NORTHERN SAW-WHET OWL MIGRATION MONITORING PROTOCOL

A project of the Calgary Bird Banding Society



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1.0 Background

This Northern Saw-whet Owl Monitoring Protocol sets out the goals, objectives, and methods utilized during fall migration monitoring south of Bragg Creek, AB, as conducted by the Calgary Bird Banding Society (CBBS). A pilot program for monitoring migrating Northern Saw-whet Owls (NSWO; *Aegolius acadicus*) was undertaken from 7 October to 18 November, 2003, with encouraging results. Standardized monitoring has occurred annually starting in 2004 (except 2009, due to a lack of banders). When this project started, there were few sites in western North America monitoring NSWO, although it had become common in eastern North America. 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. The original protocol was based on methods described in Erdman and Brinker (1997).

1.1 Goals and objectives

CBBS conducts annual fall (15 September-31 October) monitoring of NSWO migration on private property south of Bragg Creek, AB. Monitoring will be conducted each evening within those periods, unless inclement weather or unavailability of a Bander-in-Charge (BIC) or volunteer precludes operation.

2.0 Study area

CBBS conducts the NSWO migration monitoring on private property 19 km south of Bragg Creek, AB, off Hwy #762 (50°48.95'N, 114°27.88'W) (Fig. 1). The net array is under a thick canopy of mature spruce trees. The area is subject to intense cattle pasturage and the understory and tree branches as high as a cow can rub are absent. Banding is conducted in a small log cabin adjacent to the net array. The general public is not allowed on site.

3.0 Standard operating procedure

Prior to commencing each year's monitoring, the landowner is contacted to ensure that there will be no cattle in the pasture, and that the cabin will be stocked with firewood. Once the nets are set up they remain in place for the duration of the monitoring season, being furled after each evening's monitoring session. If a tree falls across a net lane or impedes a path, or is otherwise a safety hazard, contact the landowner to have it cleared. No other habitat modification is allowed.

3.1 Mist nets

Five 12-m long x 2.6-m high x 60-mm mesh mist nets are placed in a "double H" array (Fig. 2). They are opened approximately 0.5 hrs after sunset, and operated for four hours each evening, weather and other factors permitting. Early closure may be necessitated by any of the following conditions: adverse weather, adverse driving conditions, damaged net, predator in the area, or potential for capture of more birds than can be handled safely. Do not intentionally leave nets open longer than four 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 45 minutes.

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. 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 furled and raised above the height of deer at the end of each banding session.



Figure 1. Location of the CBBS's NSWO fall migration monitoring.



Figure 2. Location of NSWO nets and boom box in relation to banding cabin.

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 without being captured. 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).

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.

3.2 Audio lure

In addition to the normal provincial permits to capture and band a raptor, authorization to use an audio lure is required and must be in place prior to start of monitoring. To enhance capture rates, a recording of male NSWO primary calls is played at 80% volume (level 8) from a portable "boom box" near the centre of the net array. This plays continuously while the nets are open.

3.3 Other equipment

Is the responsibility of the BIC to monitor the band supply and alert 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, calipers, and black light used to examine wing moult. BICs must also provide their own field guides and ageing/sexing guides (Pyle 1997). 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; zero the scale with the bird in the bag, then place the empty bag on the scale to get the bird's weight). Ensure all numbers on clothespins are legible and that there are sufficient pins for the quantity of birds expected at each net.

BICs must ensure that all necessary supplies are available and in good working order, including first aid kit. 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 landowner, a maximum of three persons may participate at one time. This will include a BIC and one or two 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 appropriate to owls (e.g., Pyle 1997a, 1997b), and conversant with data entry. 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. Volunteers are not required to be members of the CBBS, but only CBBS members are allowed

to handle birds. The assistance of non-CBBS members must be authorized by the Board of Directors. Due to the remote location, uncertainty of cellular phone coverage, and potential for adverse driving conditions, under no circumstances is the BIC allowed to work alone.

3.5 Personnel safety

BICs are required to maintain valid Standard First Aid certification and CPR. First aid kits are available at the Banding Station. BICs must report any serious (more than a band-aid) incidents to the CBBS Board of Directors.

The CBBS "Code of Ethics" (Appendix A) covers the safety and welfare of the birds as well as conduct of participants. All 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.

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 same data sheet (Appendix B). All birds captured are identified to species, age, and sex. All unbanded birds are banded with a uniquely numbered USFWS aluminum leg band. An entry is necessary for each lost or destroyed band, new banding, recapture, captured but not banded, and mortality. 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 at the top of each data sheet (page 13):

- BIC initials at the top of each data sheet,
- date at the top of each data sheet,
- initials of scribe,*
- disposition,*
- band size,*
- band number,*
- species,*
- age (using calendar year),
- how aged,
- sex (using alpha code Male or Female or Unknown),
- how sexed (unless sex=U then left blank),
- fat class,
- sharpness of keel, which is a surrogate for muscle mass,
- presence of body moult (Y/N),
- presence of flight feather moult (Y/N; if Yes, then complete Owl Moult Record data sheet, see below),
- unflattened (natural) wing chord (to nearest mm),
- tail length (to nearest mm),
- body mass (to 0.1 g),*
- capture time using 24-hour clock (to nearest 5 minutes),*
- net and panel number, with panel 1 being closest to the ground (e.g., net 5 panel 3 is recorded as 5-3), and*
- any pertinent notes (e.g., photos taken, suspected age or sex, extra measurements, etc.).

The Owl Moult Record data sheet (page 14) is ongoing for the current year, whereas the banding data sheet is started new each evening. The following data, in the order of the data sheet columns, are taken on all birds showing flight feather moult, using standardized codes at the bottom of each data sheet:

- year at the top of each data sheet,
- date (e.g., 24 Sept),
- band number,
- BIC initials,
- moult in the secondaries, from 13 to 1 (outer to inner),
- moult in the primaries, from 1 to 10 (inner to outer), and
- NOTE: record the moult for both wings, but only enter the right wing unless the left wing is different, then run a diagonal line through the corresponding box and put the left wing above the slash and the right wing below it.

Owls are aged using feather generations on primaries and secondaries (Pyle 1997a, 1997b), enhanced with the use of ultraviolet light (Weidensaul et al. 2011, Migration Research Foundation 2020 (Appendix C)), and sexed using wing chord and mass (Brinker 2000), using a handy chart (Appendix D) provided by Project OwlNet (2020).

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).

Upon completion of data collection, birds are placed outside on a shelf attached to the cabin wall, where they are protected from predators until their eyes re-adjust to the darkness and they fly away. 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 the Alberta Institute for Wildlife Conservation. The CBBS "Guide to first aid for birds injured during banding projects" (Appendix E) starts with a series of questions to ask to help ascertain the issue.

4.2 Record-keeping procedures

Clear and concise records must be kept for all activities performed during normal operation of the NSWO migration monitoring project. The Session Record (page 12) is to be filled out every day even if banding does not occur (indicate why monitoring did not happen). The following data must be recorded:

- date,
- name of BIC,
- names of CBBS volunteers and/or guests (non-members),
- start and end times, and total hours,
- number of NSWO or other owls captured or recaptured,
- a summary of any injuries and/or mortalities is particularly important <u>do not leave blank</u> enter "none" if that is the case,
- wind, cloud cover, precipitation and temperature (at the start and end of the evening),
- record the net run times (to the nearest 5 minutes) in the table provided, and
- space for notes on bird migration, bird injuries and mortalities, non-avian fauna and flora, and any management of the station that had to be performed.

Data sheets are to be filed in the binder in the following order – Session Record, daily data sheets and Owl Moult Record. **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 permit holder submits banding records to the Bird Banding Office.

4.3 Record of changes or major interruptions to standardized data collection

If any standardized operational change or interruption occurs, enter details into Table 1 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.

Date	Description of change and justification
2003	NSWO migration monitoring initiated.
2004	Standardized monitoring initiated.
2009	No monitoring because no BICs were available.

Table 1. Record of operational changes or interruptions to standardized data collection.

5.0 References

Brinker, D.F. 2000. Sex criteria for Northern Saw-whet Owls. Project OwlNet, USA.

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- Pyle, P. 1997a. Flight-feather molt patterns and age in North American owls. Monographs in Field Ornithology 2:1-32. American Birding Association, Colorado Springs, CO, USA. 32 pp. Available online: <u>http://www.projectowlnet.org/wp-content/uploads/2010/10/Pyle_ABA_1997_Owl-Moltsmallfile.pdf</u> [accessed 29 Nov 2020].
- Pyle, P. 1997b. Identification guide to North American birds Part I *Columbidae* to *Ploceidae*. Slate Creek Press, Bolinas, CA, USA. 732 pp.
- Weidensaul, C.S., B.A. Colvin, D.F. Brinker, and J.S. Huy. 2011. Use of ultraviolet light as an aid in age classification of owls. Wilson Journal of Ornithology 123(2):373-377. Available online: <u>http://www.projectowlnet.org/wp-content/uploads/2011/08/Ultraviolet-light-in-ageing-owls-Weidensaul-et-al-2011.pdf</u> [accessed 29 Nov 2020].

Appendix A – 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 B – Data forms

CBBS NSWO MIGRATION PROJECT SESSION RECORD De Wit farm SW of Calgary

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wing above the slash and the right wing below it.

Scoring system: * most often used codes,

- NEW/FRESH (DARK, LITTLE WEAR, PINK ON UNDERSIDE)
- INTERMEDIATE IN AGE (INTERMEDIATE IN COLOUR AND WEAR BETWEEN FRESHEST AND OLDEST FEATHERS)
- INTERMEDIATE NEW (NOT HATCH YEAR-NEW/ER THAN INTERMEDIATE OLD, only used on birds after their third year) INTERMEDIATE OLD (NOT HATCH YEAR-OLDER THAN INTERMEDIATE NEW, only used on birds after their third year) OLD (FADED, WORN) HATCH YEAR (FADED FEATHERS THAT HAVE ALIGNED FAULT BARS and/or pale spots on feathers) UNKNOWN (AGE RELATIVE TO OTHER FEATHERS UNCERTAIN) Z-ZOODE
 - - - - GROWING
 - MISSING

Appendix C – NSWO ageing photo library (McGill Bird Observatory)

McGILL BIRD OBSERVATORY

PHOTO LIBRARY

Northern Saw-whet Owl / Petite Nyctale (Aegolius acadicus)

Introductory notes:



Age determination of Northern Saw-whet Owls is almost always based on the molt pattern among the primaries and secondaries, which is more easily viewed under ultraviolet light. While wing chord alone may be enough to identify some males (<128 mm) or females (>143 mm), there are many in the range of overlap that can be determined in combination with weight.

QUICK TIPS:

 Examine the age of the primaries and secondaries; all are uniform in colour and wear on HY/SY owis, the central block is contrastingly old on SY/TY owis, and cider owis have a more irregular mix of up to four generations of feathers (some TY/4Y and even a few 4Y/5Y individuals may be identified by the retention of a very feded and worn first secondary.

2) Determine sex by measuring the unflattened wing chord (<128 mm = male, >143 mm=female) and if necessary combining that measure with weight and referring to the decriminant function analysis available from Protect Overset

Spinies account apdated Critober 2011

Ageing and sexing guidelines:

Many owls can be aged by the pattern of moult among their primaries and secondaries. In the case of Northern Sevewhet Owls, patterns for hetch year (HY) and second year (SY) birds are widely accepted; some believe that third year (TY) and even fourth year (HY) birds show predictable and recognizable patterns of moult, while others believe that those distinctions are unreliable and prefer to classify older birds as after second year (ASY) or occasionally after third year (ATY).

A recent poster by Nova Mackentley, Eugene Jacobs, and David Evans (presented at the Raptor Research Foundation meeting in Duiuth MN, October 5-9, 2011) reported that based on recoveries of known-age owls, 95% of individuals showing a "typical". TY pattern in fail were in fact TY birds, but only 59% of TY birds showed this kind of pattern. Similarly, 95% of individuals showing a 4Y pattern were actually 4Y birds, but only 63% of 4Y birds showed the expected pattern. This suggests that it is likely safe to age Northern Sawwhet Owls as TY and 4Y if moult matches the expected patterns (see below), but that a number of individuals deviate from the norm and need to be essessed as ASY (imgular mix of two generations of feathers, or three generations), or ATY (four distinct generations of feathers).

The photos below show wings of dead owls, collected over time (with permission) by Prince Edward Point Bird Observatory (PEPtBO). In each case, the photo on the right shows the domail view of the wing under normal light, while the photo on the left is a ventral view of the same wing under ultraviolet light. Porphyrins in the newer feathers fluoresce pink, and these fade over time, often allowing for an easier distinction among different generations of feathers than under regular light.

All age determinations were made by PEPtBO master bander David Okines, who has banded several hundred Northern Saw-whet Owls each fall over the past few years; written commentary is by MBO master bander Marcel Gahbauer, based on extensive discussion of the specimens with David. Numbers given in the descriptions are intended to be representative of usual variation in the species, but exceptions no doubt occur in all cases, especially for older birds. Feedback on these photos and comments are valicome at <u>mbotRimicrationresearch.org</u>.

Hatch year (HY): The simplest pattern, in which all primaries and secondaries are a uniform shade of brown above, and all show a similar amount of pink below under UV light.



Second year (SY): Again a relatively simple pattern, with the outermost 3-7 primaries and innermost 5-9 secondaries replaced (darker brown above, pink below) contrasting visibly with the unreplaced inner primaries and outer secondaries (paler brown above, whitish below).



Third year (TY): An increasingly fragmented pattern, now showing three distinct generations of feathers. Only one juvenile flight feather has been retained, s1 (the first secondary), which appears pale brown above, and while below. On either side of it are four new feathers, bright pink below and dark brown and fresh above. Other feathers (p5-p8, s5, s8-s13) are intermediate in age, somewhat faded under both views, but not as pale as s1.



Fourth year (4Y): A complex pattern, in which four generations of feathers can be identified. Characteristic of the 4Y pattern is a very oid retained juvenile s1 (first secondary). It is distinctly paler than other feathers both above and below. The next oldest feathers are primaries 4-5, and secondary 5, these would have grown in the ow's second year. Feathers grown in the ow's third year, now two years old, still show a fair amount of pink below and dark above, these are primaries 1-3 and 8-10; as well as secondaries 2-4 and 8-13. The newest feathers are fresh and dark above and bold pink below. primaries 6-7 and secondaries 6-7.



After second year (ASY): This designation is applied to owls with a moult pattern that shows three generations of feathers but does not conform to the typical pattern of a third year bird. In this example, s1 has been recently replaced along with p1-p2, but p3-p4 were replaced last year and s2-s5 the year before that; all others were replaced



After third year (ATY): This designation is applied to owls with a moult pattern that shows four generations of feathers but does not conform to the typical pattern of a fourth year bird.



All photos by Marcel Gahbauer, of wings collected with permission from dead birds by Prince Edward Point Bird Observatory in Ontario.

Appendix D – Ageing and sexing NSWO (Project OwlNet)

Northern Saw-whet Owl

Northern Saw-whet Owls exhibit moderate reverse sexual dimorphism by size, although an earlier published reference (Buckholtz et a 1984, and Pyle 1997) using only wing chord does not accurately assign gender to many known-sex saw-whets, and should not be follow

Instead, Project Owlnet and the U.S. Bird Banding Lab (BBL) recommend the use of sexing criteria developed by Brinker in 1997 that a based on a discriminate function analysis of mass and wing chord in >200 known-sex saw-whets. To download a copy of the sexing characteric HERE.

The BBL and Canadian Wildlife Service CWS have approved the use of this method, although they require any bander using it to include following remark on banding schedules: "Sex determined using the wing-mass DF available from Project Owlnet."

NOTE: Proper gender assignment depends on accurate measurement of <u>unflattened</u> (natural) wing chord. The difference between wing chord and flattened wing is usually about 5mm, and may run to 8-10mm, so a poorly measured wing will significantly affect the accura these criteria.

When sexing saw-whet owls, you should generally only need to use the table for owls with masses from 79-92g. Any owl with a mass c 93g or more is a female, and any owl with a mass of 78g or less is a male.



115	8	Mass (grams)	8
Wing Chord	Male	Unk	Female	
120	≤88	≥89	≤92	≥93
121	≤87	≥88	≤92	≥93
122	≤87	≥88	≤92	≥93
123	≤86	≥87	≤91	≥92
124	≤85	≥86	≤91	≥92
125	≤85	≥86	≤90	≥91
126	≤84	≥85	≤90	≥91
127	≤84	≥85	≤90	≥91
128	≤83	≥84	≤89	≥90
129	≤82	≥83	≤89	≥90
130	≤82	≥83	≤89	≥90
131	≤81	≥82	≤88	≥89
132	≤80	≥81	≤88	≥89
133	≤80	≥81	≤88	≥89
134	≤79	≥80	≤87	≥88
135	≤78	≥79	≤87	≥88
136			≤87	≥88
137	1	10 - 10	≤87	≥88
138			≤86	≥87
139			≤86	≥87
140			≤86	≥87
141			≤85	≥86

Boundaries for assignment of sex in Northern Saw-whet Owls* > 95% probability of correct sex for any individual.

*When using these criteria to sex owls as part of banding schedule preparation you must include the following remark for each owl. Sex determined using the wingmass DF available from Project Owlnet.

Appendix E – Guide to first aid for birds injured during banding projects

If you suspect a bird is not healthy consider the following:

- Is it lethargic, depressed, fluffed up?
- Can it fly?
- Is it emaciated, thin? Feel the keel it should be rounded. If it is concave, the bird should be **sent to AIWC**.
- Does it have a head or eye injury? Are its pupils responsive? Is the head tilting?
- Is it lame? Can it stand? Is balance an issue?
- Is a fracture or dislocation apparent?
- Is it heavily infested with ectoparasites (lice, maggots, blowflies, *hippoboscid* flies)?
- Is it gasping or otherwise seeming to struggle for breath?
- Is it bleeding? Is there discharge from cloaca, ears, nares?
- Is the crop compacted?
- Is there a bad smell associated with the bird?
- Is it dehydrated? Is the skin turgid? Are eyes sunken? Do mucous membranes appear dry and/or pale?
- Can it grip with its feet?

First aid suggestions and when to send to Alberta Institute for Wildlife Conservation (AIWC) (403-946-2361)

Dehydration

If a bird seems dehydrated offer it water with a syringe or droplets on a fingertip. If necessary, place it in a box and allow it to rest for up to a half hour. If the bird does not freely fly away within half an hour **send to AIWC** (preferably un-banded) for assessment and potential treatment.

Abrasions and Cuts

Clean cuts and abrasions with water and assess. If wound seems serious and/or requires sutures **send to AIWC** (preferably un-banded) for assessment and potential treatment. Cover the wound with non-stick gauze and hold in a darkened box for pick-up.

Fractures and dislocations

Keep broken bone wet, tuck exposed ends under skin. Wrap and immobilize, stabilize joints above and below the fracture. Use vetwrap, non-stick gauze, non-stick tape. Be careful not to restrict circulation. If wrapping a wing be careful not to constrict the patagium. **Send to AIWC** (preferably un-banded) for assessment and potential treatment.

Wing Strain (i.e. inability to fly)

This is a non-specific term. A serious cause is a fractured or displaced coracoid. In many other cases, a half hour of rest in a darkened box is all that is needed. If the bird does not freely fly away within a half hour **send to AIWC** (preferably un-banded) for assessment and potential treatment.

General Malaise

If a bird does not evidence specific symptoms but still seems to be unhealthy and/or weak, place it in a darkened box. If the bird does not freely fly away within half an hour, **send to AIWC** (preferably un-banded) for assessment and potential treatment.