

Neighborhood Nestwatch protocols

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What is Neighborhood Nestwatch?

Neighborhood Nestwatch (NN) is an innovative citizen science program with two main goals: to help scientists solve critical questions regarding the survival of bird populations in residential environments and to educate the public about the ecology and conservation science of wild birds they encounter in their daily life. NN began in the year 2000 in Washington, DC. It expanded in 2012 and now occurs in six additional regional locations: Springfield, MA, Gainesville, FL, Pittsburgh, PA, Atlanta, GA, Raleigh, NC, and Denver, CO. Headquartered at the Smithsonian Migratory Bird Center in Washington, DC, NN features unique face-to-face interaction between Smithsonian scientists, participants, and backyard birds on an annual basis to attain research and education goals.

Over half of North American bird species are in decline. Within the twenty-first century, it is expected that urbanization will become one of the primary causes of species endangerment and extinction. It is therefore imperative for us to determine how and why birds are impacted by urbanization. NN achieves this by focusing primarily on two life history traits: survival and reproductive success. Survival is the probability that a bird will survive in a given time period. Estimated survival probabilities are determined through technician and participant resighting of color-banded birds. Rates of reproductive success, i.e., the successful rearing of viable offspring, are determined through nest monitoring conducted by participants. Both of these traits are evaluated across the rural-to-urban gradient of each regional location to get an indication of the effect of urbanization on birds.

NN brings science out of the lab and classroom and into the backyards of willing participants. These backyard visits are immensely powerful environmental education teaching tools. The educational goals of a backyard visit are to:

- Teach:
 - Life history traits of birds within the context of residential landscapes.
 - The demography and community ecology of birds of residential landscapes.
 - How features in backyards support or negatively influence bird populations.
- Evoke:
 - A connection with individually-banded birds participants observe in their yard.
 - A connection between the birds participants observe and the habitat within and surrounding their home.
- Inspire:
 - Contributions by citizen scientists through regular submissions of nest and resight data.
 - Modifications to yards to enhance habitat value.

Many journal articles based on NN research have been published ([see Appendix E](#)), contributing greatly to our understanding of urban ecology and conservation. NN has also studied participants themselves and documented greater change to participant attitudes toward birds and the environment after being involved in the program.

How does Neighborhood Nestwatch work?

NN operates in the spring and summer when the focal species for each region are breeding. Start dates for the program vary by region because breeding tends to begin earlier in lower latitudes. Each NN regional hub has between 50 to 85 active participants with houses located at varying levels of residential development intensity. By agreeing to allow NN into their backyard, participants lend access to important and understudied residential habitat. This access allows scientists to compare avian reproductive success and survival across an urban-to-rural gradient. Active participants are visited once per field season to collect data. On these visits, technicians record point count data, band birds, resight previously banded birds, search for nests, and conduct a habitat assessment. As technicians collect data, they share knowledge with the participants about the ecology of birds and science conducted in their yard. Participants are then expected to submit citizen science data on nests and banded birds throughout the year.

Safety considerations

Despite conducting fieldwork in a relatively urban environment, you will face hazards such as extreme weather, ticks and mosquitos, and poison ivy. Be sure you have weather-appropriate clothing to wear in the field each day. Early in the season and in the early mornings, a light jacket may be necessary. A lightweight rain-jacket should be worn on days with intermittent light rain. Always wear closed-toed shoes and long pants to protect from insect bites and poison ivy. Lightweight field pants that have been treated with Permethrin to control ticks are ideal. You may choose to wear insect repellent in the field, but always wash your hands before handling birds. Wear a baseball cap and reapply sunscreen frequently to protect against sun exposure. The job can tend to be messy, but be sure your field clothes are presentable for working in front of the public. Remember, you are representing the Smithsonian and must dress accordingly (i.e., no shirts with inappropriate language, torn clothing, or skimpy tank tops).

Keep a close eye on your comfort level on very hot days. Heat stress and dehydration can come on suddenly. Bring a water bottle and be sure to hydrate frequently throughout the day. You may need to take periodic breaks in the shade or in the participant's house (if they invite you in).

Scheduling backyard visits

The first week of backyard visits will be scheduled by your regional manager. After that, you are expected to contact participants yourself through email or by phone to schedule visits. Some technicians have chosen to email all of the participants at once at the beginning of the season

with a link to a scheduling calendar such as Doodle or Google Calendar. Others have chosen to schedule visits on a rolling basis, emailing or calling 5-10 participants at a time in order to fill their schedule at least two weeks in advance. Use mail merge with an Excel spreadsheet of participant contact information to send any mass emails. If you choose to use a method other than mail merge to send mass emails, **be sure to use BCC**. Once a visit is scheduled, enter the participant's name, address, and contact information in the NN Google calendar. **You should make up to three attempts to contact each participant.** If they do not respond to the first email, one follow up email and then a final phone call are appropriate.

On days in which it is forecasted to be exceptionally hot, you may contact the participant ahead of the visit to ask if you can come in earlier to avoid the heat (as early as 6am). In this case you will want to ask the participant if you should ring the doorbell when you arrive or if you should begin the visit without them and allow them to join you later.

If rain is forecasted to be heavy, consistent through the morning, or has a high probability of occurring, you must contact the participant and offer a reschedule date. On days of intermittent drizzle, it's best to go to the backyard and begin conducting the visit. There may be enough breaks in the rain to complete all of the necessary tasks. If conditions do not improve, then you can make the call about rescheduling.

On days in which your visit gets rained out, you are still expected to work. On these days, you will catch up on tasks around the research base such as data proofing, equipment maintenance, and scheduling future visits. At the end of the field season all data taken for that season must be proofed against the paper data to ensure accuracy of data entry. Using rain days to proof data on a rolling basis will save you a lot of work later in the season.

Overview of visit

In consultation with the participant, aim to arrive to the site at 7am, or earlier in warmer southern regions. Start by knocking on the participant's door and quickly introducing yourself (i.e., less than 5 minutes) and going over the order of activities during the visit. After your initial conversation, politely inform the participant of the need to conduct the point count without distraction. Many participants will be familiar with the protocol but you can remind them that the point count requires minimal disturbance and your need to concentrate.

Visit tasks are completed as below. Details for each component are described in subsequent sections. If you are in a region with more than one technician, it may be helpful to divide and conquer to complete all required tasks.

1. **Point count:** The point count is always the first data you will take on your visit. It should be conducted no later than 7:30 am.
2. **Net setup:** Nets should be set up immediately after the point count. Keep net set up brief!

3. **Banding:** If more than one technician is at the site, one technician can band birds while the other conducts the resight foray. If you are working by yourself, do not band birds past 9:30 am.
4. **Resight foray:** Begin the resight foray no later than 10:00 am. Resighting should take you 1.5-2 hours, unless you have already resighted all banded birds at the site or it is the first visit to the site.
5. **Nest searching:** You may search for nests after banding and resighting or do it in small segments during a lull in bird activity when banding.
6. **Vegetation sampling:** The habitat survey can be time intensive and is not temperature dependent, so it will likely be the last step of your field day.
7. **Post-visit:** When you return to the research base, you will enter all of your data for the day, restock equipment, and prepare for your next visit. There may be additional tasks to be completed following the field day – be sure to ask your regional manager for details.

Before each visit

Check traffic conditions and the weather report on the morning of your visit. It is very important for visits to start on time, so allot extra travel time when traffic is heavy. Some of the most urban sites will have very limited parking so it may be helpful to inquire with the participant about parking at the site ahead of time.

Before every backyard visit you must be sure that you are stocked with all of the tools and supplies you will need when you are in the field. Consult [Appendix A](#) and be sure that you have everything on it and in adequate numbers before each visit. Do not forget backup batteries for your GPS unit (if applicable) and Foxpro speaker and remote. Some sites are up to an hour's drive away from the research base, so you will not be able to turn back if you are missing necessary equipment.

Print out before your visit:

- Two copies of the map of the site with a 200 m circle drawn around the site center and circles at 10 m intervals starting in the site center and going up to 50 m. One copy for the point count and resighting, and the other to give to the participant. Use the [Shiny map maker](#) app if one is not already printed for you
- Two copies of the Participant Report, one for resighting and one to give to the participant.
- Blank copies of all datasheets you will need
 - Note: always use the official version of the datasheets. These are provided in the Document checklist in [Appendix A](#).
 - It is good idea to print datasheets in bulk rather than a few at a time.
- The address of the site you will be visiting along with any supplementary location information that will help you find the site.

- Address, contact information, and location information for each site can be found on the data entry interface.
- Contact information for the participant in case you cannot find the site or need to reschedule.

Visit information

Site:		Date:		Lead bander:	Longitude:	Latitude:	Accuracy:
Net length	Total time (minutes)	Net length	Total time (minutes)	Visit notes			
6		12					
9		18					

Write on the visit datasheet (shown above) before your visit:

- **Site:** The site name as it is listed on the data entry interface. It is very important to always write the current site name exactly as it is listed in the data entry interface. Inconsistencies in the site name can cause confusion down the line. Names for different site categories are coded as follows:
 - **Backyard visits:** The first four letters of the participant's last name, the first 3 letters of the participant's first name, the 2 letter state code and the number 1 (e.g., MARRPETMD1 for Peter Marra of Maryland). If the participant moves to a new residence in the same state the number goes up by one with each subsequent residence (e.g., MARRPETMD2 for Peter Marra's second house since he started with the program).
 - **Parks:** The first 5 letters of the park name, the letters PK for park, the 2 letter state code, and the number 1 (e.g., FORESPKMA1 for Forest Park in Massachusetts).
 - **Schools:** The first 5 letters of the school name, either ES, MS, or HS for elementary, middle, or high schools respectively, the two letter state code, and the number 1 (e.g., BAILEESVA1 for Bailey's Elementary School in Virginia).
- **Date:** The date of the visit in the format YYYY-MM-DD (this is the ISO 8601 international date standard).
- **Lead bander:** This is the individual who will head up the banding effort during the visit. If more than one technician is present at the site, you can choose ahead of time who will be the lead bander. **It is absolutely crucial that the aluminum bands used during the visit are those that have been assigned to the lead bander.** More than one bander may band birds at a visit (as recorded in the *obs* column, below), as long as all individuals are pulling from the lead bander's string of aluminum bands.
- **Longitude and latitude:** The GPS coordinates of the site center as they are listed on the data interface. The web data interface will instruct you whether a GPS point needs to

be taken. This is determined by the following conditions (see [Point Count](#) section below for methodology):

- The coordinates listed are estimated from a map
- The type of coordinates is listed as '*unknown*'
- It is a new site (e.g. a new participant or the participant has moved)
- **Accuracy:** The accuracy of the GPS point taken, in meters.

Participant involvement

Throughout your time in the field, you should be encouraging the participant to take part in visit activities. With the exception of the point count, each component of the visit can be used as a lesson in the ecology of birds, the science of NN, and how participants can modify their backyard habitats to conserve species. Teaching the participant to resight birds during your resight foray is a good way to increase their resighting efforts and ensure that they submit resight data. **Emphasize their role in this citizen science program and encourage them to take the time to submit data.**

Participants are often eager to help out during the course of the visit. Participant involvement should be encouraged, but be clear that there are limits on their involvement. Participants should NEVER remove birds from the net, band the bird, or take any of the measurements. During the netting process, participants can take an active role by helping spot target species, flushing birds into the net, or controlling the Foxpro speaker during target netting. During banding, participants can help out by scribing or obtaining color band combinations. At the end of the banding process, allow participants the opportunity to release the bird. Have them kneel down close to the ground and place the bird feet first onto their outstretched palm. Try to aim the bird in the direction of vegetation that they can perch on. Allow any children present the first opportunity to release the bird.

Visit information

Site:		Date:		Lead bander:	Longitude:	Latitude:	Accuracy:
Net length	Total time (minutes)	Net length	Total time (minutes)	Visit notes			
6		12					
9		18					

Measuring participant engagement: You are required to observe the degree of engagement of the participants throughout the visit. Participant engagement is scored on a scale of 0-5 as shown in the table below. It is recorded on the online data interface. To avoid potentially embarrassing communication with participants, it is not included in the data sheet. It is best to

include the value and any notes regarding participant behavior in the Visit notes field on your visit datasheet (as above).

Engagement score	Description
0	Participant should be avoided in the future
1	Participant was not present or showed no interest during visit activities
2	Participant only showed slight interest during visit activities
3	Participant contributed during 1 visit activity (i.e. banding)
4	Participant contributed during two to three visit activities (i.e. banding and resight foray)
5	Participant contributed during all visit activities

Point count

A point count is a field sampling method for determining species abundance and diversity. NN uses fixed-radius distance sampling repeated measures point counts. Under this protocol, detections are assigned to distance classes and time intervals to estimate abundance after accounting for detectability.

Before conducting point counts: Before your first backyard visit, learn to estimate distance. Use a map of a location with predefined distances and/or a transect tape to practice your distance estimation skills. To do so, first go to a location and estimate the distances between yourself and objects (e.g., stakes, flags, trees). Afterwards, measure the distance of those objects to yourself. Repeat this practice in open environments, such as a field, closed environments (forest), and mixed landscapes (like a suburban yard) until you can consistently estimate distances within 2-3 meters under a variety of conditions.

Before each point count: Before each backyard visit, you will have determined if the point count location is defined (see [Before each visit](#), above). If it is defined, use your GPS unit to navigate to this location to conduct your point count. If it is not defined, choose the point count location (i.e., site center). The chosen site center should be the center of detectable bird activity in the yard. This tends to be the middle of the backyard, but yard configurations will vary. Once you have decided on a location, take a GPS point using the waypoint averaging feature of your GPS unit. Allow your GPS unit to average the location during your point count. Record the resulting longitude, latitude, and accuracy on the top of the visit record datasheet.

Equipment:

- Paper copy of the site map: Use for distance estimation - study before conducting the point count.
- GPS unit
- Timer or cell phone timer app
- Point count datasheet (see image below and [Appendix A](#))
- Clipboard
- Pencil
- Binoculars

Site:		Observer:		Date:		Start Time:	
Interval	Species	Dist < 10	Dist 10 - 20	Dist 20 - 30	Dist 30 - 40	Dist 40 - 50	Detection

Method: If it is after 7:30 am, do not conduct the point count. Begin the point count by standing very still in the site center for 2-3 minutes to allow bird activity to recover from the initial disturbance of your presence before you begin the first census period. During this time, record the site, observer, and date on your point count datasheet (see above). The point count is a census of ALL bird species, not just NN focal species. Do not include flyovers in your count. Only include a bird if you perceive that it has landed within your 50 m radius.

The 10-minute point count is broken up into three 3 minute and 20 second time intervals. Each 3:20 minute interval should be considered its own census period. Therefore, it is possible that individual birds will be counted more than once across the three periods. Do not count a single individual bird more than once within a 3 minute segment.

Counted birds are classified by species and the method and location of first detection:

- **Species:** Species are recorded using four-letter AOU alpha codes. If you are not completely certain of the identity of a bird, write "UNBI" (unidentified bird).
- **Detection:** Detection method described the way in which an individual was first observed in a time interval. Methods of detection in the point count include V for visual, A for aural, and B for both visual and aural detections.
- **Distance class:** A detected bird is assigned to a distance class based on estimated distance between the location of the bird and the observer when it is first detected in a time interval. Distance classes are from 0-50 m in 10 m intervals.

Each row of the point count datasheet should be thought of as the number of birds of a species detected in a given census period and distance class that was detected with each method. After the point count, think about the NN target species you observed and where you observed them.

You can use this information to choose strategic locations to set up nets or individuals you may target with playback.

Banding

Band storage

Aluminum bands are issued by the US Geological Survey and are regulated heavily. It is therefore imperative to prevent lost bands and band number transcription errors by storing them properly and keeping accurate inventory of the bands in your possession. Rules for proper band storage include:

- Aluminum bands should be stored in a film canister with a hole or X carved into the lid. Bands are pulled out one by one in increasing numerical order through the hole in the lid of the canister. This prevents taking bands out of order and bands falling off of a string.
- The band number of any band lost or destroyed **must** be written on your datasheet and entered into the database during data entry.
 - To enter a band number that has been lost or destroyed, navigate to the Capture information section of the data entry interface, type “Lost band” in the Encounter type field (enc), enter the prefix and suffix of the missing band, and leave all other fields blank.
- **All** aluminum bands issued to you must be accounted for at the end of the season and leftover bands must be returned to your regional manager.
- **Do not** share band strings between technicians. Each technician will be issued their own band strings that only they are accountable for.
- **Do not store your banding kit in the car for extended periods of time. Remove banding kit from your car at the end of every shift.** The heat in a hot car will cause color bands to open with time and destroy their integrity.

You must ensure that you have all of the required equipment in your kit before every backyard visit. A handy equipment checklist has been included in [Appendix A](#) for your reference. If you do not have all of the proper equipment for banding, do not band! Please also familiarize yourself with the measurements you will be taking in the field ahead of your first visit. It is important to follow these guidelines carefully to standardize data collection across technicians and across regional hubs.

Netting

Netting must be done in the cooler early morning hours for the safety of the birds being caught. If the temperature goes above 90 degrees, you must shut nets. The goal is to capture 3-5 individuals of NN target species (See [Appendix B](#)). You will likely also catch non-target species. These birds are NOT to be banded. If you would like to use non-target species for educational purposes before release such as demonstrating measurement techniques to the participant that

is fine, but do not band them! Aim to set up 3-4 nets per visit if space allows, or at least try 3-4 different net locations.

Net setup

Choose the location of your nets strategically. Nets placed in the shade will be less visible to birds and safer for birds that are caught in the net. A bird caught in a sunny net can overheat very quickly. You may also want to set up nets next to low-lying shrubs or bushes. Shrubs and bushes provide a perching spot which make it more likely that a bird will come down from the tree tops. On windy days, try not to place the net too close to shrubbery or it will become tangled with the nearby vegetation. Be sure to ask participant before clearing/cutting vegetation to set up nets.

Work quickly and efficiently during net setup. The longer you take to put up nets the more you are alerting the nearby bird community to your presence. Also pay close attention to proper net set-up. Trammels should be tight (no sagging nets!) and evenly spaced to avoid double bagging birds. Remember that a properly set up net is the first defense against bird injury and difficult extractions.

Record the time that you set up each net in a field notebook or in the margins of your datasheet.

Managing nets

You may choose to use target netting, passive blanket netting, or a combination of both depending on the bird community and yard configuration. For target netting we use a Foxpro speaker and remote control pre-loaded with the vocalizations, songs, and alarm calls of all target species. Place the speaker in the center of the net and choose a song with the remote control. Choose your songs based on birds detected by sight or sound within or near the yard. You may also choose to play the Swamp Sparrow scream, the American Robin scream, or Chickadee mobbing call, which have been shown to be effective in attracting target species into the nets. Passive blanket netting is more appropriate for larger backyards with a high baseline level of bird activity. Passive nets set up next to an active bird feeder can also be very effective. If you choose to net passively you may use time between net runs to complete other tasks such as nest searching, but you must check nets at minimum once every 20 minutes. It is also effective to have passive nets set up while target netting elsewhere. Again, be mindful of 20-minute net-checking intervals.

Be sure to leave time for other activities such as resighting and nest searching. Resighting is more important to the scientific mission of NN (survival estimates) than banding so always leave enough time in the cooler-temperature morning hours (when bird activity is relatively high) for your resight foray.

Closing nets

Prior to closing a net, be sure that no objects (sticks, insects, leaves) are stuck in the net. If you are shutting nets temporarily, be sure to furl them tightly. If you are closing nets for the day, do

not furl nets before putting them away. Keep track of net closing times in a field notebook or on the margins of your datasheet.

Visit information					
Site:	Date:	Lead bander:	Longitude:	Latitude:	Accuracy:
Net length	Total time (minutes)	Net length	Total time (minutes)	Visit notes	
6		12			
9		18			

Recording net effort

Using the opening and closing times you noted, calculate the total time in minutes that nets of each length were open and write on the visit datasheet (as above). For example, if you had two 6m nets open for an hour each and one 12m net open for 45 minutes, you would record 120 min for net length 6 and 45 min for net length 12 on your visit datasheet. Do not calculate or record net hours.

Bird safety

Whenever feasible, to prevent the spread of disease from one bird to another, avoid reusing bird bags until they have been washed.

Keep extraction time to a minimum to avoid unnecessary stress on the bird. If you are working in pairs, do not hesitate to call another technician for help with a difficult extraction. Throughout the banding process, watch for signs of stress or injury. Keep handling and processing time to a minimum. Processing must occur in an area that is protected from sun and excessive stimuli (e.g., noise, predators, etc.). In the event of handling stress (e.g., panting, fatigue, inability to fly), birds are to receive Pedialyte to prevent dehydration and be placed in a dark location until they are able to fly away safely. In the rare event of a severe injury that would cause eventual mortality (e.g., severely broken wing, mortal wounds from a predator attack), technicians are to euthanize injured birds using cervical dislocation (see the [Mist Netter's Bird Safety Handbook](#) for instructions). All injuries or deaths must be reported to your regional manager and described in the notes field on your datasheet.

It is okay to allow participants to participate in activities such as holding the bird in bander's grip or releasing the bird but bird safety must be our first priority. Gauge your audience, only allow participants to touch or hold birds if they are calm, quiet, and you perceive that risk of stress or injury can be minimized. Likewise, participants may handle birds only in cases where handling time is kept to a minimum and the bird is not showing any visible signs of stress. Non-target

species, because they don't require as much handling time should ideally be used for these types of teaching moments.

Nets should be checked at least every 20 minutes and captured birds should be extracted as soon as is possible. Nets must be closed if the temperature goes above 90°F, if there is measurable precipitation, or if there is more than a light wind. If multiple technicians are at a site but separated, be sure to have a way to reach each other such as walkie-talkies in case of emergency. For more information on bird safety, consult [this link](#).

Banding Methods

Place a bird in clean cloth bag upon extraction. If multiple birds are caught, hang extra bags in a cool, shaded area until processing. Do not place multiple birds in a single bag.

1. Prior to removing a bird from the bag: Before removing the first bird from the bag be sure you have set up your banding table and laid out all equipment that will be needed. Before processing each bird, fill in the following fields on your datasheet:

Capture information

time	obs	enc	spp	band prefix/suffix	colorL	colorR	mass	wing	tail	age	sex	cp/bp	fat	sample IDs	notes

- **time:** Time is the time that you began processing the bird (24-hour-clock format).
- **obs:** The observer is defined as the person who banded the bird and took all of the measurements. Record the three letter initials of the observer. Only one person may be listed as the observer for an individual bird.
- **enc:** Encounter type is either B for banding (the first time a bird is caught) or R for recapture (any subsequent times a bird is caught).
- **spp:** The four letter alpha code of the species being banded (see [Appendix B](#)).
- **band:** The band number is a unique identifier that includes a numeric prefix of 3 or 4 digits and suffix of 5 digits. On our datasheets they are to be written with the prefix in the upper box and the suffix in the lower box. Open the properly sized aluminum band and write down the band number. To avoid band number transcription errors, please follow the rules outlined below:
 - **Pull your bands sequentially from smallest to largest number**
 - If a participant or other technician is scribing, have them read the band number back to you after you call it out.
 - If you are banding alone, read the band number once before you place it on the bird's leg and once after it has been placed on the leg.

- **YOU MUST** read every band before you place it on a bird as opposed to assuming the bands in a string are in order. Band number errors can be very difficult to fix and this is how mistakes can happen!!!
- **colorL** or **colorR**: Color combinations are read top left, bottom left, top right, bottom right (e.g., RX,GB = red over aluminum on the left and green over blue on the right). Left and right legs each have their own column.
 - The color conventions are shown in the table below. Always use these conventions when writing color band combinations on your datasheet. If you forget the conventions, they are also listed at the bottom of the visit datasheet.

Color	Code
No band	-
Aluminum	X
Black	K
Blue	B
Brown	N
Green	G
Grey	E
Orange	O
Pink	P
Purple/mauve	M
Red	R
White	W
Yellow	Y

- Obtain a color combination from your species specific color band sheets. Blank color band sheets for each species will be provided to you by your regional manager. Choose a combination that is relatively unique for the site (e.g. do not use two combinations that are a reverse of each other or contain too many similar colors). Be sure to **cross off the combination that you used immediately**. Combinations are not to be reused for a given species and regional hub under any circumstances.
- When you are close to using up all available color combinations for a species, ask your regional manager to provide you with additional sheets. It is very important to do so prior to running out of unique combinations!

2. Weigh the bird: A bird's **mass** describes the weight of the bird in grams (data field shown in the image below).

Capture information

time	obs	enc	spp	band prefix/suffix	colorL	colorR	mass	wing	tail	age	sex	cp/bp	fat	sample IDs	notes

1. Place the bird, while still in the bag, on the electronic scale
 - o Ensure that the entirety of the bag (including the string) is resting on the top of the scale
2. Zero (tare) the scale
3. Remove the bag from the scale and the bird from the bag
4. Fold and roll the bag neatly and place bag back on scale, ensuring that the entirety of the bag is resting on the top of the scale
 - o The value displayed on the scale is the negative of the mass
5. Compare the mass value with the mass distribution plots in [Appendix C](#) or at [this link](#) prior to recording the value. If the mass is outside of the range shaded in blue, re-weigh the bird at the end of the banding process.

After weighing the bird, turn the bird bag inside out to remove leftover feathers and feces stuck to the inside of the bag, and immediately remove from the banding table. If you are banding at the participant's outdoor seating area, do not flip bags at the banding station. Instead, place dirty bird bags inside a bird bag and flip the bags in the participants yard after banding.

3. Add/read aluminum and color bands: After removing the bird from the bag, your first task is to place the bands on the bird or read its current bands (for recaptures). Place the aluminum band on before the color bands. You must band the bird before taking any measurements! Always double check that you have placed the color bands on the appropriate legs. Remember that color combinations are read in the order of top left band, bottom left band, top right band, and bottom right band. Also keep in mind that we are referring to the bird's left and right legs while perching, not your left and right if the bird is facing you.

4. Measurements, age, sex, and breeding condition (data fields shown in the image below)

Capture information

time	obs	enc	spp	band prefix/suffix	colorL	colorR	mass	wing	tail	age	sex	cp/bp	fat	sample IDs	notes

wing: Unflattened wing chord.

- Measure from the bend of the wing (“shoulder”) to the tip of the longest primary feather.
- Compare your measurement of wing chord length with the wing distribution plots in [Appendix C](#) or at [this link](#) prior to recording the value. If the wing length is outside of the range shaded in blue, re-measure the wing.

tail: Length of the right R1 tail feather.

- Do not measure the tail unless it is completely grown.
- Measure from the tip of the right R1 to the stopping point (abutting the pygostyle) when inserting the ruler between the two central retrices.
- Compare your measurement of tail length with the tail length distribution plots in [Appendix C](#) or at [this link](#) prior to recording the value. If the tail length is outside of the range shaded in blue, re-measure the tail.

age: Age may be either HY, SY, AHY, ASY or U for unknown.

- For recaptures, always age based on your observation of the bird rather than the bird’s banding history.
- We do not band any species that can be aged to TY or ATY specificity and we do not band nestlings.
- Do not overestimate your aging ability – it is best to stick to HY and AHY and be correct than to guess at SY and ASY.
- Be sure to have a complete understanding of the aging criteria of our focal species in the Pyle guide

sex: May be listed as either M, F, or U for unknown.

- Most of the species that we band do not exhibit sexual dimorphism so sex will typically only be determined by breeding condition (presence or absence of CP or BP).

cp/bp: Breeding condition of the bird.

- In this field we are only noting the presence or absence of a brood patch (BP) or cloacal protuberance (CP), not scoring it on a numerical scale. Please write CP, BP, or “-“ for neither present.

fat: An ordinal scale we use to assess the amount of fat the bird has stored in its furculum. Blow the feathers away from the furculum area and score the fat based on the scale listed in the table below.

Fat score	Description
0	No fat is visible within the furculum.
T	Trace, there is some fat is visible in furculum, but it does not cover the entire furculum.
1	A thin sheet of fat across the entire furculum.
2	The fat fills the furculum level to the breast.
3	The fat is bulging slightly from furculum.
4	The fat is bulging strongly from furculum but does not meet abdominal fat.
5	Fat in the furculum meets the abdominal fat.

5. Blood and feather sampling: The last step of banding is to take a blood and feather sample from the bird. To take a feather sample, pluck the right R3. If right R3 is not present do not take a feather sample. Place the feather in a feather envelope that has been pre-labeled with a catalogue number. Write the catalogue number of the envelope in the SampleIDs field on your datasheet. When you return to the research base, fill in the rest of the fields on the envelope and store filled envelopes in chronological order by catalogue number. Blood sampling steps are outlined in the blood sampling section below. Skip blood sampling if you are not yet comfortable bleeding birds or if the bird is showing signs of handling stress or injury.

6. Release the bird close to the ground and point it in the direction of nearby trees or bushes that it can perch on.

Blood sampling

Do not attempt blood sampling without proper, in person training. If you are uncomfortable bleeding birds, do not do it. You may also skip blood sampling if the bird is showing signs of stress, if you are short on time, or if you perceive that the participant is uncomfortable with it.

Be sure that you have all of the equipment necessary (see [Appendix A](#)) and everything you will need during the bleeding process is within arm's reach. Open the needle packet, bottle of alcohol, vial of buffer, and sharps bin before you begin bleeding. Have the capillary tube handy before you prick the vein.

When you are ready to begin the bleeding process, hold the bird in bander's grip with it's back facing down. Use your thumb to open and hold back the wing. You may want to rest your elbow on the banding table or on your leg for stability and to help mitigate the effects of shaky hands. Brush aside the feathers using water or rubbing alcohol. If you use alcohol, be sure the area is **completely** dry before you prick the vein.

Just proximal to the elbow, the brachial vein branches off. A good place to puncture is just proximal to this branch. However, on larger birds, an adequate blood volume may be obtained by puncturing distal to this branch. Press the needle in just deep enough to puncture the skin and vein – you do not need to press very deep. A small bead or droplet of blood should form where you punctured. Hold the end of the capillary tube at a slight angle with the end just touching the droplet – the blood will be drawn into the tube. Try not to touch the skin with the capillary tube or push it too far into the bead, as this will limit capillary action and make obtaining a blood sample difficult. Fill the tube to at least half of its length.

To stop the bleeding, place a small piece of cotton over the puncture, apply a small amount of pressure, and close the wing when the bleeding has stopped. If bleeding does not stop, apply a small amount of styptic powder directly to the wound. Once the bleeding has stopped, remove the cotton and release the bird.

To empty the capillary tube into the buffer vial, place the end of the capillary tube over the buffer vial and the capillary bulb on the back of the tube. Squeeze the capillary bulb to force all of the blood out of the tube. Remove the bulb from the tube before you stop squeezing it, otherwise blood will end up in the bulb. Like feather envelopes, buffer vials are partially pre-labeled according to a prescribed convention familiar to the regional manager. When you return to the research base, complete the information for each label. Store the tubes in an 81-place cryobox and place the box in a cooler with the ice packs until you return to the research base. Place used needle, capillary tubes, cotton, and anything with blood on it in a small sharps bin in the field.

Back at the research base, use a fine point sharpie to fill out a sample tube label with the following information:

- Blood sample catalogue number (As mentioned above, you may use pre-labeled tubes with catalogue numbers or, using another organized system, choose to enter all blood sample data on labels at the research base.)
- Band number
- Species alpha code
- Date
- Site code

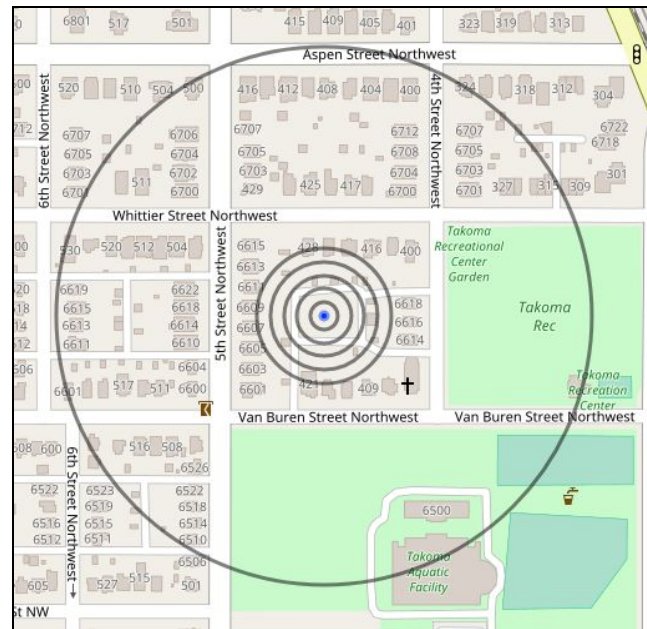
Be sure your handwriting is legible! Write the corresponding catalogue number on your datasheet (if not done already at the visit) and enter into the data entry interface when you enter your data for the day. Place the labeled vials in another cryobox and store in the freezer. Place your ice packs back in the freezer so that they are ready for the next visit. Store unused buffer tubes in the refrigerator. Empty your field sharps bin into the larger sharps bin you are provided with at the research base.

Resighting

A key scientific objective of NN is to evaluate demography of adult birds across the rural-to-urban gradient and regional NN hubs. To address the demography of adult birds, technicians attempt to resight previously banded birds during their visit and NN participants conduct resight activities throughout the year. The resight data technicians collect, in addition to recaptures during a visit and resights by NN participants, are used to develop **encounter histories** of birds (initial banding event plus all re-encounters over time for a given bird). These encounter histories are the foundation of survival models and are used to estimate **apparent survival** (the probability that an individual will survive and not emigrate) and **detectability** (the probability of observing an individual who is alive and has not emigrated). Using encounter histories of birds in Washington, DC, we have found that the inclusion of resight data improves apparent survival estimates considerably and provides higher estimates relative to models constructed using recapture data. This is because resight data increases the probability that a

bird will be detected. For example, if a bird's breeding territory shifts outside of a NN participant's backyard between years, it is more likely to re-encounter this bird with binoculars than pull it away from its territory and into a mist net. Because resighting greatly increases the probability of detecting previously banded birds, **the importance of resighting is paramount to our ability to study avian demography**. Indeed, in a power analysis of NN data, we found that detection probability has a greater influence on our ability to estimate apparent survival than the number of birds captured or even the number of years in which a site was visited. It is therefore crucial that proper resighting techniques are employed and that there is considerable effort dedicated to resighting.

Resighting activities associated with NN represent observing all banded birds within a site and conducting a **census** of unbanded and banded individuals across all accessible locations (e.g., sidewalks, parks, roads) within 200 m of a given site center (see the figure below and this [link](#)). This census is termed a **resight foray**. A census is quite different from sampling. Sampling involves estimating some characteristic of a population by evaluating representative sub-populations. In a census, you are expected to assess some characteristic of a population by evaluating all, or nearly all, individuals in a population (when conducting a resight foray, the population of interest is the totality of banded and unbanded birds within the resight extent).



Resighting within a site

Use binoculars in conjunction with playback of songs and calls to search for previously banded individuals at the NN site (*Note: the extent of a NN site is defined as a 50 m radius from the site center*). If possible, engage your participant in the resighting activity and provide any training deemed necessary on how to resight birds, use binoculars, and submit resights to NN. Birds resighted within the 50 m radius of a site are considered an incidental resight and are recorded as encounter type "I" on your datasheet. Also record the color combination of the banded bird, the band number, the time of observation, and initials of the observer. If you resight a bird within the site extent, it is unnecessary to record any additional information regarding the resight (e.g., longitude/latitude). You are also not required to record the time spent resighting within the site extent nor any unbanded birds observed while at the site (see below).

Resight forays

Materials:

- **Banded bird list and field notebook or datasheet.** Always have a list of previously captured birds before conducting your resight foray. This allows you to target only those species that have been banded at that site.
- **Foxpro or other playback device with external speaker.** Playback devices should have all of the target species songs loaded on them as well as their alarm/distress calls and the Swamp Sparrow distress call. Do not use your smartphone or rely on pishing for playback! Proper playback equipment can bring in birds that are more than 50 m away.
- **Map** of the area you're resighting (see this [link](#)). This will ensure that you cover the entire accessible area within the resight extent. In some cases you may have to drive or walk considerable distances, for example if a road lies within the resight extent and is not directly connected to the other roads within the extent. Because of this, study the site map and formulate a plan for resighting prior to your site visit.
- **A handheld GPS unit.** You will use your GPS unit to determine when you are 200 m from your site center, record the total distance walked during your foray, and the coordinates of resighted birds.
- **A smartphone with a tracking app (optional)** such as Runkeeper. You may use your smartphone to record the distance walked during your resight foray rather than a GPS unit.
- **Binoculars**
- **Walkie-talkie or other communication device.** If you are working in tandem with another technician at a site, be sure to have a way for that technician to contact you in case of emergency (e.g., difficulty in extracting a bird from a net).

Methods:

A resight foray should take an average of 1.5 to 2 hours (*Note: if multiple technicians are conducting forays, this represents the sum of time spent across forays*). Total time spent during a foray must be greater than one hour per site (as described above, time spent within 50 m of the center of a NN site not included as foray time). An exception to this rule is if you have observed all previously banded individuals from a site – in this instance no further searching is necessary and you may end your foray (e.g., at a site one NOCA and one GRCA were banded and both have already been observed). The foray should not be undertaken during late morning (later than 11:00 am) or early afternoon hours, if possible. This is because the probability of detecting a bird is dependent on bird activity and thus time of day. You are more likely to detect a bird in the early morning or evening.

It cannot be stressed enough that **resighting takes precedence over banding activity in regards to achieving the scientific goals of this project**. If you are working in tandem with another technician at a site, conduct your foray during mist netting activities. If you are working solo at a site you will need to close nets by 9:30 am to ensure that you are resighting at the

appropriate time. If you conduct multiple forays during a visit, provide a “Foray #” on your datasheet (e.g., the first foray is recorded as “1” and the second is recorded as “2”). It is strongly recommended that at least a portion of the foray is conducted with the participant – this will help increase their resighting skills as well as emphasize their role in the project as a citizen scientist.

During your foray:

- At the start of your foray: Record the time in which you begin and set your GPS unit or runkeeper app to track the distance you’ve walked.
- Walk all accessible locations within a 200 m radius of the site center. Use your GPS to know your proximity to the site center. Be sure to walk slowly, listen for any target species calls or songs and use your binoculars to search for target individuals. If you pass an active feeder, spend some extra time there observing the birds who visit it.
- At a minimum of once per 50 m of walking, cycle through focal species songs and calls on your FoxPro, playing songs/calls for a minimum of 30 seconds per focal species. It’s likely that you will play songs and calls of certain focal species more frequently than this as they opportunistically appear and need to be lured closer to observe their legs. Keep a mental accounting of vocalizations that haven’t been played as frequently so that all focal species get fairly equal playback representation. In addition to focal species songs/calls, play the Swamp Sparrow (SWSP) distress call – this usually brings in lots of birds and has been found to attract all of our focal species. If you have already resighted all previously banded birds of a given species, do not continue to target the species song or call.
- As mentioned above, throughout your foray, if you hear a song or spot an individual but can’t see the band combination, use your FoxPro to bring the bird closer.
- If you spot a bird that is one of your target species but is unbanded, record that observation on your datasheet or field notebook. Only record this observation if you are able to see both legs of the bird. If you have already resighted all previously banded birds of a given species do not continue to record unbanded individuals of that species.
- If you spot a banded bird, do your best to observe both legs of the bird. Use your GPS to estimate the location of an observed bird. Record the color bands, longitude, and latitude of the observation on your datasheet or field notebook. Resight observations during a foray are recorded as encounter type “F” (Foray) on your datasheet.
- Determine the band number of the individual you resighted by consulting the banded birds list you printed out before your visit. If you cannot determine the band number based on this list, you may use the distance query feature of the data entry interface to search for banded birds at nearby sites.
- Upon returning to the site, record the distance walked and the time that you completed your resight foray. If more than one technician conducted a resight foray, or if the foray was done in segments, record each foray separately. If you used a field notebook to record your resight observations transfer your resight data to the encounter sheet prior to leaving the site (do not wait until after your visit to do this!)

Nest searching

Nest searching is not a heat-dependent task and therefore may be undertaken later in the day, after banding and resighting. It may also be split up into small segments or done all at once **as long as you cover the full 50 m radius of the site center**. You do not have to limit the scope of your search to NN target species.

Start looking for behavioral cues for finding nests immediately when you get to the site and continue throughout all portions of the visit. Cues may include:

- Bird carrying nesting material or food
- Pairs chasing each other
- The sound of chirping nestlings
- A female flying (watching where she goes can often lead you to the location of her nest)
- A male singing on the nest

These behavioral cues will likely be how most nests are found.

Search only within the 50 m radius of the site center. If the yard is smaller than 50 m, search the entire backyard. Look in all bushes, shrubs, nestboxes, crooks of branches, and cavities within the site center and follow birds displaying the behavioral cues listed above. Viewing a shrub skyward from ground level can be helpful.

If you find a nest, begin filling out the nest data form for the participant. If participant is present, show them the location of the nest. If they are not present, write a brief description of the location of the nest to leave for them or take a picture with your smartphone and email to participant when you are back at the research base. Even if you do not find a nest, leave a nest data form for the participant in case they find one at a later date.

Inform the participant of the importance of nest monitoring to the mission of NN:

- Nest monitoring and resighting are participant's two main contributions to NN.
- We can use data from monitored nests to determine reproductive success, which can be analyzed against land use variables to determine the effect of urbanization on birds.

Participants must also be warned of the risks of nest monitoring. Disturbing birds during nesting can jeopardize avian reproductive output, so participants must follow instructions on the nest monitoring datasheet:

- Do not check nests too frequently (instructions on nest datasheet)
- Do not check nests in the early morning or at dusk
- As much as possible do not check nests during the most sensitive periods of nest building or during the first few days of incubation
- Do not approach the nest when the young are close to fledging
- Keep nest checks quick

- Try to check nests when adult birds are not present
- Try to check nests from a distance with tools such as binoculars or a mirror attached to a stick whenever possible to minimize disturbance.
- Do not approach nest when it is cold, damp, or rainy
- Do not use the same route when approaching and leaving the nest to avoid creating human scent trails that predators can use to locate nest
- During incubation, visit the nest every three days. During the nestling stage, you can visit the nest every two days.
- Never touch the eggs, young, or nest

In terms of data submission, the participants must be aware of the following guidelines:

- Nests should be followed **until the fate of the nest is known** (Failed or Successful). We ask that participants submit **at least three nest monitoring dates** including the final fledge/fail date.
- Checking the nest every 3-4 days is what you should aim for.
- A nest is considered successful if one or more young of the same species survives to fledge.
- Report brood-parasitism – Brown-headed Cowbirds lay their eggs in other species' nests where they will then hatch and are raised by the host parents. Usually the cowbird chick will kill or out-compete the host chicks for resources. This is a common cause of nest failure and should be reported.
- Once you have determined the fate of the nest, then you may begin entering data.
- You may not edit previously entered nest information in our current data entry system, so be sure you have all information necessary before you begin data entry.

Vegetation sampling

Vegetation sampling will only be conducted once every 5 years. Technicians should check with their managers to determine whether a site needs to be sampled. Vegetation sampling is not heat dependent, so it will likely be the last step of your visit. There will be three sampling plots per site.

Before your first backyard visit, familiarize yourself with the common vegetation local to your area. Consult local field guides. Online dichotomous keys such as [this one](#) created by Virginia Tech and [this one](#) created by the New England Wildflower society may be helpful. Practice identifying plant species in your yard. Determine which of these resources you find the most helpful. If you cannot identify a plant right away, try taking a picture and using online resources to figure it out.

Site ID: MARRPETMD1	Date: 2017-05-21	Observer: DLN, AMS
GPS: (X) -77.00267	Point: 1	
(Y) 38.97477		

Vegetation sampling occurs in three circular plots per site. Each plot has a radius of 11.3 m and covers an area of one-tenth of an acre. The first plot you will sample will be a circle centered at the same location as the point count. Write the site ID, the date in YYYY-MM-DD format, the three letter initials of each technician doing the veg sampling, the longitude (X) and latitude (Y) of the site center, and the plot number (1, 2, or 3) at the top of your [veg sampling datasheet](#) (see [Appendix A](#)). Determine the boundaries of your first plot by measuring 11.3 m in each cardinal direction, using a pin flag or other marker to delineate the plot.

Overall Sub-Plot (11.3m radius)

Dominant Land Use (1): Residential	% 60	Shrub Cover	n/a
Dominant Land Use (2): Golf Course	% 40	Canopy Cover	n/a (from GIS)
Dominant Land Use (3): NA			

Land uses: Forested; Residential; Developed (please describe); Agriculture; Undeveloped (but cleared); Grassland; Park; Other (please describe)

Begin by estimating the dominant land use of the plot. Write the land use types in your plot and percentage of the area used for each purpose on your datasheet. The percentages of land use types for each plot should add up to 100%. The vast majority of your plot will likely be classified as Residential land use, but it may also be Forest (remnant forest left behind), Development (industry or commercial), Agriculture (farmland), Undeveloped (vacant lot), Grassland (natural grass), Park (playground or otherwise); Other (golf course, tennis court, school, etc.).

Ground Cover (<0.5m)

%Lawn	% Nat'l Leaf Litter	%Water	%Herbaceous	%Soil/Sand	% Nat'l Woody Debris	%Pavement	%Building	%Other
30	0	0	10	2	3	20	25	10 (Mulch)

Examples of Other: Mulch, rock/stones, playground, sandbox, vines, water, artificial surface, etc.

Next, estimate the type of ground cover of your plot. Ground cover is everything less than 0.5 m in height (about to your knee caps). The percentages of all ground cover types do not have to add up to 100%, but should get close. Some areas will have more than one type of ground cover (e.g. woody debris on top of lawn or both mulch and herbaceous). All human ground cover types (a shed, playground, or garden) should be classified as type "Other". Be sure to specify what you are referring to when you say Other. Do the smaller categories first and then add them up to see if the larger ones make sense.

Shrub Spp. (10+ stems <2 cm. dbh or < 1.5m high). Estimate to nearest 0.5m

<i>Shrub</i>	<i>H</i>	<i>W</i>	<i>D</i>
Azalea	1	1	1
Boxwood	1.5	6	2
White oak	0.75	0.5	0.5
Trumpet vine	1.5	3	3

You will be measuring diameter at breast height (DBH) of many trees and shrubs. We will be using a convention of 1.5 m above ground level to measure DBH. Using a yardstick, determine where on your body 1.5 m falls. This measurement allows you to gauge where the appropriate place on the trunk to measure DBH.

List all shrubs present on your plot and the height, width, and depth of each. For this section, shrubs are considered anything either with 10+ stems that are less than 2 cm DBH or anything less than 1.5 m tall. Remember that “shrub” and “tree” are just loose labels for the structure of the vegetation. Therefore, a species you may think of as a tree may be measured as a shrub if structurally they fit the above criteria. Shrubs that are attached (e.g. boxwood hedgerows) can be counted as one bush (even if several plants make up the shrub). Shrubs that are so close they cannot be easily separated into individuals (e.g. bush honeysuckle in the forest), or make up very little volume (e.g. small white oak saplings) can be combined into one shrub on your datasheet. Vines that are aggregated should be counted as a shrub. Shrubs that are very short (e.g. juniper used as ground cover) can be counted in the ground cover column as Other: woody shrubs. Estimate height, width, and depth of each shrub to within 0.5 m of accuracy.

Trees (estimate dbh to nearest cm, other dimensions to nearest 0.5m)

<i>Tree Spp.</i>	DBH1	DBH2	DBH3	DBH4	DBH5	Height	Height to Crown	Crown Width1	Crown Width2	Condition
Paw paw	2 (x 50 trees)					3	2	1.5	1.5	G
White oak	80					35	8	18	17	D
Bradford pear	20					22	2	7	8	P
Rose of Sharon	5	5	10	8	9	3	0.5	2	3	P
	10									
Tree of heaven	30					20	1	10	10	F

List all of the trees present in your plot and the DBH of every stem of the tree and the height, the height to crown, the crown width 1 and crown width 2, and the condition of the tree. Trees are anything over 1.5 m and with less than 10 stems that are less than 2 cm DBH. (Remember, if you encounter a cluster of 10 stems or greater that are less than 2 cm DBH, it is considered a shrub.) Take a DBH (in cm) of every stem on an individual tree at 1.5 m high. Every individual tree in the plot should be listed in a new row, even if there are multiple individuals of the same species. If an individual tree has many stems, circle them on the datasheet. The height is the total height of tree rounded to the nearest 1 meter up to 15 m, then 5 m increments thereafter (e.g. trees 16-20m would be recorded as 20m, trees 21-25m recorded as 25m, etc.). Height to crown is the height to the lowest vegetation of the crown (not the height of the lowest branch). The crown of a tree is defined as the mass of branches and foliage that grow outward from the trunk of a tree. For the crown width measurements, measure the width of the widest part of the crown, and then the perpendicular width. The condition of the tree is determined using the following guidelines: G = good (very little to no dead wood; <10%), F = Fair (some dead wood;

10-25%), P = Poor (lots of dead wood; 25-50%), D = Dead (>50% dead wood). The diagram below illustrates each condition.



During the course of your sampling, write down any notes that you think are important to understanding how this veg plot was surveyed. If something hindered your ability to measure trees, write why.

After you have finished the first plot at the site center, consult the [random plot generator sheet](#) to select two additional plots.

- Use the next available row on the sheet (do not choose rows at random, go in the order they are presented on the sheet)
- The degrees value provides the compass bearing from the site center to the center of the next plot (the direction you will walk)
- The distance value provides the distance, in meters, between these two points.
- Technicians use a compass and measuring tape (or GPS) to travel to the location specified by the degrees-distance set.
- This new point will be the center of the next plot.
- Do not reuse degrees-distance sets.
- If the location of the sample is inaccessible (e.g., it is inside the house), or overlaps with one of the other plots, move to the next available degrees-distance set and repeat until the sampling location is accessible

Repeat the protocol above for the two additional plots (three plots total, including the plot at the site center). In the end you will have completed three vegetation sampling datasheets.

Identification down to the species level is very important when doing a habitat analysis, so take all possible steps to identify any unknown trees or shrubs. Write down as much information as you can in the field and then return to the research base for precise identification. For example, if you know a species is an oak but more precise identification isn't possible, write down "oak spp." If you are unable to identify a tree or shrub in the field, use these resources:

- Ask the participant: Many participants know the species in their yard well. If they are present, ask them what the identity of the plant is.
- Use dichotomous keys: The two dichotomous keys linked above are good resources for identifying unknown trees or shrubs.
- Use field guides: You may find it helpful to carry a field guide with you on your visits. Use one local to your region.
- Take pictures: You can always take a picture of a leaf or trunk and bring it back to the research station to identify. Be sure you have a way of determining which picture is which tree on your datasheet.
- Take samples: Alternatively, you may choose to take a leaf sample back to the research station to identify.
- Visit Nurseries: A stroll through a local nursery or garden section of a Home Depot or Lowes can offer plant identification help.

Visit wrap-up

At the end of each visit you should always thank the participant for their participation and the use of their yard. Encourage them to continue to contribute to the project by submitting resight and nest monitoring data throughout the rest of the year. To encourage data submission, it may be helpful to go over the data entry process with them to ensure that they understand it fully. Fill out a summary of [banded birds sheet](#) to assist them in their resighting efforts. Even if you did not locate a nest during the visit, leave them a nest monitoring datasheet. In this time encourage participants to ask any remaining questions they may have about the program.

Back at the research base

Enter all of your data taken for the day **on the day** of the visit! This reduces data entry errors and ensures that you will not get behind on data entry. Restock any supplies you used in the course of your visit such as color bands and blank datasheets. Keep an eye on your aluminum band inventory for each band size. If you are running low, ask your regional manager for more **before** you run out. If you do run out of the correct aluminum band size, you must release birds of that band size without banding or sampling. **Color bands are not to be applied and blood and feather samples are not to be taken without first applying the aluminum band.** Collect all dirty bags you have accumulated and turn them dirty side out. Shake out all of the feathers and poop stuck on the bag. Place them in a mesh lingerie bag to wash and dry them (this prevents the drawstrings from tangling). You do not need to do laundry every day, but be sure you are doing it frequently enough that you have an adequate number of clean, dry bird bags for each visit.

Appendices

Appendix A: Equipment checklists

Document checklist

Item	Quantity
Map of site with 200 m circle	2
Site report	2 (1 for resighting, 1 for participant)
Visit datasheet (banding sheet printed on front, resighting sheet printed on back)	5
Visit datasheet , rite-in-rain paper	5
Extra banding datasheet	5
Color band sheets	at least 1 per species (replace when filled up)
Point count datasheet	5
Vegetation sampling datasheet	10
Vegetation sampling, rite-in-rain	10
Vegetation random site selection sheet	1
Nest datasheet (for participant)	5
Banding visit record sheet (fill out for participant before you leave)	5
Photo release forms (obtain signatures of participants if you plan to take pictures)	5
Informational sheets for participant (provide to participants upon request), including: <ul style="list-style-type: none"> • Nest datasheet • Habitat checklist • Focal species descriptions 	5 of each

Note: Items in blue are downloadable hyperlinks. Please download to your computer and store in an accessible location.

Banding kit checklist

Item	Quantity
Banding pliers	2 (one large, one small)
Band spreaders	1
Wing ruler	1
Scale	1
Color band cauterizer	1
Pencils	At least 2
Aluminum bands, all sizes (0, 1B, 1A, 2)	1 string per size
Color bands, all sizes, all colors (0, 1B, 1A, 2), (R, O, Y, G, B, M, P, W, K)	For each visit, at least 5 of each color, in each size should be available in your kit
Color band spoons, 2 sizes	3 per size
Feather envelopes	1 stack (at least 20)
Pyle guide	1
Pedialyte	1 bottle
GPS unit	1
Binoculars	1 per technician
FoxPro speaker and remote	1
Backup batteries (for FoxPro, GPS unit, and scale)	At least 6 (type of battery dependent on equipment)
Portable banding table	1
Sharpie	1
Scissors	1
Mesh bag for bird bag storage and cleaning	1
Bird bags	At least 15

Netting kit checklist

Item	Quantity
12 m nets	3
6 m nets	3
Poles	4 sets
Rubber mallet (the heavier the better)	1 per technician
Blasting cap	1 per technician
Stakes and strings	10 sets

Bleeding kit checklist

Item	Quantity
Heparinized capillary tubes	1 container
27 X 1/2 gauge disposable needles	10
Cotton balls	1 bag
Rubbing alcohol	1 bottle
Buffer filled vials in cryobox	At least 20
Mini-aspirator bulb	1
Styptic powder	1 vial
Sharps container	1
Ice packs	2-3
Cooler	1

Veg sampling kit checklist

Item	Quantity
Measuring tape	2
Diameter measuring tape	1
Compass	1
Flagging tape	1 roll
Pin flags	4
Clinometer	1

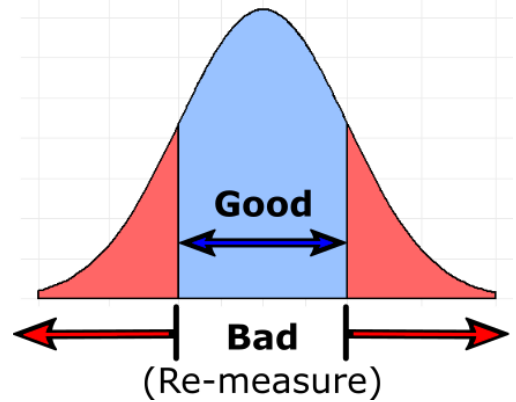
Appendix B: Nestwatch target species

Species	Region(s)	Species code	Band Size
American Robin	CO, DC, GA, MA, NC, PA	AMRO	2
Black-capped Chickadee	PA, MA, CO	BCCH	0
Brown Thrasher	FL, GA	BRTH	2
Carolina Chickadee	FL, GA, NC, DC, PA	CARW	0
Carolina Wren	DC, GA, FL, MA, NC, PA	CARW	1B
Eastern Phoebe	MA	EAPH	0
Gray Catbird	CO, DC, GA, MA, NC, PA	GRCA	1A
House Wren	CO, DC, GA, MA, NC, PA	HOWR	0
Northern Cardinal	DC, GA, FL, MA, NC, PA	NOCA	1A
Northern Mockingbird	DC, GA, FL, MA, NC, PA	NOMO	2
Song Sparrow	CO, DC, GA, MA, NC, PA	SOSP	1B
Spotted Towhee	CO	SPTO	1A, 2
Tufted Titmouse	FL, GA	TUTI	1B

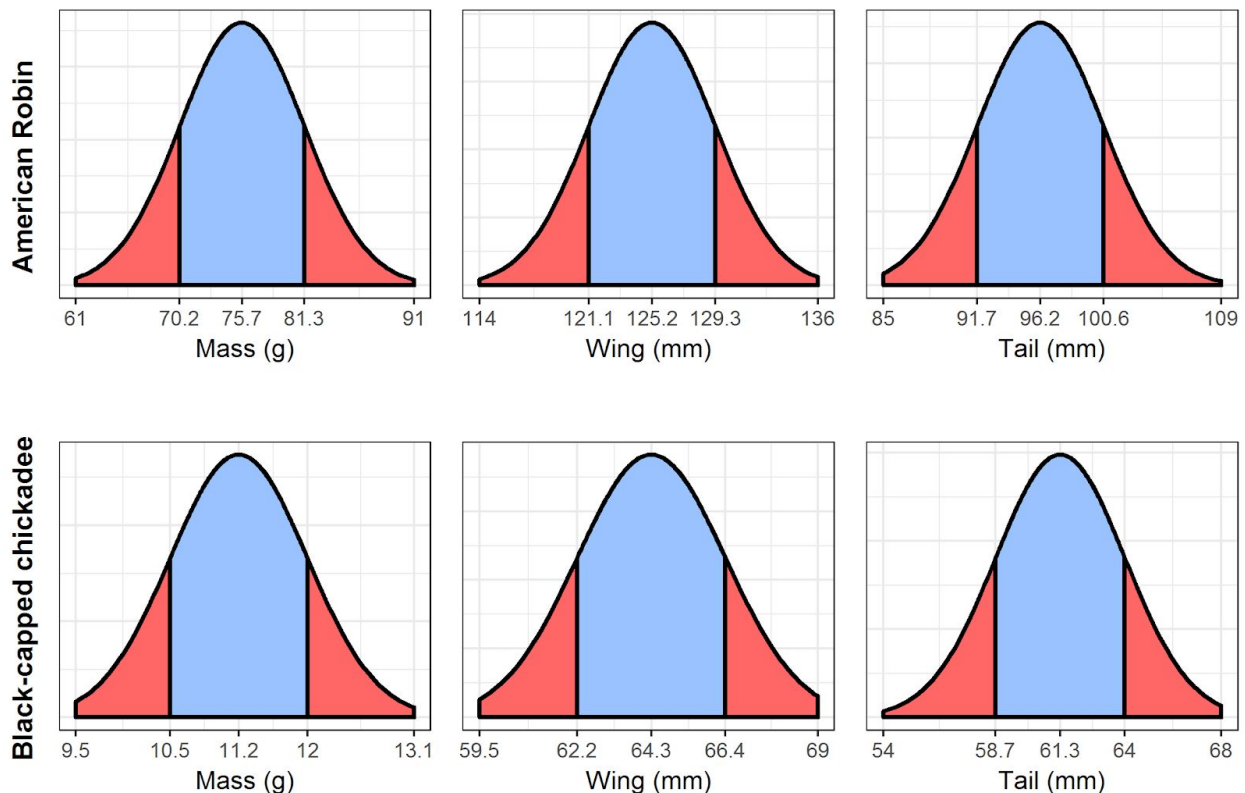
Appendix C: Distribution plots of bird measurements

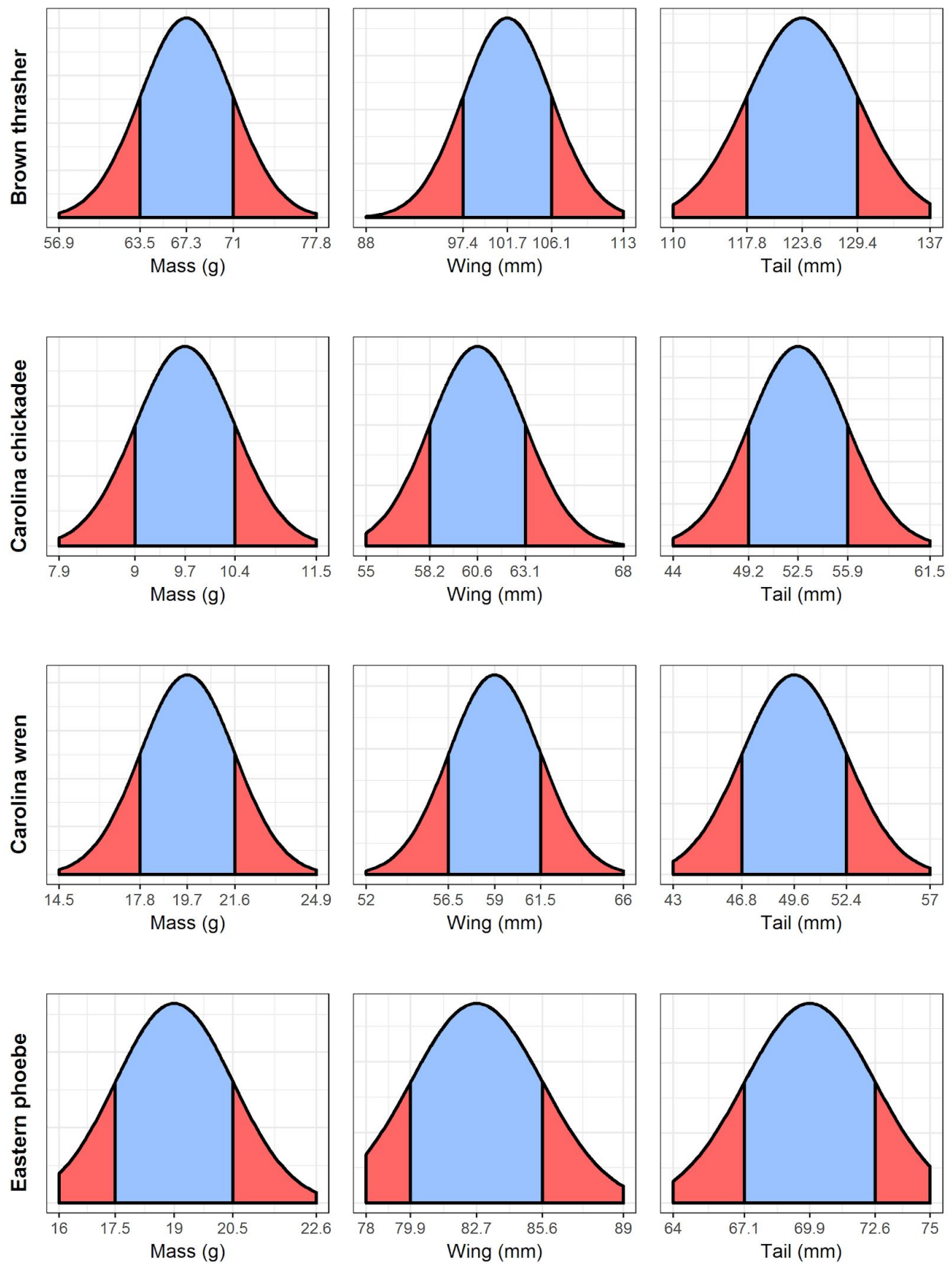
This document contains the distribution of mass, wing, and tail measurements for the Neighborhood Nestwatch (NN) focal species. These data are also available at [this link](#). The intent of this document is to provide a mechanism for field technicians to double-check whether the measurements that they obtain are valid. The plotted distributions are based on measurements taken at NN sites. Use this document to compare your measurement with the observed distribution. The x axis is labeled with:

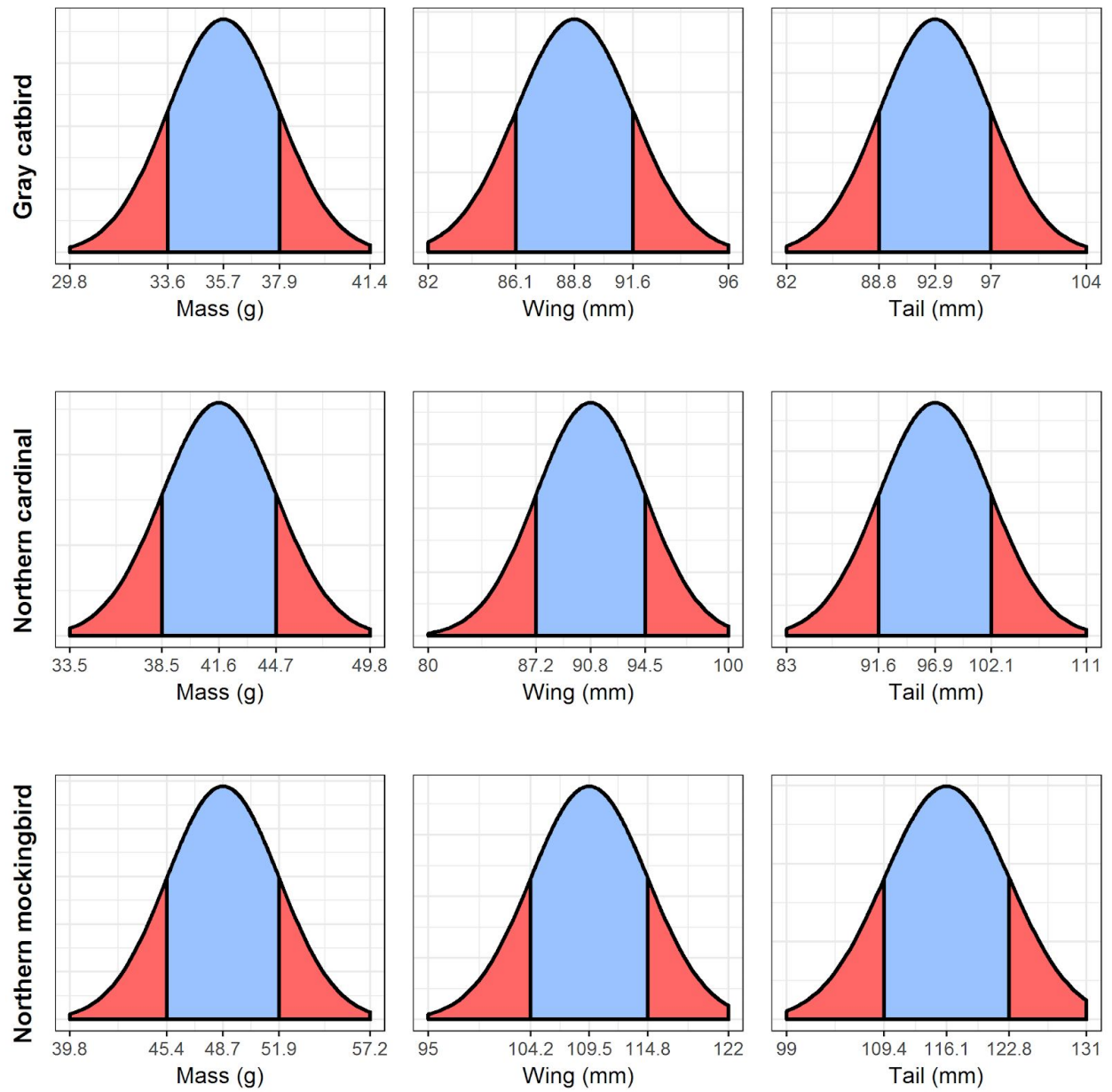
- The mean
- The mean plus and minus 1 standard deviation
- The minimum and maximum values beyond which the measurement is considered an outlier

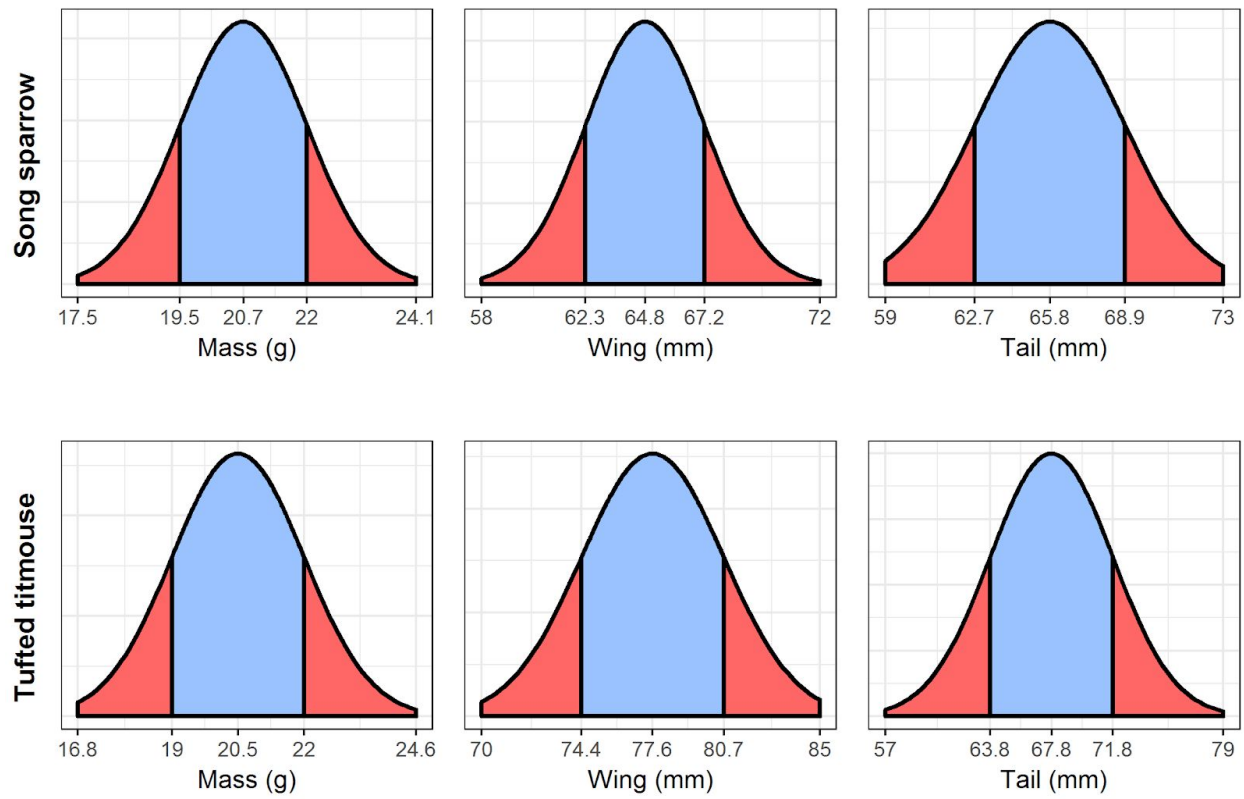


If your measurement is within the blue region, it is within the acceptable range. If your measurement is outside of the blue region, please take the measurement again.









Appendix D: Bird banding resources

[Bird Banding code of ethics](#)

[Photographic guidelines](#)

[Piranga: A bird-bander's aid to identifying, ageing and sexing birds of the Western hemisphere](#)

[Guidelines to the Use of Wild Bird in Research \(2010\)](#)

[The North American Banders Study Guide \(2001\)](#)

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