Joint Oil Sands Monitoring: Environment Canada Cause and Effects Monitoring for Landbirds

Standard Operating Procedure (SOP) 5: Data Entry and Verification

This Standard Operating Procedure describes the general procedures for data entry, verification, and quality control/quality assurance of field data in the working project database. The following are general guidelines:

1. Data should be entered as soon after data collection as possible so the field crews (Field Crew Lead and Field Technicians) remain current with data entry tasks, and identify any errors or problems as close to the time of data collection as possible.
2. The working database application is in the project workspace on the EC server. Users should copy the data entry template onto their workstation hard drives.
3. Each data entry form within the data entry template is patterned after the layout of the field data forms (Point Count and Vegetation Form and the Summary Form) and has built-in quality-assurance components such as drop-down lists and validation rules to test for missing data or illogical combinations.
4. As data are being entered, the person entering the data should visually review each data form to make sure that entered data matches the field data form. This should be done for each record and each data form prior to moving to the next data form for data entry.
5. After all data has been entered, the Project Manager should inspect the data to check for quality, completeness, and logical consistency. The Project Manager may also periodically run a series of quality control/quality assurance tools to check data for data integrity, data outliers, missing values, and illogical values. The Project Manager may then fix these problems and document the fixes.
6. After completion of quality control/quality assurance procedures, all data should be transferred to the project database for storage.

1. Data Entry Template

A data entry template was prepared in advance of the field season using Microsoft Excel. A spreadsheet format was chosen over entering data directly into a database due to the simplicity and ease of use for field crew staff. Cell validation rules and drop-down menus were used to restrict possible values and to minimize entry errors. Figure 1 shows the five primary data entry worksheets in the template with sample data.

Figure 1a. Site location worksheet in data entry template.

Figure 1b. Survey condition worksheet in data entry template.

Figure 1c. Bird observation worksheet in data entry template.

Figure 1d. Habitat assessment worksheet in data entry template.

Figure 1e. Vegetation assessment worksheet in data entry template.

2. Prepare Field Data for Entry

2.1 Complete Summary Form

After completing all of your point counts for the day, fill out the daily log and the Summary Form. Verify that all pertinent information has been recorded accurately. Make sure that all field data forms are properly stored in a secure location for safe keeping until you return to the office.

2.2 Check Transcription Accuracy

Once back in the office, review data on your field data forms with the following checks:

• All data is accurately transferred from the Point Count Form to Summary Form (e.g. location, bird data, weather, and notes).

• Point count data: Double-check all bird records to ensure that all records are included. Check to ensure that all required data is included on the Summary Form (e.g. observation #, species code, time period, location).

• Vegetation data: Check to ensure that all required data is included on the Vegetation Form (e.g. site, ecosite, habitat type, vegetation).

Confirm that you've completed these checks by using a Sharpie marker and writing **CH1☑** in the top right corner of your Point Count Form, Vegetation Form, and Summary Form.

2.3 Listen to Recordings from Audio Recording Unit (ARU)

If you recorded unknown birds (UNKN) or non-species specific observations (UNWA, UNVI) during your point count survey listen to the recording from the audio recording unit (ARU) to make a positive species identification.

Once you have identified an unknown bird from the recording, replace on the Point Count Form and Summary Form the UNKN (or UNWA) code with the actual species code, and add a note to the Bird Observation record that the UNKN was identified from the recording.

Listen to recordings from the audio recording unit (ARU) using a basic media player or the free software Audacity. Use over-the-ear headphones to limit external noise when listening to recordings.

3. Data Entry Procedures

Make a copy of the provided MS Excel spreadsheet named "Data Entry 2013.xls" and append your initials to the end of the file.

All columns are set and must not be changed. Many fields have validation checks and/or drop-down lists to restrict what can be entered. Columns shaded in light blue contain formulas to aid in entry and should not be overwritten.

Data types (e.g. Site, Survey Conditions, Bird Observations) must be entered in the given order, as information cascades between sheets to ensure validation and completeness.

If you are missing a piece of data or forgot to record something (e.g. Mesoslope), leave that cell blank and add a note in the comments section of the spreadsheet. Do not put N/A or X for missed data.

A very helpful keyboard shortcut for data entry is to use Ctrl-D to copy (fill down) the information into a cell from the cell above. This also works when highlighting multiple cells in a single row. To copy the value(s) from one row into multiple rows (e.g. for a flock of birds), highlight the value you want to copy along with the cell(s) you want to fill. Pressing Ctrl-D will fill down the top row of your selection into the selected cells.

3.1. Observer Information

Enter your Observer ID, name, and external contact information so that we can contact you regarding data issues after your employment period ends.

3.2. Site Information

Enter the Point Count Site ID (PCSiteID). If you created a new point count site you will need to enter the coordinates (in 10TM/NAD83 projection) manually. For pre-determined point count sites, the spreadsheet should automatically look up the coordinate values for you to check and confirm.

Add any relevant notes regarding the location of the point count site or access issues, including a note explaining the reason for establishing a new point count site.

3.3. Survey Conditions

Enter the date, time and weather conditions as recorded on your Point Count and Vegetation Form and Summary Form. If your start and end weather variables (e.g. wind) were outside of the normally acceptable range, enter them as recorded. We will assume that you made a judgement call in the field to conduct the point count survey.

Add any notes relevant to the conditions during the point count (e.g. frequent wind gusts, road or machinery noise, aircraft noise, air/sound cannons near tailings ponds).

3.4. Bird Observations

Enter all birds observed, each as a single row (record) in the spreadsheet. Flocks of birds should be copy-and-pasted into individual records (i.e. ten lines for a flock of ten PISI).

Enter the direction, distance and time interval for each bird observation. Enter as many detection types (singing, calling, and/or visual) as is relevant to each observation, with the initial detection type listed first if it's evident from your data sheet (if not, use S or V as the first detection type).

Enter age and sex if known—singing birds are assumed to be adult males. Enter any observed behaviours or leave those columns blank if no additional behaviours were observed.

For unknown birds, enter the precise time(s) that the bird sang or called to align with the recording from the audio recording unit (ARU).

Enter any notes about specific bird observations (e.g. WTSP sang prior to start of point count but only called during the 10 minute period).

3.5. Habitat Assessments

Enter the ecosite and habitat type information from the Vegetation Form.

If you started the vegetation classification immediately after completing the point count, the spreadsheet will automatically fill in the appropriate date and time for you to check and confirm.

Ecosite information must be entered to the level of plant community type. If plant community type was not assessed (and if there is more than one option for plant community type for the observed ecosite phase) enter the plant community type as 0 (zero) (e.g. BM-d1.0).

Enter any notes explaining ecosite information and classification. Enter any notes explaining habitat type information and classification especially when the mapped habitat type does not match the observed habitat type. Ensure that your notes are clear, logical, and consistent.

3.6. Vegetation Assessments

Enter the canopy, tree, shrub and ground cover information from the Vegetation Form.

All vegetation species must be entered using standard 7-letter codes. All codes used for entry will be in the drop-down lists for each cell, and the complete lists are in separate worksheets that can be searched (press Ctrl-F) by common or Latin names to find the correct code.

Enter any notes concerning specific vegetation cover attributes (e.g. canopy aspen 80% defoliated by caterpillars; scattered large residual trees within forest stand).

3.7. Nest Observations

Enter all information collected about nests detected while conducting point count surveys, including notes on nest location (coordinates in 10TM/NAD83 projection), nest position (branch, shrub, ground), individual birds and activities observed at the nest, and any other relevant details.

4. Data Quality Control/Quality Assurance Procedures

4.1 Check Entry Accuracy

After entering all of the data from each survey area, compare the data from the Summary Form (point count data) and Vegetation Form (vegetation data) to the entered data. Ensure that the two sets of data align.

Confirm that you've completed these checks by using a Sharpie marker and writing **CH2☑** in the top right corner of your Point Count Form, Vegetation Form, and Summary Form.

4.2 Data Verification Procedures

After all field data has been entered electronically and checked for data entry errors, the Project Manager will collect the data entry templates and compile all the data into a single "master" file. Once compiled, several data verification procedures will be conducted to ensure that the data is complete, consistent, and accurate. These data verification procedures are listed below:

4.3 Non-spatial Data

1. Check for duplicate or erroneous PC Site IDs. Each PC Site ID must be unique and adhere to the common 7-digit alphanumeric format (see SOP 3: Conducting Point Counts for naming convention).

2. Check that each PC Site ID has all associated data including: Site, Survey Conditions, Bird Observations, Habitat Assessment, Vegetation Assessment, and if relevant, Nest Observations (see SOP 3: Conducting Point Counts and SOP 4: Classifying Vegetation for all required data).

3. Ensure that all required fields have values entered and that missing data is properly commented.

4. Check that all data meets validation criteria. Under certain circumstances (e.g. copy and pasting data) validation rule checking is bypassed during entry. Validation rules will be checked manually and invalid data will be highlighted for review.

5. Check that all entered data aligns with daily work reports recorded by Crew Leaders in the daily log books.

4.4 Spatial Data

Because the spatial location of the data is of such high importance to this project, a number of assessments will be used to check the accuracy of the spatial data. These assessments include:

1. For established point count sites, compare recorded UTM coordinates with GIS coordinates.

2. For each new point count site established in the field, compare the recorded UTM coordinates with marked GPS waypoints.

3. Check for point count sites > 2 kilometers from other point count sites, which likely indicate a position error.

4. Check that the Mapped Habitat Type recorded during the vegetation classification matches the habitat type obtained when intersecting the point count site coordinates with the habitat type layer in ArcGIS.

5. Ensure that point count site locations fall along tracklogs recorded by the GPS units carried by each member of the field crew staff (Project Lead, Project Manager, Field Crew Leads, Field Technicians). Point count sites that are located a large distance (> 20 meters) from the tracklogs likely indicate a position error.

5. Transfer to Project Database

Once the data has been assessed and appears to be free of significant errors or inconsistencies, all data will be imported into the project database for storage and additional summary and analysis.

5.1 Project Database Design

Figure 2 shows the tables and relationship structure of the project database (EC OSM Landbird database). The data entry template (see Figure 1) was designed to mirror the table structure of the database.
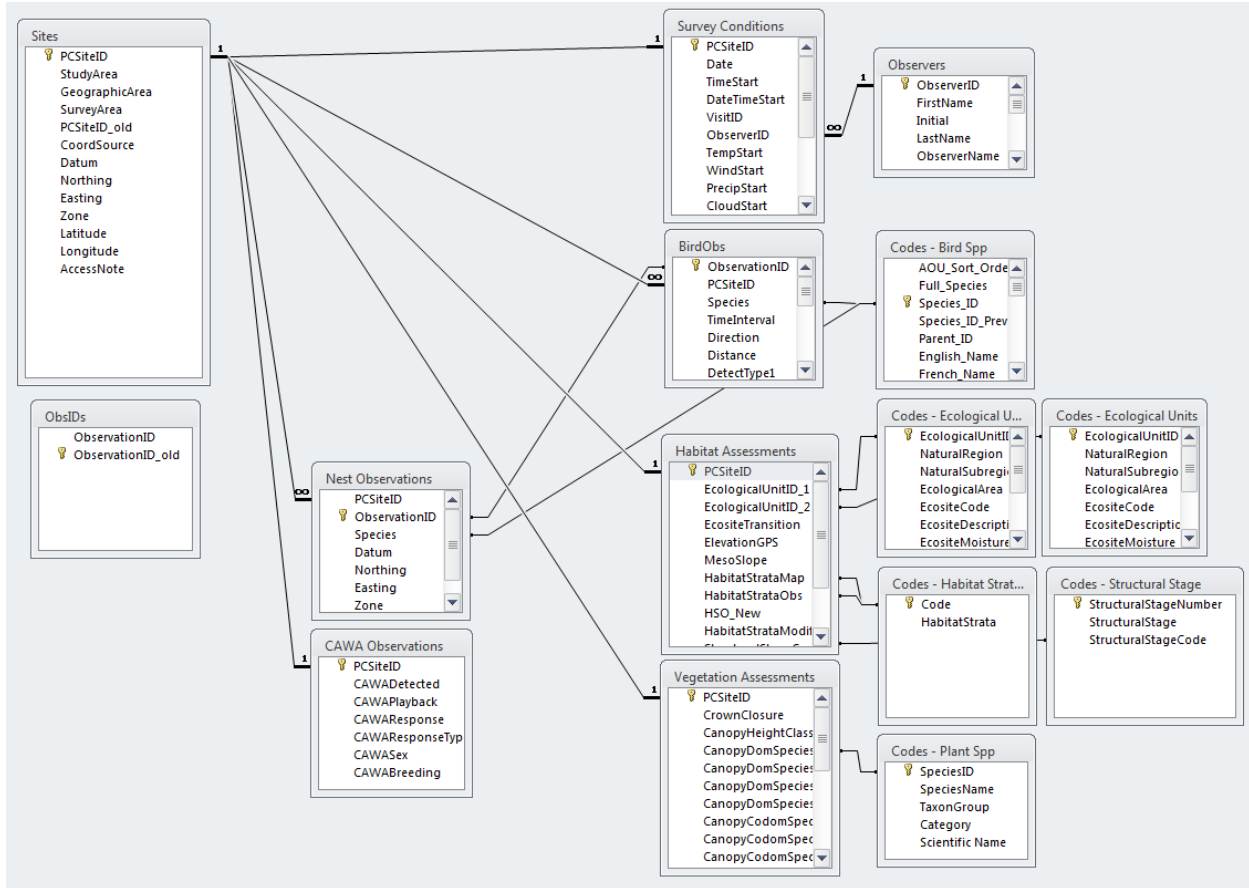
Figure 2. Structure of project database (EC OSM LB database).

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