



Iona Island Bird Observatory Protocol

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Introduction

Bird populations across North America have been declining, resulting in many avian species listed as conservation concern. Long-term Monitoring programs, such as the Canadian Migration Monitoring Network (CMMN), Monitoring of Avian Productivity and Survivorship (MAPS), and Breeding Bird Survey (BBS) can help to identify large scale population trends for a variety of species, helping direct conservation actions where and when it is needed most. One of the most important aspects of a successful migration monitoring program is a network of stations, each following a standardized protocol so that data gathered at multiple individual migration monitoring stations can be analyzed together. The purpose of the Iona Island Bird Observatory (IIBO) Protocol is to provide instructions for operating the station in a safe, efficient, and consistent manner. All staff and volunteers participating in IIBO monitoring activities are required to read this protocol prior to participating to ensure bird and volunteer safety and that data are collected in a consistent and efficient manner.

Observatory Objectives

The primary objective of IIBO is to monitor bird species that breed, migrate through, and winter on the Pacific coast of British Columbia. In British Columbia there are 108 species of birds that are listed as 'of conservation concern' provincially or federally. However, accessibility impedes monitoring across much of the province. Standardized monitoring of birds during migration can be used to examine populations that cannot be tracked on their breeding or wintering grounds. The Iona Island Bird Observatory (IIBO), located in Iona Beach Regional Park, Richmond, BC, is ideally situated to monitor migratory species that make use of the Pacific flyway. With a diversity of habitats in a small area and bordered by city and ocean on either side, IIBO provides a unique opportunity to monitor both migrating and wintering birds.

Monitoring programs that track bird populations require trained personnel. IIBO strives to provide training in bird identification, banding, and monitoring so that programs at IIBO are conducted effectively and participants can transfer their skills to other projects around the world. IIBO welcomes anyone who is interested in bird banding and monitoring to volunteer and receive training.

An informed and concerned public is essential to ensure that conservation problems are identified and that solutions are implemented. IIBO, located within the highly populated Metro Vancouver area, represents an opportunity to educate the public about birds and avian conservation.

Observatory Location

IIBO is located in Metro Vancouver, British Columbia in Iona Beach Regional Park near the Vancouver International Airport (Figure 1). To access the observatory, make your way to the main terminal at Vancouver International Airport (YVR) and turn north onto Templeton Street towards the Templeton Skytrain Station ~1km east of the YVR main terminal. Follow Templeton Street as it turns west and becomes Ferguson Road. After ~2km it will turn north again, cross a causeway, and then turn west immediately before the vehicle access gate to the sewage treatment facility. You will come to a yellow gate next to a sign for Iona Beach Regional Park. The Bander-In-Charge (BIC) will be provided a key for this gate but all other volunteers will need to wait here to be admitted to the park. Once the gate has been opened proceed west along the road until it turns north into the parking lot. Drive to the far north end of the lot and park. The BIC will ensure that the gate is closed and locked behind all station visitors and volunteers. (note: the public can drive in after the gates are opened at 7:00 – 8:00 am). From the parking lot proceed on foot ~70m north until you come to a path that leads east between the two ponds. Follow this path ~230m until you reach a small hut. This is the banding hut and all banding operations are carried out from here (49.22°N, -123.21°W).

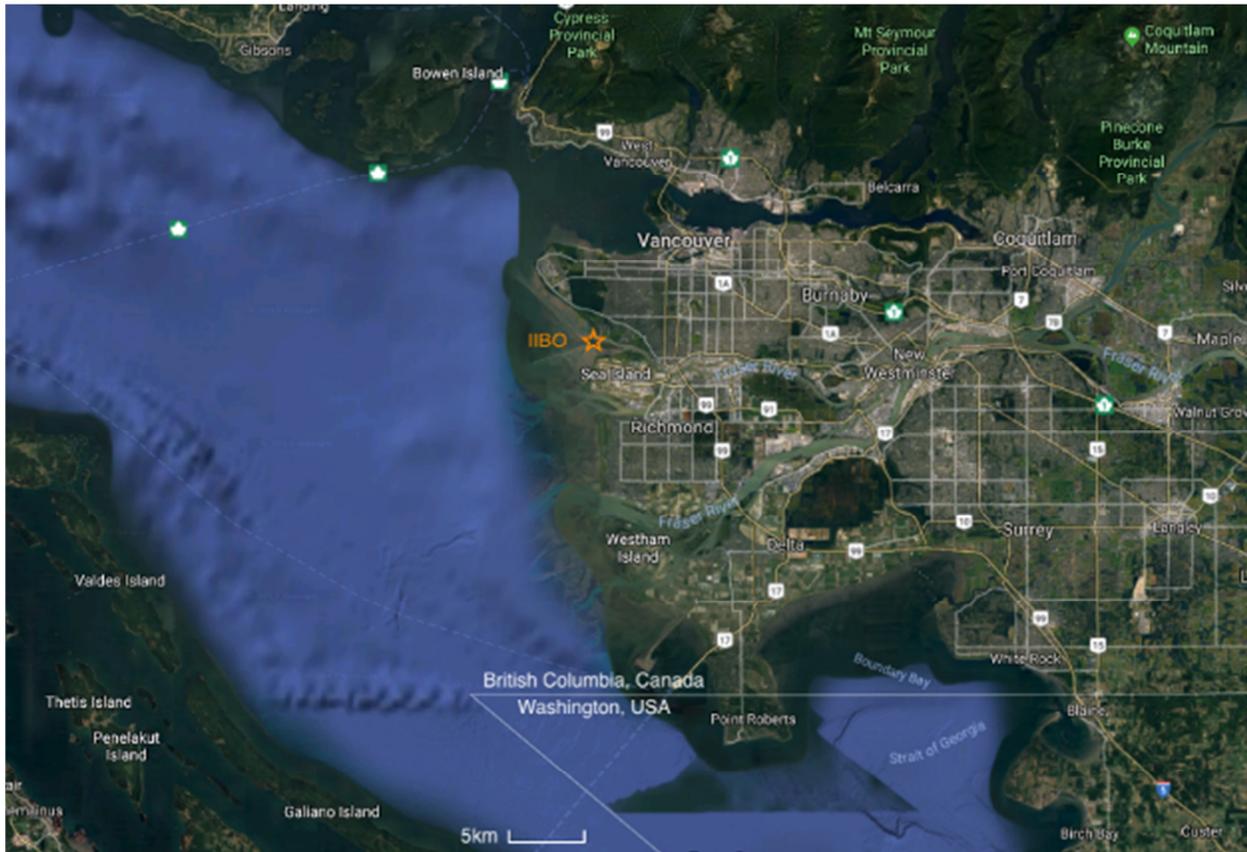


Figure 1. Location of the Iona Island Bird Observatory.

The station provides no accommodation but a 3 m X 3.5 m, temporary, structure provides some shelter from the elements.

Programs

Three core programs operate at IIBO (Table 1). Additional banding and other research programs may operate at IIBO periodically. The dates and coverage represent ideal start and end dates and maximum coverage for each program, though these values may vary due to weather conditions. Core dates are April 15 – May 31 for the Spring Migration Monitoring Program (SMMP) and the last week of August – the first week of October for the Fall Migration Monitoring Program (FMMP). Coverage should strive to achieve the target amounts summarized in Table 1. However, weather and other factors may result in a lower level of coverage. During both spring and fall migration point counts are conducted daily (page 24). Core dates for Winter Survivorship Monitoring (WSMP) are November 1 – March 31.

Table 1. Potential start and end dates for core Iona Island Bird Observatory programs.

Program	Start Date	End Date	Target Coverage Amount
Winter Survivorship Monitoring Program (WSMP)	November 1	March 31	4 Days per Month
Spring Migration Monitoring Program (SMMP)	April 15	May 31	Daily
Fall Migration Monitoring Program (FMMP)	Last week of August	First week of October	Daily

Spring and Fall Migration Monitoring Programs (SMMP/FMMP)

The migration monitoring programs conducted at IIBO strive to address questions related to stopover ecology, migration timing, and population trends of migratory landbirds on the pacific flyway. To do this we use point counts, incidental observations, and banding data.

Winter Survivorship Monitoring Programs (WSMP)

Data gathered during winter monitoring will be used to address questions related to songbird survivorship, impacts of habitat restoration and population trends of species that winter in Metro Vancouver. Standard banding is conducted for WSMP but point counts and Daily Estimated Totals are not carried out/calculated.

Staffing

During all bird banding operations, a Bander-in-Charge (BIC) with a valid master permit or sub-permit for banding must always be present and is responsible for ensuring adherence to this protocol. Point counts do not require a BIC but need to be completed by observers able to identify at least 90% of the birds present by sight, song, and call. Additional volunteers should be present to ensure that programs operate efficiently. Volunteers of all levels of experience are welcomed at IIBO as one of the observatory goals is to provide training in bird identification, banding, and monitoring. There is no maximum number of volunteers that may be present at IIBO. However, the number of volunteers, especially new or inexperienced, may be limited to ensure that bird safety is ensured and volunteers optimize their learning experience.

Lack of Staff Protocol:

A minimum number of volunteers required, in addition to the paid BIC and Assistant, to allow for all operations to be carried out, is highly variable and depends on volume of birds. So, regular net operation and standard banding procedures will be prioritized where there aren't enough volunteers to carry out point counts. If the volume of birds is low enough, the BIC or Assistant can carry out point counts, but should remain in radio contact. If there are too few volunteers to run standard banding operations, some nets will be closed according to best judgement of the BIC and a subset of nets will be used.

Volunteer Training

One responsibility of the BIC, along with the safety of birds captured and quality of the data gathered, is volunteer training. Volunteers new to banding will receive comprehensive training to provide them with the skills in bird identification, bird banding, and bird monitoring techniques. Volunteers must read the monitoring protocol and the North American Banders Study Guide prior to their first day of volunteering. Volunteers should also familiarize themselves with the commonly detected birds at IIBO to help facilitate their training. There is a list in the lab of commonly caught species, reference text pages, band sizes, skull dates, etc. It is recommended that volunteers bring binoculars, sturdy boots (either hiking or rubber), suitable clothing, and a snack.

The abilities of all volunteers will be assessed during their first visit to IIBO by the BIC according to our Volunteer Ranking System (below). All volunteers will need to demonstrate their bird handling, banding, and extraction abilities to the BIC prior to taking part in each of those activities.

First time volunteers will have the general and daily activities explained at the start of the day and will receive a tour from the BIC or an experienced volunteer. Volunteers new to banding will start their training by watching other volunteers prior to proceeding with hands-on training. Hands-on training starts with learning bird handling and measurement techniques. It is important that new banders learn first how to hold birds in the bander's grip (NABC 2001) and get comfortable with safely manipulating birds prior to processing their first bird. Volunteers should only learn additional ways of holding birds (i.e. photographer's grip, reverse grip, etc.) once they have demonstrated competence with bander's grip and with banding and processing birds. The BIC will directly guide the volunteer through their first few birds processed until the BIC feels that the volunteer is competent to learn under the guidance of other volunteers.

Once a volunteer has shown competency with bird handling, they will be trained to extract birds from mist-nets. Training will begin with the BIC and can continue with an advanced volunteer once the BIC determines that adequate skills have been demonstrated. Volunteers extracting birds at IIBO should preferentially use the safer *Body Grasp (Body Pluck) Method* (Ralph 2005) but will also be instructed in the *Feet First Method* (Smith et al. 1997). Volunteers should be familiar and comfortable with both *Bander's* and *Photographer's Grips* prior to learning how to extract.

Knowledge of both grips is ultimately the best for volunteers and the best method to use will depend on both the nature of entanglement and the species.

The health and safety of the birds captured at IIBO are the top priority for everyone at the station. Volunteers in training should expect that at least some of their extractions will be finished by a supervisor. It is the responsibility of both the extractor and supervisor to identify that this bird needs to be passed on to a more experienced volunteer or BIC to ensure the safe and efficient extraction of the bird. This may happen to anyone at the station and even the most experienced extractor should not let their ego get in front of passing a bird to someone else or cutting the net if they cannot quickly and safely extract a bird. As a rule, if a volunteer has made no progress with extracting a bird for 60 seconds, the BIC may take over to reduce further stress to the bird. After the BIC has decided that the volunteer is competent with extraction the volunteer may be left alone to extract birds and ultimately given the responsibility to lead net checks.

Some volunteers may not be comfortable banding, but still want to extract. This is acceptable, but every extractor still requires a significant amount of bird handling experience and practice with all commonly used grips and transitions (i.e. bander's grip, modified bander's grip, photographer's grip, passing from one hand to another, passing from one person to another, transitioning between grips, etc.) prior to extracting their first bird. These grips and manipulations will be learned and practiced under the supervision of the BIC at the banding hut. Because extraction is one of the more dangerous and difficult aspects of bird handling encountered at any banding station it is not acceptable at IIBO to begin training a volunteer on bird handling through extractions.

In addition to training in bird banding, volunteers will also receive training in bird identification and monitoring methods. Training in identification will be done when time permits, allowing volunteers to become skilled in their identification of the birds detected at IIBO. This is an important aspect of the IIBO migration monitoring programs including *Daily Estimated Totals* and *Point Counts*.

Volunteer Ranking System

At IIBO we categorize our volunteers into four competency levels: BIC, Advanced Trainee, Intermediate Trainee, and New Trainee (Table 2). Within each of these categories, volunteers are ranked according to their banding, extracting, and supervisory abilities. Volunteers may request at any point in their training to be re-evaluated if they feel they are ready to move to the next level. The BIC may also move volunteers up to the next level when they feel the volunteer has the appropriate skills. It is important that these are not experience levels, but assessment of an individual's abilities. The BIC should not feel pressured to assign a level of competency to a volunteer that they do not believe this volunteer possesses. If a volunteer is assigned a level too high for their abilities, bird safety and data quality are likely to be compromised. The *Volunteer*

Level (Table 2) is a guideline for setting daily limits of volunteers so that BICs are not overwhelmed with training duties on a given day. Ultimately, the activities someone is qualified to undertake (i.e. leading a net round, banding/extracting unsupervised, etc.) should not be identified by *Volunteer Level*, but instead by the specific bander, extraction, or supervision levels. BICs should be familiar with these categories and should constantly re-assess volunteer abilities.

Table 2. Banding, extraction, and supervision categories for each volunteer level at the Iona Island Bird Observatory.

Volunteer Level	Banding	Extraction	Supervision	Bird Identification
New Trainee	B0-B1	E0-E1	S0	ID0-ID1
Intermediate Trainee	B2-B3	E2	S0	ID1-ID2
Advanced Trainee	B4	E3-E4	S0	ID2-ID3
Bander-In-Charge	B4	E4	S1	ID3

Categories

Zero Categories (B0, E0, S0, ID0)

A volunteer who has no experience with said category. Not allowed to hold birds, extract, or band unless closely supervised by BIC (i.e. holding their first bird for release etc.).

Banding

Bander Trainee (B1):

A volunteer who is new to bird handling and banding. The volunteer has not handled/banded many birds and must have direct supervision with handling/banding from BIC.

New Bander (B2):

A volunteer who is comfortable handling birds and may band birds supervised by the BIC or B4 volunteer. Species, age, sex, and measurements should be checked for every bird.

Intermediate Bander (B3):

Volunteers who have banded several birds of multiple species and are comfortable with bird handling and banding. They can reliably identify expected identify species, age, sex birds, and take accurate measurements. They are allowed to band with minimal supervision but not independently and their ageing, sexing, and measurements should be periodically checked.

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Advanced Bander (B4):

A volunteer who is a competent bander and can band unsupervised. They have banded many birds, can accurately identify all expected species (and know techniques for identifying unknown, unexpected species), age/sex virtually all birds, and take all expected measurements. They are competent with skulling, taking additional measurements (e.g., tarsus, bill length/width, tail length, etc.), and using alternate grips. They are well versed in banding ethics, banding terminology, and this protocol.

Extraction

Extractor Trainee (E1):

A volunteer who is comfortable handling birds but has not extracted many birds and must have direct supervision for extraction from an S1 supervisor.

New Extractor (E2):

A volunteer who has received training in extraction and is comfortable with and understands the process but needs the BIC or an E3 volunteer to be nearby during extraction.

Intermediate Extractor (E3):

A volunteer who is able to extract most birds unsupervised and can lead net rounds.

Advanced Extractor (E4):

A volunteer who is able to extract and instruct on extraction of all birds of any taxa captured at IIBO.

Supervisors

Bander-in-Charge (S1):

Volunteers at the B4 /E4 level responsible for making sure all station protocols are adhered to. BICs can operate IIBO independently and have a master or sub-bird banding permit. BICs should be competent at training new volunteers with banding and extraction and possess sound judgment and reasoning to make tough decisions, independently. Complete familiarity with data recording and accuracy is required. The BIC is responsible for any problems that arise at IIBO under their supervision.

Bird Identification

New Birder (ID0):

A volunteer who can identify less than 50% of bird species heard or observed at IIBO.

Novice Birder (ID1):

A volunteer who can identify between 50% and 75% of bird species heard or observed at IIBO.

Intermediate Birder (ID2):

A volunteer who can identify between 75% and 90% of birds heard or observed at IIBO.

Advanced Birder (ID3):

A volunteer who can identify >90% of bird species heard or observed at IIBO. They are able to confidently carry out point counts surveys and have likely done so professionally.

Daily Operations

Net Operation

Mist-net Size

All mist-nets used at IIBO are 30 - 32 mm mesh and are 12 m long.

Net Locations

There are 14 mist-nets used at IIBO. Nets are located mostly around the woodlot at the northeast corner of the park with several nets between the two large ponds in the centre of the park (Figure 2; exact locations in Appendix 1).



Figure 2. Mist-net locations at the Iona Island Bird Observatory.

Standard Net Operating

Nets are to be opened at approximately 30 minutes prior to sunrise and closed 6 hours later (defined at Vancouver International Airport and found at <https://www.timeanddate.com/sun/canada/vancouver>). Nets will be opened and closed in approximately the same order to ensure they are all open for six hours. Because of historical net vandalism nets are not furled but taken down at the end of every day and set back up in the mornings. Setup should begin approximately an hour and a half before sunrise to ensure that all nets will be open at 30 minutes before sunrise. Net sticks should be placed at each end of every net and used to raise and lower nets at the beginning, end, and throughout the day. If the nets need to be opened and/or closed during the day due to inclement weather, predators, or bird volume then the time that they are opened and closed should be noted in the effort sheet (Table 9). Nets should be closed in the following weather conditions: temperatures below -3°C or above 25°C , wind strong enough to pose a health threat to birds in the net, and any kind of precipitation. Every net should be

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checked every 30 minutes or sooner if conditions necessitate. If net checks cannot be completed within a 30-minute period, all nets should be closed to allow captured birds to be processed and released in a timely manner before more birds are captured.

Net Checks

Only volunteers who have been given permission by the BIC may extract birds and only volunteers with *E3* extraction level or higher can run net checks (Table 2).

Volunteers should ensure that they have enough bird bags for the potential volume of birds on a net check. Numbers of birds have ranged from 0-100+ birds per net round. If numbered clothes pegs indicating net number have accumulated at the banding hut, take them with you to return to those nets as you do the check.

Nets should be checked in the following order 5, 4, 3, 2, 1, 6, 7, 14, 13, 12, 11, 10, 9, and 8. During the early spring and winter months water levels often rise around the banding station and some net lanes can become flooded (nets 7 and 14) resulting in a different check order because the normal loop is partially impassable. During these times a different order can be created to check the nets depending on which areas are flooded, but net-check order should remain consistent throughout the day.

Radios should be used by volunteers to communicate with each other, the banding hut, and the BIC regarding net checks and should report any issues encountered, help required, or updates requested during the net round. At least one charged and functioning radio should accompany each group extracting, the BIC, and the banding hut during a net check. These radios must all be turned on.

Extraction

If a bird is higher than chest level the mist-net should be pulled down using the blue net stick until the bird is at chest level to facilitate safe removal. Do not extract above your head. Always ensure that when the extraction is finished that the net is returned to its original height. When finished placing the bird in the bag, place the draw-string loop around your wrist or clip it on a carabiner clipped to a rope or other device around your neck and clip a numbered clothes peg on the string to indicate the net number in which the bird was captured. Never carry bags with birds simply by holding the string in your hand. If you were to trip the birds could drop and be hurt. If you do fall the birds should never hit the ground. The easiest way of doing this is to have the birds around your wrist or attached to your binocular strap or to a rope around your neck by a carabiner. If you are using the carabiner technique make sure that your binoculars are not bumping against the birds. Do not place a bag with a bird in your pocket, on a branch, or any other location when on a net check. If the bags with birds are causing problems with other extractions, pass them onto another person. Birds in bags should not leave your body until you hang them up in the banding hut. Only one bird per bag with no exceptions. Bags should be used only once then thrown into the laundry bin (kept underneath the banding counter).

During net rounds at least one person per group, should be carrying a seam ripper or crochet hook so assist with extractions, for the rare case that the net needs to be cut to safely extract the bird. Only a BIC or assistant should be cutting nets and all cut nets need to be reported to the BIC.

At the banding hut, all birds from a particular net round should be grouped together with priority birds, if applicable, moved to the front of the line. with a tag indicating the time when that round was done. If the birds cannot be processed within an hour of that time, they should be released unbanded.

Banding

Ensuring the health and safety of all birds captured is the number one priority at IIBO. Only volunteers who have been given permission by the BIC may band birds at IIBO. Banders should strive to minimize the handling time for each bird by processing birds on a first-in first-out basis with birds kept for no more than one hour after the start of the net check during which they were extracted. Exceptions to this may be made by the BIC and priority may be shifted to smaller, easily stressed, or recently fledged birds. In addition, young recently fledged birds, depending on the age, should be released near the net where they were caught. Birds that appear to be stressed, suffering from wing-strain, or any other health concerns can be held for up to a few hours in a dark, quiet place. There is an insulated soft lunch kit at the station for this purpose. Birds that are recovering will be labelled with the time they were placed back into a bird bag for holding and checked every 15-30 mins. At each check, the BIC will decide whether the bird should be released, taken to a qualified wildlife rehabilitation facility, or euthanized in accordance with Animal Care Committee of Canada guidelines.

As bird bags are emptied, put them into the container for bags to be laundered before re-use.

Banding Data

IIBO uses a direct data entry system (Figure 3). For each bird banded the following data should be recorded: band number, species, age (Table 3), how aged (Table 4), molt cycle, sex, how sexed (Table 4), wing chord (mm, wing unflattened), fat (Table 7), skull (Table 8 and Figure 4), weight (g), capture time (to the nearest 10 minutes, always in local time), date, net number, bander initials, breeding characteristics, flight feather molt (Table 5), body molt, and any relevant comments. If many birds are waiting to be banded certain data fields can be dropped (i.e. wing, fat, weight), however, the band number, species, age, and sex of each bird banded must be recorded. Banding data are to be recorded electronically onto the station laptop. After each measurement/determination is called out by the bander, it should be repeated by the scribe as it is entered, to reduce error rate.

If the laptop cannot be used banding data should be recorded into the banding binder. This binder must always have plenty of extra blank data sheets in the case that the issues arise with the computer or data entry program. The species codes to be used are those accepted by the Bird Banding Office (do not use BC provincial bird codes). If in doubt about a bird code refer to Peter Pyle's Identification Guide to North American Birds (Pyle 1997) and a laminated cheat sheet in the banding hut.

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	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
	Band Number	Net Check Time	Net#	Species	Wing cord	Fat	Sex	How Sexed	Age	How aged	Skull	Mass	Day	Month	Year	Banders
1	2790-27123	6:40	6	ROCK	59	3	M	P	SY	P		6.5	15	APRIL	2017	MOQ
2	2790-27124	6:40	8	ROCK	59	1	M	P	SY	P		6.4	15	APRIL	2017	MOQ
3	2790-27125	8:10	12	ROCK	58	1	M	P	ASY	P		6.5	15	APRIL	2017	KAS
4	2790-27126	11:10	10	MYWA	77	4	M	P	ASY	P		17.3	15	APRIL	2017	KAS
5	2790-27127	11:10	12	GOKI	54	3	M	P	ASY	P		6.1	15	APRIL	2017	CSL
6	2790-27128	11:50	8	ROCK	55	3	M	P	SY	P		6.6	15	APRIL	2017	MOQ
7	2790-27129	12:10	4	ROCK	55	3	F	P	SY	P		7.2	15	APRIL	2017	JSG
8	2790-27130	12:10	8	ROCK	54	4	F	P	SY	L		6.5	15	APRIL	2017	KAS
9	2790-27131	6:20	2	FWWR	45	1	U		AHY			9.1	15	APRIL	2017	CSL
10	2790-27132	6:50	1	ROCK	64	3	M	P	ASY	L		7.4	16	APRIL	2017	ABB
11	2790-27133	6:50	8	ROCK	56	3	M	P	SY	P		7.0	16	APRIL	2017	ABB
12	2790-27134	6:50	8	AUWA	74	2	M	P	ASY	LP		14.3	16	APRIL	2017	ABB
13	2790-27135	6:50	1	ROCK	59	2	M	P	AHY			6.5	16	APRIL	2017	ABB
14	2790-27136	6:50	1	ROCK	53	1	M	P	SY	P		6.7	16	APRIL	2017	AAS
15	2790-27137	7:20	4	ROCK	61	3	M	P	ASY	PL		6.7	16	APRIL	2017	AAS
16	2790-27138	7:50	4	ROCK	59	2	M	P	ASY	P		6.4	16	APRIL	2017	CSL
17	2790-27139	8:20	8	ROCK	59	3	M	P	ASY	P		7.5	16	APRIL	2017	AAS
18	2790-27140	8:20	8	ROCK	59	3	M	P	SY	P		6.8	16	APRIL	2017	AAS
19	2790-27141	8:20	8	ROCK	61	2	M	P	ASY	P		6.9	16	APRIL	2017	AAS
20	2790-27142	8:20	10	ROCK	60	3	M	P	ASY	P		7.1	16	APRIL	2017	AAS
21	2790-27143	8:20	2	ROCK	57	3	F	P	SY	P		6.5	16	APRIL	2017	AAS
22	2790-27144	8:50	3	ROCK	56	1	F	P	SY	P		6.7	16	APRIL	2017	CSL
23	2790-27145	9:20	4	AUWA	77	2	M	P	ASY	P		14.4	16	APRIL	2017	ABB
24	2790-27146	9:20	10	ROCK	59	0	M	P	ASY	P		7.3	16	APRIL	2017	ABB
25	2790-27147	9:20	1	ROCK	57	0	M	P	ASY	P		6.6	16	APRIL	2017	ABB
26	2790-27148	9:50	1	ROCK	55	4	M	P	SY	P		7.3	16	APRIL	2017	AAS
27	2790-27149	9:50	1	GOKI	54	2	M	P	ASY	P		5.8	16	APRIL	2017	AAS
28	2790-27150	9:50	1	ROCK	62	2	M	P	ASY	P		7.8	16	APRIL	2017	AAS
29	2790-27151	9:50	10	ROCK	62	3	M	P	ASY	P		7.5	16	APRIL	2017	AAS
30	2790-27152	9:50	6	ROCK	58	4	M	P	SY	P		7.7	16	APRIL	2017	AAS
31	2790-27153	9:50	10	MYWA	73	3	M	P	SY	P		14.3	16	APRIL	2017	AAS
32	2790-27154	10:20	2	AUWA	71	4	F	P	SY	P		12.8	16	APRIL	2017	AAS
33	2790-27155	10:20	8	ROCK	60	0	M	P	ASY	P		7.1	16	APRIL	2017	CSL
34	2790-27156	10:20	8	ROCK	60	1	M	P	ASY	P		7.2	16	APRIL	2017	CSL
35	2790-27157	10:20	10	ROCK	58	4	M	P	SY	P			16	APRIL	2017	AAS
36	2790-27158	10:50	11	ROCK	57	4	M	P	SY	P		7.1	16	APRIL	2017	CSL
37	2790-27159	11:20	1	ROCK	56	2	M	P	SY	P		7.0	16	APRIL	2017	CSL
38	2790-27160	11:50	10	GOKI	55	3	M	P	SY	P		6.4	16	APRIL	2017	ARR
39	2790-27161	11:50	3	ROCK	53	3	F	P	SY	P		6.5	16	APRIL	2017	ABB
40	2790-27162	11:50	6	ROCK	56	4	F	P	ASY	P		6.8	16	APRIL	2017	ABB

Figure 3. Example of banding and effort data entry in excel.

Age and Sex

The age of the bird captured should be written following the alpha code system accepted by the banding data submission program (Table 3). The sex of the bird is noted in using single letter codes M (male), F (female), or U (unknown). Table 4 details the codes for describing how the bird was aged and/or sexed, and these are posted at the banding hut. If a molt limit is detected, then the location of this limit will be noted in the 'Molt Limit' column (Table 5).

Table 3. Numeric age classes and descriptions for birds.

Numeric Age Class	Alpha Translation	Description
U	Unknown	A bird of an unknown age and may only be used after the breeding season and December 31 st .
L	Local	A young bird incapable of sustained flight, i.e. local to the banding area.
HY	Hatch-year	A bird hatched in the calendar year it was banded.
AHY	After hatch-year	A bird hatched before the calendar year it was banded.
SY	Second-year	A bird known to have hatched in the previous calendar year in which it was banded.
ASY	After second-year	A bird known to have hatched in an earlier year than the year prior to the year it was banded, i.e. hatched 2009 and in banded 2011
TY	Third-year	A bird known to have hatched in the calendar year two years prior to the year it was banded.
ATY	After third-year	A bird known to have hatched prior to two years prior to the year of banding, now in at least its fourth calendar year of life

Table 4. Alpha codes describing how captured birds are aged or sexed.

CODE	DESCRIPTION
BP	Brood patch
BU	Bursa of Fabricius
CC	Comb. characters
CL	Cloaca
EY	Eye color
FB	Fault bar
FF	Flight feather condition/color
IC	Inconclusive/Conflicting
LP	Molt limit present
MB	Mouth/bill
MR	Actively-molting remiges
NA	Not attempted
NF	Nestling recently fledged
NL	No molt limit
NN	Nestling/downy young
OT	Other
PC	Pp cov wear/shape
PL	Body Plumage
RC	Re-captured
SK	Skull
TS	Tail shape or wear

Table 5. Alpha codes for molt limits in birds.

Molt Limit Code	Area of Molt Limit
G	Within Greater Coverts
R	Within Primary Coverts
A	Within Alulas
C	Between Carpal Covert and Greater Coverts
P	Within Primaries
S	Within Secondaries

Molt and Molt Cycle

A bird's current molt cycle will be noted using the Wolfe-Ryder-Pyle (WRP) three-letter code system developed using Howell's updated terminology (found in Table 6) (Wolfe et al. 2010; Howell et al. 2003).

Table 6. WRP three-letter age codes.

WRP Age Code	WRP Description	Traditional Bird Banding Office Age Code
FPJ	First prejuvenal moult	HY
FCJ	First cycle, juvenal plumage	HY
FPF	First preformative moult	HY
FCF	First cycle, formative plumage	HY
FPA	First prealternate moult	SY
FCA	First cycle, alternate plumage	SY
DPB	Definitive prebasic moult	AHY
DCB	Definitive cycle, basic plumage	AHY
DPA	Definitive prealternate moult	ASY
DCA	Definitive cycle, alternate plumage	ASY
UPB	Unknown cycle, prebasic moult	U/AHY
UCB	Unknown cycle, basic plumage	U/AHY
UPA	Unknown cycle, prealternate moult	U/AHY
UCA	Unknown cycle, alternate plumage	U/AHY
UPU	Unknown cycle, unknown moult	U/AHY
UCU	Unknown cycle, unknown plumage	U/AHY

Fat

IIBO uses the seven-level fat scale (Table 7).

Table 7. Numeric codes for fat level in birds.

Fat Level	Description
0	No fat present in the furculum.
1	A slight amount of fat present in the furculum, <5% filled. Typically, only a hint of fat either on the bottom or sides, formerly known as Trace.
2	Typically, the bottom of the furculum is filled with fat, approximately 5-33% of the furculum is filled.
3	Typically, the furculum is half filled but it may vary from 33-67% filled.
4	Typically, the furculum is filled but it may vary from 67-95% filled.
5	The furculum is bulging with fat but little fat under the wings or around the cloaca.
6	The furculum is bulging with fat as are the area under the wings and around the cloaca.
7	Fat connects between the furculum, under the wings, and to the cloaca.

Skull

IIBO uses a 0-6 level skull pneumatization scale (Table 8 & Figure 4).

Table 8. Number codes for skull pneumatization levels in birds.

Skull Pneumatization Level	Description
0	No second layer of ossification.
1	Typically, a small open triangle of ossification at the back of the skull.
2	The triangle at the back of the skull is completely ossified.
3	A line of ossification extends from the back of the skull to the eyes or approximately one third of the skull is fully ossified.
4	The line up the centre begins to fill in and from the sides, leaving large 'windows', or approximately two thirds of the skull is fully ossified.
5	Most of the skull is ossified with only one or two small 'windows' present near the front of the skull.
6	Skull is completely ossified.

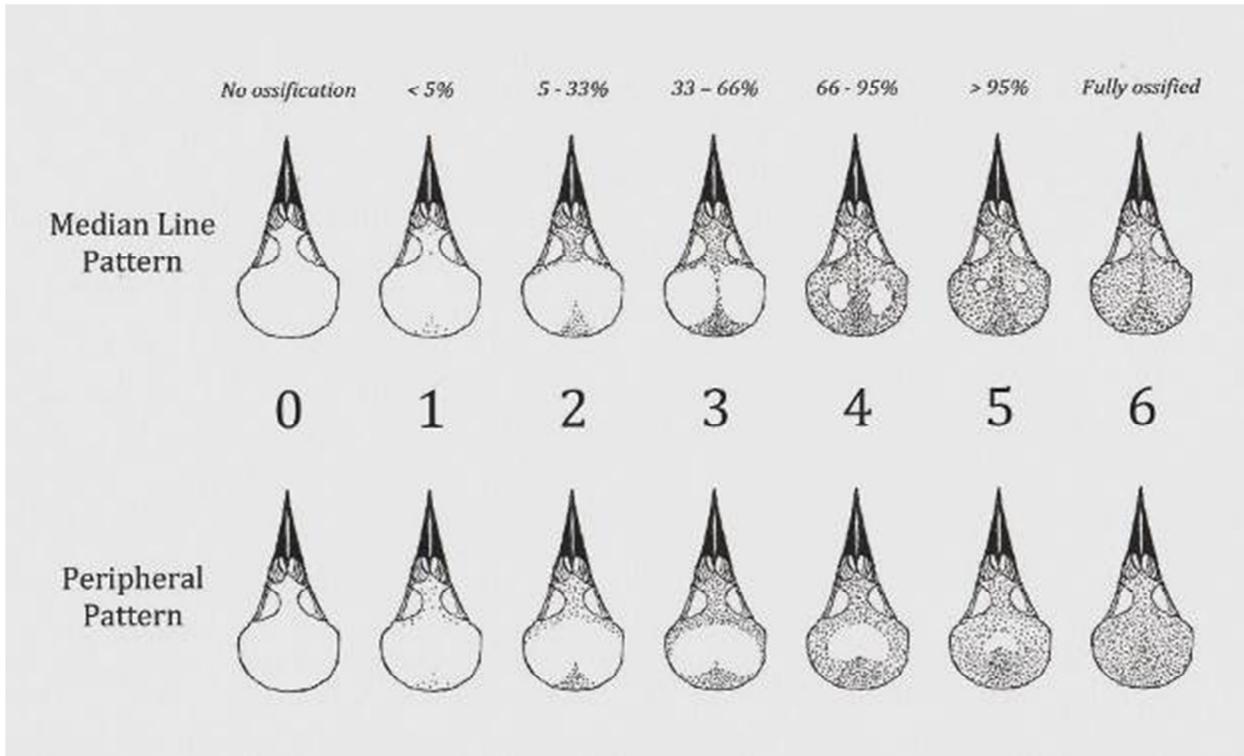


Figure 4. Median line and peripheral pneumatization patterns using 0-6 scale

Recaptures

All banded birds that are captured should be brought back to the banding table for processing. If the bird has already been banded or processed that day it should be released as quickly as possible. Except for birds that have already been processed on the same day, complete processing occurs for each bird, regardless of whether they have been previously banded.

Unbanded Birds

If a bird escapes before it is banded, or for birds that cannot be banded, data should be recorded on the Unbanded page. Record as much of the information as possible but it is expected that some to many of the data categories will be empty.

Additional Data sheets

The following tables illustrate additional data that should be kept during IIBO operation:

Table 9. Data sheet for keeping documenting net hours each day IIBO is in operation.

Date	Net Number	Open 1	Close 1	Open 2	Close 2	Open 3	Close 3	Total Hours Open	Notes

Table 10. Data sheet for volunteer hours.

Date	Volunteer Names	Hours at Station
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Table 11. Data sheet for documenting station visitors.

Date	Scheduled Groups	# of Passerby	# of Scheduled Group Members	Notes on Groups
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Table 12. Data sheet for bander codes and ranks for all banders.

3-letter code	Full Name	Banding Rank	Extraction Rank	Supervisor Rank	Bird Id Rank
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Quality Assurance/Quality Control (QA/QC) for data entry

Part of the BIC's daily responsibilities is to ensure data are entered into the spreadsheet with the utmost accuracy. BICs can examine for errors and crosscheck with the previous data either at the end of the shift or during idle hours. The benefit of conducting QA/QC daily, as opposed to at the end of the year, is so that errors can be fixed with more accuracy since it is easier to recall recent events rather than events from months ago.

Some questions to ask yourself when checking for potential errors include:

- Do measurements entered for wing length and weight seem appropriate for the bird species?
- Does the species code appear to be off or unrecognizable? (E.g. TRES vs TRSW)
- Is the species code entered a species that typically wouldn't occur at Iona?
- If a recaptured individual from the same year, does the information match the information entered previously
- Does how a bird was sexed or aged make sense for the species?

If a recaptured bird is from previous years, don't worry about doing the QA/QC check; the Program Managers will do the cross-checking with the dataset from previous years. However, they would appreciate it if you could highlight any individuals recaptured from previous years!

If data conflicts have been identified for individuals within the same year, please use your own professional judgment. For instance, assessment using skull would typically trump plumage for aging). Otherwise, feel free to flag it, make a note under the Comments column, and/or discuss with the bander who made the original assessment for the bird. Also, remember that "unknown" data are always better than inaccurate data.

Point Counts

Using a standardized point count system to monitor bird abundance, diversity, habitat use, and migration timing can provide information on a variety of birds that are typically not caught in mist-nets. Combining the use of a standardized point count system with a standardized mist-netting operation provides a well-rounded system to monitor the birds present at IIBO. Six-point count stations (Figure 5) have been established in a variety of the habitats found at IIBO to achieve these goals.



Figure 5. Point count station locations for monitoring birds at the Iona Island Bird Observatory. Black circles indicate the 100 m radius within which birds should be counted. Station 6 was added last but should come before Station 5 for obvious reasons.

Point counts should be conducted on each day of monitoring IIBO, in a clockwise fashion (i.e. in the sequence 1, 2, 3, 4, 6, 5, regardless of starting point). The first station visited should be rotated daily to reduce timing bias (e.g. start point count at station #1 on day X, then station #2 on day X+1, then station #3 on day X+2, etc.) Care should be taken to ensure point counts are conducted at the same location every time. To do this, at the beginning of every season the BIC should mark each point count location with flagging tape at the designated GPS points (*Table 13*). The first count should be conducted at an hour after sunrise and the last completed within two hours of this first count. Counts last five minutes during which time all birds detected by sound or sight within a 100m horizontal distance of the counter should be identified to species and recorded (black circles in Fig.

5). The surveyor should use a stopwatch to ensure that the count length is accurate. The following information should be recorded for each point count: point count number, time started, and surveyor. For each detection (heard or seen) record the species, number of individuals, and if the bird flew through the 100m radius count circle but did not land during the count (denoted by “F”). Only surveyors who are familiar by sight and sound with 90% of the expected species at IIBO can conduct point counts. It should be noted that this system is only useful for trend monitoring when the protocols are followed exactly. Volunteers should not view it as a competition to get the most birds, as this can introduce bias into the long-term data. Point counting should be done by different observers on different days whenever feasible, as this will also reduce potential for bias.

Prior to starting the counts, the point counter should stop by the banding hut and alert the BIC that the point counts are being conducted. All counts are entered into eBird by the day’s counter and forwarded to IIBO@WR after the counts are completed and before noon that day.

Table 13. Point Count Coordinates.

Point Count Number	GPS Coordinates
1	49.220162, -123.210949
2	49.220854, -123.207788
3	49.219132, -123.208270
4	49.216953, -123.209617
5	49.220278, -123.213692
6	49.218612, -123.213154

Using eBird for point counts

You can conduct point counts using the eBird app or by writing down the species you see and then entering your data into eBird later. Be sure to record the time that each the count began at each location. When entering point counts into eBird, use the Iona Island Bird Observatory account (IIBO@WR). When entering your count data into eBird make sure you select stationary count, enter duration as 5 minutes and enter party size of one. Make sure you enter your species and subspecies as specifically as possible (i.e. if you know it’s an Audubon’s Warbler enter that, but if you are unsure whether it is a Myrtle or Audubon’s then just write Yellow-rumped Warbler). Enter any comments and note flyovers for individuals where it is applicable.

Daily Estimated Totals (DET)

Volunteers should strive to record all their bird observations (species and number of individuals) within the monitoring period (30 minutes before sunrise until 5.5 hours after sunrise) and count area (Figure 6) during each day of monitoring at IIBO. All observations are valid and necessary for obtaining a good estimate of the total number of birds present at IIBO (i.e. every volunteer should have at least some bird observations at the end of each monitoring period).

These extra observations will be combined with new bandings, retraps, and point count totals to determine the DETs within the count area (Figure 6) during the 6-hour standard monitoring period.

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DETs should be completed by all personnel as a group at the end of the day, under direction of the BIC. The final tally for each species must not exceed the sum of the categories. Efforts should be made to ensure that birds are not double-counted and should tend towards under-counting rather than over-counting where there is uncertainty. Do not extrapolate to include birds that 'must have been present', but include only those directly detected. Any extra birds observed outside the standard 6-hour count period should be recorded in the log sheets as such.

Enter the additional observations into the IIBO eBird account (IIBO@WR) via the eBird app. If an app isn't available, enter data into the excel sheets provided in the computer and the BIC will enter them directly into eBird later in the day.

Daily Log

The Daily Log requires several sections to be filled out for every day of operation:

- The full name, three letter code, and number of field hours for each volunteer
- The opening and closing times for each of the nets and their total open hours
- Start time and total number of birds seen on each point count
- Tallies of banded birds and recaptures for each species
- Total species and number of birds banded and recaptured

Comments regarding IIBO, birds seen or captured, or other pertinent information may be recorded in the Comments section. Comments on weather can be included as appropriate (keeping in mind that detailed hourly data are collected at the nearby Vancouver International Airport).

Table 14. Table for logging volunteer hours.

Volunteer/Date	Date #1	Date #2	Date #3
Volunteer #1	Hours for Volunteer #1 on Date #1	Hours for Volunteer #1 on Date #2	Hours for Volunteer #1 on Date #3
Volunteer#2	Hours for Volunteer #2 on Date #1	Hours for Volunteer #2 on Date #2	Hours for Volunteer #2 on Date #3
Volunteer #3	Hours for Volunteer #3 on Date #1	Hours for Volunteer #3 on Date #2	Hours for Volunteer #3 on Date #3

Table 15. Table for logging net hours each day. Total hours can be summed and entered in the bottom row of each day.

Date	Net number	Time Open	Time Closed	Time Open	Time Closed	Total hours open	Total hours	Notes
Date #1	1							
Date #2	2							
Date #3	3							



Figure 6. Count area for bird observations at the Iona Island Bird Observatory during daily estimated totals White polygon delineates total count area. The area beyond the fence (between point counts 2, 3 and 4) is not included because access is restricted in secondary sewage treatment area. .

Literature Cited

North American Banding Council 2001. *The North American Banders' Study Guide*. Point Reyes Station, CA.

Pyle, P. 1997. *Identification Guide to North American Birds. Part 1*. Slate Creek Press, Bolinas, CA.

Ralph, C.J. 2005. The Body Grasp Technique: A Rapid Method of Removing Birds from Mist Nets. *North American Bird Bander* 30 (2) 65-70.

Smith, H., McCracken, J., Shepherd, D., & Velez, P. 1999. *The Mist-Netter's Bird Safety Handbook*. The Institute for Bird Populations, Pt. Reyes Station, CA.

Appendix 1

April 2, 2017

Net Locations:

Net #1: 49.219329°N, -123.208808°W

Net #2: 49.219382°N, -123.209348°W

Net #3: 49.219489°N, -123.209710°W

Net #4: 49.219699°N, -123.210125°W

Net #5: 49.219959°N, -123.210609°W

Net #6: 49.220487°N, -123.209133°W

Net #7: 49.220937°N, -123.209081°W

Net #8: 49.219724°N, -123.208913°W

Net #9: 49.219857°N, -123.208874°W

Net #10: 49.219866°N, -123.208492°W

Net #11: 49.219938°N, -123.208593°W

Net #12: 49.219850°N, -123.208394°W

Net #13: 49.219853°N, -123.208851°W

Net #14: 49.219725°N, -123.208918°W

Contacting volunteers about shift cancellation due to weather:

The BIC should, on the evening before the following morning's shift:

1. Compile a list volunteers and their emails/phone numbers for the following morning's shift via **Better Impact**. As best practice, even if the weather looks promising contact them ahead of time to confirm next morning's shift.
2. If there is a potential for banding to be disrupted by the weather, contact the volunteers to give them a heads-up about possible shift cancellation.

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On the morning of banding shift:

3. If the weather looks decidedly unsuitable for banding, contact the volunteers **at least one hour before shift start time** to let them know about shift cancellation. Volunteers commute from all over the Lower Mainland, so surely they would appreciate having as much as heads-up as possible.
4. If the weather looks unpredictable and you are on the fence about whether the shift should be cancelled, contact the volunteers (again, **at least one hour before shift start time**) to let them know about the uncertainty of the situation. Understandably, some volunteers may choose to forego their shift (especially those that drive from afar); others may still choose to attend the shift. In these situations, BICs are encouraged to drive out to Iona before start of the shift to evaluate the weather situation and to make the final call about the shift. From past experience, weather at Iona is oftentimes more agreeable than the weather forecast.

On days where the banding shift has been cancelled or ended much earlier than scheduled, both the Bander-in-Charge and Banding Assistant should let the Program Managers know and they will assign other IIBO-related tasks for you to do, including but not limited to data management, writing e-newsletters, and conducting other administrative work.

Note that for some banding days, we may have guests scheduled to visit IIBO – these include funders and university/college groups. If it seems like banding may be affected by weather on those days, we tend to lean towards opening the banding station (i.e. not cancelling the shift). Oftentimes, although banding is impacted by inclement weather initially, by the time the guests arrive, the weather may become more cooperative to allow banding to occur.