



Crow Patrol Recap

2018–2019

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Table of Contents

Introduction	page 1
Mission	page 1
Background.....	page 1
Getting the Crow Patrol Started	page 2
Creation of the Blog.....	page 2
Field Observation, Documenting, Photographing and Analysis.....	page 2
Outreach to the Scientific Community.....	page 4
Community Outreach	page 5
Research Project	page 8
Media Coverage	page 9
Moving Forward.....	page 9
Biographies	page 9
Appendix A: Camera Equipment, Techniques and Settings.....	page 10
Appendix B: Research Project	page 10
Appendix C: Preliminary Pellet Report.....	page 10



Introduction

For decades, the city of Lawrence, Massachusetts, has hosted a significant Winter Crow Roost. The size of the winter roost typically grows from an initial group of 100–200 Crows as early as September to more than 25,000 Crows in the new year.

The Winter Crow Roost in Lawrence consists of mostly American Crows, along with a much smaller number of Fish Crows. Typically, an hour before sunset, the Crows gather in small, pre-roost groupings. These pre-roost (staging) locations may change on any given night. The Crows then converge after sunset into the final roost location. Some Crows may start as anchors in the final roost just before sunset, and then most other Crows join after sunset. They will fly in over the following 60 minutes, until the roost quiets down completely for the night. For many years, the final roost location had been along the south side of the Merrimack River by the New Balance factory complex. Over the last two winter seasons, from October 2017 until spring 2019, the final roost location has changed many times.

Dana Duxbury Fox and Bob Fox, avid amateur birders, have been observing the Lawrence Crow Roost for the past few years. Wayne Petersen, Mass Audubon's Director of the Massachusetts Important Bird Areas (IBA) program, had been fascinated by Crows since he was a child. He said a visit or two with Dana and Bob really got him galvanized on the dynamics of the roost in Lawrence. Soon, Dana was providing Wayne updates on the behavior of the birds.

In the fall of 2017, Dana and Bob invited Craig Gibson, a fellow, local birder known for his photographs who had also recently been observing the Winter Crow Roost in Lawrence, to join them during their observations and take photographs of the Crows. Shortly thereafter, the three joined forces to coordinate their activities, and the Crow Patrol was established.

This document is a recap of the Crow Patrol's first full year in operation.

Mission

The mission of the Crow Patrol is to chronicle the Winter Crow Roost in Lawrence by observing, monitoring, documenting and photographing this amazing sight; to learn from it; and to share it with others.

Background

Each spring, resident American Crows in New England and southern Canadian provinces start the breeding season. They typically have one brood per season. They will normally lay four-to-six eggs in the nest, and those eggs typically hatch after approximately 22 days. Young Crows will usually fledge or make first flight around 30 days after that. Later in the fall, many American Crows from northern New England and southern Canada depart their local breeding grounds and begin the migration journey in a southwestern direction.

According to recent research conducted by Andrea Townsend, Ph.D., Assistant Professor of Biology, Hamilton College, New York, these migratory Crows in the Eastern United States often travel between 100 and 500 miles and consistently return to prior roost locations in urban areas. They join both American Crows and Fish Crows from the local area to form large, overnight, communal roosts for the winter months. In the area around Lawrence, Massachusetts, the Crows start to arrive in September, and their numbers grow over the next many months.

In early 2019, the numbers of the Winter Crow Roost in Lawrence reached an estimated peak of more than 27,000 Crows. This number is based on the disciplined counting methodologies utilized by Bob Fox, who has had decades of experience in counting birds. Typically, the Crow numbers begin to fall off in late February as Crows start the journey north back to their breeding territories.

Like many birds, American Crows tend to be creatures of habit, and the same seasonal migration cycle occurs year after year, with Crows often returning to the same winter roosting location each fall. These Crows are known to be very social, intelligent, and family oriented. The typical winter roost includes both local and migrant American Crows as well as local Fish Crows, reported as short-distance migrants. Professor Townsend's research suggests that these roosts may consist of approximately 80 percent migrants and 20 percent locals for the American Crows. The local American Crows likely reside within a 15-mile radius. According to Kevin McGowan at the Cornell Lab of Ornithology, the Fish Crows likely depart their immediate breeding territory and congregate nearby around reliable food

sources. Fish Crows may make up anywhere from five to perhaps 10 percent of the total roost.

Getting the Crow Patrol Started

In June of 2018, Dana, Bob and Craig attended “In the Company of Corvids,” a weekend seminar at the North Cascades Institute Environmental Learning Center located in the North Cascades National Park in Washington State. The Learning Center is about three hours northeast of Seattle.

The institute hosted Professor John Marzluff from the University of Washington. Professor Marzluff shared his knowledge and field work on Corvids, arguably the smartest of the bird families. Marzluff, who has been teaching for the Institute for almost 10 years, continually fills courses to the brim, and the “In the Company of Corvids” adult weekend seminar in June 2018 was expanded to 20 eager participants, all excited to spend time in the field searching for Ravens, Crows, Jays, Magpies and Nutcrackers.

The weekend included lectures by Marzluff and then-doctoral candidate Kaeli Swift (now a post-doctoral researcher) on their work studying Crow behavior and information sharing. The lectures provided a basis for the weekend’s main focus, field observation and study of Corvids in the wild. Both Marzluff and Swift shared anecdotes about fascinating Corvid behavior and highlighted the particularities of the family known to recognize human faces and outwit traps and mazes in order to find food. Dana and Bob presented a fascinating talk about the Winter Crow Roost in Lawrence.

Creation of the Blog

In order to share information about the Crow Patrol’s work observing, monitoring, documenting and photographing the Winter Crow Roost in Lawrence, we were strongly encouraged by community members to start a blog. Craig led this aspect of the project. Over the summer of 2018, the new blog was launched at www.wintercrowroost.com. The blog covers information about the nightly observations, including weather conditions, cloud cover, wind direction, speed, temperature, flight lanes, staging, roosting and other behaviors; photos and videos of the Crows taken during the observations; an extensive collection of academic research papers on Winter Crow Roosts; and news stories.

Using Google Analytics, we were able to analyze blog usage. We made more than 130 blog entries. Most of the postings provided details on sightings and typically included some information that had been in the eBird or Massbird postings. The blog experienced a lot of traffic with more than 3,200 individual visitors over the past nine months. The growth in blog readers is mainly due to the highly specialized content and quality photographs. Here is a snapshot of measurable activity from the blog during the first season of activity:

- 3,220 Users: Number of unique visitors that initiated at least one session over the date range from September 1, 2018, until May 31, 2019;
- 4,485 Sessions: Total number of visits by unique visitors. Many made multiple visits after initial session on the blog;
- 10,655 Page Views: Total number of page views by all visitors.

Based on considerable feedback from readers, the blog was well received because it consistently offered detailed, practical and insightful information on the Winter Crow Roost phenomenon. Specifically, readers liked the informative regular updates on staging and roosting, the variety of the photos, information on the suggested times and locations to find the Crows, the practical steps to use in the field, field notes on Fish Crows versus American Crows, background information on the Crows and suggestions on optics and camera gear.

Field Observation, Documenting, Photographing and Analysis

During this past winter season, the Crows were observed staging and roosting in a number of different locations. In September 2018, they began the nightly roosting ritual in the trees along the Merrimack River, on the north side of the New Balance building located on Merrimack Street in Lawrence. Key vantage points included the New Balance parking lot, South Canal Street and the rooftop of the nearby MVRTA McGovern Transportation Center. The rooftop of the parking garage at the McGovern Center provided an excellent vantage point for observing overall incoming flight directions and patterns into the nearby staging areas.

From the garage rooftop we were often able to observe the Crows staging on the ground and in trees around O'Connell South Common. We watched the Crows move in large numbers to the rooftop of the nearby B&D Advanced Warehousing building on Merrimack Street and then on towards the final roost. At the end of January, the Crows shifted the nightly roost to a general area west of Route 28 and the Great Stone Dam. This location is just under a mile to the west-southwest of the New Balance building. From the end of January until April, the nightly roost moved many times in this general area but remained within a radius of approximately 1.25 miles. Key vantage points included Riverfront State Park, the Bashara Boathouse at the end of Eaton Street, the streets around Industrial Way and the Lawrence Riverfront Industrial Park, the Boys and Girls Club of Lawrence and the extended area between the north side of the Merrimack River and the Immaculate Conception Cemetery on Barker Street.

For the second winter starting in October, Dana and Bob made more than 80 visits to observe the staging and roosting. The previous winter they had developed a detailed protocol of what they would record. At the end of each night, Dana and Bob wrote up their detailed notes. On 25 nights, Dana posted her nightly summary to the birding listservs of Massachusetts, New Hampshire and Maine.

She also encouraged readers to come and visit the roost. Many evenings they offered an informal "Crow Patrol" trip with ideas of what to bring, detailed directions and even ideas of where to dine. They took out 100 visitors.

Dana and Bob plan to write an analysis of their two winters observing the crows. Observations included:

- Estimating a count;
- Noting what was happening between staging and roosting;
- Noting weather conditions. Weather conditions can affect how the birds approach the area being watched. For example, the Crows will fly low into a headwind. When there is a tailwind, they will fly high. Temperature can affect how they fly in as well;

- Measuring timing as it relates to light. How do birds measure light? We don't really know, but Dana and Bob would watch each night, noting the time the Crows arrived and what the light was;
- Determining direction and distance. The Crows have stopping points along the way. By driving to earlier stopping points, it was possible to estimate the direction and distance.

The American Birding Association (ABA) hosts a page known as Birding News. On this page the ABA lists a large number of birding email lists for many states and regions. These lists provide timely postings about bird sightings and birding information. These lists were started and continued to be maintained by locals in the indicated locations. The ABA is not responsible for any of the content posted to any of these lists. Each list has a designated moderator who oversees content.

For example, MASSBIRD is a mailing list dedicated to the interchange of wild bird and birding information relevant to Massachusetts and New England. The list is owned and moderated by Barbara Volkle and is intended for discussion on local birding issues. Like other birding email lists, it is a very useful forum for sharing and exchanging timely birding information with others.

This past season, Craig made more than 80 field visits during staging and roosting activities around sunset as well as during roosting and dispersal activities before and just after sunrise. Craig entered more than 80 postings on eBird (<https://ebird.org/home>), closely following the eBird data collection protocols and posting photographs as well.

The description of eBird and its protocols includes the following:

- eBird is the world's largest biodiversity-related, citizen-science project, with more than 100-million bird sightings contributed each year by eBirders around the world. A collaborative enterprise with hundreds of partner organizations, thousands of regional experts and hundreds of thousands of users, eBird is managed by the Cornell Lab of Ornithology.

- eBird utilizes very specific data-collection protocols. The fundamental data gathered with each observation are: species, date, location and whether all species detected are included on the eBird checklist. Most observations include counts of individuals for each species and basic information that identifies the observers and describes how the count was conducted (start time, duration and distance traveled). Birders also have the option to provide additional, detailed information for each observation, such as age, sex, breeding behavior and information on staging and roosting patterns. A significant aspect of the data that birders contribute to eBird is that each observation has an exact date and is linked to a point on the map. This provides the opportunity to link eBird data with a variety of covariate data that potentially influence bird occurrence, such as weather, climate, habitat and human-population density. This allows the eBird community to focus on what it does best: finding, identifying and counting birds.

(The above has been adapted from a Public Library of Science (PLOS) article “eBird: Engaging Birders in Science and Conservation,” published December 20, 2011, authored by Chris Wood, et al.

Craig’s observations included:

- Flight lanes into staging areas from distant, daytime foraging locations;
- Flight patterns and directions upon entering staging areas;
- Relative size of incoming flights;
- Waves and intervals of incoming flights;
- Progression of staging patterns until Crows settled into final roost;
- Identification and differentiation of American Crows and Fish Crows;
- Behavior of American Crows and Fish Crows: foraging, perching locations, takeoff and landing patterns;
- Adults versus juveniles;
- Range of vocalizations;
- Changes in vocalization patterns of the Crows.

In addition to observing Crow behavior, Craig had the challenge of photographing the birds under difficult lighting conditions. He utilized a range of camera equipment

to capture large numbers of Crows during staging and at the roost, including birds perched, in flight, in the midst of action and on the ground. Despite the considerable challenges of lighting conditions around black subjects in diminishing light at the end of the day, through sunset and even after civil twilight, the photographs clearly portrayed all these activities and were significant in helping to document and understand the behavior patterns of Crows.

The challenges were the same when out on Crow Patrol early in the morning from astronomical through nautical twilight and then finally civil twilight just before sunrise. (For detailed information about camera equipment, techniques and settings, see Appendix A at the end of this document.)

Recent research has shown that the use of drones by scientists and avian biologists is changing the process and accuracy of data collection for all kinds of birds, especially in large groupings. In an effort to enhance our counting methods, we were able to work with a certified drone operator on a pilot project to assist in tracking and documenting the staging and roosting of the Crows during the roosting season. The initial results were very favorable, and utilization of an aerial drone will be considered for next season.

Finally, we were welcomed to visit the New Balance complex in Lawrence. In addition to touring the site, we had the ability to observe staging and roosting from one of the upper floors. The staff at New Balance has been wonderful and very supportive.

Outreach to the Scientific Community

Consistent with outreach at the Cornell Lab of Ornithology, part of Cornell University in New York, we are developing the Winter Crow Roost as a community-science project for members of the extended community to actively engage in scientific investigation and environmental conservation. We are also placing a strong emphasis on understanding the social and educational impacts of community involvement in science.

The Cornell Lab describes citizen science this way: “In North America, citizen science typically refers to research collaborations between scientists and volunteers, particularly (but not exclusively) to expand opportunities for scientific

data collection and to provide access to scientific information for community members.”

Over a 12-month period we established outreach and open communications with a range of academic, scientific and avian experts around the United States. In addition to our earliest connection with Wayne Petersen of Mass Audubon, these included:

- Tom French, Ph.D., MassWildlife, Natural Heritage and Endangered Species Program;
- Andrew Vitz, Ph.D., State Ornithologist, MassWildlife;
- John Marzluff, Ph.D., Professor Environmental and Forest Sciences, University of Washington;
- Kaeli Swift, Ph.D., Post-Doctoral Researcher, University of Washington;
- Andrea Townsend, Ph.D., Assistant Professor of Biology, Hamilton College;
- Sarah Courchesne, D.V.M., Associate Professor, Northern Essex Community College, Haverhill, MA;
- Sylvia Halkin, Ph.D. Professor of Biology, Central Connecticut State University;
- Irene Pepperberg, Ph.D., Research Associate/Lecturer, Harvard University;
- June Chamberlain-Auger, Crow Researcher, Retired Teacher, Cape Cod Academy;
- Margaret Brittingham, Ph.D., Professor Wildlife Resources, Pennsylvania State University;
- Laurie Ulrich, Lancaster Crow Coalition, Lancaster, PA;
- Luanne Johnson, Ph.D., Wildlife Biologist, BiodiversityWorks, Vineyard Haven, MA;
- Mark Pokras, D.V.M., Associate Professor Emeritus, Wildlife and Conservation Medicine, Tufts University.

In early December 2018, the truck depot parking lot along South Canal Street in Lawrence provided ample opportunity to collect ejected pellets from the wintering American and Fish Crows. Each morning, the Crows left behind cast pellets from the night before. From Birds of North America Online (<https://birdsna.org/Species-Account/bna/home>), published by The Cornell Lab of Ornithology, we learn that Crows cast pellets throughout the day as well as overnight in the roosts. Pellets contain indigestible, sclerotized parts of insects, chaff, pits, bones and eggshells. Pellets are regurgitated after arrival at roost, perhaps within two hours. Typically plant material makes up much (69 percent) of the Crow diet, consistent

with other studies. During the colder winter months, this is likely a much higher percentage. The initial Crow pellet analysis performed by Tom French in 2019, and made after discussion with Dana and Bob, offered up the following highlights:

- Preliminary report on the contents of the first 108 crow pellets collected in Lawrence, Essex Co., MA, by Craig Gibson on December 6, 2018, (89 pellets), and December 10, 2018, (19 pellets);
- In 2018, most pellets were stored separately and analyzed individually;
- In 2017, about 95% by volume and 90–95% by frequency of the material contained in the pellets was from Asian Bittersweet (*Celastrus orbiculatus*) berries;
- In 2018, bittersweet was again an important food item, but was far less dominant.

The details of Tom’s initial pellet analysis report are available in Appendix C.

Community Outreach

*“As they came in, the sky was just filled with them.
We had Crows using the river almost like a highway.
The first time you see it, it really is a spectacular thing.
There was a lot of wonder in people’s faces.”*

— Lara Mataac, Volunteer,
The Merrimack River Watershed Council

With the Crow Patrol established, our next step was to engage the community directly. We did this by first inviting individuals to join us in observing the birds and next by reaching out to a wide range of other community organizations in the extended Lawrence area.

“As the continued interest in the Lawrence roost began to grow, largely because of the enthusiasm of Dana, Bob and eventually Craig Gibson, various opportunities began to emerge within the city of Lawrence,” said Wayne Petersen. Wayne credited the increase in media coverage and visits from birders to Craig’s connections and contacts in the community and the outreach efforts of Dana and Bob. “At the same time, Craig established connections with a local art gallery in Lawrence that was so enamored with all the local Crow publicity that they hosted a two-month-long art exhibit that did nothing but feature Crows.”

Arts Partnership

"It really was record-breaking crowds for us. Over the entire run of the show we had a lot of interest from bird lovers as well as art lovers who came from far and wide to see it."

— Cathy McLaurin, Executive Director,
Essex Art Center

To broaden the awareness and understanding of the Crow Patrol and the Winter Crow Roost even further, we teamed up with Essex Art Center, located on Island Street in Lawrence. We had already made contact with The Studio Door, an art gallery located in San Diego, California. The gallery had been hosting a Crow-themed art show for five years. During the previous year's show, gallery owner Patric Stillman had engaged more than 125 artists and exhibited more than 70 works of art based on Crow themes.

We took what we learned in San Diego back to Essex Art Center. Essex Art Center is a non-profit art organization with a mission to inspire and nurture the diverse artistic potential of the Greater Lawrence Community through classroom exploration and gallery exhibitions, making the creation and enjoyment of art accessible to all.

The center's Executive Director, Cathy McLaurin, had a vision for the program that included dedicating all three of the center's exhibition spaces to create an exhibit called "Celebrating the Winter Crow Roost." The exhibit took place over two months, from January 11 to March 15.

The main room, the Chester F. Slidell Gallery, showcased Crow photography. We brought in five experienced bird photographers to contribute 25 matted and framed prints for the exhibit. Seven framed prints were sold at \$200 each. Each photographer gifted all revenue from framed-print sales back to Essex Art Center.

The Elizabeth A. Beland Gallery showed the video work of Dennis Hlynsky, artist and Professor and Department Head of the Film/Animation/Video Department at the Rhode Island School of Design.

The third room, which is the center's community-artist exhibition space, was given over to community members

who contributed writing, mixed media, paintings and other two-dimensional artwork with Crows as their theme.

Some highlights of "Celebrating the Winter Crow Roost":

- Opening night saw a significant turnout. Dana, Bob and Craig attended and had many conversations with opening-night attendees;
- A Mass Audubon January leadership-donor event was hosted by Essex Art Center. The afternoon included a gallery tour, an introduction by Wayne Petersen, a Crow talk by Dana and Bob Fox and a guided field tour. The event was sold out with approximately 50 attendees, and there was a waiting list. "It was a stunning success," said Wayne. "Thanks to lots of careful planning by Dana, Bob and Craig, the feedback by those in attendance was most positive.";
- The Merrimack River Watershed Council brought its members and friends to the center for two events organized by volunteer Lara Mataac. The council's mission is to improve and conserve the Merrimack River Watershed for people and wildlife through advocacy, education, recreation, and science:

* The first event included a gallery tour, an introduction by Craig, a Crow talk by Dana and Bob Fox and a guided field tour. It was co-sponsored by Merrimack Valley Bird Club and Andover Village Improvement Society (AVIS). Again, the event was sold out with approximately 50 attendees, and there was a waiting list.

* The group returned in March, when Craig presented an informal talk on staging and roosting. The following guided-field tour was conducted before and after sunset at the Abe Bashara Boathouse, part of the Greater Lawrence Community Boating property at the end of Eaton Street along the Merrimack River. More than 50 adults and children attended.

"Because of the increasing media attention the roost and its Crows were receiving, I was invited by our Mass Audubon Development and Membership Departments to consider running an evening Crow-watching event in Lawrence! Since the timing was serendipitous—the large number of Crows, lots of good media buzz and an art gallery featuring

*Crows right in downtown Lawrence all were happening
at the same time—I said yes...let's do it!"*

— Wayne Petersen, Mass Audubon

Youth and Education

*"Working with high school kids we try to spark interest...
These kids here in Lawrence, they see them every year.
They've grown up with them, but it's just been background
noise. So to shine a light and to bring them into seeing them
closer, and seeing a different view, there was an interest.
We're excited to get them back out next year."*

— Matt Morin,
Groundwork Lawrence and the Green Team

We reached out to a variety of youth groups and colleges:

- **Groundwork Lawrence and the Green Team.** We worked with the staff of Groundwork Lawrence and the Green Team to bring high-school students into Essex Art Center. Groundwork Lawrence's mission is to bring about the sustained regeneration, improvement and management of the physical environment by developing community-based partnerships which empower people, businesses and organizations to promote environmental, economic and social well-being:
 - * Matt Morin serves as the Education Program Manager. He manages the Green Team, a year-round program that offers part-time, paid positions for 40 Lawrence high-school students each year to help learn about and lead local environmental and healthy community initiatives, grow food, conduct research, raise awareness, challenge their peers to do community service and participate in hands-on improvement projects throughout the City of Lawrence.
 - * At Essex Art Center, the high-school students received a tour of the gallery and heard a talk presented by Craig providing an overview of the Crow exhibition and what to expect in the field related to the staging and roosting of the Crows. The group then headed out for a field visit at the Bashara Boathouse to observe Crows staging and roosting along the Merrimack River;
- **Boys and Girls Club of Lawrence.** We worked with Karen Kravchuk, Director of Education, to create a learning program for lower-school students. During February, young members dedicated time each week to

Crow-themed art work and essays with guidance from high-school-student writing leaders:

- * During a five-week period, young artists ages 7 to 11 joined writing leaders and art therapists from Lawrence Arts House to create this show. This collaboration aimed to be an artistic response to the Crows and to getting in touch with the overwhelming power of nature's beauty. The young artists explored themes of community, family, and collaboration through working with writing prompts and learning new art techniques;
- * On Feb. 28, the Boys and Girls Clubs hosted Breadloaf Family Night with Lou Bernieri, Director of the Andover Breadloaf program at nearby Phillips Academy, where young members displayed their work. The Andover Bread Loaf Writing Workshop (ABLWW) is part of a longstanding collaboration between Phillips Academy and the Bread Loaf School of English at Middlebury College in Vermont. Created in 1987 and directed with unflagging energy by Bread Loaf graduate and Phillips Academy faculty member Bernieri, its stated mission is "to enhance the teaching and learning of writing and to help catalyze educational renewal in classrooms, schools, school systems and communities."
- **Lawrence High School.** We established and have maintained contact with Rebecca Veullieux, biology teacher at Lawrence High School. Rebecca was fully briefed on unfolding activities and attended and participated in the March 4th event hosted by the Merrimack River Watershed Council. She has expressed strong interest in getting Lawrence High School science students involved next winter season;
- **Northern Essex Community College.** Dana convened a meeting at Northern Essex Community College in Haverhill, Massachusetts, with faculty members and Wayne Petersen. The leader of the academic group was Sarah Courchesne, DVM, Associate Professor, Biology Program Coordinator, Department of Natural Sciences, Northern Essex Community College. The purpose of this meeting was to explore possibilities for a research project about the daily movements of Crows as they move each morning from the roost directly out to foraging grounds, sometimes more than 30 miles away, and return in a more leisurely fashion each

night back to the roost. In late December, Professor Courchesne was joined by students and other faculty members to observe the Winter Crow Roost;

- **Central Connecticut State University.** We hosted a field visit with Professor Sylvia Halkin, faculty member at Central Connecticut State University, and her colleague Professor Irene Pepperburg:

* Sylvia Halkin is a biology professor and field biologist at Central Connecticut State University with a research focus on how birds use their vocal repertoires and also on the winter roosting behavior of American Crows. Professor Halkin was featured in a February 20, 2019, story about the Hartford winter Crow roost in the Hartford Courant. Rand Richards Cooper wrote: "An animal behaviorist and professor of biology at CCSU, Halkin is part of the annual effort to count the Hartford crows. She finds something sublime in the birds. What first got her interested was the sight of crows sleeping on the snow near Flatbush Avenue, years ago. 'It knocked my socks off, it was so beautiful. And once you see them flying around on the wind, there's just a great amount of joy.'"

* Irene Pepperberg is a research scientist noted for her studies in animal cognition, particularly in relation to parrots. She is an adjunct professor of psychology at Brandeis University and a lecturer at Harvard University.

Guided Tours, Talks and Marketing

Throughout the winter season, Dana and Bob organized and coordinated an endless number of informal guided tours, taking out in small groups a total of more than 100 visitors.

They also visited outside groups to give talks on Winter Crow Roosts. The groups were:

- South Shore Bird Club, March 2018;
- Edgewood, May 2018;
- The Corvid Cascade Workshop, June 2018
- Athol Bird Club, December 2018;
- Brookline Bird Club, February 2019;
- TIN Mountain Conservation Group, May 2019.

Dana provided monthly updates on our Crow Patrol activities and sightings to members of the Nuttall Ornithological Club. Nuttall is the oldest ornithological club in the United States and meets monthly in Cambridge, Massachusetts. To spur interest in the Crow Patrol and the new Winter Crow Roost blog, we shared a number of creative Crow-themed food items, which were distributed to attendees. Items included "Crows" licorice candies, black-frosting Crow cookies, Crow-themed cupcakes, black-licorice Twizzlers and customized Crow Patrol "Dark Roost" coffee packets.

Eric Swanzey, president of Bird Observer, reached out to us with an open invitation to provide event listings for the newly created master-birding calendar that has been organized by Bird Observer.

The Lawrence Mayor's office provided its full support for our activities as well as an open line of communications. We have discussed outings for the winter months next winter with other bird clubs/groups, including Brookline Bird Club, Arlington Bird Club and Newburyport Birders. We also initiated contact with a number of potential corporate sponsors.

Research Project

We are making preparations for a research project. Some of our efforts to date include:

- Dana established communications with Drew Vitz, State Ornithologist, MassWildlife, to explore methods and structure for a research project that will focus on daily/nightly movements between the overnight communal Crow roost and foraging grounds in winter months, as well as migration routes back to breeding grounds;
- Craig collaborated with Professor Halkin in regard to the critical elements that will need to be included in a proposed research project to look at daily/nightly movements between the overnight communal Crow roost and foraging grounds in winter months, as well as migration routes back to breeding grounds;
- Dana and Bob developed a draft research proposal for the winter of 2019–2020 to tag, band and take blood and feather samples of the Crows in coordination with the Massachusetts Department of Fisheries and Wildlife.

For more information about the research project, see Appendix B.

Media Coverage

- *Bird Observer*, December 2018: Craig wrote a short article to recap the prior season;
- *Newburyport News*, Dec. 22, 2018: Article about Dana's blog entry on another spectacular night watching the Winter Crow Roost;
- *Boston Globe*, January 16, 2019: Article previewing the opening of the "Celebrating the Winter Crow Roost" art exhibit at Essex Art Center;
- *Eagle Tribune*, January 24, 2019: Article that recaps the opening of the "Celebrating the Winter Crow Roost" art exhibit at Essex Art Center;
- *Eagle Tribune*, March 14, 2019: Article that recaps the Family Breadloaf Literacy Night at Lawrence Boys/Girls Club, a night that showcased the art and writing program on the winter Crows;
- *Museum Open House*. *Museum Open House* features and highlights many of the outstanding museums and art centers throughout the state. The show is presented by NewTV, an Emmy® Award-winning, state-of-the-art media center dedicated to providing quality local programming and training:
 - * *Museum Open House NewTV* show, February 21, 2019: Produced by Jay Sugarman, the episode with Dennis Hlynsky and Craig Gibson focused on the Crow-themed art exhibit;
 - * *Museum Open House NewTV* show April 10, 2019: Produced by Jay Sugarman, the episode with Cathy McLaurin, Craig Gibson, Lara Mataac, and Matt Morin focused on Essex Art Center, the "Celebrating the Winter Crow Roost" exhibit and community group involvement;
- *Birding*: Dana initiated contact with Ted Floyd, Editor of *Birding*, published by ABA. An agreement was reached on publishing an article by Dana on the recent Crow Patrol activities. *Birding* magazine is the award-winning, full-color, bimonthly members' magazine of the American Birding Association.

Moving Forward

With the success of Essex Art Center events and the tremendous response from both the birding community and the public, we are looking to create a more comprehensive series of events next winter, events that would benefit Lawrence's economy and engage more members of the

extended community. Wayne Petersen suggested making the Crows the centerpiece of a mini-festival that could also feature other winter-birding events, such as visits to Plum Island and Cape Ann and the viewing of eagles along the Merrimac River. "I think the Crows offer a special experience for visitors, and the information that this roost could possibly also provide researchers with an interest in studying roosting behavior could be considerable," he said.

Whatever the future holds, the 2018–2019 Winter Crow Roost program has provided a strong foundation upon which to build for the years ahead.

Biographies

Dana Duxbury-Fox dfox@wintercrowroost.com

Dana Duxbury-Fox became fascinated by birds at the age of eight; a fascination that continues today. Over the years, she has travelled widely to see birds, led bird trips, written articles about them, given talks, joined many ornithological organizations, and monitored many species of concern including the Common Loon, Eastern Whip-poor-will, Purple Martin and Common Nighthawk.

Over the past few years, a Winter Crow Roost in a neighboring town caught her fascination. This past winter she and her husband, Bob Fox, have monitored and documented this roost. As a result, she has written an article about Crows and this roost, raised awareness about the roost and promoted extensive media coverage.

Bob Fox bfox@wintercrowroost.com

Bob Fox also developed a keen interest in watching birds at an early age. Throughout his life he has been an active bird watcher. Since retirement, he and Dana have travelled the world to see birds. He was the co-author on the *Birds of New Hampshire* which documented over 100 years of bird sightings in that state. He has also become a member of many ornithological groups, led trips, given talks and monitored species of concern.

At the Greater Lawrence Roost, he has become the official note taker and Crow counter.

Craig Gibson cbgibson@wintercrowroost.com

Craig Gibson is a well known bird and conservation photographer. While he has photographed birds from Antarctica to Alaska, his current focus is on Peregrine Falcons in Lawrence, Massachusetts, and everything related to the Winter Crow Roost.

In 2017, Craig, Dana and Bob worked together in close collaboration to establish the Crow Patrol in the Lawrence area. Over the past two winter seasons, they have documented more than 250 observation nights, observing the staging and roosting of the Crows in the extended area around Lawrence. During the same time frame, Craig has made almost 150 Crow-Roost-specific eBird postings.

Craig's Crow photos have appeared in the Essex Art Center exhibition, Bird Observer, Mass Audubon publications, the Eagle Tribune newspaper as well as in a new book coming out by well-known author and naturalist John Kricher. The book is a new addition to the Peterson's Guide series, and it will focus on bird behavior.

Appendix A: Camera Equipment, Techniques and Settings

Photographing flight action of Crows in low light conditions is a huge challenge. To take flight-and-action photos during staging and roosting, we set shutter speeds higher to account for flight movement of individual Crows as well as large flock movements. For eye-popping photos that freeze the action, we found that higher shutter speeds were a must. To photograph in diminishing light just before and after sunset, we opened up our aperture very wide to let in all of the available light.

It was so important to constantly recalibrate our gear and settings in order to hit the balance between aperture setting (the lower the number the better) and shutter speed. Using a lens with fast auto focus made a big difference. Often, we pushed higher ISO settings to help as the light of day faded away. It was a big plus to have cameras that shoot at higher frames per second to freeze the flight and action scenes. Here is a brief recap of suggested camera settings: aperture wide open, higher shutter speeds, bump up the ISO as light fades, shoot in burst mode and continuous focus, test and check settings through the LCD screen especially as the light changes, use panning to reduce motion blur and bursting for

more crisp images, leave room for final adjustments when processing images later.

Appendix B: Research Project

The following items were highlighted: federal and state trapping permits; individual well-trained in trapping Crows; ability to explain specific learnings; ability to provide evidence that is a reasonable expectation, how it would contribute knowledge new to science; field biologists with sufficient scientific background to review of relevant published peer-reviewed literature; ability to use current statistical and other analysis methods on the data they collect; ability to get discoveries published in peer-reviewed journals that validate the appropriateness of the methods, data collection, and interpretation, to make your findings available to other researchers and the public; ability to secure commitment from local ornithologist with experience in trapping, marking, and tracking large birds to work with these Crows; need to research and read all relevant prior research; ability to demonstrate what information our study could provide that was not learned from prior research or from other studies that have already been done; all of the above prior to making funding estimates; the need to explain trapping specifics; type of traps and expected results and or pitfalls; knowledge of proper handling and procedures; record keeping; efficiencies in processing permits and record keeping; contingency plans around stress, injury, death issues while trapping and handling birds; a preliminary budget to be drafted with consideration of all possible line items; establishment of a realistic project timeline.

Appendix C: Preliminary Pellet Report

This is a preliminary report on the contents of the first 108 crow pellets collected in Lawrence, Essex County, Massachusetts, by Craig Gibson on December 6, 2018, (89 pellets), and December 10, 2018, (19 pellets). More will be examined later. In December 2017, about 130 pellets were collected, but were not kept separately, and most disintegrated so they could not be examined individually. In 2018, most were kept separately and were analyzed individually. In 2017, about 95% by volume and 90–95% by frequency of the material contained in the pellets was from Asian Bittersweet (*Celastrus orbiculatus*) berries. The pellets containing bittersweet were easily identified by their rich, orange color.

In 2018, bittersweet was again an important food item but was far less dominant. Many of the pellets contained unidentifiable plant fibers, skin, pulp etc. Some of these pellets probably contained pumpkin pulp with no seeds to confirm an identification. The primary food and non-food items identified in the 2018 crow pellets are listed below with the number of pellets out of the total 108 in which the item was identified (and the percent frequency in brackets):

Seeds

An unknown seed (possibly Staghorn Sumac): 49 (45%)
 Asian Bittersweet seeds: 38 (35%)
 Pumpkin: 16 (15%)
 Buckthorn: 11 (10%)
 Unknown small, flat, pea-shaped seed: 11 (10%)
 Acorn: 10 (9%)
 Large seed "meat" (acorn or other large seed): 8 (7%)
 Poison Ivy: 7 (6%)
 Corn: 4 (3.7%)
 Cantaloupe: 4 (3.7%)
 Rubus sp. (blackberry/raspberry): 3 (2.7%)
 Safflower: 2 (1.9%)
 Four other species of unidentified seeds from 1, 1, and 2 pellets each.

Vertebrate Animals

Bone fragments from squirrel/rabbit-size mammal: 26 (24%)
 Mouse: 7 (6%)
 (1 *Peromyscus leucopus*, 2 *Microtus pennsylvanicus*,
 4 *Peromyscus/Microtus* (possible prey or scavenged)
 Larger rodent, probably rat: 2 (1.9%)
 (possible prey or scavenged)
 Short-tailed Shrew (*Blarina brevicauda*): 1 (0.9%)
 (possible prey or scavenged)
 Muskrat fur: 1 (0.9%) (scavenged)
 Raccoon/opossum (1 tail vertebra): ... 1 (0.9%) (scavenged)
 Small snake: 1 (0.9%)
 (possible prey or scavenged)
 Bird (possible pigeon vertebrae): 1 (0.9%)
 (probably scavenged)
 Chicken (discarded human trash): 3 (2.7%)
 Chicken egg-shell fragments: 8 (7%)

Invertebrates

Insect parts: 3 (2.7%)
 Salt marsh Snail, *Melampus bidentatus*:
 3 (2.7%) (with 1, 1, and 26 each)
 Crab shell fragments?: 6 (5.5%)

Non-food Items Picked Up While Feeding

Small stones (about 3–10 mm long) found in 104 of the 108 pellets (96%), and numbering up to 91 (average 30) per pellet.

The following list of small, foreign objects suggests that many of the crows were feeding in an old industrial area consistent with the abandoned parking areas associated with the old mill buildings where the crows have been seen staging, and possibly in the vicinity of where the pellets were collected.

Glass: 23 pellets (21%) with the number of pellets containing the following colors of small glass fragments. It was common to have 4 colors in a single pellet.

Clear: 16 (15%)
 Light green: 13 (12%)
 Dark green: 9 (8%)
 Brown: 9 (8%)
 Blue: 1 (0.9%)
 Coal slag: 7 (6%)
 Charcoal: 7 (6%)
 Hard plastic: 5 (4.6%)
 Aluminum foil: 4 (3.7%)
 Asphalt: 4 (3.7%)
 Plastic film/bag: 4 (3.7%)
 Lead solder: 2 (1.9%)
 Concrete: 2 (1.9%)
 Red brick fragments: 2 (1.9%)
 Plastic packing beads: 2 (1.9%)
 Metal shaving: 1 (0.9%)
 Silicone seal rubber: 1 (0.9%)
 A paper staple: 1 (0.9%)

These foods suggest feeding in the following situations:

1. In and along the edges of abandoned industrial parking lots with Asian bittersweet, sumac, poison ivy, asphalt, concrete, broken glass, lead solder, etc.;
2. Scavenging for squirrel/rabbit size mammals and possibly smaller animals dead on the road;

3. Possibly preying on white-footed mice, meadow voles, a short-tailed shrew and a small snake, and insects;
4. Possibly in agricultural fields with pumpkins and corn, but probably more likely around human refuse with pumpkins, cantaloupe, corn and discarded chicken parts;
5. Possibly feeding occasionally around a house with a bird feeder where a small number of safflower seeds were eaten in both 2017 and 2018. And one sunflower seed was eaten in 2017;
6. Feeding in a salt marsh (in both years), which is the only source of salt marsh snails.

