

MIGRATION MONITORING PROTOCOL

Inglewood Bird Observatory

A project of the Calgary Bird Banding Society



Version 2.0
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1.0 Background

This Migration Monitoring Protocol sets out the goals, objectives, and methods utilized during migration monitoring at Inglewood Bird Observatory in Calgary, AB, as conducted by the Calgary Bird Banding Society (CBBS). Fall migration monitoring has occurred at IBO since 1995, and data collection has been completely standardized since 1997 (fall) and 2002 (spring). Standardized data collection methods are critical to ensure uniform day-to-day operation and year-to-year consistency, thus providing reliable data to regional, national and international conservation managers and regulators. IBO is a member of the Canadian Migration Monitoring Network (CMMN), a cooperative initiative of member stations, Birds Canada and Environment and Climate Change Canada.

The original protocol was based on methods described in section 6.9 of Hagan *et al.* (1994) and informed by McCracken *et al.* (1993), Hussell and Ralph (1996) and Dunn and Hussell (2011).

1.1 Goals and objectives

CBBS conducts annual spring (01 May-06 June) and fall (28 July-06 October) monitoring of bird migration at the Inglewood Bird Sanctuary (IBS). Monitoring will be conducted each day within those periods, unless inclement weather or unavailability of a Bander-in-Charge (BIC) precludes operation.

2.0 Inglewood Bird Observatory (IBO)

2.1 Study area

IBO conducts migration monitoring in the Inglewood Bird Sanctuary (IBS), a 36-ha (89 ac) area of the Federal Migratory Bird Sanctuary (gazetted in 1929) along the Bow River within the city of Calgary, AB (Fig. 1). Since 1970 this core area of mostly natural habitat on the west side of the river has been owned and managed by the City of Calgary. IBS is roughly triangular in shape, bounded on two sides by the Bow River, and on the third side by a multi-use pathway. The reserve area (approximately 4 ha or 9 ac) where IBO operates is at the southern end of IBS, within which the general public is not allowed, which is separated from the main area by chain-link fencing.

2.2 Habitat description

The general habitat is mature riverine balsam poplar (*Populus balsamifera*) forest with a well-developed shrub understory along the banks of the Bow River (Appendix A). Shrubs include Saskatoon (*Amelanchier alnifolia*), wolf willow (*Elaeagnus commutata*), willow (*Salix sp.*), buffaloberry (*Shepherdia canadensis*), snowberry (*Symphoricarpos sp.*), catoneaster (*Catoneaster sp.*) (App. A). Because of its location on the banks of the Bow River, IBO is subject to fluctuating water levels due to upstream dam releases and, in rare circumstances, uncontrolled flooding (see Section 4.5 for details). While land ownership is secure, the two biggest impacts on habitat are severe weather events, and the impact of herbivores. Beaver (*Castor canadensis*) are periodically relocated from the sanctuary, and most mature trees are protected by wire mesh. A resident herd of mule deer (*Odocoileus hemionus*), feeds on understory forbs, grasses and shrubs.

In 2001, CBBS adopted the Monitoring Avian Productivity and Survival (MAPS) program's Habitat Structure Assessment (HSA) Protocol (Nott 1999), which requires monitoring at least every five years. The MAPS project at IBO utilizes seven of the 12 net lanes involved in migration monitoring. In 2015, an extra replicate (App. A) was obtained to quantify any change to understory conditions due to the catastrophic 2013 flood.

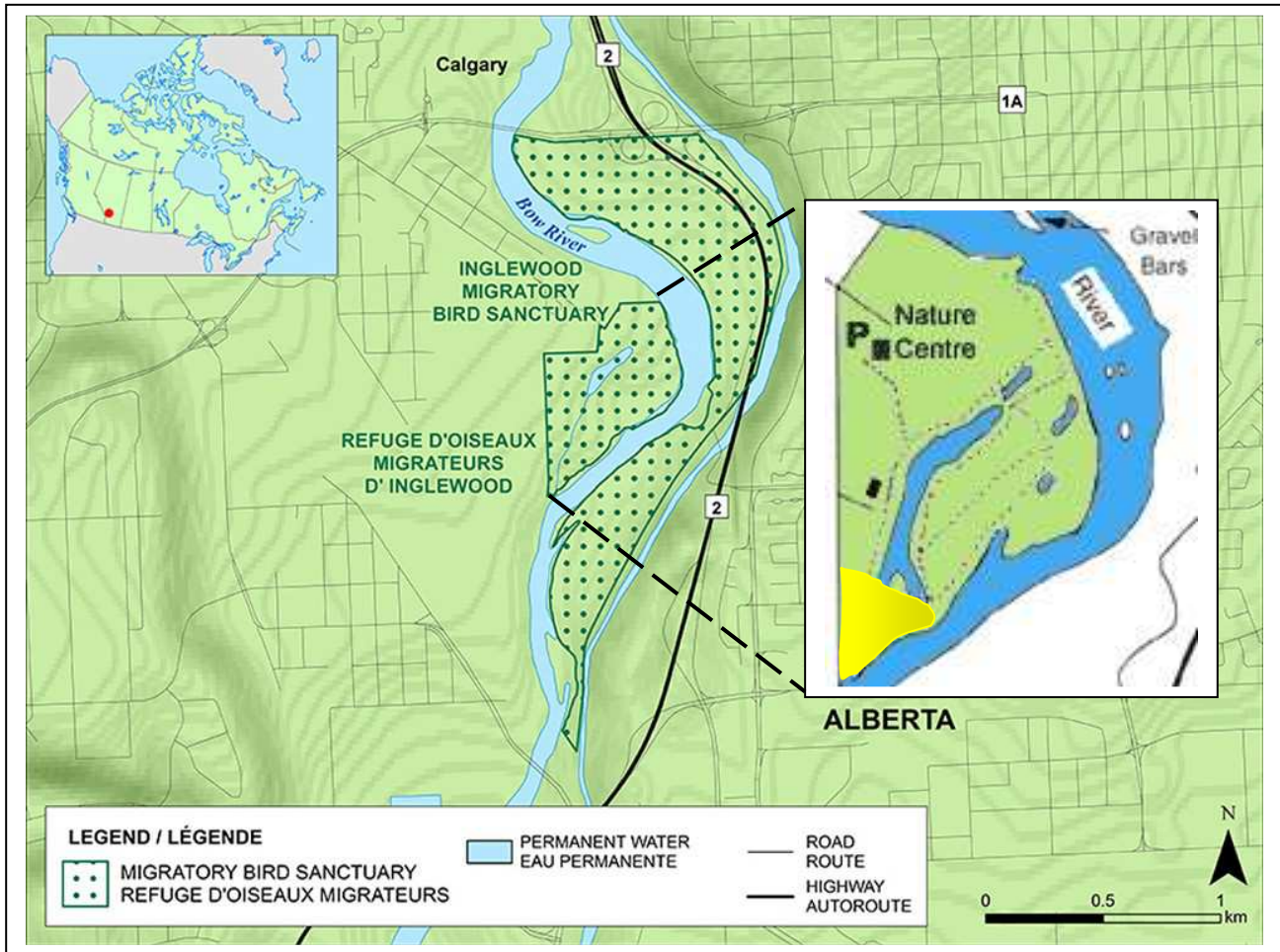


Figure 1. The Inglewood Federal Migratory Bird Sanctuary in Calgary, AB. Map available at: <https://www.canada.ca/en/environment-climate-change/services/migratory-bird-sanctuaries/locations/inglewood.html>. Inset map shows the core Inglewood Bird Sanctuary and the reserve area (yellow polygon) where the Inglewood Bird Observatory (IBO) operates.

Standardized photos of net lanes, and of the site more generally, convey a non-quantitative but very informative quick impression of site conditions and whether they have changed over time which might necessitate taking photos sooner. Photos will be taken every five years, starting in 2020, to coincide with the HSA schedule, or more often if important changes have occurred. Photos should be taken in the third week of both the spring and fall monitoring periods (01 May to June 06 and 28 July - 06 October, respectively). Photos are to be taken of every net lane and some general site conditions, as per the locations identified in Appendix B. Photos should be labeled and stored as set out in Appendix B.

3.0 Operation of the Observatory

Deer are a constant threat to the nets and a problem for the banding effort. Approach all deer slowly and observe their behavior before determining how best to haze them away from the nets. Do not force deer to move into nets because you have cornered them.

3.1 Mist net numbers and locations

Twelve 12-m long x 2.6-m high x 30-mm mesh mist nets are operated in permanent net lanes for six hours each day, beginning at sunrise. The rebar for the net poles is permanent, and the geolocation of net lanes is given in Table 1. Nets should be operated for six hours from the standard opening time. However, early closure may be necessitated by any of the following conditions: adverse weather, damaged net, predator in the area, potential for capture of more birds than can be handled safely. Do not intentionally leave nets open longer than six hours from the standard opening time under any circumstances. We strive for year-to-year consistency. Checking for trapped birds should take place at least every 30 minutes. The order in which the nets are checked is not critical, although the usual sequence is: check 8 and 10 on the west side of the pond first then backtrack to cross the beaver dam near the banding shed, carrying on to check nets 15, 12, 13, 7, 5, 4, 1, 14, 17 and 18. Nets 7, 13, 12, and 15 are re-checked on the return trip as the trail goes right past them.

A Monitoring Avian Productivity and Survivorship (MAPS) station is run at IBO between 07 June and 08 August each year. The last MAPS day usually falls during FMM, during which nets are operated for both projects. Nets 1, 4, 5, 7, 8, 10, and 15 are common to both projects; nets 2, 3, and 6 are MAPS-only nets, and; nets 12, 13, 14, 17, 18 are migration monitoring nets only (Fig. 2). During overlap days all nets are checked and birds processed as normal, but birds captured in the three MAPS-only nets are not included in the migration monitoring database.

Net lanes will be cleared completely prior to the start of the migration monitoring season. It is the BIC's responsibility to ensure that vegetation, especially directly under the nets, is clipped regularly during the season. If a tree falls across a net lane or impedes a path, or is otherwise a safety hazard, contact staff at IBS to have it cleared. All habitat modification must be discussed with staff at IBS.

3.2 Mist net maintenance

Only use nets in good condition. If other than minor repairs are required, replace with a new net as repairs affect catchability and increase potential for injury. Net poles should be placed perpendicular to the ground and parallel to one another at a distance of a net length plus 1-1/2 times the total shock cord length. Guy ropes are tied to an eyebolt at the top of the pole to prevent the tops of net poles from being pulled in. Guy ropes must not be used to provide tension. Do not slide net loops or shock cord up and down poles except when necessary to access an out-of-reach top loop. Sliding causes wear and eventual breakage. Do not tie knots in net loops to increase tension – re-locate poles or tighten shock cord instead. All nets must be properly furlled, locked and raised above the height

of deer at the end of each banding session. If the five nets located close to the Bow River (12, 13, 14, 17, 18) may be at risk of being flooded before the next day they should be taken down at the end of the banding session and put back up the next day (if water levels permit).

Table 1. Geolocation of the migration monitoring nets at IBO. Location given is of the net pole closest to the access route to that net lane. Angle of orientation (degrees) is from this pole along the direction of the net to the second pole. Geolocation precision is 4-5 m. Nets 2, 3, 6 are MAPS-only nets.

Net #	Geolocation	Angle of orientation in degrees	Notes
1	N 51.02490, W -114.00950	170	Roughly perpendicular to reserve fence
2	N 51.02482, W -114.00956	134	Perpendicular to net #4
3	N 51.02485, W -114.00946	97	Pole at pond end of net
4	N 51.02472, W -114.00936	178	Contiguous with net 5
5	N 51.02454, W -114.00937	353	Pole closest to river; contiguous with net 4
6	N 51.02448, W -114.00958	60	Pole closest to net #7
7	N 51.02436, W -114.00969	358	Pole closest to trail
8	N 51.02411, W -114.01077	38	Between pond & road; roughly parallel to pond; first net of two
10	N 51.02420, W -114.01069	284	Between pond & road; perpendicular to pond; pole closest to pond
12	N 51.02412, W -114.00967 **	237	Perpendicular to #13 leading downstream
13	N 51.02417, W -114.00961	147	Parallel to bridge crossing channel
14	N 51.02441, W -114.00903	104	Perpendicular to river; pole closest to bank
15	N 51.02406, W -114.01012	268	Roughly perpendicular to pond
17	N 51.02444, W -114.00902	11	Pole closest to #14
18	N 51.02454, W -114.00909	70	Pole closest to bank
Banding Shed	N 51.02951, W -114.01092		

** Location taken from Google Earth as bridge was washed out and water too high to cross on 26 May 2020

Nets are constantly assessed by the BIC with assistance from volunteers. Nets are considered damaged if they contain small holes or tears allowing birds to pass through unabated. These should be repaired ASAP. Do not replace a damaged net with the intention of fixing it later... it will not happen! This action only results in an inventory of damaged nets in need of repair. If net requires significant repair it should be destroyed.

At the end of the season all nets must be stored dry in a breathable bag to prevent net rot. Stored nets should not be tied in the mesh area of the net. Toggle and shock cords may be left on for storage. Shock cord should be replaced when wear affects their function. Ensure that the trammel loops are bound with a plastic clip or another appropriate tie to prevent tangling. Secured trammel loops should hang outside of the bag. Ensure nets are dry before storing (all nets must be good and immediately usable the following season). Labelling nets with the net lane occupied is helpful.

All nets new and used are the property of CBBS and the responsibility of the BICs collectively. It is their responsibility to ensure that discarded nets are destroyed appropriately.



Figure 2. Location of nets, by number and project, at IBO. Nets used for both migration monitoring and MAPS are shown in yellow; additional nets only used for migration monitoring are shown in blue; and MAPS-only nets are shown in red. North is to the top of the map.

3.3 Other equipment

Is the responsibility of the BIC to keep tabs on the band supply and contact the Master Permit holder if more bands are needed, with sufficient lead time for delivery. Use bands in order if possible (i.e. lower sequences first).

BICs must provide their own banding tools: pliers suitable for the band sizes provided, band removal tools (e.g., circlips pliers), wing rules, electronic scale, and calipers. BICs must also provide their own field guides and ageing/sexing guides (Pyle 1997, 2008). Bird bags are provided to each BIC by CBBS and their care is the responsibility of the BIC. Clean bags must be in good supply at the beginning of the banding day. This means that soiled bags from the previous day must be washed in soapy water with bleach and available the next day. Birds should be weighed in their bags in a shallow container on the scale (subtract the bag weight=bird weight) rather than in weighing tubes. Ensure all numbers on clothespins are legible and that there are sufficient pins for the quantity of birds expected at each net.

Keep the banding table free of clutter. Unnecessary items (coffee cups, personal items, etc.) should not be present on the table while processing birds. Periodically wipe the table with bleach to disinfect. Regardless, this procedure should be done after every “big” run. Food and birds do not mix. Ensure that personnel wash their hands as well as disinfecting the table before eating.

Electronic scales become temperamental at about 5°C although a hand warmer placed beneath helps significantly. Wind may make weighing difficult as well – protect the scale from air movement by placing it inside the box at the station. If there is a backup spring scale available only use it when the electronic scale isn’t functioning properly; record its use in the comments.

BICs must ensure that all necessary supplies are available and in good working order at IBO including first aid kit, insect repellent (deet), sunscreen, latex gloves, and hand-held radios. Advise the next scheduled BIC of any shortage. Expenditures for routine items will be reimbursed by the CBBS treasurer upon submission of receipts. Higher cost items must be discussed with the CBBS Executive first.

3.4 Personnel requirements

Due to constraints imposed by The City of Calgary’s Area Manager, a maximum of four persons may participate within the restricted reserve area of the sanctuary at one time on any given day. This will include a Bander-in-Charge (BIC) and one to three volunteers. The BIC must be a qualified bird bander (a master permit or sub-permit issued by Environment and Climate Change Canada) holding mist-netting and any other appropriate authorizations. The BIC must have good identification skills and be able to use the age and sex keys contained in Pyle (1997, 2008), and conversant with data entry software, primarily Microsoft Excel. The BIC must exercise good judgment as to when mist nets should be closed due to weather or other circumstances that may endanger the birds. The BIC must be willing to train volunteers whenever possible. Occasionally there are no volunteers and the BIC can choose to work alone. CBBS has established a Working Alone Policy (Appendix C) in conjunction with IBS, which must be followed by the BIC.

All volunteers must be members in good standing of the Calgary Bird Banding Society. All members must review the annual CBBS and City of Calgary orientations. Within one year of joining, new members must attend the CBBS *Introduction to Bird Banding* session in order to volunteer during year 2 and future years.

3.5 Personnel safety

All participants must carry a CBBS hand-held FRS radio for communication within the group and are encouraged to carry a cell phone in case of emergency. Being within a secluded area within a major city, hazardous materials (e.g., needles) are occasionally encountered within the reserve area. Volunteers are instructed not to pick up any hazardous items, rather mark the location and call or stop in at the Nature Centre to report it, and a staff member will pick it up with a sharps or biohazard kit. If a homeless camp or combative person is encountered, volunteers should not engage but rather report same to the Nature Centre, call Bylaw Officers at 3-1-1 directly, or in extreme situations call 9-1-1. IBS provides a Safety Card for volunteers (see Appendix D for the 2019 card) on an annual basis, with updated phone numbers.

BICs are required to maintain valid Standard First Aid certification and CPR. First aid kits are available at the Banding Station and at the Colonel Walker House in the main sanctuary. BICs must report any serious (more than a band-aid) incidents to the CBBS executive, who will advise IBS.

The CBBS “Code of Ethics” (Appendix E) covers the safety and welfare of the birds as well as conduct of participants. All IBO participants are expected to treat each other with respect and courtesy at all times. Anyone who feels they have been harassed or treated unfairly is encouraged to file a confidential report to any executive member of the CBBS Board of Directors.

3.6 Reserve area rules

The Area Manager has placed the following requirements on field procedures. These restraints are intended to reduce human impact within the environmentally sensitive reserve portion of IBS where all bird banding will be performed.

- Only BICs will be issued a key to the 9th Avenue reserve gates. Both gates must be kept closed and locked at all times.
- Only one vehicle is allowed to park next to the pathway at the entrance to the reserve area (Fig. 3).
- A maximum of four persons will be in the reserve at any one time.
- Personnel must stay on the established pathways.
- Personnel must minimize their exposure to the general public while in the reserve and should wear low-visibility clothing.

4.0 Data collection

4.1 Data collected on captured birds

All birds captured, recaptured, repeating (same day), escapes or dead will be recorded on the data sheet (Appendix F). Opening and closing times (to the nearest 5 minutes) must be recorded on the net log.

All birds captured are identified to species, age, and sex. Except for hummingbirds, all unbanded birds are banded with a uniquely numbered USFWS aluminum leg band. The following data, in the order of the data sheet columns, are taken on all birds captured (only those marked with asterisk for same-day recaptures), using standardized codes on the back of each data sheet (page 28):

- BIC at the top of each data sheet
- date at the top of each data sheet

- disposition,*
- band size,*
- band number,*
- species (all birds must be identified to species before banding, unidentified species must be released),*
- age (using calendar year),
- how aged using codes on reverse of data sheet,
- sex (using alpha code **M**ale or **F**emale or **U**nknown),
- how sexed using codes on reverse of data sheet (unless sex=U then left blank),
- wing chord (to nearest mm),
- body mass (to 0.1 g),*
- extent of skull pneumaticization (only if skulled),
- presence (Y/N) of body moult,
- fat class using codes on reverse of data sheet,
- presence (Y/N) of cloacal protuberance (CP) or brood patch (BP) of adults,
- net run time and time bird banded (to nearest 5 minutes),*
- net number,*
- initials of scribe,* and
- any pertinent notes (e.g., subspecies, primary moult, photos taken, feather sample taken, suspected age or sex, extra measurements, etc.).

All data will be collected unless there are more birds being captured than can be processed in a reasonable amount of time or other extenuating circumstances. An attempt to band all birds captured will be maintained although no individual bird will be held for more than one hour. Minimum data recorded will be species and obvious age and/or sex, even if bird is released at the net (unbanded birds are entered on data sheets and included in the daily totals for trend analyses).

The CBBS “Bird Safety Protocol” outlines principles to be followed that will reduce injury and/or mortality of birds, and identifies “red flag” or “sensitive” species that should be prioritised for extraction and/or processing (Appendix G). If a captured bird does not appear to be healthy, appropriate action and/or first aid should be taken to ensure the bird recovers, either on site or by taking it to a rehabilitation facility. The CBBS “Guide to first aid for birds injured during banding projects” (Appendix H) starts with a series of questions to ask to help ascertain the issue.

4.2 Casual observations

Throughout the day, personnel will make note of any birds in the station area or near net lanes, apart from the ones captured in banding operations. The monitored area will include the entire reserve area. Birds seen or heard on or above adjacent lands and the Bow River will be included, as long as observed from within the boundaries. At the end of the shift the BIC will chair a review of the casual observations and record totals by species on the Daily Totals form (Appendix F). Casual observations are not part of IBO’s migration monitoring database but are reported to E-Bird.

4.3 Trend analysis

Trend analysis is based on IBO’s banding captures only – new bandings, unbanded mortalities, captured but not banded, and foreign recaptures. IBO’s contract statistician is provided with a complete data set and calculates his own daily totals for analysis.



Figure 3. Access and parking for the reserve area.

4.4 Record-keeping procedures

Clear and concise records must be kept for all activities performed during normal operation of the bird banding station at IBO. The following data forms (Appendix F) are to be filled out every day before leaving the field:

- *Daily Log* – includes the names of all participants present including Bander-in-Charge (BIC) and volunteer helpers. Space is provided for commentary on bird migration, bird injuries and mortalities, non-avian fauna and flora, and any management of the station that had to be performed. The summary of injuries and mortalities is particularly important – **do not leave blank** – enter “none” if that is the case. The daily log must be completed even if banding does not occur, indicating why migration monitoring did not happen.
- *Net Log* – this form contains columns for the opening and closing times for each net (recorded to the nearest five minutes), total amount of time each net is up, as well as space to record brief weather data at specific times during the day.
- *Daily Totals (DT)* – this form is the end result of each day's effort (maximum six hours) from all personnel involved at the migration monitoring station. It contains columns for each species of bird likely to occur during fall migration at IBS. Next to the species names are columns for numbers of newly banded birds (disposition 1), unbanded mortalities (disp. 0), captured but not banded (disp. 9), recaptures (disp. 2 and 3), and casual observations.
- *Banding Sheet* – contains space for all data taken from individual birds captured by mist net. The minimum data recorded on these sheets for banded birds must include disposition code, band number, species, age, sex, how aged and sexed, time banded, and net number. Secondary data, listed in order of importance, will also be collected whenever possible and appropriate – wing chord, skull ossification if skulled, mass, cloacal protuberance (CP), brood patch (BP), fat condition and moult. **An entry is necessary for each lost or destroyed band, new banding, recapture, captured but not banded, and mortality.** Try to identify subspecies whenever possible, time permitting – note the subspecies and your criteria in the notes column of the data sheet. Please note age and sex and how for all birds except same-day recaptures.

Data sheets are to be filed in the binder in the following order – Daily Log/Net Log, Daily Totals, data sheets for new bandings, data sheets for recaptures/mortalities/unbanded. **Do not staple them together.** Ensure that every sheet has the proper date on it. Record of the start and end number of all band strings used at IBO at the front of the data binder in order to facilitate identifying returning adults.

Ensure that your Excel data files include an entry for any lost or destroyed bands as well as new bandings, recaptures, escapes and mortalities. At the end of the season the master bander permit holder submits Estimated Daily Totals for trend analyses to the CMMN as well as banding records to the BBO.

4.5 Record of changes or major interruptions to standardized data collection

If any standardized operational change or interruption occurs, enter details into Table 2 below, underneath any previous entries. Refer to parts of the text that were changed (e.g., section number, revised map, GPS points). Revise the ‘latest version’ date on page 1. If changes have been made to the protocol other than adding to the table below, submit a copy of the new protocol to Birds Canada along with year-end data submission; otherwise, send only a copy of the table.

Because of its location on the banks of the Bow River, IBO is subject to fluctuating water levels due to upstream dam releases and, in rare circumstances, uncontrolled flooding. These conditions typically arise during the first week of June during the annual freshet from the Rocky Mountains to the west, and sometimes in late August through first half of September, if heavy rain events occur. Five of the 12 net lanes are frequently inaccessible due to high water in late spring, although usually only for short periods of a few days to a week.

Table 2. Record of operational changes or interruptions to standardized data collection.

Date	Description of change and justification
1995	Fall migration monitoring initiated.
1997	Full complement of 12 net lanes standardized.
2002	Spring migration monitoring initiated.
2012	Spring migration monitoring had significantly reduced net hours on 9 days due to high water levels in the Bow River: May 01, 02, 03, 05, 10, 15, 24, 28; 06 June. Fall migration monitoring had significantly reduced net hours on 10 days due to high water levels in the Bow River: 28 Jul – 03 Aug; Sept 02, 11, 25; 02 Oct.
2013	Catastrophic flooding of the Bow River resulted in no access for fall monitoring.
2014	Spring monitoring did not start until 24 May due to ongoing safety concerns and clean-up efforts.
2014	Fall monitoring halted after September 12 th due to heavy snowfall damage to trees, resulting in loss of access.
2020	Spring migration monitoring had significantly reduced net hours on the following 14 days due to high water levels in the Bow River: May 23-June 5.

5.0 References

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Appendix A – Habitat Structure Assessment map and data forms



IBO

Location: I N B S

Form H0: MAPS Station Map

Station: I N B S

IBO

Date: (m/d/y) 10 / 06 / 2018

Zoo1

Habitat types (>=5% cover of station)

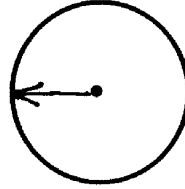
A Balsam poplar - wolf willow - Saskatoon - middle terrace

B Balsam poplar regenerating from caragana clearing - upper terrace

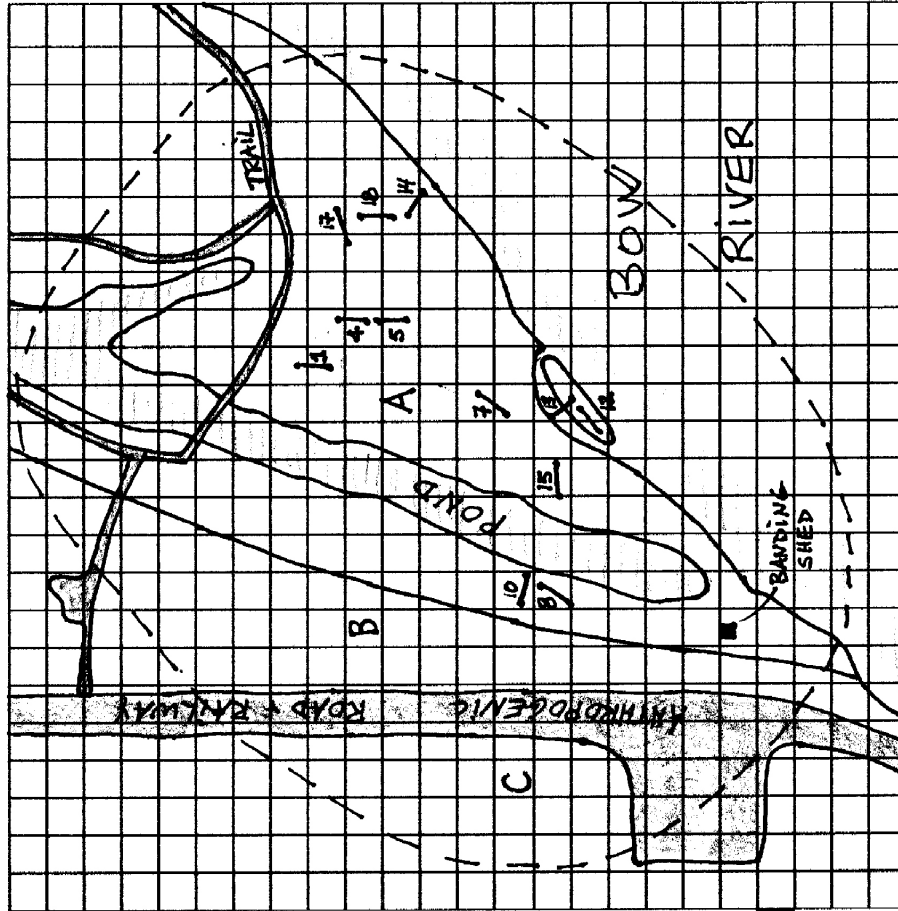
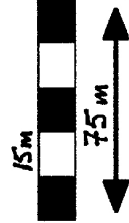
C Balsam poplar - Saskatoon - upper terrace

D _____
 E _____

Indicate North with arrow



Indicate scale in meters (normally 30m per block)



* nets shown are for migration monitoring



Form H1: MAPS Habitat Structure Assessment (HSA) form

Location code: INBS Station code: INBS Date: (m/d/y) 07/21/2015 Surveyed by: GE Hornbeck, DMCollister Survey (circle one) single consensus
 Habitat dominance code (as shown on station map; circle one): A - dominant B - sub-dominant | C - minor 1 | D - minor 2 | E - minor 3
 Describe habitat type: Balsam poplar (Populus balsamifera)
 Successional stage of habitat type (circle one): L - late M - mid | E - early National Vegetation Classification Standard Formation: n/a
 Percentage of station comprised of this habitat type (from station map): 60 % National Vegetation Classification Standard Alliance: n/a
 Pattern code of this habitat type (1-12): 8 Average height of: Tree canopy 21 m, Shrubs 4.5 m, Herbaceous vegetation 0.8 m

Vegetative Layers	Cover <5, 10, 20, ... see below, 90, >95	Pattern 1-12	Number of Species	Vegetation types within each layer <i>Estimated percentages must add up to 100%</i>			Main species e.g. <i>Vaccinium ovatum</i> , <i>Poa pretensis</i> <i>Quercus rubra</i> , <i>Q. alba</i> , <i>Pinus contorta</i>
				Conifer %	Broad Forbs & ferns %	Grass-like %	
Upperstory: >15m	15	7	1				
Midstory: 5-15m	45	8	3	100			Balsam poplar
Understory: 0.5 - 5m	60	8	6	100			Saskatoon, Salix, Waterbirch
Ground cover*: <0.5m	50	9	6	Woody 40	Forbs & ferns 40	Grass-like 20	Shepherdia, Dogwood, Cotonestier Snowberry, Saskatoon, Wolf-willow
Live vegetation	10	7	leaves	Nonvascular 0	old logs	recent treefall	Smooth brome, Yellow sweet-clover
Dead vegetation	40	NA see text p.13	stems or gravel	branches	dirt or sand	nutrient-macro	Sagewort, Canada thistle, Alsike clover, Wild yatch
Total non-vegetative	40		logs				
Non-vegetative Features	Estimate %	Pattern 1-12	Circle one or more features of cover type				Comment
Running water	%		seep/trickle	very small brook (<0.5m)	small stream (0.5-2.0m)	large stream (2.0-5.0m)	river (>5m)
Standing water	%		canal	pond/lake <50m ² >50m ²	marsh/bog <50m ² >50m ²	occasional	seasonal other
Human-made Corridors	%		paved	road	track	break	boardwalk
Human-made Structure	%		building	culvert	dam	channel	other
General description of habitat type including habitat age:							
Habitat located on first and second river terrace, Balsam poplar forest, Saskatoon and Water birch							
Note: first terrace receives annual spring flooding, second terrace flooded 2005 and more severely 2013 with silt deposition							
Note: We cannot explain why the upperstory canopy is measured so much taller than 2012 HSA							
Number of snags (>1m tall, >10cm diam.): 0 <5 <u>5-15</u> >15							
Management / Disturbance history: No public access to IBS Reserve section							
Update herbivory, mule deer are resident							
Year(s) occurred: Year(s) occurred: Year(s) occurred:							
Logging: No clear-cut selective strip							
Disturbance: fire wind flood drained ice storm							
Other: Sep 2014 heavy snowfall caused tree damage							
Feature Options							
Drainage: well-drained poorly-drained							
Slope: flat gentle undulating steep							
Geography: bottomland hillside ridgetop plain							
Ridges: none single two >2							
Aspect: none N E S W All							
Logging: No clear-cut selective strip							
Disturbance: fire wind flood drained ice storm							
Other: Sep 2014 heavy snowfall caused tree damage							
Percentage cover midpoints <5 10 20 30 40 50 60 70 80 90 >95							
Percentage cover range 0-5% 5-15% 15-25% 25-35% 35-45% 45-55% 55-65% 65-75% 75-85% 85-95% 95-100%							



Form H1: MAPS Habitat Structure Assessment (HSA) form

Location code: _INBS Station code: _INBS Date: (m/d/y) 07/21/2015 Surveyed by: GE Hornbeck DM Collister Survey (circle one): single consensus
 Habitat dominance code (as shown on station map; circle one): A – dominant B – sub-dominant C – minor 1 | D – minor 2 | E – minor 3

Describe habitat type: Balsam poplar regeneration following clearing of caragana stand

Successional stage of habitat type (circle one): L – late M – mid E – early National Vegetation Classification Standard Formation: n/a

Percentage of station comprised of this habitat type (from station map): 15 % National Vegetation Classification Standard Alliance: n/a

Pattern code of this habitat type (1-12): 8 Average height of: Tree canopy 8 m, Shrubs 2.5 m, Herbaceous vegetation 0.8 m
 Note: appears we over-estimated free canopy height in 2012

Vegetative Layers	Cover <5, 10, 20, ... see below...90, >95	Pattern 1-12	Number of Species	Vegetation types within each layer			Main species e.g. <i>Vaccinium ovatum</i> , <i>Poa pretensis</i> <i>Quercus rubra</i> , <i>Q. alba</i> , <i>Pinus contorta</i>
				Conifer	Forbs & ferns	Grass-like	
Upperstory: >15m							
Midstory: 5-15m	40	8	1				
Understory: 0.5-5m	35	7	8	100			Balsam poplar
Ground cover*: <0.5m	100	1	7	Woody 15%	Forbs & ferns 10%	Grass-like 75%	Saskatoon, Wolf willow, Balsam poplar Siberian larch, Honeysuckle, Aspen, snowberry Smooth Broma, Vetch, Canada thistle Goldenrod, Toadflax, Aster, Goat's beard
Live vegetation	0		leaves		old logs	recent treefall	
Dead vegetation	0		stones or gravel		branches	human-made	
Total non-vegetative	0	NA see text p.13	rock		water		

Non-vegetative Features	Estimate %	Pattern 1-12	Circle one or more features of cover type	Comment
Running water	%		very small brook (<0.5m)	river (>5m)
Standing water	%		pond/lake for livestock <50m² >50m²	seasonal occasional
Human-made Corridors	%		paved road	mown path boardwalk
Human-made Structure	%		building culvert	other tower other

General description of habitat type including habitat age:

Young Balsam Poplar forest on third terrace above Bow river,
 Note: the third terrace does not flood during 2013 and probably very infrequently (not part of floodplain)

Feature	Options
Drainage:	well-drained poorly-drained
Slope:	flat gentle undulating steep
Geography:	bottomland hillside ridgetop plain
Ridges:	none single two >2
Aspect:	none N E S W All
Logging:	clear-cut selective strip
Disturbance:	fire wind flood drained pest storm
Other:	cleared 18 yrs ago

Percentage cover midpoints	<5	10	20	30	40	50	60	70	80	90	>95
Percentage cover range	0-5%	5-15%	15-25%	25-35%	35-45%	45-55%	55-65%	65-75%	75-85%	85-95%	95-100%

* Ground Cover (Live vegetation, Dead vegetation, and Total non-vegetative) must total 100%



Form H1: MAPS Habitat Structure Assessment (HSA) form

Location code: INBS Station code: INBS Date: (m/d/y) 07/21/2015 Surveyed by: GE Hornbeck, DM Collister Survey (circle one): single consensus
 Habitat dominance code (as shown on station map; circle one): A - dominant | B - sub-dominant | C - minor | D - minor 2 | E - minor 3

Describe habitat type: Balsam poplar / Saskatoon

Successional stage of habitat type (circle one): L - late | M - mid | E - early National Vegetation Classification Standard Formation: n/a

Percentage of station comprised of this habitat type (from station map): 25 % National Vegetation Classification Standard Alliance : n/a

Pattern code of this habitat type (1-12): 10 Average height of: Tree canopy 14 m, Shrubs 3 m, Herbaceous vegetation 0.7 m

Vegetative Layers	Cover <5, 10, 20, ... see below...90, >95	Pattern 1-12	Number of Species	Vegetation types within each layer <i>Estimated percentages must add up to 100%</i>				Main species e.g. <i>Vaccinium oxanum</i> , <i>Poa pretensis</i> <i>Quercus rubra</i> , <i>Q. alba</i> , <i>Pinus contorta</i>
				Conifer	Broad Forbs & ferns	Grass-like	Grass-like	
Upperstory: >15m								
Midstory: 5 -15m	70	10	1		100			Balsam poplar
Understory: 0.5 - 5m	80	10	6		100			Saskatoon, Coloneaster, Wolf-willow Salix, Buckbrush, Soapberry
Ground cover*: <0.5m	80	10	8	Woody 10	Nonvascular %	Forbs & ferns %	Grass-like %	Blome, Vetch, Dandelion, Aster, Bindweed
Live vegetation	15	7		twigs stones or gravel	branches dirt or sand	old logs water	recent treefall human-made	oldentrod, C. thisle, White/Yellow sweet-clove
Dead vegetation	0	NA see text p.13						
Total non-vegetative								
Non-vegetative Features	Estimate %	Pattern 1-12		Circle one or more features of cover type				Comment
Running water	%			very small brook (<0.5m)	small stream (0.5-2.0m)	large stream (2.0-5.0m)	river (>5m)	
Standing water	%			pond/lake <50m ² >50m ²	marsh/bog <50m ² >50m ²	seasonal occasional	permanent other	
Human-made Corridors	%			paved road	gravel track	dirt break	boardwalk other	
Human-made Structure	%			building culvert	fence dam	bridge channel	powerline wall other	
General description of habitat type including habitat age:								
upland Mature Balsam poplar forest, some evidence that top died back in the past								
Note: aspen and poplar regeneration occurring								
Number of snags (>1m tall, >10cm diam.): 0 <5 <u>5-15</u> >15								
Management / Disturbance history:								
No management that we are aware of, no history of flooding								
Year(s) occurred: _____								
Year(s) occurred: _____								
Year(s) occurred: _____								
Percentage cover midpoints <5 10 20 30 40 50 60 70 80 90 >95								
Percentage cover range: 0 - 50% 15% - 35% 35% - 45% 45% - 55% 55% - 65% 65% - 75% 75% - 85% 85% - 95% 95% - 100%								

Appendix B – Standardized habitat photography

- A complete set of photos will be taken every five years, starting in 2020, to coincide with the HSA schedule. If there are important changes to net lanes or the site in general, photos should be taken ahead of the normal schedule.
- Photos should be taken in the 3rd or 4th week of the spring (01 May to June 06) monitoring period.
- Photos should be taken at the standardized locations as per the table below.
- Carry this table of locations and a GPS. As GPS precision is only 4-5 m carry the 2020 photos to help find the proper location.
- Nets can be either furled or open.
- The nearest pole should be roughly in the centre for most of the photographs, with the bottom of that pole in the photograph. This should show the net lane as well as habitat to both sides and beyond the net.
- Net lane photos should be labelled as follows, based on the date the photo was taken: yyyy.mm.dd-net#-IBO (e.g., 20200526-net4-IBO). General site photos should be labelled with the name from the table below.
- If possible, turn on the date setting on your camera so that the date and time show on every photo. This is not critical, but provides a backup to the file name.
- Photos are to be submitted to the IBO manager for storage.

Net or site name	Geolocation (decimal degrees)	Where to stand & what to shoot description
1	N 51.02502, W -114.00948	Stand 5 m north of the northmost pole with back towards fence & shoot south
4	N 51.02475, W -114.00941	Stand 5 m north of the northmost pole & shoot south along both nets 4 & 5
5	N 51.02451, W -114.00933	Stand at junction of trail to Nets 14-17-18 & shoot north along both nets 5 & 4
7	N 51.02435, W -114.00964	Stand at junction of main trail & shoot north
8	N 51.02407, W -114.01077	Stand 7 m south of the southmost pole & shoot north to show both nets & pond
10	N 51.02420, W -114.01065	Stand with back to pond & shoot west towards fence
13 & 12	N 51.02424, W -114.00954	10 m to north of stairs along top of bank, next to a large cottonwood; most of the island & nets 13 & 12 should be in the photo
17 & 18 & 14	N 51.02456, W -114.00920	From the top of the stairs before dropping down to net level; photo of each net & panorama with all 3 nets
15	N 51.02409, W -114.01007	Stand 5 m east of the eastmost pole, next to a large cottonwood tree & shoot west towards the pond
Pond	N 51.02360, W -114.01083	Stand on west end of dam looking north towards Nature Centre & include both sides of pond
West Side	N 51.02410, W -114.01038	Stand on pond edge with back to large cottonwood tree & net 15; shoot across the pond to include both nets 8 & 10, & a panorama including up- and down-stream
East Side	N 51.02420, W -114.01065	Stand on pond edge with back to net 10 & shoot across the pond towards net 15; shoot across the pond to include net 15, & a panorama including up- and down-stream



20200526-nets8-10-IBO



20200526-net10-IBO



20200526-eastside-IBO



20200526-eastside-panorama-IBO



20200526-pond-IBO



20200526-pond-panorama-IBO



20200526-westside-panorama-IBO



20200526-westside-IBO



20200526-net15-IBO



20200526-net7-IBO



20200526-nets13-12-IBO



20200526-nets17-18-14-IBO



20200526-net17-IBO



20200526-net18-IBO



20200526-net14-IBO



20200526-net5-IBO



20200526-net4-IBO



20200526-net1-IBO

APPENDIX C – Working Alone Policy

Banders in Charge that might work alone must complete a Registration Form and provide it to IBS. If and when required, please use the following process when working alone.

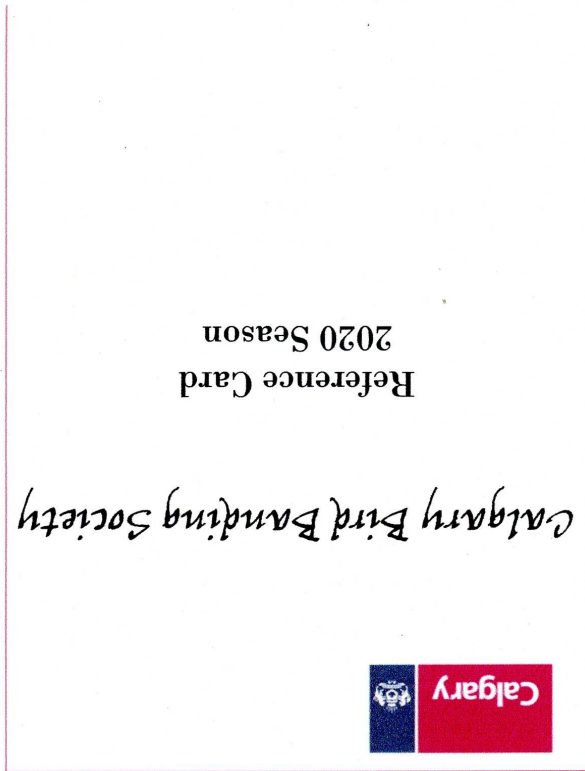
When you arrive at the park for the beginning of your shift call Corporate Security (403-268-8868) to let them know you are working alone. Provide them with the following information:

- Name
- Role: Inglewood Bird Banding Volunteer
- Location: Inglewood Bird Sanctuary (2024 Sanctuary Rd SE)
- Shift start & shift end times
- Primary number you can be reached at (personal cell phone) ... and keep your phone on!!

At the end of your shift, call Corporate Security again (403-268-8868) to let them know you are finished.

It is very important to call and check out. If they do not receive your check out within a 15-minute period after the end of your shift, they will attempt to reach you. If they cannot get confirmation of your safe return, they will send staff out, including Calgary Police and Calgary Fire.

APPENDIX D – Inglewood Bird Sanctuary Example Safety Card (folds in middle)



NAME	SITUATION	ACTION	PHONE
LEVEL I EMERGENCY	All life-threatening injuries	Give precise location from Sanctuary Rd	9-1-1
LEVEL II EMERGENCY	Non life-threatening injuries	Police Services	403-266-1234
Bylaw or Peace Officers	Encampments - do not enter	Give general location - do not enter	3-1-1
Nature Centre	Front Desk/ Park staff	Call or email lbs@calgary.ca	311 when closed 403-300-1068
Maris Eaton	Volunteer Supervisor	Park Liaison	403-861-3731 maris.eaton@calgary.ca
Corporate Security	Working Alone at end of shift & Call at start	403-268-8868	
City Media Relations	Media requests	403-828-2954	
Bird Alert	Rare sightings	403-300-1067	

Contact List

Information & Reminders

- Walker House and alarm code is **1435**.
- Wear your nametag while in the Natural Reserve.
- Additional First Aid Kits are located in the Walker House Volunteer room (behind door).
- Be discreet at all times including entering and exiting the Reserve. Ensure all gates are locked behind you.
- The maximum is 4 including bander in charge and volunteers in the reserve at one time. Stay in eyesight of each other.
- Work Alone Policy is in effect – if you are working alone call before and after your shift.
- Politely ask people who have wandered into the Reserve to return to the trail.
- Stay on existing trails at all times.
- Pathway (Sanctuary Road) speed limit is 20 km/h.
- Only 1 vehicle parked on the pathway. Please park away from the gate.

SAFETY IS THE BOTTOM LINE

Do not touch needles, glass, sharp objects or condoms. Highlight area with visible flag / marker to ensure other Banders can avoid hazard. Report location to Park staff for removal.

Report all encampments to 311 to alert Peace Officers and Park staff.

Report all dead birds to Park staff for pick up. Do not touch! (We are always on the lookout for avian diseases).

Disinfect table, equipment and hands before eating.

Do not enter into conflict with visitors. If you feel unsafe remove yourself from the area.

Thank you for contributing to the knowledge about Birds in the Sanctuary!

Appendix E – Calgary Bird Banding Society Code of Ethics

1. Members are jointly responsible for the safety and welfare of the birds they capture and study. Stress, injuries and mortalities must be minimized. The following guidelines must be adhered to:

- handle each bird carefully, gently, quietly, and with respect,
- capture only as many birds as you can safely process,
- close traps or nets when predators in the area result in unacceptable risk to bird safety,
- do not open nets in inclement weather,
- assess the condition of nets frequently and repair or replace them quickly,
- members must be properly trained and supervised,
- check nets at least every 30 minutes,
- close and properly furl all nets at the end of each banding day,
- do not double bag birds,
- use the correct band size and banding pliers for each bird, and
- treat all bird injuries in the most humane way.

2. Members must continually assess their own work to ensure that the highest standards possible are maintained. The following guidelines must be adhered to:

- reassess methods and your approach whenever an injury or mortality occurs, and
- accept constructive and positive criticism from your peers.

3. Members must offer honest and constructive assessment of other members work to help develop and maintain the highest standards possible. The following guidelines must be adhered to:

- provide criticism to other members in a constructive and positive manner,
- inform members and others of innovations and improvements in capture, handling and banding techniques, and
- any mistreatment of birds or improper conduct by a member must be reported to the BIC and/or a member of the CBBS executive.

Appendix F – Data forms

Daily Log

Calgary Bird Banding Society
Inglewood Bird Observatory

Date: 18 May 2018
Bander: Doug Colloster
Volunteers: Hank Klassen
Mike Potter

Bird Migration

light

Bird Injuries and Mortalities

Recaptured 505P with broken leg - appears caught by
band resulting in excess torque on leg.

Non-avian Fauna and Flora

Beaver comes upstream and around outside of
outflow.

Wink foraging on beaver dam near station

Management of the Station

original signed
signed (BIC)

Net Log
Calgary Bird Banding Society
Inglewood Bird Observatory

Net	Open	Close	Hours	Minutes	Hours.tenths
1	550	1135	5	45	5.8
4	550	1135	5	45	5.8
5	550	1130	5	40	5.7
7	545	1130	5	45	5.8
8	545	1130	5	45	5.8
10	545	1130	5	45	5.8
12					.
13					.
14					.
15	545	1130	5	45	5.8
17					.
18					.
Total					40.5

Date 18 May 2018

Notes

River very high
Nets 12-14, 17+18
inaccessible

Time Decimal Approximations

1	0.0	20	0.3	39	0.7
2	0.0	21	0.4	44	0.7
3	0.1	26	0.4	45	0.8
8	0.1	27	0.5	50	0.8
9	0.2	32	0.5	51	0.9
14	0.2	33	0.6	56	0.9
15	0.3	38	0.6	57	1.0

net rounds
0630, 0700 ... 1130

Weather			
	Wind	Temp	% cloud cover
opening		7°	100
midpoint		5°	100
close		10°	80

original signed
 signed (BIC)

Calgary Bird Banding Society - Inglewood Bird Observatory
Daily Totals

Date May 24, 2018

Bander-in-Charge Shonna McLeod

Species	NB Disp 1	Disp 9 or 0	Daily Total	Recaptures				Casual
				?	SD	Y-Y	SY	
Canada Goose								11
Wood Duck								2
Gadwall								4
Mallard								
Blue-winged Teal								
American Wigeon								2
Lesser Scaup								
Harlequin Duck								
Common Goldeneye								3
Hooded Merganser								
Common Merganser								3
Ring-necked Pheasant								
Pied-billed Grebe								
Rock Pigeon								
Sora								
American Coot								
Killdeer								
Spotted Sandpiper	2		2					3
Solitary Sandpiper								
Lesser Yellowlegs								1
Greater Yellowlegs								
Sandpiper spp								
Wilson's Snipe								
Franklin's Gull								
Ring-billed Gull								
California Gull								
Herring Gull								
Gull spp.								
Common Loon								
Double-crested Cormorant								1
American White Pelican								
Great Blue Heron								

Species	NB Disp 1	Disp 9 or 0	Daily Total	Recaptures				Casual
				?	SD	Y-Y	SY	
Osprey								
Bald Eagle								1
Sharp-shinned Hawk								
Cooper's Hawk								
Swallow's Hawk								
Red-tailed Hawk								
Great Horned Owl								
Belted Kingfisher								
Yellow-bellied Sapsucker								
Downy Woodpecker								
Hairy Woodpecker								
Northern Flicker								
American Kestrel								
Merlin								
Olive-sided Flycatcher								
Western Wood-Pewee								
Trail's Flycatcher								
Least Flycatcher	1		1					
Empidonax spp.								
Flycatcher spp.								
Eastern Kingbird								1
Blue-headed Vireo								
Warbling Vireo							1	1
Red-eyed Vireo								
Vireo spp.								
Blue Jay								
Black-billed Magpie								2
American Crow								3
Common Raven								
Tree Swallow								12
N Rough-winged Swallow								
Bank Swallow								

Species	NB Disp 1	Disp 9 or 0	Daily Total	Recaptures				Casual
				?	SD	Y-Y	SY	
White-crowned Sparrow								
Dark-eyed Junco								
Sparrow spp.								
Baltimore Oriole								
Red-winged Blackbird								
Brown-headed Cowbird								
Rusty Blackbird								
Brewer's Blackbird								
Common Grackle								
Blackbird spp.								
Ovenbird								
Northern Waterthrush								
Black-and-white Warbler								
Tennessee Warbler								
Orange-crowned Warbler								
Nashville Warbler								
Connecticut Warbler								
MacGillivray's Warbler								
Mourning Warbler								
Common Yellowthroat								
American Redstart								
Magnolia Warbler								
Bay-breasted Warbler								
Yellow Warbler	1		1					
Blackpoll Warbler								
Palm Warbler								
Yellow-rumped Warbler								
Townsend's Warbler								
Black-throated Green Warbler								
Canada Warbler								
Wilson's Warbler								
Warbler spp.								
Western Tanager								
Rose-breasted Grosbeak								
TOTALS	8	5	13	1	0	2	1	49

Species	NB Disp 1	Disp 9 or 0	Daily Total	Recaptures				Casual
				?	SD	Y-Y	SY	
Cliff Swallow								
Barn Swallow								
Swallow spp.								
Black-capped Chickadee								
Red-breasted Nuthatch								
White-breasted Nuthatch								
Nuthatch spp.								
House Wren	1		1					1
Golden-crowned Kinglet								
Ruby-crowned Kinglet								
Townsend's Solitaire								
Veery								
Swainson's Thrush	1		1					1
Hermil Thrush								
American Robin								
Varied Thrush								
Gray Catbird								
Brown Thrasher								
European Starling		4	4					
Cedar Waxwing	1		1					
House Sparrow								
House Finch								
Purple Finch								
Pine Siskin								
American Goldfinch								
American Tree Sparrow								
Chipping Sparrow								
Clay-colored Sparrow								
Savannah Sparrow								
Fox Sparrow								
Song Sparrow								
Lincoln's Sparrow								
Swamp Sparrow	1	2	2					1
White-throated Sparrow								
Harris' Sparrow								

