations:

7. There is proper use of statistics (i.e., tests of significance are used where possible and appropriate). ❑Yes ❑No

   Comments/Recommendations:

8. The discussion adequately addresses issues or points relative to the results, and attention has been paid to potential weaknesses and to errors or limitations of the project. ❑Yes ❑No

   Comments/Recommendations:

9. The report has been grammar and spell-checked, the writing style is concise and coherent and the report follows appropriate formats (as per the contract requirements and RISC standards). ❑Yes ❑No

   Comments/Recommendations:

Wildlife Inventory QA Form 6: Field QA and Reporting QA Summary

Project Name:

SPI Project ID (BAPID):

Inventory Contractor:

Date of Submission: **Submission #:**

Field QA *(Not Mandatory)*

❑ Acceptable ❑ Unacceptable (see recommendations below)

Comments/Recommendations:

Reporting QA

Data Entry and Analysis

❑ Acceptable ❑ Unacceptable (see recommendations below)

Comments/Recommendations:

Final Report

Comments/Recommendations:

Additional Comments

Wildlife Inventory QA Form 7: Project QA Sign-off

Project Name:

SPI Project ID (BAPID):

Inventory Contractor:

Date of Submission: **Submission #:**

All project deliverables are complete and acceptable. ❑Yes ❑No

Print Name of QA Contractor Signature Date

References

Jones, K.B. 1986. “The Inventory and Monitoring Process” in A.Y Cooperrider, R.J. Boyd and H.R. Stuart (eds.) *Inventory and Monitoring of Wildlife Habitat*. WR208.

Species Inventory Fundamentals. 1998. RIC, Victoria, BC.
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Appendix A. Roles and Responsibilities

Participants in the QA process include the data-collection contractors, the QA contractors, the contract monitor, and the Government of BC. See Table 1 for the roles and responsibilities specific to each of these participants.

Table 1. Roles and responsibilities in the QA process.

Participant	Roles	Responsibilities
Data-collection contractors	Project planning Data collection, entry and validation Provision of deliverables as specified in the project contract	Follow the appropriate RISC standard for the type of inventory specified in the project contract Co-ordinate with the contract monitor on project objectives and working plan Provide QA auditor(s) with all materials required to complete QA for each stage of the project Document all changes and corrections, including those that differ from the QA auditor's recommendations Correct project deliverables as required by the QA auditor, ensuring that corrections suggested for a sample of the project are applied to the whole project (i.e., not just for the plot that was assessed) Upon completion of the inventory project, submit the final, signed off deliverables to the Ecosystem Information Section (MoE).
QA auditors	QA for data-collection projects	Follow the provincial QA standards described in this document to ensure that all work undertaken by the data-collection contractors adheres to RISC standards Document all relevant communications about project QA and submit this information to the client as part of the final project deliverables Notify the contract monitor and Government immediately, if, during any phase of the QA, there are outstanding issues or concerns regarding any aspect of the inventory work Ensure that diverse QA auditors co-ordinate responses that require integration of information. For example, soil and ecology QA auditors should consult on SNR and SMR issues. Provide comments and recommendations for each question in the QA Checklists and Summary Checklists, to justify answers to each checklist question and overall assessments for each stage Submit the QA report to the Ecosystem Information Section (MoE).
Contract monitor	Oversee contracts for the project and the project QA	Ensure the contracts and QA for the project specify that all project work meets the appropriate RISC standards Co-ordinate with inventory contractors on project objectives and working plan

		Co-ordinate with QA auditor(s) on concerns about quality of the work Coordinate the scheduling and sequence of work between the data-collection contractors and QA auditor(s) Ensure client receives all final, signed-off deliverables. Ensure client delivers all final, deliverables to MoE. Approve final payment to data collection contractor after deliverables accepted and warehoused by provincial government
Government of BC	Provide standards for conducting projects Provide standards for conducting QA on projects	Perform spot audits to ensure final products meet the minimum requirements of provincial data warehouse Approve any variances from RISC standards or other applicable standards Keep all project information on file at the Ecosystem Information Section (MoE) for the lifespan of the data Provide public access to the data in the provincial data warehouse Assist the contract monitor to mediate conflicts between data-collection contractors and the QA auditor(s) Provide technical expertise and access to all related RISC standards