

South Florida/Caribbean Network

National Park Service
Inventory and Monitoring Division



Standard Operating Procedure CNB05

Collecting Data, Circling Nests, and Counting Nests— Version 1.1

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Summary

The purpose of this SOP is to describe the procedures for collecting data, including circling and counting nests.

Revision Log

Revision Date	Author	Changes Made	Reason for Change	New Version #
3/23/2020	Robert Muxo	Revised the description of the data sheet entries. Minor edits in text. Added procedures for 5% QA/QC check	New version provides more detail of required entries. Correct minor errors and update changes. Incorporate QA/QC procedures.	1.1

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Introduction

Colonial nesting bird data is collected by analyzing photographs taken during monthly helicopter flights over Biscayne National Park (BISC). Data analysis consists of meticulously counting nests visible in the photographs. Care should be taken to avoid counting nests twice, because the same nest might appear in multiple photographs. The data are then entered into a database for future cataloging and reporting (see SOP CNB06 *Data Entry, Data Proofing, and Reporting*–Version 1.1; [SFCN 2021a]).

Colonial Bird Survey-Photo Processing Data Sheet

The photo processing data sheet (Figure 1) is used to record the active nest data from the photographs taken of the nine colony islands. A trained technician performs the analysis of the photographs. Information recorded on the photo processing data sheet includes:

- Flight date – the date the survey took place.
- Front observer – the first initial and last name of the person gathering the observed data.
- Photographer – the first initial and last name of the person taking the photographs.
- Processing date – the date the nest counting took place.
- Photo processor – the first initial and last name of the person who processed the hard copies of the photographs.
- Date entered – the date the processed photos were entered into the database.
- Data checked – record the first initial and last name of the person who entered the data and the person who performed the 100% check.
- Name of colony and colony location – this information is preprinted on the data sheet.
- Sequence numbers of photos used (circled) – record the complete name of the first and last photographs used in processing (Example: top line – “20200115_BirdFlight_SOKE_0199_copy.jpg” to bottom line “20200115_BirdFlight_SOKE_0238_copy.jpg”. In the interest of saving time, “0238” can be written on the bottom line instead of the complete photo name.
- Species code – this column has the most common birds encountered listed on the form. There are spaces where other bird species can be written if the code is not listed on the pre-printed form.
- Total number of occupied nests – this column includes the total of all occupied nests (including nests with adults, chicks, and eggs).

- No. of nests with chicks (from total) – this subset of occupied nests includes only nests with chicks counted in them.
- No. of nests with eggs (from total) – this subset of occupied nests includes only nests with eggs counted in them.
- No. of empty nests – this count refers to nests that are classified as active but are not occupied at the time the photograph was taken. This count is not part of the occupied nest total.
- Tallies – this space on the data sheet allows the photo processor to keep a running tally, thus summarizing the printed analyzed photographs.

The photo processing data sheet is printed back to back with the helicopter field data sheet (SOP CNB01 *Personnel Training*–Version 1.1 [SFCN 2021b]). Keeping data sheets together provides for more convenient and accurate data entry. Data are entered in the SFCN Colonial Bird Monitoring database (SOP CNB06 [SFCN 2021a]).

These forms are available in Z:\SFCN\Vital_Signs\Colonial_Nesting_Birds\data\BISC\Data_sheets\data_sheet_BISC.xlsx.

Biscayne National Park - Colonial Bird Survey - Photo Processing Data Sheet						Initials and Date			
Flight date	Front observer	Photographer	Processing date	Photo processor	Data entered	Data checked			
Mangrove Key Colony				Easting: 568810.602918233 Northing: 2808792.87449692					
Sequence numbers of photos used (circled): _____									
Species codes	Total no. of occupied nests	No. of nests with chicks (from total)	No. of nests with eggs (from total)	No. of empty nests	Species codes	Total no. of occupied nests	No. of nests with chicks (from total)	No. of nests with eggs (from total)	No. of empty nests
DCCO					ROSP				
ANHI					WHIB				
CAEG					BAEA				
GWHE					OSPR				
GBHE					UNWH				
GREG					UNDA				
LBHE					Other (specify)				
REEG					Other (specify)				
SNEG					Other (specify)				
TRHE					Other (specify)				
Tallies:									

Figure 1. This image shows a photo processing data sheet. Data from the photographs is entered on this sheet. The data are then entered in the SFCN Colonial Bird Monitoring database.

Collecting Data with Adobe Photoshop and Adobe Bridge Software

The technician needs a photo processing program or programs to process the monthly survey photographs. Currently the South Florida/Caribbean Network uses Adobe Photoshop Elements 15 and Adobe Bridge software. Both programs must be running at the same time for data processing.

1. First open Adobe Bridge. Navigate to the folder that contains the photos to be marked. On the left-hand side there is a folder menu with a list of folders. Select the appropriate folder and the photos will appear on the main screen. You can choose how these pictures are to be displayed (i.e., filmstrip, thumbnails, or metadata focus).
2. Create three new folders within the photograph folder with the following names: “Circled,” “Uncircled,” and “Not_used”. The photos that are determined to have nests that get circled, will go into the “Circled” folder. The raw/ unmarked corresponding photos will be put in the “Uncircled” folder. The photos determined not to have any active nests will be placed in the “Not_used” folder.

3. When you are ready to begin circling nests, double-click on the picture you want to review. This will open Adobe Photoshop. Use the ‘magnifying glass’ feature in the Bridge program – simply click on the selected picture and the magnifying glass will appear. You can drag the magnifying glass all over the picture to have a magnified view of any area. This will help detect nests that might be too small to detect with the naked eye and help you decide if it needs to be moved to the Photoshop program for circling. Another option is to click and drag the picture onto the Adobe Photoshop program directly to utilize the zoom feature of the software to look for nests.
4. To move a picture onto Adobe Photoshop simply click and hold the selected picture in Bridge, then drag the picture onto the main view area of the Photoshop screen. Once the picture is in the Photoshop main screen you can do all the tasks necessary to locate nests, circle nests, and save the pictures.

The following steps are done in Adobe Photoshop. Once the desired photo has been dragged into the Photoshop main screen you are ready to begin data collection.

1. The first step that must be taken before altering the picture is to create a new layer where all the painting and circling is going to occur. Creating this layer will protect the original photo from any alteration and will facilitate deleting any markings without affecting the picture. To create a new layer where the circling is going to take place first go to the top drop-down menu and select Layer, a drop-down menu with New is going to appear. Place your cursor over New to open the following drop-down menu and choose Layer. A dialog box opens; click OK to create a new layer named “Layer 1.” You will see the new layer on the Layer tab on the lower right-hand side of the screen. Make sure that “Layer 1” is highlighted so work is performed in this layer and not in the background picture. “Layer 1” is automatically highlighted once it is created.
2. The next step is to use the drop-down menu from the “Arrange Documents” icon above the top of the picture. Click the “Float All in Windows” choice this will keep the picture from moving out of view on the screen as you scan the picture for nests.
3. On the left-hand side of the screen there is a vertical tool bar with a series of icons. If you click on the magnifying glass icon (the Zoom Tool), you will be able to zoom in and out, in order to detect nests that might not be noticeable by looking at the picture in its normal size. If you click on the hand icon (the Hand Tool), you will be able to pan through the picture to detect nests.
4. Occupied and non-occupied active nests that are detected must be circled (see below for definitions of occupied and non-occupied active nests). To achieve the best results, it is recommended that nests are circled by someone with experience, or that the person circling nests is trained by someone with experience (See SOP CNB01[SFCN 2021b]). There are four colors used to circle an active nest. RGB Yellow is used to circle nests that are occupied (bird sitting on a nest or within one meter of the nest), RGB Cyan is used when eggs can be

detected in the nest, and RGB Magenta is used when chicks can be seen in the nest. Non-occupied nests without birds or eggs which show signs of recent activity are circled using RGB Blue and are counted as well. Nests that are not occupied and do not have a maintained appearance are not circled and not considered in this protocol. These colors are picked from the swatch table found on the right-hand side of the screen. To pick a color, click on Swatches, place the cursor over the desired color and click on it. You will know that the color is chosen when in the bottom of the vertical tool bar, on the left-hand side of the screen, the Set Foreground Color icon changes to the selected color.

5. Once a nest has been detected and the color has been determined and chosen from the swatch table, click on the brush icon (the Brush Tool) located on the vertical tool bar on the left side of the screen. You will notice on the top menu bar the Brush Tool settings appear. The settings we use are not too specific but we found that having set the Master Diameter at “13 px,” Hardness at “100%,” and Mode to “normal” creates a noticeable mark. To change these settings click the Brush: drop-down menu.
6. With the Brush Tool activated, and “Layer 1” highlighted, move the cursor over the detected nest and draw a circle around it by clicking and holding the mouse’s left button as you drag the pointer around the nest. Release the mouse button to stop drawing. If satisfied with the circle, click on the hand icon (the Hand Tool) to continue panning and looking for more nests. When circling birds other than DCCO, it is beneficial to identify the birds using the four-letter codes for species. This process helps later when counting species for data entry.
7. If a mistake is made marking, it can be erased with the eraser icon (the Eraser Tool) on the vertical left-hand side toolbar. To change eraser settings, click on the Brush: drop-down menu and set the Master Diameter to “45 px,” the Hardness to “100%,” and Mode to “brush.”
8. Once you are confident that all nests within that picture have been detected and circled appropriately with the right color, the picture must be saved. To save the picture click on File and select Save As... and a dialog box opens. Navigate to the correct folder where the photo is to be saved. Select “JPEG (*.JPG;*.JPEG;*.JPE)” from the Format drop-down menu. Check the As a Copy box under Save Options. Follow this naming convention: YYYYMMDD_BirdFlight_four letter ISLAND CODE_####_copy.jpg and ensure the word “copy” is in the file name (Example: 20200115_BirdFlight_SOKE_0200_copy.jpg). Click Save. A dialog box named JPEG Options opens. Under Image Options set the Quality: to “8” and select “High” resolution from the drop-down menu. Click OK. The picture is saved in your folder as a copy.
9. The folder you’re working in now contains the original picture and the marked copy just created. The original copy can now be moved to the “Not_used” folder previously created. To move your original picture, click on it to drag and drop it in to the “Not_used” that folder.

10. Make sure to close the photos you worked on in Photoshop. The system will ask to save the photo again – disregard the message and close the photo. This prevents the accumulation of open photos in Photoshop.
11. Evaluate the next photo and repeat the process. Note, after completing the circling process for each colony, the “Circled” and “Uncircled” folders should contain the same photos, just the “Circled” folder will have marked photos with the nests circled.

Active Nests Definition: Occupied and Non-occupied

For this survey it is imperative to have a set of guidelines when defining active nests. Active nests can be occupied or non-occupied. Defining the criteria for the types of nests aid in consistency among people performing circling and is useful for training purposes. Figures 2 through 5 demonstrate the criteria for active nests as defined by the South Florida/Caribbean Network.



Figure 2. The nest pictured above is an example of a non-occupied nest. Although the nest is empty, it appears maintained; it has a bowl shape and maintains structure. This nest is not occupied thus it is counted as an empty nest. This nest would be circled in blue.



Figure 3. The photo above shows an adult bird sitting on a nest. This nest would be circled in yellow.



Figure 4. This picture shows an adult bird with two chicks. This photo would be circled with magenta to indicate a chick in the nest. Chicks range from hatchlings to juveniles.



Figure 5. This last active nest photo shows eggs in the nest. Although no bird is present, this nest is considered active and occupied. A nest with eggs, with or without a bird is present, is circled with cyan.

Printing Photographs Using ThumbsPlus

ThumbsPlus is used to print photographs for processing. After opening the ThumbsPlus program, proceed with the following steps:

1. Click on the SFCN folder. Several folders will drop down.
2. Click on the Vital_Signs folder. Several folders will drop down.
3. Click on the Colonial_Nesting_Birds folder. Several folders will drop down.
4. Click on the Images folder. Folders documenting each year of photographs taken will drop down.
5. Click on the appropriate year. Folders for each month will appear. Note: the files are named using the following format: YYYYMMDD_BISC_BirdFlight (e.g. 20111220_BISC_BirdFlight).
6. Click on the flight desired. Folders of the specific islands will drop down.

7. Click on the appropriate island folder. The photos processed earlier with circled bird nests will appear on the screen.
8. Highlight the first photo for printing by clicking on it. Start the process to print the photo, after making sure the print settings, print setup, and printer properties are set as follows: Click on Printer, Set the Orientation to Landscape, Click Properties... then click the Paper/Output tab and set as follows:
 - a. Job Type: Normal Print
 - b. Paper: Letter (8.5x 11")
 - c. 2-Sided Printing: 1-Sided Print
 - d. Stapling: None
 - e. Print Quality: High Speed
 - f. Output Destination: Center Tray
9. Under the Color Option Tab:
 - a. Color Correction: Automatic Color (Recommended)
 - b. After selecting the setting, click on OK to exit the first window, then click on OK again to exit the second window. Print the photo.
 - c. Once the picture is printed, make sure the picture format and name are correct. It is good practice to print one picture first in case the print settings are wrong, this may prevent a waste of time and resources if the settings are incorrect.
 - d. After the proper settings are confirmed, the remaining pictures can be selected for printing. Note: printing several pictures may occupy the printer for several minutes.

Counting Occupied and Non-occupied Active Nests

As an overview, once all the nests are circled on all the photos for a single colony, the photos are printed out (with nests circled) and laid out on a large table to eliminate cases when the same nest is circled on more than one photo, and then all remaining nests are counted.

The process in greater detail is described as follows: photographs that are marked with circled occupied nests are printed for further processing. Once printed, these photographs are laid out in sequential order so total active nests (circled nests) can be counted. The photographs are processed in the order they were taken by a single technician working on an entire colony. As there is often overlap between adjacent photos, to ensure nests are not counted more than once, the circled nests that appear on multiple photos are crossed out from all additional photos in which they are repeated. It is critical to make sure nests are not counted more than once. It is beneficial to write down totals of the various circled nests in the margin of each photo so this information can be recorded on the photo

processing data sheet. It is good practice to write nest counts on the bottom margin of the photo processing data sheet – this facilitates review of the work. Occasionally a nest may be categorized one way in one photo and another way in the next photo(s). It is up to the analyst to determine the best view of the nest and make a determination—asking for a second opinion can be helpful. Occasionally it is helpful to review photographs on the computer screen for additional analysis. When a nest is seen as an active empty nest in one photo, and a subsequent photo shows a bird, it is appropriate to eliminate the empty nest count and recount the nest as occupied. Looking through several photos of a nest may reveal an egg or a chick, and so the nest may be re-categorized. The active nest quantities (occupied and not) are entered on the data sheets and categorized by nests with adults, nests with chicks or juveniles, nests with eggs, and non-occupied nests. There is a prioritization to how nests are categorized: an empty nest is overridden by an occupied nest. The priority for occupied nests is as follows: a nest with egg(s) is greater than a nest with chicks which is greater than a nest with only adult(s). Remember, each nest can only be counted once. This information is then entered into the SFCN Colonial Bird Monitoring database. When entering active nests into the database, the quantity of nests with chicks and nests with eggs are separated for data purposes but are included in the total occupied nest count. Note that birds observed during a survey are not included in the count of active nests, but their quantities are estimated and maintained in the ‘observed section’ data base. These data can be used to create an Observation Report providing a more complete picture of birds using the park.

Review of Circled Nest Photos

Once a technician has analyzed the photographs from a flight, a trained second technician will perform an additional 5% check of un-circled, raw photographs as part of the QA/QC process. This will consist of the project leader and another technician comparing one another’s work. One person will analyze and circle all photos for a flight, and the other person will analyze 5% of those same photos (e.g., if 260 photos are used in the circling process, 13 photos will be reviewed, hence forth referred to as QA/QC photographs). These QA/QC photographs will be chosen with an R script that loads all images files from a specified directory and uses the sample() function to pull a random 5%. The second technician will analyze and circle these QA/QC photographs. The project leader will print out and compare both sets of photographs and note:

- Missing nests – nests that were not circled
- False nests – nests that were circled in error
- Discrepancies in determining occupied vs. non-occupied nests
- Discrepancies in species identification

If this check reveals a large number of discrepancies, the protocol lead or data manager may search for the source of the discrepancy, require additional training for technicians, or require additional images to be reviewed.

Literature Cited

- South Florida/Caribbean Network (SFCN). 2021a. Data entry, data proofing, and reporting—Version 1.1. South Florida/Caribbean Network Standard Operating Procedure NPS/SFCN/SOP—CNB06. South Florida/Caribbean Network, Palmetto Bay, Florida. Available at: <https://irma.nps.gov/DataStore/Reference/Profile/2285052> (last accessed January 2022).
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