

A large flock of crows is shown in flight against a clear blue sky. The birds are silhouetted and appear as numerous small, dark shapes scattered across the upper half of the image. The title text is overlaid on this image.

# WINTER CROW ROOST COUNTING GUIDE

## Methods for Counting Crows in a Winter Roost

The Winter Crow Roost in Lawrence, Essex County, Massachusetts, is an annual, natural phenomenon that attracts great local attention each year. From late September through the end of March, both American Crows (*Corvus brachyrhynchos*) and Fish Crows (*Corvus ossifragus*) converge every evening into this industrial city to populate an overnight communal roost. Most of the American Crows are migratory individuals, while the Fish Crows tend to be almost all nearby residents. Crow numbers start small, with a few hundred migratory American Crows arriving in the early fall. By the time the New England winter population is at its peak, in the middle of January, more than 10,000 crows stream into the roost from all directions every night.

To witness this awesome display of nature is to experience a dazzling spectacle. It is even more rewarding to observe this behavior and document observations for others to help them better understand crows. This guide has been prepared to help do that.

### Why Count Crows in a Roost?

One aspect of this roosting phenomenon that you can document, and the part that is particularly interesting to avian biologists, is counting the large number of crows using the roost. By obtaining accurate and reliable numbers, biologists can better track changes in the size of winter crow populations, follow the timing and extent of winter migration, pin down specific roost locations each winter and over time, document responses to changes in the local habitat, and monitor the possible effects of climate change. In addition, this data can help biologists establish priorities for ongoing research and may allow for comparisons between different counting methods.

With strong encouragement from senior staff at the National Audubon Society, we're striving to better understand the types of current counting methods that can be most effective in this specialized counting effort, which is a unique challenge due to the very large numbers of crows, low light conditions, and dynamic flight patterns. From the Audubon perspective, this is a compelling opportunity to document and compare different methods for counting large numbers of birds at an overnight roosting site.

A winter crow roost is also a remarkable avian event during the annual life cycle of a migratory bird species. According to Scott Weidensaul, ornithologist, naturalist, and renowned author, avian researchers know very little about the behavior of most migratory birds and their wintering habits and ecology. Weidensaul estimates that there are about 850 breeding birds in North America, including nearly 500 migratory birds. He indicates that there may be fewer than 100 birds for which researchers have detailed knowledge of winter roosting habits. A winter crow roost provides an excellent opportunity to expand on our knowledge of bird migration patterns and wintering habits as well as a significant opportunity to refine counting methods.

***“Much is yet to be learned about the dynamics and interactions of crows as they occupy these huge roosts.”***

***John Kricher***

***Retired Professor and Author***

If you are a new observer, counting large numbers of crows can serve as a nice way to participate in citizen science and gain an understanding of this unique social behavior among birds. If you are a more experienced bird observer, counting such large groups of birds may offer a fascinating new challenge.

### Which Method to Use

You may be wondering how it is possible to count large groups of crows. In creating this guide, we interviewed numerous avian biologists and crow experts from coast to coast and learned that there is no single definitive method. The optimal counting method at each roost location is different, and it can vary based on the overall habitat, access to clear vantage points, time of year, the behavior of the crows, and the resources available. The two primary methods are either direct counting or careful estimation.

#### Direct Count

A direct count is one in which the observer attempts to individually tally every crow within a roost. While a direct count can obviously be more accurate than an estimate, the process of counting individual crows ranges from tedious to impossible, depending on the size of the roost. Some experienced observers prefer direct counting for roosts containing up to 2,500 crows. However, many roost counters only choose this method for roosts with fewer than 1,000 crows. If you choose this method, to get accurate results you must be in a situation where movement and disturbances within the roost are limited, and you must take care not to count individual crows more than once. If you are counting with a large group of observers, you may break up the roost area into smaller sub-sections and divide the work of counting individual crows in a subsection among different team members.

***“You’re going to be estimating no matter what you do, and the ability to estimate only comes with practice.”***

***Wayne Petersen***

***Director, Important Bird Areas, Mass Audubon***

#### Estimation

The larger the overall roost size, the greater the challenge in making accurate and reliable counts. When direct counts are impractical, some sort of estimation method should be used. Estimation methods include *flight count*, made while crows are flying into the overnight roost or leaving the roost at dawn, and *roost count*, made after the roost has settled down for the night.

- **Flight Count:** The best approach to counting a moving flight stream is to create counting blocks, or groups, and use these groups to estimate the number of birds passing a fixed vantage point. Try focusing on a fixed vantage point as the flight stream is passing by, then estimate the number of crows passing that point (e.g., 50, 100, 500, or more individual crows). Use this method to estimate the total number of crows that pass by that vantage point. It may help to start with smaller-sized blocks to get a sense of how the density of birds in flight can change and how to adjust your block or group size.

There are many challenges to estimating numbers of crows as they fly into or out of the overnight roost. Birds may stream in quickly and from multiple directions at the same time, or the density of the flight streams may change dramatically throughout the counting period. In addition, there may be disturbances that divert or redirect an approaching flight stream. If birds are arriving steadily from multiple directions, multiple observers may count crows passing different fixed points and add their counts together to obtain a more accurate estimate.

- **Roost Count:** Once crows are settled into an overnight roost, you may also use the block or group method. First, choose a defined section of the roost with a somewhat uniform crow density and distribution, and then count the number of crows in that section. Next, repeat that sectional count across the remainder of the roost, estimating how many similarly sized sections would be needed to cover the remaining space, and multiply the number of sections by the number of individuals present in the original section. Small changes to the relative sizes of the sections can be used to compensate for more sparsely or densely populated areas. Great care is required in making block or group estimates because as natural light diminishes, observing and counting become more challenging. In some situations, you may benefit from external lighting sources such as nearby building or street lighting. Night vision optics may also be beneficial to compensate for diminishing light.

***“Ultimately, photography is going to be the answer.”***

**Bob Fox**

***Co-Founder, The Crow Patrol, Lawrence, Massachusetts***

### Photography

Photography can also be a very useful tool when counting large numbers of crows. The use of various types of photography may make it possible to capture images of each section of the roost and perform direct counts on the photos later.

Given the limited light available during the overnight roost period, you will need to use low light photography techniques to capture usable images. In most cases, some form of external illumination may be required to distinguish the black crows from each other and from the complex background of tree branches. While this can sometimes be done with visible white light illumination, infrared illumination paired with night vision optics or an infrared camera will minimize disruption to the roosting crows. An informative guide to the basics of photographing crows in a roost at night can be found at [www.wintercrowroost.com](http://www.wintercrowroost.com).

Once the images have been captured, break them down into smaller units for counting. This can be done with sectional groupings or by drawing circles around natural clusters of crows.

When you have counted each section in each image, add the subtotals to arrive at a final roost total. Despite requiring additional effort in manual counting after the fact, this is one of the most accurate and reliable methods known for counting large numbers of crow roost populations and allows for additional observers to examine the images and replicate the counts.

### When To Count

When should you conduct a crow roost count? The options are when the crows are streaming into a roost, while they are roosting, or when they are leaving a roost at dawn.

***“I count crows the same way a lot of people count other birds, and it’s by using a technique called blocking.”***

**Kevin McGowan**

***Director, Distance Learning, Cornell Lab***

### At Dusk

Just before, during, and up to roughly 30 minutes after sunset there may be enough natural light to count individual crows. During this period, the crows will be streaming into the roost and settling in trees or on other nearby surfaces. Counting at dusk can be advantageous because typically the overall timeframe of arrival is shorter than that of roost departure. However, this also means that crows arrive faster, which can be challenging for even the most experienced observers.

### At Dawn

Before sunrise, crows prepare to leave the roost for their daytime foraging grounds. They tend to leave in a more staggered fashion than when they arrive, typically over a 90 minute time period. Although this requires a longer period of observation, the slower pace can make estimation easier and possibly more accurate.

***“Counting in the morning was more effective in terms of getting an accurate count than counting at night.”***

**Margaret Brittingham**

***Professor, Penn State University***

### During the Overnight Roost

Counting can occur almost any time after the start of astronomical twilight at dusk or before the start of astronomical twilight at dawn, since the crows will typically remain in the trees, on the ground, or on flat surfaces nearby with little movement. The biggest challenge to counting during the night is the greatly



diminished light level. By the time crows have settled into an overnight roost, any remaining natural light will have diminished, and only artificial lighting may be available. However, if an area has enough ambient light, or if night vision optics are available, you can sometimes achieve accurate counts.

***“It would be neat to try to do a count with infrared, once the crows have settled into the roost; that would be more precise, if you could clearly identify the boundary of the aggregation.”***

***John Marzluff***

***Professor, University of Washington***

### **Over Multiple Days in a Row**

By returning to the same location at the same general time over several days in a row, you are likely to encounter similar numbers of crows each day. There will of course be some fluctuation, but by observing and counting over several consecutive days, you or your team members can increase the ability to carry out a more accurate series of overall roost counts.

***“Our counts are probably within ten-to-fifteen percent of the actual number.”***

***Gary Granger***

***Co-Founder, PDX Crow Roost***

### **How To Record the Count**

While it's challenging to estimate numbers of crows, it can be equally challenging to keep track of how many you have counted. There are several reliable ways to record your count.

#### **Pencil and Paper**

This is the most common technique among experienced crow counters. It is easiest if there are at least two observers working together, one to call out the numbers, and the other to record them.

#### **Tape Recording**

If you are alone, a tape recorder can be handy. Simply call out the count into the recorder for later replay and tallying.

***“We would go out after dusk, or pre-dawn when the crows were settled in, before they had started flying out; we would count the number of trees with birds in them; then get an estimate for how many birds were in the roost.”***

***Andrea Townsend***

***Associate Professor, Hamilton College***

### **Tablet**

You can also type data directly into a spreadsheet on a tablet. The advantage of typing directly into a tablet of some sort is instant data capture. However, many find it challenging to focus on both the crows and the device at the same time. Again, if there are multiple observers working together, dividing these tasks can be beneficial.

### **Where the Crows Are**

Crows may vary their roosting locations throughout a winter season. Every locality is different, and it may be useful to learn as much as possible about the local roost history. Sometimes roost locations and movements to new locations may be gradual over a period of days or weeks. Alternatively, the location of a roost may shift quickly, and you may have difficulty finding the new location. Often, with patience and good observation skills, you will be able to track down new locations of overnight roosts.

***“What we’ve done to count the crows coming into a roost is find a vantage point where you can really see all four different directions, if possible.”***

***Anne Clark***

***Associate Professor, Binghamton University***

### **How To Share Your Data**

What to do when you've finished counting? You have chosen an accurate method, found a good vantage point for observations, and taken good notes. Now you want to share the information. There are various vehicles you can use to do this. These are some options we recommend:

- eBird: [ebird.org](http://ebird.org) or eBird mobile app;
- Local American Birding Association listservs;
- Local Facebook groups;
- Audubon Christmas Bird Count: <https://netapp.audubon.org/aap/application/cbc>.

### **What You Gain**

No matter which method you choose, you will acquire a greater knowledge and appreciation of this natural phenomenon that often takes place practically in your own backyard.

***“We hope that the use of drones with specialized cameras can better count the crows one day!”***

***Gaetan Dubois & Micheline Forget***

***2020 Christmas Bird Count***

***St. Jean-sur-Richelieu, Canada***

### Our Panel of Crow Experts

- **Anne B. Clark**, Associate Professor, Biological Sciences, Binghamton University, New York;
- **Gary Granger**, Co-Founder of PDX Crow Roost, a citizen-science project in Portland, Oregon;
- **Jim Lafley**, Retired, Department of Conservation and Recreation, Commonwealth of Massachusetts;
- **John Marzluff**, Professor, Environmental and Forest Sciences, University of Washington, Washington;
- **Margaret Brittingham**, Professor of Wildlife Resources, Department of Ecosystem Science and Management, Penn State University, Pennsylvania;
- **Sylvia Halkin**, Professor of Biology, Central Connecticut State University;
- **Andrea Townsend**, Associate Professor, Biology, and Director of Environmental Studies, Hamilton College, New York;
- **Wayne R. Petersen**, Director of the Massachusetts Important Bird Areas (IBA) program, Mass Audubon, Massachusetts;
- **Robert Fox**, Co-Founder, the Crow Patrol, Lawrence, Massachusetts;
- **Kevin McGowan**, Project Manager Distance Learning, Cornell Lab of Ornithology;
- **Soheil Zende**, Co-Founder, Take a Second Look (TASL); Co-Founder, Friends of Belle Isle Marsh.

### Acknowledgements

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#### Additional Thanks To:

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at Manomet; Bob and Dana Fox for their dedication and involvement in the Crow Patrol; Ron Phillips and Paul Nelson at Hunt's Photo and Video in Melrose, MA; Dan Wampler at Life Pixel Infrared; Peter Weir at Kolari Vision; Tim Little at Cape Night Photography; staff and leadership at the Merrimack River Watershed Council, Groundwork Lawrence and members of the Green Team, Merrimack Valley Bird Club, Andover Village Improvement Society, Essex Arts Center, and the Boys and Girls Club of Lawrence; Lou Bernieri from Phillips Andover and the renowned Breadloaf Writing program; business leaders in Lawrence, including Maryanne Paley Nadel at the Lawrence Partnership, Markus Fischer at the Boys and Girls Club of Lawrence, John Campbell at New Balance, and Sal Lupoli at the Lupoli Companies; Mass Audubon Board Member Michael Pappone for his unwavering support; the endless number of friends and students who have joined us for Crow Patrol outings in the winter months and encouraged us to pull together a counting guide.

#### A Big Round of Applause To:

After many of our field visits to other winter crow roosts, we offer a very big round of applause to the following individuals for providing invaluable information and support: Barbara Hunsberger and Emily Broich, Lancaster, PA; Sylvia Halkin and Jay Kaplan, Hartford, CT; Jim Lafley, Springfield, MA; Kevin McGowan, Auburn, NY; Tyler Delisle, Bill Cook, Albany, NY; Alan Mapes, Larry Alden, George Steele, Richard Guthrie, and Larry Federman, Troy, NY; Nava Tabak, Poughkeepsie, NY; Jay Exum, Lorne Malo, Econlockhatchee, FL.

#### And on the Front Lines:

Thanks to our many new friends out on the front lines each winter. They have shared very informative insights with us on their local counting methods. The following individuals deserve great credit for tracking and counting the American Crows in these winter roosts each year for the Annual Christmas Bird Count sponsored by the National Audubon Society. For each location, we also note the 2020 CBC count numbers for American Crows:

St. Jean-sur-le Richelieu, Quebec, CA (72,000): Real Boulet, Gaetan Dubois, Micheline Forget; Woodstock, Ontario, CA (57,655): Jeff Skevington, Richard Skevington; Middle Fork River Valley, IL (41,304): Mary Jane Easterday, Vonna Bley, Susan Stearns; St. Clair NWA, Ontario (35,015): Allen Woodliffe; Keokuk, IA (35,003): John Cecil, Steve Dinsmore; Mansfield, OH (30,701): Steve McKee, Jason Larson; Lancaster, PA (26,744):

Barbara Hunsberger; Ottawa-Gatineau, Ontario, CA (20,000): Daniel Toussaint, Bernie Ladouceur; Raleigh County, West Virginia (18,500): Allen and Mindy Waldron; Rochester, NY (16,349): Shirley Platt, Norma Platt; Andover, MA (15,200): Donna Cooper, Bob Fox, Dana Fox; Clark County, OH (15,000): Brian Menker, Doug Overacker; Granby, Ontario, CA (9,000): Ginette Boyer, Rachel Papineau-Pepin; Plattsburgh, NY (8,526): Michael Burgess; Salem, NJ (7730 Fish Crows): Jerry Haag; Martha's Vineyard: (757 Fish Crows) Luanne Johnson; Newburyport, MA (922) Tom Young, Nick Paulson, Doug Chickering, Kirk Elwell.

### Lessons Learned

Here is a quick recap of lessons learned from our many friends in the field:

- Use a group or team of experienced counters to monitor all directions, especially with larger roosts;
- Monitor all the activity until at least 60, if not 90, minutes past sunset time;
- Use multiple locations among your counting team members;
- Recognize the difficulty in counting while streaming and staging;
- Be aware of all take-offs and landings before the Crows reach the final overnight roost;
- Avoid any possibility of double counting;
- Make every effort to watch from all possible directions;
- Allow for dramatically different numbers from year to year. Be flexible and adjust as needed;
- Recognize that CBC count fluctuations are to be expected. The count for each year is independent of prior year counts;
- Be aware the roost site may pose significant challenges in terms of open and unobstructed viewing access;
- Attempt to position each counter with the best wide open views, not from inside a car or any type of limited viewing location;
- Use one of many photography methods to provide a quantitative, accurate, and comparable source of data;
- Have fun, work together as a team, enjoy the mystery of it all, learn, mentor, and share with others.

### Additional Resources for Counting Birds

- <https://support.ebird.org/en/support/solutions/articles/48000838845-how-to-count-birds>
- <https://morebirds.com/blogs/news/how-to-accurately-count-flocks-of-birds>
- <https://madisonaudubon.org/blog/2020/9/13/how-to-count-birds>

### Published by Craig Gibson and Will Bicks

Craig Gibson is a bird conservation photographer. His current focus is on expanding awareness about the Winter Crow Roost located in Lawrence, Massachusetts. Craig has more than 300 documented observation nights tracking and documenting this Crow roost. He leads many group tours and has made numerous presentations and talks. Craig designed and launched a blog and a podcast about the Winter Crow Roost and continues to oversee all editorial content. He has also been the lead on initiating and coordinating a range of activities and events with local arts, education, and community groups and has worked with a growing number of conservation and environmental organizations. He wrote and published a comprehensive 14-page report to recap the 2018–2019 winter season and a comprehensive guide for roost photography at night. His efforts have raised much greater awareness about the Winter Crow Roost in Lawrence, MA, and he has been a catalyst for a range of new community science initiatives.

Will Bicks is a second-year computer engineering student at the Rochester Institute of Technology who has been assisting the Crow Patrol for over three years. Through countless visits to the Lawrence roost, Will has provided insight into the use of new and emerging technologies, specializing in audio recording and analysis, unoccupied aircraft systems (drones), and infrared imaging. In addition, Will has developed custom software solutions for the Crow Patrol to graph the acoustic activity of roost populations, automatically count individuals from photos, and help train and test fellow citizen scientists.

In the spring of 2021, Craig and Will participated in the annual Northeast Natural History Conference, held in conjunction with the annual meetings for the Wilson Ornithological Society and the Association of Field Ornithologists. Their submission for the NENHC Video Festival was awarded first place in the observational footage category. In August 2021, Craig and Will presented a talk about the Winter Crow Roost for one of the Round Table Discussions for the 2001 joint virtual meeting of the American Ornithological Society and the Society of Canadian Ornithologists. In November 2021, Craig and Will presented another talk about the Winter Crow Roost for the virtual 2021 annual meeting of The Wildlife Society, an international association for wildlife biologists involved in wildlife stewardship through science and education.

*For more information about the Winter Crow Roost and the Crow Patrol, please take a moment and visit [www.wintercrowroost.com](http://www.wintercrowroost.com).*

*Contact Craig at: [cbgibson@wintercrowroost.com](mailto:cbgibson@wintercrowroost.com).*

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# Photo Gallery



In the early fall, smaller groupings of crows are seen streaming in after sunset time. This flight stream image shows about 250 crows heading to the overnight roost.

## Early Fall/October

As we move deeper in fall, the size of the incoming flight streams becomes larger. This image shows about 450 crows in November swirling in flight after sunset before heading to the overnight roost.

## Late Fall/November



## Early Winter/December

The size of the flight streams continue to increase as we move towards the end of the year. This flight stream image shows close to 1,100 crows, again swirling in flight and approaching the overnight roost.

In early January the size of the overall roost starts to hit its peak, and the size of the flight streams reflects larger numbers. This image, after sunset, shows a group of more than 1,400 crows making a straight line for the overnight roost.

## Winter/Early January



## Winter/Late January

Crows will often gather in larger numbers nearby before moving closer to the roost. At times, something will alarm the birds, causing them to lift up in momentary flight before settling down and landing again. That was the case in this photo taken at the baseball field on Incinerator Road in Lawrence, Massachusetts, showing a group of more than 2,000 crows about 10 minutes after sunset time.

