



Ontario Great Gray and Boreal Owl Survey

INSTRUCTION MANUAL

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The Ontario Breeding Bird Atlas is a partnership project of:



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Environment and
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Environnement et
Changement climatique Canada



Thank you very much to the [Ontario Breeding Bird Atlas Supporters](#)

Ontario Great Gray Owl and Boreal Owl Survey: Quick guide.

Skill Level:	Minimum ability to identify Great Gray Owl and Boreal Owl calls and a few similar sounding nocturnal species sometimes heard at night.
Timing:	Between 1 April – 30 April. Start later than 30-min after sunset and end before 30-min before sunrise.
Duration:	Requires 2-3 hours to complete (10 survey stations at 4.5 minutes each, plus travel between).
Location:	Predominantly in northern Ontario, north of approximately 47 degrees latitude (Atlas regions 29, 34, 36-44).
<i>Atlas Square:</i>	Contact the Regional Coordinator for assignment to an available square.
<i>Survey stations:</i>	Use numbered Atlas point count stations - the 10 lowest numbered stations with suitable habitat.
Considerations:	
<i>Weather:</i>	Survey on calm nights with good visibility and little precipitation. Winds should be < 19 km/h (Beaufort 1-3) and temperatures > -15 degrees C.
<i>Equipment:</i>	A device capable of playing digital audio files in MP3 format (e.g. smartphone, or MP3 player) and amplifying sound (e.g. external speaker) are required. See detailed protocol for additional information.

A safety kit and wearing a high visibility safety vest is highly recommended.

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Introduction

Thank you for your interest in the Great Gray and Boreal Owl Survey. Your contribution will aid in the understanding of Great Gray and Boreal Owls in Ontario.

The Great Gray and Boreal Owl Survey is an excellent opportunity for everyone - from new to experienced birders. While you do need good hearing, the required bird identification skill level is considered easy to intermediate. Participants need to know or learn the calls of Great Gray Owl, Boreal Owl, Great Horned Owl, and other owls that may be encountered in northern Ontario (Long-eared Owl, Northern Saw-whet Owl, Barred Owl, and Northern Hawk Owl). Participants may find the species identification of owls easier if they also become familiar with a few similar sounding nocturnal species sometimes heard at night, such as Mourning Dove, American Woodcock, Ruffed Grouse and Wilson's Snipe. **Wilson's Snipe winnows (sound made from flight displays) can be readily miss-identified as Boreal Owl calls, but Wilson's Snipe winnows tend to increase and decrease in frequency, Boreal Owl calls are consistent in frequency (i.e. tone stays the same) and Boreal Owls usually call at regular intervals.** Other nocturnal species such as red fox, coyote, chorus frog and spring peeper can also sometimes be confused with owl calls.

The Great Gray and Boreal Owl Survey is being undertaken as part of a larger project, the Ontario Breeding Bird Atlas-3 and will be ongoing from 2021 through 2025. For more information on the Atlas, see www.birdsontario.org.

The Ontario Great Gray and Boreal Owl Survey complements, but is not the same as, the Ontario Owl Survey coordinated by Birds Canada. The Ontario Owl Survey is a provincial program designed for the long-term monitoring of Owl populations within the Ontario Ministry of Natural Resources and Forestry (OMNRF) Area of the Undertaking (see www.birdscanada.org/ON_Owls). This program, and its existing routes, will continue to be surveyed during the period of the Ontario Breeding Bird Atlas-3, from 2021 through 2025. If you are interested in surveying owls during the Atlas, please visit the owl route map available at www.birdscanada.org/on_owls to see if there is an available route in your area. If a route is assigned to you, please follow all of the protocols outlined in the Ontario Owl Survey. If there are no Ontario Owl Survey routes available in your region and you still wish to survey owls, then please contact an Ontario Breeding Bird Atlas Regional Coordinator to locate the nearest Atlas survey square that is available for owl surveys. Once a square has been assigned to you, then please follow the appropriate Ontario Atlas-3 Owl protocol to complete your surveys.

Owls represent a special challenge to monitor because they are difficult to survey. They breed early in the year, are secretive, primarily nocturnal and roost in concealed locations during the day. As a result, special surveys are required to better document the distribution and abundance of most of Ontario's owls. For Atlas-3, we have developed the following five protocols: Eastern Screech-Owl; Barred and Northern Saw-whet Owl; Great Gray and Boreal Owl; Long-eared Owl; and Northern Hawk Owl. Figure 1 shows the part of the province where each survey should take place.

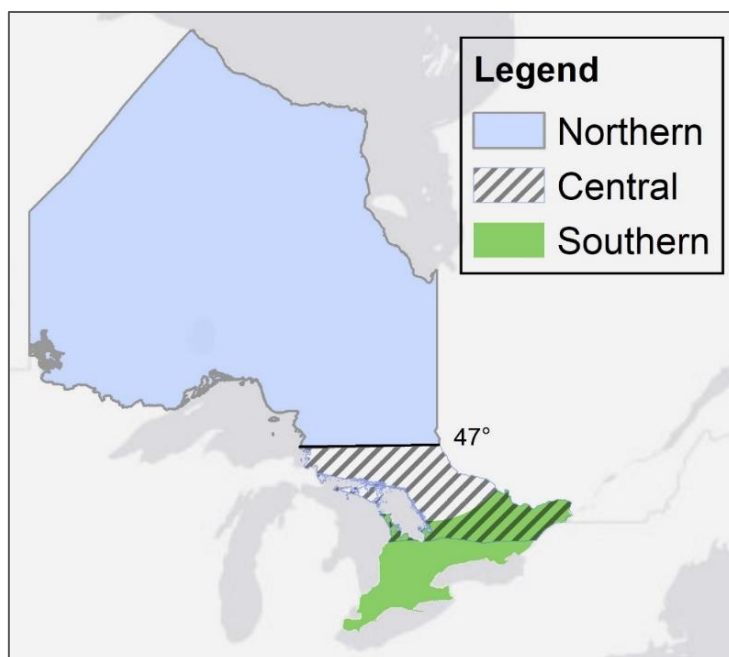


Figure 1. The Great Gray Owl-Boreal Owl survey and the Northern Hawk Owl survey should be run in the “Northern” section; the Barred Owl and Northern Saw-whet Owl survey should be run in the “Central” section; and the Eastern Screech-Owl survey should be run in the “Southern” section. The Long-eared Owl survey can be run in any section.

Most of these surveys involve using playback. Playback of recorded songs is a useful technique for surveying many owl species. Due to their territorial behaviour, songs broadcast within an owl's territory may elicit a vocal or visual response by the resident owl in an attempt to defend its territory against an intruder. The higher response rate elicited by playback will enhance our ability to detect owls and will increase our knowledge of the distribution, status and conservation needs of these mysterious creatures of the night.

The Great Horned Owl (GHOW) occurs throughout Ontario, and although we encourage atlassers to seek them out they are not included on this broadcast. They do not consistently respond to playback of their calls, and use a wide variety of habitat types, so they aren't well suited to a focused survey. Nevertheless, they call at night and could be heard during any of the Atlas's standard owl surveys. We will use the GHOW data collected in this manner, together with data from regular nocturnal owling for the atlas, and any other GHOW data provided (they can be seen quite readily on nests before the leaves emerge, for example) to map GHOW relative abundance.

Draft results from the Great Gray and Boreal Owl Survey, and the other owl surveys, will be posted on the Atlas project website. Maps of Great Gray Owl and Boreal Owl relative abundance and breeding distribution will be created based on the survey results and other atlas data and used in the final atlas website and/or book.

Thank you for contributing to the survey!

Ontario Great Gray (GGOW) and Boreal Owl (BOOW) Survey Guidelines

Preparing for your survey

Training

The survey playback is in a downloadable MP3 file called **Northern Owl Survey Broadcast** file at: [here](#). It contains calls of a Boreal Owl and a Great Gray Owl interspersed with periods of silence. This is the same broadcast used for the Northern Ontario Owl Survey (called northern broadcast), which is being used to maintain consistency across programs. See Playback protocol ([below](#)) for complete information on the playback file's contents. Please ensure that you use only this standard MP3 file and that you play it in its entirety. If you are unable to retrieve it contact the Atlas office for support.

Note - owl broadcast files always start with silence, this allows all North American Owl surveys to be compared.

Before surveying, familiarize yourself with the calls of the Great Gray Owl (see training MP3 files at [here](#), and see [Appendix A](#)), the Boreal Owl, Great Horned Owl, and other owl species that can be found in northern Ontario (Long-eared Owl, Barred Owl, Northern Saw-whet Owl, Northern Hawk Owl) as well as other similar sounding species including birds such as American Woodcock, Mourning Dove, Ruffed Grouse, Wilson's Snipe, a few frogs (Spring Peeper, Woodfrog, Chorus Frog, Gray Treefrog) and mammals (Red Fox and Coyote). These bird sounds are also available on [Dendroica](#) and [Xeno-canto](#), and phone apps such as Merlin. **Wilson's Snipe winnowing (sound from a flight display) is commonly confused with the Boreal Owl call, so it's important to learn both in order to tell them apart.**

Equipment

Make sure you have all the required equipment before heading out. Note that although an app for running owl surveys is under consideration, it will not be ready for the 2021 owl survey season.

- This manual, either in hard copy or on your phone
- A map of the 10-km square you are to survey showing the survey stations. Either a hard copy map, or the map on the Atlas app.
- The GGOW and BOOW survey data form
- Time-keeping device (watch or phone)
- Flashlight or headlamp
- Clipboard
- Compass
- Portable MP3 player, boom box, or smartphone and amplified speaker. Note that amplified speakers have their own power source. Contact your Atlas Regional Coordinators if you need to borrow a broadcast speaker for Atlas owl surveys.
- The MP3 file "Northern Ontario Owl broadcast file"
- Road map or GPS
- Spare batteries and/or power bank with charging cord
- Pen or pencil (and spares)

- A towel to place under the player and speaker

Survey area

For the purpose of the Ontario Breeding Bird Atlas-3 Great Gray Owl and Boreal Owl surveys should be conducted north of 47 degrees latitude (the “Northern” section of Figure 1; also see Figure 2 for maps of these species from the 2nd Ontario Breeding Bird Atlas).

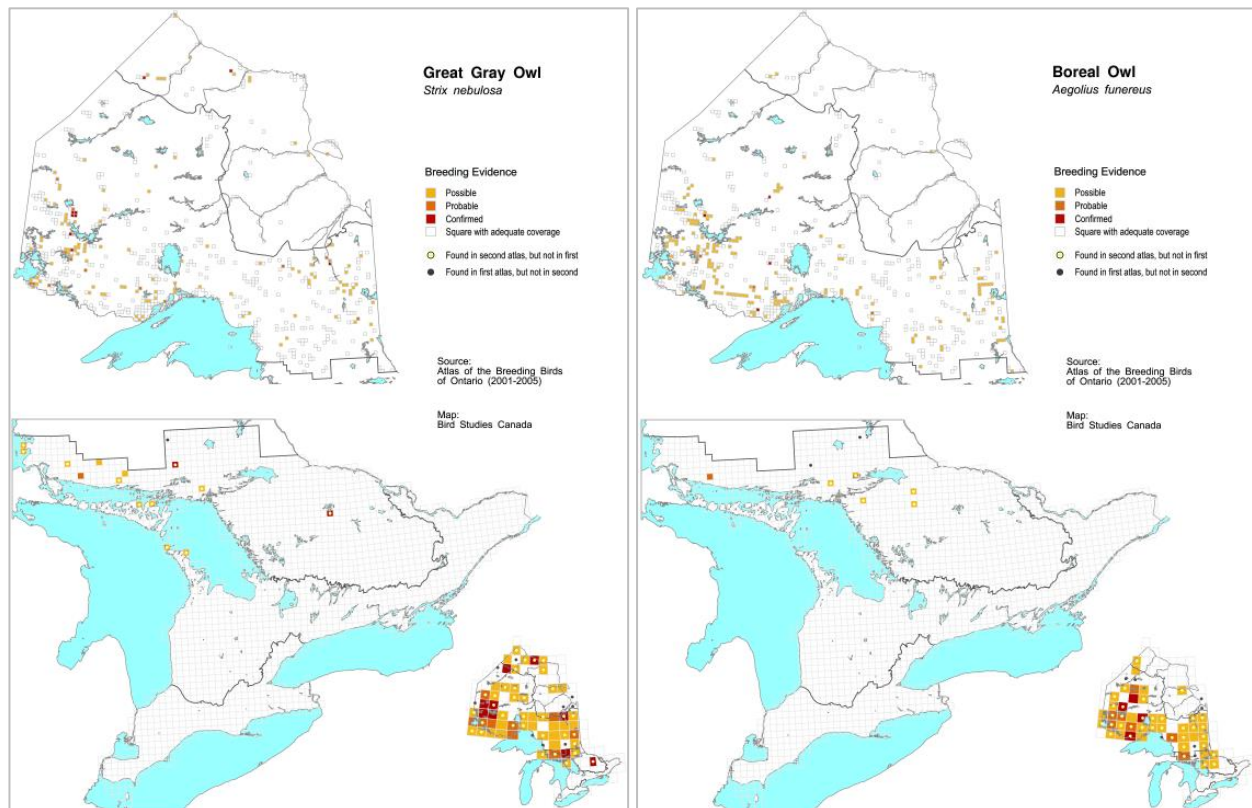


Figure 2. The Great Gray Owl (left) and Boreal Owl (right) survey should be run north of approximately 47 degrees latitude. These maps are from Atlas-2 and show the breeding evidence for each species by 10-km square.

Which squares to cover?

We would like GGOW and BOOW surveys to be undertaken in as many of the 10-km squares in the Northern section (Figure 1), as possible. For the first two years of the project (2021-2022), we will not be targeting specific 10-km squares - surveys can be run in any square. After that, we will assess coverage needs and start to pick specific squares to fill in gaps in coverage. A map of 10-km squares is available at [here](#).

We encourage you to do as many squares as you like. Please inform your [Regional Coordinator](#) of which square(s) you plan to cover to avoid duplicating effort with other participants or the long-term Ontario Owl Survey. Or ask your Regional Coordinator if there are squares needing to be surveyed.

Planning your survey

Survey timing

You should complete your survey between April 1st and April 30th.

Time of day

We recommend that surveys begin about one half hour after sunset, but they can be run anytime between a half hour after sunset and a half hour before sunrise.

Weather conditions

Weather has a great influence on our ability to hear owls; calm conditions are best. Wind and precipitation critically reduce owl calling and impact your ability to hear. Surveys should be conducted on nights with wind less than 19 km/hr (i.e., 3 or less on the Beaufort Scale, which is enough to constantly move twigs and to extend a small flag). Extremely cold temperatures can also decrease owl calling. Surveys should be run on nights that are calm and not too cold (warmer than -15°C). There is little point in attempting or continuing a survey if the wind exceeds force 3 or if there is persistent snow or rain. If you have started a survey and the weather conditions worsen to a point where they are unsuitable, simply stop the survey and finish it another night.

Time required

It takes approximately 2-3 hours to run the full 10-station survey. Ideally, survey all your stations on the same night. If you are unable to complete the survey on a single night (e.g., due to bad weather conditions), simply complete the remaining stations (to make a total of 10 stations surveyed) on another night and use a separate data form to record your results.

Completing your survey

Locating designated survey stations

There are 40 randomly selected, designated roadside survey stations within each square. These are marked on the map of each 10-km square, and their UTM Coordinates are shown on the right side of the map. Maps of each 10-km square as well as survey station coordinates are available [here](#) and on the NatureCounts app. Point Count stations can also be downloaded from the Atlas website: Coming Soon). See [Appendix B](#) for information on how to navigate to the point count stations.

To select stations for your surveys, start with designated survey station number 1 and check each designated station on the map sequentially (1, then 2, then 3, etc.), until you have selected the first 10 designated stations that have suitable habitat for GGOW or BOOW. See [below](#) for a definition of suitable habitat for GGOW and BOOW. Ensure that all survey stations are at least 1.6 km apart. It can be helpful to line up a few extra “backup” designated stations in case you need to switch stations during the survey, e.g., if a station is inaccessible due to current road conditions.

We recommend that you go into the field during daylight hours to locate each station and to assess habitat suitability. This makes it easier to find the stations when you go back after dark.

If you arrive at a station and realize that it is not suitable, you should reject this station and find a new one among the designated stations, using the same rules as above (first check number 11, then 12, etc.). The 10 stations can be surveyed in the most convenient order (not necessarily sequentially 1-10). If you cannot find 10 suitable survey stations in your square using the rules above, contact the Atlas Office (atlas@birdsonario.org).

Once you arrive at the designated station do the survey as close as possible to designated coordinates. For more information on reading Latitude and Longitude from GPS units or a smart phone see [Appendix B](#).

“No owls” is very important data! Please follow the protocol, run the full playback broadcast file and complete the requested app data or data form for each station, whether or not you actually detect owls.

Determining “suitable” stations

Suitable stations are those that are:

- physically accessible at the time of year of the survey
- legally accessible (no trespassing)
- near a safe parking spot
- in a quiet location with little traffic
- not directly in front of a house
- designated stations should be within 100 m of suitable habitat
- more than 1.6 km from any other Great Gray and Boreal Owl survey station

Suitable GGOW and BOOW habitat

Familiarize yourself with the species range and habitat of GGOW and BOOW as they are the main targets of this survey.

Great Gray Owl: Permanent resident in boreal forests across Eurasia and North America. In Ontario, its breeding range is primarily constrained between the 47th parallel and the northern edge of the tree line. Great Gray Owls are found in coniferous forests and will hunt in meadows, bogs and other open areas with a few scattered trees.

Boreal Owl: Permanent resident in boreal forests across Eurasia and North America. In Ontario, its breeding range is primarily constrained between the 47th parallel and the northern edge of the tree line. Boreal owls are found mainly in areas of extensive mature coniferous forest intermixed with small openings and patches of younger forest. In the winter, they forage in spruce-fir forests where uncrusted snow under the trees facilitates access to prey. In spring, they often forage in clearcuts and agricultural fields where small mammals are easier to locate.

Playback protocol

See [Appendix C](#) for information for specifications about broadcast units suitable for the survey.

Use the Northern Ontario Owl Broadcast playback MP3 file ([here](#)) to perform your surveys. The playback is 4.5 minutes long. At each station, put the portable player on the roof of your vehicle, push the play button and move at least 20 metres away from your vehicle. This will reduce noise interference from the engine as it cools and will enable you to hear the owls.

The entire recording is 4.5 minutes long. It begins with a double-beep to indicate the start of the first silent listening period lasting one minute. Another double-beep marks the end of the

first silent listening minute. This is followed by a second silent listening period lasting one minute. Then, the Boreal Owl broadcast will begin (20 seconds long), followed by another one minute silent listening period. Next, the Great Gray Owl broadcast will play for 20 seconds and is followed by a one minute listening period. A double-beep marks the end of the playback file.

Data collection

We recommend doing all 10 stations in one evening, but the 10 stations can be done over more than one evening should that be necessary or more convenient. Fill in a data sheet even if you recorded no owl species. Negative data are as important as owl detections – they help us gain insight into the relative abundance and distribution of owls across the province. See [Appendix E](#) for how to complete the data form.

Safety issues

See [Appendix D](#). Please have fun but make sure you are safe. Carry a cell-phone and have a friend accompany you on owling outings. They provide a safety factor, and can help with the survey – juggling the playback machine, map, GPS, flashlight and data forms can be challenging for one person. It's a good idea to let someone know where you plan to be travelling, and when you expect to return. Double-check the survey in advance and during daylight to ensure the roads are accessible at the time of your survey. Dress warmly and wear highly visible clothing, a safety vest is recommended. *Please be careful when standing on roadsides at night and while driving on wintery roads.* Be careful to ensure your car is pulled completely off the road and, on snowy roads, be careful when pulling off the road as it is easy to slide one or two wheels into the ditch. Carry a shovel just in case. Do not overuse your electric system in your car. Experienced owl surveyors will tell you that your modern car's alternator cannot keep up with the energy needed to charge equipment AND use your GPS AND heat seats AND heat the car AND keep the lights on AND start your engine.

Be sure to test your playback equipment before heading into the field. Play the playback at the maximum volume that does not cause distortion. If possible, test the equipment on a still night and indicate on your data form how far away you can hear the call. To do this, set up a speaker and play the recording on a straight, reasonably flat road and stop at 100 m intervals to listen.

Call broadcasts are effective in locating and studying owls but should not be used indiscriminately. Responding birds may continue to vocalize for some time after the playback ends, and therefore may be more easily located by predators. In addition, frequent and persistent playbacks may affect the normal activities of the owl. Enjoy the experience but please keep disturbance to a minimum. Remember that the health and welfare of each bird is our utmost priority.

Once you have surveyed the 10 stations and entered the data (see below), you have completed the minimum requirement for the survey in that square. Congratulations, and thank you!

If you were not able to complete all 10 stations, please try to complete the remaining stops on another night. Simply fill out a second data form and submit both forms. If you are not able to complete the remaining stops on another night, please send in the results for the stops you were able to complete. This information will still be usable in the final analysis.

If you completed 10 stations and would like to do additional surveys, please select another square to survey. It's best to check with your Regional Coordinator to find a square needing coverage and avoid duplicating effort.

Entering GGOW and BOOW survey data

In the future, you may be able to enter the data for your survey via an GGOW and BOOW app while in the field. This option is not available for 2021. Please print off and complete the hard copy data form in the field, and then enter the data via the Atlas website.

Completing the Owl Survey Data Form

Use dark pencil or pen. You will be entering your data on the Atlas website, so make sure the form is legible. See the sample completed form in [Appendix E](#).

Missed fields - Don't miss fields on the forms as missing information may cause a data entry error that prevents you from submitting your data.

Square ID: fill in the 7 digit number, e.g., 17TNU61

Name: Fill in your full name.

Date: Record the year, month and day of your survey. If you have done the survey on more than one night, use a new data form for each night.

Maximum Distance at which playback can be heard. This information is optional, but useful for data analysis. It can help ensure that future surveys set their equipment to about the same volume level, which will increase standardization. Record if you can hear your broadcast at 100 m, 250 m or 500m. In the example on page 18, the broadcast could be heard at a distance of < 200 m.

Comments: Fill in any pertinent information about that night's survey.

Station # (Point Count #): Fill in the number of the point count station where you did your survey.

Time: Record the time you start the survey at that station. Use the 24-hour clock: 7:30 p.m. is 19:30.

Survey Data: Each line in this table is used to record data on each individual owl reported at each survey station, i.e., one line for every bird. In the example provided, at this example station (#1), two owls were heard: one Boreal Owl and a Great Horned Owl, and each is recorded on a separate line.

If no birds are heard at a station, record the Time, "# cars" and Noise, and leave the other columns blank. Write in the comments "no owls heard".

Species Codes:

GGOW – Great Gray Owl

BOOW – Boreal Owl

GHOW – Great Horned Owl

If you come across other owl species, you should also record them on your data form. Some other owls that you might come across while doing your surveys are:

BDOW – Barred Owl (Note: BDOW is used to separate it from Barn Owl, BNOW)

LEOW – Long-eared Owl

NSWO – Northern Saw-whet Owl

NHOW – Northern Hawk Owl

SEOW – Short-eared Owl

Recording Observations: Observations are to be recorded in one-minute intervals during the broadcast. Use a separate line for each individual owl. Put an “X” in the appropriate box to indicate each one minute period during which the bird was heard or seen:

- The first or second minute of the listening period (columns headed “Silent listening 1st Min” and “Silent listening 2nd Min”); or,
- During BOOW broadcast period or the following minute of silence. Put the X in the column ‘After BOOW’.
- During GGOW broadcast period or the following minute of silence. Put the X in the column ‘After GGOW’.
- If an owl is heard during every listening period, place an “X” in every column.

In the example, the BOOW was heard during the first minute of the two minute silent listening period. The GHOW was heard during the 4th minute of playback.

Direction: Record the one- or two-letter code to indicate the **direction** at which the bird was first heard or seen. Direction: N – North; NE – North-east; E – East; SE – South-east; S – South; SW – South-west; W – West; NW – North-west. In the example, the BOOW was North-east of the survey station while the GHOW was West.

Distance: Put an “X” in the appropriate box to indicate the distance category in which the bird was first heard (<200 m, 200-500 m, 500-1000 m or 1000+ m). In the example, the BOOW was less than 200 m away and the GHOW was 500-1000 m away.

Traffic count (# cars): Record the number of vehicles that passed by that station during the survey period. In the example, 2 cars passed the survey station during the survey.

Noise: Record number 1 to 4 based on the following scale:

1. None or slight: relatively quiet, little interference.
2. Moderate: some interference with broadcast and/or listening.
3. High: substantial interference with broadcast and/or listening.
4. Excessive noise: extreme interference with broadcast or listening.

If there is excessive noise or too much traffic at one station to survey properly, we recommend stopping the survey, erasing any data that you may have recorded from that station, and selecting a different station using the procedure described on page 8-9.

In the example, the noise level was level one during the survey.

Remarks: Record comments such as what caused the noise, whether or not you saw the owl, probable breeding evidence (such as duetting), or what type of call was made by the owl.

Evidence of breeding: Enter the highest (furthest down the list) 1- or 2-letter breeding code that best describes the situation. The full set of Atlas breeding codes and definitions are provided [here](#). The most likely codes during an owl survey are:

Code Definition

- | | |
|---|--|
| H | Species observed in its breeding season in suitable nesting habitat. |
| S | Singing male(s) present, or breeding calls heard, in suitable nesting habitat in breeding season. In addition to owl calls this would include peenting American Woodcock Males, drumming Ruffed Grouse or winnowing Wilson's Snipe. |
| M | At least 7 individuals singing or producing other sounds associated with breeding (e.g., calls or drumming), heard during the same visit to a single square and in suitable nesting habitat during the species' breeding season. This is only likely to occur towards the end of your 10-stop survey, and is less likely for GGOW and BOOW than some other owls, as they tend to occur at lower densities. |
| P | Pair observed in suitable nesting habitat in nesting season. |

Unknown owl species: If you hear an owl (or what seems to be an owl) but can't identify it, enter "UNKO" as the 4 letter species code and enter the rest of the data. In the comments section, please describe what you heard in as much detail as possible and we will try to ID it. If you can do so, please provide a recording of the vocalization taken in the field.

Submitting your data

Data are entered on the NatureCounts website [here](#). Please enter your data **within 2 weeks of completing your survey, or, at the latest by May 15th each year.** You can review and correct your data using the app or the Atlas website, you can correct the data as long as your region's data reviewer (your RC) has not finalized the submission.

You can print the GGOW and BOOW data form from the Owl Survey web page here: <https://www.birdsontario.org/owl-nightjar-surveys/>

If you have any questions, please email atlas@birdsontario.org.

Thanks very much for doing owl surveys. We hope you enjoy them!

Appendix A - MP3 Owl training resources

Owl training. The owl training MP3 files can be obtained using separate links for each MP3 file available [here](#). It includes recordings of other birds and common frogs you might hear while out owling. Included are: Great Gray Owl; Long-eared Owl; Great Horned Owl; Barred Owl; Northern Saw-whet Owl; Boreal Owl; Northern Hawk Owl; Short-eared Owl; Eastern Screech-Owl. Wilson's Snipe; American Woodcock; Ruffed Grouse; Mourning Dove; Wood Frog; Spring Peeper; and Chorus Frog. This is the same training recording used by the Ontario Owl Survey.

Appendix B – Navigating to survey stations

The Universal Transverse Mercator (UTM) grid system is the location system used for the Ontario Great Gray and Boreal Owl Survey and Ontario Atlas-3.

Finding stations using the 10-km square map

The locations of the numbered Atlas Point Count Station are shown on the Atlas 10-km square map, and the UTM coordinates of each are listed on the right side of the map. You can use a hard copy printed map to navigate to the station. Use the UTM on a GPS or other device (see below) to find the precise coordinates of the station and run the survey as close as possible to the designated coordinates.

Finding stations using downloaded Point Count locations

Coming soon when Atlas-3 point count locations are available for download.

Finding stations using the NatureCounts app

Coming soon when Atlas-3 point count locations are available on the NatureCounts app.

Using a GPS unit to determine UTM location

If you have a GPS unit, set the device to NAD83. Check all 6 digits of the Easting and all 7 digits of Northing. (If your GPS unit gives you 7 digits for Easting, ignore the initial “0”).

Using a Smart Phone

iPhone

On an iPhone you can use the built in Maps app or Compass app or you can download a mapping app such as Google Maps. iPhone defaults to latitude longitude so you will need to set your defaults to UTM.

Android Smart Phone

Unlike the iPhone, the Android system doesn’t have a default, built-in GPS coordinate utility to show you the information that the phone already has, so you have to find an Android app that can provide this functionality. See the google play store for available apps or review your options online. One good review is available at <https://www.androidauthority.com/best-gps-app-and-navigation-app-for-android-357870/>. Remember to set your default to UTM or you will need to convert your coordinates later.

Appendix C - Choosing a Bird Call Broadcast Unit

Below are recommendations/guidelines for selecting a bird call broadcast unit.

Broadcast device

Many devices will work including a smartphone, tablet, or some sort of mp3 player. When selecting your device consider the following:

- Battery life: your device should have large enough battery capacity to run for several hours to ensure it will last the entire survey. Keep in mind batteries will drain more quickly in the cold and when in constant use. If you can, bring spare batteries. Do not rely on charging it as you go or running it through your car – the small drain may drain your car's battery!
- Ease of use: make sure you're familiar with using the broadcast unit. If possible, turn off all other notifications so as to not interrupt playback once it begins. If using a phone, it helps to put it into "airplane mode" to prevent interruptions and conserve battery power.
- Lock system: it's helpful to use a device that can be locked so as to not accidentally interrupt the playback (for example, a pocket-dial).

Speaker

Volume: The most important consideration of the playback setup is to choose an amplified speaker that is loud enough. You must choose a device that you can clearly hear from at least 400 m away. We strongly encourage participants to test their speakers with the most quiet recording before the survey begins. If you cannot test the unit in the field, you can measure the volume output with a phone app or other device; it should produce sound of at least 90 decibels. You will also want to ensure that as you increase the volume on your unit that the quality of the calls is not distorted.

There are now many very good, portable (and rugged/waterproof) speakers that work well for owl surveys. Here are two options:

[JBL Clip 3 Portable Waterproof Wireless Bluetooth](#) speaker. Atlas Regional Coordinators will be provided with this speaker which they can loan out to atlasers:

[Pyle-Pro Pwma60ub 50-Watts](#) - this unit in combination with a USB drive replaces both the speaker and the broadcast device leaving your mobile device free for other purposes.

Appendix D - How to stay safe while conducting owl and crepuscular surveys

Surveyors, not just birds, are important! For nocturnal surveys in high traffic areas, in remote locations, or on narrow snowy roads, we cannot overemphasize how important it is to consider YOUR safety and that of other drivers. Please use these tips to help ensure you have a fun enjoyable and SAFE evening:

- Take a Friend, Tell another friend your survey plans and be sure to check in
- Bring a cell phone, know if you have service where you survey
- Keep your eyes on the road while driving – stop and pull over before you survey
- While driving only the passenger should handle tech (gps locations, texts, calls etc.)
- Is your car ready? Is it in good condition, do you have/need snow tires or chains, is your gas tank full, does your battery charge correctly.
- Check the roads IN DAYLIGHT to ensure they are safe to drive and that people can safely pass you when you stop. Consider snow, mud, ruts, bridges, washouts etc.
- Will others be able to see you? Check the forecast for road conditions and for visibility and avoid poor driving conditions
- Wear your reflective Safety Vest!
- Take a flashlight or headlamp and extra batteries
- If you don't like listening to your caution lights leave your headlights on but watch and ensure your alternator is charging your battery
- What else will drain your batteries? Your headlights, stereo system, cell phone, broadcast unit, seat warmers and starting the car every six minutes. You will need to choose what equipment you need and what you don't.
- If there is no snow, check for ticks and/or stay out of the tall grass
- Consider carrying the following particularly for more remote routes:
 - shovel, shovelling is far better than a long walk
 - bring your winter roadside emergency kit. If you aren't sure what goes in an emergency kit, check out [here](#) or [here](#);
 - a blanket or sleeping bag for every participant
 - bring your first aid kit, make sure you know where it is and that it is up to date
 - make sure you have a spare tire and a jack or a tire repair kit. Refresh your memory on how to use this equipment
 - and take more food and water than you think you need
- For further information on safety while atlassing [click here](#)

Taking little ones along? What a great idea! Take lots of fun snacks, bring ear protectors, dress them in light-reflective colours and ensure children remain off the road. As you will be looking up a lot (and not at your child) make sure there is another adult with you to specifically keep an eye on them. **If an owl calls - remember to take their ear protectors off so they can enjoy the moment as well. Above all else, remember that people are important too and if for any reason you are concerned for your safety or the safety of others, please stop your survey! There will always be another day and another year to collect data.**

Appendix E - Sample data form

Ontario Breeding Bird Atlas – 3 : Great Gray and Boreal Owl Data Form

Please ensure the data is submitted online at www.birdscanada.org/birdmon/onatlas

Square ID :	Atlasser Name:	Assistant Name:
Year : ____ Month : ____ Day : ____	Comments	
Broadcast Test : Please circle the furthest distance that you heard each call. Great Gray Owl call : 100m 250m 500m Boreal Owl call : 100m 250m 500m		

Species Codes

BDOW – Barred Owl BOOW – Boreal Owl EASO – Eastern Screech-Owl GGOW – Great Gray Owl GHOW – Great Horned Owl LEOW – Long-eared Owl
NSWO – Northern Saw-whet Owl SEOW – Short-eared Owl NHOW – Northern Hawk Owl AMWO – American Woodcock WISN – Wilson Snipe RUGR – Ruffed Grouse

Noise Codes: How does the ambient noise, natural (e.g. frogs) or man-made (e.g. traffic, power lines) noise impact your ability to survey.

- 1: None or slight, relatively quiet, little interference with broadcast and/or listening.
2: Moderate, some interference with broadcast and/or listening.
3: High, substantial interference with broadcast and/or listening.
4: Excessive noise, extreme interference with broadcast and/or listening.

Breeding Codes (from lowest to highest evidence):

H: Species observed in its breeding season in suitable nesting habitat;

S: Singing male(s) present, or breeding calls heard, in suitable nesting habitat in breeding season;

M: At least 7 individuals singing/producing other breeding sounds (e.g., calls or drumming), heard during the same visit;

P: Pair observed in suitable nesting habitat in nesting season.

			Recording observations. Mark "X" if heard, "S" if seen; "XS" if both					Direction and Distance (m) to <u>each owl when first heard</u>					Conditions and <u>Remarks</u>	
Stn # (i.e. Point Count #)	Time (24 hr)	<u>Species</u>	1 st Min	2 nd Min	<u>After BOOW</u>	<u>After GGOW</u>	<u>Breeding Code</u>	<u>Direction</u>	<200	200-500	500-1000	1000+	<u>Traffic Count (# cars)</u>	<u>Noise Level (1-4)</u>
<u>Example</u>														
7	22:12	BOOW	X	X	XS	X	S	NE	X				2	1
		GHOW				X	S	W			X		BOOW was close and calling frequently. GHOW was distant	

Other species (record any species that are uncommon or unusual to hear on diurnal point counts)

Stn #	Species	Total Count	Breeding Evidence	Stn #	Species	Total Count	Breeding Evidence	Stn #	Species	Total Count	Breeding Evidence
1	WISN	4	S	8	RUGR	1	S				
4	AMWO	8	M								
5	WISN	3	S								
5	AMWO	2	S								