BRUCE PENINSULA
BIRD OBSERVATORY
THE VOICE OF BIRDS ON THE BRUCE

Migration Monitoring at Cabot Head Research Station, Cabot Head, Ontario:

Protocol for
Bird Migration Monitoring

Version 5.0

Prepared for:

Bruce Peninsula Bird Observatory

by:

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Revised in June, 2020

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1.0 Introduction

The Bruce Peninsula Bird Observatory (thereafter, BPBO) has been operating the Cabot Head Research Station (thereafter, CHRS), at Cabot Head, Bruce Peninsula, Ontario, with a standardized protocol since 2002. The protocol was extensively reviewed, revised, and updated on August 2003 by Audrey Heagy, Daniel Derbyshire, and Ted Cheskey, with input from Rod Steinacher, Stéphane Menu, and Jon McCracken. BPBO maintains a website at bpbo.ca and can be reached through bpboinfo@gmail.com or direct mail at Bruce Peninsula Bird Observatory, PO Box 273, Lions Head, Ontario, N0H 1W0. The current reviewer of the protocol, Stéphane Menu, can be reached at stefmenu@gmail.com.

1.1 Statement of purpose

The main goal of the bird migration monitoring project at Cabot Head is to contribute to the efforts of the Canadian Migration Monitoring Network (CMMN) to monitor changes in the populations of certain migratory bird species that are not being adequately monitored by other programs.

The primary objective of this protocol is to generate Standard Migration Counts that represent a consistent and unbiased sample of the birds migrating through Cabot Head each day during the spring and fall migration.

More general objectives of the bird migration research at Cabot Head include:

- to learn more about the composition, magnitude, timing and demographics of bird migration on the Bruce Peninsula and Great Lakes Basin; and
- to foster the public's understanding and appreciation of birds and bird migration and other aspects of the natural history of the Bruce Peninsula.

1.2 Data storage

Data collected are summarized in Daily Logs and archived at Birds Canada. Banding data is also sent to the Bird Banding Office, the regulatory government agency in charge of bird banding in Canada. Hard copies are stored at CHRS in a secure metal cabinet, with electronic copies stored in various devices (laptops, USB keys, external hard drives).

2.0 Information on site

2.1 General information

Cabot Head is a promontory of the northeast headland of the upper Bruce Peninsula in south-central Ontario. CHRS is situated on the western side of Wingfield Basin (at 45°15’N, 81°18’W) near the community of Dyer’s Bay. The land where the station and net lanes are situated are owned and managed by Ontario Parks (Fig.2.1). The site is accessible by means of a seasonal gravel road (Fig.2.2). Since late fall 2019, the record high water levels of Lake Huron

have badly eroded a short section of the road, complicating access: ATVs and high-clearance trucks are the only motorized vehicles capable of passing through for now, until significant repairs are made to the road. The site is located on lands acquired by the Province as part of the 4500-ha Cabot Head Provincial Nature Reserve. The Nature Reserve and adjacent waters of Georgian Bay form the Cabot Head Important Bird Area.

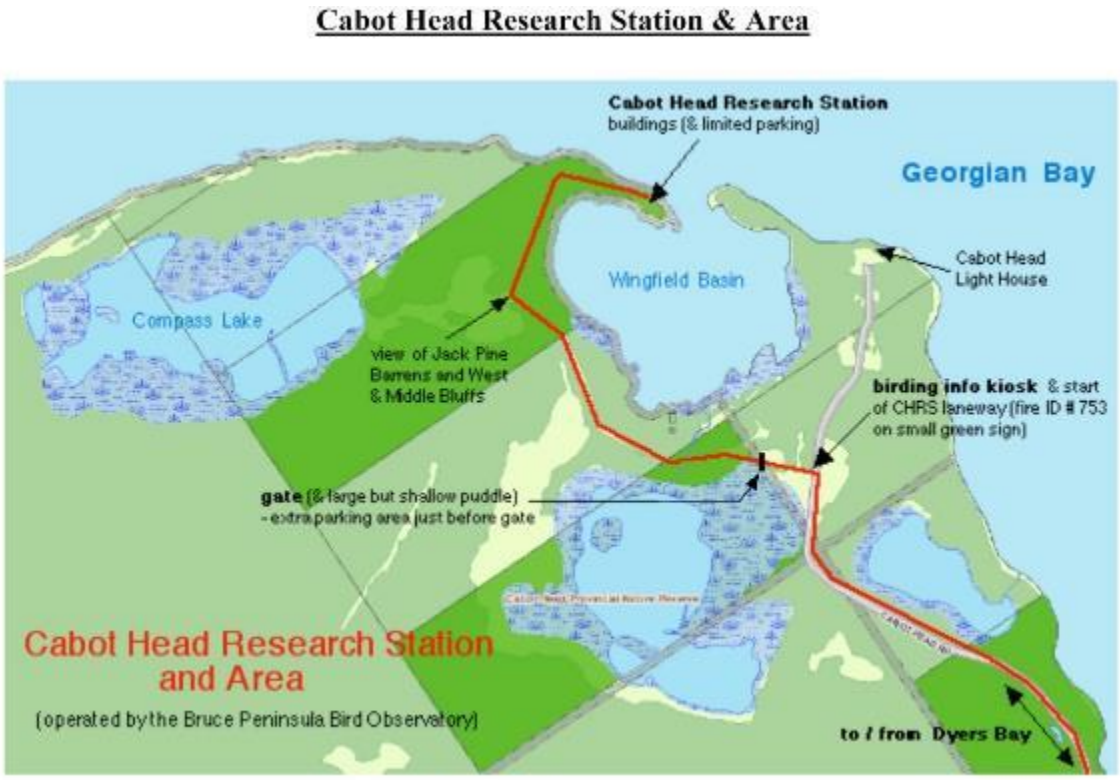
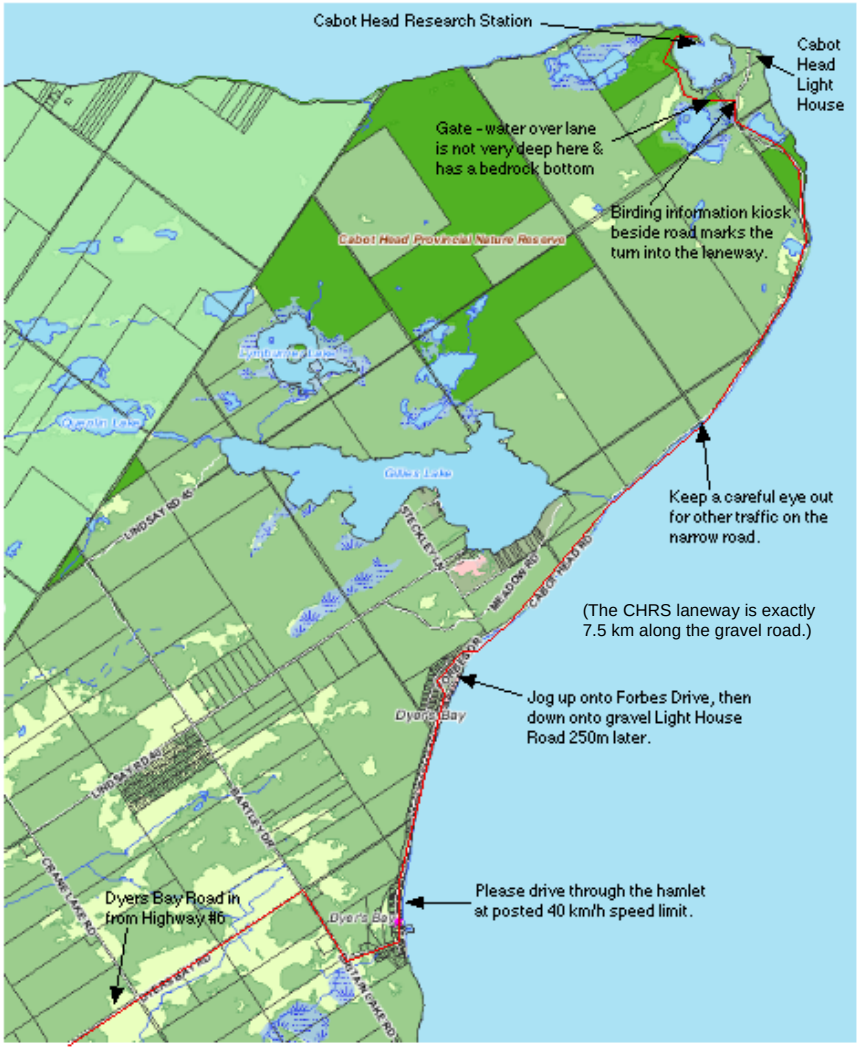


Fig.2.1 Map of the CHRS and area

Getting to the Cabot Head Research Station



** Count on about 25 minutes from the turn off Highway #6 onto the Dyers Bay Road to the Research Station in daylight. Add at least 5 more minutes if driving in the dark.

Fig.2.2. Local directions to access CHRS

2.2 Count Area

The Count Area includes Wingfield Basin and land on its western side including the small peninsula of land oriented toward the outlet of the basin (where the net lanes and buildings are situated), and the access road that runs south from this small peninsula to the 'Jack Pine barrens' (see map in Fig.2.3). The Count Area is naturally limited by the near horizon of forests and bluffs, except over Georgian Bay. All counting is done from within these boundaries.

2.3 Census route

The census route begins at the old dock steps in front of the cottage (45°14'46.3" N, 81°17'57.0" W) and then turns East toward the point where it loops back up the road on the north side of the point and follows the road up to the jack pine barrens; the census ends there (45°14'38.5" N, 81°18'11.3" W)(Fig.2.3.1; coordinates for more locations in Appendix 2). There are two observation points over Georgian Bay, one towards the "tip" of the basin entrance, and one to the East of the Grebe Lodge building (see Section 3.6 for more details - Fig.2.3.2).

Fig.2.3.1. Census route at CHRS

Fig.2.3.2. Detailed first part of the census route at CHRS

2.4 Net locations

Net locations have been set in place in 2002 and have not changed ever since (Fig.2.4 and Table 2.1), except for a small change in Spring 2003 (See Section 6).

2.5 Instructions for habitat maintenance

Ongoing habitat maintenance should be carried out to maintain safe and stable conditions for the mist-netting operation during both the spring and fall migration monitoring seasons, including trimming of overhanging branches and shrubs along the access lane and mowing the centre of the laneway.

The net lanes and connecting paths are trimmed regularly in early June, early August, and late October. Localized Poison Ivy control measures are implemented as necessary. Fallen trees and branches are cleared as needed after wind storms. Around the nets, vegetation should be trimmed back approximately two or three feet from the nets, to the height of the nets (just over 2.6 m). In strong winds, the nets should be able to billow straight out without catching on any twigs, branches, or leaves.

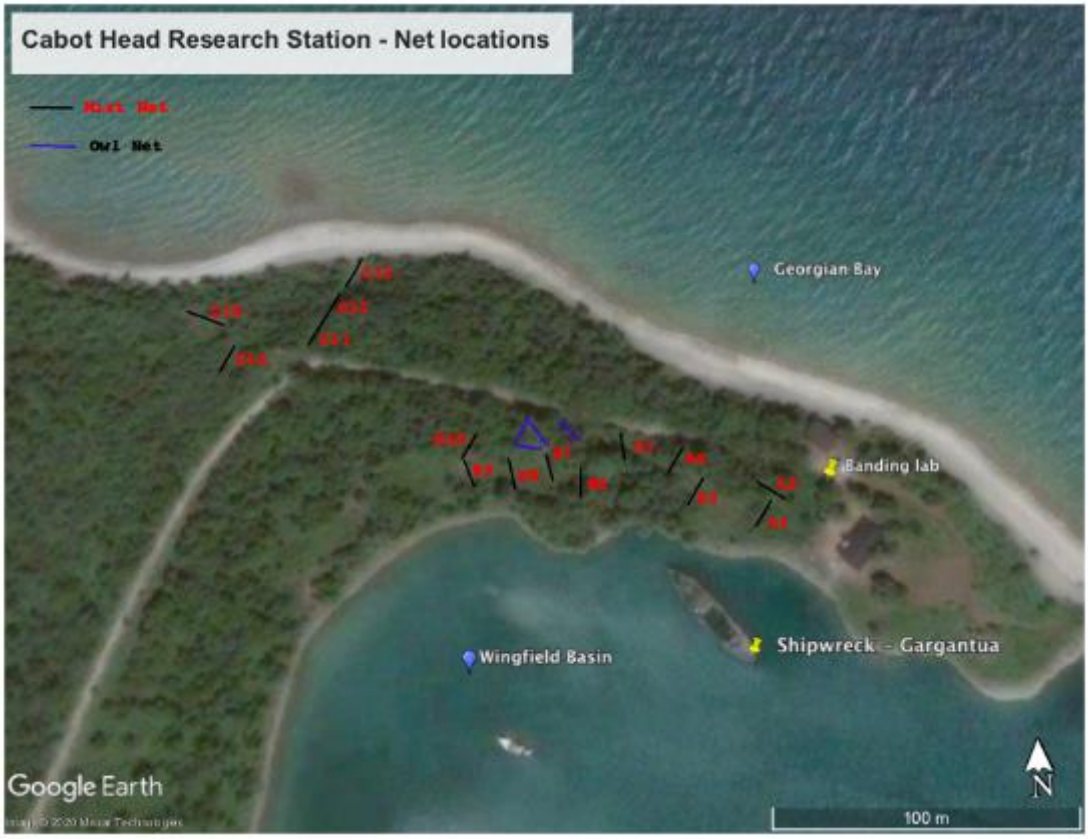


Fig.2.4. Net locations at CHRS

Table 2.1: Net coordinates at CHRS

Net ID	Latitude	Longitude	Net poles where coordinates were taken
A1	45°14’46.7” N	81°17’58.2” W	North
A2	45°14’46.7” N	81°17’58.1” W	East
A3	45°14’47.1” N	81°17’59.3” W	North
A4	45°14’47.2” N	81°18’00.0” W	South
A5	45°14’47.4” N	81°18’00.7” W	North
B6	45°14’47.0” N	81°18’01.4” W	South
B7	45°14’47.5” N	81°18’02.0” W	South
B8	45°14’47.4” N	81°18’03.1” W	North
B9	45°14’47.2” N	81°18’04.9” W	North
B10	45°14’47.6” N	81°18’04.8” W	South
C11	45°14’48.9” N	81°18’05.9” W	South
C12	45°14’49.3” N	81°18’05.8” W	South
C13	45°14’49.6” N	81°18’05.6” W	South
C14	45°14’48.8” N	81°18’06.3” W	North
C15	45°14’48.9” N	81°18’07.2” W	East

3.0 Data-collection procedures

3.1 Coverage

Monitoring is from April 15 to June 10, and August 15 to October 31. Occasionally unavoidable deviations in start or end dates of up to a week occur, but are too uncommon to affect data quality; with the exception of 2020 (details in section 6.0).

3.2 Count Period

The daily Count Period is the 7-hour period starting 30 minutes before sunrise and ending 6.5 hours after sunrise (Table 3.2).

3.3 Staffing

This protocol is designed so that it can be adequately carried out by at least two experienced persons. The position title of the person responsible for operations at the station is the *Station Scientist*. This person must be an experienced passerine bander with good to excellent bird identification skills. The Station Scientist is a paid contract-based staff person with the observatory, reporting directly to the Board Chair/President or their designate. The Station Scientist is expected to have strong interpersonal skills and a scientific background, in addition to his or her knowledge and qualifications with respect to banding and bird identification. At least one (volunteer) assistant must be available who can complete the census and assist with banding operations. The second assistant must therefore be a qualified observer and should have some banding skills if possible.

Two experienced birders/banders are usually sufficient to safely manage the migration monitoring program. However, additional personnel can be of assistance with both the banding procedure and related bird observations.

3.4 Standard Captures

A standardized program of mist net captures is the best method available for determining the number of migrants present for many of the priority target species because of the dense vegetation in much of the Count Area. Moreover, banding allows identification of those individuals that are residents or stopovers, and provides information on the age, sex and condition of each captured bird.

The goal of the Standard Capture program is to capture, mark and collect data on a representative sample of the target species present in the Count Area on any particular day. Ideally, all nets in the standard array are used for a set period every day, a full set of data are collected for each bird captured, and each bird is banded with a standard numbered band issued by the Canadian Bird Banding Office. However, the welfare of the birds takes priority over maintaining the standard protocol, which could require reducing the number of nets in operation when detrimental conditions arise.

This document includes guidelines to assist the Bander-in-charge in deciding when to reduce the capture effort, to reduce the amount of data being collected and/or release birds unbanded and how to implement these measures. If these guidelines are followed, then the capture operation can be carried out with minimal stress to the birds being captured while maximizing the value of the data being collected.

3.5 Capture Effort

The standard capture effort includes only mist nets. Other nets or traps may be used only provided they do not impact on the standard netting efforts by attracting birds closer to, or farther from, the standard nets. In particular, water drips, bird feeders and tape lures should not be used within the Count Area unless it is clear that they will have no impact on the capture of any of the target species (hummingbird feeders are allowed, for example).

3.6 Standard Equipment

Nets: The standard net array consists of 15 small-mesh mist nets in fixed locations (see Figure 2.4). Most of the nets are single sets but a few are set in lines of two nets. Each individual net has a unique identifier code that is used to track net opening and closing times and track where each bird was caught. They are 12 m long, 30 - 32mm mesh nets made of 110 dernier, 2 ply black nylon thread. Nets are 2.5 m high with 4-shelves or 5- shelves, generous amounts of bag.

Nets are set on 2.5 m (10')[1] poles (1" and .75" electrical conduit) with the bottom shelf string set at knee height (minimum 40 cm ground clearance at all points). Even though some birds will end up going under the net, this minimum clearance is essential to prevent predation of birds in the bottom panel by red squirrels, chipmunks and snakes. Some of the net lanes are on uneven ground and a short section must be added one or both poles to achieve the minimum ground clearance. One net (A3) is set across a slope and the lower end of the net is fixed to a pulley arrangement on a 15' pole so the net can be set approximately horizontally with the bottom panel of the lower end up to 5' off the ground. Another net (B6) is set up on 15’ poles with a pulley arrangement. Both end poles should ideally be placed over a short section of rebar and both poles must be guyed to maintain tension.

Ground traps: Ground traps are not allowed as part of the regular bird migration monitoring. (See section 6.0).

Mist nets are opened 30 minutes before sunrise and run for a 6-hour period, weather permitting (Table 3.2).

Table 3.2: Schedule of count period, with time for net opening and closing, and census, in spring and fall at CHRS

Period and sunrise	All Nets Opened Starting at:	Census starts	All Nets Closed Starting at:	End of Count Period:
April 11 – 20 - 6:45	06:15	7:45	12:15	13:15
April 21 – 30 - 6:30	06:00	7:30	12:00	13:00
May 1 – 10 - 6:15	05:45	7:15	11:45	12:45
May 11- 20 - 6:00	05:30	7:00	11:30	12:30
May 21 – 31 - 5:45	05:15	6:45	11:15	12:15
June 1 – 15 - 5:30	05:00	6:30	11:00	12:00
August 1-11 - 5:30	6:00	7:30	12:00	13:00
August 11 - 20 - 5:30	6:00	7:30	12:00	3:00
August 21 - 30 - 5:30	6:00	7:30	12:00	13:00
September 1 - 10 - 5:45	6:15	7:45	12:15	13:15
September 11- 20 - 6:00	6:30	8:00	12:30	13:30
September 21 - 30 - 6:15	6:45	8:15	12:45	13:45
October 1 - 15 - 6:30	7:00	8:30	13:00	14:00
October 11- 20 - 6:45	7:15	8:45	13:15	14:15
October 21 - 30 - 7:00	7:30	9:00	13:30	14:30

Nets are checked every 30 minutes after opening time, in the same order as they are opened (from A1 to C15). All open nets are checked in sequence (normally starting with nets closest to the banding lab, working down the Wingfield Basin side of the lane to last open net). Under normal conditions, nets are closed in the same order they were opened, starting 6 hours after the first net was opened. The opening and closing time (to nearest 10 minutes) of each net is recorded in the log.

Each net has a unique identifier, which is used to keep track of nets from which bird are extracted.

The net lanes for hawk and owl nets (Fig.2.4) are situated within tall cedar trees and, as a consequence, require little, or no, maintenance. Raptor (owl) banding happened occasionally in past years and none has taken place since 2014, but may be resumed on decision of the Station Scientist.

3.6 Census Guidelines

The census is the highest priority element of the migration monitoring day at Cabot Head if the full program cannot be completed. Census can be done in any weather and does not require a qualified bander to be present; and is thus the count type best suited for providing a standard index of daily abundance on the largest number of days.

The census must be completed regardless of weather conditions (except for electrical storms and violent weather when birds are poorly detected). The census must begin 1.5 hours after sunrise and continues for exactly 60 minutes. Only one person may do the census on any one day. This person must be skilled in bird identification. To ensure that census data is not biased toward the abilities of a single observer, personnel who are skilled enough to do the census, should rotate this task. Census participants must stay on the specified route (see section 2.3 and Fig.2.3) and cannot veer off course to a distance greater than 10 meters. Census participants must use binoculars and cannot use spotting scopes. Pishing to attract birds on census is not permitted. Lastly, the census participants should pay close attention to bird movements over the course of the census in order to avoid double counting the same individual birds. The census route should be completed at the same pace regardless of whether there is a large volume of birds around or whether there are very few.

The pace of the census is rather slow, with frequent short pauses: the entire route walked at a normal walking pace would be completed in less than 15 min. At the start of census, a stationary five minutes should be spent in front of the cottage. Two more stops of about five minutes each should be done at both lake overlooks. One should expect to take about 20 minutes from start of census to end of second lake overlook. Another 10 minutes should be taken to reach the curve in the road where the C nets are located. The rest of the walking should be done in 25 minutes, leaving about five minutes for a stationary observation period at the Pine Barrens.

3.7 Incidental Observations

Incidental (or "casual") observations refer to observations made by any personnel on a given day that were not made on the census. The only rules for incidental observations are that they must be made during the count period and that the observers must be within the count area. The count area is confined by natural boundaries (bluffs, forests), except over Georgian Bay: therefore, there is no distance limits for observation. The use of a scope is allowed, notably for waterfowl over the bay or raptors over the southern horizon. The purpose of these observations is to document birds that were not captured or banded, and to assist with determining the estimated total for each species each day. Incidental observations can occur any time during the count period, as long as they do not interfere with census and banding. Observers must record their incidental observations on a notebook, recording time spent to the nearest 5 minutes so that each person's total observation time for day can be recorded in the daily log.

In order to account for day to day variation in the amount of time that observers spend performing incidental observations, each observer must record total time spent making these observations, and this will be reported in the daily log. This will ensure that the daily variation in effort does not affect the validity of the data.

3.8 Additional observations

Additional, non-standard observations are observations done in the Count Area but recorded outside the standard hours, later than seven hours after sunrise on any given day. Observations outside the Count Area are not recorded in the daily log, even as non-standard observations.

3.9 Operation priorities

The census should take precedence over any other operations and, as mentioned, should be done every day, regardless of weather. If banding cannot take place, try to make observations throughout the Count Area through the full Count Period so the Daily Totals (see section 5.0) will be as comparable as possible to those of other days.

3.9.1 When not to operate a net or nets due to hazardous conditions

Nets should not be operated if any bird captured would be at high risk of injury or mortality. Nets may be operated with caution (more frequent checks) if conditions are marginal or deteriorating. If the hazardous or potentially hazardous circumstances are affecting only certain nets, then only those particular nets should be closed. If all nets are affected than all nets should be closed. Any net that is not in good condition (large holes, broken shelf strings or loops, etc.) should be closed until repairs are made.

Many weather conditions can pose a hazard to birds in the net. They include rain or blowing mist, moderate to high winds, and high or low temperatures. No nets should be operated if it is raining or so damp that water is beading on the nets. In deciding when to close nets due to weather condition, the Station Scientist must consider the combined effect of wind speed and direction, temperature, humidity, and sun exposure at each net. In general, if operating conditions are such that net checks are needed every 20 minutes, then the nets farthest from the banding laboratory should be closed.

The Station Scientist and field assistants should be continually alert for the presence of potential predators (hawks, Blue Jays, fox, red squirrels, chipmunks, etc.), other problem species (deer, bears, dogs), or unexpected visitors wandering through the site. The condition of all birds being captured should be closely monitored for signs of stress (panting, fluffed feathers, etc.).

If a potential problem is identified, the Station Scientist may decide to operate all nets with more frequent checks, close nets that are particularly affected by the problem, or close one or more blocks of nets. If an actual problem does occur (e.g. stressed or injured bird in the net, bird killed by a predator), then the Station Scientist must immediately reassess the situation. If a second problem occurs, then all netting should be halted for the day or until the problem is resolved.

All incidents, including injuries and mortalities, must be documented in the casualty log. Reasons for closing nets must be documented in the daily log.

3.9.2 Reducing the Capture Effort due to excessive captures

In general, all nets that can be safely operated should be operated, provided that the available personnel can safely handle the anticipated number of captures. If the anticipated catch exceeds the safe operating threshold, then the catching effort should be reduced by closing (or not opening) nets: The order in which the nets (or blocks of nets) are closed is determined by distance from the banding lab, with nets in the farthest block always closed first since that results

in significant time savings on net rounds. On exceptionally busy days it may be necessary to close all nets, at least temporarily. If circumstance change so that more nets can be safely operated, then nets may be re-opened as blocks starting with block A, then block B and C. The times at which each net is closed and re-opened should be recorded (to the nearest 10 minutes).

For data analysis purposes it is important that any deviation from the standard operating schedule be noted by recording the time and reason each net is opened and closed.

While birds being held in bags in the banding lab are at little risk of harm, they are nonetheless not able to feed or migrate and should be processed and released as soon as possible. As a guideline, all small birds should be released within 60 minutes of being captured. Whenever it appears that more birds are being caught than can be safely processed within 60 minutes of capture, then the standard processing procedures must be adjusted by dropping some or all of the optional measurements in order to speed up the process (streamlined processing or "ring and fling"; see Table 3.3). If it appears that, even with a streamlined banding processing, more birds are being caught then can be processed within 60 minutes of capture, then the catching effort should be reduced. Birds not processed after 60 min. should be released unbanded, recording only the species

The minimum data recorded for every banded bird are: band number, species, age, how aged, sex, how sexed, wing chord, weight, bander, location, date, time of capture, time weighed (or of release, if weight is not taken), and net number. Additional data that are routinely collected include: fat score, skull ossification score, cloacal protuberance score, brood patch development score (Table 3.3). Banders are also encouraged to record moult information if time permits. The various scoring systems and data sheets in use at Cabot Head are available in the banding lab.

Table 3.3: Data collected under Full and Streamlined Processing Procedures

Data collected	**Explanation**	**All Banded Birds**	**Rapid Release procedures**
date	dd-mon-yy	Required	Required
location	CHRS	Required	Required
capture	Start of the net round to 10-minute accuracy (ignore minutes)	Required	Required
Trap Type	MN (mist net); GT: Ground Trap; HN: Hawk Net	Required	Required
trap ID	Net number or code	Required	Required
Species	as required by banding lab (e.g. recognizable forms should be identified as such)	Required	Required
Band Number	9- or 10-digit band number	Required	Required
age/how aged	see banding manual and operations manual	Required	Required
sex/how sexed	see banding manual and operations manual	Required	Required
bander	2 or 3 letter initials, include full name in daily log	Required	Required
wing chord	to nearest millimetre	Required	
weight	to 0.1 gram	Required	
time weighed or released	time weighed (to 10-minute accuracy as per time caught) (if not weighed then time of release.	Required	Required
fat score		Optional	
CP score		Optional	
BP score		Optional	
Skull score		Optional	
moult		Optional	
comments	record additional measures or other information including any circumstances that require use of a status code other than 300 (e.g. injury or deformity) or use of a remark code (large leg requiring a larger than normal band size, band used out of sequence, etc.).		

4.0 Habitat monitoring and management

4.1 Habitat Monitoring

Monitoring vegetation and documenting site conditions generate important background information on bird-habitat associations and habitat changes that may alter the numbers and species of birds present at a given site. An initial habitat assessment was completed in 2002, during the first year of BPBO's migration monitoring program but was not repeated.

Beginning in 2020, BPBO will institute a standardized habitat monitoring and assessment following CMMN recommendations. Habitat monitoring, including making photographic records of site conditions, is to be carried out once every five years, beginning in 2020 (see Appendix 2 for more details).

4.2 Station Map

The Count Area at CHRS encompasses four different types of habitats (Fig.4.2), which will be assessed every five years as required by the CMMN Habitat Assessment requirement. This, alongside photographic records, will allow to monitor changes of habitats through time. The station map (Fig.4.2) made using Google Earth indicates the count area and the designated habitats, as well as the main buildings and the access road.

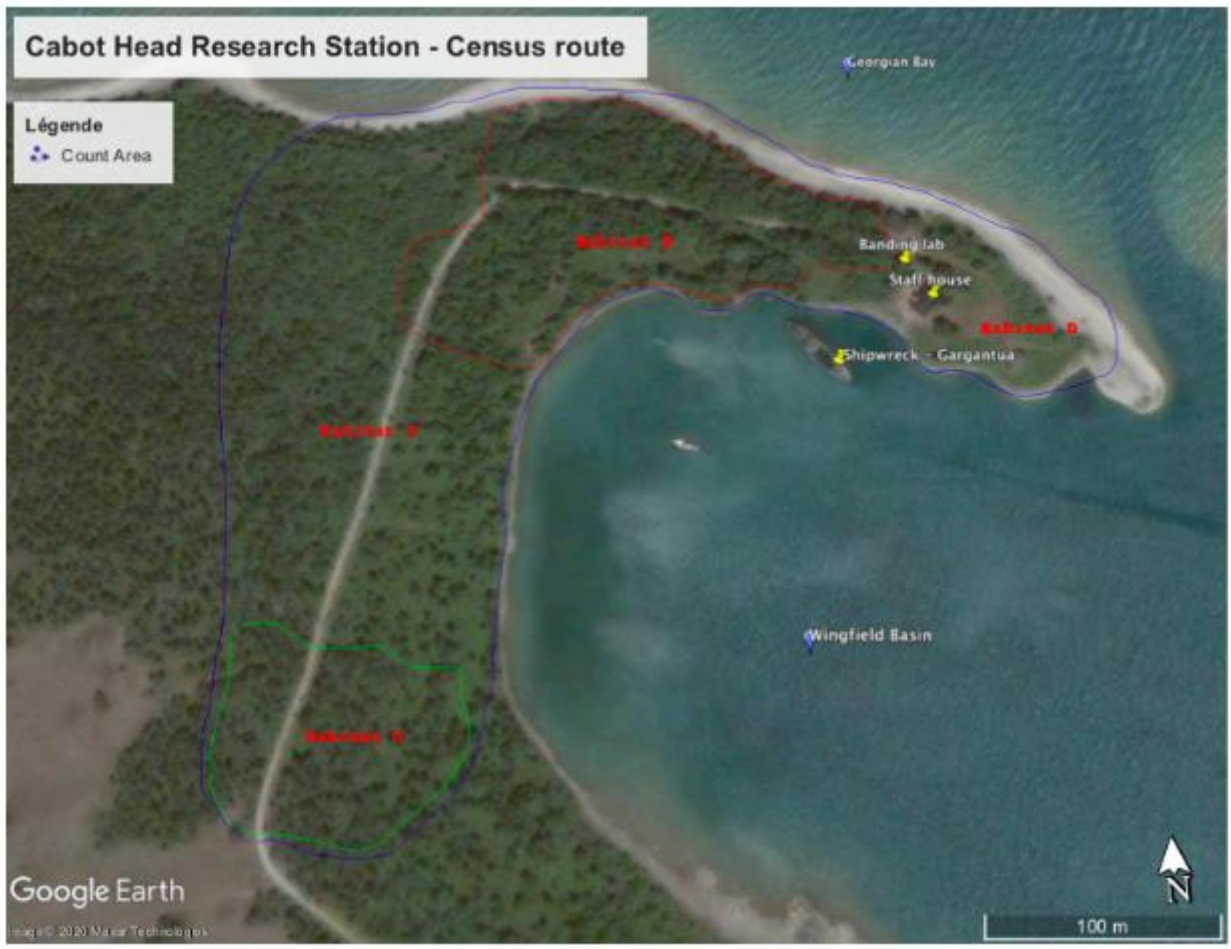


Fig.4.2. Count Area and Habitat Assessment Areas at CHRS

5.0 Record keeping

5.1 Completing the Daily Log

Every day at the end of each Count Period, the following data should be summarized and carefully entered on to the appropriate section of the Daily Log (example in Appendix 1)

- Date
- Names of personnel with their field hours and observer code (Table 5.1.1)
- Cumulative season total for total number of birds banded
- Coverage Code (Table 5.1.2)
- Weather data at Count period start and end and also at dusk, including exact time, wind direction/strength (using the Beaufort scale), visibility, cloud cover (in tenths), temperature and type and intensity of precipitation
- Census observer and start/finish times
- Details of the Standard Capture effort (individual net/trap opening and closing time, and total net-hours)
- The number of individuals of each species handled during the Standard Capture effort broken down into numbers newly-banded (column marked 'Band' in Appendix 1), recaptures and foreign recoveries ('Rec;' not including same-day repeats), and any cases of birds captured but not banded ('Cap Unb')
- Number recorded on census ('Cens')
- Other observations during the standard coverage period ('Obs')
- If capture takes place outside the standard coverage period or in non-standard nets, record numbers banded as 'NSB' and numbers re-trapped as 'NSR.'
- Observations outside the standard coverage period are recorded as 'Add Obs'
- Known stopovers ('KS') – see below
- The daily Estimated Total (ET) – see below
- Description of visitor activity
- Narrative including a written summation of the day

Once the standard Capture data (i.e. 'Band', 'Rec', and 'Cap Unb') and census data ('Cens') are filled in onto the Data Sheet, complete the 'Obs' column. If only one Observer was involved, then other observations done during the count period can also be entered directly into the 'Obs' column. More commonly, 'Obs' are a combination of observations from all observers and should be determined for each species in turn, with all staff and volunteers present and providing input into the decision-making process used to arrive at the daily Estimated Totals (see below for a description of the typical process). Anyone can take the lead in completing the data sheet, but the Station Scientist is responsible for ensuring that data are correctly entered and that the Counts are properly determined.

At Cabot Head, the Estimated Total (ET) is the best estimate of the number of individuals of each species detected in or passing through the Count Area during the Count Period, as described below. Many analyses of long-term population trends are based on this value, so they should be

carefully and consistently constructed. Other data that may be collected on an irregular or non-standard basis are **not** considered in determining the daily ET.

How to derive Estimated Total (ET)

1. At the end of the count period or soon thereafter, all available staff and volunteers are summoned, and someone is selected to take the lead in completing the Daily Log.
2. The Count Leader checks that the Capture effort, Capture, Recapture and Census data sections of the Daily Log have been completed.
3. The Count Leader records the names of everyone present for the Count Period that day and then records the Observation time for each individual for that day.
4. The Leader checks that all Observation data are available, including any records left by observers who left earlier, and then proceeds to work through the list of species on the Data Sheet.
5. For each species, the census and capture/recapture totals for the species are read aloud.
6. Next, everyone is asked for the numbers they observed as Incidental Observations. Discussion should follow to eliminate probable double counting between observers. Numbers of birds that were detected but not counted carefully, such as flocks moving by, can be estimated -- but estimates should **never** include birds that 'likely were there' when no one actually detected them.
7. Finally, the adjusted observation totals are added to the census and capture totals and recorded in the 'ET' (Estimated Total) column on the log sheet.

5.2 Known Stopovers (KS)

The category of Known Stopover is used to document rare or uncommon species that are present in the count area for consecutive days. For example, if a Snowy Owl is observed for six consecutive days, and it appears to be the same individual based on plumage characteristics, it would be recorded as KS. Known Stopovers also include recaptured birds from previous days, or known residents (e.g. the Grey Catbirds that always call from the same shrubs in August). The purpose of the Known Stopover category is to flag any individuals included in that day's count, which have been included in the migration counts on one or more previous occasions during the same migration season. It is recorded for research purposes but does not affect calculation of ETs.

5.5 Observer and coverage Codes

Observer codes gauge the experience of the observers. The coverage code is intended to give a general indication of the level of coverage achieved. The target is to obtain adequate to good coverage on at least 75% of all days during the coverage window and good coverage on as many days as possible. Coverage code is recorded on the daily log.

Table 5.1.1. Observer Codes

0	No experience
1	Able to identify < 25% of species of the area
2	Able to identify < 50% of species of the area
3	Able to identify < 75% of species of the area
4	Able to identify > 75% of species of the area

Table 5.1.2. Coverage Codes

Coverage Code		**Standard Observations and Standard Capture Effort**
0	**No coverage**	No coverage
1	**Poor coverage**	Census and some incidental observations and/or less than 20 net hours
2	**Adequate**	Census and >20 but <45 net hours
3	**Good**	Census and 45-89 net hours
4	**Full coverage**	Census and 90 net hours (based on 15 nets)

5.6 Data Management

At present the BPBO is using a paper-based system for recording all migration monitoring and banding data. A set of standard data sheets has been developed for this purpose (see Appendix 1). All migration count and banding data are later computerized (the same day if possible) using the current versions of the CMMN Daily Estimated Total and BandIt software programs. All Count and effort data are entered into the CMMN-developed Excel spreadsheet, saved with a name for the specific season and year name, e.g. BPBO CMMN data spring 2020. (N.B. the 'ET_auto' column will show the total of all counts prior to adjustment for overlaps, and the 'ET_manual' column is the one that shows the final ETs.). Backup copies of the electronic data **must** be made after each data entry session.

All banding and recapture data are entered into an Excel file (using a specific season and year name, e.g. BPBO banding data spring 2020) and finally transfer into a computer database using the current banding software program (BandIt, at the time of writing). This program is also used to produce the banding schedules required by the Bird Banding Office, which are normally submitted within 60 days of the end of each season.

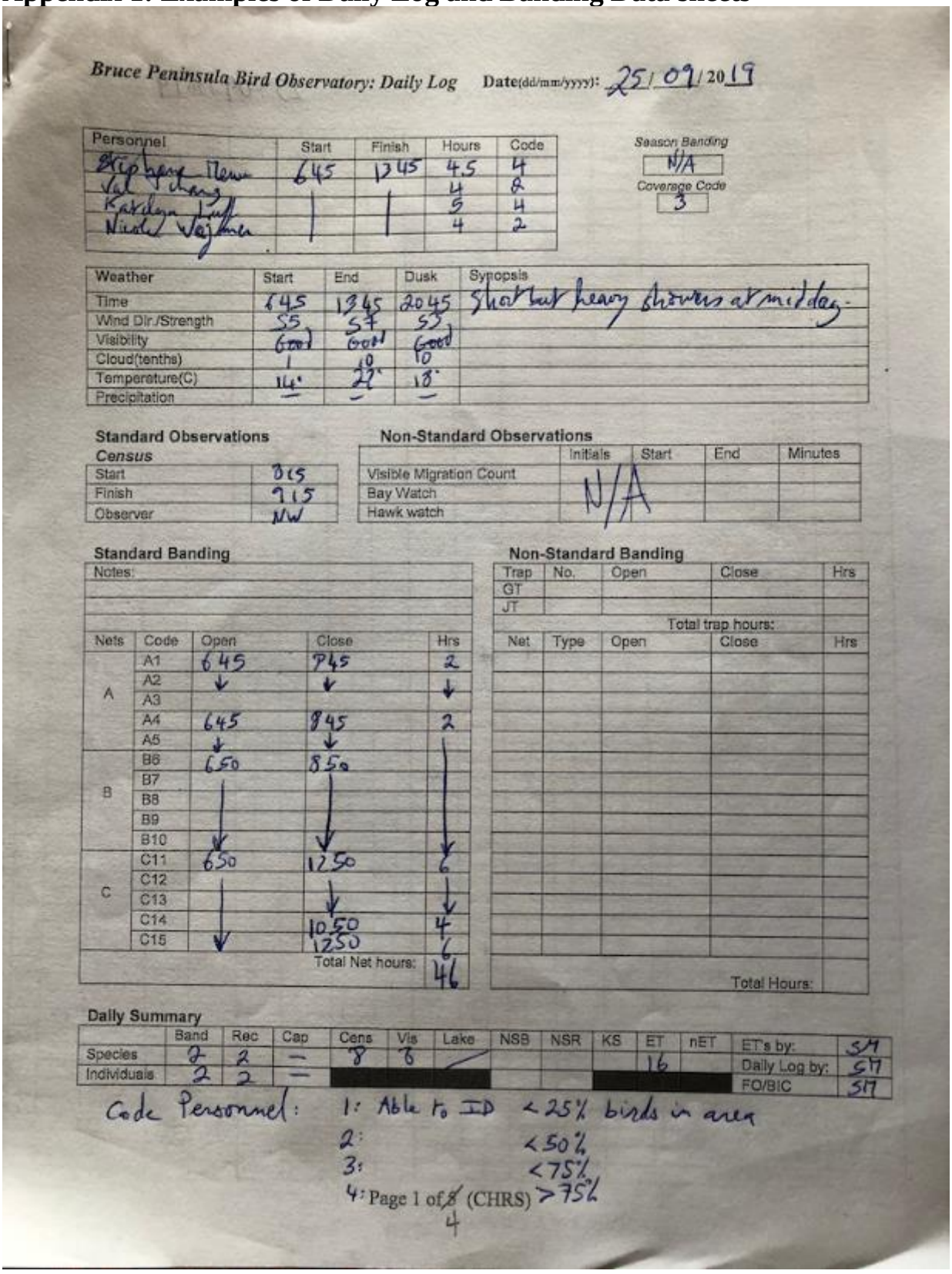
At the end of each year, proofed and corrected copies of all computerized databases are given to Birds Canada for analysis and archival purposes. Banding data may be sent as well for permanent archiving of all data.

6.0 Record of changes in standardized data collection

If any standardized operational change or interruption of greater than one week occurs, enter details into the table below, underneath any previous entries. Refer to parts of the text that were changed (e.g. section number, map, tables). Revise the 'latest version' date on page 1 of this protocol. If changes have been made to the protocol other than adding to the table below, submit a copy of the entire revised protocol to Birds Canada along with year-end data submission; otherwise, send only a copy of this section.

Date	Description of change and justification (if applicable)
Spring 2003	Removed permanently two nets due to extremely low capture rates. One net was just south of current A5 and the other one was on the north side of the access road, roughly opposite A3. Added two nets (current C14 & 15) to keep the same overall numbers of nets (15). As a consequence, 2003 should be taken as start year for standardized coverage.
Spring 2020	Reduced monitoring due to Covid19: only the Station Scientist from May 8 to June 10, doing daily census and banding with six nets (A1&2, B9&10, C14&15; nets chosen based on their high capture rate); banding usually for four, instead of six, hours.
Various	One or two ground traps, baited with bird feed mix, were used in an ad hoc manner in some seasons and years (springs 2004, 2013, 2014 and falls 2012, 2013, 2014). Numbers captured were recorded as NSB, but trap use may have attracted more of certain species into the count area such that observations and numbers captured in nets may have been elevated in those years.

Appendix 1: Examples of Daily Log and Banding Data sheets



Bruce Peninsula Bird Observatory: Daily Log Date(dd/mm/yyyy): 25/09/2019

Personnel	Start	Finish	Hours	Code
Stephanie Menu	645	1345	4.5	4
Val Chang	|	|	4	2
Kaitlyn Luff	|	|	5	4
Nicole Vajcner	|	|	4	2

Season Banding: N/A
Coverage Code: 3

Weather	Start	End	Dusk	Synopsis
Time	645	1345	2045	Short but heavy showers at midday.
Wind Dir./Strength	SS	SE	SE	
Visibility	Good	Good	Good	
Cloud(tenths)	1	10	10	
Temperature(C)	14°	22°	18°	
Precipitation	—	—	—	

Standard Observations

Census

Start	815
Finish	915
Observer	NW

Non-Standard Observations

	Initials	Start	End	Minutes
Visible Migration Count	N/A			
Bay Watch				
Hawk watch				

Standard Banding

Notes:

Nets	Code	Open	Close	Hrs
A	A1	645	745	2
	A2	↓	↓	↓
	A3			
	A4	645	845	2
	A5	↓	↓	
B	B6	650	850	
	B7			
	B8			
	B9			
	B10	↓	↓	↓
C	C11	650	1250	6
	C12		↓	↓
	C13			
	C14		1050	4
	C15	↓	1250	6
			Total Net hours:	46

Non-Standard Banding

Trap	No.	Open	Close	Hrs
GT				
JT				
			Total trap hours:	

Net	Type	Open	Close	Hrs
			Total Hours:	

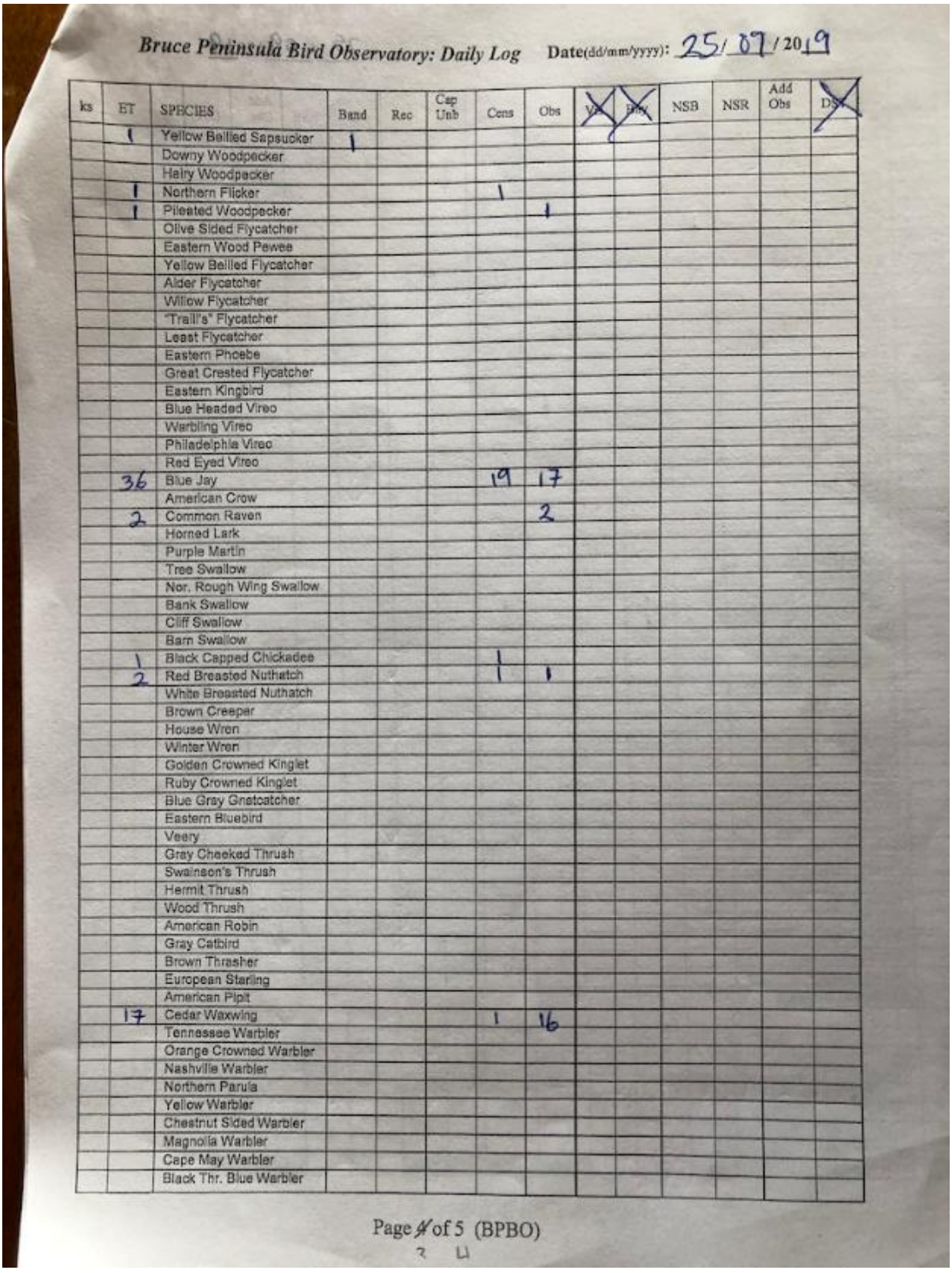
Daily Summary

	Band	Rec	Cap	Cens	Vis	Lake	NSB	NSR	KS	ET	nET	
Species	2	2	—	8	8					16		ET's by: SM
Individuals	2	2	—									Daily Log by: SM
												FO/BIC SM

Code Personnel: 1: Able to ID <25% birds in area
2: <50%
3: <75%
4: >75%

Page 1 of 4 (CHRS)

FO/BIC: Field Ornithologist\Bander-in-Charge (now called Station Scientist)

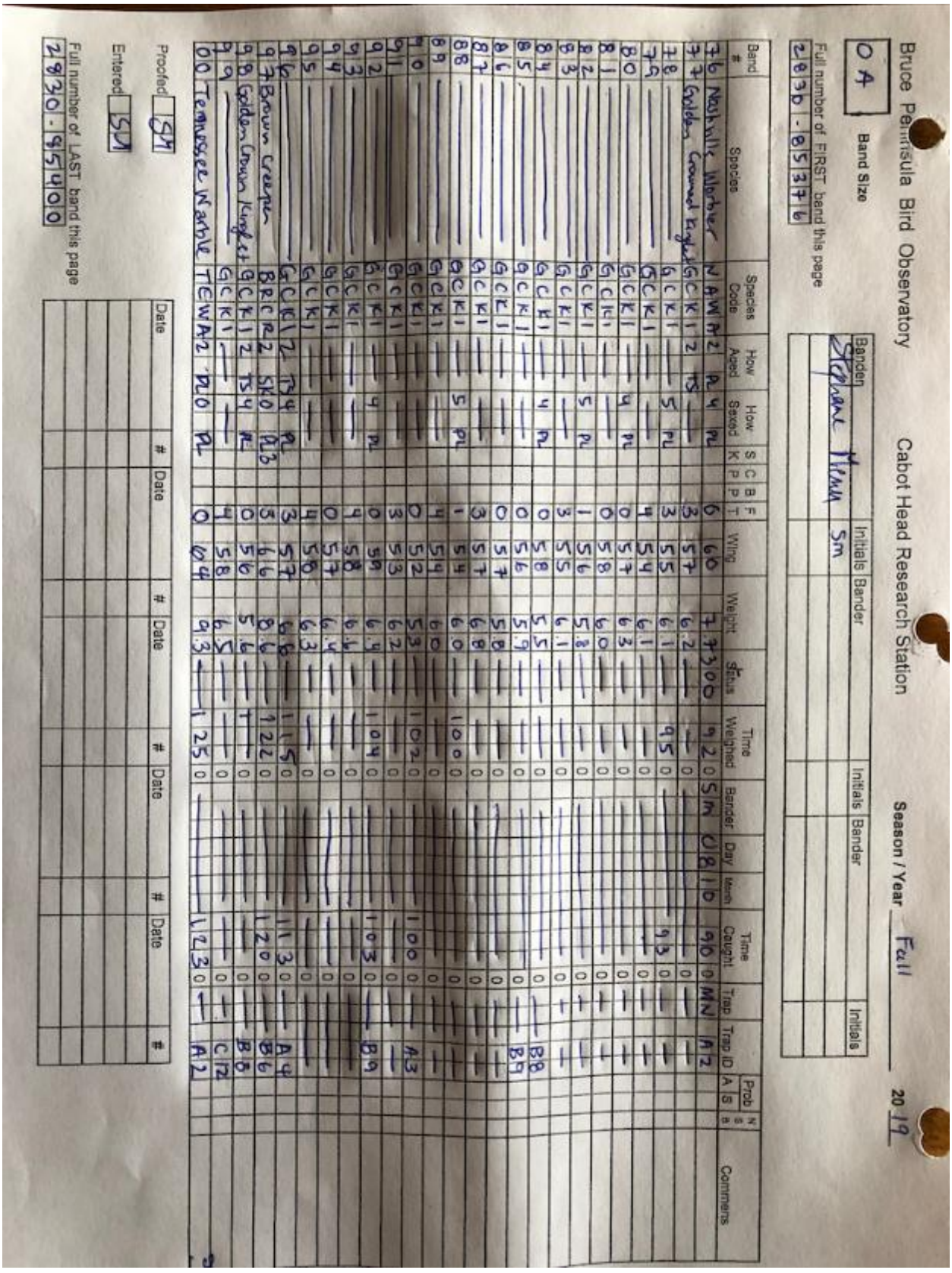


Bruce Peninsula Bird Observatory: Daily Log Date(dd/mm/yyyy): 25/07/2019

ks	ET	SPECIES	Band	Rec	Cap Unb	Cens	Obs	V	B	NSB	NSR	Add Obs	D
	1	Yellow Bellied Sapsucker	1										
		Downy Woodpecker											
		Hairy Woodpecker											
	1	Northern Flicker				1							
	1	Pileated Woodpecker					1						
		Olive Sided Flycatcher											
		Eastern Wood Pewee											
		Yellow Bellied Flycatcher											
		Alder Flycatcher											
		Willow Flycatcher											
		"Traill's" Flycatcher											
		Least Flycatcher											
		Eastern Phoebe											
		Great Crested Flycatcher											
		Eastern Kingbird											
		Blue Headed Vireo											
		Warbling Vireo											
		Philadelphia Vireo											
		Red Eyed Vireo											
	36	Blue Jay				19	17						
		American Crow											
	2	Common Raven					2						
		Horned Lark											
		Purple Martin											
		Tree Swallow											
		Nor. Rough Wing Swallow											
		Bank Swallow											
		Cliff Swallow											
		Barn Swallow											
	1	Black Capped Chickadee				1							
	2	Red Breasted Nuthatch				1	1						
		White Breasted Nuthatch											
		Brown Creeper											
		House Wren											
		Winter Wren											
		Golden Crowned Kinglet											
		Ruby Crowned Kinglet											
		Blue Gray Gnatcatcher											
		Eastern Bluebird											
		Veery											
		Gray Cheeked Thrush											
		Swainson's Thrush											
		Hermit Thrush											
		Wood Thrush											
		American Robin											
		Gray Catbird											
		Brown Thrasher											
		European Starling											
		American Pipit											
	17	Cedar Waxwing				1	16						
		Tennessee Warbler											
		Orange Crowned Warbler											
		Nashville Warbler											
		Northern Parula											
		Yellow Warbler											
		Chestnut Sided Warbler											
		Magnolia Warbler											
		Cape May Warbler											
		Black Thr. Blue Warbler											

Page 4 of 5 (BPBO)

NSB: Non Standard Banding; NSR: Non Standard Recapture



Bruce Peninsula Bird Observatory — Cabot Head Research Station — Season / Year: Fall 2019

Band Size: 0A

Banders: Stephanie Menu (Initials: SM)

Full number of FIRST band this page: 2030-05376

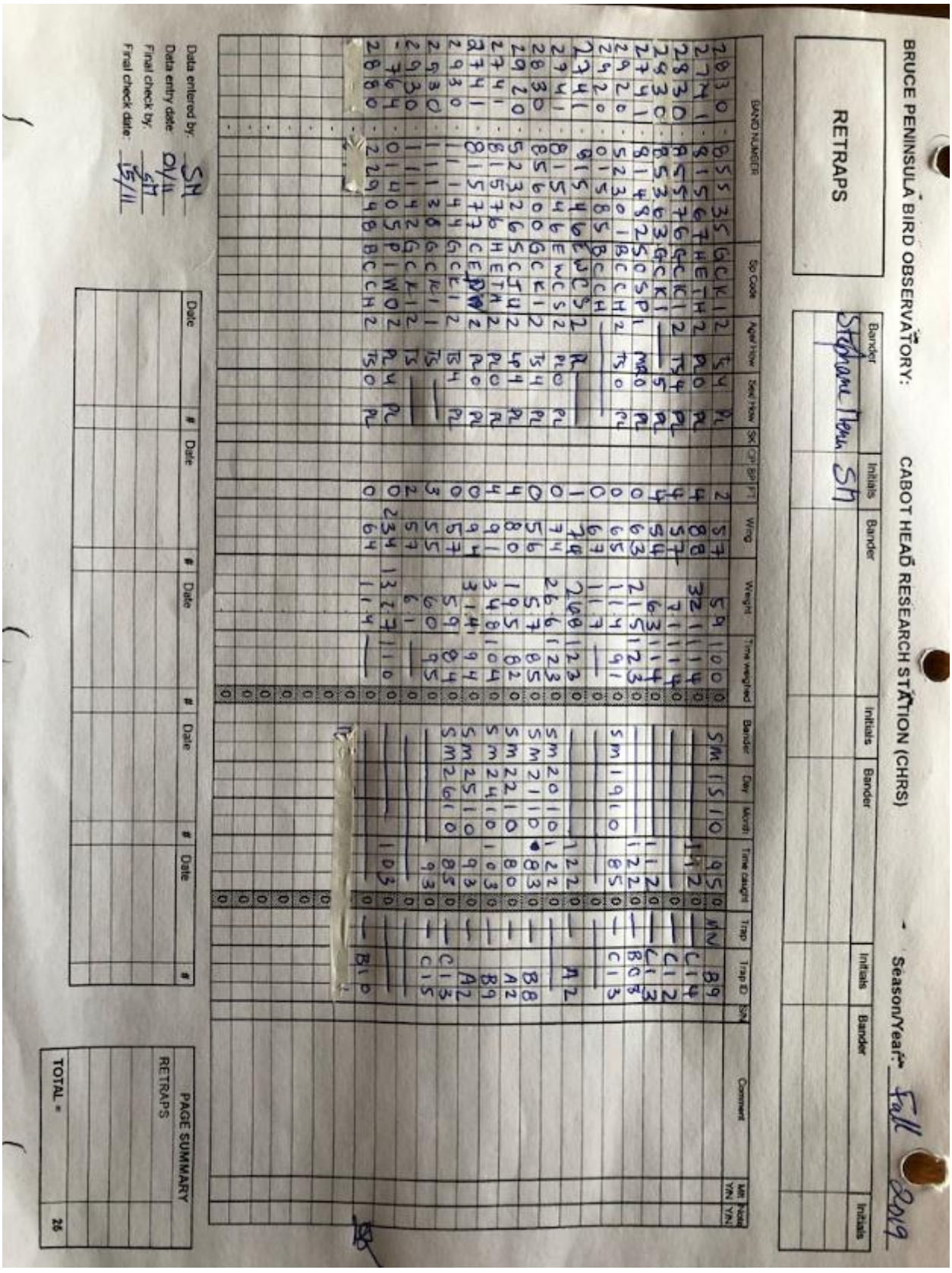
Band #	Species	Species Code	How Aged	How Sexed	S C K P	B F T	Wing	Weight	Status	Time Weighed	Bander Initials	Day	Month	Time Caught	Trap	Trap ID	Prob A	Prob S	Prob B	Comments
76	Nashville Warbler	NAWA	2	4	PL		60	7.7	300	920	SM	08	10	900	MN	A2				
77	Golden-crowned Kinglet	GCKI	2	5		3	57	6.2		0				0						
78		GCKI	1	5	PL	3	55	6.1		950				0						
79		GCKI	1			4	54	6.1		0				0						
80		GCKI	1	4	PL	0	57	6.3		0				0						
81		GCKI	1	5	PL	0	58	6.0		0				0						
82		GCKI	1	5	PL	1	56	5.8		0				0						
83		GCKI	1			3	55	6.1		0				0						
84		GCKI	1	4	PL	0	58	5.5		0				0		B8				
85		GCKI	1			0	56	5.9		0				0		B9				
86		GCKI	1			0	57	5.8		0				0						
87		GCKI	1			3	57	6.8		0				0						
88		GCKI	1	5	PL	1	54	6.0		1000				0						
89		GCKI	1			4	54	6.0		0				0						
90		GCKI	1			0	52	5.3		1020				1000		A3				
91		GCKI	1			3	53	6.2		0				0						
92		GCKI	1	4	PL	0	54	6.4		1040				1030		B9				
93		GCKI	1			4	58	6.6		0				0						
94		GCKI	1			0	57	6.4		0				0						
95		GCKI	1			4	56	6.3		0				0						
96		GCKI	2	4	PL	3	57	6.8		1150				1130		A4				
97	Brown creeper	BRCR	2	5	PL	3	66	8.6		1220				1200		B6				
98	Golden-crowned Kinglet	GCKI	2	5	PL	0	56	5.6		0				0		B5				
99		GCKI	1			4	58	6.5		0				0						
00	Tennessee Warbler	TEWA	2	4	PL	0	64	9.3		1250				1230		C12				
																A2				

Proofed: SM

Entered: SM

Full number of LAST band this page: 2030-05400

Date	#	Date	#	Date	#	Date	#


BRUCE PENINSULA BIRD OBSERVATORY
CABOT HEAD RESEARCH STATION (CHRS)
Season/Year: Fall 2019
RETRAPS
Banded By: Stephanie Menu SM
Data entered by: SM
Data entry date: 01/11
Final check by: SM
Final check date: 15/11
PAGE SUMMARY
RETRAPS
TOTAL =

Appendix 2: Habitat monitoring

2.1 Photographic records

Photographs of BPBO's mist-nets and of certain locations along the census route will be taken twice a year, at least once every 5 years, beginning in 2020. Photographs will be repeated sooner if drastic changes have occurred to the Count Area. In order to properly illustrate the conditions that most migrants experience, photographs should be taken in both May and October. (N.B. In 2020, the first set of photographs were taken in late June.)

Locations from which to take the photographs necessary for habitat assessment should be constant throughout time (Table 2.1 and 2.2). Because of the dense vegetation and narrow net lanes, it is not possible to stand back much from the mist nets. To assure that photograph locations would be the same ones across years, photographs are taken at the end pole closest to the trail (exact coordinates in Table 2.1), aimed in the direction given as much of the net as possible should be in the photograph (Table 5.1). Sample photographs are available on the BPBO storage devices.

Table 2.1: Instructions for habitat photographs of BPBO mist nets.

Net ID	A1	A2	A3	A4	A5	B6	B7	B8	B9	B10	C11	C12	C13	C14	C15
Direction to point camera	225°	348°	220°	3	338°	9°	161°	192°	175°	198°	28°	31°	35°	213°	197°

For the habitat assessment to be as detailed and accurate as possible, two other photographs should be taken in the netting area: one before the path to A1 and A2, and one before the path to C14 and C15. These two locations are the shrubbiest and the most likely to experience rapid changes through growth of small deciduous trees as well as beaver activity. Photographs should also be taken along the census route at various locations (Table 4.2).

Table 2.2: Instructions for habitat photographs of general habitat and along the census route.

Location Identification	Coordinates		Direction to point camera
	Latitude	Longitude	
Start of census route A (Staff house - Wingfield Cottage)	45°14'46.3" N	81°17'57.0" W	255°
Start of census route B (Staff house - Wingfield Cottage)	45°14'46.3" N	81°17'57.0" W	173°
Census route just East of Wingfield Cottage	45°14'45.5" N	81°17'55.8" W	52°
Census route before the tip	45°14'45.4" N	81°17'55.2" W	101°
Start of the net path	45°14'46.2" N	81°17'57.3" W	323°
End of net path (before C14&15)	45°14'48.7" N	81°18'06.3" W	1°
Census route A	45°14'44.6" N	81°18'09.0" W	157°
Census route B	45°14'43.1" N	81°18'09.7" W	81°
End of census route	45°14'38.5" N	81°18'11.3" W	249°

When the image files are downloaded, rename them to define the location and date. The file name for each photo should follow this convention: '[DD] [MONTH] [YEAR] – [LOCATION NAME] - BPBO', e.g., a photograph taken on October 16th, 2020 of Net A3 would be labelled '16 Oct 2020 – Net A3 – BPBO'. The names for the locations photographed along the census route are provided in the table 5.2 above.

Each set of photos from a given year should all be kept in one folder named 'Site photos [YEAR] BPBO'. A copy of this folder is to be saved to the BPBO laptop and on BPBO's external hard drive, and another copy is to be sent to Birds Canada along with the data submission for the year.

2.4 Assessment of habitat structure

A formal habitat assessment following the MAPS protocol will be carried out once every 5 years beginning in 2020, and whenever there has been a significant change to the Count Area. Habitat assessments are to be carried out in July (ideally, or in mid-June, depending on staff availability), between the spring and fall migration monitoring season.

Hard copies of 'Monitoring Avian Productivity and Survivorship (MAPS) Habitat Structure Assessment (HAS) Protocol' and all relevant data sheets are to be kept at the BPBO field house. Please refer to these materials for detailed instructions each time an assessment is undertaken. Currently there are four habitat type CHRS; however, it is important to remember to NOT base the current year's habitat assessment on the results of past assessments. Each time assessment is repeated, the area must be carefully considered anew. Addition of new habitat types will require new maps.

Once the habitats have been defined and delineated (e.g., Figure 4.2), complete a BPBO Habitat Structure Assessment (HSA) Form for each of the defined habitats. BPBO's form includes descriptions of permanent or semi-permanent non-vegetative features (specifically, the gravel road running through the Count Area and ending at the CHRS). If any of these features is subject to change, describe the change in section 6.0 of this document, as well as on the habitat assessment form.

The habitat assessment results are to be saved in a folder labelled 'Habitat assessment [YEAR] BPBO'. Within that folder, save the habitat photographs (labelled according to the conventions above) and scanned copies of the BPBO Habitat Structure Assessment Form (HSA). Each habitat will have its own HSA form: save each one as 'Habitat Structure Assessment form [YEAR] [HABITAT DESIGNATION] BPBO, e.g. for the dominant habitat in 2020, the file name will be 'Habitat Structure Assessment form 2020 A BPBO'.

A copy of the habitat assessment folder is to be saved on the BPBO various electronic devices (laptop, external hard drive, USB key). Another copy will be submitted to Birds Canada along with year-end submission of bird data.