

## **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.

A	B	C	D	E	F	G	H	I
StudyArea	GeographicArea	SurveyArea	PCSiteID	EastingX	NorthingY	CoordSource	ObsDateTimeHC	SiteNote
1	OSA	CL	CL10102	604035.181250000	6114905.154440000	GIS	TCL 6/22 5:12, DM5	
2	OSA	CL	CL10106	604175.722970000	6113651.089810000	GIS	DB, 6/22 6:29, FN5	
3	OSA	CL	CL10108	604521.671840000	6113737.577020000	GIS	DB, 6/22 5:11, FN5	
4	OSA	CL	CL10109	604694.646270000	6114970.019860000	GIS	TCL 6/22 5:52, DM4	
5	OSA	CL	CL10111	604695.954870000	6112833.729170000	GIS	DB, 6/22 7:55, DM5	
6	OSA	CL	CL10112	604791.944390000	6113315.951840000	GIS	DB, 6/22 7:16, DM5	
7	OSA	CL	CL10114	604867.620700000	6111726.749240000	GIS	DB, 6/22 9:29, DM5	
8	OSA	CL	CL10117	605278.434980000	6113888.929650000	GIS	TCL 6/22 8:33, DM4	
9	OSA	CL	CL10118	605418.976710000	6114905.154440000	GIS	TCL 6/22 6:37, DM4	
10	OSA	CL	CL10119	605462.220320000	6113456.493570000	GIS	TCL 6/22 9:05, DM5	
11	OSA	CL	CL10120	605656.816550000	6114191.634910000	GIS	TCL 6/22 7:58, SH3	
12	OSA	CL	CL10121	605537.896630000	6112980.813880000	GIS	TCL 6/22 9:34, DM5	
13	OSA	CL	CL10122	605991.954520000	6114786.234520000	GIS	TCL 6/22 7:19, DM4	
14	OSA	CL	CL10170	606640.000378344	6110939.971510290	GPS	DB, 6/24 5:00, DM4	
15	OSA	CL	CL10171	606819.988912297	6111360.054065730	GPS	DB, 6/24 5:44, DM4	
16	OSA	CL	CL10172	606539.983084753	6111629.987611670	GPS	DB, 6/24 6:19, DW4	
17	OSA	CL	CL10173	607050.009045259	6112000.026167380	GPS	DB, 6/24 7:09, DM5	
18	OSA	CL	CL10174	607129.98257017	6112340.038961140	GPS	DB, 6/24 7:44, DM5	
19	OSA	CL	CL10175	607100.034094446	6112749.960784800	GPS	DB, 6/24 8:16, DM5	
20	OSA	CL	CL10176	606699.989727931	6113079.977391650	GPS	DB, 6/24 8:50, DM5	
21	OSA	CL	CL10177	606699.989306489	6113429.969846750	GPS	DB, 6/24 9:20, DM4	
22	OSA	CL	CL10180	607209.981963440	6111160.004877690	GPS	TCL 6/24 5:04, DM5	
23	OSA	CL	CL10181	607569.989521388	6111450.033152390	GPS	TCL 6/24 5:41, DM5	
24	OSA	CL	CL10182	607150.015594590	6111709.978190640	GPS	TCL 6/24 6:15, DM5	
25	OSA	CL	CL10183	607390.024119480	6112150.008338850	GPS	TCL 6/24 6:45, DM5	
26	OSA	CL	CL10184	607689.986594776	6112230.049072360	GPS	TCL 6/24 7:12, DM5	
27	OSA	CL	CL10185	607399.991849257	6112609.970988280	GPS	TCL 6/24 7:48, DM5	
28	OSA	CL	CL10186	607380.013152201	6112970.054325100	GPS	TCL 6/24 8:19, DM5	
29	OSA	CL	CL10187	607100.025003600	6113350.012955510	GPS	TCL 6/24 9:12, DM5	
30	OSA	CL	CL10188	607050.012547734	6113060.021010350	GPS	TCL 6/24 8:46, DM5	
31	OSA	CL	CL10189	606950.002751427	6113690.048113550	GPS	TCL 6/24 9:36, DM5	
32	OSA	CL	CL10190	604301.020735266	6113949.991482850	GPS	DB, 6/22 5:52, FN5	
33	OSA	CL	CL10191	604899.999522990	6112560.032813440	GPS	DB, 6/22 8:27, DM5	
34	OSA	CL	CL10192	604996.000000000	6112225.000000000	MAP	DB, 6/22 9:00, DM5	
35	OSA	CL	CL10204	617149.888850000	6122068.593410000	GIS	CAM, 5/27 10:14, SP3	Created point because routed point (CL10116) was too close (< 300m) from previous point (CL10191). Way

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

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
PCSiteID	Date	TimeStart	ObserverID	TempStart	WindStart	PrecipStart	CloudStart	TempEnd	WindEnd	PrecipEnd	CloudEnd	Noise	O/N Rain	Recording	SurveyNote
1	CL10102	22/06/2013	5:12	TCL	8.5	0	0	0	7.4	0	0	0	1	N	SM2 NOISE: HWY
2	CL10106	22/06/2013	6:29	DB	4.8	0	0	3	4.5	0	0	3	0	N	SM2
3	CL10108	22/06/2013	5:11	DB	4.1	0	0	0	4.0	0	0	0	0	N	SM2
4	CL10109	22/06/2013	5:52	TCL	8.7	0	0	0	7	0	0	0	1	N	SM2 NOISE: BOAT
5	CL10111	22/06/2013	7:55	DB	9.2	0	0	3	9.4	0	0	3	0	N	SM2
6	CL10112	22/06/2013	7:16	DB	8.0	1	2	3	8.2	1	0	3	0	N	SM2 Precipitation: occasional drops of rain
7	CL10114	22/06/2013	9:29	DB	13.9	2	0	0	14.3	2	0	0	1	N	SM2 Noise: overhead plane
8	CL10117	22/06/2013	8:33	TCL	11.2	0	0	2	10.9	0	0	2	0	N	SM2
9	CL10118	22/06/2013	6:37	TCL	8.7	0	0	3	7.2	0	0	3	0	N	SM2
10	CL10119	22/06/2013	9:05	TCL	13.1	0	0	1	13.2	2	0	1	1	N	SM2 WT DEER STAMPING FEET AND SNEEZING....
11	CL10120	22/06/2013	7:58	TCL	9.5	0	0	2	9.6	0	2	2	0	N	SM2
12	CL10121	22/06/2013	9:34	TCL	14.1	2	0	1	13.3	2	0	1	1	N	SM2
13	CL10122	22/06/2013	7:19	TCL	7.9	3	1	3	8.2	3	0	3	1	N	SM2 NOISE: BOAT
14	CL10170	24/06/2013	5:00	DB	7.8	0	0	2	7.9	0	0	1	0	Y	SM2 O/N Rain: previous late-afternoon. Water dripping from trees
15	CL10171	24/06/2013	5:44	DB	7.6	0	0	0	7.4	0	0	0	0	Y	SM2 BAWW sang from NW quadrant, 0-50m, just after count ended. Another, cc
16	CL10172	24/06/2013	6:19	DB	7.3	0	0	2	6.3	0	0	2	0	Y	SM2 O/N Rain: previous late-afternoon.
17	CL10173	24/06/2013	7:09	DB	6.4	0	0	2	8.1	0	0	3	0	Y	None O/N Rain: previous late-afternoon. YRWA sang right after count ended (1-5
18	CL10174	24/06/2013	7:44	DB	9.8	0	0	0	9.5	0	0	1	1	Y	SM2 O/N Rain: previous late-afternoon. Noise: small aircraft in distance. Hearc
19	CL10175	24/06/2013	8:16	DB	9.9	1	2	2	10.5	0	0	2	0	Y	SM2 O/N Rain: previous late-afternoon. Precipitation: a few drops in period 1 a
20	CL10176	24/06/2013	8:50	DB	11.4	0	0	3	11.5	0	0	3	0	Y	SM2 O/N Rain: previous late-afternoon. Distracted during count by noises in th
21	CL10177	24/06/2013	9:20	DB	12.7	0	0	2	13.5	0	0	2	0	Y	SM2 O/N Rain: previous late-afternoon.
22	CL10180	24/06/2013	5:04	TCL	12.4	0	0	0	9.5	0	0	0	0	Y	None NO RECORDING
23	CL10181	24/06/2013	5:41	TCL	7.8	0	0	0	7.4	0	0	0	0	Y	None NO RECORDING
24	CL10182	24/06/2013	6:15	TCL	8.8	0	2	2	7.5	0	2	2	1	Y	None NO RECORDING (NOISE: RAINDROPS)
25	CL10183	24/06/2013	6:45	TCL	8.5	0	0	0	7.8	0	0	0	0	Y	None NO RECORDING
26	CL10184	24/06/2013	7:12	TCL	8.7	0	2	3	8.7	0	2	3	0	Y	None NO RECORDING
27	CL10185	24/06/2013	7:48	TCL	9.8	0	0	2	9.5	0	0	2	1	Y	None NO RECORDING
28	CL10186	24/06/2013	8:19	TCL	11.1	1	0	2	11.5	0	0	2	1	Y	None NO RECORDING, NOISE: BOATS. IN CALLING LAKE PROVINCIAL PARK.
29	CL10187	24/06/2013	9:12	TCL	13.5	0	0	3	13.6	0	0	3	1	Y	None NO RECORDING
30	CL10188	24/06/2013	8:46	TCL	12.3	0	0	2	12.4	0	0	3	1	Y	None NO RECORDING, NOISE: BOATS, ROAD
31	CL10189	24/06/2013	9:36	TCL	14.5	0	0	3	14.7	0	0	2	0	Y	None NO RECORDING
32	CL10190	22/06/2013	5:52	DB	3.4	0	0	1	3.0	0	0	2	0	N	SM2 Cloud to east but clear directly above
33	CL10191	22/06/2013	8:27	DB	9.9	0	0	3	10.3	0	0	3	1	N	SM2 Noise: overhead plane, briefly.
34	CL10192	22/06/2013	9:00	DB	12.0	0	0	1	12.2	0	0	1	0	N	SM2 Read PCSiteID as "CL10116-2" on SM2 recording. Subsequently re-named p
35	CL10204	27/05/2013	10:14	CAM	16.1	1	0	1	17.2	1	0	1	1	Y	SM2

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

ObservationID	PCSiteID	ObsNum	Species	Direction	Distance	TimeInterval	DetectType1	DetectType2	DetectType3	Age	Sex	Activity1	Activity2	Activity3	ActivityNote	BirdObsNote
1	CL10102	1	REVI	1	1	1	S				A	M	CS			
2	CL10102	2	OVEN	2	2	1	S				A	M	CS			
3	CL10102	3	OVEN	2	2	1	S				A	M	CS			
4	CL10102	4	REVI	2	1	1	S				A	M	CS			
5	CL10102	5	CORA	1	3	5	C				A	U				
6	CL10102	6	COLO	4	3	5	C				A	U				
7	CL10102	7	UNWU	4	2	3	S				A	U	DR			
8	CL10102	8	YRWA	4	2	1	S				A	M				
9	CL10102	9	OVEN	4	1	1	S				A	M	CS			
10	CL10106	1	TEWA	1	1	1	S				A	M	CS			
11	CL10106	2	CHSP	1	1	1	S				A	M				
12	CL10106	3	YRWA	1	1	5	S				A	M				
13	CL10106	4	SWTH	1	1	1	S				A	M	CS			
14	CL10106	5	REVI	2	1	1	S				A	M				
15	CL10106	6	WIWR	2	2	5	S				A	M	CS			
16	CL10106	7	BHVI	3	1	5	S				A	M				
17	CL10106	8	TEWA	3	1	1	S				A	M	CS			
18	CL10106	9	TEWA	3	2	1	S				A	M	CS			
19	CL10106	10	UNWA	3	1	3	S				A	M				Hard to hear over loud and close TE
20	CL10106	11	SWTH	4	1	1	S				A	M	CS			
21	CL10106	12	WIWR	4	1	1	S				A	M	CS			
22	CL10106	13	TEWA	4	2	1	S				A	M	CS			
23	CL10106	14	SWTH	4	2	5	S				A	M				"duck-like" grunt
24	CL10106	15	UNKN	2	1	1	C				U	U				
25	CL10106	16	CORA	3	3	3	C				U	U				
26	CL10108	1	SWTH	1	2	1	S				A	M				
27	CL10108	2	LEFL	1	2	1	S				A	M				
28	CL10108	3	LISP	1	1	1	S				A	M	CS			
29	CL10108	4	ALFL	1	1	1	S				A	M	CS			
30	CL10108	5	YRWA	2	1	1	S				A	M				
31	CL10108	6	COYE	2	1	1	S				A	M				
32	CL10108	7	PIWO	2	2	1	S				A	M	DR			Call in period 1, song (drum) in per
33	CL10108	8	HETH	2	3	3	S				A	M				
34	CL10108	9	ALFP	3	1	1	S				A	M	CS			
35	CL10108	10	LISP	3	1	1	S				A	M	CS			

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

PCSiteID	DateVeg	TimeVeg	ObserverID	NatReg	SubReg	EcoUnitID_1	EcoUnitID_2	EcoTransition	MesoSlope	HC_Map	HC_Obs	StructStage	HabitatNote
1	CL10102	22/06/2013	5:22 TCL	BF	CM	BM-D1.5			LV	DM5	DM5	YF	
2	CL10106	22/06/2013	6:39 DB	BF	CM	BM-k1.1			LV	MW5	FNS	YF	
3	CL10108	22/06/2013	5:21 DB	BF	CM	BM-k1.1			LV	MW5	FNS	YF	Mostly tall shrub, grass, and horsetail (few actual trees, but some Bw and Lt)
4	CL10109	22/06/2013	6:02 TCL	BF	CM	BM-D1.5			LV	DM4	DM4	PS	
5	CL10111	22/06/2013	8:05 DB	BF	CM	BM-d1.0			LV	DM5	DM5	YF	
6	CL10112	22/06/2013	7:26 DB	BF	CM	BM-d1.0			LV	DM5	DM5	YF	
7	CL10114	22/06/2013	9:39 DB	BF	CM	BM-d1.0			MD	DM5	DM5	YF	
8	CL10117	22/06/2013	8:43 TCL	BF	CM	BM-D1.5			MD	DM4	DM4	PS	
9	CL10118	22/06/2013	6:47 TCL	BF	CM	BM-D1.5			MD	DM4	DM4	PS	
10	CL10119	22/06/2013	9:15 TCL	BF	CM	BM-D1.5			LV	DM5	DM5	YF	
11	CL10120	22/06/2013	8:08 TCL	BF	CM	BM-F1.1			LV	SH3	SH3	SH	
12	CL10121	22/06/2013	9:44 TCL	BF	CM	BM-D1.5			LV	DM5	DM5	YF	
13	CL10122	22/06/2013	7:29 TCL	BF	CM	BM-D1.5			MD	DM4	DM4	PS	
14	CL10170	24/06/2013	5:10 DB	BF	CM	BM-d1.0			LV	DM4	DM4	PS	Some of the Aw starting to be taller and larger in diameter than 4/PS. Almost 5/YF in places.
15	CL10171	24/06/2013	5:54 DB	BF	CM	BM-d1.0			LV	DM4	DM4	PS	
16	CL10172	24/06/2013	6:29 DB	BF	CM	BM-e1.0			LV	DM4	DM4	PS	
17	CL10173	24/06/2013	7:19 DB	BF	CM	BM-d1.0			LV	DM5	DM5	YF	
18	CL10174	24/06/2013	7:54 DB	BF	CM	BM-d1.0			LV	DM5	DM5	YF	
19	CL10175	24/06/2013	8:26 DB	BF	CM	BM-d1.0			LV	DM5	DM5	YF	
20	CL10176	24/06/2013	9:00 DB	BF	CM	BM-d1.0			LV	DM5	DM5	YF	
21	CL10177	24/06/2013	9:30 DB	BF	CM	BM-d1.0			LV	DM4	DM4	PS	
22	CL10180	24/06/2013	5:14 TCL	BF	CM	BM-D1.8			LV	DM5	DM5	YF	
23	CL10181	24/06/2013	5:51 TCL	BF	CM	BM-D1.8			MD	DM4	DM5	YF	
24	CL10182	24/06/2013	6:25 TCL	BF	CM	BM-D1.5			LV	DM5	DM5	YF	
25	CL10183	24/06/2013	6:55 TCL	BF	CM	BM-D1.5			LV	DM5	DM5	YF	
26	CL10184	24/06/2013	7:22 TCL	BF	CM	BM-D1.5			MD	DM5	DM5	YF	
27	CL10185	24/06/2013	7:58 TCL	BF	CM	BM-D1.5			LV	DM5	DM5	YF	
28	CL10186	24/06/2013	8:29 TCL	BF	CM	BM-D1.5			LV	DM5	DM5	YF	
29	CL10187	24/06/2013	9:22 TCL	BF	CM	BM-D1.5			LV	DM5	DM5	YF	
30	CL10188	24/06/2013	8:56 TCL	BF	CM	BM-D1.5			LV	DM5	DM5	YF	
31	CL10189	24/06/2013	9:46 TCL	BF	CM	BM-D1.5			MD	DM5	DM5	YF	
32	CL10190	22/06/2013	6:02 DB	BF	CM	BM-k1.1			LV	MW5	FNS	YF	
33	CL10191	22/06/2013	8:37 DB	BF	CM	BM-d1.0			LV	DM5	DM5	YF	
34	CL10192	22/06/2013	9:10 DB	BF	CM	BM-d1.0			LV	DM5	DM5	YF	
35	CL10204	27/05/2013	10:24 CAM	BF	CM	BM-k2.2			LV	SP3	SP3	SH	SOME PATCHES OF BLACK SPRUCE IN DISTANCE

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.



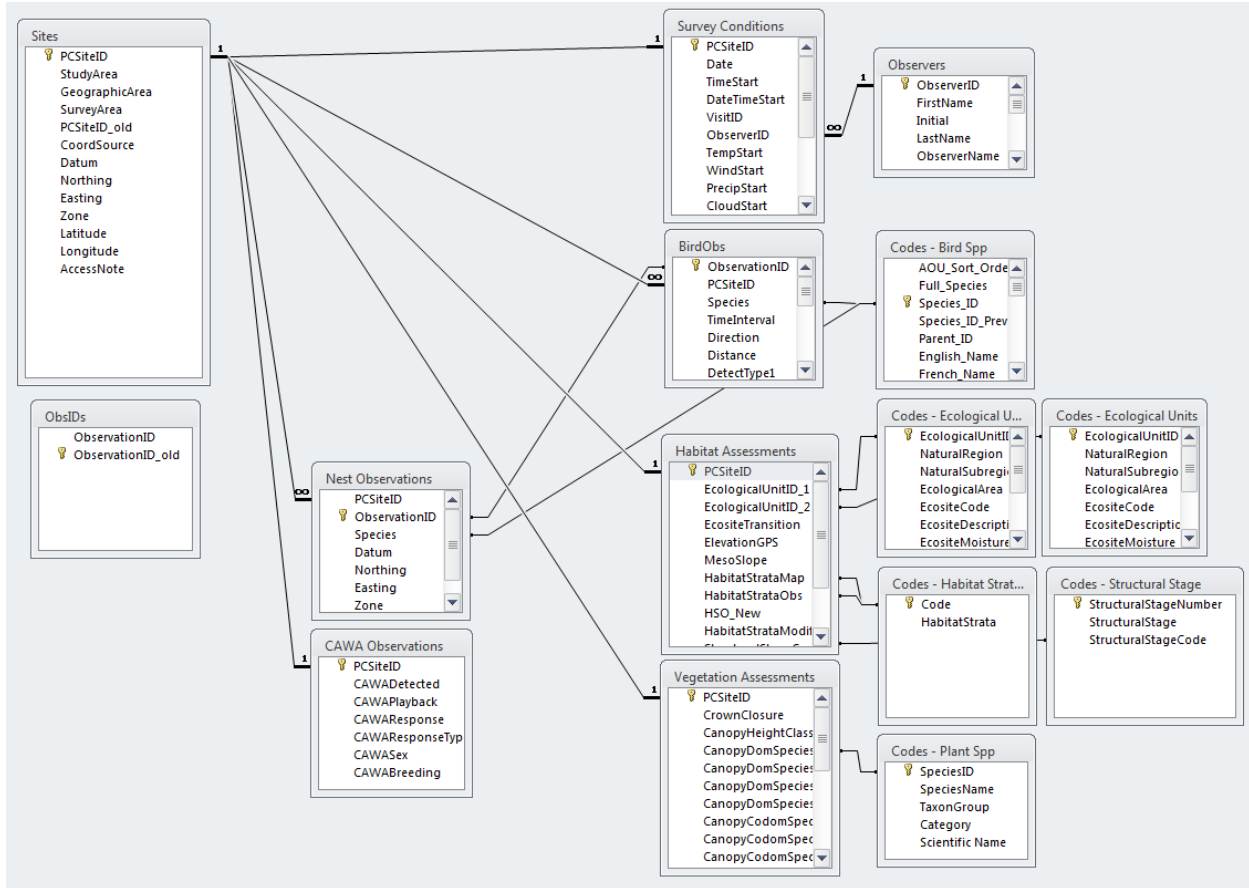
2. For each new point count site established in the field, compare the recorded UTM coordinates with marked GPS waypoints.
3. Check for point count sites > 2 kilometers from other point count sites, which likely indicate a position error.
4. Check that the Mapped Habitat Type recorded during the vegetation 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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