



Ontario Bird Banding Association

**Ontario Northern Saw-whet Owl
Cooperative Banding Project**

Participant's Kit
Version 2007

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PROJECT OVERVIEW

Introduction

Thank you for your interest in the Ontario Northern Saw-whet Owl (NSWO) co-operative banding project, organized by the Ontario Bird Banding Association (OBBA).

The goal of this project is to organize and carry out a five-year cooperative project to increase our understanding of Northern Saw-whet Owls in Ontario. The first phase of this multi-year project involves acquiring available NSWO banding and effort data from Ontario banders, and compiling these data in a central database. This database will include both current and historic datasets.

To facilitate this data gathering process, we have developed draft data collection guidelines, and templates of forms and spreadsheets for use by project participants. The purpose of the data guidelines is to increase the compatibility of data currently being collected at different stations so that it can be pooled for future analyses. Stations are not required to change their operating procedures in order to participate in this project. The data forms are provided primarily as an aid for stations which do not already have suitable forms for tracking their owl banding effort. Established stations can continue to use their existing forms. Similarly, the data entry spreadsheet templates can be adapted to meet the needs of each station, and stations that are already computerizing their data are not required to use these spreadsheets.

In developing this material, we have tried to accommodate the full range of data collection and data management needs and capacities of the diverse array of owl banding stations currently operating in Ontario. In particular, we have prepared two sets of data forms and spreadsheets to accommodate the different needs of stations that follow a standardized effort protocol (e.g., stations monitoring population change; Dunn 2001), and other stations that do not have a constant effort component.

All of the material in this kit will be available for download from the OBBA website (www.ontbanding.org). As parts of the kit are revised and updated, the newest version will be posted on the website. A CD of these files will also be available from the Coordinator:

**OBBA Owl Project Coordinator
Christian Friis
3-637 Broadview Ave. | Toronto, ON | M4K 2N9
416.461.2137 | friis.christian@gmail.com**

Background

Northern Saw-whet Owls (NSWO) have been banded in Ontario for over 50 years. With the introduction of mist nets in the 1960's and audio lures in the early 1990's, the efficiency of NSWO banding operations has increased considerably.

The launch of Project OwlNet (www.projectowl.net) in 1996 spurred the establishment of many new owl-banding operations in Canada and the United States. By 2004, there were at least 15 owl-banding operations in Ontario, banding approximately 2000 owls each fall.

Due to the intensity of NSWO banding in eastern North America, the recapture rate for NSWO has risen to levels that are exceptionally high for a non-game bird – as high as 5% at southern Ontario stations. This high recapture rate gives great potential for analyzing and understanding patterns of NSWO migration. However, such an analysis requires a regional approach, using data from multiple stations collected over several years.

Banding, recapture and effort data are needed for analyses of NSWO migration routes and trends in numbers of migrating owls. Most banding and recapture data are available in a standardized format (e.g., *Band Manager*). However, there is considerable variation in how stations record banding effort and ancillary banding data (e.g., fat, moult). The material in this participant's kit is designed to overcome this lack of consistency by providing guidelines and aids for recording and reporting owl banding effort and other relevant data.

This kit does not contain detailed information on owl banding equipment as this information is readily available on the Project OwlNet website (www.projectowl.net) and the associated list serve.

Guidelines for stations wanting to prepare a written operating protocol are also available on the OwlNet website (Dunn 2001). Developing a standard protocol will enhance the value of your banding operation, by facilitating year-to-year comparison.

Project Goal

- To organize and carry out a five-year cooperative project to increase our understanding of Northern Saw-whet Owls in Ontario.

Project Objectives

- To develop a central repository for data collected by owl banders in Ontario that can be used to answer scientific questions about regional migration patterns;
- To analyze and report on the results of owl banding projects in Ontario;
- To compile additional data that could be used in the future to answer other questions on NSWO migration, moult patterns, sex and age ratios, and population dynamics;
- To enhance the value of owl banding projects being undertaken in Ontario, by analysing these data through a central reporting body; and
- To raise the profile of the OBBA across Ontario so as to attract new members.

Approach

For the regional analysis of migration patterns, it is important to compile as much available NSWO banding and recapture data as possible. We are interested in both large and small datasets. To encourage you to provide data, we have tried to make things as simple as possible.

So why not just obtain people's banding records?

The short answer is that in addition to getting your banding records, we want to know about your banding effort. Also, many stations are collecting additional valuable data that they may not get around to analyzing, or that needs to be part of a bigger data set for analysis. While we are most interested in obtaining your banding, recapture, and effort data, we are also trying to compile additional data so that it can be used in the future.

A further complication is that the database and data forms are designed to accommodate the needs of a wide range of users – ranging from the casual weekend owl bander to bird observatories that have been carrying out standardized owl banding for years. Therefore, we have included data fields that may only be used by some stations and can be ignored by others. We recognize that each station has different objectives and capabilities and therefore will be collecting data differently.

The material in this participant's kit is intended to help you:

- Keep track of your banding effort;
- Record the data you are collecting (sample data forms are provided); and
- Computerize those data for analysis (spreadsheet templates for data entry are provided).

If you are already doing all or some of these things than you can keep doing so. If your

effort data is already computerized then you can just send it to us and we will figure out how to incorporate it in the OBBA database. If you already have data forms prepared then you can keep using them – the data entry spreadsheets can be modified to fit your forms.

Please remember these important points:

- When possible, please provide data in a format compatible with the OBBA database structure;
- Provide banding, recapture and effort data in electronic format after each season (preferably by 31 December); and
- Grant OBBA permission to use these data for this regional analysis.

Banding Permits: To capture and band owls you require both a provincial Scientific Collector's Permit ("raptor banding permit"), and a federal Banding Permit with authorization to use mist nets and to band Northern Saw-whet Owls. Each station is responsible for obtaining banding permits and bands. The provincial permit can be obtained by contacting a biologist or wildlife technician at your local Ontario Ministry of Natural Resources (MNR) office. The Bird Banding Office (BBO) of Environment Canada issues federal banding permits and issues the standard bands (see below). Both MNR and the BBO office will require a project description in order to process requests.

Bands: The recommended band size for NSWOW is the new "4-short" (4S) size. A 3A band may be a better fit on small birds. Bands that can still be used, but are no longer recommended include 4 lock-on or regular size 4.

Banding and Audio-luring Equipment: Participants must obtain their own equipment. Information on nets, audio-lures and other equipment is available on the Project OwlNet website (www.projectowl.net). Stations are free to use whatever equipment types and set-ups they wish (consistency of effort at your station should be important to your operations but consistency of effort among the various stations is not important to this project).

Audio-lure broadcast call: The use of an audio-lure greatly increases the capture rate and we expect that participating stations will use an audio-lure most of the time. You are free to use whatever broadcast call and audio format (tape, CD, digital) you wish. Digital audio calls can be downloaded from the Project OwlNet website (if you can't burn CD's then you can request an audio-lure CD from the Project Coordinator).

Data Collection

The intent is that stations will adapt these generic forms and spreadsheets to suit their operation. We have tried to indicate which data, are **required** (i.e., essential to the proposed analyses), which additional data are **recommended** (i.e., will help with interpretation of the results or could be used for other pooled analyses), and which are **optional** (i.e., may not be used for regional analyses, but may be used for station

analyses). We encourage stations to enter and submit all of the data they routinely collect, as this will add value to the overall database.

Data Forms

Sample data collection forms can be included with this kit. The electronic templates for these forms (as PDF, Word, or .rtf documents) will be available for download from the OBBA website (or sent by email from the Coordinator). You can photocopy the data forms included in this kit, modify the electronic template to fit your needs before printing, or you can continue to use your current data collection forms.

Data Entry

Banding data should be entered into Band Manager or BANDIT, as usual. Spreadsheet templates (in Excel .xls format) have been developed for you to computerize your effort data and the optional moult data. These data entry templates will be available for download from the OBBA website (or sent by email from the Coordinator). If your effort data are already computerized then you can send your data file directly to us and we will convert it as necessary.

Please contact the Project Coordinator if you have problems using the spreadsheets.

Data categories

At present, the database can accommodate the following categories of data (required data are indicated in **bold**):

Station Information

- **Station Location (coordinates);**
- Description of capture set-up (number, size, height and type of nets, type of audio lure, type of broadcast equipment); and
- Configuration (sketch map showing position of audio lure and net locations).

Station information should be recorded on the **Ontario Northern Saw-whet Owl Cooperative Banding Project Station Registration Form** (see Figure 1 and Table 1) and submitted to the Owl Project Coordinator *as soon as possible*. We may ask for additional details (e.g., copy of your station map) at a later point.

As a minimum, we need to know the station location (UTM or Lat/long coordinates), and the name and contact information for the station operator/coordinator, as well as for the master permit holder, if different. Additional information on your station set up may be useful in interpreting results (and will help you track any year-to-year changes made in your station configuration or equipment). Information on the station objectives and activities are optional.

Figure 1. Example registration form.

**ONTARIO NORTHERN SAW-WHET OWL COOPERATIVE BANDING PROJECT
STATION REGISTRATION FORM**

Please complete as much of this form as possible now and send it to the **OBBA Owl Project Coordinator: Christian Friis 3-673 Broadview Ave., Toronto, ON, M4K 2N9**
friis.christian@gmail.com We may request additional details later.

Station Coordinator/Manager Contact Information

Name: Christian Friis

Affiliated Organization: Ontario Bird Banding Association

Mailing Address: 3-637 Broadview Ave., Toronto, ON, M4K 2N9

Preferred E-mail: friis.christian@gmail.com

Preferred Phone: (416) 461-2137

Best time to phone you (during the day, evenings, weekend): evenings/weekend

Name and contact information for the Master Permit holder (federal and provincial) if different from above:

Station Location Information

Name of Station: Broadview Ave.

Station Code (Location code used in Band Manager program): BA

Coordinates (degrees, minutes, seconds; as accurate as possible please)

Latitude: _____ Longitude: _____

UTM Coordinates (if available): **ZONE 17 | EASTING 6 3 2 5 5 8 | NORTHING 4 8 3 6 8 8 5**

Nearest Town: Toronto County: Metro Toronto Province: ON

Land Ownership: Permission granted by landowner (landlord)

Average Altitude (in m): 112m

General Habitat Description (e.g., "Mixed woodland in suburbia"; "cottonwood-willow riparian corridor"):

Mixed woodland in urban centre, near Don River.

Station Operation

Number of nets: 4

Mesh size of nets: ~~2-3/8"~~ **1.5"** ~~4-25"~~ other _____

Periods of operation: Start date: 30 September End date: 20 December

Number of hours of operation per night: 4

Station type (choose one):

~~Fully standardized~~ ~~Partly standardized~~ ~~Pilot/experimental~~ **Casual** ~~Other (specify):~~

First year of operation at this site: **2007**

Audio Lure: **yes.**

Broadcast Equipment:

MP3 player attached to two JBL cs206 (6 1/2") 120W (91dB) car audio speakers, powered by AC Delco car battery.

Station Map: do you have a sketch map showing the general configuration of your station?

Yes.

Written Protocol: do you have a written protocol describing your station's operations?

No.

Station Objectives and Activities

Please provide a short description of the current objectives of your owl banding project, and the type of activities involved, (e.g., do you do owl banding demonstrations for groups or the public? Any special research projects? Nestbox monitoring?)

Demonstrations are given nightly to the public for one hour during the operation. No special research projects or nestbox monitoring are conducted. This is a purely for fun project.

Data Release

I hereby grant permission to the OBBA to use the data I provide for purposes of the NWSO Cooperative Banding Project. Any publications or reports arising from this project will acknowledge the important contribution of the participating stations and banders in collecting and providing the necessary data.

Please provide the name of the organization or banding group and individual bander(s) to be cited in the acknowledgements of publications. Due to space limitations we can include a maximum of two names per station. However, we would like to include a list of all staff and volunteers for each station in our annual project report.

All information gather in this document will be used strictly for the purposes of the Cooperative Project. The OBBA does not sell, lend or give out personal information. Your privacy is important to us. If you would not like your **Names to be Cited** published in the annual report, please check here

Signature of Master Permit Holder

Date

Names to be Cited

Organization or Banding Group: OBBA

Master Bander: Christian Friis

Assistant Bander(s): None

Other volunteers and staff: None

Table 1. Details on station registration form data.

Required data	Details
Station Name	Your station's name.
Station Code	Location name/code used in <i>Band Manager</i> location field.
Lat/long coordinates	Location details from <i>Band Manager</i> location file.
Master Permit Holder	Name and contact information for master permit holder.
Master Permit #	Federal banding permit number for owl bands used.
Coordinator Contact Information	Name and contact information for station coordinator/operator if different from master permit holder.
Recommended data	Details
Net Information	Details of number, length and mesh-size for nets in use.
Audio-lure	Description of the audio-lure (media, source of call).
Broadcast equipment	Description of broadcast unit (media type, model #, brand), speakers (number used, model #, brand, output), etc.
Station map	Sketch map showing net locations, net numbers, location of audio lure speakers, trails, landmarks, etc.
Optional information	Details
Station objectives	Brief description of station objectives or activities (e.g., population monitoring, migration research, public education, bander training).

Banding and Band Encounter Data (recorded in Band Manager)

- **Band number, age, sex, wing chord, weight, time, date, etc.;**
- Additional banding data such as fat, tail length, maximum wing, etc.; and
- Net number, panel or height in net, direction of travel.

Banding data, including foreign and local recaptures, should be recorded on your regular banding data sheets and/or retrap cards. A **Banding data sheet** template is available upon request, or will be available for download from the OBBA website (www.ontbanding.org; see Figure 2).

All banding data should be entered using the *Band Manager* or BANDIT software. Banding schedules and foreign recaptures must be submitted to the Bird Banding Office, as usual.

An electronic copy of your NSWOB banding data records should be sent to the Owl Project Coordinator at the end of the season, along with your effort data. This is easiest if you enter your owl banding data into a separate file for each season. See Appendix 3

for instructions for copying and sending data files.

Ageing

NSWOs should be aged following Pyle (1997). See Appendix 1 for additional information on how to age NSWOs (including photos). **Note:** A black-light can be useful for discerning moult patterns when ageing birds.

Sexing

NSWOs can be sexed based on wing chord and weight measurements following the criteria developed by Brinker (2000; www.projectowl.net/df.htm; see also Appendix 4).

The data listed in Table 2 should be recorded for each newly banded owl, foreign recapture and local recapture (returns or same-season recaptures). We recommend that repeats (birds captured earlier the same night) should be recorded and re-weighed, unless they were recently released (e.g., released on the previous net round).

Figure 2. Example banding data.

Northern Saw-whet Owl Banding Data Form

Ontario Bird Banding Association

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Band Size

Bander Owl McNut Initials OSM

First Band Number:

Prefix	Suffix	Permit	Year
0664	18001	99999	2006

Band	Species	Sp. Code	AGE	How Aged	Sex	How Sexed	Wing	FAT	Weight	Status	Date	Time	Bander	Time	Trap	PROB	Remark	NSB	Notes	
Last 2 Digits			E								Mo. Day	Weighed	Initials Area	Trapped	Type No.	Age	Code			
01	Northern Saw-whet Owl	NSWO	1	14	9	120	1	87.1	300	1006	203	0	OSM01	200	0W01		07		Strange moult pattern - see moult data	
02		NSWO	2	15	9	140	2	101.3							0					
03		NSWO	2	15	9	141	1	100.9				212			210	0W03				
04		NSWO	5	15	9	138	0	90.7	300	1008	193	0		01	190	0W02			Repeat capture on 2008 round	
05		NSWO	5	14	9	136	1	85.5							200	0W01				
06		NSWO	2	14	9	135	1	77.8				201			0					
07		NSWO	2	14	9	126	0	87.0							210	0W03				
08		NSWO	2	15	9	130	0	92.1							0	0W02				
09		NSWO	2	15	9	137	1	99.0							0	0W01				
10		NSWO	2	15	9	140	3	107.0							0	0W03				
11		NSWO	5	14	9	128	1	80.7				224			220	0W01				
12		NSWO	5	10	9	136	1	86.3	300	1009	004	0			000	0W02				
13		NSWO	5	10	9	127	1	88.9				005			000	0W01				
14		NSWO	2	10	9	124	0	89.1	300	1010	212	0		01	210	0W03				
15	Band Lost	BALO																		
16	N. Saw-whet Owl	NSWO	2	15	9	141	2	103.1	300	1010	212	0	OSM01	210	0W03					
17		NSWO	2	15	9	142	1	102.7							0					
18	Band Destroyed	BADE																		misshapen band.
19	N. Saw-whet Owl	NSWO	5	15	9	139	2	92.0	300	1010	223	0	OSM01	220	0W01					
20		NSWO	7	14	9	126	1	82.4							0					
21		NSWO	5	14	9	121	1	86.0							0					
22		NSWO	2	15	9	140	1	98.3				224			0	0W03			Repeat capture on 2008 round.	
23		NSWO	2	10	9	139	3	85.2							0					
24		NSWO	2	15	9	138	0	92.4							0					
25		NSWO	2	10	9	134	0	82.7							0					

Last Band Number:

Prefix	Suffix
0664	18025

Courtesy of Long Point Bird Observatory

Table 2. Details on banding data.

Required data	Details
Banding data as required by the banding office	Band number, species, age, sex, location, bander, etc.
	Age using Pyle (1997) plumage criteria, see Ageing NSW Information Sheet.
	Sex using Brinker (2000) wing-weight criteria (footnote required), see Sexing NSW Information Sheet.
Wing	Length of natural (unflattened) wing chord (in mm).
Weight	To nearest gram or 0.1 gram.
Time	Nearest 10 minutes (specify whether time is time of net round, time weighed or time released).
NSB (Non-standard banding)	For use by stations with a standard effort component. Check if capture occurred during a non-standard period.
Recommended data	Details
Time captured	Time of net round.
Time weighed/released	Time weighed and released (to nearest 10 minutes).
Fat	Record the level of fat. See Appendix 2.
Moult	Record the moult for all birds with more than one generation of flight feathers (i.e., all non-HY birds). See Appendix 1.
Net number	Number of the net the owl was captured in (should correspond to net numbers in description of net array/station map).
Optional data	Details
Other measurements	Tail length, flattened wing, etc.
Height of capture	Height above ground at which the owl was captured.
Panel of capture	Panel in which the owl was captured (indicate whether panels numbered from bottom to top or top to bottom).
Direction of movement	Direction in which the owl was moving when captured (towards or away from lure).

Band Encounter data

Band encounter data includes all data collected for a newly-banded individual, but is recorded on the **Band encounter data sheet** (see Figure 3), which is available upon request or will be available for download from the OBBA website. These include

recaptures (foreign banded owls and any other recaptures that haven't been captured earlier this season), retraps (any banded bird that has been captured at some point earlier this season but not that same night) and repeats (recaptured or banded earlier that same night). The data in Table 3 should be recorded for all NSWOW band encounters.

Table 3. Details on band encounter data.

Required data	Details
Age	Using Pyle (1997) plumage criteria. See Appendix 1.
Sex	Using Brinker (2000) wing-weight criteria (footnote required in <i>Band Manager</i>). See Appendix 4.
Wing	Length of natural (unflattened) wing chord (in mm).
Weight	To nearest gram or 0.1 gram.
Time	Nearest 10 minutes (specify whether this is time of net round, time weighed or time released).
NSB (Non-standard banding)	For use by stations with a standard effort component. Check if capture occurred during a non-standard period.
Recommended data	Details
Time captured	Time of net round.
Time weighed/released	Time weighed and released (to nearest 10 minutes).
Fat	Record the level of fat. See Appendix 2.
Moult	Record the moult for all birds with more than one generation of flight feathers (i.e., all non-HY birds). See Appendix 1.
Net number	Number of the net in which the owl was captured (should correspond to net numbers in description of net array/station map).
Notes	Record whether the individual was a recapture, retrap or repeat.
Optional data	Details
Other measurements	Tail length, flattened wing, etc.
Height of capture	Height above ground at which the owl was captured.
Panel of capture	Panel in which the owl was captured (indicate whether panels numbered from bottom to top or <i>vice versa</i>).
Direction of movement	Direction in which the owl was moving when captured (i.e., towards – on the outside of the net/net array – or away from lure – inside of the net/net array).

Nightly Effort data

- **Number of net-hours and lure-hours for each night of operation;**
- **Start and end times for each night of operation;** and
- Light and weather conditions at the opening and closing of nets.

Various measures of effort are needed to better calibrate and interpret the capture

information (Table 4). For example, the total net-hours and the number of luring-hours per night are used to calculate nightly capture rates. Opening and closing times (as well as capture times) are needed to examine time-of-night differences in captures rates.

While nightly effort data are essential, we recommend that you also record effort, weather and light conditions, and capture data for each net round (see *Net Check Effort Data*). The **Owl Log form**, or a similar data sheet, can be used to keep track of the nightly effort data (as well as net round data). The time and weather and light conditions at the start and end of each night of owling are entered in to the **Nightly Effort worksheet** (see Figure 4).

Calculating Net Hours

In calculating net-hours, a net is considered to be 12 m (40') long, and 2.5 m to 3 m high when open. A correction should be made for any nets with substantially different dimensions (e.g., an 18 m net counts as 1.5 nets, a double-height net counts as 2 nets).

For example, at a station with a total of 10 nets, 8 are standard size (i.e., 12m), one is 18m and one is a double-height net (i.e., 5-6m high). The net-hours for a 4-hour period are: $(8 \times 4) + (1.5 \times 4) + (2 \times 4) = 32 + 6 + 8 = 46$ net-hours. In terms of 12-m nets, there are $8 + 1.5 + 2 = 11.5$ nets in operation.

Most stations operate with the audio-lure running constantly when the nets are open. However, there are circumstances in which the nets may be kept open with the lure not running such as:

- Some stations routinely stop audio-luring a few hours before sunrise to avoid potential influence on diurnal migration monitoring results;
- Some stations may switch to using a different broadcast call (e.g., Boreal Owl) on occasion;
- Some stations routinely turn the lure off while birds are being extracted; and
- Equipment breakdown can interrupt luring (but not netting).

Occasional short interruptions in luring (less than 30 minutes) can be ignored, but *longer periods in which the nets are operated with no audio-lure playing should be noted.*

Weather and light conditions affect the number of birds migrating, and capture rates. Lunar charts and regional weather data will be used to analyze the role of light and weather conditions on the number of birds migrating. However, we would also like to acquire local station data to ground truth the regional weather data, and to examine the extent to which local versus regional conditions affect the capture rate. The weather variables included here (i.e., wind direction, wind speed (Beaufort scale), temperature, cloud cover and precipitation) are easily measured and are routinely collected at several of the standardized stations. Light conditions greatly affect the visibility of the nets (and

likely also migration rates). Several stations in Ontario currently use the light scale (very bright to very dark) developed at Thunder Cape Bird Observatory. Noise may be a consideration for exposed coastal stations, where wave noise can drown out the broadcast unit.

Recommended guidelines for recording weather, light and noise conditions are presented in Appendix 2.

Figure 4. Example nightly effort data entered into the Excel spreadsheet.

Station code: AEH_HOME

Year: 2005

Date	Time nets opened	Nets closed before midnight	Nets closed after midnight	Total trapping time	# of nets open	Lure	Total net-hours	Comments
15-Sep-2005	00:00	00:00	00:00	00:00			0:00:00	
16-Sep-2005	00:00	00:00	00:00	00:00			0:00:00	
17-Sep-2005	00:00	00:00	00:00	00:00			0:00:00	
18-Sep-2005	00:00	00:00	00:00	00:00			0:00:00	
19-Sep-2005	00:00	00:00	00:00	00:00			0:00:00	
20-Sep-2005	00:00	00:00	00:00	00:00			0:00:00	
21-Sep-2005	00:00	00:00	00:00	00:00			0:00:00	
22-Sep-2005	00:00	00:00	00:00	00:00			0:00:00	
23-Sep-2005	00:00	00:00	00:00	00:00			0:00:00	
24-Sep-2005	00:00	00:00	00:00	00:00			0:00:00	
25-Sep-2005	19:30	21:30	00:00	02:00	6	Y	12:00:00	net 1 closed at 21:30, blowing
25-Sep-2005	21:30	23:30	00:00	02:00	5	Y	10:00:00	wind picked up
26-Sep-2005	19:30	00:00	02:00	06:30	6	Y	39:00:00	CD stopped working at 2 am, dead battery.
26-Sep-2005	02:00	00:00	03:00	01:00	6	N	6:00:00	
28-Sep-2005	00:00	00:00	00:00	00:00			0:00:00	rained out
29-Sep-2005	00:00	00:00	00:00	00:00			0:00:00	away
30-Sep-2005	00:00	00:00	00:00	00:00			0:00:00	away
1-Oct-2005	00:00	00:00	00:00	00:00			0:00:00	away
2-Oct-2005	19:00	00:00	03:00	08:00	6	Y	48:00:00	
3-Oct-2005	19:00	00:00	03:00	08:00	6	Y	48:00:00	
4-Oct-2005	00:00	00:00	00:00	00:00			0:00:00	south wind, didn't try
5-Oct-2005	19:00	23:30	00:00	04:30	6	Y	27:00:00	
6-Oct-2005	20:20	21:00	00:00	00:40	5	Y	3:20:00	had to fix end loop on net 3
6-Oct-2005	21:00	00:00	01:30	04:30	6	Y	27:00:00	
7-Oct-2005	19:00	21:00	00:00	02:00	6	Y	12:00:00	
8-Oct-2005	00:00	00:00	00:00	00:00			0:00:00	didn't operate
9-Oct-2005	00:00	00:00	00:00	00:00			0:00:00	didn't operate
10-Oct-2005	19:10	00:40	00:00	05:30	6	Y	33:00:00	
11-Oct-2005	18:30	22:20	00:00	03:50	6	Y	23:00:00	
12-Oct-2005	00:00	00:00	00:00	00:00			0:00:00	
13-Oct-2005	18:30	23:00	00:00	04:30	6	Y	27:00:00	
14-Oct-2005	19:20	23:20	00:00	04:00	6	Y	24:00:00	
15-Oct-2005	19:00	00:00	06:00	11:00	6	Y	66:00:00	best night so far!
16-Oct-2005	19:00	00:00	06:00	11:00	6	Y	66:00:00	
17-Oct-2005	19:00	21:00	00:00	02:00	6	Y	12:00:00	
18-Oct-2005	02:00	00:00	06:00	04:00	6	Y	24:00:00	opened at 2 am on 19th
19-Oct-2005	19:10	21:20	00:00	02:10	6	Y	13:00:00	
20-Oct-2005	00:00	00:00	00:00	00:00			0:00:00	didn't operate

21-Oct-2005	00:00	00:00	00:00	00:00			0:00:00	didn't operate
22-Oct-2005	18:30	23:30	00:00	05:00	6	Y	30:00:00	
23-Oct-2005	18:30	00:00	01:15	06:45	6	Y	40:30:00	good weather, 0 owls
24-Oct-2005	00:00	00:00	00:00	00:00			0:00:00	didn't operate
25-Oct-2005	00:00	00:00	00:00	00:00			0:00:00	light SE wind
26-Oct-2005	18:20	20:20	00:00	02:00	6	Y	12:00:00	
27-Oct-2005	00:00	00:00	00:00	00:00			0:00:00	windy
28-Oct-2005	00:00	00:00	00:00	00:00			0:00:00	too windy
29-Oct-2005	00:00	00:00	00:00	00:00			0:00:00	
30-Oct-2005	19:00	22:30	00:00	03:30	6	Y	21:00:00	
31-Oct-2005	18:50	23:00	00:00	04:10	6	Y	25:00:00	
1-Nov-2005	19:30	00:00	01:00	05:30	6	Y	33:00:00	
2-Nov-2005	18:45	23:45	00:00	05:00	6	Y	30:00:00	
3-Nov-2005	00:00	00:00	00:00	00:00			0:00:00	rain
4-Nov-2005	21:00	23:30	00:00	02:30	6	Y	15:00:00	battery died
5-Nov-2005	19:00	23:30	00:00	04:30	6	Y	27:00:00	Last night
6-Nov-2005	00:00	00:00	00:00	00:00			0:00:00	Slept 12 hours!
7-Nov-2005	00:00	00:00	00:00	00:00			0:00:00	
8-Nov-2005	00:00	00:00	00:00	00:00			0:00:00	
9-Nov-2005	00:00	00:00	00:00	00:00			0:00:00	
10-Nov-2005	00:00	00:00	00:00	00:00			0:00:00	
11-Nov-2005	00:00	00:00	00:00	00:00			0:00:00	
12-Nov-2005	00:00	00:00	00:00	00:00			0:00:00	
13-Nov-2005	00:00	00:00	00:00	00:00			0:00:00	
14-Nov-2005	00:00	00:00	00:00	00:00			0:00:00	
15-Nov-2005	00:00	00:00	00:00	00:00			0:00:00	

Table 4. Details on nightly effort data.

Required data	Details
Date	The night, month and year of operation (e.g., 21-22 OCT 2005).
Start time/Opening time	Time at which you started the lure and/or the time at which you started to open nets.
End time/Closing time	Time at which you stopped the lure and/or started to close nets.
Number of nets opened	# of 12 m nets open at start. Provide comments for any nets left closed.
Additional opening/closing times	If the number of nets changed during the night (e.g., closed a net or opened another net), the time needs to be recorded, and insert another record for that date in the spreadsheet.
Lure operating?	Yes/no. If the lure is not used for part of the night, record the time when it was stopped/started. In the spreadsheet you need to insert another record for that night.

Total net-hours	Auto-calculated. [# of 12m nets] X [# of hours]. Adjust for different sized nets. See net hour example above.
Total lure-hours	Auto-calculated. [End time] – [Start time for lure operation].

Recommended Data	Details
Conditions at start and Conditions at end of operation	Wind direction, wind speed (Beaufort scale), temperature (°C), cloud cover (tenths), precipitation, light conditions (very bright to very dark), and noise conditions.

Net Check Information

- Time of each net round
- Light and weather conditions at each net round.
- Captures per net round

Many stations record the time of each net round, along with information on the number of captures, light conditions, and so on (Table 5). Knowing the frequency of net checks means that we can more accurately determine the actual capture time.

We recommend that stations use the **Owl Log form** (see Figure 5a), or a similar data sheet, to keep track of net round data (form also includes space for recording the nightly effort data). These data are entered in to the **Net check data template** (see figure 5b).

Figure 5a. Example net check data, entered into the Owl Log form.

Area: AEH_HOME OBBA OWL LOG Night of: 15-16 SEP 2005

COOPERATORS	Initials	VISITORS/ASSISTANTS
OWLSNUT	OSN	

START TIME (CHECK 0)	# of NETS OPENED	LURE	WIND Direction & Speed	TEMP.	SKY Conditions	CLOUD	PRECIP.	NOISE
18:00	6	Yes	-10	22 °C	Light-A	0/10ths	N	-

NOTES ON SET UP:

NET CHECKS		LIGHT	WIND	TEMP	NSWO CAPTURES					OTHER SPECIES
Check No.	Time Start of check				BAND	NEW RECAPS	RETRAPS	REPEATS	NSWO TOTAL	
1	19:00	D	0	21	1				1	
2	20:00	D	N1	20					0	
3	21:00	D	N1	17	Z	1			3	
4	22:00	D	N1	17				1	1	
5	23:00	D	N2	17					0	
6	00:00	D	N2	16	1	1			2	
7	01:00	A	N2	14					0	
8	02:00	A	N3	14					0	
9	03:00	A	NW3	14					0	
10	04:00	A	NW3	12					0	
11	05:00	B	NW3	12					0	
12	06:00	VB	W4	12					0	
13										
14										
15										
16										
SUB-TOTALS FOR THE NIGHT					4	2		-	6+1	

END TIME (CHECK C)	# of NETS at CLOSE	LURE	WIND Direction & Speed	TEMP.	SKY Conditions	CLOUD	PRECIP.	NOISE
06:00	4	No	W4	12 °C	VB	3/10ths	N	-

NOTES: Closed 2 nets at check #9. Turned off lure at check #10
Standard Period ends at 23:00.

For information on completing this form see **Guidelines on Weather, Light and Noise Conditions**
Enter data in **NSWO General Effort Data Template**

Figure 5b. Example net check data, entered into the Excel template.

Station code: **AEH_HOME**

Year: **2005**

Net Round			Effort		Conditions							Captures				Comments
Night of	#	Time	# of nets open	Lure	Light	Wind Dir.	Wind Speed	Temp	Cloud Cover	Precip	Standard period	Total	New Band	Recaps	Repeats	
15-Sep-2005	0	18:00	6	Y	A		0	22	0	N	Y	X	X	X	X	
15-Sep-2005	1	19:00	6	Y	D		0	21			Y	1	1		X	
15-Sep-2005	2	20:00	6	Y	D	N	1	20			Y	0				
15-Sep-2005	3	21:00	6	Y	D	N	1	17			Y	3	2	1		
15-Sep-2005	4	22:00	6	Y	D	N	1	17			Y	1			1	
15-Sep-2005	5	23:00	6	Y	D	N	2	17			N	0				
15-Sep-2005	6	00:00	6	Y	D	N	2	16			N	2	1	1		
15-Sep-2005	7	01:00	6	Y	A	N	2	14			N	0				
15-Sep-2005	8	02:00	6	Y	A	N	3	14			N	0				
15-Sep-2005	9	03:00	6	Y	A	NW	3	14			N	0				
15-Sep-2005	10	04:00	5	Y	A	NW	3	12			N	0			closed net 2 turned lure off	
15-Sep-2005	11	05:00	5	N	B	NW	3	12			N	0				
15-Sep-2005	12	06:00	5	N	VB	W	4	12	3	N	N	0				
15-Sep-2005			X	X	X	X	X	X	X	X		sum	4	2	X	
22-Sep-2005	0	17:45	6	Y	A		0	22	10	N	Y	X	X	X	X	
22-Sep-2005	1	18:30	6	Y	A		0	21			Y	0			X	
22-Sep-2005	2	19:30	6	Y	A	S	1	18			Y	1	1			
22-Sep-2005	3	21:00	6	Y	A	S	1	18			Y	0				
22-Sep-2005	4	21:45	6	Y	A	S	2	18	10	F	Y	0			CLOSED	
22-Sep-2005			X	X	X	X	X	X	X	X		sum	1	0		X

Table 5. Details on net check data.

Net check data	Details
Date	Date for start of night (e.g., 21 OCT 2005).
Time of each net round	Record the time at which each net round was started. Round 0 = start time.
Light conditions/Sky conditions	Light conditions at the station on each net round. See below for scale to be used.
Wind direction and speed	Wind direction and speed at the nets on each net round (Beaufort scale).
Temperature	Temperature (°C).
# of nets	Number of nets in use for that net round. Give details of any changes (i.e., net closed or opened) in the comments section.
Lure operating?	Indicate (yes/no) if the lure was operating for that net round.
Standard/Non-standard?	For use by stations with a standard effort component.

Optional data	Details
Number of owls captured on each net round.	Record new birds, retraps and repeats separately.

Moult records

- Flight feather moult records.

Past studies have shown that NSWOs have a complex and irregular moult pattern, typically following a multi-year sequence of incomplete moults but, at least occasionally, involving a complete moult. Understanding moult patterns is essential to accurately age NSWOs, and study the demographics of the migratory population.

We encourage all owl banders to record the extent of flight-feather moult on all AHY birds (HY birds show uniform feathers). Having a permanent record means that you can check for accuracy and consistency in ageing (error rates increase with the level of sleep deprivation!).

Moult records (Figure 6a; see also Table 6) are most useful if they can be pooled with data from other stations to increase the sample size and allow regional comparisons. Moreover, if enough banders record moult in a consistent manner, then we can use data from recaptures to compare moult patterns for the same bird in different years. This latter analysis is feasible only if individual datasets are pooled.

Additional information, including recommended moult coding guidelines, is provided in Appendix 1. A **Moult Record data form** is available from the coordinator and will be

available for download on the OBBA website. A **Moult record data template** (see Figure 6b) for entering the moult records is also available upon request.

Submitting current and historic data

We would like to obtain your data from previous years as well as the current year's data. Including data from previous years will greatly increase the overall sample size and the value of the dataset. Banding data can be submitted by sending a copy of your Band Manager (or BANDIT) file(s) containing the banding records for all newly banded owls and all recaptured owls (including foreign encounters). Historic effort and moult data (if available) should be entered into the electronic spreadsheets as for the current year's data.

All data should be saved on a CD and a copy should be sent via email or snail-mail to the Owl Project Coordinator as soon as possible after the end of each banding season, preferably before December 31st so we can produce timely reports. Please give your files meaningful names, so they can be readily distinguished from other stations. For example, banding data from IPBO for 2005 could be saved with the name "IPNSWO05.dbf".

We would like to receive any historic data you have that is already computerized (e.g., owl banding files), as soon as possible. If you have historic effort or moult data that needs to be computerized please contact the Project Coordinator as we may be able to help with this task.

Data for the current year should be submitted as soon as possible after the end of each banding season, preferably before 31 December so that we can produce timely reports.

Banding schedules should also be submitted to the BBO in the normal manner. Foreign recaptures should also be reported promptly to the BBO or on the www.reportband.gov/ website.

Figure 6b. Example moult record data, entered into the Excel template.

Day	Month	Year	Band	Initials	Age	Left wing																																		
						Secondaries										Primaries																								
						13	12	11	10	9	8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8	9	10												
11	October	2004	833-16266	MAG	ASY	N	N	N	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	N
11	October	2004	833-16269	SRC	SY	N	N	N	N	N	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	N	N	N	N	N	N	N	N	N	N	N	N	
11	October	2004	833-16271	MAG	SY	N	N	N	N	N	1	1	N	1	1	1	1	1	1	1	1	1	1	1	1	1	N	N	N	N	N	N	N	N	N	N	N	N	N	
11	October	2004	833-16274	JLC	ASY	1	1	1	1	1	N	N	N	N	N	N	2	2	2	2	N	N	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	N	
11	October	2004	833-16275	MAG	SY	N	N	N	N	N	N	N	N	1	1	1	1	1	1	1	1	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	
11	October	2004	833-16276	SRC	ASY	N	N	N	N	N	1	1	N	1	1	1	N	2	N	N	N	1	1	N	N	N	1	1	N	N	N	N	N	N	N	N	N	N	N	
11	October	2004	833-16279	SRC	AHY	1	1	1	1	N	1	1	1	1	1	1	1	N	N	N	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	N	
12	October	2004	833-16281	SRC	SY	N	N	N	N	N	N	N	N	1	1	1	1	1	1	1	1	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
18	October	2004	1283-88336	MAG	ASY	1	1	1	1	1	1	1	N	N	2	2	2	1	1	1	1	N	N	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	N	
Day	Month	Year	Band	Initials	Age	Right Wing																																		
						Secondaries										Primaries																								
						13	12	11	10	9	8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8	9	10												
11	October	2004	833-16266	MAG	ASY	2	2	2	N	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	N	1	1	1	1	1	1	1	1	1	N		
11	October	2004	833-16269	SRC	SY	N	N	N	N	N	N	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	N	N	N	N	N	N	N	N	N	N	N	N	
11	October	2004	833-16271	MAG	SY	N	N	N	N	N	N	N	N	1	1	1	1	1	1	1	1	1	1	1	1	1	N	N	N	N	N	N	N	N	N	N	N	N	N	
11	October	2004	833-16274	JLC	ASY	1	1	1	1	1	N	1	N	N	N	N	2	2	2	2	N	N	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
11	October	2004	833-16275	MAG	SY	N	N	N	N	N	N	N	N	1	1	1	1	1	1	1	1	N	N	N	N	1	1	1	1	1	1	1	1	1	1	1	1	1	1	N
11	October	2004	833-16276	SRC	ASY	N	N	N	N	N	1	1	1	N	N	1	N	2	N	N	N	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	N	
11	October	2004	833-16279	SRC	AHY	N	1	1	1	1	1	1	1	1	1	1	1	1	1	1	N	N	N	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	N
12	October	2004	833-16281	SRC	SY	N	N	N	N	N	N	N	N	N	N	N	N	1	1	1	1	1	1	1	1	1	N	N	N	N	N	N	N	N	N	N	N	N	N	N
18	October	2004	1283-88336	MAG	ASY	1	1	1	1	1	1	1	N	N	2	2	2	1	1	1	1	N	N	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	N

Table 6. Detail on the moult record data form.

Recommended data	Details
Wing moult pattern	Record the relative age of each primary and secondary feather on both wings. See Appendix 1

References

Brinker, D.F. 2000. Sexing criteria for Northern Saw-whet Owls.

<<http://www.projectowl.net/df.htm>>

Dunn, E. 2001. Recommendations for banding of nocturnally migrating owls for the purpose of monitoring population change. <<http://www.projectowl.net/dunnowl.htm>>

Project Owl.net. <<http://www.projectowl.net>>

Pyle, P., S.N.G. Howell, D.F. DeDante, R.P. Yunick, and M. Gustafson. 1997. Northern Saw-whet Owl. *In* Identification Guide to North American Birds, Part I: Columbidae to Ploceidae. Slate Creek Press: California, pp 98-99.

Appendix 1a. Guidelines for Ageing NSWOs

The currently accepted criteria for ageing NSWO are presented in Pyle (1997). Molt patterns must be interpreted with caution, as adult NSWOs undergo a complex and variable incomplete to complete molt. Certain molt patterns are typical of hatch-year, second-year, and third-year birds (see Pyle 1997). However, these same patterns can also occur in much older birds (Evans and Rosenfield 1987). It is, therefore, important to try and determine if the oldest flight feathers have characteristics typical of juvenal flight feathers (poorer quality, strongly contrasting in wear compared to next-youngest generation, aligned fault bars, etc.).

We recommend that you use a blacklight to help discern molt patterns. The underside of fresh feathers fluoresce a strong pink; older feathers show less pink (the fluorescent porphyrin chemical compound breaks down over time, especially with exposure to sunlight). Note that the under-wing coverts of all birds will fluoresce strongly in the fall (including on HY birds that replace these feathers).

Blacklights are available in various forms including small handheld units that operate on AA batteries, units for detecting counterfeit money (usually required AC power), and as individual blacklight tubes that fits a regular 4' fluorescent light fixture. Blacklights that use incandescent bulbs (same shape as regular light bulb) are not recommended.

We also recommend that all banders record the extent of flight feather replacement for all AHY birds (birds with non-uniform flight feather age; see the **Molt Record Example** and Appendix 1b).

The following descriptions are meant to aid in ageing NSWOs using the observed pattern of flight feather molt. No other plumage characteristics are known to be useful in ageing NSWOs, but more research is needed (e.g., the extent and pattern of light bars on the alula may change with age, Bruce Fortman, pers. comm. 2005).

The accompanying photographs (each showing the right wing of 3 different birds) illustrate a range of molt patterns. Each pair of photos shows the top and bottom of the same wing under normal light and black light (UV), respectively (e.g., Photos 1a and 2a show the top and bottom of the same wing). The **Molt Record Example** shows the actual molt record data for the birds shown in the wing molt photographs.

Uniform flight feathers

HY – Hatch year birds have uniformly fresh juvenal flight feathers (Photo 1a). These feathers typically show some wear and fading (relative to replaced feathers of adult birds). When the underside of the wing is examined under normal light, the feathers usually show little, if any, pinkish sheen. When the underside of the wing is examined under a blacklight, all the feathers fluoresce bright pink (Photo 2a).

AHY – Watch for birds that have uniform adult feathers (very fresh with a definite pink sheen on the underside in normal light). These individuals should be aged as AHY.

Two generations

SY – Second year birds have two distinct ages in three blocks: freshly replaced outer primary feathers and inner secondary feathers, and a block of older, faded feathers in the center of the wing (Photo 1b). When the underside of the wing is examined under a blacklight, outer feathers (grown in the current year) fluoresce bright pink, and inner feathers (grown the previous year) fluoresce a pale pink (Photo 2b).

AHY - Birds that have two generations of feathers, but show little contrast between generations and/or do not show the typical SY moult pattern should be aged as AHY.

Three generations

ASY – Birds with three ages of feathers (Photos 1c, 3a, 3b, 3c) should be aged as after-second-year. Feathers grown 2 or more years previously are paler and more worn than feathers grown in the previous year. On the underside of the wing, feathers grown 2 or more years previously fluoresce even paler pink than feathers grown in the previous year (Photos 2c, 4a, 4b, 4c).

Other patterns

U – Any bird for which you are not certain of the age should be aged as unknown (but record the moult pattern).

With experience, some additional codes can be used in some instances:

TY – Birds with three generations of feathers fitting the third-year pattern as described in Pyle (1997) can be safely aged as third-year (**TY**) if the oldest feathers are clearly faded juvenal feathers (e.g., very faded, worn and no fluorescence),

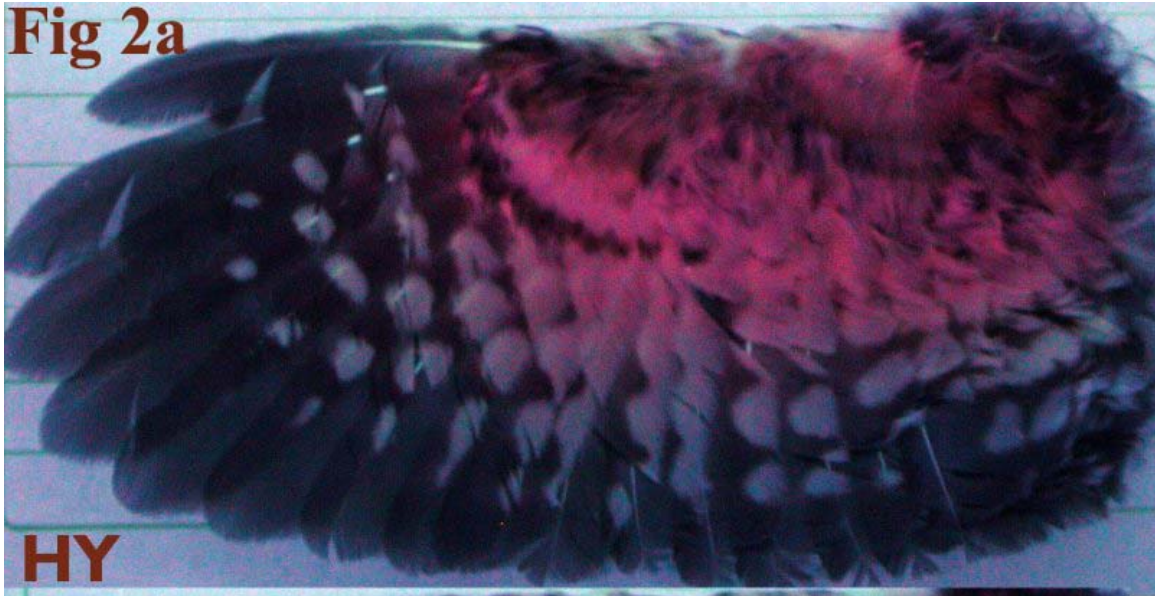
ATY – Birds that clearly have four distinct generations of feathers **within** the primary or secondary feather tracts can be aged as after-third-year (**ATY**).

Note: These age categories and codes apply to birds captured during fall migration (prior to 31 December). Birds captured after 31 December through spring migration are considered a year older (i.e., HY becomes SY, ASY becomes ATY, AHY becomes ASY).

Moult Record Example

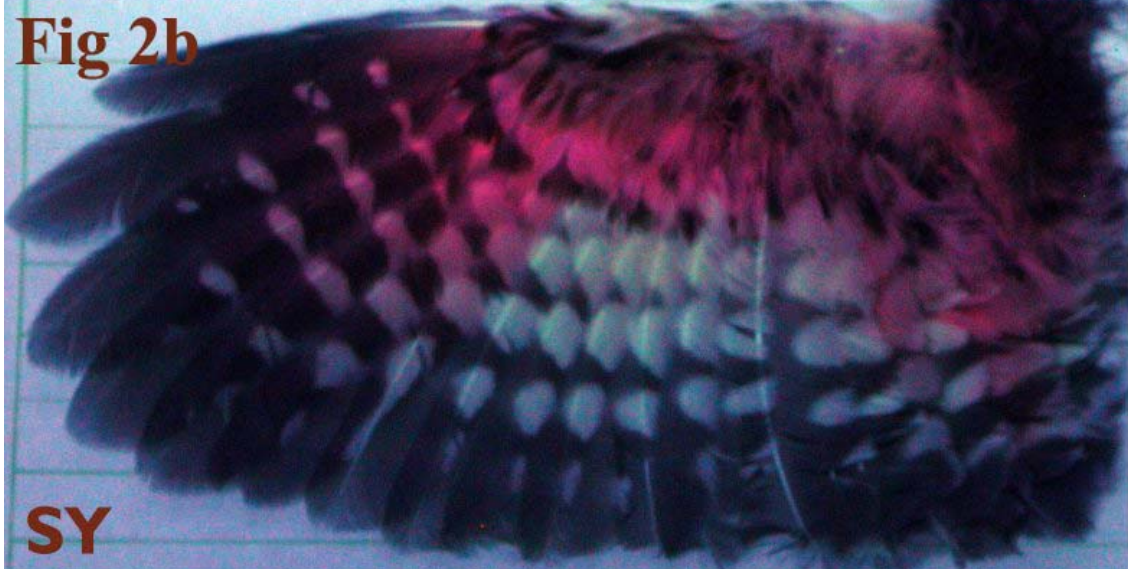


Fig 2a



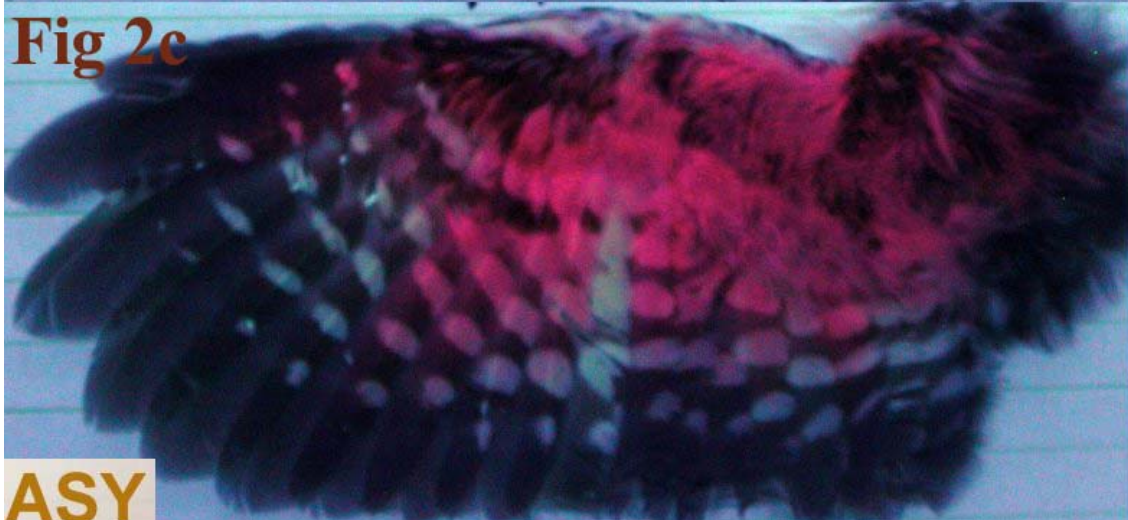
HY

Fig 2b



SY

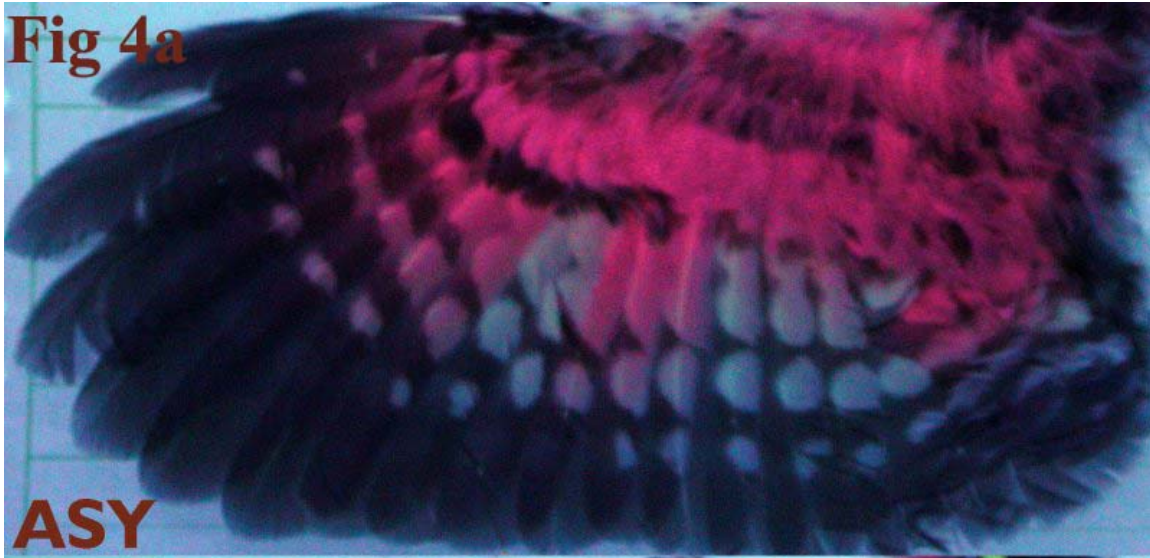
Fig 2c



ASY

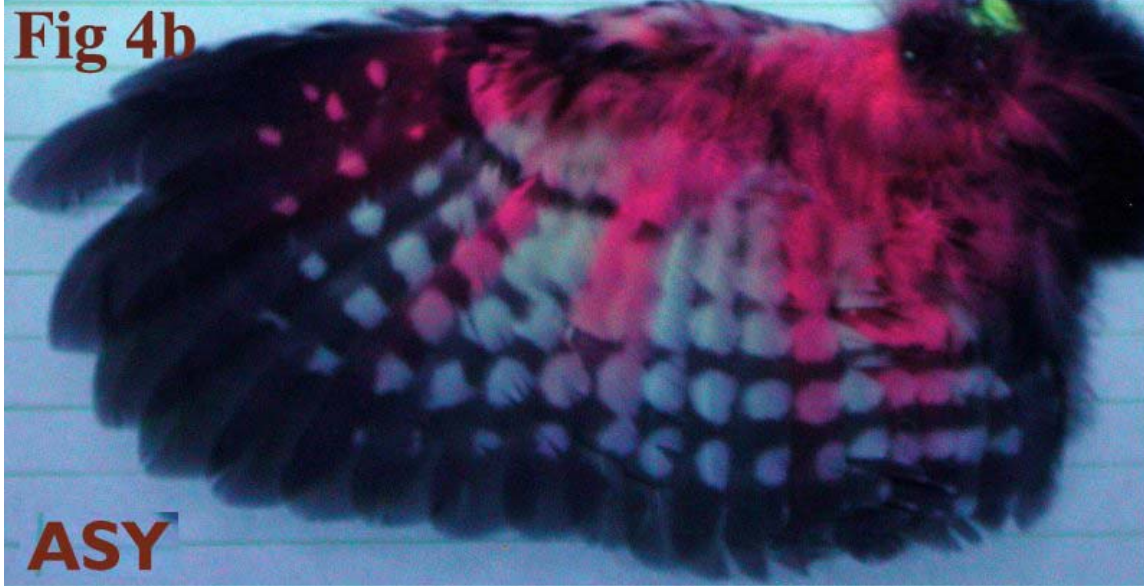


Fig 4a



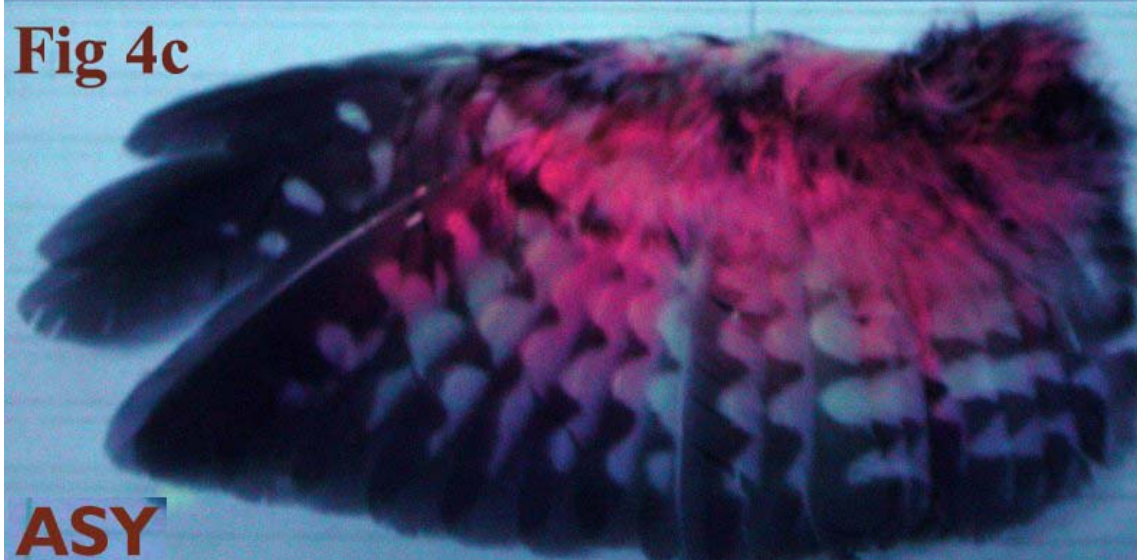
ASY

Fig 4b



ASY

Fig 4c



ASY

Appendix 1b. Guidelines for Recording NSWO Moulting Data

Although not required for the migration movement analysis, the OBBA is also compiling available data on NSWO moulting patterns. By recording the moulting on all birds other than HY birds with uniformly young feathers, we hope to be able to compare the extent and relative frequency of the typical moulting patterns in a given year across Ontario.

Moreover, we hope to be able to compile a database of moulting data collected from the same individual in different years. This is feasible only if most banders systematically record moulting so that the original and subsequent moulting records are available for a large proportion of recaptured owls.

We would like as many stations as possible to use a standardized format for recording wing moulting patterns on all AHY owls. *Moulting records for any recaptures with worn bands (e.g., foreign recaptures and returns assumed to have been banded 1 or more years previously) are particularly valuable.*

The system described here was developed at TCBO, IPBO and MBO. The generic **NSWO Moulting Record data form** can be used for recording moulting using this system. If you prefer, you may adapt the template to create your own form, or you can continue to use your current moulting record form.

We would like as many participants as possible to use the coding system described in Table IB for indicating the *relative ages of the flight feathers*. *If you use a different system, please provide a similarly detailed description of your own scale.* See also the **Moulting Record Example** (Appendix 1a), which has the moulting record data for the birds shown in the wing moulting photographs.

In addition to comparing the relative ages of the feathers, you should also note the *relative contrast* between the various ages to determine if the oldest feathers appear to be juvenal flight feathers (acquired as nestlings and retained for 1 to 3 or more years). For example, SY birds show a strong contrast between the central block of faded, blotchy 1-year old feathers and the inner and outer blocks of new feathers. Older birds may show this small pattern of replaced feathers but the difference in wear and fading between the 1 and N generation feathers is much more subtle (these birds should be aged as AHY). In birds with 3 generations of flight feathers, a strong contrast between the 2 and 1 generation feathers may indicate a TY bird (see Pyle 1997).

Both wings should be examined to see if the replacement patterns are identical (symmetric). If the patterns differ, please record the moulting separately for each wing.

Taking Photos: Wing photos are useful for documentation (and sometimes show the pattern more clearly). Hold the spread wing flat against a white paper (or other uniform pale background) on a flat surface. Write the Band Number, date and location on a piece of paper so it is visible in the photo.

Table IB – Recommended codes for recording relative ages of flight feathers.

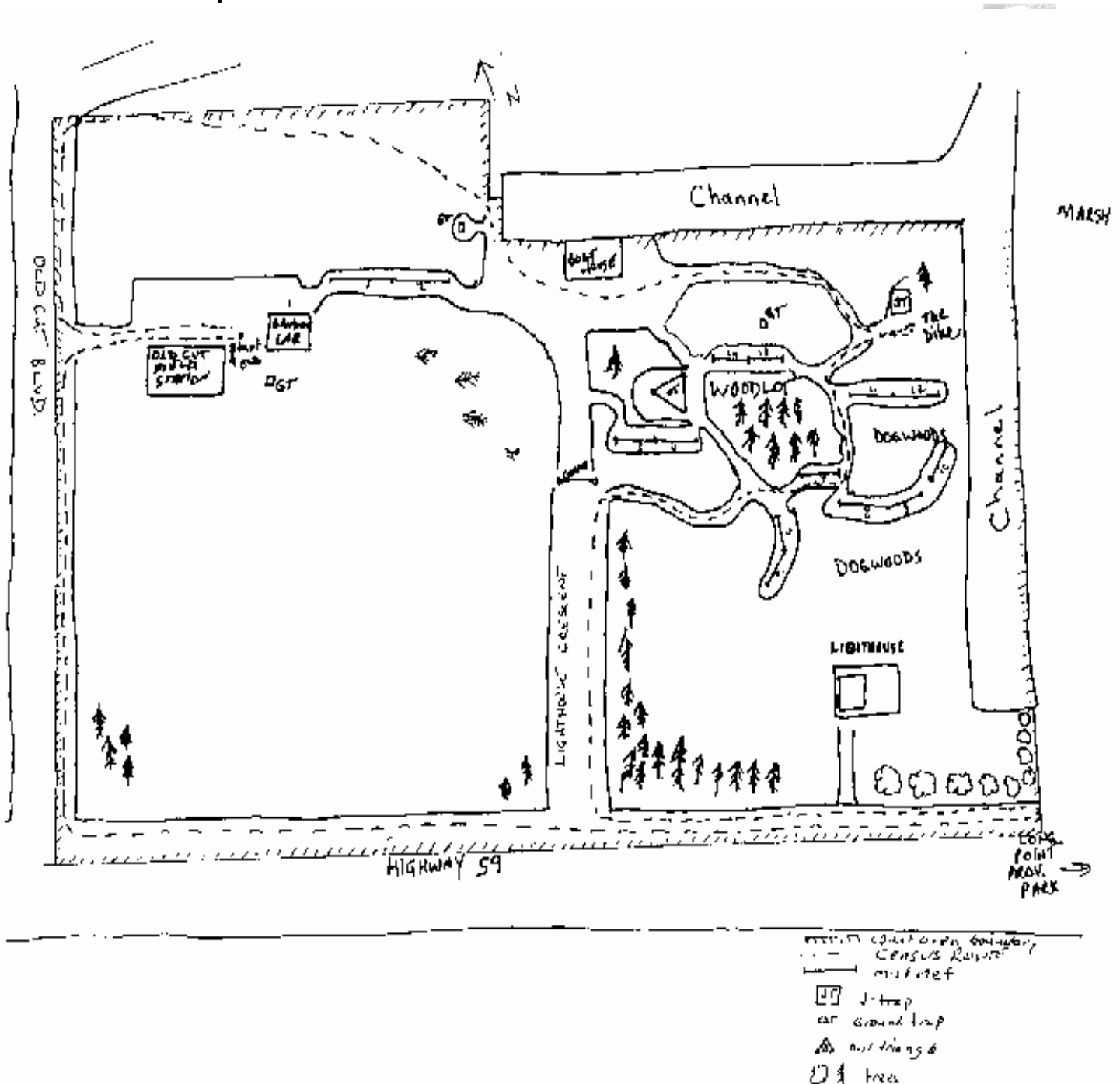
Code	Category	Description
N	Newly replaced	<ul style="list-style-type: none">▪ Fresh, dark brown on top, with little wear;▪ Under normal light, a faint pink sheen is visible on the underside; and▪ Under black light, the underside fluoresces dark pink.
1	1 generation (approximately 1 year-old) older than N	<ul style="list-style-type: none">▪ Paler and more worn than the N feathers;▪ No pink sheen visible in normal light; and▪ Under black light, underside shows paler pink than N feathers.
2	2 generations (~2 years-old) older than N	<ul style="list-style-type: none">▪ Paler and more worn than 1 year-old feathers; and▪ Under black light, underside may show some faint pink.
3	3 or more generations; Older than 2 and N	<ul style="list-style-type: none">▪ Any feather that is paler and more worn than 2, and clearly representing an older generation; and▪ Shows hardly any pink under black light.
U	Unknown	<ul style="list-style-type: none">▪ Age of feather unclear.
X	Missing	<ul style="list-style-type: none">▪ Feather broken or missing.

Other things to note:

- Relative contrast (strong or subtle) in wear and fading between generations;
- Do the oldest flight feathers appear to be worn juvenal feathers;
- Any new feathers that are still growing (sheath at base); and
- Photograph taken?

Appendix 2. Example station map and data collection methods.

Station map



Map courtesy of Bird Studies Canada



understand appreciate conserve and Long Point Bird Observatory
comprendre apprécier conserver

a) Guidelines for Recording Weather, Light and Noise Conditions

Record the weather conditions at the start and end of each banding session (and at the end of the standard period, if relevant). Light conditions should be recorded more frequently (i.e., each net round). Noise conditions are relevant only at exposed coastal stations.

Weather variables should be evaluated at the same place each time (e.g., have a fixed place for the thermometer). To assess whether light (see Table II d) or wind speed is affecting capture rates, light conditions and wind speed should be evaluated close to the nets. Alternatively, weather conditions can be recorded at a fixed location by the nets and at a fixed location away from the nets (e.g., in an open area away from forest cover) to capture overall weather conditions at the station. Wind speed can be estimated using the Beaufort scale (Table II a), or measured using a hand-held anemometer (reported as km/h or Beaufort scale).

Wind direction

Compass quadrant: N, NW, W, SW, S, SE, E, and NE

Wind speed

Table II a. Beaufort scale for recording wind speed.

Beaufort wind force	km/h	Description	Indicators of Wind Speed
0	< 2	Calm	Calm; smoke rises vertically, <i>nets motionless</i>
1	2-5	Light air	Direction of wind shown by smoke drift, <i>nets still.</i>
2	6-12	Light breeze	Wind felt on face; leaves rustle; <i>nets blown partly open/moving slightly.</i>
3	13-19	Gentle breeze	Leaves and small twigs in constant motion; wind extends light flag, <i>nets blown open, shelf string slightly bowed.</i>
4	20–29	Moderate breeze	Raises dust and loose paper; small branches move, <i>nets open, shelf string bowed, conditions marginal for netting.</i>
5	30-38	Fresh breeze	Small trees in leaf begin to sway; <i>time to close nets!</i>

Cloud cover

Estimate in 10ths, or use following categories and codes (Table IIb).

Table IIb. Cloud cover codes.

Code	Category	Equivalent in 10ths
NC	Clear, few or no clouds	0/10 or 1/10
PC	Partly cloudy or variable sky	2/10 to 5/10
MC	Mostly cloudy (broken)	6/10 to 9/10
OC	Overcast	10/10

Precipitation

Record the level of precipitation, if present. Otherwise code as 'N' (Table IIc).

Table IIc. Precipitation codes.

Code	Category
N	None
F	Fog, mist (water/frost on nets)
LR	Light Rain/ Showers
LS	Light Snow/ Showers
R	Rain
S	Snow

Light conditions

Table IIId. Light condition codes.

Code	Category	Description
VB	Very Bright	Light enough to read, nets visible; typically occurs under full moon, with no cloud.
B	Bright	A flashlight is not needed to walk in open areas
A	Average	Flashlight may or may not be needed
D	Dark	Flashlight is needed at all times
VD	Very Dark	Hardly possible to see your hand in front of your face; typically occurs under no moon and overcast sky.

Noise conditions

Codes for recording noise conditions at the nets (recommended for stations where wave noise is a factor; Table IIe).

Table IIe. Noise condition codes.

Code	Category	Description
Q	Quiet	No interference with tape
S	Slight	Lure clearly audible over background noise
M	Moderate	Lure mostly drowned out
L	Loud	Background noise louder than lure

b) A proposed system for recording fat on migrating NSWOs

Subcutaneous fat reserves are often assessed as a measure of a bird's condition. It is particularly important to assess the amount of fat on NSWOs as this affects the bird's weight, which is used in combination with the wing chord for determining the sex of NSWOs (See **Appendix 4**).

Currently, several different fat scoring systems are being used by owl banders in Ontario including:

- Scoring for visible fat in the furculum area, using the MAPS fat scale or similar scale, as for passerines;
- Scoring for visible fat in the wing pit area, using an adapted version of the MAPS fat scale or other scale; and
- Scoring the bird's "crop", using the same scale as for diurnal raptors (e.g., full, half, or empty) based on touch (Note: owls do not actually have a crop).

It would be desirable to have a standard method for scoring fat reserves on NSWOs so that data from different stations could be compared. A preliminary description of one such system is presented here for consideration. However, it has not been field tested or compared with existing systems.

If you want to suggest an alternative system, or would be interested in developing or participating in a field test of NSWO fat scoring systems please contact the Owl Project Coordinator.

Proposed system for scoring fat in NSWOs:

Where to Look

The wing pit area, the bare depression at the base of the underside of the owl wing.

Fat Scores

Score	Description
0	None
1	Trace, linear deposit
2	Thin wedge
3	Thick wedge
4	Extensive fat deposit

Appendix 3. Copying and sending data files.

Band Manager Files

When sending Band Manager files, simply create a copy of the schedule of the file you will create for the Bird Banding Office. Save the file using a name that will distinguish your file from the other stations (e.g., LPBONSWO07). Details on how to use Band Manager are available on the web at <http://www.pwrc.usgs.gov/bbl/resources/bandmgr/bandmgr.PDF>. The copied file can be emailed to the Project Coordinator.

Database Files

When sending the Excel files to the Project Coordinator, simply create a copy of the Excel spreadsheet you wish to send using Windows Explorer. Select the file you wish to copy, copy the file and email it to the Project Coordinator. Making the file name unique will make easy the task of sorting data into the database at our. Please select a file name that indicates your station and year(s) of data submitted.

Alternatively, one could simply email the file directly to the Project Coordinator. It is, however, recommended that back-up copies of all data be created and stored on a jump drive, CD/DVD, or external hard drive.

BANDIT Users

For those stations that use Bandit software, please contact the Owl Project Coordinator for further details on copying and sending data files. Detailed information can be gathered from the web at <http://www.pwrc.usgs.gov/BBL/resources/bandit/index.html>

Any questions regarding copying and sending data files can be directed to the Owl Project Coordinator.

Appendix 4. Wing-weight criteria for sexing Northern Saw-whet Owls.

Boundaries for assignment of sex in Northern Saw-whet Owls*

> 95% probability of correct sex for any individual.

Wing Chord	Mass (grams)			
	Male	Unknown		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			≤87	≥88
138			≤86	≥87
139			≤86	≥87
140			≤86	≥87
141			≤85	≥86

*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 wing-mass DF available from Project Owlnet.**