

Integrated Monitoring in Bird Conservation Regions (IMBCR):

Point Transect Quality Assurance/Quality Control Protocol

2014



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I. Introduction

In order to provide data quality assurance, IMBCR Partners proof the data collected and entered into the database after each field season. To efficiently catch as many errors as possible the data undergoes a full proof followed by a proof using data queries. The full proof is designed to catch data entry errors that cannot be detected using the data queries. The proofing queries will identify records that are unusual in some way to facilitate further inspection. This process forms the second line of defense in eliminating erroneous records that may be missed during the full proof. Every technician and project is different; so proofers will need to actively consider the data proofing process for their area of interest. Do not ignore any incomplete or incorrect data that may become evident while following this protocol. If at any point you have concerns about data accuracy, do not wait to address them because you may not remember to correct these issues later. We ask that a project lead for the program oversee the query proofing process. Also, we recommend that all data entry and full proofing be completed prior to the onset of the query proofs. This will ensure that all data are available to be proofed, that full proofers will not undo a change made during the query proofing process, and that the volume of proofing for the query proofer will be reduced.

You will need to generate several queries in order to complete the data query proofing process. RMBO has set up a website where you can run queries specific to your study area. This website can be accessed at <https://fc.rmbo.org/queryproof.aspx> for those working outside of the Fort Collins RMBO office and at <intranet/queryproof.aspx> for those working within the Fort Collins RMBO office. Login information is required to access this website. If you do not have login information please contact Chris White at chris.white@rmbo.org. Once logged in you will find buttons for proofed or unproofed data, buttons for raw and query proofing data, filter options, and a “Download” button. Query proofers should select “Unproofed Data” and “Query Proofing Data” at the top of the screen. Next, add the “Study Design” filter and select “IMBCR”. Next, select the state you are interested in followed by the BCR. Note that you can select multiple BCRs if you want (e.g., Avian Science Center can select IMBCR, MT, BCR10, and BCR17) to get data specific to your area or you can leave out the BCR altogether and just select a state. Alternatively, you can add the “Collected By” filter and select your organization from the drop-down list. Lastly, you will want to add the “Year” filter and select the current year. The query produces many separate sheets within an excel file and therefore can take some time to run. The more specific your filters are the faster the query will run. If you have a large project you may want to run separate queries for smaller portions of your project area. There are additional query filters such as stratum, county and management entity that should allow you to make the query as specific as you need.

Once you have set your filters, hit the “Download” button to download the queries for your study area. A pop-up window will appear warning you that you are using unproofed data and it will ask you if this is what you want. Click the “OK” button. Once the download is complete a single Excel workbook will be generated with multiple worksheets; one for each query. Save this workbook on your computer for the proofing process. Prior to beginning the query proofing process the query proofer should cross-check their list of transects completed with the “Transect Start Times” worksheet in the query proofing workbook to ensure that the query proofing download includes all surveys completed during the desired timeframe. The “Transect Start Times” query should be used since it contains start times for all transects

included in the query. Note that the Date column in each tab will have an unusual format. If you highlight the Date column, right-click the selected column and choose “Format Cells”, select Date from the options on the Number tab, select the top Date format option, hit “Okay”, the date will be in a format that you can recognize.

The first two tabs in the query workbook contain the raw bird and vegetation data for your project which can serve as a reference tool. The remaining worksheets will contain a variety of suspicious records within the database. You will investigate the lines within each of these tabs to ensure no typos or erroneous data were collected. In each query worksheet the query proofer should change the font of lines that have been proofed and do not have an error to blue. Similarly, the font should be changed to red for rows with an error. When an error is found the proofer should make a note describing the problem and the change that was made. Once the proofing process is complete you will send your saved Excel Workbook with notes to Chris White at chris.white@rmbo.org.

II. Physical Data

1. Data Entry

To begin query proofing you will need to have hard copies or scanned copies of all the datasheets and all the data must be entered into the database and full-proofed. Proofers should visit <https://fc.rmbo.org/Default.aspx> (visit <http://intranet/> if you are in the Fort Collins office) to view a list of transects entered into the database. Once you have logged in, click on the “Data Entry Status (CSV Download)” option at the top of the page. A data entry status query will automatically run and generate an excel workbook for you. This workbook contains a list of transects entered into the database for the current year, the date the survey was conducted, the number of points checked as completed, the number of points with bird data entered (Bird Points), the number of points with vegetation data entered (Veg Points), the observer, the data enterer and the date and time the transect was submitted to the database. Additionally, the workbook contains a column entitled “Point Difference” which subtracts the number of points with bird data from the number of points with vegetation data. Non-zero values in this column indicate there is a problem that needs to be fixed. It’s also a good idea to check that the number of points marked as complete matches the number of bird points with data entered.

2. Scanning Data

Electronic copies of all bird monitoring datasheets serve as backups in case physical datasheets are lost. Field technicians should scan all of their data at the end of each 10-day work period and email it to their crew leaders. Crew leaders will be responsible for keeping this data organized.

If, for some reason, you do not have a scanned copy of a transect, you will need to create one. Before scanning, compile the datasheets for each transect in the following order: a) transect description page, b) transect map c) Landowner Contact Page, d) Landowner Contact Log, e) vegetation datasheet, f) reasons points not completed, g) bird datasheet(s). Be sure to scan each transect in this order and make sure all pages associated with a transect are saved as a single PDF document.

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Verify that all of the scanned data is legible and complete, then make sure each file is saved with the exact same name as the transect, followed by the year the survey was conducted (i.e., “CO-BCR16-BL21_2014”).

If you are working from the RMBO office in Fort Collins please save all scanned copies of your data on the server at \\RMBONAS1\Science\Datasheets. If you do not work in the Fort Collins office you will need to upload your scanned data onto RMBO’s cloud storage site (<https://files.rmbo.org>).

Note: You should always retain a copy of the scanned data on your own computer for future reference.

To log in, you can use the same username and password that you use to access the landowner database, query website, transect descriptions, etc. Please follow the steps below to share your scanned data:

1. Log on to the site, hit the New button up at the top, select Folder, type an appropriately named folder to save your datasheet scans to and hit enter.
2. Click on the folder you just created, then hit the upload button next to the New button.
3. Navigate to the datasheet scans you want to upload, click on one of the files, then hit Ctrl+A to select all files
4. Hit the Open button and the file should begin to upload. You should see a progress bar displayed next to the upload button. It will probably take a while for all the files to upload.
5. Hit the home button. Hover over the folder you created and click on the Share link off to the right. In the space provided, type in “Chris White” and hit enter. Click on the “Notify by email” option so that I will know when you’ve added your files.
6. You’re done! Note that after step 1, you can drag-and-drop the datasheet scans into this folder rather than selecting them through the upload option if you prefer.

3. Datasheet Organization

Compile and staple together datasheets for each transect in the order that they were scanned. Organize transects by alphanumeric order according to project, BCR, state, or some other logical grouping. File these datasheets into the appropriate, pre-existing binders or create new binders as necessary.

4. Datasheet Check

Once you receive all the data from your field technicians, check through the hard copies of the data to verify that you have a copy of each transect completed. Check against the list of completed transects you put together during the field season for this. You may need to contact field technicians to track down any missing data.

III. Transect Description Pages

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Refer to the “Transect Descriptions” worksheet in the query workbook. This query will only display transect description information for surveys that have been entered. All of the information listed on the Transect Description Page for each transect in the database will be displayed. Look through this worksheet and verify that technicians have entered their information correctly and completely. If you find errors in this table, you will need to make corrections using the Transect Description portion of the data entry application.

Note that it may be necessary to shorten long transect directions, descriptions, or notes as they may not print properly when generating transect description pages. If you are concerned that one of these fields may contain too many characters, go to <https://fc.rmbo.org/TransectDescriptionSheets.aspx> (<http://intranet/> if working from within the RMBO Fort Collins office) and generate the transect description page to see if looks okay.

1. Access Point UTMs

It is very useful to have Access Point (AP) UTM's associated with each transect. Make sure there are AP UTM's associated with every completed transect. If you cannot find UTM's on any of the datasheets or the technician's GPS, then make a note in the notes section telling future observers to record that information.

2. DeLorme Page

Check to make sure every active transect has a DeLorme Page number and location code entered on the transect description page (i.e., 24 B3). This information makes it much easier to locate the transect on a map. If an active transect is missing this information, look up the transect map (<https://fc.rmbo.org/TransectDescriptionSheets.aspx>) (<http://intranet/> if working from within the RMBO Fort Collins office), find this location on a DeLorme Atlas, and enter it into the database. If you do not use DeLorme Maps for your project, you can skip this step.

3. Vehicle Accessibility

Verify that every survey completed has vehicle accessibility associated with it. The column for this on the transect table will have number values on it. These number values correspond with the vehicle accessibility options seen on the transect description page on the data entry site: 0 = Blank, 1 = All vehicles, 2 = High-clearance and 3 = 4WD only. If there are any 0's for completed surveys then there is no accessibility associated with that survey and the information needs to be filled in. Contact technicians about any missing vehicle accessibility information because you cannot always determine vehicle accessibility without physically visiting a site.

4. Transect Directions

Accurate and detailed directions to each transect are essential to finding transects on the ground (refer to the Field Protocol for Spatially-balanced Sampling for more information on transect directions). Check to make sure every completed transect has directions. If a transect is missing directions, first check the hard copy of the transect description page to see if the field technician recorded directions there. If not, contact the field technician responsible for this transect and ask

them to enter the directions. If they no longer have this information or cannot remember how to get there, record directions to the transect as best you can using a map. If you have to resort to this last option, make a note that the directions are approximate and that they should be ground-truthed and updated by the next surveyor.

5. Transect Description

The transect description should contain information about 1) which points are accessible, 2) which points are private or public, 3) what habitat types are present on the transect and 4) what order the points should be conducted (if applicable). Fill in any missing information as described in the above section.

6. Notes/Camping Info

The notes section should contain directions to the nearest or best camping spot in the area. If no camping is available, then there should be notes about where to stay in town, or other options. Eliminate any notes listing rare or unusual species detected on the transect. These notes may influence future observers and the birds they detect. Notes about interesting bird species at camp or somewhere outside of the survey grid are acceptable and may be retained.

7. Access and Transect Difficulty

This information should be filled out for every completed survey using the difficulty rubric found in the Field Protocol for Spatially-balanced Sampling. There are two separate columns; one for access difficulty and one for transect difficulty. If any completed surveys are missing this information, refer to the corresponding transect description page and see if the technician recorded this information. If they did not, email the technician and ask them for this information.

IV. Full Proof

Please refer to the Integrated Monitoring in Bird Conservation Regions (IMBCR): Point transect full proofing protocol for instructions on conducting the full proof of the data.

V. Data Entry Status Check

Once the full proof of all of your data is complete, go back and run the Data Entry Status query (outside of the Fort Collins RMBO office: <https://fc.rmbo.org/Default.aspx>, at the Fort Collins RMBO office: <http://intranet/>). Once you have logged in, click on the “Data Entry Status (CSV Download)” option at the top of the page. A data entry status query will automatically run and generate an excel workbook for you. Look through all of the transects in your study area and make sure the number of points completed, the number of points with bird data, and the number of points with vegetation data match up. If they do not, you will need to look at the data with discrepancies and fix them accordingly.

VI. Uncommon Bird Proofing

This check should be completed by the crew leader to look for possible field identification errors made by field technicians. If a species was recorded infrequently, it could either be because a four-letter

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Species Code was entered into the database incorrectly, the bird was misidentified and doesn't occur in the study area, or it was identified correctly and is either a rare detection or an infrequently surveyed habitat type. The idea behind looking at uncommon species is to correct any mistakes in the first two scenarios and to confirm rare detections in the third scenario. Data entry errors should have been corrected during the Full Proof process, so you will mostly be looking for misidentifications and confirming legitimate rare detections.

Determining whether a rare detection is legitimate or not typically requires input from the technician that conducted the survey. Because technicians may take some time to respond to your inquiry we suggest that you work on the Uncommon Bird proofing at the onset of the query proofing process.

There are two steps to Uncommon Bird Proofing. The first step is to identify the Uncommon Birds you want to proof and the second step is actually proofing each of these uncommon records.

1. Compiling Bird Data by BCR and Habitat

Open a copy of the query proofing workbook and delete all worksheets except for the first worksheet labeled "Raw Bird Data". Save this workbook as "Uncommon Birds". You will use this raw data to create a pivot table displaying the number of each species recorded on the project. You should create two pivot tables, one showing the number of species detected by BCR and one showing the number of species by Primary Habitat (the BCR and Primary Habitat columns will be included in the raw bird data query). Separating your data by BCR and by Primary Habitat will help you identify rare detections. For example, you create the Uncommon Birds by Primary Habitat pivot table and discover that one of the 98 WEME detections that occurred in your study area occurred in Spruce-Fir habitat. This record should be investigated. Had you not looked at the data this way, you wouldn't have investigated any of your 98 detections since Western Meadowlarks are generally not considered uncommon.

To create a pivot table by BCR, select all of your raw data, click the "Insert" tab at the top of your excel document, then select "PivotTable" and hit "Okay". From the Pivot Table Field List on the right, drag and drop "Common Name" into the Row Labels box at the bottom. Next, drag and drop BCR into the Column Labels box. Then, drag and drop the Cluster Count (CL_Count) in the values box at the bottom. You should see a table on the left side of the screen summarizing how many of each species were detected in each BCR. At the top of the table you should see "Sum of CL_Count". Right-click on this, select "Summarize Values by" and then select "Count". This will give you the number of detections for each species instead of the number of individuals recorded (that way a cluster of 40 WTSW will show up as 1, not 40). Label this sheet "BCR Pivot".

Copy the BCR Pivot table and paste special "values" into a new worksheet. Delete all unknown Species Codes and "NOBI" records. Copy and paste this table into a separate worksheet. Repeat this entire process using Primary Habitat instead of BCR to get a list of Species Codes by Primary Habitat.

2. Proofing Uncommon Birds

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Go through the list of species by BCR and check that each species recorded makes sense in each BCR. Pay special attention to species detected less than 10 times in a given BCR. Repeat this process looking at each species detected by primary habitat to make sure the species makes sense for the habitat it was detected in.

When you come across an infrequently detected bird or one that appear out of place for the BCR or habitat, you should check the datasheets first to make sure the uncommon bird in the database was entered correctly. If a field technician entered the wrong Species Code, simply change the record to the correct Species Code in the database. If the Species Code was entered correctly, then you will need to verify that the species recorded could legitimately occur in that area. Use a field guide, Breeding Bird Atlas, eBird, the transect map, the Primary Habitat where the field technician recorded the species and any other relevant resources to make sure the record is valid. You can also check historic RMBO data to see if the species has been detected on the same project in the past. Some records will be obviously right or wrong. For those that are obviously wrong, navigate to the transect through the data entry application and make the appropriate correction. If you believe a recorded species was misidentified, change the record to "UNBI" in the database.

Other detections may be questionable and will require contacting the field technician to obtain specifics regarding the observation. You will need to make judgment calls on many of these records, so please do your best to make an informed decision. Occasionally, technicians fail to respond or provide pertinent information regarding these uncommon bird sightings. In these cases you need to decide if the record should be left in the database as is or if the Species Code should be changed to "UNBI" (Unknown Bird). We recommend erring on the side of caution and changing bird codes that cannot be determined with certainty to "UNBI". Please keep detailed notes on your actions, whatever your decision may be and remember to change the font to blue or red depending on if the record is correct or needed to be changed.

Using BCR and Primary Habitat are just a couple of ways to identify species recorded in unlikely locations or habitats. If you can think of a better way of looking for uncommon birds based on your particular study area, please proceed as you think best.

VII. Queried Data Proofing

The Full Proof process is designed to catch errors made during data entry and eliminate typos. However, it does not capture most of the errors that were made in data collection. In order to eliminate these kinds of errors, we will run several queries in the database to look for commonly made data collection errors. There are four query proofing sections, one for each tab on the data entry application – 1) Visit Data; 2) Points Completed; 3) Vegetation Data and 4) Bird Data. The final section, 5) Updating Erroneous Data on Hard Copies, will eliminate discrepancies between the database and hard copies/scans as to not confuse future data viewers.

You will need to go through the data line-by-line on each worksheet looking for errors in the data as detailed in the following sections. If a line of data is correct highlight it in blue. If a line of data contains

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an error highlight it in red and enter notes in the corresponding Notes column that describe what was wrong with the data and how it was fixed. To correct the error in the database you will need to remotely load the transect with the error, edit the data and resubmit the data to the database. Proofers should also correct the entry on the datasheet using a red pen and re-scan the data.

Note that blank query worksheets mean that no errors were found by that query and you can simply move on to the next query worksheet. Because the data entry application was designed to cut down on the number of errors in the data, you may find quite a few queries with no data.

1. Transect Info

A. Transect Start Times

Refer to the worksheet labeled “Transect Start and End Times” in the query workbook. Sort by Transect Start Time ascending and check all Transect Start Times that are entered as “0000”. If there is a Transect Start Time recorded on the vegetation datasheet then enter the Transect Start Time on the Transect Info page. If the Transect Start Time was not recorded on the vegetation datasheet then enter the Point Start Time recorded on the bird datasheet for the first point count conducted. If no Transect Start Time was recorded on the vegetation datasheet and no Point Start Time was recorded on the bird datasheet for the first point count conducted leave the Transect Start Time as “0000”. Next, check all Transect Start Times that are more than ½ hour earlier than sunrise in your study area. If the data on the datasheet matches that in the database, email the corresponding technician for more information. Finally, scroll down to check all Transect Start Times more than ½ hour after sunrise in your study area. If you find late start times check to make sure the data on the datasheet matches that in the database.

B. Transect End Times

Next, sort the “Transect Start and End Times” worksheet by Transect End Time ascending. This will display all transects from earliest to latest Transect End Times. Check all Transect End Times that are entered as “0000”. If there is a Transect End Time recorded on the vegetation datasheet, enter the Transect End Time in the database. If the Transect End Time was not recorded on the vegetation datasheet then add six minutes to the last Point Count Start Time recorded on the bird datasheet and enter that time into the database. If no Point Start Time was recorded on the bird datasheet for the last point count conducted and the Transect End Time was not recorded on the vegetation datasheet leave the Transect End Time as “0000”. Next, sort the sheet by Transect End Time descending. This will list transects from the latest Transect End Time to earliest Transect End Time. If there are Transect End Times more than 5 hours after sunrise in your area, verify the time was entered correctly. If so, consider removing the data recorded more than 5 hours after sunrise, since this is the cutoff point according to the field protocol.

C. Transect Start Time Later Than Transect End Time

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Refer to the “Start – End > 0” worksheet. Any transects on this list have a Transect Start Time that is later than the Transect End Time. Check the vegetation datasheet to see if the times were entered correctly. If consulting the vegetation datasheet does not provide you with a reasonable Transect Start or Transect End Time you should consult the bird datasheets. The first point conducted in the morning should represent the Transect Start Time for the survey. Similarly, if a Transect End Time appears to be incorrectly entered, add six minutes to the Point Count Start Time for the final point surveyed. This should represent the end of the survey. If the Transect Start or Transect End Times were entered incorrectly then fix the error. If you are unable to determine the Transect Start and/or Transect End Times using the vegetation and bird datasheets then enter “0000” for the missing time.

2. Point Data

A. Point Start Time

Refer to the “Empty Point Start Time” worksheet. This query will pull out any Point Start Times entered as “0000”. This means a Point Start Time was not recorded for that point on the datasheet. If it is the first point conducted for that survey, see if a Transect Start Time was recorded on the vegetation datasheet. If so, use that as the Point Start Time for the first point. If the Transect Start Time was not recorded leave the Point Start Time as “0000”. If it is the last point, see if there is a Transect End Time recorded on the vegetation datasheet. If so, subtract six minutes from the Transect End Time and use it as the Point Start Time for the last point. If the Transect End Time was not recorded leave the Point Start Time as “0000”. If a point is missing a Point Start Time, but the point before and the point after have Point Start Times, then determine the midpoint between those two Point Start Times and use that as the Point Start Time for the point with missing data. If consecutive points are missing Point Start Times, then leave the Point Start Times as “0000”.

Note that if you change a Point Start Time from “0000” to an actual time, the Point Start Time should fall between the Transect Start and End Times found on the vegetation datasheet. If it does not, refer to the following section for how to handle this situation.

B. Point Start Times outside of Transect Start and End Times

Refer to the “Point Start Not Btw Start & End” worksheet. This query will pull out any Point Start Times that do not fall between the Transect Start and End Times. For each record, check the Point Start Time recorded on the bird datasheet to make sure it was entered correctly. If the Point Start Time was entered correctly but does not fall between the Transect Start and End Times see if you can determine what the correct Point Start Time should be. If it is the first point conducted, try to determine if the Point Start Time listed on the bird datasheet or Transect Start Time listed on the vegetation datasheet is correct. To determine which time is correct compare the Transect Start Time, the first Point Start Time and the Point Start Time for the next few points conducted. If the Point Start Time is clearly incorrect change it to match the Transect Start Time. For example, if the Transect Start Time was recorded as 0535, the Point Start Time

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recorded for the first point was 0635 and the Point Start Time for the second point conducted was recorded as 0550 change the Point Start Time for the first point to 0535. If it is clear that the Transect Start Time was recorded incorrectly change it to match the Point Start Time for the first point. For example, if the Transect Start Time was recorded as 0539, the Point Start Time for the first point was recorded as 0528 and the Point Start Time for the second point conducted was recorded as 0542 change the Transect Start Time to 0528. If you cannot determine how to correct the error contact the technician for clarification. If the technician does not remember what should have been recorded, or you do not hear back from them, change both the Point Start Time for the first point and the Transect Start Time to "0000". If the Point Start Time for the last point is later than the Transect End Time, compare the Transect End Time and the Point Start Times for the last few points to determine if the Transect End Time or the last Point Start Time should be changed. If the Point Start Time for the last point needs to be changed subtract six minutes from the Transect End Time listed on the vegetation datasheet and use it as the Point Start Time for the last point. If it is clear that the Transect End Time is incorrect add six minutes to the Point Start Time for the last point and record this as the Transect End Time. If you cannot determine if the Transect End Time or the Point Start Time for the last point needs to be changed contact the technician for clarification. If the technician cannot remember, or you do not hear back from them, change both the Transect End Time and the Point Start Time for the last point to "0000". If any other Point Start Time falls outside of the Transect Start and End Times for a survey but the points surveyed before and after the point with an incorrect Point Start Time have Point Start Times then determine the midpoint between those two Point Start Times and use that as the Point Start Time for the point with an incorrect Point Start Time. If consecutive points are missing Point Start Times, then leave the Point Start Times as "0000".

3. Vegetation Data

When proofing the data you may find instances where acceptable values were not recorded and; therefore, cannot be entered. In these instances, you will need to mark the appropriate field(s) as unusable in the data entry system. This can be done by putting a checkmark in the Unusable Data checkbox that corresponds to the field within the data entry system. Any time that you mark a field unusable you need to include comments in the Unusable Notes field located next to # Snags field in the top right corner of the Vegetation Data tab. You should also include notes regarding the error on the appropriate query proofing worksheet. We recommend that you type your notes on the query proof spreadsheet first and then copy the notes into the Unusable Notes field. It can be difficult to read the notes while typing in the data entry system due to the small field size.

A. Primary Habitat

Refer to the "Unknown Primary Habitat" query. This query displays all "XX" Primary Habitat codes as well as any Primary Habitats that are not found on the accepted list of codes for the IMBCR program. If the Primary Habitat field is "XX" the proofer should review the overstory, shrub and ground cover fields. If the proofer feels confident that they can deduce an appropriate Primary Habitat code for the point, the appropriate code should be entered. If it remains unclear what the Primary Habitat type should be after reviewing the overstory, shrub

and ground cover data the Primary Habitat field should be left blank and the Primary Habitat should be flagged as unusable.

Repeat the same proofing process for any primary habitat codes that begin with a number. These codes were created for a different study design and should not be used for the IMBCR program.

B. Invalid Overstory and Snags

Select the “Invalid Overstory and Snags” worksheet. This worksheet will include Overstory data for all Mean Overstory Heights less than 3m and greater than 25m. This worksheet also displays Overstory data for points where a number larger than zero was recorded for Snags and either “0” or “-1” was recorded for Percent Overstory and/or Mean Overstory Height. Check all values on this worksheet for errors with Snags, Percent Overstory and Mean Overstory Height. Take note that there are more proofing instructions dealing with Snags outlined in section H. (below).

1) Heights less than 3m

Check all Mean Overstory Heights less than 3m to make sure they were entered correctly. If the Mean Overstory Height was entered incorrectly and it is actually 3m or more, correct the Mean Overstory Height on the data entry site. If the Mean Overstory Height is equal to 0, check to make sure that no Overstory Cover or Overstory Species were recorded. If either of these was recorded, but no Mean Overstory Height was recorded, mark the Mean Overstory Height as unusable.

If the Mean Overstory Height recorded on the datasheet is less than 3m or was not recorded, you’ll need to flag at least some of the data as unusable. If species with a height less than 3m were recorded in the overstory this may affect all of the overstory data recorded, as well as the shrub data since the species probably should have been recorded in the shrub layer. If you think the observer incorrectly recorded the height and it should have actually been above 3m, then you only need to mark the Overstory Height as unusable. However, if you think the observer included plants less than 3m in the overstory, then the Overstory Cover and Overstory Percentages are incorrect and those data should be flagged as unusable. In this instance, the Shrub Height, Shrub Layer Cover and Shrub Percentages are also incorrect and should be marked as unusable, because the species should have been recorded in the shrub layer.

2) Heights greater than 25m

Check all Mean Overstory Heights greater than 25m. If the Mean Overstory Height was entered correctly, it was actually recorded as over 25m, and you believe this to be a reasonable height, no action is needed. Mean Overstory Heights over 25m are possible so we do not want to eliminate these data from analyses unless the height for the overstory species recorded is clearly unrealistic; in which case you should mark the Mean Overstory Height as unusable.

3) Snags with missing Mean Overstory Height and/or Percent Overstory

Check all Snag, Percent Overstory and Mean Overstory Height data on this worksheet. If the datasheet contains data that should have been entered, update the database to match those values. If a value greater than zero was recorded for Snags and no data were recorded for Percent Overstory and/or Mean Overstory Height you should mark the Overstory % and Overstory Mean Height data as unusable and enter "SN" as an overstory species with 100% species composition.

C. Unknown Overstory Codes

Select the "Unknown Overstory Codes" worksheet. This query will display any two-letter Overstory Species Codes that equal to "XX", "OT", "UC", or "UD". You should consult the raw datasheet for each of these records and enter the appropriate code provided if it occurs in the drop-down list on the data entry site. If the technician recorded "UC" or "UD" on the datasheet and did not determine the species, leave the record as "UC" or "UD" on the datasheet and in the database. If the code recorded on the datasheet is not a legitimate code, contact the technician to see if they can determine what they intended to record. If you are unable to get a response from the technician, change the code to "OT" in the database.

D. Duplicate Overstory Codes

Select the "Duplicate Overstory Codes" worksheet. This worksheet displays data for points where the same species code was recorded at least twice in the overstory layer. Check these records to see if there was an error in data entry. If a code was entered incorrectly in the database, change the entry in the database to match the datasheet. Confirm that the Overstory percentages still add up to between 90 and 110 (see "F. Overstory Percentages" below). If the species codes were recorded twice on the datasheet, mark the Overstory species as unusable.

E. Missing Overstory Info

Select the "Missing Overstory Info" worksheet. This worksheet includes records where one or two of the three following fields have a non-zero value: Percent Overstory, Mean Overstory Height, and Overstory Species. Check all of these rows in the worksheet against the datasheet. Correct any mistakes you find. If one or two of these fields are blank on the datasheet and something is entered for the remaining field(s) mark the blank field(s) as unusable.

F. Overstory Percentages

To check the Overstory Percentages, select the "All Overstory By Transect" worksheet. Create a column called "Total Percent" to the right of the last column on the sheet. Add a formula that sums across each row. Sort by "Total Percent" (the rightmost column) from smallest to largest. Check all Total Percentages that do not add up to 100 to make sure they were entered into the database correctly. Percentages totaling between 90 and 110 are acceptable. If the total Overstory Percentages on the datasheet add up to less than 90% or more than 110% flag the overstory species data as unusable. If a single value for an overstory species was not recorded,

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it is acceptable to fill in a number for that species such that the total overstory percentage sums to 100%.

G. Overstory Species

Select the “All Overstory By Transect” worksheet. Create a row at the bottom of the sheet titled “total for each species”. Create a formula in the newly created row that sums each column. Using this row delete any species code that has a value of zero from the spreadsheet. A value of zero indicates that this species was not recorded in the overstory section. Check to make sure all remaining species codes make sense for the overstory layer. If the observer recorded a code that seems unreasonable (e.g., a shrub species that never reaches 3m height or an overstory species that doesn’t occur in the study area) first check to make sure the code was entered correctly. If the code was entered correctly but the species doesn’t get tall enough to be included in the overstory layer, check with the technician to make sure they recorded the species they meant to. If they meant to record a different species, fix the data in the database accordingly. If you are still unable to fix the code, change the Overstory Species code to “OT”.

H. Snags

To check that the Overstory Percentages and Snags fields were properly recorded and entered, select the “Snags w No Dead Codes or opposite” worksheet. This worksheet displays transects and points where:

- 1) A non-zero value was entered for Snags and BC, BD, DA, DC, DD, DJ, DY or SN was not recorded as an Overstory species; or
- 2) BC, BD, DA, DC, DD, DJ, DY or SN was recorded as an Overstory species and no snags were recorded in the Snags field.

Take note that this worksheet does not display data for points where a non-zero value was entered for Snags and no data was recorded for Mean Overstory Height or Percent Overstory. Those records will appear in the “Invalid Overstory and Snags” worksheet. Sort the “Snags w No Dead Codes or opposite” worksheet by Transectnum then Point and consult the raw datasheet to check all of these records.

For instance # 1 (above), check the datasheet to see if five legitimate Overstory Species Codes were recorded. If five Overstory Species Codes were recorded then mark the row on the query worksheet as “okay” and don’t make any changes to the database. If fewer than five Overstory Species Codes were recorded and the number of Snags is less than the % Overstory Cover (e.g., % Overstory Cover is equal to 20 and 12 Snags were recorded) subtract 1% from the largest Overstory Species Percentage and add “SN” as an Overstory Species Code with a Species Composition equal to “1%”. If fewer than five Overstory Species Codes were recorded and the number of Snags is greater than or equal to the % Overstory Cover mark the Overstory %, Overstory Mean Height, and Overstory species data as unusable. If no Overstory species were recorded and a non-zero value was entered for Snags add “SN” as an Overstory species code

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and enter “100%” for the Overstory species abundance. You will still need to mark the Overstory % and Overstory Mean Height as unusable in this case.

For instance # 2 (above), check the raw datasheet to verify that no Snags were recorded. If Snags were recorded on the datasheet but not entered into the database make the appropriate change to the database. If no snags were recorded and one of the dead Overstory species codes was entered on the datasheet, this could be legitimate if the dead trees were less than 6 inches dbh. Do not mark this as unusable.

I. Shrub Height

Refer to the “Invalid Shrub Heights” worksheet for sections one and two below. This query will include all Shrub Heights greater than or equal to 3m and less than 0.25m.

1) Heights less than 0.25m

Check all Shrub Heights less than 0.25m. If the data were entered correctly and the height recorded on the datasheet is less than 0.25m mark the shrub height, shrub cover, shrub species, and ground cover data as unusable. If the Shrub Height is equal to “0”, check to make sure that no Shrub Cover or Shrub Species were recorded. If either Shrub Cover or Shrub Species were recorded, but no Shrub Height was recorded, mark the missing data as unusable.

2) Heights greater than or equal to 3m

Check all Shrub Heights greater than or equal to 3m. If the data was entered correctly and the Shrub Height recorded on the datasheet is greater than or equal to 3m, then you’ll need to mark at least some of the data as unusable (see next paragraph for details).

Keep in mind if species with a height greater than or equal to 3m were recorded in the shrub layer this may affect all of the shrub data recorded, as well as the overstory data since the species probably should have been recorded in the overstory layer. If you think the observer incorrectly recorded the height and it should have actually been below 3m, then you only need to mark the Shrub Height as unusable. However, if you think the observer actually included plants greater than or equal to 3m in the shrub layer, then the Shrub Layer Cover and Shrub Percentages would also be wrong and that data should be flagged as unusable as well. The Overstory Height, Overstory Cover and Overstory Percentages would also all be incorrect and should be flagged, because the species should have been recorded in the overstory layer.

J. Unknown Shrub Codes

Select the “Unknown Shrub Codes” worksheet. This query will display any two-letter Shrub Species Codes that are equal to “XX”, “OT”, “UC”, or “UD”. You should consult the raw datasheet and enter the appropriate code provided it occurs in the drop-down list on the data entry site. If the Shrub Species Code recorded on the datasheet is not a legitimate code, contact the

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technician to see if they can determine what they intended to record. If the technician recorded “UC” or “UD” on the datasheet and did not determine the species, leave the record as “UC” or “UD” on the datasheet and in the database. If you are unable to get a hold of the technician, or you are still unsure about the record, change the code to “OT”.

K. Duplicate Shrub Codes

Select the “Duplicate Shrub Codes” worksheet. This worksheet displays data for points where the same species code was recorded twice in the shrub layer. Check these entries to see if there was an error in data entry. If one of the codes was entered incorrectly in the database, fix the entry in the database. Confirm that the shrub species percentages still add up to between 90 and 110. If the species code was recorded twice on the datasheet, mark the Shrub species as unusable.

L. Missing Shrub Info

Select the “Missing Shrub Info” worksheet. This worksheet includes records where one or two of the three following fields have a non-zero value: Shrub Cover Percentage, Mean Shrub Height, and Shrub Species. Check all of these rows in the worksheet against the datasheet. Correct any mistakes you find. If one or two of these fields are blank on the datasheet and something is entered for the remaining field(s) mark the blank field(s) as unusable.

M. Shrub Percentages

To check the Shrub Percentages, select the “All Shrubs By Transect” worksheet and create a column called “Total Percent” to the right of the last column on the sheet. Add a formula that sums across each row. Sort by “Total Percent” descending. Check all Total Percentages that do not equal 100 to make sure they were entered into the database correctly. Total Percentages totaling between 90 and 110 are considered acceptable. If the Total Percentage adds up to less than 90% or more than 110% flag the Shrub species as unusable. If a single value for a shrub species was not recorded, it is acceptable to fill in a number for that species such that the total shrub percentage sums to 100%.

N. Shrub Species

Select the “All Shrubs By Transect” worksheet. Create a row at the bottom of the sheet titled “total for each species”. Create a formula in the newly created row that sums each column. Using this row delete any species code that has a value of zero. A value of zero indicates that this species was not recorded in the shrub layer. Check to make sure all remaining species codes make sense for the shrub layer. If you come across a code that does not belong, refer to the datasheet to see if it was entered incorrectly. If so, fix the code in the database. If not, email the technician for more information to see if they confused the species for something else or used the wrong code. If you are still unable to fix the code, change the Shrub Species to “OT”.

O. Ground Covers that don't sum to 100

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Select the “Ground Cover Not 100%” worksheet and Sort by “TransectNum”, ascending. The “GroundCover” column displays all total Percentages that do not equal “100”. Check all rows of this sheet to make sure they were entered into the database correctly. Total Percentages between 90 and 110 on the datasheet are considered acceptable and do not need to be flagged as unusable. If the database matches the datasheet and the Total Percentage is less than 90% or more than 110% flag the Ground Cover data as unusable. Note the value “-1” is used to represent data missing from the datasheet. Check these records and update the database if values are actually present on the datasheet. Make sure to double check that the newly entered values add up to between 90 and 110 percent. If not, mark the Ground Cover data as unusable. If a single value for a ground cover category was not recorded, it is acceptable to fill in a number for that category such that the total ground cover percentage sums to 100%.

P. Grass and Herbaceous Height

Select the “Grass Height” worksheet. This query will display:

- Dead Standing Grass Heights that are “0” when the Dead Standing Grass Cover % is non-zero;
- Live Grass Heights that are “0” when either the Live Grass % or Herbaceous % is non-zero;
- Dead Standing Grass Heights that are non-zero when the Dead Standing Grass % is “0” and;
- Live Grass Heights that are non-zero when both the Live Grass % and Herbaceous % are “0”.

If there was Dead Standing grass present and the Dead Standing Grass Height was left blank or recorded as “0”, flag the height as unusable. If there was a Dead Standing grass height > “0” recorded, but the Dead Standing grass % cover was left blank or recorded as “0”, mark the Ground Cover data as unusable. Repeat this process for Live Grass and Herbaceous heights. Remember that it is valid to have a Live Grass Height if there is Live Grass OR Herbaceous cover at a point.

4. Bird Data

A. Bird Distances ≤ 0

The “Bird Distances ≤ 0 ” worksheet displays all bird records, except for NOBI and 88 records, with distances equal to or less than 0. Check all of the records to make sure the data were entered correctly. Make any necessary changes in the database and record notes for any changes you make on the query proof worksheet.

B. Same Distances

The “Same Distances” worksheet displays all bird records where the radial distance is the same for two or more bird records within a point AND the records are within one minute interval or in the same minute interval of each other. Check all of these records against the raw datasheet and make any necessary corrections.

C. Birds with Cluster IDs

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The “Birds with Cluster IDs” worksheet displays all bird records with an alpha code in the Cluster ID field. We need to verify that these are in fact clusters. Check each record to make sure they meet the definition of a cluster. Multiple lines of bird data linked by an alpha code must meet the following requirements:

- 1) Must be the same species;
- 2) Must occur on the same point and same minute within a transect;
- 3) Must be $\leq 20\text{m}$ from one another;
- 4) Cannot be two singing males.

Look for errors like clusters across species or minutes, a single bird detection missing its partner, or non-alpha codes entered into this column. It’s also important to make sure the same cluster code is not reused for different clusters within a single point count. If they are reused, please select a unique cluster code for each cluster and enter it that way in the database. Delete any unnecessary or invalid cluster IDs and record notes for any changes you make.

D. Unusual Cluster Sizes

The “Unusual Cluster Sizes” worksheet displays all records where the bird code is not “NOBI” and the cluster size is equal to “0”. Additionally, records with cluster sizes greater than 5 are displayed in this worksheet. Check all of the records against the datasheet and make any necessary corrections. If you think a cluster size is unrealistic, contact the technician for more information and decide if the value should be kept or not. Also, when reviewing cluster sizes be sure to keep in mind that large clusters may be migrants. Review the survey date, species, habitat and cluster size to determine if the Migrant box should be checked.

E. Birds with F, U, or Invalid How Codes

Refer to the “Birds with Invalid How or F U” worksheet. This worksheet displays all bird records with a “How” code entered as “U” or “F”.

1) Unknowns “U” Code

Check all codes equal to “U” against the physical datasheets to make sure these were entered correctly. If there was no “How” recorded on the datasheet then leave the code in the database as “U”. If there is an accepted “How” code recorded then enter the correct code in the database.

2) Flyovers “F” Code

For all “F” (flyover) detections, it is a good idea to make sure technicians understood the definition of a flyover. This is often a difficult concept for technicians to understand; frequently birds that are flying get recorded as flyovers even if they are actually using the surrounding habitat (e.g., Red Crossbill, swallows, swifts, raptors). If a technician repeatedly records a bird like Red Crossbill as a “flyover” and you believe the bird was using the habitat, you should change the “F” code to “U”. We do not include “flyover” birds in analysis, so if a

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technician consistently recorded a species as a “flyover” when it should not have been, data analyses will be significantly impacted.

F. Birds with Invalid Minute

The “Birds with Invalid Minute” worksheet will show all bird records where the Minute field is equal to “-1”. For bird records where the Minute field is equal to “-1” check the datasheet to see if a valid Minute was recorded and, if so, enter that into the database. If no Minute was recorded and the Minute can be deduced by looking at the bird data (e.g., there is one bird recorded followed by five NOBIs and none of the records have a Minute recorded), enter the Minutes as they should have been recorded. If the Minute associated with the bird record cannot be deduced (e.g., eight bird records on a point with no Minutes recorded), then leave all Minutes equal to “-1”.

G. Incorrect Minute Count

Each point count conducted using the IMBCR design should have six Minutes of data recorded. The “Incorrect Minute Count” worksheet will show the number of Minutes recorded for each point on each survey conducted when the number of Minutes does not equal six. Investigate why these points don’t have six Minutes recorded. Some of the errors may have been fixed in the previous query, so be careful not to duplicate your effort here. If errors were made during data entry, make any necessary changes in the database and record notes for any changes you make. If errors were made while collecting the data in the field, there are two ways of handling the problem:

1) No 6th Minute

If a technician recorded Minutes sequentially (e.g., 1, 2, 3, 4, 5), but forgot to record the sixth minute, you can assume that no birds were detected in the last minute. Enter a “NOBI” record for minute six in this case.

2) Too many or too few Minutes recorded

If a field technician recorded too many Minutes on the physical datasheet, delete bird records associated with Minutes above six. If a technician recorded too few Minutes and they were not recorded sequentially (e.g., 1, 2, 4, 5, 6), then change all of the Minutes for these points to “-1”. If the minutes were recorded sequentially starting with 1, you can assume that no birds were detected in the last minutes. Enter a “NOBI” record for each missing minute in this case.

I. NOBIs with Birds

The “NOBI with Birds” worksheet will display all Transects, Points and Minutes where there are both a NOBI and a non-NOBI Bird Code. Each of these lines represents an error since these two codes should never be found in the same minute. First check to make sure the data were entered correctly and make the necessary corrections if not. If the bird datasheet has a valid bird record in the same minute that a “NOBI” entry was recorded, then there are a couple of

possible errors made in the field. One is the technician wrote down “NOBI” before the minute was over then detected a bird before the minute was over, recorded it, and forgot to delete the “NOBI”. The second is the technician forgot to write down a new minute after recording the “NOBI”. We assume the second scenario is more likely and we will proof accordingly. The bird recorded after the “NOBI” should be entered as the next minute, and the remaining minutes should be modified to reflect this change. If this results in more than 6 minutes recorded, remove any data from minutes 7 and above from the database.

J. Migrant Birds

The “Migrant Birds” worksheet will display any bird records that have the “Migrating?” checkbox selected in the database. Review these records and make sure that the “Migrating?” box was actually checked on the datasheet. If the bird record on the datasheet does NOT have the “Migrating?” box checked please uncheck the “Migrating?” box in the database (unless you determine the bird to be a migrant, see below). If the datasheet does have the “Migrating?” box checked then review the record (e.g., date of survey, location, habitat, etc.) and determine if the “Migrating” status is reasonable.

If you are uncertain of the “Migrating?” status please contact the technician. Also, remember that the “Migrating?” status indicates that the individual *may* be a migrant. The designation does not indicate certainty. You may want to review all bird species detected within your study area, and the habitats they were detected in, to ensure that detections of likely migrants were recorded as such. It is acceptable to change a detection to a migrant even if it wasn’t marked as such in the field if you can confirm that the species does not breed in your study area but does pass through it during migration. Keep in mind that any detection flagged as a migrant will be removed from analyses, so be sure to verify a species is a migrant through a variety of sources, such as distribution maps, eBird, breeding bird atlases, and local forest service or other personnel, before accepting a bird record as a migrant.

5. Updating Erroneous Data on Hard Copies

Before you can finish the query proofing process, you’ll need to check through all error tracking sheets from the query proof to find errors that need to be edited on the hard copies of the datasheet. If bird codes or veg codes were written down incorrectly on the datasheet, these will need to be fixed to match the database at this point and rescanned. This will prevent future data viewers from trying to “fix” discrepancies that have already been treated in the proofing process.

VIII. Final Steps (for the Monitoring Coordinator only)

After all proofing is complete the Monitoring Coordinator should request the database manager to do the following:

- Clear all cluster codes that do not meet the criteria
- Check for Missing UTMs/zones for point and pointvisit tables

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- Check for points missing bird data (data entry status query)
- Check for points missing reasons skipped (points_not_visited_query)
- Check for points with bird data and a reason skipped (SkippedPointsWithBirdDataByYear)
- Check for duplicate reasons points were skipped and remove (PointsWithMultiplePointVisitSkippedPoints)
- Check for birds entered as 88 that also occur on point counts on same transect (Bird88sWithSameSpeciesNot88)
- Check for sex other than “U” where visual box was not checked and how is not “V”. (sexandvisualcheck)
- Check for any blank (not NULL) values in ClusterID (blankclustercodes)
- Check for blanks in the “Who Collected” data field in the transectvisit table (blankWhoCollected)
- Update ExcludeAnalysis, ExcludeADC, and Proofed info in Transect and Transectvisit tables (Update_ExcludeADC_ExcludeAnalysis_Proofed)
- Check for missing notes when veg data marked as unusable (Unusable_veg_data)
- For projects where no vegetation data were collected, make sure there are no entries in the newveg table associated with those surveys.
- Check that all 88s are marked in database.