Species Inventory Fundamentals

Standards for Components of British Columbia's Biodiversity No.1 (Version 2.0, November 1998)

Errata
August, 2011

This document replaces Section 3 (Project Management) in *Species Inventory Fundamentals* (No. 1, Version 2.0, November 1998)[1]. This document also replaces Errata No. 1 (2004), Errata No. 2 (2005), and Errata No. 3 (2008).

[1] This document is located on the Resources Information Standards Committee (RISC) website at http://ilmbwww.gov.bc.ca/risc/pubs/tebiodiv/index.htm.

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3. PROJECT MANAGEMENT

A successful field season is preceded by thorough preparation. This is especially true as the time available for many types of species inventory is limited by biological cycles, seasonal weather, and economic constraints. To avoid unforeseen delays and make the most efficient use of time in the field, a project biologist should anticipate the demands of survey work prior to leaving the office. Although no one can anticipate every obstacle, thorough preparation can help to avoid many problems and inefficiencies, in addition to making unforeseen difficulties easier to manage.

All surveys must be conducted in a safe manner. Because of potential dangers while working in the outdoors, field crews should contain a minimum of two people, at least one of which possesses a current, WCB-endorsed first aid certificate. Proper survey planning; appropriate safety equipment and proper training in the use of field equipment; standards for weather and field conditions in which the survey may be conducted; and field workers that are in good physical condition, can aid in ensuring a safe and successful survey.

Once the objectives and methods of the inventory have been determined, the project leader should develop a time schedule which considers:

1. Preliminary information collation
2. Hiring / contracting / training personnel
3. Obtaining necessary equipment and supplies
4. Doing preliminary field work
5. Describing associated habitat
6. Operational species inventory.

3.1. Resources and Personnel

3.1.1. Information

Bringing together available resources is the first step when starting any project. Prior to beginning a field inventory, it is mandatory to collate existing information which may have relevance to the current project. There are numerous potential sources of useful geographic, ecological, and logistical information for most study areas in British Columbia. Information may come in four basic forms: maps; reports and articles; consultation; and raw data. Some appropriate sources of information for planning most wildlife inventories are provided below:

Map Products

1. **Base maps:** TRIM is preferred. Where this is not available, the best alternative is a current NTS map sheet registered to NAD 83.
2. **Small scale ecological mapping:** This includes mapping based on ecoregion and biogeoclimatic classification. The province has been mapped as Broad Ecosystem Units (BEUs) at a scale of 1:250,000. Species-specific habitat capability and suitability interpretations exist for some species.
3. **Large scale ecological mapping:** Terrestrial ecosystem mapping showing ecological site series exist at scales of 1:20,000 to 1:50,000 for some of the province. Species-specific habitat capability and suitability interpretations exist for some of terrestrial ecosystem mapping projects.

4. **Resource-based thematic maps:** In many cases, maps of key habitat attributes may have been created unintentionally by other resource sectors. These include maps of forest cover, soils, and bedrock geology.
5. **Aerial photographs:** Select photos of the appropriate scale, coverage and quality. Computerized "ortho" photos are also available. These are aerial photos which have been orthorectified to resolve distortion due to the curvature of the earth's surface.
6. **Road maps:** Access is an important consideration when planning inventory work. Road maps, forest recreation maps, and logging road maps produced by forest licensees may all be useful.

Reports and Articles

1. **Field guides:** This may include district, provincial and/or continental guides to species identification and distribution.
2. **Scientific papers:** Even if they do not address local conditions, papers from peer-reviewed journals provide high quality information about general species ecology such as behaviour and habitat selection, and specialized technical matters, such as sampling design and data analysis.
3. **Status reports:** Of particular interest are status reports produced in British Columbia through the academic community or by MOE, and nationally by COSEWIC. Useful information about species ecology, current distribution, habitat associations, and limiting factors. They are also of great use when providing management recommendations.
4. **Conference proceedings:** These may provide a more pragmatic look at certain issues which may not be suitable for scientific journals.
5. **Government publications:** These are numerous, but may be very relevant, particularly in terms of assessing previous work in the study area.
6. **CBCB manuals:** The RISC inventory manual for each species group contains relevant information on the ecology of different species, as well as detailed descriptions of techniques for sampling them. In addition, each manual contains a bibliography of useful references.

Consultation

1. **Professional Biologists:** Government biologists who might be consulted include forest ecosystem specialists, habitat protection officers, regional wildlife biologists, wildlife and habitat inventory specialists, rare and endangered species specialists, and provincial species and inventory specialists. Private consultants, university professors, and graduate students may also share their knowledge.
2. **Local First Nations People:** Local First Nations people may possess valuable historical knowledge of the distribution and abundance of species within their traditional territory. Their current land use practices may also give them a familiarity with wildlife populations.
3. **Naturalists:** Particularly for inventories dealing with non-game species, such as songbirds, raptors, and herptiles, local naturalist clubs may be the greatest source of local information about species distribution.
4. **Sportspersons/Hunting Guides/Trappers:** Consumptive wildlife users have a strong interest in following the annual fluctuations in abundance and seasonal movements of games species and furbearers.

5. **Field Workers:** Timber cruisers, loggers, and other workers who work largely in the outdoors have useful observations of conspicuous species.

Data

1. **Conservation Data Centre (CDC):** The CDC maintains an electronic database of occurrences of rare and endangered species and ecosystems in the province. This information is available free to the public, although a handling fee may be charged for large requests.
2. **Provincial Wildlife Harvest Data Systems:** Several data systems containing wildlife harvest information are maintained by MOE. Specifically, the Summary Statistics Database contains information about hunters and harvest, and the Wildfur Harvest Database contains information about trapping of furbearers in the province.
3. **Provincial Species Inventory Data System (SPI):** Since 1995, all wildlife projects which are funded with provincial money are required to contribute their data to this centralized provincial data system. In addition, all existing wildlife data in possession of the provincial government will eventually be included in this system. Summary information and non-sensitive data will be available free to the public, although a handling fee may be charged for large requests.
4. **Other Sources:** Numerous programs for collection of wildlife data already exist (*e.g.*, Breeding Bird Survey) and provide data to interested people for a minimal cost. In addition, there are also a number of independent data systems designed to centralize wildlife observations throughout the province.

3.1.2. Equipment

A checklist of the essential equipment for each survey method has been provided in each CBCB manual as part of the survey protocol. Due to their specialized nature, certain items of equipment can be very difficult to acquire (*e.g.*, Anabat detector for bat surveys). Availability of these items will need to be ensured well ahead of the field season to allow time for alternatives if required, and to provide lead time to allow crew members to become familiar with equipment prior to entering the field. All equipment should be checked to make sure it is in good working condition before going out in the field. Back-up equipment should be carried as appropriate (*i.e.*, spare batteries, an extra recorder, etc.).

In addition to the items of equipment listed in the CBCB manuals, field crew should carry appropriate safety equipment to ensure that they are able to deal with the rigors of working outdoors as well as handle emergencies. A camera is also useful to have along, particularly for capturing pictures of significant or unidentifiable animals, plants, behaviours, landforms, etc. for later discussion.

Global position system (GPS) equipment may be convenient for registering locations of design components[2] and species observations. Persons using GPS should be familiar with GPS standards and specifications, in particular the document, *Province of British Columbia Standards, Specifications and Guidelines for Resource Surveys Using Global Positioning System (GPS) Technology*, available at:

http://ilmbwww.gov.bc.ca/bmgs/gsr/index.htm

Satellite technology is not required however, and georeferenced locations may also be obtained by recording them in UTM coordinates from maps registered to NAD 83.

[2] For an explanation of Design Components, see Section 2.2.4 in *Species Inventory Fundamentals* (RIC, 1998).

3.1.3. Personnel

The specific qualifications of project personnel are no longer specified. Rather, RISC addresses qualifications by requiring that inventory projects be managed and signed off by a qualified Registered Professional Biologist (RP Bio). The professional is responsible for the reliability of the data and reports. Personnel undertaking specific tasks within a project must possess appropriate skills and experience. Note that attendance and participation in specialized RISC-developed training courses is no longer required.

Before rigorous field surveys begin, all personnel should visit the study area to evaluate access, practice identification skills (if required), and familiarize themselves with the various ecosystem distributions and major land use practices. Crew leaders should be introduced to appropriate land and resource managers in the study area to avoid complications during active sampling. In certain situations it may be necessary to obtain permission from those with tenure over the land prior to commencing surveys. This is also an appropriate time to become familiar with the practicalities and logistics of the methods to be used, to sort out any problems and to refine techniques to suit site-specific conditions. As well, a review of the data capture templates (discussed below) is essential before attempting to record actual observations in the field.

3.2. Inventory Project Design and Data Management

There is an important distinction between the terms "data" and "information" to denote separate entities (Cooperrider *et al.* 1995). "Data" are defined as raw, unedited, unanalysed observations in the form of numbers, pictures, locations, and so on. "Information" refers to data which have been analyzed, synthesized or summarized so that inferences or predictions can be made about natural patterns. For example, an observation of an animal in a location is one datum; many such observations are data. A map of the distribution of the species compiled from such data is information. Unlike the raw data from which it was derived, information tends to address specific questions. For example, from a distribution map, it is possible to predict where a species is likely to occur.

Data management is an important area of project supervision. It is not uncommon that data are collected, a report is generated, and then the original data are misplaced, forgotten or left in a form that is unusable to resource managers and other data users. Ecological data are extremely expensive to acquire so the utmost care must be taken to maximize their life expectancy. In an effort to ensure that data remains interpretable and accessible to all, raw data and reports should be collected in such a way that they can be stored within a secure, accessible, central data repository. The Species Inventory Database (SPI) was created to achieve these objectives for wildlife inventory data.

3.2.1. Species Inventory Database (SPI)

The Species Inventory Database (SPI) was developed to store the data, results, and reports of inventory projects. The database was structured to emulate the design of an inventory project. Each project is assigned a unique business-area project ID (BAPID) to aid in cataloguing the data. All files for each project, including the original data files, are stored under this ID.

More information about the SPI database system is available at:

http://www.env.gov.bc.ca/wildlife/wsi/spidatasystem.htm

3.2.2. Inventory Surveys

Inventory surveys focus on **what species**, **when** it was detected, **where** it was detected, **how many** were detected, and **what area** was searched. Inventories may also collect other information related to the species, such as morphometric data, voucher specimens, and site-specific habitat information.

There are several templates (in Microsoft Excel™) for capturing detection data from the different inventory surveys, and a spatial data template for capturing spatial data about the areas searched (e.g. study areas boundaries, transects, or block boundaries). All inventory data must be submitted using the appropriate templates. For more details on the data capture templates, see the next sections.

3.2.3. Survey Data Templates

To ensure that detection data can be loaded into the SPI Database, all detections must be captured using consistent structure, codes and definitions. To accomplish this, survey data templates were designed to support the survey types described above. These templates are available as Microsoft Excel™ files.

Project information, survey observations, and incidental observations, are entered into the survey data templates. Location information (i.e. UTM coordinates) is required for each design component[3]. For example, provide the UTM coordinates for sample stations, for the center point of blocks, or for the start and end of transects or transect segments. The UTM coordinates of the individual observations are also required, if they have been collected.

Predefined data fields, codes, and their definitions are provided. As indicated in the templates, certain predefined fields are mandatory and must be completed for successful data loading. These fields must not be altered or removed. All other predefined fields are optional and can be removed but not renamed.

User-defined data fields and codes can be added to any template. These additional fields will be stored in the template copy and will be archived in the database along with the report and the original data submission. Archived copies can be downloaded via the Species Inventory Web Explorer (SIWE) in exactly the form that they were submitted. Only the predefined fields of the survey observations are available in the Land Resource Data Warehouse (LRDW) spatial views through iMap and ArcMap.

Worksheets may be added to the templates in order to analyze the data or additional workbooks may also be used to perform analyses. These analyses can be submitted, if desired.

Instructions for completing the template are located within each template file. The survey data templates are available at:

http://www.env.gov.bc.ca/wildlife/wsi/index.htm

3.2.4. Field Dataforms

There are several different ways the data may be recorded in the field. Clients may use the Microsoft Excel™ data capture templates or the dataform examples available on the RISC website (http://ilmbwww.gov.bc.ca/risc/pubs/tebiodiv/index.htm). Clients may also develop their own forms.

Regardless of the approach used for field data collection, detection data *must* be submitted using the survey data templates. Please follow the instructions for data submission, as described in section 3.2.8.

3.2.5. Spatial Data Template

Spatial lines and polygons are a valuable portion of the data from wildlife species inventory projects. Lines typically represent the transects traversed during a survey, and polygons typically represent boundaries of areas that were surveyed. Storage and access to these spatial features greatly increase the value of inventory data and the accompanying analyses such as density estimates, sex ratios, and age-class ratios for geographic areas.

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

To ensure that spatial features can be loaded into the Species Inventory (SPI) database, the format of all spatial features must conform to the standards described in the following section.

3.2.6. Spatial Data Structure

1. Spatial data for SPI inventory projects must include one or more of the following feature classes:
    a. StudyAreas
    b. Blocks
    c. Transects
    d. FlightLines
2. Spatial data must be in Albers BC projection.
3. Spatial data must be submitted in a standard spatial data template.
    a. The spatial data template is an empty ESRI™ file geodatabase. Much like the MS Excel™ survey data templates, the spatial data template contains predefined columns, codes, and structure in which spatial features can be created or loaded.
    b. An alternative Shapefile-based template is available to support data providers who work in the ArcView 3.xx environment.
    c. One spatial data template must be populated for each project; a spatial data template must not be populated with spatial data from more than one project.
    d. The spatial data templates are available at: http://www.env.gov.bc.ca/wildlife/wsi/index.htm and instructions for using the spatial data templates are located within each template file.
4. The standard spatial data template has the following characteristics
    a. Column names are no longer than ten characters.
        i. An ESRI™ file geodatabase permits long column names. However, a Shapefile only permits column names up to 10 characters long. In order to avoid confusion, the spatial data template has column names limited to 10 characters long so that the spatial data template column names are compatible with Shapefiles.
    b. Column names and their alias names are identical.
        i. Within an ESRI™ file geodatabase, differing names between column names and their aliases can be confusing because ArcView 9.xx will sometimes display the formal column name and sometimes the alias. Furthermore, when appending any Shapefile into the spatial data template, ArcView 9.xx only maps columns automatically based on the formal column names. Therefore the spatial data template is designed so that the column names and their aliases are identical, and are compatible with Shapefile column names.
    c. "SA_Name" and "Comments" columns are in every feature class
        i. Regardless of whether a spatial feature is to be associated with a study area, block, or transect, the "SA_Name" column must always be present and populated for each spatial feature. The names of the study areas must exactly match the names of the study areas listed in the MS Excel® data capture template. The "Comments" column is for free-form textual notes; it need not be populated.
    d. "Blocks" feature classes contain the additional column B_Label which must be populated with block labels that match the labels of blocks in the MS Excel® data capture template.

e. "Transects" feature classes contain the additional column T_Label which must be populated with transect labels that match the labels of transects in the MS Excel® data capture template.

f. "FlightLines" feature classes.

i. Flight lines can be associated with a block or a study area. The "FlightLines" feature class contains a column named "BelongsTo" that must be populated with values of either "Block" or "Study Area" to indicate whether each line is associated with a block or study area. If a flight line belongs to a block, then the "B_Label" column must be populated with the label of the block, and the label must exactly match the names of the blocks in the MS Excel® data capture template.

ii. Multiple flight lines may be associated with a single study area or a single block. In these cases, use the "Comments" column to differentiate between multiple flight lines.

3.2.7. Report

All data must have a report and reports should follow a standard scientific format[4]. Reports are required because they provide important metadata about the project. The report, including all figures and tables, must be in one PDF (portable document format) file. Appendices that are in separate files will be accepted in XLS (Microsoft Excel™) format.

3.2.8. Project Information

Project information allows reliable filing and tracking of projects. For an inventory project, typical information to report is the project name, project team, funding information etc. Project information must be entered on the online submissions site (see Section 3.2.8). Required fields must be completed.

3.2.9. Submission Procedures

Clients register their projects, submit data, and track project loading status on the online submissions site. Instructions on how to access the submission site are available at:

http://www.env.gov.bc.ca/wildlife/wsi/contributions.htm

After entering the submissions site, clients will be required to register themselves and their projects, complete survey description(s), and submit their completed survey data templates, spatial data templates, reports, and other supporting documents such as photos, graphics, and analysis spreadsheets.

For an inventory project to be considered complete, the following must be submitted:

- Completed project registration and survey description(s)
- Completed survey data template(s)
- Study area boundaries in a spatial data template
- If design components are used, spatial lines and/or polygons of design components in a spatial data template.
- A report.

[4] The report format details are available in Appendix B of the *Species Inventory Fundamentals* (RIC, 1998).