Guidelines for preparing an operations protocol for the Canadian Migration Monitoring Network

The operations protocol for a CMMN station serves as:

- A manual for participants that ensures standardized data will be collected consistently from day-to-day and year-to-year despite frequent turnover of personnel;
- A reference that allows researchers to determine whether your data set is going to be suitable for addressing their particular research questions.

This template is an outline covering all the topics that should be covered in the protocol for a member station taking part in the CMMN's Trend Monitoring Program. To use the template as the basis for your own protocol, delete any irrelevant sections and modify the rest to explain the procedures actually followed at your site. If you have a written protocol already there is no need to rewrite in this format, but it should be checked (especially the Table of Contents) to ensure that your protocol is complete.

Key to styles in the template:

- Numbered headings (bolded text) are formatted by style (Heading 1 or 2), which allows you to update the Table of Contents automatically by right-clicking anywhere within the Table of Contents. (If you're not familiar with this and things get messed up, don't worry about it.)
- Italicized text *[in brackets]* gives instruction or advice on what information should be included
- Plain text, if present, offers specific wording that you are free to use as is, or to modify as you wish.

Data collection methods are most effectively communicated by keeping them separate from other types of instruction you may have for volunteers and staff, such as health and safety concerns, emergency procedures, training materials for new volunteers, outreach operations, etc. These topics are better covered separately, either as separate documents or, if not lengthy, as appendices. Also best described separately from the migration monitoring protocol are field programs that are not routine parts of your migration monitoring (such as owl or Bobolink banding, or winter and breeding season studies.)

Feel free to consult protocols of current CMMN member stations for examples. If you have questions, or a draft you'd like someone to look at, contact us at cmmn-rcsm@gmail.com

Cover page: Name, and logo if desired, with a note at the bottom of the page indicating the date the protocol was most recently updated.

TABLE OF CONTENTS *[optional]*

INTRODUCTION

Contact: *[Website address if you have one; contact email (preferably a permanent address; otherwise, name and email of current best contact); latitude & longitude]*

Overview: *[Brief description of study objectives and site, a bit of station history, who owns the land you're on, main organizational partners]*

1.0 GENERAL OPERATIONS

Consistent collection of standardized data is the hallmark of CMMN member stations, and all participants in our operations are required to be aware of and to follow the instructions in this manual. Consistency of methods and effort from day to day and year to year are particularly valuable for documenting temporal changes in species composition, abundance, and physical condition.

1.1 Personnel

A minimum of *[how many]* are needed to conduct all standardized procedures on days with typical levels of bird activity (recognizing that there may be a few days each season when operations must be curtailed due to unusually high bird volume). *[Describe the qualifications required for each person – e.g., bander-in-charge must be experienced and eligible for banding permit, and at least one field assistant able to identify > 90% of birds likely to occur in the region by sight and sound.]*

1.2 Seasonal Coverage Period

The Seasonal Coverage Period extends from *[start date, end date]* in the spring and from *[start date, end date]* in the fall. Daily coverage is interrupted only by conditions unsafe for operators and/or birds. Even partial coverage is better than none at all.

1.3 Daily Count Period

The Daily Count Period consists of *[x]* hours of fieldwork each day starting *[give start time – typically "one-half hour before sunrise"* and ending *[give end time – typically one-half hour after banding ends, but sometimes all daylight hours].*

Standard operations, detailed in later sections, include *[summarize field work components, separating standard and non-standard; e.g., 6 hours of banding, a fixed-route census each morning lasting about an hour, and incidental observations for the duration of Coverage Period. All bird capture and observations that take place outside of the Daily Coverage Period, or outside of the Coverage Area, must be recorded as Non-standard Banding or Non-standard Observation.]*

1.4 Coverage Area

The official Count Area is illustrated in *[Figure x. Figure should be a map, preferably Google Earth map that shows terrain and vegetation structure. Count area may be defined as the area extending x meters beyond the outermost paths and net lanes, or as the area within a boundary drawn on the map. If the latter, describe Count Area boundaries in the text according to landmarks easily identified by observers so they know if they are in or out – such as roads, streams, buildings, etc.]*

2.0 OBSERVATIONS

2.1 Standard Counts *[Change title to the kind of count done at your site. Instructions and text here are for Census, and should be modified as needed if you do something else, such as point counts or timed lake watches.]*

[Indicate start time, and degree of allowable flexibility – e.g., 1 hr after sunrise, but if necessary, up to 1 hr later. Should be completed during the period when birds are most abundant – usually before c. 10:30 a.m., but better late than never. Indicate how long the census should take with typical levels of bird activity, and advise a fairly steady speed regardless of variation in bird abundance. It's a good idea to indicate one or more interim goals, e.g. try to reach point x after x minutes. If there are known spots where more time is appropriate, say so – e.g., "spend about 5 min at the lakeshore". The unitalicized text here below is recommended, but if you do things differently, describe your own procedures.]

Completing the daily Census should be a high priority when weather conditions prevent banding, as it provides at least one standardized estimate of bird activity that day. Census should also take precedence over all other activities if personnel are lacking for full netting operations. Mist-nets must be closed or reduced in number if necessary to permit someone to conduct the census. The only exception is if there are large numbers of birds in nets, in which case staff will delay the Daily Census until nets are cleared.

When feasible, responsibility for conducting the Daily Census should be rotated among observers with the ability to identify at least 75% of all the birds that typically occur within your region *[see codes in Appendix 7*. This will randomize the influence of the variable skill levels among observers, ensuring consistency of average skills across years.

[Add text describing the Daily Census route. Refer to Figure that shows this; if possible one that also shows Count Area and net locations. Briefly describe the features of the route not visible on the map, noting permanent features such as signs, fences, or structures. Refer to table of GPS points (could be an appendix) that specify start and end points of census route, as well as key turning or stopping points]

How to do the census *[Alter suggested list below as needed]*

- Record birds on paper at regular intervals during the census rather than writing them down after the walk is completed. *[If using app to record census for NatureCounts and/or eBird, give instructions here]*
- Conduct the census no matter how inclement the weather, with the exception of intense lightning storms (in this instance, conduct the census after the storm has passed and make a note in the Daily Log about the altered start and end time).
- *[Optional]* Record the weather *[see codes in appendix 7]*
- Do not 'pish' for birds or play bird songs or calls on your phone or other device.
- Stay on the census route, although you may step off a meter or so to get a better look at a target individual.
- Use binoculars, but no scope allowed.
- If flocks are too large to count individuals, estimate the flock size as best you can. Choose a single number (e.g., 600 instead of 500-700).
- Do not spend too much time trying to identify individual birds.
- Try not to vary the pace (rushing through on quiet mornings and going more slowly on busy mornings). Take the best count you can, recognizing that you are taking a standardized 'snapshot' of birds detected in a set time period rather than making an exact count.

[If census results are to be reported to eBird, include instructions as to account that should be used.]

2.2 Incidental Observations

During the Count Period, all birds identified by observers who are inside the Count Area are recorded as Incidental Observations, whether or not the birds themselves are beyond the boundaries. It's a good idea to keep notes during the day so you don't forget**.**

[NOTE: If the level of effort put into general birding varies widely (e.g. someone occasionally does a lake or hawk watch that produces a big jump in observations), it is best practice to label such efforts as 'non-standard observation' (section 2.3) so they won't add undue variation to Daily Estimated Totals. (The latter are used for trend calculation for many species.) If special watches are done fairly often but irregularly, consider standardizing location and minimum duration of the watch, and record effort and results separately in Daily Log so they can be included or excluded from particular analyses as appropriate.]

2.3 Non-standard Observations

All birds observed outside the standard Coverage Period, or by observers who are outside the Count Area boundaries, are considered Non-standard Observations (NSO).

3.0 BANDING *[Delete if capture is not part of your operation]*

Most population monitoring programs included banding or visual counts alone, but combining the two is a hallmark of CMMN that enhances the value of value of what we do. Bird banding is a privilege, and all participants must adhere to the Banders' Code of Ethics (Appendix 1). The safety and welfare of birds are paramount in all operations.

Banding procedures described in this section apply to all captures, whether captured in standard operations or otherwise*. [Modify the following as suits your operation. If NSB is not allowed, just say that and delete the rest]:*
As a rule, non-standard banding (NSB) is not allowed during the standard Count Period (although the BIC may permit this in exceptional cases, such as to capture a specific rare or injured individual.) NSB may also be conducted may be conducted after the standard banding period or, for special purposes (such as education or research projects) far enough from normal operations so as not to compromise the numbers banded and observed during the standard coverage period. NSB must never draw needed personal away from the standard operations.

3.1 Capture procedures

Standard banding operations consist of mist-netting *[and trapping?]*, at permanent locations *[Figure x – preferably a Google Earth map showing the Count Area and satellite view of vegetation. Could be combined with Count Area map if not too much for one map.]* Locations are detailed in Table 1 *[could be an appendix, or placed here, or placed in section 5.0 if it is combined with locations for taking photo. If specs of all nets are the same, you could add text here indicating mesh size, length, number of panels. Or, put this info in a column of Table 1.]*

[If additional trapping devices are part of the standard program, add these to Table 1, and add instructions as to dates of operation (if different from netting), type of bait for each trap, and amount of bait that should be in each trap at start of banding day. Using drip traps or bird feeders as attractants to standard capture sites is discouraged because it is very difficult to ensure consistent operation. Use of audio broadcast to attract birds to CMMN stations is prohibited unless plans for use have been reviewed and approved by CMMN (*though it is routinely approved for nocturnal owl banding.)]*

Nets *[and traps?]* are opened, weather permitting, at *[give start and end times, preferably starting with respect to dawn and continuing for at least 5 hours. Add details on the following:*

- Frequency of net/trap checks *[at least every 20-30 min]*
- *[Whether and how to report which net/trap each bird came from. Most sites keep a batch of clothespins at each net, labelled with net numbers, such that there is one handy for clipping to holding bag when bird is extracted. Pegs are returned from banding location to net site in a later net-round.)*

3.2 Banding *[The remaining parts of section 3.0 are standard operations for a banding station, but it's important to staff and volunteers to have key points laid out up front, and researchers using your data need to know how measurements were taken and what scoring criteria were used.]*

Methods for handling and banding birds are as described in the North American Banders' Study Guide unless otherwise noted, while aging and sexing follows Pyle's 'Identification Guide to North American Birds' (Part 1, Second edition. Slate Creek Press*). [Provide details if you use different references.]*

Species Identification – all birds must be identified to species *before* being banded and must be released unbanded if ID is not 100%. For any unidentified or unusual-looking bird, take photos, measurements, and notes as time allows.

Hummingbirds are always released unbanded *assuming you don't have permit for banding these]* but should nonetheless be recorded as 'captured' in the Daily Log sheets. *[List any others you don't band, if any.]*

Records must indicate which individuals were captured in non-standard operations (Non-standard Banding, or 'NSB').

Except as noted in section 3.4, the following information must be recorded for all banded birds: *[Modify the following as needed:].*

- Ageing & Sexing – While staff must try to age and sex all individuals, it is important not to record an age/sex if the bander is not extremely confident (95% certain) of the bird's status. Record age/sex as Unknown (Numerical Code 0) if there is any uncertainty.
- Wing Measurement – Unflattened wing cord measure
- Fat – 0-7 numerical scoring system (Appendix 2). *[The Banders' Study Guide uses a 5-level code, and other systems are used in other places, so you should refer to an illustration of what you use. The 7-level scale is recommended for CMMN stations.]*
- Skull Ossification – scoring system ranges from 1 to 6 (Appendix 3). *[Specified, because different scales may be used elsewhere].*
- Mass – weigh birds to the nearest *[0.5 gram is the usual]*.
- Time Trapped *[and/or weighed. Specify how to record: e.g., Local time, to the nearest ten-minute interval. Use 24-hour clock, and three-digit code i.e. 6:00 am is 060, 11:25 am is 112, 1:40 pm is 134.]*
- Net or trap ID code where bird was captured *[if name not self-evident, refer location in protocol where codes are identifed.]*
- Bander's initials - initials should be included for each banded bird and the bander's full name recorded in daily records.
- Additional information can be written in the "Comments" column.

3.3 Recording banding data – *[Indicate whether banding records are recorded on paper alone, paper and then computer, or directly into computer. Refer to Appendix 4 (paper form or screen shot, as appropriate), and add text here to explain any codes, abbreviations etc. that are not clear from the forms themselves. Keep in mind that future users of your computerized data may not have access to codes built into entry software.]*

3.4 Recaptures

Most recaptures are birds recently banded at the station that have remained in the area, although a few are recaptured from season-to-season and year-to-year. Foreign encounters – are birds caught at this site that were originally banded at another location. Band numbers should always be checked prior to releasing a bird to ensure that foreign encounters are not missed.

[Modify the following to describe procedures at your site.] Data for recaptured birds are recorded on a separate Recapture Sheet. All are processed completely the first time they are captured on a given day. If recaptured again the same day, enter the comment "SDR" (same day retrap) next to the data from the earlier recapture, then release.] A small group of local breeding birds *[list any relevant species]* have territories near the netting operation and are recaptured consistently in late-May and early June. Once these birds have become familiar to staff, bands should be read at the net and, if you are certain the bird is one of the regulars, it can be released immediately. Such recaptures should still be recorded on the Recapture Sheet, with the code 'RAN' (released at net) in the comment space.

3.5 Bird Handling
[Modify text below to describe your procedures]

Handling Time – birds must not be held for more than *[x min (no more than one hour)]* from the time they are extracted from nets. Birds held more than one hour should be released unbanded (but keep track of the number of each species released), so the BIC must anticipate looming back-ups and take steps to reduce it. If collecting less data will reduce the backlog, then record only the band number, species, and capture time. Record age and sex only if immediately obvious (skipping detailed examination of plumage or skull ossification). Of all measurement data, wing length and weight are the data most used in research, so give those measures priority if you have enough time to take any. If the backlog is not getting smaller with reduction in data collection, close some or all nets temporarily (see section 3.6).

Injuries – Birds should be released immediately at the net in poor weather conditions or after a difficult extraction if they show signs of heat exhaustion, torpor, or undue stress (e.g., eyes closed, head waggling, feathers very fluffed). Place the bird back in a bag if it does not fly. Place the bag containing the bird in a quiet location, (warm or cool and shaded as appropriate). In the case of captured hummingbirds that are observed to be in distress, carefully administer sugar water via an eyedropper. Check a resting bird at least once every hour, being careful not to disturb it more than necessary, and if it is observed to have recovered (eyes are open, bird is active and moving well), release it. If the bird has not recovered well enough to fly after a few hours, place it slightly off the ground in a location some distance from the netting area. Any bird that is held even for a short time for reasons of stress or injury must be recorded in the Casualty Log (available in banding lab), along with details of its condition, the steps taken for its recovery, and its condition upon release.

Occasionally a bird will be released at the net that does not need rest but the extractor deems should not be subjected to the additional stress of being banded (e.g. if bleeding from tongue tangle). Such a bird should be counted as a Capture and the details of the case recorded in the Casualty Log; in addition, the BIC must be informed so that the situation may be discussed with other staff and volunteers, and any necessary steps taken to prevent or alleviate such injuries in the future.

3.6 Closing Nets
[Modify as needed for your site]

At the end of the standard netting period, nets should be closed in the same sequence as they were opened.

Nets must be closed whenever conditions are such that undue stress to birds and injury are likely to result from leaving them open.

- Too many birds --If a partial closure of the mist nets is needed, nets a, b and c should be closed first, followed by net x and, if necessary, net y. These are the mist nets that are the most distant from the banding station, and closing them considerably reduces the time needed to complete a net check. If the banding station is still overwhelmed with birds, the remaining nets that are capturing the majority of the birds should be closed until all of the birds currently held at the banding station have been banded or released.
- Rain – rain and other forms of precipitation negatively impact birds caught in mist-nets. Do not open nets if it is raining. Keep watch on developing weather so that nets can be closed before rain begins.
- Wind – although the netting area is generally well protected, some or all nets must be closed if the force of the wind is great enough to cause undue stress or injury to birds**.** *[Indicate particular nets that should be closed first.]*
- Temperature – extremes of heat and cold also have a dramatic and harmful impact on birds and so nets must not be opened if conditions are poor. Although the BIC must consider other factors such as wind strength on cold days, the number and level of experience of staff, the volume of bird activity, relative humidity, etc., caution must be taken whenever the temperature drops below 0° C or rises above 30° C.

- Predation – *[Indicate chief issues at your site, and what should be done in response, such as raising net height, or closing nets (and for how long).]*

4.0 END OF DAY RECORD-KEEPING

In addition to the fieldwork, staff and long-term volunteers are responsible for completing data entry as described here. The BIC is responsible for seeing this is done, either personally or by training and overseeing others to help with daily records and/or proofing.

4.1 Daily Log Sheet

The Daily Log Sheet (Appendix 5) is a multi-page form used to document and record all data collected at the migration station that day. It includes a record of effort levels, participants and ancillary information. (See Appendix 7 for some of the codes often included). *[An example is shown in Appendix 5, but feel free to model yours on Log Sheets of other stations' protocols. Whatever the format, define here what the column headings mean, and what data to put into which column. Each source of data should have its own column so analysts can use only what they want.*

Typically, columns are included for Band (birds newly banded that day + any banded birds being caught at the site for the first time this calendar year + any captured but released unbanded), Retraps (captures of birds banded on site the same year), Census, and Observations (incidental observations). There is also a column for standardized daily total, constructed as described below. *[Columns for Non-standard band and Non-standard observations can be included as well, although if infrequent they may as well be recorded solely as comments.]* The Narrative is the fun part of the logs; useful for recording rare species (floral as well as faunal), unusual events (whether avian or human), building projects etc. The historic (and nostalgic) value of station narratives is considerable.

The log must be completed at the end of each day (including a Narrative) and, as the only source of original data until the information is entered on computer, must be guarded with utmost care (just as for the original banding records).

4.2 Daily Estimated Total

Every CMMN station prepares its best estimate of the number of separate individuals of each species actually detected during the standard Count Period by observers who are inside the official Count Area boundaries. CMMN historically has called these summary figures 'Daily Estimated Totals' (DETs). *[Indicate here whether you follow the same convention. If not, give the name that you use in your own documents, and be sure you use that consistently throughout all your operations and forms. Other name options include ET (Estimated Total), DT (Daily Total) or SDT (Standard Daily Total) – the latter probably most informative about what the number actually represents.) New stations may use any name they choose, but once you have submitted data to Birds Canada, do not change the name you give to your data columns without first clearing it with the Birds Canada database manager; and be sure to record the approved name change in section 6.0. More important than the name you choose is to have a clear explanation in the next paragraph of what data are included in the total, and how the number is arrived at. Adjust the following text to reflect what is done at your site.]*

DETs should be calculated with input from all personnel participating in the day's activities. The first step is to fill in the data columns for each species on pages 3 and 4 of the log sheets (Band, Retrap, Census *[or other standardized count]* and Obs). DET is calculated by adding the numbers in these columns, then adjusting as needed to eliminate probable duplicate counts. For example, if 6 Yellow Warblers are counted on the Daily Census, 3 are banded during netting observations, and 5 additional birds are recorded within the netting area during the standard Count Period, the initial DET for that species would be 14. However, if discussion indicates that the 5 incidental observations of Yellow Warblers included one that was observed in the same spot by 2 different people at close to the same time, it may be surmised that it was the same bird. And if another of the warblers was counted as it flew towards a net where it was likely to have

been caught, thus being recorded already in banding totals, then it, too was likely duplicated. Thus, the DET should be reduced to 12.

Discussion is particularly important when there were many more birds observed than in the example above. For example, if small flocks of Yellow Warblers were seen throughout the day, the final estimate of *separate individuals* detected will depend on whether it was probably the same group moving around constantly vs. many small groups moving through the area in a steady stream. The latter is more likely if numbers seen on census were relatively high and Yellow Warblers were being banded throughout the day. The final DET should be a conservative estimate, and should reflect considered judgement of the number of separate individuals actually detected (no extrapolation to numbers that might have gone by when no one was looking).

4.3 Daily Grand Totals *[Optional]*

[Stations that normally close for the day at the end of the standard Count Period may get a few reports of out-of-bounds or after-hours observations, which can be recorded as comments in the Log. If non-standard observations are routine, a second daily total can be recorded that includes all non-standard observations and captures in a somewhat wider area, perhaps including off-site or out-of-season projects. If a grand total of all observations made during the day is to be calculated, define the allowable area and indicate what type of data should be included (e.g. DET plus NSB + NSO banding within area X, after removing any individuals presumed to be already included in the DETs.) Many stations like to keep a list like this for their own records, or for reporting to eBird.]

4.4 Digitizing and submitting records

[If your site currently submits daily data to eBird via a station account, give details on what data are to be submitted (DET? Banding totals?), and who is responsible for submission.]

During banding, data are entered *on [paper or computer? If originally recorded on paper and only later to computer, indicate that as much of that be done as is feasible on the actual day of data collection. If proofing is done later, ensure that it gets by the end of the calendar year.]* The BIC *[or who?]* is responsible for seeing this is done, either personally or by training and overseeing others to help with daily records and/or proofing. The BIC *[or who?]* is also responsible for ensuring that annual reports are submitted to the Banding Office are files in a timely manner.

The Daily Log is completed *on [paper or computer? If on paper, indicate that it should be entered into the Birds Canada DET software on a daily basis if at all possible].* Completed DET software should be submitted to Birds Canada by 1 March of the next calendar year. CMMN will send reminders toward the end of each year, with instructions on year-end reporting.

5.0 HABITAT MONITORING AND MANAGEMENT

5.1 Photographic records

Photographic records allow researchers to quickly assess whether their use of your data is likely to be compromised by long-term changes in vegetative structure that affect species composition and abundance. As instructed here, a standard set of photographs is to be taken mid-summer *[or name another convenient time when plants are in leaf,* beginning in *[indicate start year].* Repeat at least every 5th year, but shorten the interval if there is a large change all at once.

Table *[x,]* indicates the locations for photos. *[Could be Table 1, referred to in section 3.1. Give locations of photo sites, location ID codes (names of nets or other points on map, or brief descriptors), direction to point camera. Photos of nets should be taken from a specified end, with camera pointed along the net lane to show height of vegetation on each side.*

Several additional photographs should be taken along the census route or elsewhere, designed to give an overview of the typical vegetative structure of the Count Area as a whole.]

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 ID]_[STATION NAME]. Each set of photos from a given year should all be kept in one folder named 'Site photos_[YEAR]_[STATION NAME]'. A copy of this folder is to be saved to station computer *[or alternate permanent site]*, and another copy is to be sent to Birds Canada along with the data submission for the year.

5.2 Assessment of habitat structure ***[****Not required, but strongly recommended for sites taking part in the Trend Monitoring Program, especially for sites where succession is likely causing long-term changes in the proportions of open/shrub/wooded areas within the Count Area.*

CMMN Habitat Structure Assessment (HSA) should be repeated at least every 5 years, beginning in *[enter year],* moving the schedule forward if there has been a sudden change such as fire or severe wind damage. It is best to assess habitat at the same time each year, preferably in the summer when migration monitoring will not be disrupted and vegetation is at a stage intermediate to that experienced by migrants both in spring and fall. For full instructions, see 'CMMN Habitat Assessment Instructions' and the associated data excel data form

5.3 Habitat maintenance

[Ask land-owner for permission to trim vegetation at net lanes, and/or to mow open areas to prevent invasion of shrubs; then modify text as appropriate]

Ongoing habitat maintenance should be carried out as needed in the netting area during both the spring and fall migration monitoring seasons. Pruning saws and hand saws can be used to cut up trees and large branches that have fallen across the net lanes or foot paths as quickly as possible, rather than walk around obstructions.

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. Weather conditions can change unexpectedly, and rather than expecting that you will be able to anticipate and forestall any wind-related damage, it is better to take steps in advance to remove any potential sources of possible injury to mist-nets and birds.

6.0 RECORD OF CHANGES OR MAJOR INTERRUPTIONS IN STANDARDIZED DATA COLLECTION

[Use the exact wording shown in the next two paragraphs. Table entries (gray scale) are for illustration only]

Changes or interruptions to operations should be recorded in the change table (below) if they are likely to have affected the consistency of the long-term data set. The purpose is to alert researchers to issues that may affect the appropriate use and interpretation of the data set. Include permanent changes in dates or daily hours of coverage, or gaps of a week or more in operations (e.g. due to lack of personnel or site access).

6.1 Instructions for the change table

If there is any notable change or interruption to standardized operations, enter details into the table below (retaining all previous entries). Refer to parts of the text that were changed (e.g. section number, figure or table number). Revise the 'latest version' date on page 1 of this protocol. Submit a copy of the entire revised protocol to Birds Canada along with year-end data submission, so the protocol posted on the CMMN website can be replaced with the latest version.

Date	Description of change and justification (if applicable)
2013	Removed a J-trap that was located between nets A and C, and was operational from late 2007 to 2012. Captures were recorded as standard, but numbers were so low as to have a negligible impact on daily totals.
2020	Spring program curtailed due to Covid-19 pandemic restrictions. Daily census completed, but no banding or other observations possible.

7. SUBMISSION OF RECORDS

Records should be transmitted at least annually to CMMN. Reminders will be sent towards the end of each year, with instructions for what to send where. The Bander-in-Charge is responsible for ensuring records are submitted or, if necessary, will arrange with a different station representative to complete the transfers.

Records to be submitted:

- DET software files
- Banding data. Though submitted annually to the Bird Banding Office (BBO) as a requirement of the banding permit, the BBO does not accept the details of measurements, daily effort or other data that are most useful for research. Birds Canada archives CMMN stations' banding data in anticipation of making it accessible for research via NatureCounts
- Habitat should be submitted in the years when the work was done (see section 5.0)
- Changes/interruptions to protocol should be rare, but should be reported to Birds Canada when they occur. Follow the instructions in section 6.0.

APPENDIX 1 – BANDER'S CODE OF ETHICS

1. More than anything else, banders are responsible for the safety and welfare of the birds they study. This means that stress and risks of injury or death need to be minimized. Some basic rules are as follows:
    - handle each bird carefully, gently, quietly, and with respect
    - capture and process only as many birds as you can safely handle
    - close traps or nets when there are known predators in the area
    - do not band in inclement weather
    - frequently assess the condition of traps and nets and repair them quickly
    - trainees must be properly trained and supervised
    - check nets every 20 to 30 minutes
    - check traps as often as is recommended for each trap type
    - properly close all traps and nets at the end of the banding day
    - do not leave traps or nets set and untended
    - only double-bag non-aggressive birds of the same size and species
    - use the correct band size and banding pliers for each bird
    - treat all bird injuries in the most humane way

2. Banders must continually assess their own work to ensure that it is beyond reproach.
    - reassess methods and your approach whenever an injury or mortality occurs
    - accept constructive criticism from other banders

3. Banders must offer honest and constructive assessment of others' work to help maintain the highest standards possible.
    - publish innovations in banding, capture and handling techniques
    - educate prospective banders and trainers
    - provide feedback of any instances of mistreatment of birds to the bander
    - if there is no improvement, then file a report with the Banding Office

4. Banders must ensure that the data gathered are accurate and complete.

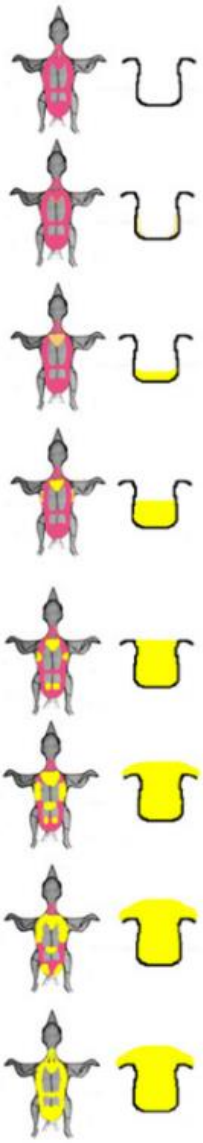
5. Banders must obtain permission to band on private property.

APPENDIX 2 – FAT SCORE CODES

[This 7-level code is the preferred method for CMMN sites, but if you have been using something else and want to continue, provide your own scoring instructions here.

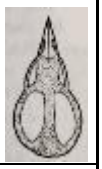
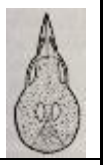
The following numeric codes should be used to record fat content.

FAT SCORES



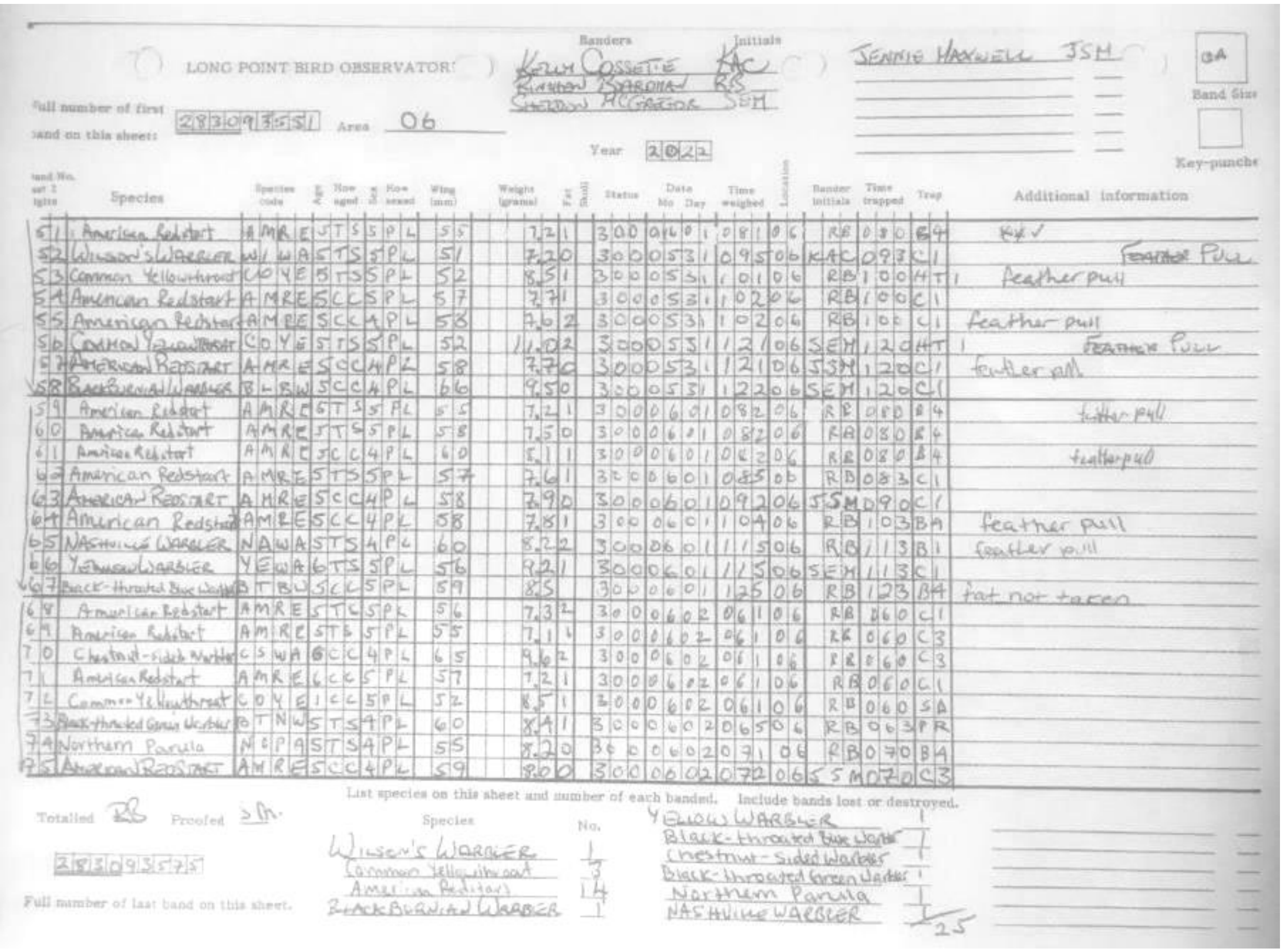
SCORE	FURCULUM	ABDOMEN
0	No fat	No fat
1	Trace, furcular hollow less than 5% full	None or a trace
2	Thin layer, less than one third full (5 - 33%)	Trace or thin layer
3	One-half full (50%)	Small patches, but not covering some areas
4	Furcular hollow full (100%) fat in wingpits	Covering pad, slightly mounded
5	Fat slightly bulging above furcular hollow and wingpits	Well mounded
6	Fat greatly bulging in all areas	Greatly distended
7	Excessive; fat nearly joined from all areas	Excessive, meets furcular hollow

APPENDIX 3– CODES FOR SKULLING

Numeric Code	Stage of Pneumaticization	
1	Trace (less than 5%)	
2	Less than 1/3 but greater than 5%	
3	Half (1/3 to 2/3)	
4	Greater than 2/3 but less than 95%	 
5	Almost complete	 
6	Complete	

APPENDIX 4 – BANDING FORM

[If you record on paper, provide an example as below, illustrating how your station fills these in. You can make up some data to illustrate conventions at your site (e.g., how to indicate 'same as in line above') If all data are entered directly into computer, show a screen shot here instead. Provide text that describes any codes, abbreviation or instructions that are not self-evident from the form]



LONG POINT BIRD OBSERVATORY

Banders / Initials: Kelly Cossette KAC; Rinshan Barona RB; Sheldon McGregor SEM; Jennie Maxwell JSM

Band Size: 0A

Full number of first band on this sheet: 2830993551 — Area: 06 — Year: 2022

Key-punched

Band No.	Species	Species code	Age	How aged	Sex	How sexed	Wing (mm)	Weight (grams)	Fat	Status	Date Mo Day	Time weighed	Location	Bander initials	Time trapped	Trap	Additional information
51	American Redstart	AMRE	5	TS	5	PL	55	7.2	1	300	06 01	0810	06	RB	080	B4	KX ✓
52	Wilson's Warbler	WIWA	5	TS	5	PL	51	7.2	0	300	05 31	0950	06	KAC	093	C1	Feather Pull
53	Common Yellowthroat	COYE	5	TS	5	PL	52	8.5	1	300	05 31	1010	06	RB	100	HT1	feather pull
54	American Redstart	AMRE	5	CC	5	PL	57	7.7	1	300	05 31	1020	06	RB	100	C1	
55	American Redstart	AMRE	5	CC	4	PL	58	7.6	2	300	05 31	1020	06	RB	10[illegible]	C1	feather pull
56	Common Yellowthroat	COYE	5	TS	5	PL	52	11.0	2	300	05 31	1210	06	SEM	120	HT1	Feather Pull
57	American Redstart	AMRE	5	CC	4	PL	58	7.7	0	300	05 31	1210	06	JSM	120	C1	feather pull
58	Blackburnian Warbler	BLBW	5	CC	4	PL	66	9.5	0	300	05 31	1220	06	SEM	120	C1	
59	American Redstart	AMRE	5	TS	5	PL	55	7.2	1	300	06 01	0820	06	RB	080	B4	feather pull
60	America Redstart	AMRE	5	TS	5	PL	58	7.5	0	300	06 01	0820	06	RA	080	B4	
61	American Redstart	AMRE	5	CC	4	PL	60	5.1	1	300	06 01	0820	06	RB	080	B4	featherpull
62	American Redstart	AMRE	5	TS	5	PL	57	7.6	1	300	06 01	0850	06	RB	083	C1	
63	American Redstart	AMRE	5	CC	4	PL	58	7.9	0	300	06 01	0920	06	JSM	090	C1	
64	American Redstart	AMRE	5	CC	4	PL	58	7.8	1	300	06 01	1040	06	RB	103	BA	feather pull
65	Nashville Warbler	NAWA	5	TS	4	PL	60	8.2	2	300	06 01	1150	06	RB	113	B1	feather pull
66	Yellow Warbler	YEWA	6	TS	5	PL	56	9.2	1	300	06 01	1150	06	SEM	113	C1	
67	Black-throated Blue Warbler	BTBW	5	CC	5	PL	59	8.5		300	06 01	1250	06	RB	123	B4	fat not taken
68	American Redstart	AMRE	5	TC	5	PL	56	7.3	2	300	06 02	0610	06	RB	060	C1	
69	American Redstart	AMRE	5	TS	5	PL	55	7.1	1	300	06 02	0610	06	RB	060	C3	
70	Chestnut-sided Warbler	CSWA	6	CC	4	PL	65	9.6	2	300	06 02	0610	06	RB	060	C3	
71	American Redstart	AMRE	6	CC	5	PL	57	7.2	1	300	06 02	0610	06	RB	060	C1	
72	Common Yellowthroat	COYE	1	CC	5	PL	52	8.5	1	300	06 02	0610	06	RB	060	SA	
73	Black-throated Green Warbler	BTNW	5	TS	4	PL	60	8.4	1	300	06 02	0650	06	RB	063	PR	
74	Northern Parula	NOPA	5	TS	4	PL	55	8.2	0	300	06 02	0710	06	RB	070	BA	
75	American Redstart	AMRE	5	CC	4	PL	59	8.0	0	300	06 02	0720	06	JSM	070	C3	

Totalled: RB — Proofed: JSM

Full number of last band on this sheet: 2830993575

List species on this sheet and number of each banded. Include bands lost or destroyed.

Species	No.
Wilson's Warbler	1
Common Yellowthroat	3
American Redstart	14
Blackburnian Warbler	1
Yellow Warbler	1
Black-throated Blue Warbler	1
Chestnut-sided Warbler	1
Black-throated Green Warbler	1
Northern Parula	1
Nashville Warbler	1
	25

APPENDIX 5 – DAILY LOG FORMS

[Example shows form from Long Point Bird Observatory, but check out other protocols for other layouts]

Page 1

1575562685

LPBO Daily Log

Day	Month	Year	Area
10	10	2004	01

Coverage Code: 4

Volunteer Effort

Vol Initials	Observers (Migration Program)	Field hrs	cd
CAF	BIC: Christian Friis	8.0	1
RWW	Ross Wood	8.0	1
DRR	Dave Nestvo	6.0	2
EAW	Anne Wynn	5.0	2
DJG	Derek Grmar	6.0	1
TAB	Tiffany Beachy	5.0	2

Other Station Personnel (swallows, BBC, etc)

Weather

	Dawn	Cens.	Noon	Dusk
Wind Direction	N	NW	N	N
Wind Strength	3	3	2	1
Cloud(10ths)	7	8	9	2
Temp. (C)	11	11	16	16
Precipitation				

Synopsis:

Census

Start Time (24hr)	End Time (24hr)	Duration(min)	Initials
8:31	9:46	75	RWW

Supplementary Censuses? (Y/N): Y

Migration Monitoring Summary

	Band	Census	ET
# individuals	47		
# spp	19	35	74

Season-to-Date Banding Total: 1537

Trap	# Traps	Trap Hrs	Trap Min
JT	2	12	00
GT	4	24	00
Other			
	Drives		
HT	07		

Extra Nets	# of Nets	Hrs	Min
30mm	4	13	15
>30mm	2	4	50
Owl Nets			

Banding Effort

Net	Open	Close	Ditto	Re-Open	Re-Close	Ditto	Re-Open	Re-Close	Ditto	Total Hours	Total Min
1											
2			☐			☐			☐		
3	10:20	12:45	☐			☐			☐	2	25
4	06:45	12:45	☐			☐			☐	6	00
5	10:20	12:45	☐			☐			☐	2	25
6	06:45	10:15	☐			☐			☐	3	30
7			☐			☐			☐		
8	11:00	12:45	☐			☐			☐	1	45
9	06:45	08:10	☐	11:00	12:45	☐			☐	3	10
10			☐			☐			☐		
11			☐			☐			☐		
12			☐			☐			☐		
13			☐			☐			☐		
14			☐			☐			☐		
									Grand Total Net Hr/Min	17	15

LPBO Daily Log

Day: 10 | Month: 10 | Year: 2004 | Area: 01

Narrative:

Summary of Bird Migration:

Today started off slow because of wind & cold, but things sped up a bit throughout the morning. our MX nets pulled thru for us again, Yay!. we banded a beautiful Savannah Sparrow - a lifer for me! Later that afternoon, after some time at the Tip, I took a wonderful walk which ended in a very "enlightening" venture out to the tippy tip of the Tip - I took advantage of its desertedness - not a gull or a cormorant there - except for some dead Ringers, a dead sanderling, & a poor lonely Greater Black-backed gull dying of Botulism -- Real life, raw & out in the open - w/ a gorgeous landscape surrounding me - It reminded me of the Galapagos & the lovely island of Española... so it was an absolutely gorgeous sunset behind the lighthouse - I watched a Dunlin, some sanderlings, & a Black-bellied plover scamper around before heading back - fun stuff.

Facilities & Site Changes/Activities:

Other Remarks:

Yay Stars!. I learned several new constellations tonight - ☆

Signature: Tiffany Beachy

Unusual Species

Species Code	Species Name	Band	Rec	Cens	Obs	ET
R.W.B.I.	Rusty Blackbird			17	15	22
C.C.S.P.	Clay-Colored Sparrow			1		1
O.C.W.A.	Orange-crowned Warbler				1	1

Old Cut Estimated # Visitors	
Old Cut Total # Visitor Groups	
Tip Total # of boats on Shore	1

Lighthouse Attraction
Put details in Narrative
☐ Yes ☒ No ☐ Not Checked

Monarch Butterfly Summary

Afternoon Census	43
Comments:	

2738562687

Page 3 (top only)

8376440912

Species Totals

Day 10 / Month 10 / Year 2004 / Area 01

Species	Band	Rec.	Cens	Obs	ET
Common Loon				6	6
Pied-billed Grebe					
Double-cr. Cormorant			4500	15600	20000
American Bittern					
Great Blue Heron			1		1
Green Heron					
Tundra Swan					
Mute Swan					
Canada Goose				2	2
Wood Duck					
Green-winged Teal					
American Black Duck					
Mallard			3	1	4
Northern Pintail					
Blue-winged Teal					
Gadwall					
American Wigeon					
Canvasback					
Redhead				6	6

Species	Band	Rec.	Cens	Obs	ET
Unid. Yellowlegs					
Solitary Sandpiper					
Spotted Sandpiper					
Ruddy Turnstone					
Sanderling			9		9
Semipalmated Sandpiper					
Least Sandpiper					
Pectoral Sandpiper					
Dunlin			4	1	5
Short-billed Dowitcher					
Unid. Dowitcher					
Common Snipe				4	4
American Woodcock				1	1
Bonaparte's Gull					
Ring-billed Gull			1200		1200
Herring Gull			10	40	50
Gr. Black-backed Gull			4	1	5
Caspian Tern				1	1
Common Tern					

Page 4 (bottom only)

Species					
Wood Thrush					
American Robin			3	12	15
Gray Catbird	1			1	2
Brown Thrasher					
American Pipit					
Cedar Waxwing			4	10	14
European Starling			7	5	12
Blue-headed Vireo				1	1
Warbling Vireo					
Philadelphia Vireo					
Red-eyed Vireo					
Tennessee Wa					
Nashville Wa	1			2	3
Yellow Wa					
Chestnut-sided Wa					
Magnolia Wa					
Cape May Wa				1	1
Black-thr Blue Wa					
Myrtle Wa	6		45	69	120
Black-thr Green Wa	1		1	1	3
Blackburnian Wa					
Sub-total (3)					

Species					
Lincoln's Sparrow					
Swamp Sparrow	1			8	9
White-thr Sparrow	4		12	25	41
White-cr Sparrow	2		2	10	14
Slate-colored Junco	2		3	5	10
Bobolink					
Red-winged Blackbird			70	220	290
Eastern Meadowlark			1		1
Common Grackle				4	4
Brown-hd Cowbird					
Baltimore Oriole					
Purple Finch					
House Finch				7	7
Pine Siskin				31	31
American Goldfinch	13		55	122	180
House Sparrow					
Sub-total (4)					
Total #	47				
# of Species	19		35		74

APPENDIX 6: CODES USED IN THE DAILY LOG

[Some of these are optional, but are included here as a resource if you want to use them. Some (even all) could be moved to appropriate spots in the text.]

A: Daily Coverage Code

[Optional. Text below is an example from one site, but there is wide variation among options that you can choose from.]

The Daily Coverage Code indicates the level of coverage achieved at the station each day. Level 5 represents 100% coverage (i.e. two experienced birders/banders and one intern/scribe conducting the Daily Census, recording Standardized Observations for six hours and operating mist-nets for six hours). The code should be entered in the appropriate box on page one of the Daily Log Sheet, based on the following criteria:

Code	Description
0	No coverage. Use of this code should occur only rarely.
1	Incidental observations and/or casual banding only (no census or ETs).
2	Census only (no ETs). No other observations or banding
3	Fair coverage, including census and ETs, the latter based on 6 hours of observation within the Count Area and possibly some banding. Use this code if there is only one qualified observer and banding has to be interrupted to do the census, or if weather interrupts banding for more than an hour.
4	Good coverage, Full standardized coverage: census, 6 hr of banding as weather permits, two experienced observers. This is the code most frequently used.
5	Excellent coverage, including census/ETs, 6 hr of banding, and 3+ experienced birders.

B: Observer Experience Code

All staff that contribute observations to the ETs must be identified on the Daily Log Sheet *[preferably also with the number of hours they spent in the field]* and their Observer Experience Code.

The Observer Experience Code provides general information about the experience level of field staff and their ability to identify birds by sight and sound. The code enables data analysts to factor in the different skill levels of observers, along with many other variables, when deriving population indices from the ETs. The code should be entered in the appropriate box beside each participant's name on the Daily Log Sheet *[preferably based on the example below]*

Code	*Description*
	Able to identify greater than 95% of all birds that regularly occur in this region by sight and sound.
1	*Very experienced field birder.*
2	*Able to identify 75-95% of the above. Experienced field birder.*
3	*Able to identify 50-75% of the above.*
4	*Able to identify less than 50% of the above.*

C: Weather Data

[Optional, because weather data can be obtained online by researchers in need of it, but some stations like to have local record]

Weather readings are recorded at the start of the Daily Census, and entered in the appropriate field on page one of the Daily Log Sheet. Recording weather at other times of day is optional. The following information is recorded:

Table x – Weather Data

Data	*Description*
Temperature	*° C.*
Wind Direction	*N, S, E, W, NE, ENE, etc.*
Wind Strength	*Beaufort Scale*
Visibility	*In kilometers – upper limit 40 km*
Cloud Cover	*0 – 10. Zero = no cloud, 10 = completely overcast*
Precipitation	*Light rain, sleet, snow, heavy thunderstorms, etc.*

Temperature should be taken from the thermometer at the banding station. Wind Direction indicates the direction the wind is originating from rather than the direction it is blowing. Wind Strength is calculated using the marine-based Beaufort Scale (Appendix x). Visibility readings are an estimate of horizontal visibility based on familiar landmarks (i.e. Middle Island, at the south tip of Fish Point, is approximately 4-5 km distant; Kelley's Island, visible behind Middle Island, is app. 10-12 kms, and the Bass Islands are 12-15 km). Estimates should be rounded to five km intervals (e.g., 5, 10, 15, 30, 35 km). Perfect visibility is recorded as 40 km. Heavy fog conditions should be recorded as very low visibility (e.g., 0.5 km, 0.25 km, or <0.01 km). Cloud Cover info above. Precipitation should be recorded in the appropriate field on the Daily Log Sheet and more specific information (i.e. duration, start and end-time, intensity, etc.) can be included in the Weather Synopsis field.

Although first-hand readings are preferred, weather conditions can also be checked by going online to the NOAA weather station situated on Middle Bass Island (app. 15 km from the migration field station):
http://seaboard.ndbc.noaa.gov/station_page.php?station=sbio1

Wind Speed Codes

Beaufort Number	Wind Speed (kmph	Wind Speed (mph)	Indicator of Wind Speed
0	<1.6	<1	Calm: smoke rises vertically
1	1.7 – 4.8	1 - 3	Light Air: rising smoke drifts
2	4.9 – 11.2	4 – 7	Light Breeze: leaves rustle, wind felt on face
3	11.3 – 19.2	7 – 12	Gentle Breeze; leaves and twigs move; light weight flags extend
4	19.3 – 28.8	13 – 18	Moderate breeze: thin branches move; dust and paper raised
5	28.9 – 38.4	19 – 24	Fresh Breeze: trees sway
6	38.5 – 49.6	25 - 31	Strong Breeze: large tree branches move; open wires "whistle"