

Integrated Monitoring in Bird Conservation Regions (IMBCR):

Point Transect Quality Assurance/Quality Control Protocol

2013



Suggested Citation:

Van Lanen, N.J., C.M. White and M.F. McLaren. 2013. Integrated Monitoring in Bird Conservation Regions (IMBCR): Point transect quality assurance/quality control protocol. Unpublished report. Rocky Mountain Bird Observatory, Brighton, Colorado, USA.

Cover Photos:

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Contact Information:

Nick Van Lanen nick.vanlanen@rmbo.org
Chris White chris.white@rmbo.org
Rocky Mountain Bird Observatory
PO Box 1232
Brighton, CO 80601
303.659.4348

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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 the “Unproofed Data” button and the “Query Proofing Data” button 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, 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 “Yes” 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 and select Format Cells, select Date from the options on the Number tab, select the top Date format option, the 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

We cannot begin the query proofing process on a project until we have hard copies or scanned copies of all the datasheets and all the data have been entered into the database. Proofers outside of the Fort Collins RMBO office should visit <https://fc.rmbo.org/Default.aspx> to view a list of transects entered into the database. Proofers at the Fort Collins RMBO office can access this information at <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. 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. You will need to figure out what the problem is and make sure all bird and vegetation data has been 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 single transect are saved as a single PDF document.

After receiving scanned data from your technicians or scanning your data, open each individual file and verify that the scanned data is legible and complete. 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_2012”). 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 ftp site (ftp://fc.rmbo.org/public_uploads). To do this, open a Windows Explorer window on your computer and paste this ftp link into the address bar. This should take you to the upload folder. Next, copy all of the scanned data and paste it into an appropriately named folder within the uploads folder. After you upload your data please email Chris White at chris.white@rmbo.org and notify him that

datasheets have been uploaded. RMBO staff will then transfer the data to the proper location on our server. You should always retain a copy of the scanned data on your own computer for future reference.

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. It is essential to have hard copies of datasheets for each transect, because during proofing we compare the data entered into the database with the data on the physical datasheets. You may need to contact field technicians to track down any missing data.

III. Transect Description Pages

Refer to the “Transect Descriptions” worksheet in the query workbook. This query will only display transect description information for surveys that were conducted and it will contain all of the information listed on the Transect Description Page for each transect in the database. 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 UTM

It is very useful to have Access Point (AP) UTM associated with each transect. Make sure there are AP UTM associated with every completed transect. If you cannot find UTM 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 (<http://rmbo.org/v2/dataentry/monitoring/transectLocationMaps.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.

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. 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. Identifying Uncommon Birds

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 special paste "values" in a new worksheet. Delete all unknown Species Codes and "NOBI" records. Copy and paste this table into a separate worksheet for each BCR within your study area. In each worksheet, isolate one BCR by deleting all other BCR columns then name the worksheet after the BCR to avoid confusion. Sort each table by the "count" column. Go through all Species Codes that have greater than 10 detections and delete any that don't look odd to you. You will proof the remaining Species Codes on this list as well as any Species Codes with 10 or fewer detections. Once you have a list of Species Codes to proof for each BCR within your study area, use the "Filters" option in Excel to isolate the bird detections of interest and paste them into an excel worksheet labeled "Uncommon Birds by BCR". Repeat this entire process using Primary Habitat instead of BCR to get a list of Species Codes by Primary Habitat.

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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.

2. Proofing Uncommon Birds

Proofing for uncommon birds is more complicated than just comparing the data in the database to the data on the datasheets. However, 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 Code recorded is legitimate. 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. 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 airing 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.

VI. Queried Data Proofing

There are certain errors that are not caught during the Full Proof process. In order to eliminate as many errors as possible, we will run several queries in the database to look for commonly made 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.

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 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 new 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. Time

1) 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 1 hour earlier than sunrise in your study area (these times are 1/2 hour earlier than a technician should start surveying). 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 1 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. If so, look at the datasheet for notes on why this might be the case (e.g., “Late start due to rain”). If there are no notes but two technicians surveyed the transect together (likely due to dangerous wildlife or other situations) check to see if both technicians recorded late Transect Start Times. If so, then you may assume they actually did start late. If you do not see any notes and there was a single observer on the survey look at the first Point Start Time to see if it matches the Transect Start Time. If so, you may assume the technician started late and the Transect Start Time entered in the database is correct. If no notes were recorded, the survey was only conducted by a single individual and looking at the first Point Start Time does not verify that the technician started late, email the technician for more information. If they cannot explain or verify that the Transect Start Time recorded is correct, change the Transect Start Time to “0000”. Record any notes from your correspondence with the technician on the worksheet. If the Transect Start Time was entered incorrectly change it to match the Transect Start Time recorded on the datasheet.

2) 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 Point Start Time recorded on the bird datasheet for the last point count conducted 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. Check all Transect End Times that are 5 hours later than sunrise in your area. If you find either of these situations and the data on the datasheet matches that in the database, email the corresponding technician for more information. If they cannot explain or verify that the Transect End Time recorded is correct, change the Transect End Time to “0000”. If the Transect End Time was entered incorrectly change it to match the datasheet.

3) Transect Start Time Later Than Transect End Time

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 Start Time recorded on the bird datasheet 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.

B. Sky

Refer to the “Unusual Sky Values” worksheet. This worksheet will contain a list of all Sky Codes that do not match accepted codes for Sky Conditions (the acceptable Sky Codes are -1, 0, 1, 2, 3, 5, 6, 8 or 9). Compare all Sky Codes on this worksheet to the vegetation datasheet. If a Sky Code was entered incorrectly change the code to match the datasheet. If a Sky Code was recorded on the vegetation datasheet that does not match one of the accepted codes then change the Sky Code in the database to “-1”.

C. Wind

Refer to the “Unusual Wind Values” worksheet. This worksheet will contain a list of all Wind Codes that do not match accepted codes for wind conditions (the acceptable Wind Codes are 0 – 4). Compare all Wind Codes on this worksheet to the datasheet. If a Wind Code was entered incorrectly, change the code to match the datasheet. If a Wind Code greater than 4 was recorded on the datasheet and 1 or more points were not completed because of weather then change the end wind to “4”. If an incorrect Wind Code was recorded on the datasheet but weather was not a reason for any points being skipped change the Wind Code to “-1”.

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 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”.

C. Points Not Completed

Refer to the “Points Skipped with No Code” worksheet. It is important to know why points were not completed during the season. You will need to check that all points not conducted on completed surveys within your study area have reasons they weren’t conducted associated with them. This query will contain points that don’t have reasons associated with them. Look at the hard copies or scan of the data to see if the codes were recorded on the datasheet but not entered in the database. If so, enter the recorded codes in the database. If no reason codes were recorded, you will need to contact the field technician responsible for that transect and ask them why they did not complete the point(s). Once you receive this information, enter it into the database. If you are unable to obtain this information record the code as “O: Other” and enter “Reason unknown” in the notes section.

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 the Live Grass Height field in the bottom 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 because it can be difficult to read the notes in the data entry system due to space limitations.

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 in the data entry application. If the Primary Habitat field is “XX” the proofer should review the canopy, 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 canopy, shrub and ground cover data the Primary Habitat field should be left as “XX” and the record should be flagged as unusable.

B. Missing Overstory Info

This worksheet includes records where one or two the following fields have a non-zero value Canopy Cover Percentage, Mean Canopy Height, 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 fields unusable.

C. Mean Canopy Height

To check Mean Canopy Heights, select the “Invalid Canopy Heights” worksheet. This worksheet will include all Mean Canopy Heights less than 3m and greater than 25m. Check all values on this sheet.

1) Heights less than 3m

Check all Mean Canopy Heights less than 3m to make sure they were entered correctly. If the Mean Canopy Height was entered incorrectly and it is actually 3m or more, correct the Mean Canopy Height on the data entry site. If the Mean Canopy Height recorded on the datasheet is less than 3m or was not recorded, flag the data as unusable. If the Mean Canopy 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 Canopy Height was recorded, mark the Mean Canopy Height as unusable.

Keep in mind 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 Canopy Cover and Overstory Percentages are incorrect and those data should be flagged as unusable. In this instance, the Shrub Height, Shrub Layer

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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 Canopy Heights greater than 25m. If the Mean Canopy Height was entered correctly and was actually recorded as over 25m then do not change the height or mark the data as unusable. Mean Canopy 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 incorrect; in which case you should mark the Mean Canopy Height as unusable.

D. Overstory Species

Select the “Unknown Overstory Codes” worksheet. This query will display any two-letter Overstory Species Codes that equal to “XX” or “OT”. You should consult the raw datasheet for each of these records and enter the appropriate code provided it occurs in the drop-down list on the data entry site. If the code recorded on the datasheet is not a legitimate code, see if you can confidently determine what the technician intended to record. For example, if “PI” was entered as an overstory species and the transect is obviously in Pinyon/Juniper habitat, change the species code to “PY”. If you are uncertain about the species code recorded, try contacting the field technician that recorded the data to see if they can help you figure it out. If you are unable to contact the technician, or you are still unsure about the record, change the code to “OT”.

E. 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 data as unusable.

F. Overstory Species

On the “All Overstory By Transect” worksheet, go through the list of two letter species codes at the top and look for any species that do not belong in your study area. If you come across a species 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 Overstory Species code to “OT”.

G. 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 given a non-zero Overstory Percentage and no snags were recorded in the Snags field. Sort this worksheet by Transectnum and then by Point and consult the raw datasheet to check all of these records. For instance # 1, 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

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Overstory Species Codes were recorded and the number of Snags is less than the % Canopy Cover (e.g., % Canopy 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 % Canopy Cover mark the 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 and enter "100%" for the Overstory Species Composition. For instance # 2 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 so it reflects the datasheet. If no snags were recorded and one of the dead Overstory Species Codes was entered on the datasheet mark the Snags data as unusable.

H. Missing Shrub Info

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 fields as unusable.

I. Shrub Codes in the Overstory

To check for shrub species codes recorded in the overstory section 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. 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 was recorded as an Overstory Species) first check to make sure the code was entered correctly. If the code was entered correctly but the species doesn't meet the requirements to be in that layer, check with the technician to make sure they recorded the code correctly. If they meant to record a different species code, fix the data in the database accordingly. If they recorded the Overstory Code they meant to, or you do not hear back from the technician, flag the data as unusable. It is important to remember that tree species are often legitimately found in the shrub layer (representing saplings); however, the reverse is seldom true.

J. 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, 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 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, mark the data as unusable.

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, Canopy Cover and Overstory Percentages would also all be incorrect and should be flagged, because the species should have been recorded in the overstory layer.

K. Shrub Species

Select the “Unknown Shrub Codes” worksheet. This query will display any two-letter Shrub Species Codes that are equal to “XX” or “OT”. 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, see if you can confidently determine what the technician intended to record. For example, if “PI” was entered as a Shrub Species Code on the datasheet and the transect is obviously in Pinyon/Juniper habitat, change the species code to “PY”. If you are uncertain about the species code recorded, try contacting the field technician that recorded the data to see if they can help you figure it out. If you are unable to contact the technician, or you are still unsure about the record, change the code to “OT”.

L. 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 data as unusable.

M. Shrub Species

On the “All Shrubs By Transect” worksheet, go through the list of two letter species codes at the top and look for any species that do not belong in your study area. 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”.

N. Ground Covers that don't sum to 100

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 data as unusable.

O. 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 that data 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 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 either 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

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 within 20m of one another;
- 4) Can NOT 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. These are incorrect entries and should be fixed. Make any necessary changes in the database 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 9 are displayed in this worksheet. Check all of the records against the datasheet and make any necessary corrections.

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 were correctly recording birds as flyovers. 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 technician consistently recorded a species as a “flyover” when it should not have been the data analyses will be significantly impacted.

F. Birds with Invalid Minutes

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 set 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. 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, contact the technician to see if they can remember what they did. If the technician confirms recording too many minutes, delete bird records associated with Minutes above six. If the technician does not respond or does not know, delete the data for any Minutes

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above six and change all Minutes to “0”. 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”.

H. Invalid NOBIs

Due to the data entry platform restrictions this query is no longer relevant. Please skip this section if your data were entered using the 2013 data entry platform.

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. If the bird datasheet has a valid bird record in the same minute that a “NOBI” entry was recorded then delete the “NOBI” record for that minute. Otherwise, make necessary changes so the database reflects the datasheet.

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. 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.

VII. Final Steps (for the Monitoring Coordinator only)

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

- Change 88 bird distances to “-1”
- Clear all cluster codes that do not meet the criteria
- Check for Missing UTM/zones for point and pointvisit tables
- Check for points missing bird data and reasons skipped that were entered into the database
- Check for points missing reasons skipped
- Check for points with bird data and a reason skipped
- Checked for points marked as completed with no bird data
- Check for birds entered as 88 that also occur on point counts on same transect
- Check for sex other than “U” where visual box was not checked and how is not “V”.
- Check for any blank (not NULL) values in ClusterID
- Check for blanks in the “Who Collected” data field in the transectvisit table
- Make data available on ADC