

Iona Island Bird Observatory

# 2018/19 Annual Report

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Iona Island Bird Observatory (IIBO) is a program run by non-profit organization, WildResearch.

WildResearch's mission is to build, train, and educate a community that contributes to conservation science.



The Iona Island Bird Observatory is situated at Iona Regional Park. Use of the park is permitted by Metro Vancouver Regional Parks.



Major funders for Iona Island Bird Observatory in 2018/2019 were Canada Summer Jobs (Service Canada), Port of Vancouver, BC Nature, and the City of Richmond.



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## Executive Summary

- In 2018 and 2019 WildResearch operated the bird banding station at Iona Island Bird Observatory (IIBO) for ~6 weeks in the spring and fall to monitor migration.
- We opened up to 14 mist nets in Iona Island Regional Park for up to 6 hours each day.
- Fall 2019 was the busiest season to date, with a season total of 4163 individuals of 45 species.
- Spring 2019 broke our record for species banded with 52 different species or forms.
- Species highlights included Northwestern Crow, Calliope Hummingbird, Yellow-headed Blackbird, Virginia Rail, and Northern Saw-whet Owl.
- In 2019 we recaptured our oldest bird to date, a 10-year-old Spotted Towhee initially banded as a second-year in 2010.
- IIBO had an active volunteer program, with 71 volunteers contributing 1687 hours in 2018, and 82 volunteers logging 2087 hours in 2019.
- WildResearch hosted beginner and intermediate banding workshops in both 2018 and 2019.
- Both years saw major increases in station visitation, with numbers roughly doubling each year - from 201 people in 2017, to 505 in 2018, and 961 in 2019.

## Introduction



*WildResearch members Andrew Huang and Catherine Jardine leading a banding demonstration for a school group.*

WildResearch is a charitable organization whose goals are wildlife research and monitoring, environmental education, and community engagement through training and outreach. We believe that semi-natural habitats are important for supporting wildlife communities, and should be further studied. To increase our knowledge of such communities, WildResearch has operated Iona Island Bird Observatory (IIBO) since 2010 as one of its core programs. IIBO also provides educational opportunities whereby volunteers work alongside experienced ornithologists, learning to identify, safely handle, and band captured species. It provides a venue for WildResearch to engage with the public about avian ecology and conservation.





*Looking north at the outer ponds and woodlot.*

IIBO is located within Iona Beach Regional Park, immediately north of the Vancouver International Airport in Richmond, BC (Figure 1), and is maintained by Metro Vancouver Regional Parks. This urban park is an isolated patch of riparian and meadow habitat that is surrounded by an expanding matrix of residential, commercial and industrial development. The park is included in the Boundary Bay - Roberts Bank - Sturgeon Bank (Fraser River Estuary) Important Bird and Biodiversity Area as designated by Birdlife International and its local partners, Birds Canada and BC Nature. The Sitka Foundation has provided significant funding to WildResearch for operating IIBO.

In 2018-2019, IIBO conducted both a Spring Migration Monitoring Program (SMMP) and Fall Migration Monitoring Program (FMMP). The objectives of these monitoring programs were to monitor population abundance, species diversity, migratory trends, local stopover length, and long-term trends during the spring and fall migratory periods. Overall these programs are designed to monitor the abundance, diversity, annual productivity, survival and stop-over ecology of birds that use this urban park. IIBO is one of nine bird observatories currently operational in British Columbia, allowing the opportunity to compare data at local and regional scales within the province.

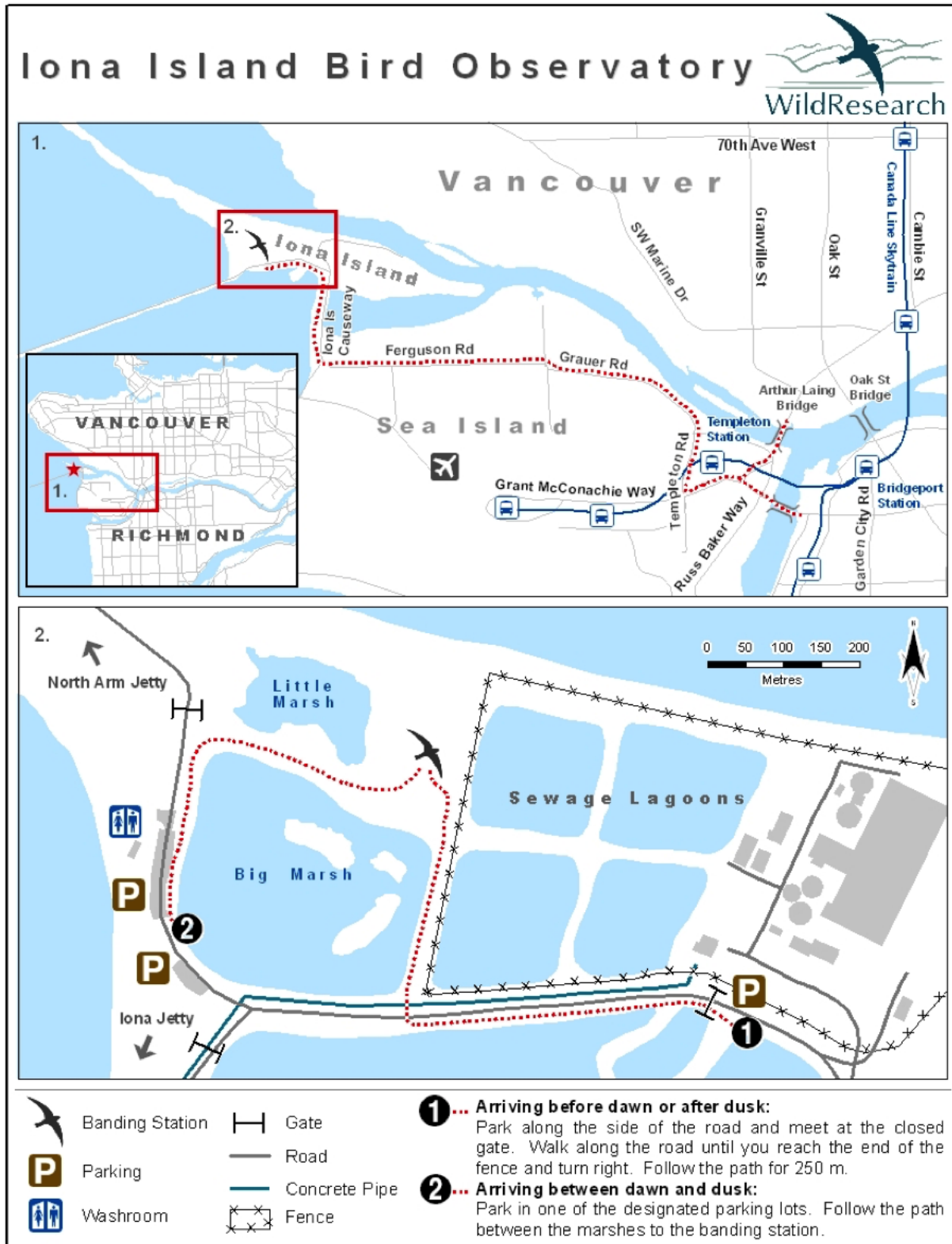


Figure 1. IIBO's location within Metro Vancouver and Iona Island.



## Methods



Figure 2. Map depicting Iona Island Bird Observatory, including the 14 mist-net locations and the banding station.

In 2018 and 2019, we operated 14 12 m mist nets located in a diversity of habitat types found in Iona Island Regional Park (Figure 2). These include hedgerow, woodlot, wetland and riparian habitat, and native as well as invasive plant species assemblages (Figure 3). Nets are opened a half hour before sunrise and remain open for up to 6 hours, provided that weather conditions do not endanger bird health or safety. Net rounds are conducted every 20 to 30 minutes, depending on weather, to minimize the amount of time birds spend in the nets. Special care is taken to train volunteers to adhere to IIBO's banding protocol, and a Bander-in-Charge (BIC) with an active master



or sub-banding permit is present at all times to ensure adherence to banding protocols. All volunteers are taught to handle birds using bander's and photographer's grips; both of which can be used during extraction.



Figure 3. Net 6 in October, showing a mixed native-invasive species hedgerow bordered by marsh habitat.

Once extracted, birds are carefully placed individually in cloth bags and are brought to the banding station for processing. At the station, birds are processed on a first-in first-out basis to minimize handling time, with the exception of more sensitive species or individuals that are processed sooner. During processing, banders record the following information: species (subspecies where possible), age, sex, body and flight feather molt, wing chord, weight, and fat score. Capture net and time are also recorded. All new birds (birds that had not been previously captured) are fitted with a Canadian Wildlife Service-issued aluminum butt-end band marked with a unique eight or nine-digit band number. For all birds that have been previously captured (recaptures), banders record their unique band number, collect the same age and body condition data as with new birds, and release the bird.

For ease of reporting, subspecies of Yellow-rumped Warbler (Audubon's Warbler and Myrtle Warbler), Dark-eyed Junco (Slate- coloured Junco and Oregon Junco), and White-crowned Sparrow (Puget Sound White-crowned Sparrow and Gambel's White-crowned Sparrow) are listed as separate species in this report. No hummingbirds that were captured were banded, but they are included in the capture data (Appendix A and B) as new birds.

## Results

### 2018 Spring Migration Monitoring Program

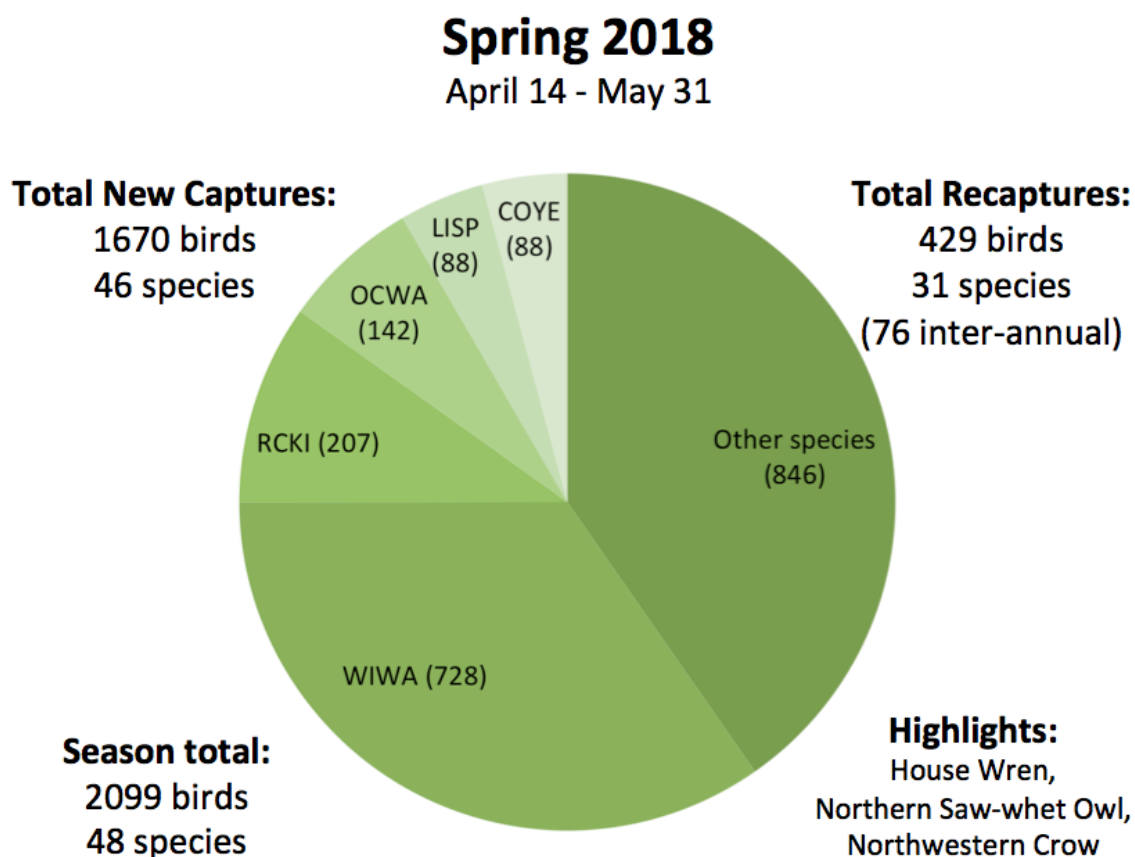


Figure 4. Summary of Spring 2018 banding numbers. A breakdown of all captures is shown in the pie chart.

The 2018 Spring Migration Monitoring Program ran from April 14th until May 31st for a total of 48 days (Figure 4). During this time we had 1670 new captures of 46 species and 429 recaptures of 31 species (including 76 inter-annual recaptures), for a season total of 2099 individuals of 48 species. The five most frequently caught species were Wilson's Warbler (728), Ruby-crowned Kinglet (207), Orange-crowned Warbler (142), Lincoln's Sparrow (88) and Common Yellowthroat (88). Other banding highlights were a House Wren, banded on May 12th, and a Northern Saw-whet Owl which was caught during the opening net check on April 27th. IIBO's second ever Northwestern Crow was captured during the spring banding workshop on April 14th, but was released unbanded as we didn't have the correct band size on hand. For a complete list of the species and number of individuals captured, see Appendix A1.





*This was the third Northern Saw-whet Owl that has been caught during a SMMP season, and the first since 2011.*



*Violet-green Swallow, Orange-crowned Warbler, and Wilson's Warbler*

## 2018 Fall Migration Monitoring Program

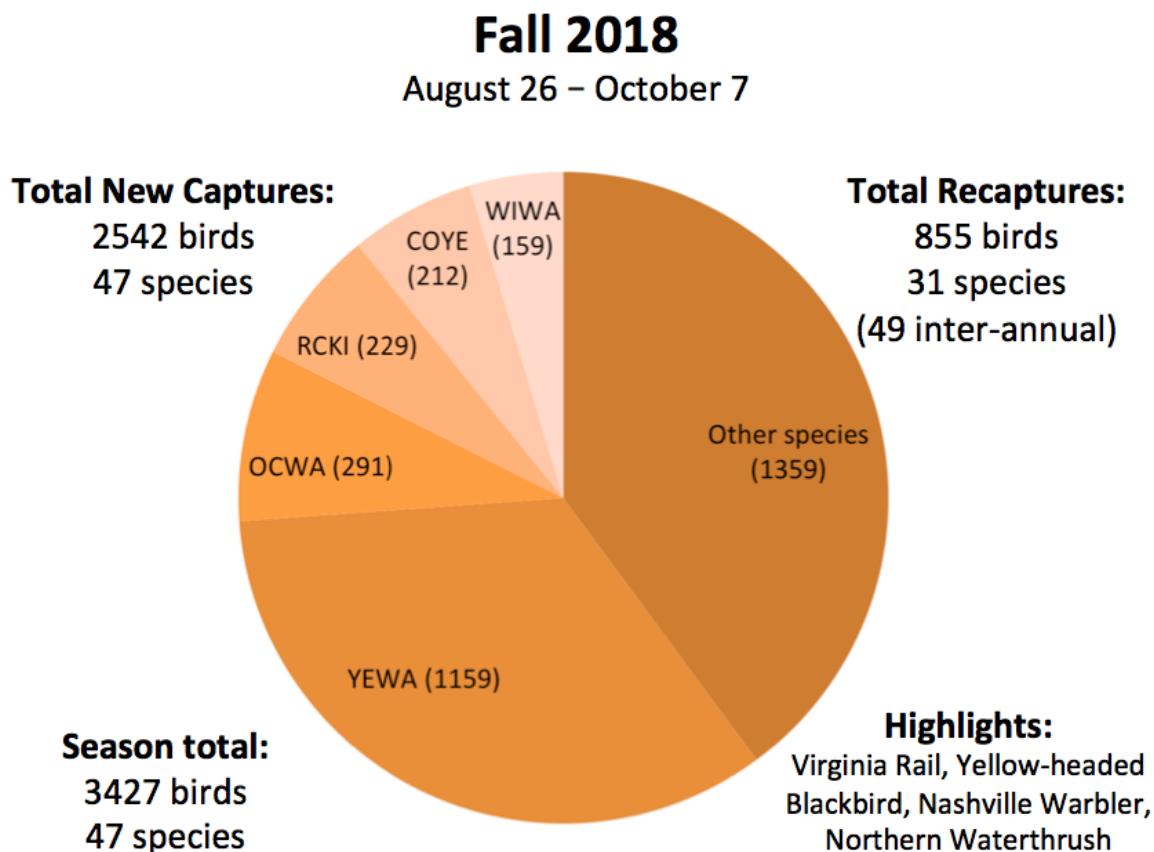


Figure 5. Summary of Fall 2018 banding numbers. A breakdown of all captures is shown in the pie chart

The 2018 Fall Migration Monitoring Program ran from August 26th until October 7th, for a total of 43 days (Figure 5). In contrast to previous fall seasons where we operated 3 days a week for 10 weeks, this is the first year where we operated daily for 6 consecutive weeks during the fall. During this time we had 2542 new captures of 47 species and 855 recaptures of 31 species (including 49 inter-annual recaptures), for a season total of 3427 birds of 47 species. The top 5 species were Yellow Warbler (1159), Orange-crowned Warbler (291), Ruby-crowned Kinglet (229), Common Yellowthroat (212), and Wilson's Warbler (159). Species highlights included Virginia Rail (2nd ever), Yellow-headed Blackbird (2nd ever), Nashville Warbler (2 total, 3rd and 4th ever) and Northern Waterthrush (3rd ever).



*A Virginia Rail that was banded during the 2018 FMMP.*



*Golden-crowned Sparrow, MacGillivray's Warbler and Bewick's Wren*



## 2019 Spring Migration Monitoring Program

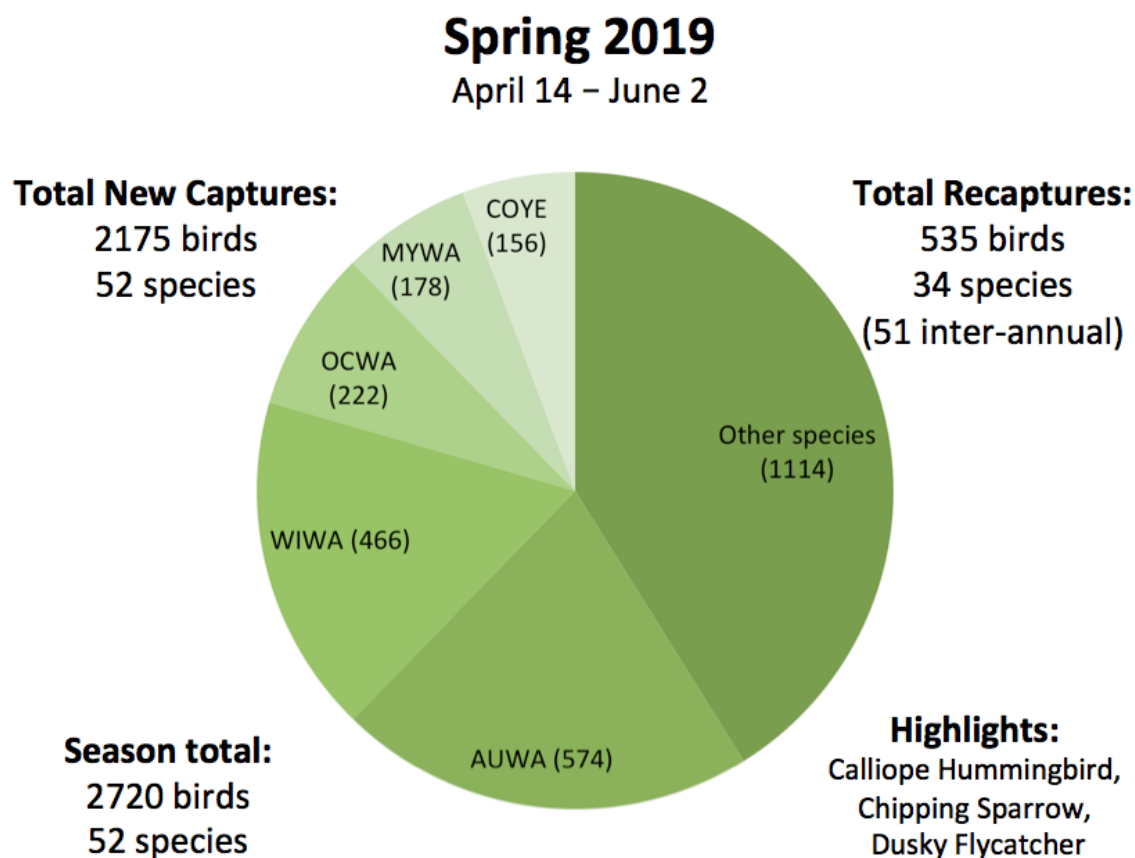


Figure 6. Summary of Spring 2019 banding numbers. A breakdown of all captures is shown in the pie chart

The 2019 Spring Migration Monitoring Program ran from April 14th until June 2nd, for a total of 50 days (Figure 6). During this time we caught 2175 new birds of 52 species and 545 recaptures of 34 species (including 51 inter-annual recaptures), for a season total of 2720 birds of 52 species. The top 5 species caught were “Audubon's” Yellow-rumped Warbler (574), Wilson’s Warbler (466), Orange-crowned Warbler (222), “Myrtle” Yellow-rumped Warbler (178) and Common Yellowthroat (156). Season highlights included a Calliope Hummingbird (4th ever), Chipping Sparrow (3rd ever) and Dusky Flycatcher.



*This male Calliope Hummingbird was caught twice in Net 7 on May 1st. This was the 4th CAHU captured at IIBO to date.*



*Black-throated Gray Warbler, Swamp Sparrow, and "Audubon's" Yellow-rumped Warbler*

## 2019 Fall Migration Monitoring Program

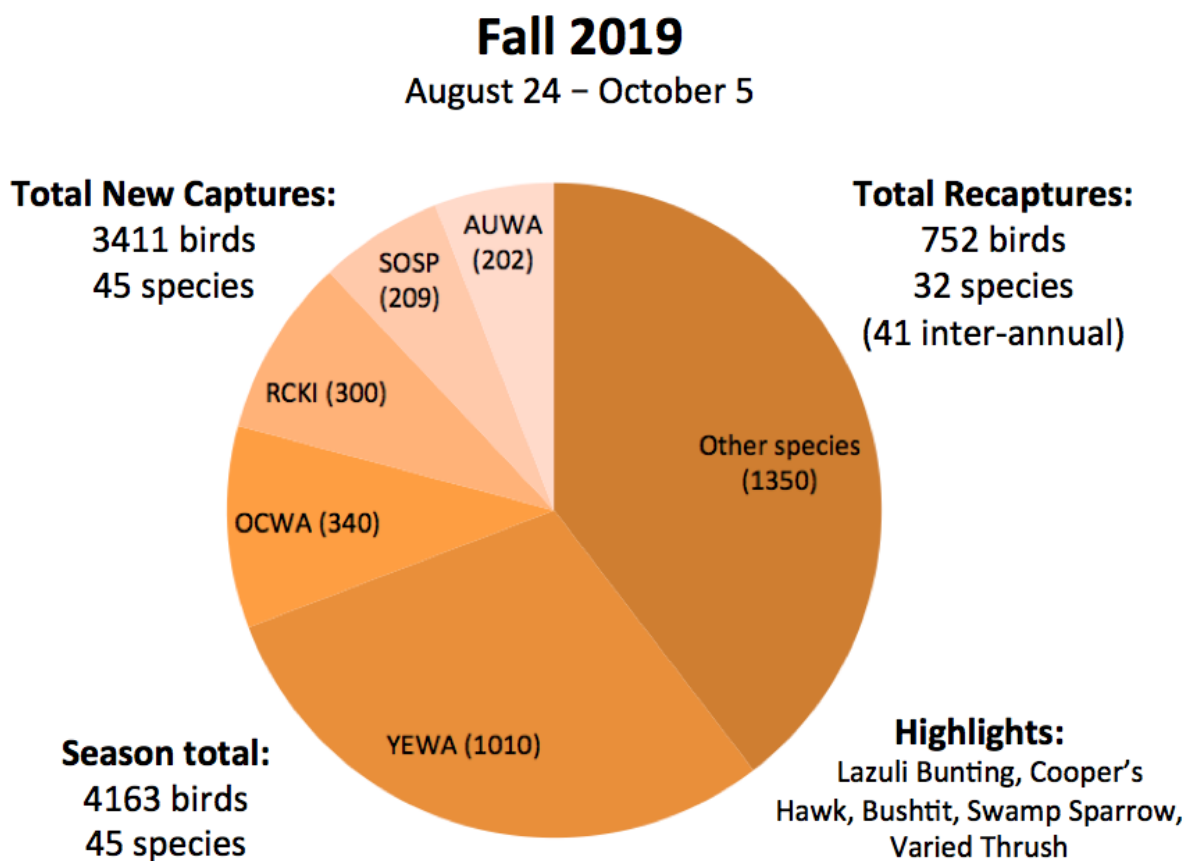


Figure 7. Summary of Fall 2019 banding numbers. A breakdown of all captures is shown in the pie chart

The 2019 Fall Migration Monitoring Program ran from August 24th until October 5th, for a total of 43 days (Figure 7). There were 3411 new captures of 45 species and 752 recaptures of 32 species (including 41 inter-annual recaptures), for a season total of 4163 birds of 45 species. This was a new FMMP record (Table 2), and this also made 2019 the busiest year overall for IIBO with 6883 birds processed. The top 5 species were Yellow Warbler (1010), Orange-crowned Warbler (340), Ruby-crowned Kinglet (300), Song Sparrow (209) and “Audubon’s” Yellow-rumped Warbler (202). Season highlights included Lazuli Bunting, Cooper’s Hawk, Bushtit, Swamp Sparrow and Varied Thrush.





*Lazuli Bunting*



*Bushtit, Townsend's Warbler, and Varied Thrush*

## Discussion

### Season totals and capture rates

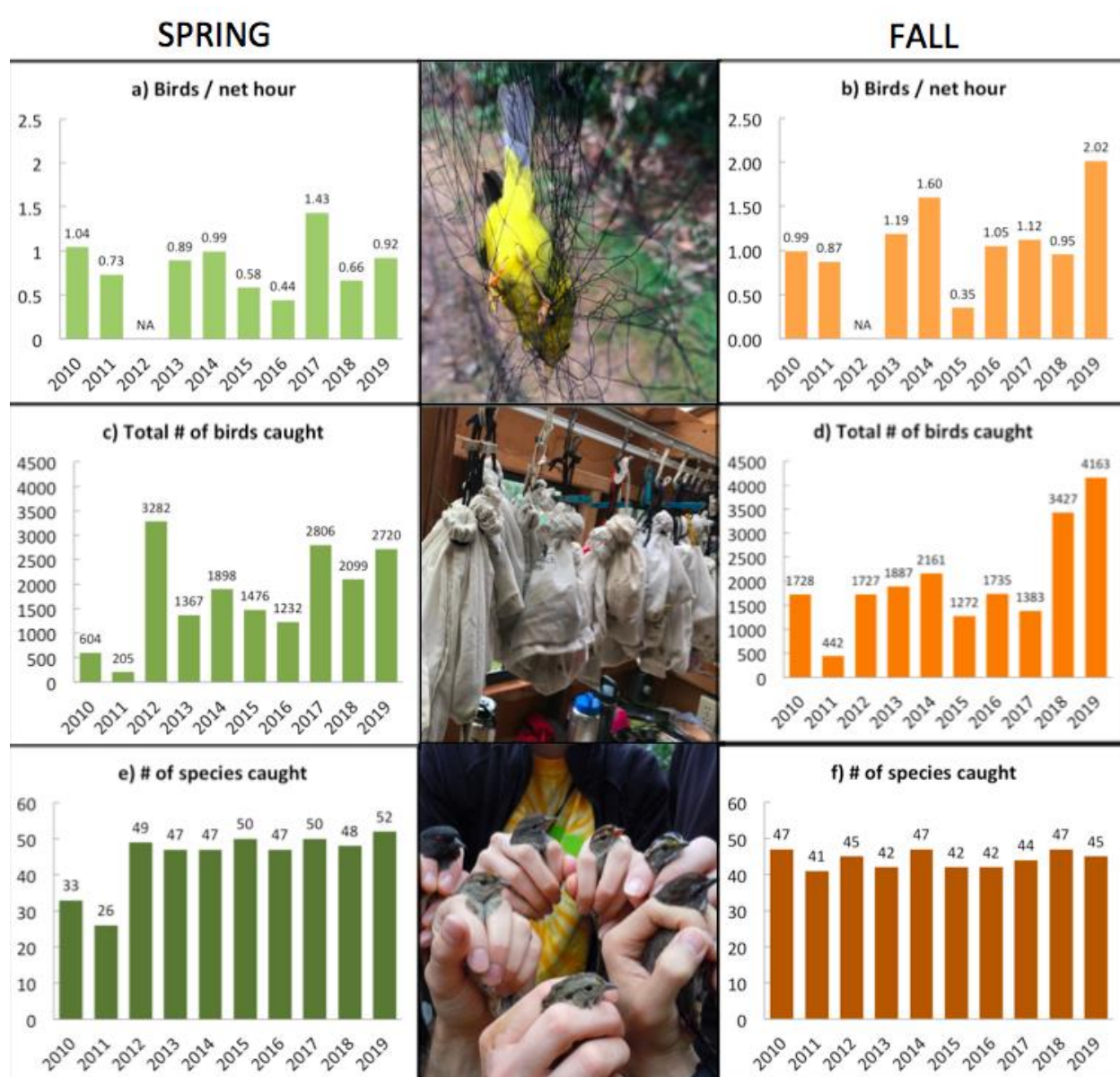


Figure 8. Birds per net hour, total number of birds caught, and number of species caught at IIBO in spring and fall banding seasons from 2010-2019.

An increase in total net hours in fall 2018 and fall 2019 corresponded with a jump in total capture numbers, as IIBO transitioned from operating 3 days a week for 10 weeks to daily for 6 weeks straight (Figure 8). In terms of birds per net hour, the 2018 SMMP was our second-slowest spring season after 2015. In contrast, fall of 2019 was by far the busiest season to date. This also made 2019 the busiest year overall for IIBO with

6883 birds processed. The 2019 SMMP also broke the 2015 and 2017 species richness record of 50 species, with a total of 52 species caught (including subspecies).

### Commonly Captured Species

During the spring, Wilson's and Audubon's Warbler are consistently the top-captured species at IIBO, and the 2018 and 2019 SMMPs were no exception (Table 1). Yellow Warbler and Orange-crowned Warbler are often among the top two species in the fall season, and 2018 and 2019 FMMPs retained this pattern as warbler-heavy years (Table 2). In contrast, years such as 2011, 2015, and 2017 had Fox Sparrows and Song Sparrows as the top two commonly captured species.

Rank	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
1	Wilson's Warbler	Violet-green Swallow	Audubon's Warbler	Wilson's Warbler	Wilson's Warbler	Wilson's Warbler	Wilson's Warbler	Wilson's Warbler	Wilson's Warbler	Audubon's Warbler
2	Orange-crowned Warbler	Audubon's Warbler	Myrtle Warbler	Yellow Warbler	Audubon's Warbler	Orange-crowned Warbler	Rufous Hummingbird	Orange-crowned Warbler	Ruby-crowned Kinglet	Wilson's Warbler
3	Ruby-crowned Kinglet	Song Sparrow	Wilson's Warbler	Orange-crowned Warbler	Myrtle Warbler	Audubon's Warbler	Orange-crowned Warbler	Ruby-crowned Kinglet	Orange-crowned Warbler	Orange-crowned Warbler
4	Lincoln's Sparrow	Red-winged Blackbird	Orange-crowned Warbler	Myrtle Warbler	Orange-crowned Warbler	Myrtle Warbler	Common Yellowthroat	Audubon's Warbler	Common Yellowthroat	Myrtle Warbler
5	Audubon's Warbler	Tree Swallow	Ruby-crowned Kinglet	Audubon's Warbler	Ruby-crowned Kinglet	Yellow Warbler	Lincoln's Sparrow	Yellow Warbler	Lincoln's Sparrow	Common Yellowthroat

Table 1. Top 5 species monitored during the Spring Migration Monitoring Programs over the past 10 years.

Rank	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
1	Yellow Warbler	Fox Sparrow	Yellow Warbler	Yellow Warbler	Yellow Warbler	Song Sparrow	Yellow Warbler	Fox Sparrow	Yellow Warbler	Yellow Warbler
2	Orange-crowned Warbler	Song Sparrow	Audubon's Warbler	Orange-crowned Warbler	Audubon's Warbler	Fox Sparrow	Ruby-crowned Kinglet	Song Sparrow	Orange-crowned Warbler	Orange-crowned Warbler



3	Common Yellowthroat	Yellow Warbler	Song Sparrow	Fox Sparrow	Myrtle Warbler	Golden-crowned Kinglet	Song Sparrow	Yellow Warbler	Ruby-crowned Kinglet	Ruby-crowned Kinglet
4	Lincoln's Sparrow	House Finch	Orange-crowned Warbler	Song Sparrow	Song Sparrow	Ruby-crowned Kinglet	Common Yellowthroat	Golden-crowned Sparrow	Common Yellowthroat	Song Sparrow
5	Wilson's Warbler	Lincoln's Sparrow	Fox Sparrow	Ruby-crowned Kinglet	Yellow-rumped Warbler	Yellow Warbler	Fox Sparrow	Orange-crowned Warbler	Wilson's Warbler	Audubon's Warbler

Table 2. Top 5 species monitored during the Fall Migration Monitoring Programs over the past 10 years.

### Interannual recaptures

There were a total of 113 inter-annual recaptures (birds banded in a prior season) in 2018 and 80 in 2019. Inter-annual recaptures made up 1.0 to 3.6 percent of total captures in the four seasons (Figure 10). Fox Sparrow, Common Yellowthroat, Song Sparrow, and Spotted Towhee were the most common inter-annual recaptures in both years (Figure 9). Of note, we recaptured a Spotted Towhee that was originally banded as a second-year male in 2010, making this a 10-year-old individual. Several other birds were also banded in 2012 to 2014 and were 4 to 7 years old when they were recaptured (Table 3).

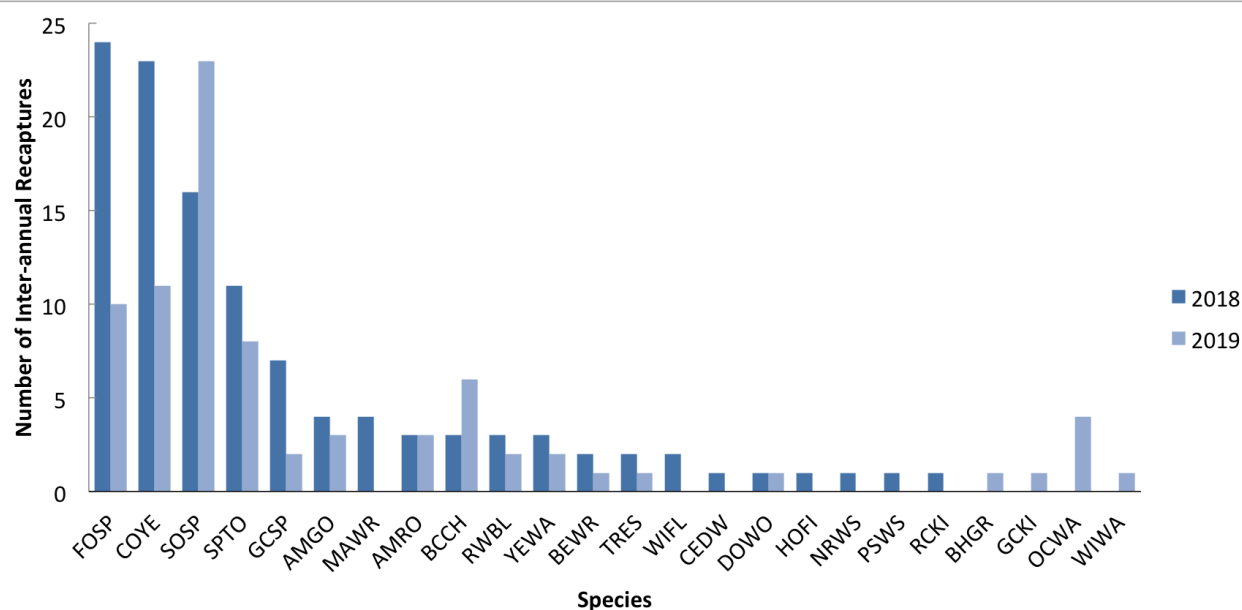


Figure 9. Inter-annual recaptures (birds banded in a past season) in 2018 and 2019 by species.

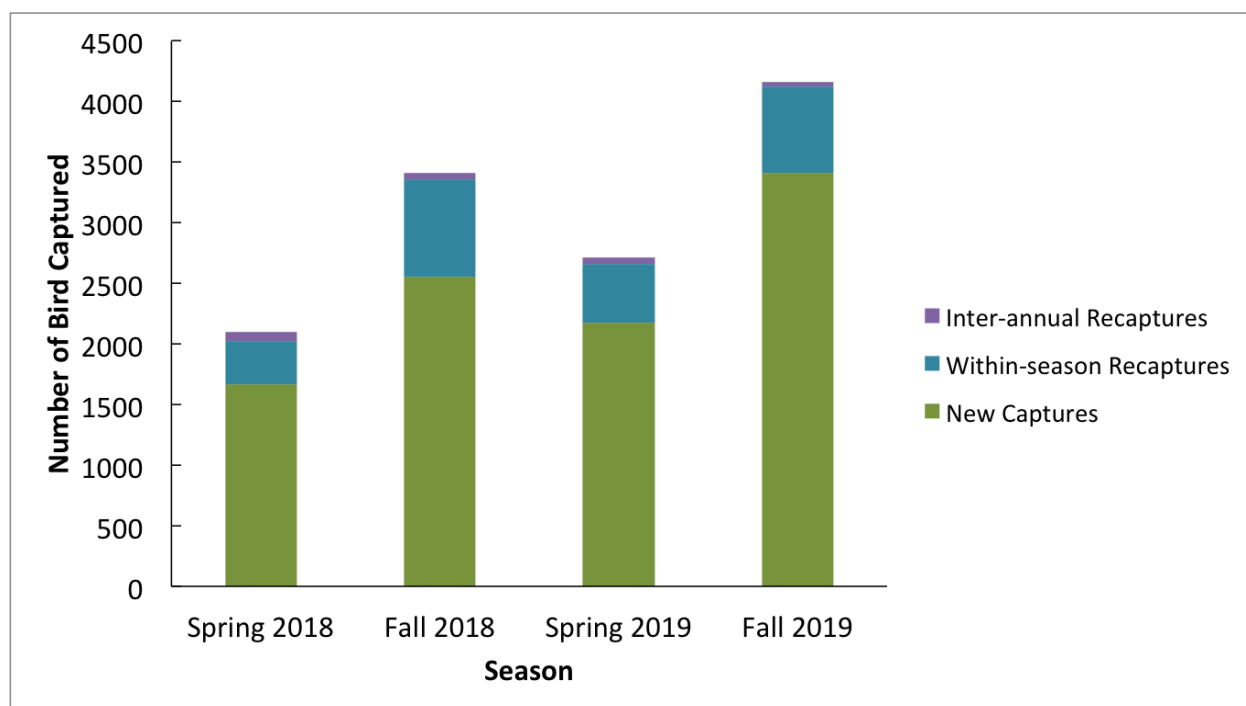


Figure 10. Inter-annual recaptures compared to total captures in spring and fall 2018 and 2019.

Band	Species	Year Returned	Original Capture Season	Age at Original Capture	Minimum Age at Recapture
8051-87233	Spotted Towhee	2018	Spring 2010	SY	9
<b>8051-87233</b>	<b>Spotted Towhee</b>	<b>2019</b>	<b>Spring 2010</b>	<b>SY</b>	<b>10</b>
2690-53240	Common Yellowthroat	2018	Spring 2012	SY	7
2531-29290	Spotted Towhee	2018	Spring 2013	HY	5
2531-29516	Fox Sparrow	2019	Fall 2013	HY	6
2710-66390	Common Yellowthroat	2018	Fall 2013	AHY	6
2531-29716	Spotted Towhee	2019	Spring 2014	HY	5
2581-79124	Song Sparrow	2019	Fall 2014	HY	5
2581-79124	Song Sparrow	2019	Spring 2014	HY	5
2581-79136	Song Sparrow	2018	Spring 2014	HY	4
2760-53357	Orange-crowned Warbler	2019	Spring 2014	HY	5

Table 3. Inter-annual recaptures originally captured in 2010-2014.

## Volunteer Contributions & Training programs



*At Doors Open Richmond, Andrew and Nisarg process our first bird of the weekend, a Song Sparrow.  
(Photo: Vinci Au)*

Apart from contracted banders, everyone who contributes time at IIBO during the migration monitoring programs does so as a volunteer. Collectively, 71 volunteers contributed to over 1687 hours in 2018. In 2019, 82 volunteers put in 2087 hours - a substantial increase from 2018.

In Spring 2018, 45 volunteers contributed 1072 hours, and in fall 2018 46 volunteers put in 615 hours, for a cross-season total of 71 volunteers and 1687 hours. During the 2019 SMMP, 57 volunteers logged 1420 hours, and 41 volunteers donated 677 hours in the fall, for a total of 2087 hours by 82 volunteers.

Training provided by experienced banders resulted in many beginner volunteers rising to intermediate and advanced training levels, ensuring the continued success of the migration monitoring programs at IIBO and allowing volunteers to gain practical biological field skills. Many of the volunteers had little to no previous experience banding birds and were very enthusiastic about the opportunity to be involved in banding, especially their first bird in the hand. Volunteers were aided in their learning by beginner and intermediate banding workshops hosted each year by WildResearch.

## 2018-2019 Banding Workshops

### Spring 2018 Beginner's Bird Banding Workshop



*Comparison between a SY and an ASY of Yellow-rumped Warbler, Audubon's subspecies for the Beginner's Banding Workshop (Photo: Constanza Rivas).*

We kicked off spring at IIBO with a beginner banding workshop on April 14th where 24 keen WildResearch members started the morning at the station learning about the goals and results of bird banding, handling and extracting techniques and how to process birds. The attendees were given an extra special treat with the capture of a Northwestern Crow. Despite their common presence around the station, in the 8 years that IIBO has been operating only 2 have ever been caught due to their intelligence in avoiding the nets and their size and structure which allows them to bounce out of our mist nets. A little bit of luck meant this young, second year crow hit the net just as one of our banders was approaching during a net check. Though we did not have a large enough band to mark him, it was still quite the experience to get up close and personal with one of the most intelligent and locally successful species at Iona.



## Fall 2018 Intermediate Bird Banding Workshop



*Participants review aging specimens during the fall intermediate banding workshop.*

On Saturday, October 13th, WildResearch held an intermediate banding workshop. We had a total of 20 participants for this in-class workshop. We are very, very grateful and fortunate to have both Catherine Jardine and Ana Gonzalez (NABC-certified bander) leading the workshop. Both Catherine and Ana are experts in the ornithology field, and have been doing bird banding for over a decade. Ana gave an overview of molt theory with plenty of fantastic photographs of wings showing molt limits. Catherine then built on top of Ana's presentation and reviewed the Wolfe-Ryder-Pyle terminologies. As part of the workshop, we also had the privilege of using >100 bird specimens, over half of which are warblers. Participants were able to examine each specimen closely as the experts analyzed their wings and molt patterns with them. We would like to thank the Canadian Wildlife Service for providing us with these specimens.

## Spring 2019 Beginner's Bird Banding Workshop



*Beginner's Banding Workshop: Participants learning about molt analysis led by Catherine Jardine and Azim Shariff. (Photo credit: Andrew Huang)*

The 2019 season began with the Bird Banding Workshop on Sunday, April 14th. We had 27 participants this year eager to learn everything from handling their first bird, to fine tuning the aging process of a complex moult. It is really satisfying to see how birds, migration, and conservation are a universal passion for many nature enthusiasts. We started in the early morning, and after going over the basics of setting up mist-nets, the participant had the chance to practice handling, extracting, banding and aging birds. Luckily, the rain held off and we enjoyed a cloudy day that broke out into sun later on, producing the perfect conditions to capture a decent number of birds representing several species.

## Fall 2019 Intermediate Bird Banding Workshop

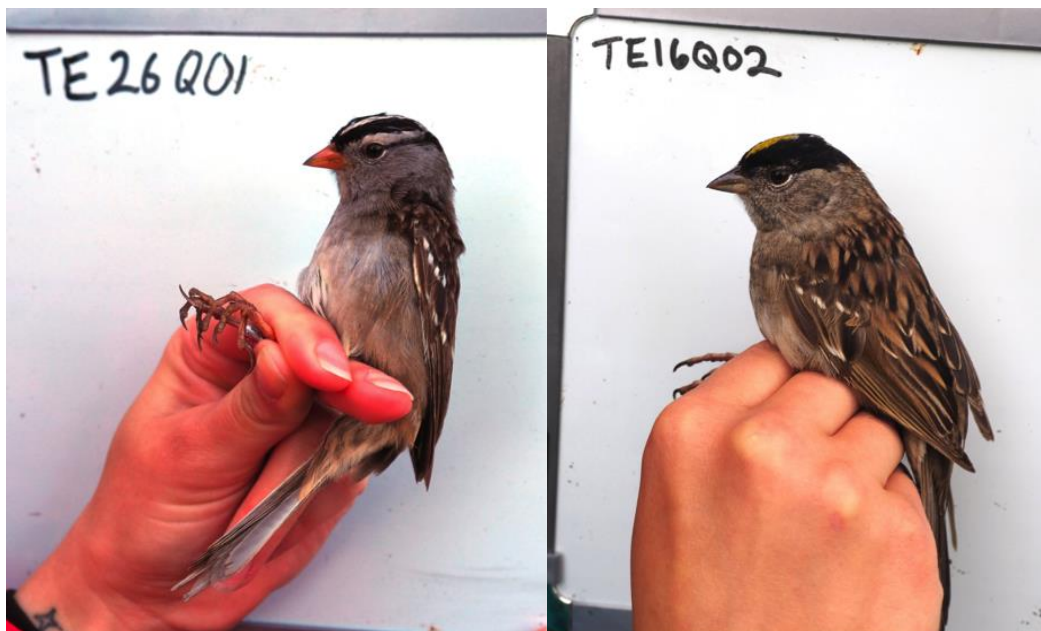


*Instructors Catherine Jardine and Julian Heavyside leading the workshop.*

This year we partnered with Wild Bird Trust to bring members an Intermediate Banding Workshop at Maplewood Flats on November 24, 2019. We had 12 participants who were taught by experts Catherine Jardine and Julian Heavyside. Attendees were invited to try their hand at aging and practice their knowledge of complex moults by looking at numerous wing mounts. As part of the workshop, we also had the privilege of using >100 bird specimens provided by the Canadian Wildlife Service, over half of which are warblers. Participants were able to examine each specimen closely as the experts analyzed their wings and molt patterns with them.



## Research Projects



*Quinn's study species, the White-crowned Sparrow (right) and Golden-crowned Sparrow (left) are closely related, but morphologically distinct. The resident pugetensis subspecies of White-crowned Sparrow are caught at Iona through most of the spring season, but the Golden-crowned Sparrows migrate North to breed early in the spring season (Photos: Quinn McCallum).*

As well as contributing to a general understanding of avian population trends, IIBO collaborates with local universities allowing students to pursue specific research projects. In 2019, two UBC students gathered data as part of the migration monitoring programs. Quinn McCallum compared the nuclear and mitochondrial genomes of the Golden-crowned Sparrow and White-crowned Sparrow to study their hybridization and speciation. Finola Fogarty studied patterns of genetic divergence and variation between the three subspecies of Orange-crowned Warbler.



*Finola's study species: orange-crowned warbler. The orestra subspecies (left) has grey head and white eye ring – they breed in the Rocky Mountains and interior of BC. The coastal lutescens subspecies (right) is entirely olive above with a yellow eye ring (Photo: Quinn McCallum).*

## Education & Outreach Programs



*David Bradley (Birds Canada) shows an American Robin to a visiting group in 2018.*

A key goal of the IIBO program is to provide public education and outreach on avian conservation. The 2018 and 2019 seasons were highly successful in this regard, nearly doubling the past season's number of visitors. In 2018, total station visitors increased to 505, from 201 in 2017. In 2019, we hit 961 visitors to the station. A large part of this expansion was due to collaboration with Birds Canada (David Bradley, Catherine Jardine, Kevin Devitt, James Casey, and Zoe Crysler). In 2019, we also connected with local outreach events held by City of Richmond (Doors Open Richmond) and Metro Vancouver Regional Parks (Wings Over Iona).

In spring of 2018, 268 people visited IIBO, including numerous park visitors, photographers, biologists from the Canadian Wildlife Service and the Canadian Environmental Assessment Agency, Nature Vancouver, UBC Sauder School of Business, Brockhaus Senior Center, Charles Dickens Annex Elementary, Sir Charles Tupper Secondary. Fall 2018 brought 237 more people by the station, including



numerous park visitors, photographers, attendees from the International Ornithological Congress (Taiwan, Sweden, Japan, Thailand, Germany, Australia), Air Canada (EnRoute Magazine), Patagonia, Metro Vancouver Regional Park, Darren Irwin's UBC Ornithology class, UBC Wildlife Society, Rockridge Secondary School, and Delta Field Naturalists.



*Left: Azim and Wren age a Yellow Warbler while a young visitor watches very closely (Photo: Vinci Au).  
Right: A Downy Woodpecker unimpressed with Jay.*

The 2019 SMMP drew 587 visitors to the banding station, including groups with Canadian Wildlife Service, Tupper Secondary, Nature Kids BC, UBC Wildlife Society, Vancouver Parks, and Dillon Consulting. Fall 2019 totalled 367 visitors, with banding demonstrations for Nature Vancouver, Oak Wisdom Learning, and the UBC Ornithology class.





*A momentous moment: Darren Irwin showing his fourth year UBC ornithology class a species he discovered through genomic and song analysis, the Pacific Wren (formerly lumped with Winter Wren as a single species ranging across Canada).*

## Acknowledgements

WildResearch could not operate IIBO without the dedicated contributions and enthusiasm of our volunteers. In particular, we would like to thank Brooklyn Hillman, Nisarg Chaudhari, Angela Bond, Cadi Schiffer, Allison Binley, Wren Peters, Suzanne Naaykens, Tatchai Titichetrakun, Donna MacKenzie, and Cole Gaerber who contributed the most volunteer hours during the 2018 and 2019 seasons.”

Metro Vancouver Regional Park has supported and facilitated the use of Iona Beach Regional Park for IIBO from 2010-2019. Big thanks to Iona Beach Regional Park Facilitators, Melanie Blendell for assistance with lane clearing, path upgrades, Markus Merkens, and Robyn Worcester, Parks West Area Natural Resource Management Specialist for permitting support.

WildResearch board members Andrew Huang and Azim Shariff served as IIBO Program Managers, putting in numerous hours behind-the-scenes to ensure the functioning of the station.

Our programs were made possible by funding received from City of Richmond, BC Nature, Canada Summer Jobs (Service Canada), and the Port of Vancouver. These contributions allowed for equipment purchase, and wages towards seasonally hired contractors (banded-in-charge and assistant banded). Because of the specialized work involved in bird banding, the success of the IIBO program continues to be tied to our ability to attract and hire knowledgeable and skilled contractors, who further advance membership training and community building at IIBO.

## Appendix A: 2018 Capture Data

**Table A1.** 2018 Spring Migration Monitoring Program Capture Data

Species	Species Code	New Captures	Number of Recaptures
American Goldfinch	AMGO	50	11
American Robin	AMRO	12	16
Anna's Hummingbird	ANHU	14	0
Audubon's Warbler	AUWA	74	3
Barn Swallow	BARS	3	0
Black-capped Chickadee	BCCH	0	7
Bewick's Wren	BEWR	0	9
Brown-headed Cowbird	BHCO	9	2
Brown Creeper	BRCR	2	0
Cedar Waxwing	CEDW	13	1
Common Yellowthroat	COYE	48	40
Downy Woodpecker	DOWO	1	2
Fox Sparrow	FOSP	29	27
Golden-crowned Kinglet	GCKI	29	6
Golden-crowned Sparrow	GCSP	63	12
White-crowned Sparrow, Gambel's subspecies	GWCS	1	0
Hammond's Flycatcher	HAFL	2	2
Hermit Thrush	HETH	22	3
House Finch	HOFI	25	3
House Wren	HOWR	1	0
Lincoln's Sparrow	LISP	83	5
Marsh Wren	MAWR	14	11
MacGillivray's Warbler	MGWA	16	0
Myrtle Warbler	MYWA	41	4
Northern Rough-winged Swallow	NRWS	13	1
Northern Saw-whet Owl	NSWO	1	0
Orange-crowned Warbler	OCWA	122	20
Oregon Junco	ORJU	14	3
Pacific Wren	PAWR	6	0
Pacific Slope Flycatcher	PSFL	10	0
White-crowned Sparrow, Puget Sound subspecies	PSWS	37	4
Ruby-crowned Kinglet	RCKI	139	68



Rufous Hummingbird	RUHU	48	0
Red-winged Blackbird	RWBL	8	4
Savannah Sparrow	SAVS	14	0
Slate-colored Junco	SCJU	1	0
Song Sparrow	SOSP	20	35
Spotted Towhee	SPTO	5	15
Swainson's Thrush	SWTH	8	0
Tree Swallow	TRES	25	8
Yellow-rumped Warbler, Unknown subspecies	UYRW	10	1
Violet-Green Swallow	VGSW	16	0
Warbling Vireo	WAVI	5	0
White-crowned Sparrow	WCSP	3	0
Willow Flycatcher	WIFL	1	0
Wilson's Warbler	WIWA	629	99
Yellow Warbler	YEWA	43	6
White-crowned X Golden Crowned Sparrow Hybrid	ZSHY	2	1

Table A2. 2018 Fall Migration Monitoring Program Capture Data

Species	Species Code	New Captures	Number of Recaptures
American Goldfinch	AMGO	7	0
American Robin	AMRO	9	4
Anna's Hummingbird	ANHU	8	0
Audubon's Warbler	AUWA	19	1
Barn Swallow	BARS	3	0
Black-capped Chickadee	BCCH	17	22
Bewick's Wren	BEWR	1	1
Black-headed Grosbeak	BHGR	1	0
Brown Creeper	BRCR	3	7
Black-throated Gray Warbler	BTYW	7	0
Cedar Waxwing	CEDW	12	1
Common Yellowthroat	COYE	135	77
Downy Woodpecker	DOWO	3	3
European Starling	EUST	2	0
Fox Sparrow	FOSP	73	40
Golden-crowned Kinglet	GCKI	141	7
Golden-crowned Sparrow	GCSP	38	14
Hermit Thrush	HETH	33	11
House Finch	HOFI	4	0
Lincoln's Sparrow	LISP	124	10
Marsh Wren	MAWR	17	2
MacGillivray's Warbler	MGWA	14	9
Myrtle Warbler	MYWA	17	0
Nashville Warbler	NAWA	3	0
Northern Waterthrush	NOWA	2	0
Orange-crowned Warbler	OCWA	247	44
Oregon Junco	ORJU	11	1
Pacific Wren	PAWR	63	3
Pacific Slope Flycatcher	PSFL	18	2
White-crowned Sparrow, Puget Sound Subspecies	PSWS	128	17
Purple Finch	PUFI	2	0
Ruby-crowned Kinglet	RCKI	175	54
Savannah Sparrow	SAVS	14	0
Slate-colored Junco	SCJU	3	1

Song Sparrow	SOSP	107	43
Spotted Towhee	SPTO	43	20
Swainson's Thrush	SWTH	5	2
Traill's Flycatcher	TRFL	16	2
Virginia Rail	VIRA	1	0
Warbling Vireo	WAVI	46	30
Western Tanager	WETA	1	0
Willow Flycatcher	WIFL	39	34
Wilson's Warbler	WIWA	97	62
White-throated Sparrow	WTSP	5	1
Yellow Warbler	YEWA	829	330
Yellow-headed Blackbird	YHBL	1	0
Unknown Yellow-rumped Warbler	UYRW	6	0

## Appendix B: 2019 Capture Data

Table B1. 2019 Spring Migration Monitoring Program Capture Data

Species	Species Code	New Captures	Number of Recaptures
American Goldfinch	AMGO	55	22
American Robin	AMRO	8	13
Anna's Hummingbird	ANHU	9	0
Audubon's Warbler	AUWA	521	53
Barn Swallow	BARS	2	0
Black-capped Chickadee	BCCH	8	18
Bewick's Wren	BEWR	1	0
Brown-headed Cowbird	BHCO	6	4
Black-headed Grosbeak	BHGR	7	13
Black-throated Gray Warbler	BTYW	2	0
Calliope Hummingbird	CAHU	2	
Cedar Waxwing	CEDW	26	2
Chipping Sparrow	CHSP	1	0
Common Yellowthroat	COYE	94	62
Downy Woodpecker	DOWO	2	2
Dusky Flycatcher	DUFL	1	0
European Starling	EUST	7	0
Fox Sparrow	FOSP	8	5

Golden-crowned Kinglet	GCKI	33	9
Golden-crowned Sparrow	GCSP	28	3
White-crowned Sparrow, Gambel's subspecies	GWCS	1	0
Hammond's Flycatcher	HAFL	3	1
Hermit Thrush	HETH	33	8
House Finch	HOFI	9	0
House Wren	HOWR	1	0
Lincoln's Sparrow	LISP	120	19
Marsh Wren	MAWR	10	5
MacGillivray's Warbler	MGWA	18	2
Myrtle Warbler	MYWA	155	23
Northern Rough-winged Swallow	NRWS	14	1
Orange-crowned Warbler	OCWA	184	38
Oregon Junco	ORJU	9	1
Pacific Wren	PAWR	5	0
Pacific Slope Flycatcher	PSFL	7	0
White-crowned Sparrow, Puget Sound subspecies	PSWS	17	3
Purple Finch	PUFI	1	0
Ruby-crowned Kinglet	RCKI	116	22
Rufous Hummingbird	RUHU	95	0
Red-winged Blackbird	RWBL	28	6
Savannah Sparrow	SAVS	12	0
Song Sparrow	SOSP	27	59
Spotted Towhee	SPTO	7	29
Swamp Sparrow	SWSP	2	1
Swainson's Thrush	SWTH	14	5
Townsend's Warbler	TOWA	2	0
Tree Swallow	TRES	13	4
Yellow-rumped Warbler, Unknown subspecies	UYRW	61	6
Violet-Green Swallow	VGSW	40	1
Warbling Vireo	WAVI	18	0
Willow Flycatcher	WIFL	5	5
Wilson's Warbler	WIWA	377	89
Yellow Warbler	YEWA	56	11



**Table B2.** 2019 Fall Migration Monitoring Program Capture Data

<b>Species</b>	<b>Species Code</b>	<b>New Captures</b>	<b>Number of Recaptures</b>
American Goldfinch	AMGO	12	1
American Robin	AMRO	5	2
Anna's Hummingbird	ANHU	10	0
Audubon's Warbler	AUWA	202	8
Barn Swallow	BARS	2	0
Black-capped Chickadee	BCCH	17	19
Bewick's Wren	BEWR	6	8
Brown Creeper	BRCR	4	2
Black-throated Gray Warbler	BTYW	3	1
Bushtit	BUSH	6	1
Cedar Waxwing	CEDW	36	2
Cooper's Hawk	COHA	2	0
Common Yellowthroat	COYE	127	32
Downy Woodpecker	DOWO	2	2
Fox Sparrow	FOSP	110	31
Golden-crowned Kinglet	GCKI	142	14
Golden-crowned Sparrow	GCSP	52	5
Hermit Thrush	HETH	46	27
House Finch	HOFI	26	0
Lazuli Bunting	LAZB	1	1
Lincoln's Sparrow	LISP	105	5
Marsh Wren	MAWR	17	0
MacGillivray's Warbler	MGWA	9	7
Myrtle Warbler	MYWA	192	4
Orange-crowned Warbler	OCWA	340	47
Oregon Junco	ORJU	13	0
Pacific Wren	PAWR	29	2
Pacific Slope Flycatcher	PSFL	18	0
White-crowned Sparrow, Puget Sound Subspecies	PSWS	63	1
Purple Finch	PUFI	12	0
Ruby-crowned Kinglet	RCKI	300	51
Red-winged Blackbird	RWBL	3	0
Savannah Sparrow	SAVS	17	0
Song Sparrow	SOSP	209	90
Spotted Towhee	SPTO	72	28

Swamp Sparrow	SWSP	1	0
Swainson's Thrush	SWTH	14	15
Townsend's Warbler	TOWA	3	0
Traill's Flycatcher	TRFL	21	3
Varied Thrush	VATH	3	0
Warbling Vireo	WAVI	62	59
White-crowned Sparrow	WCSP	3	0
Western Tanager	WETA	2	0
Willow Flycatcher	WIFL	13	4
Wilson's Warbler	WIWA	27	18
White-throated Sparrow	WTSP	1	0
Yellow Warbler	YEWA	1010	261
Unknown Yellow-rumped Warbler	UYRW	51	1