FIELD PROTOCOL FOR MIGRATION MONITORING AT VASEUX LAKE BIRD OBSERVATORY

Version 2.1

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1. Introduction

This protocol is intended to outline field procedures for migration monitoring at Vaseux Lake Bird Observatory (VLBO). This document is required for the purpose of ensuring that field procedures at VLBO are understood and adhered to in a consistent or standardized fashion by volunteers and staff. Future changes to this protocol should be cleared with CMMN Science Committee before implementation and must be fully recorded in Appendix 8.

VLBO is a project of the Okanagan Similkameen Conservation Alliance (OSCA), in collaboration with the Canadian Wildlife Service (CWS), which provides the majority of the funding for the project. Started in 1994, it has been operating as a migration monitoring station. The station relocated in 2001 (Figure 1), and migration monitoring at the new site was fully standardized in 2006. The site comprises approximately 22 ha between the Okanagan River and Highway 97 (Figure 2) and can be reached by driving about 4.5 km south from the centre of Okanagan Falls along Highway 97 (49.3101300, -119.5450798). The station is situated partly on provincial Crown Lands managed by the Ministry Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD) and on part of the Vaseux-Bighorn National Wildlife Area, which is managed by the Canadian Wildlife Service (CWS) (Figure 1). The habitat consists of riparian woodlands dominated by water birch and alder, willow shrubland, wet meadows, remnant oxbows of the old channel of the Okanagan River and the present, dyked channel of the same river. It is in the narrowest portion of the Okanagan Valley, concentrating migrants, especially in spring when birds are using the valley bottoms almost exclusively. The most common species banded during fall migration include Orange-crowned Warbler, Gray Catbird, Lincoln's Sparrow, Common Yellowthroat, and Song Sparrow. As of the fall of 2020, 116 bird species have been banded at the site.

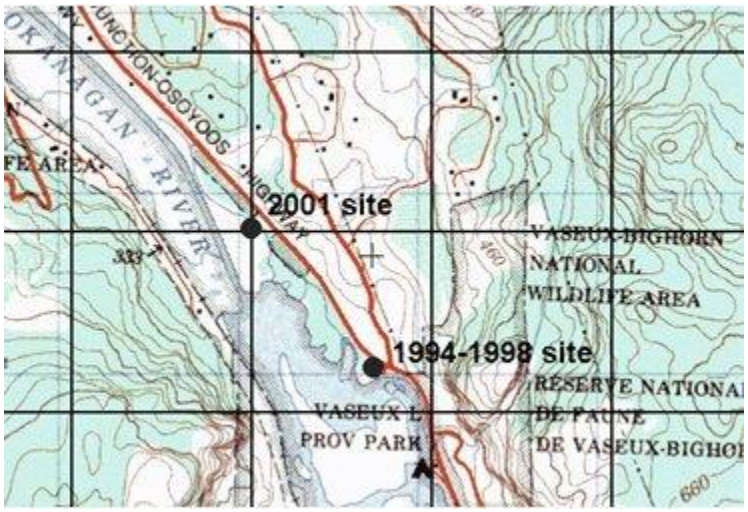

Figure 1. Location of Vaseux Lake Bird Observatory. The southerly site was used from 1994 to 1998; the station was moved 1 km northwest in 2001 and has remained at that site.

Fieldwork described in the protocol is conducted at VLBO to monitor populations of passerines migrating through the Interior of British Columbia during the fall. VLBO serves a broader purpose as a member of the national Canadian Migration Monitoring Network (CMMN) managed by Birds Canada (BC). The CMMN oversees all migration monitoring stations in Canada by providing protocols and standards, pooling data, and offering opportunities for networking and collaboration. As such, one objective of VLBO is to gather quality, standardized data on intermontane migrating birds to calculate population indices and trends. Of

the stations that monitor avian migration in British Columbia, VLBO is the only one located in the dry southern interior region, thereby filling a gap in migration monitoring along the Pacific Flyway.

2. Personnel

Daily migration monitoring at VLBO is to be conducted by at least two experienced people, usually paid staff. At least one of those persons must be a permitted and experienced bander and birder who acts as the Bander-in-Charge (BIC) on a daily basis. The BIC is ultimately responsible for ensuring that all aspects of fieldwork are completed in accordance with this document. However, all personnel participating in the fieldwork are expected to read this protocol. On most days, a second skilled individual with at least some banding and extracting experience acts as the Banding Assistant (BA). Safe and efficient field work is the daily goal and is best achieved when additional skilled individuals are on hand to assist the BIC and the BA. In particular, at least a third individual skilled at identifying at counting birds is available to conduct census and to help gather observations. Extra volunteers can help with banding, extracting, scribing, and contributing observations, depending on their skill level and experience. On occasions where there is a lack of skilled staff on hand, the daily program must be scaled down as necessary. Conducting the daily census is a priority, while banding and general observations are 2nd and 3rd priorities, respectively.

Individuals who are new to VLBO and with little or no training elsewhere should approach the BIC about bander training procedures. Inexperienced volunteers will be expected to read through this protocol, walk the census route, get familiarized with the count area and assist banders through scribing and assisting with net runs. The BIC will delegate responsibilities and tasks based upon the abilities and experience of all personnel available. Volunteers preferring not to participate with banding can still be of great help by making observations, censusing, scribing, and entering data. All decisions made by the BIC are final.

Visitors are welcome and should report to the banding trailer upon arrival. Education and outreach are important components of VLBO's program, and station personnel can provide demonstrations for visitors as long as banding is not too busy. Volunteers should be prepared to participate in interpretation if they feel comfortable doing so. Larger visiting groups are encouraged to make an appointment beforehand.

3. Count Area

The Count Area is the area within which all off observations are part of the official record. As long as the observer is inside the boundary, any bird detected outside the boundary may also be counted.

Figure 2. The Vaseux Lake Bird Observatory Count Area (white line).

4. Daily Monitoring Schedule

Migration monitoring at VLBO runs daily from August 1st to October 15th. The standard count period begins 30 minutes before dawn, at which time nets are opened (weather permitting), and general observations commence. A list of sunrise times for each day during the monitoring period can be found on the station website. Nets remain open for 6 hours from net opening (if possible), and daily census must begin one hour after sunrise and runs for approximately 1 hour and 30 minutes. The standard count period ends a one half-hour after net closure. General observations (section 7) begin at net opening and continue for the duration of the standard count period. The extended observation period (half an hour after net closure) is designed to accommodate further general observations and data recording. If monitoring is not possible on any day during the standard monitoring period due to lack of personnel or unsuitable weather conditions, this should be noted in the daily log along with justification. The same should be done if monitoring is interrupted on any given day.

5. Census

Census is conducted on a daily basis, barring extreme weather conditions, along the prescribed route shown in Figure 3, and takes priority over mist netting if there are not enough staff available to run the full program. The route begins along the path down to the station from the road (see “start” in Figure 3, and first continues southwest to the small loop past nets 9 and 10. It then backtracks past the banding

site along a trail that leads to the river channel dike, where the observer must first head north to the dead end, before backtracking and continuing to the south end of the dike path which is the end of the census route. If there is anyone qualified for census on site, it should be done, even in poor weather conditions. The census route should be conducted for 1 hour and 30 minutes, beginning precisely one hour after sunrise. This "window" for census is significant as suitable light levels and high bird activity generally occurs at this time. Special conditions for which census may be delayed or aborted include electrical storm, heavy rain or extremely high winds (Beaufort Scale ≥7).

Census should generally be conducted by only one person, and they **must be a class 1 observer** (**Table 1**). Observer classification is intended to account for variation in skill level of personnel for analysis purposes. The identification percentage refers to all birds encountered, either visually or audibly. New volunteers can assign themselves a code based on the criteria detailed below. Personnel should be honest and accurate in self-assessment of abilities. A second person can join on census for training purposes.

Rotate the census as much as possible among qualified observers, as this evens out average observer variability within and between years and makes the census a more consistent index of abundance.

Table 1. Observer classification codes.

Observer Class	Description
1	Can correctly identify 75% of birds or greater at Vaseux Lake.
2	Can correctly identify 50%-75% of birds at Vaseux Lake.
3	Can correctly identify <50% of birds at Vaseux Lake.

Census observers must record start and finish times as well as all species and their total counts on the census route in the Estimated Totals Log (Appendix 2). Temperature, wind, and sky conditions at the start of census must also be recorded in the Daily Log (Appendix 3). All birds seen or heard from within the Count Zone (Figure 2) can be counted, including any birds seen flying. The observer is allowed to stray off the main path to a maximum distance of a few metres to confirm identification.

The census taker may not use spotting scopes but must use binoculars and record observations promptly with pencil and notebook or using the mobile eBird app. Ideally, all census results should be submitted to eBird using the "Vaseux Lake Bird Observatory" hotspot as the checklist location. "Pishing" may be used to attract birds on census if necessary to confirm identification. Birds must not be double-counted, so the censuser should make careful observations of bird locations and movements during the census. For example, if 3 Song Sparrows are counted walking south to net 10 and 5 counted on the return walk to the trailer, a maximum of 5 should be recorded. Any birds found caught in the mist nets are not counted during the census. Census takers are encouraged to keep moving and not dwell in any one area for too long. All birds should be recorded, even if unidentified (record to group when possible, e.g. "Sparrow sp."). Flocks of birds too large to count the number of individuals should be tallied in groups of 5 or 10, or more, depending on the flock's size. Estimated numbers should be reported as the middle point of the probable range (e.g., 125 for a range of 100-150, or 300 for a range of 100-500) (Dunn and Hussell, 2011).

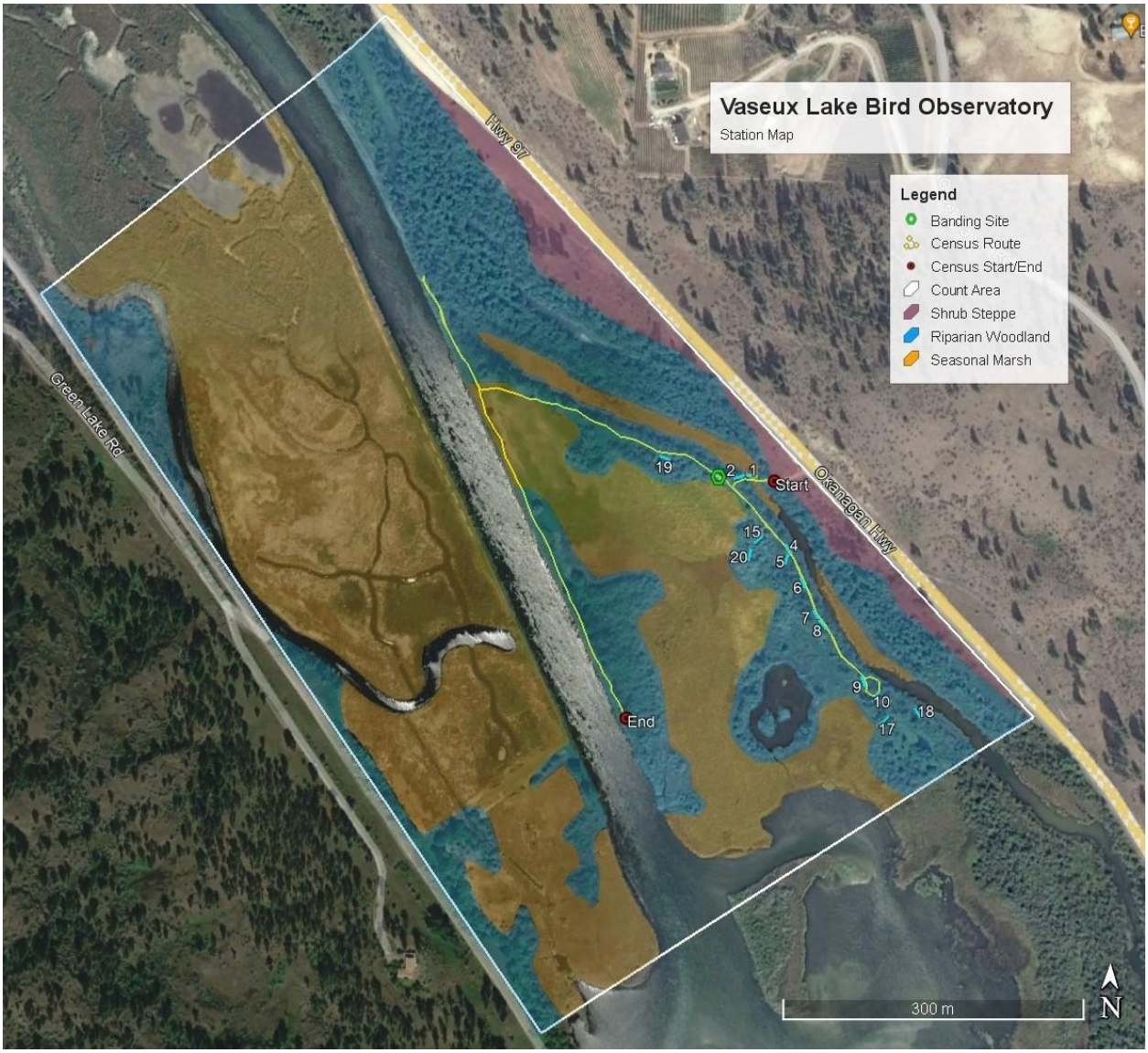

Figure 3. The VLBO station map showing the count area, census route, locations of net lanes, and broad habitat types.

6. Banding Operation Procedures

6.1. Standard Mist-netting

VLBO currently runs 14 standard mist nets (Figure 3), which are 12 m by 2.6 m, with four panels and 30 mm mesh size. The nets exist at fixed locations and are numbered sequentially, beginning with 1 at the station's entrance. However, several old net lanes are no longer used, which means the sequential order of nets does not match numerical order. Nets with the following numbers have been consistently used since 2006: 1, 2, 4, 5, 6, 7, 8, 9, 10, 15, 17, 18, 19, 20. All mist net locations have been mapped using a GPS unit to mark the coordinates of both net ends (Table 4)). Nets are set up using 3 m electrical conduit poles mounted on 3 ft rebar and tied down with rope anchored to the ground or nearby trees and shrubs.

The fourteen mist nets operated in the standard count period comprise the standard mist-netting effort (extra nets or traps are not representative). These nets are to be run from one half hour before sunrise for 6 hours, comprising the **standard banding period**. Nets are usually checked every 20-30 minutes, starting at the north end (nets 19, 1, 2) of the net trail and working southward. Because VLBO's nets are located in a more or less linear fashion, all nets are essentially checked a second time on the return net run with the exception of net 18. Net run time may vary depending on how many birds are captured; thus, personnel on net runs should note the time when leaving net 18 so that the next net run can be planned such that no more than 30 minutes pass before 18 is checked again. Situations in which birds may be at greater risk of injury (i.e., wind, rain, presence of predators) mean that nets should be checked more frequently, if not closed altogether. Should bird volume exceed that which can be extracted in regular time, some or all nets should be closed until the banders have caught up, starting with the most southerly nets (18, 17, 10 and 9, in that order). Nets should be closed for birds' safety when winds are gusting above 30 kph, particularly those more exposed to the wind (nets 1, 2, 9, 10, 20). Nets must not be operated in overly wet conditions (rain, showers, drizzle or heavy fog). Banders should also be aware of unusually hot days in which birds may experience heat stress if left in the nets or hanging in bags for too long. VLBO is also home to bears, deer, and hawks in migration. Sightings of these potential predators around the nets should be reported to the BIC. As bird welfare is paramount, the BIC should not hesitate to shut down if birds are at risk. Nets should be set so that the top shelf loop is 2-3 inches from the top of the net pole and the lowest shelf string is at knee height. Nets must also be properly furled and tied up (using three t-shirt fabric strings per net) at close down.

While it generally takes 15-20 minutes to close all the nets, personnel should pay close attention to the time each net was opened. Because the nets are set-up in a line as opposed to a loop, there is a 15-20 minute difference in time of opening when one or two people are opening. Therefore, nets 1-5 may have been operated for 5.5 hours while nets 6-10 were open for 6 hours. To avoid this, nets should always be opened and closed in the same order, starting with nets 1 and 2 and then sequentially going southward, finishing with net 19 on the return.

Only those individuals authorized by the BIC are allowed to extract birds. The BIC or BA must supervise inexperienced personnel at all times during the extraction process. Birds in bags should be safely hung up in the designated waiting area. Generally, birds are processed in the order they were extracted, but any species more prone to stress, like hummingbirds, or individuals showing signs of stress during extraction, females with brood patches, or very recently fledged birds, should be prioritized. Each bag containing a bird is marked with a clothes pin marked with the number of the net the bird was extracted from. A coloured clothes pin (red or yellow) should be used to mark bags with priority birds. A different designated colour (usually blue) can be used to mark hummingbirds.

Newly caught birds are processed with the following information determined and recorded: band number, species, age, sex, wing cord, fat deposition, whether moulting body and/or flight feathers, mass, net number, net check time (to the nearest 10-minute interval), and bander initials. Appendix 1 shows the banding datasheet and scribing method used at VLBO. Alternatively, banding data may be entered digitally using the station laptop into an Excel spreadsheet called "[Year] VLBO Banding Spreadsheet." This saves a significant amount of time later as the entered data can be imported directly from the spreadsheet into BandIt. Ageing and sexing at VLBO is primarily based on Peter Pyle's An Identification Guide to North American Birds (Pyle et al., 1997) (commonly referred to as "Pyle") with some usage of The North American Banders Study Guide (Ralph et al., 1998). Volunteers with little or no familiarity with these manuals should read the introduction in Pyle, which includes excellent descriptions of moult processes, measurement techniques, and sexing criteria.

In most cases at VLBO, captured birds are processed before the next net run starts. However, in some cases, bird volume is high enough that birds may need to be held longer. In these situations, birds waiting to be processed should be held at the very longest for 60 minutes. The BIC should take steps to reduce backlog before it becomes unmanageable, such as closing a few nets temporarily until processing catches up, and/or by omitting collection of certain ancillary data (fat and moult first and then wing and mass if really overwhelmed). As a last resort, birds should be released unbanded, noting only the number of each species released.

When time permits, banders should attempt to identify birds to subspecies. Prior banding experience at the site has demonstrated that several forms of a given species (i.e., Yellow-rumped Warbler, Dark-eyed Junco, Northern Flicker, Orange-crowned Warbler) can be encountered. Banders may use the descriptions in Pyle as an indicator. Warblers of the Americas (Curson et al., 1994) is also a helpful reference for distinguishing subspecies of warblers.

Recaptures are recorded at VLBO on a Recap datasheet (Appendix 1) or in the "Recaps" tab of the banding spreadsheet if entering data digitally. Banders and scribes must pay close attention to the reading and recording of the band number, as this number is the most important piece of information. Recaptured birds are processed with the same information as newly banded birds. Recaptures that have already been processed earlier on the same day (banded or recaptured) are released immediately after extraction if known to be a "same-day recap." If the band on a recapture looks brand new, but the extractor is unsure if it has already been processed that day, radios can be used to communicate back to personnel at the banding lab to double-check. This is usually more feasible on busy days when some personnel remain at the banding lab while others complete net runs. Generally, on slow days, all personnel go on net runs; however, it may be easier to recall band numbers of already processed birds when few birds are captured. In either case, "same-day recap" should be noted in the comments of that bird's record for the day to allow these captures to be included in analyses.

Any birds which were captured but managed to escape, or were released, are recorded on a separate banding datasheet for Unbanded birds (or the "Unbanded" spreadsheet tab) and are factored into the ET process (Section 8). The rules pertaining to what is a "capture" and what otherwise is a general observation are: the bird must have been handled before escape or release in order to be counted as an unbanded capture. Therefore, birds that were flushed out of a net but were not touched are factored into the general observations category. This includes quail and other species that VLBO is not authorized to band. These birds should be aged and sexed if possible and these data recorded on the Unbanded datasheet.

6.2. Non-standard Banding

Non-Standard Banding refers to either: **a)** netting or trapping which occurs after the standard count period or **b)** for birds caught in non-standard nets and traps during the standard count period. Personnel should also avoid attempting to flush or "pish" birds into the nets. Such non-standard situations of capture are recorded on the banding sheets with NSB (Non-Standard Band) in the comments. The daily log has a section where these banded birds can be accounted for. Apart from two owl nets used for Northern Saw-whet Owl banding, no non-standard nets or traps are currently used at VLBO.

Owl banding using audio lures (call playback for Northern Saw-whet Owl) is conducted in some years at VLBO on a voluntary and unstandardized basis. The owl banding season typically runs from September 15th to October 15^{th,} with a mist-netting period starting half an hour after sunset and continuing for four

to six hours. Two additional mist nets better suited to catching owls are set up at a right angle just north of net 5. These owl nets use larger mesh size and are twice as high as standard mist nets. They must be erected using two stacked electrical conduit poles and a pulley system for opening and closure.

7. General Observations

General observations or simply "obs" refers to birds encountered that do not fall under census or banding. The count area still applies to these observations and birds detected outside the count zone by observers who are inside should be included. The "general obs" is an important component of estimated totals (ETs). Personnel must pay careful attention to these observations, remembering that numbers, location and identifying characteristics of the birds observed will be used to eliminate probable duplicates during the ET tallying process.

General observations within the standard count period are factored into the ET; any observations after this period (non-standard count period) are not included in the ET and can be recorded in the daily log instead. General observations are treated as a separate tally from both banding and census and are subsequently recorded without regard for "double counting" possibilities. Rather, the different categories are independent, and probable duplicates are eliminated during the estimation of ETs.

Volunteers and staff are strongly encouraged to make as many observations as possible, depending on daily circumstances. Staff and volunteers leaving before ETs are calculated, again, must record their observations on paper with reference to species and their total number, location, time and movements of birds.

8. Estimated Totals

Estimated totals (ETs) are often used as the basis for calculation of long-term trends by The Canadian Migration Monitoring Network (CMMN). The quality of VLBO trends depends upon consistent ET tabulations. The ET is derived from census, banding, and general observations within the standard count period. All categories of data are integrated to arrive at the best possible estimate of the number of individuals of each species that were actually detected in the count area on a given day.

The exercise of tabulating ETs first involves the tabulation of banding, recapture, and census data. The designated ET coordinator (usually the BIC) is responsible for inviting open discussion and encouraging input from all participants at the end of each day. The general observations total is first deduced by eliminating overlap between observers present (i.e., one singing Marsh Wren heard by several individuals in the marsh area equals one, not three). Banded and recaptured birds are then called out.

The final ET figure accounts for all categories and is delineated by discussing relevant time, location, behaviour, and movement detected by all observers. The ET figure cannot exceed that which has been detected. For example, if the combined total of census, banding, recap and general observations equals 34, the ET figure cannot be greater than 34. By extrapolation and careful consideration of "double counting," the ET figure will more often be less than the sum total of all categories.

An example of ET calculation for Lincoln's Sparrow.

Todd reports 3 incidental observations of Lincoln's Sparrow, Dick 3, and Laurie 2. It is determined that there are only 6 sparrows between all observers (4 from the field and 2 along the oxbow). The total for

the incidental obs. column is therefore 6. The ET conductor reports **3** banded and **1** recap as well as **5** on census. While the sum total of all categories is 15, it is then investigated as to whether there were actually 15 or if there is overlap. Further discussion discloses that all 5 censused birds were along the dyke, an area not covered by other observers. It is agreed, however, that the 3 banded and 1 recaptured birds were taken from the nets along the oxbow which eliminates 2 of the 6 observed. It is presumed then that there were 4 incidentally observed birds that differ from all others. Therefore, the breakdown for Lincoln's Sparrow is 5 from census, 4 from mist-netting and 4 from incidental observations. Thus, the estimated total is 13 (**3+1+5+4=13**).

As earlier mentioned, birds identified only to family or genus are recorded as Gull species, Dowitcher sp., and so on. These ET examples are marked in parentheses as Gull sp.= (400) in the ET column. This only applies to situations where one or more species of gull were identified. If there were no species of gull identified, but there were 10 gulls of unknown species, then the gull sp. row is counted as a species with no parentheses added.

An example of a completed ET form is provided in Appendix 2.

9. Recording Effort

The names, arrival and departure times, and role (e.g., census, extractor, scribe) of all personnel at the station must be recorded in the Daily Log (Appendix 3). All times are recorded in Pacific Standard Time (PST), to the nearest 10-minute interval. Tracking effort by accurately and consistently recording all personnel hours is an important component of migration monitoring. A daily coverage code serves to evaluate the quality of the migration monitoring on a given day and, therefore, allows for variability in trend analysis. VLBO operates with a coding system based on observer effort and mist-netting effort (Table 2). Observer class and observer hours are combined for the calculation of observer coverage codes. The observer coverage code is actually a measure of "skill converted observer hours," which are derived using a combination of observer class and observer hours. Raw observer hours must be converted using the classes described in Table 1 (page 6): class 1 hours are taken on par, class 2 hours are halved, and class 3 hours are not included in the calculation of skill converted observer hours. An observer's hours should not be included unless they are actively contributing observations to the daily totals datasheet. More details are provided in Appendix 3. The daily total value for skill converted observer hours is then converted to the corresponding observer coverage code (see Table 2).

Net opening and closing times must also be recorded each day, with special care taken to accurately record when and which nets are opened or closed outside of the typical start and end times. One opening and closing time can be used for all nets as long as they are opened and closed in the same order and in approximately the same amount of time. At the end of each session, the number of hours open for each net should be calculated and then all net hours summed for a daily net hour total. This total is then converted to a daily net coverage code using Table 2.

A daily final coverage code out of 5 is attained by summing the observer coverage code and net coverage code (both out of 2.5)

Table 2. Coverage code conversion rate for mist-netting hours and observer hours. The converted net coverage code and observer coverage code are summed for a Final Coverage Code out of 5.

Observer/Net Coverage Code	Net Hours	Skill Converted Observer Hours

0	0 – 4	0 – 0.9
0.5	4.1 – 23	1 – 4.4
1.0	23.1 – 42	4.5 – 7.9
1.5	42.1 – 61	8.0 – 11.4
2.0	61.1 – 80	11.5 – 14.9
2.5	80 – 84	15+

10. The Daily Log

An example of the daily log is provided in Appendix 3. The VLBO daily log sheet must be completed at the end of each field day. As with ETs and DETs, data entry is an integral part of migration monitoring. Therefore, it is recommended that volunteers and staff pay close attention to the following items to be included on the log:

- Date (all pages);
- List of personnel present for that day, their observer class and field hours;
- Census taker, census start and end time;
- Weather information after net opening, census start and after net closing;
- Net opening and closing times and hours of operation;
- Coverage codes;
- Daily summation of species for ET, DET, census, banded, and recaptured;
- Daily summation of total # of birds per species banded and recaptured;
- Unusual species;
- Season banding total and species totals;
- Daily synopsis – any unusual or interesting occurrences;
- Birds detected outside standard period;
- Fauna of interest: approximate count of snakes, deer, any interesting observations;
- Deviations from protocol or other comments.

Any additional information about any of the topics below may be recorded on the back of the log if time allows:

- A description of bird movements and their relative density;
- Unusual species;
- Observational information on volunteers (e.g., training procedures);
- Notes about injuries or casualties;
- Personnel changes;
- Unusual or noteworthy bird behaviour;
- Observations made outside of the count area zone;
- Description of other floral and faunal species at VLBO;
- Anecdotal information deemed worthy of record (i.e., stories about personnel);
- Site maintenance.

11. Weather Data

Weather is recorded at VLBO three times daily: after net opening (roughly at dawn), at start of census (one hour after sunrise), and after net closure (six hours after sunrise). The following information is to be measured: temperature, wind direction, Beaufort wind strength (Table 3), sky condition (Table 4), and precipitation, as well as any other pertinent weather observations. Temperature is recorded in Celsius from an outdoor thermometer at the banding station. Wind direction and strength are estimated visually based on movement of the surrounding vegetation. Precipitation is measured based upon the three simple, descriptive gradients indicating intensity: drizzle, showers or rain. Sky condition is measured from an open viewing position and rated according to the scale in Table 4.

Table 3. Beaufort wind scale and corresponding indicators used at VLBO.

Scale	Descriptor	KPH	Wind Speed Indicators
0	Calm	<2	Smoke rises vertically
1	Light air	2-5	Wind direction shown by smoke drift
2	Light breeze	6-11	Wind felt on face; leaves rustle
3	Gentle breeze	12-19	Leaves and twigs in constant motion
4	Moderate breeze	20-28	Wind raises dust; small branches moving
5	Fresh breeze	29-38	Small trees in leaf begin to sway
6	Strong breeze	39-49	Large Branches in motion
7	Near gale	50-61	Whole trees in motion

Table 4. Sky condition scale and corresponding indicators used at VLBO.

Scale	Sky Condition Indicators
0	Clear or a few small cloud patches
1	Partly cloudy or variable sky
2	Cloudy (broken) or overcast
3	Sandstorm (not applicable)
4	Fog or smoke
5	Drizzle
6	Rain
7	Snow
8	Showers

12. Digital Data Entry

Thorough completion of the datasheets and electronic entry of all data is considered of equal importance, and responsibility for completion of all data entry will be shared among VLBO personnel. The banding and recapture data and the estimated totals must be recorded daily on the standard VLBO datasheets and entered in an appropriate electronic format. It is anticipated that the BIC, or another designated data manager, will co-ordinate electronic data entry during the banding season or immediately after its conclusion.

As mentioned before, banding, effort, and weather data were entered directly into the station laptop for the first time in 2020, eliminating the need for paper-to-electronic entry later on. Data were entered into an excel spreadsheet called “[Year] VLBO Banding Spreadsheet.” This spreadsheet uses the “Validations” tool, which prevents the occurrence of typos in most of the data columns. Using Excel also enables the

data to be quickly and easily summarized and checked using “Pivot Tables.” ETs/DETs were still entered into the daily estimated totals log and entered electronically later on the same day. It is up to the BIC to decide which data entry method they prefer in future seasons. Both methods are acceptable, and examples of all printed datasheets and directories for digital versions are provided in the Appendices.

To avoid costly backlogs of data that have occurred in the past, the monitoring data at VLBO must be entered electronically on a regular basis. Banding data must be entered and submitted to the Bird Banding Office using The Bander Portal; while daily totals, weather and effort data through the CMMN DET program (through Excel). As part of VLBO’s agreement with the CMMN, the DET data must be submitted to Birds Canada annually. Once completed and checked, the BIC sends a final version of the banding data (“[Year] VLBO Banding Spreadsheet”) and the CMMN DET data to Sharon Mansiere who will submit them to The Bander Portal and the CMMN.

13. Banding: Ethics and Training Procedures

As with access to the site, the handling of birds is a privilege, not an inherent right! Bird handling, extraction from mist nets and banding are extremely delicate processes that require lengthy training by experienced persons. Therefore, it is necessary for those wanting to get hands-on experience to approach the volunteer coordinator about this beforehand. Volunteers who want training should consult the following station manuals for basic instruction on banding operations: “The North American Banders Study Guide”, “The North American Banders Manual for Passerines and Near Passerines”, and Pyle's “Identification Guide to North American Birds”. The Bander in Charge is ultimately responsible for bird welfare and a safe banding operation and is the person who will train in these areas of interest. Any mortalities and/or injuries encountered at VLBO must be recorded on the appropriate forms, i.e. a) as Unbanded for mortalities and major injuries or b) as Banded/Recap if banding the bird was possible despite the injury, or if it was recaptured with an injury. Injuries and mortality are rare when banding is being done correction by trained personnel. If they are not, the banding program should be reassessed and shut down if warranted.

Banding is a Privilege

The Banders Code of Ethics

from “The Canadian Bander’s Study Guide.”

1. **More than anything else, banders are responsible for the safety and welfare of the birds they study. This means that stress and risks of injury or death must be minimized. Some basic rules are as follows:**

- handle each bird carefully, gently, quietly, and with respect;
- capture and process only as many birds as you can safely handle;
- close traps or nets when there are known predators in the area;
- do not band in inclement weather;
- frequently assess the condition of traps and nets and repair them quickly;
- trainees must be properly trained and supervised;
- check nets every 20-30 minutes;

- check traps as often as possible as is recommended for each trap type;
- properly close all traps and nets at the end of the banding day;
- do not leave traps or nets set and untended;
- use the correct band size and banding pliers for each bird;
- treat all bird injuries in the most humane way.

2. **Banders must continually assess their own work to ensure that it is beyond reproach:**

- re-assess methods and your approach whenever an injury or mortality occurs;
- accept constructive criticism from other banders.

3. **Banders must offer an honest and constructive assessment of others' work to maintain the highest standards possible:**

- publish innovations in banding, capture and handling techniques;
- educate prospective banders and trainers;
- provide feedback of any instances of mistreatment of birds to the bander;
- if there is no improvement, then file a report with the banding office.

4. **Banders must ensure that the data gathered are accurate and complete.**

5. **Banders must obtain permission to band on private property.**

14. Habitat Management

14.1 Habitat Assessment Instructions

Protocol

VLBO's habitat assessment protocol follows that established by the Institute for Bird Populations (IBP) for the Monitoring Avian Productivity and Survivorship (MAPS) program. This protocol requires the station area to be divided into distinct habitat types (see Figure 4) and a separate Habitat Structure Assessment form (Appendix 5) filled out for each. In brief, this form requires a breakdown of vegetative layers (upperstory, midstory, understory, and groundcover) for each habitat. Cover percentage, cover pattern, number of species and an estimation of the percentage of four broad vegetative classes (conifer, broad, forbs and ferns, grass-like) must be determined within each layer as well as the dominant species. Non vegetative features (running, water, standing water, human features and structures) are also assessed and different cover types must be identified. The full protocol can be found at: HSAFRNT.PDF (birdpop.org).

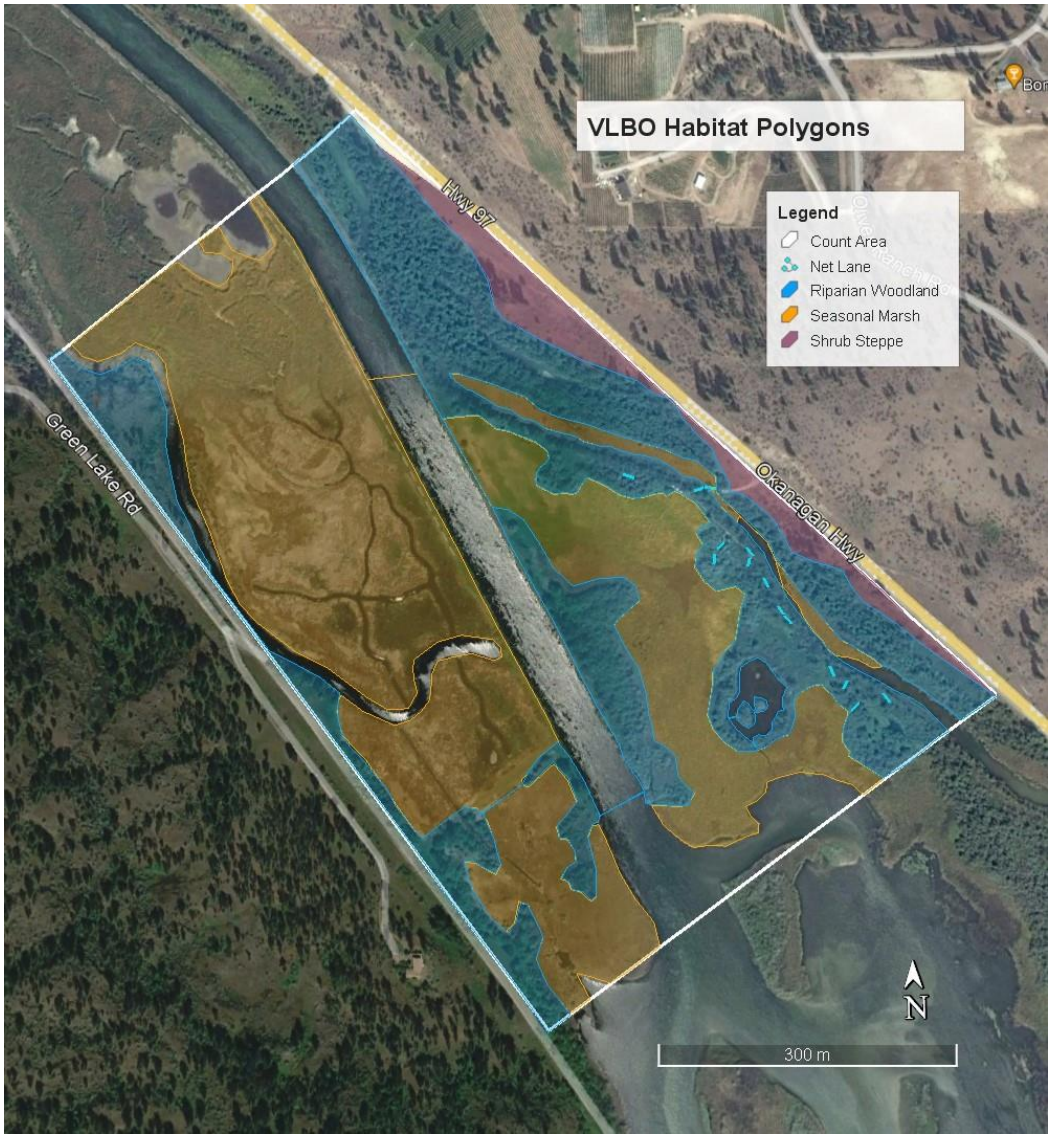

Figure 4. Habitat patch delineations within the VLBO Count Area.

Schedule

A habitat assessment should be completed every five years, or whenever there has been a significant change in habitat since the previous assessment. The assessment should be done between late August or early September, when the vegetation is in the state experienced by most migrants but is also still in full leaf to facilitate plant identification. The assessment can be carried out in the afternoons after banding and can be completed in two days. The first assessment was done in 2019 meaning the next should be conducted in 2024, barring any major habitat changes before then.

Data Management

Results of the habitat assessment should be saved in the folder called “Habitat Assessment [Year] VLBO” in the following directory: Documents -> VLBO -> Habitat. Completed habitat forms should be scanned and saved together as one pdf file named “Habitat Forms [Year] VLBO”. They should be submitted to Birds Canada along with any site photos taken during the same year after the migration monitoring season. A blank habitat form (Appendix 5) is also saved in the “Habitat” folder.

14.2 Site Photo Instructions

Schedule

Site photos should be completed every three years. The first set was taken in 2020 and the next should be done in 2023. Only fall migration monitoring is run at VLBO; thus photos should be taken in early September. This timing enables them to be taken almost halfway through the fall season, but while the vegetation is still in full leaf, which illustrates the conditions that most migrants experience.

Photo Locations

A set of standardized photo locations were established and mapped in during the fall of 2020 with the first set of photos. Reference photos were taken at either end of each net (Figure 4) and at specific locations along the census route, as shown in Figure 5. Table 4 provides the coordinates and a brief description of each reference photo location as well as the direction the camera should be pointed. A document entitled "VLBO Site Photo Reference Guide" was created which contains scaled down versions of each photo to fit on only a few pages (see Appendix 6). This should be used as a reference when taking subsequent sets of photos to ensure they are taken with comparable composition and orientation.

Data Management

The naming convention for VLBO Site Photos includes reference to the location, station, and month and year, as follows: "N1E-VLBO-Sep20" as an example for a net photo, and C1A-VLBO-Sep20" for a census reference photo. More precise dates are not necessary in the name as each photo has a time stamp.

Site photos are saved in a folder named "Site Photos [Year] VLBO" which is located within the following directory on the VLBO station laptop: This PC -> Documents -> VLBO -> Habitat. A second copy is saved on the VLBO External hard drive within the same directory. All site photos should be submitted to Birds Canada after the banding season during which they were taken. The VLBO Site Photo Reference Guide is saved in the same "Habitat" folder.

Habitat Assessment data sheets are also be saved within the "Habitat" folder. A separate field sheet should be filled out for each of the three habitat types, and scanned together into one document, named "VLBO HA Datasheets [Year]". Refer to the section below for more information on the Habitat Assessment.

Table 4. List of VLBO Site Photo with photo names, location descriptions, date taken, bearing, and UTMS for the initial set of photos, taken in 2020.

VLBO Site Photos				Date Taken	Bearing (°)	UTM		
Photo Name	Way point	Location	Description			Zone	Easting	Northing
C1A-VLBO-Sep20	C1	Census starting point	Looking SE into oxbow	04-Sep	140	11 U	315054	5465049
C1B-VLBO-Sep20	C1	Census starting point	Looking W down trail to banding area	04-Sep	260	11 U	315054	5465049
C2A-VLBO-Sep20	C2	Meadow observation point	Looking SE toward net lane trail	04-Sep	130	11 U	315017	5465045
C2B-VLBO-Sep20	C2	Meadow observation point	Looking SW across meadow to bluff	04-Sep	220	11 U	315017	5465045
C3-VLBO-Sep20	C3	Marsh observation point	Looking SW across marsh to bluff behind net 9	04-Sep	220	11 U	315149	5464840
C4-VLBO-Sep20	C4	Oxbow observation point	Looking E into open oxbow	04-Sep	60	11 U	315164	5464852
C5-VLBO-Sep20	C5	Behind banding lab	Looking WNW down census trail	04-Sep	300	11 U	314998	5465062

C6A-VLBO-Sep20	C6	Census willow patch	SE view of willow patch along census trail	04-Sep	90	11 U	314930	5465089
C6B-VLBO-Sep20	C6	Census willow patch	NW view of willow patch along census trail	04-Sep	270	11 U	314930	5465089
C7A-VLBO-Sep20	C7	Census meadow edge	Looking SE toward willow patch	04-Sep	130	11 U	314885	5465109
C7B-VLBO-Sep20	C7	Census meadow edge	Looking NW to small meadow	04-Sep	270	11 U	314885	5465109
C8A-VLBO-Sep20	C8	Dyke access point	Looking WSW across river to marsh and bluff in the background	04-Sep	240	11 U	314771	5465139
C8B-VLBO-Sep20	C8	Dyke access point	Looking NNW along river and trail	04-Sep	330	11 U	314771	5465139
C8C-VLBO-Sep20	C8	Dyke access point	Looking E into small meadow and riparian corridor	04-Sep	90	11 U	314771	5465139
C8D-VLBO-Sep20	C8	Dyke access point	Looking SSW along river and trail	04-Sep	140	11 U	314771	5465139
C9A-VLBO-Sep20	C9	Census dyke north	Looking NW to bend in river	04-Sep	330	11 U	314721	5465245
C9B-VLBO-Sep20	C9	Census dyke north	Looking SSW along census trail	04-Sep	140	11 U	314721	5465245
C10A-VLBO-Sep20	C10	Census dyke forest	Looking NW along river and birch forest	04-Sep	350	11 U	314869	5464913
C10B-VLBO-Sep20	C10	Census dyke forest	Looking SW along river and birch forest	04-Sep	150	11 U	314869	5464913
C11A-VLBO-Sep20	C11	Census dyke south	Looking NW from south end of census route	04-Sep	340	11 U	314911	5464818
C11B-VLBO-Sep20	C11	Census dyke south	Looking SSW toward head of Vasuex Lake	04-Sep	150	11 U	314911	5464818
N1E-VLBO-Sep20	N1E	Net 1	Net 1 east end	06-Sep	280	11 U	315043	5465054
N1W-VLBO-Sep20	N1W	Net 1	Net 1 west end	06-Sep	100	11 U	315036	5465059
N2E-VLBO-Sep20	N2E	Net 2	Net 2 east end	06-Sep	260	11 U	315034	5465056
N2W-VLBO-Sep20	N2W	Net 2	Net 2 west end	06-Sep	80	11 U	315025	5465051
N15E-VLBO-Sep20	N15E	Net 15	Net 15 east end	06-Sep	230	11 U	315051	5464995
N15W-VLBO-Sep20	N15W	Net 15	Net 15 west end	06-Sep	50	11 U	315043	5464990
N20N-VLBO-Sep20	N20N	Net 20	Net 20 north end	06-Sep	190	11 U	315039	5464980
N20S-VLBO-Sep20	N20S	Net 20	Net 20 south end	06-Sep	10	11 U	315037	5464971
N4N-VLBO-Sep20	N4N	Net 4	Net 4 north end	06-Sep	150	11 U	315074	5464986
N4S-VLBO-Sep20	N4S	Net 4	Net 4 south end	06-Sep	330	11 U	315077	5464977
N5N-VLBO-Sep20	N5N	Net 5	Net 5 north end	06-Sep	200	11 U	315076	5464976
N5S-VLBO-Sep20	N5S	Net 5	Net 5 south end	06-Sep	20	11 U	315073	5464966
N6N-VLBO-Sep20	N6N	Net 6	Net 6 north end	06-Sep	170	11 U	315091	5464952
N6S-VLBO-Sep20	N6S	Net 6	Net 6 south end	06-Sep	350	11 U	315092	5464945
N7N-VLBO-Sep20	N7N	Net 7	Net 7 north end	06-Sep	160	11 U	315102	5464922
N7S-VLBO-Sep20	N7S	Net 7	Net 7 south end	06-Sep	340	11 U	315107	5464913
N8N-VLBO-Sep20	N8N	Net 8	Net 8 north end	06-Sep	140	11 U	315105	5464911
N8S-VLBO-Sep20	N8S	Net 8	Net 8 south end	06-Sep	320	11 U	315113	5464903
N9N-VLBO-Sep20	N9N	Net 9	Net 9 north end	06-Sep	160	11 U	315149	5464856
N9S-VLBO-Sep20	N9S	Net 9	Net 9 south end	06-Sep	340	11 U	315152	5464844
N10E-VLBO-Sep20	N10E	Net 10	Net 10 east end	06-Sep	220	11 U	315165	5464837
N10W-VLBO-Sep20	N10W	Net 10	Net 10 west end	06-Sep	40	11 U	315159	5464833
N17E-VLBO-Sep20	N17E	Net 17	Net 17 east end	06-Sep	220	11 U	315174	5464815
N17W-VLBO-Sep20	N17W	Net 17	Net 17 west end	06-Sep	50	11 U	315165	5464807
N18N-VLBO-Sep20	N18N	Net 18	Net 18 north end	06-Sep	150	11 U	315200	5464823

N18S-VLBO-Sep20	N18S	Net 18	Net 18 south end	06-Sep	330	11 U	315206	5464813
N19N-VLBO-Sep20	N19N	Net 19	Net 19 north end	06-Sep	110	11 U	314951	5465075
N19S-VLBO-Sep20	N19S	Net 19	Net 19 south end	06-Sep	290	11 U	314961	5465071

14.3 Habitat Maintenance

Habitat maintenance at VLBO has in the past been limited to clearing the net lanes, net trail, and census trail a few days prior to the start of the migration monitoring season. The station is situated on protected land which sees very little disturbance and few visitors outside of the fall season. Cleared trails grow back very quickly during the off season which means the clearing is typically quite arduous, requiring a full day of weed whacking and pruning of fallen branches and new growth across the net lanes. However, the habitat at the station is mostly late succession riparian woodland/shrubland and marshland which has not changed significantly for many years. The larger trees and shrubs (mostly water birch, mountain alder, and willows) are unlikely to grow much so maintaining vegetation height for the upperstory should not be an issue. Habitat should be maintained at this late successional stage.

Any major vegetation changes should be well documented (photographic records of net lines, census route). When trimming net lanes and census paths, it should be stressed that nets and walking paths should remain well hidden. Although it is convenient for personnel to have more room to manoeuvre in the field, it is more important to minimize people's impact on the vegetation. Therefore, net lanes and census paths should be trimmed back just enough to allow individuals to extract birds comfortably and ensure that vegetation blowing in the wind will not damage nets.

Some small open patches of early succession shrub habitat exist which have the potential to grow in over time, particularly around nets 5, 9 and 18. These areas should be closely monitored during each habitat assessment and site photos should be compared to the VLBO Site Photo Reference Guide. In addition, the small clearing surrounded by willows at location C7 along the census route (See Figure 5) has the potential to fill in with shrubby understory (especially willows) if moisture levels in upcoming summers are low. Excessive willow growth in this area should also be trimmed back.

Any significant habitat maintenance beyond regular net clearing will require permission from CWS who own the land that VLBO is located on.

15. Record of changes or major interruptions in standardized data collection

Important interruptions to operations should be recorded here, such as flooding or lack of personnel that reduced effort for periods of a week or more. Also, to be recorded are any permanent changes to data collection methods. Although operational changes are sometimes necessary (as when a netting location is destroyed), changes in data collection are not to be made unless absolutely necessary, and must first be discussed with CMMN advisors.

If any standardized operational change or interruption occurs, enter details into Table 5 below, underneath any previous entries. Refer to parts of the text that were changed (e.g. section number, altered locations on a map, new GPS points). Revise the 'latest version' date on page 1 of this protocol. If changes have been made to the protocol other than adding to the table below, submit a copy of the entire

revised protocol to Birds Canada along with year-end data submission; otherwise, send only a copy of the table.

Table 5. Operational changes and major interruptions of standardized data collection at VLBO since 2001 including the date on which they were introduced.

Date	Description of change and justification (if applicable)
Aug. 2002	Nets 11-14 were abandoned and replaced with nets 15-18 at the start of the 2002 season. Net 19 was added for the last quarter of the 2002 season and made permanent in 2003, replacing net 16.
Aug. 2006	Net 3 moved to become net 20.
Oct. 2006	Standard monitoring period extended to October 15th. Previously the monitoring period ended on Sept. 31st.

16. References

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Pyle, Peter, S.N.F. Howell, D.F. DeSante, R.P. Yunick and M. Gustafson. 1997. Identification Guide to North American Birds. Slate Creek Press, Bolinas California

Ralph, John et. al. 1999. The Instructors Guide to Training Passerine Bird Banders in North America. The North American Banding Council: Publications Committee, May 1999.

Ralph, John et.al. 1999. The North American Banders Study Guide. North American Banding Council: Publications Committee, May 1999.

Appendix 1: Banding Datasheets

Example of VLBO Banding and Recap Forms

Note that times are rounded to the nearest 10 minutes.

Willow Lake Bird Observatory

Banding Form

Year: 2020
Season: Fall

Band Size: OA

Full # of first band on page: 2480 54912

Page # 1

Repeat capture	Bander	Band #	Species Code	Species Name	Age	How aged	Molt Cycle (WRP)	Sex	How sexed	Skull	Fat	Moult	Areas B P S R	Wing	Mass	Status	Month	Day	Capture Time	Net	Feather Pull?	Comments (use reverse if necessary)
	MEB	912	WIFL	Willow Flycatcher	2	PL	FCS	U	MA		0	N		68	11.26	30	08	06	1100	05		
	>	913	YEWA	Yellow Warbler	2	MB	FCF	M	PL		2	N		61	9.7	>		>	>	19		
	>	914	WPFL	Wood-Pewee Fl.	2	PL	FCJ	U	MA		2	N		78	11.8	>		>	>	19		
	>	915	YEWA	Yellow Warbler	2	MB	FPF	M	PL		1	YB		62	9.7	>		>	>	19		
	>	916	YEWA	>	2	MB	FPF	F	PL		0	YB		59	9.3	>		>	>	19		
	>	917	YEWA	>	1	MB	DPB	M	PL		0	YB		62	9.1	>		>	>	19		
	>	918	YEWA	>	2	MB	FCF	M	PL		0	N		60	8.6	>		>	>	19		
	>	919	NAWA	Nashville Wa.	2	PL	FCF	M	PL		0	N		60	8.9	>		>	>	19		Entered

Full # of last band on page: 2480 54919

Checked by: MEB
Entered by: MEB

Recaptures Form

Year: 2021
Season: Fall

R

Page #___

Repeat capture	Bander	Band #	Species Code	Species Name	Age	How aged	Molt Cycle (WRP)	Sex	How sexed	Skull	Fat	Mout	Areas B P S R	Wing	Mass	Status	Month	Day	Capture Time	Net	Feather Pull?	Comments (use reverse if necessary)
	AAS	2561014722	GRCA	Gray Catbird	1	C	D	U	C	0	1	B	P S R	92	38.9	30	08	01	0840	02		CC: EY, LP
	MCB	2480631022	WIFL	Willow Fly	1	P	F	U	C	0	0			70	12.9	30	08	02	0830	01	5	

Checked by: _____
Entered by: _____

Banding code reference tables (taken from BandIt)

Banding Disposition	
1	new band
4	destroyed
5	replaced
6	added band
8	band lost
9	record lost
D	double band 1st
S	double band 2nd

Age		
Numeric Code	**Letter Code**	**Reference**
0	U	Unknown Age
1	AHY	After Hatch Year
2	HY	Hatch Year
4	L	Local
5	SY	Second Year
6	ASY	After Second Year
7	TY	Third Year
8	ATY	After Third Year

Appendix 2: Estimated Totals Form

Example of a VLBO Estimated Totals (ET) form (page 1)

How Aged	
AM	Auxiliary Marker on bird at capture
BO	Behavioral observation
BP	Brood patch
CC	Combination of characteristics/measurements
CL	Cloaca
EG	Egg in oviduct
EY	Eye color
FB	Fault bar
FF	Flight feathers (remiges), condition or color
IC	Inconclusive, Conflicting
LP	Molt limit present
MB	Mouth/bill
MR	Actively-molting remiges
NA	Not attempted
NF	Nestling recently fledged, incapable of powered flight
NL	No molt limit
OT	Other
PC	Primary covert wear and/or shape
PL	Body Plumage
RC	Re-captured bird with USGS band
SK	Skull
TL	Tail length
TS	Tail shape or wear

How Sexed	
BO	Behavioral observation
BP	Brood patch
CC	Combination of characteristics/measurements
CL	Cloaca
EG	Egg in oviduct
EY	Eye color
FS	Feather Shape (Primaries or tail)
IC	Inconclusive, Conflicting
MB	Mouth/bill
NA	Not attempted
OT	Other
PL	Body Plumage
RC	Sexed upon recapture
TL	Tail length
WL	Wing length

Vaseux Lake Bird Observatory--Estimated Totals Log												1
Date: Aug. 2, 2020		Season Date: 2				Observers: MEB, AAS, RJC					Census Taker:	RJC
SPECIES	Banded	Recaps	Census	OBS	E.T.	SPECIES	Banded	Recaps	Census	OBS	E.T.	
Canada Goose			30	20	40	Bonaparte's Gull						
Wood Duck			9		9	Ring-billed Gull						
Blue-winged Teal						California Gull						
Cinnamon Teal			1		1	Herring Gull			1		1	
Blue-w./Cinnamon Teal						Glaucous-winged Gull						
Northern Shoveler						*gull sp.*				1	1	
Gadwall						Common Loon						
American Wigeon						Double-c. Cormorant			1		1	
Mallard			22		22	Great Blue Heron			1		1	
Northern Pintail						Turkey Vulture						
Green-winged Teal						Osprey			3	2	3	
dabbling duck sp.						Golden Eagle						
Canvasback						Northern Harrier						
Redhead						Sharp-shinned Hawk						
Ring-necked Duck						Cooper's Hawk						
Greater Scaup						*Accipiter sp.*						
Lesser Scaup						Bald Eagle						
White-winged Scoter						Red-tailed Hawk						
Bufflehead						Great Horned Owl						
Common Goldeneye						Long-eared Owl						
Barrow's Goldeneye						Northern Saw-whet Owl						
Hooded Merganser						*owl sp.*						
Common Merganser						Belted Kingfisher						
Ruddy Duck						Red-naped Sapsucker						
duck sp.						Downy Woodpecker			1	1	2	
California Quail						Hairy Woodpecker						
Ring-necked Pheasant						Pileated Woodpecker						
Pied-billed Grebe						Northern Flicker			1	2	3	
Horned Grebe						American Kestrel						
Red-necked Grebe						Merlin						
Rock Pigeon						Peregrine Falcon						
Eurasian Collared-Dove			3		3	*falcon sp.*						
Mourning Dove			1		1	Western Wood-Pewee			1			
Common Nighthawk						Willow Flycatcher	5	2	14	10	22	
Vaux's Swift						Least Flycatcher						
White-throated Swift						Hammond's Flycatcher						
Black-c. Hummingbird	1				1	Dusky Flycatcher						
Rufous Hummingbird				1	1	Pacific-slope Flycatcher						
Calliope Hummingbird						*Empidonax sp.*						
hummingbird sp.						Say's Phoebe						
Virginia Rail			2	2	3	Western Kingbird						
Sora						Eastern Kingbird			8	4	9	
American Coot						Northern Shrike						
Sandhill Crane						Cassin's Vireo						
Killdeer			1	1	1	Warbling Vireo						
Wilson's Snipe						Red-eyed Vireo			1		1	
Spotted Sandpiper						Steller's Jay						
Solitary Sandpiper						Black-billed Magpie						
Greater Yellowlegs						Clark's Nutcracker						
Lesser Yellowlegs						American Crow						

Example of a VLBO Estimated Totals (ET) form (page 2)

Vaseux Lake Bird Observatory--Estimated Totals Log												2
Date: Aug. 2, 2020	Season Date:					Observers:					Census Taker:	
SPECIES	Banded	Recaps	Census	OBS	E.T.	SPECIES	Banded	Recaps	Census	OBS	E.T.	
Common Raven			1	1	2	White-throated Sparrow						
Horned Lark						Vesper Sparrow						
N. Rough-w. Swallow			4		4	Savannah Sparrow						
Tree Swallow						Song Sparrow	6	2	5	4	11	
Violet-green Swallow			3		3	Lincoln's Sparrow						
Bank Swallow			5		5	Swamp Sparrow						
Barn Swallow			6		6	Spotted Towhee						
Cliff Swallow						*sparrow sp.*						
swallow sp.						Yellow-breasted Chat						
Black-c. Chickadee	1		5	4	7	Yellow-h. Blackbird						
Mountain Chickadee						Western Meadowlark			1			
chickadee sp.						Bullock's Oriole			2			
Red-breasted Nuthatch						Red-winged Blackbird			72	10	82	
White-b. Nuthatch						Brown-headed Cowbird		1	1		1	
Pygmy Nuthatch						Brewer's Blackbird						
Brown Creeper						Northern Waterthrush						
Rock Wren						Orange-c. Warbler	3				3	
Canyon Wren						Nashville Warbler						
House Wren						MacGillivray's Warbler						
Pacific Wren						Common Yellowthroat	13	2	9	3	18	
Marsh Wren	1		1	2	3	American Redstart						
Bewick's Wren				1	1	Yellow Warbler	14		7	6	18	
Golden-crowned Kinglet						Audubon's Warbler						
Ruby-crowned Kinglet						Myrtle Warbler						
Western Bluebird						*U. Yellow-r. Warbler*						
Mountain Bluebird						Wilson's Warbler						
Townsend's Solitaire						Western Tanager	1				1	
Varied Thrush						Black-headed Grosbeak						
Veery		1			1	Lazuli Bunting						
Swainson's Thrush						House Sparrow						
Hermit Thrush												
American Robin	1		1	1	2	**UNUSUAL SPECIES**						
Gray Catbird	6		4	6	10							
European Starling												
American Pipit												
Cedar Waxwing	6	1	23	20	35							
Evening Grosbeak												
House Finch												
Cassin's Finch												
Red Crossbill				3	3					**TOTAL**	47	
Pine Siskin	1			3	4							
American Goldfinch	8		25	8	30							
Chipping Sparrow												
Lark Sparrow												
Fox Sparrow												
Oregon Junco												
Slate-coloured Junco												
Unid. Dark-eyed Junco												
White-crowned Sparrow												

Appendix 3: Daily Log Form

Example of a VLBO Daily Log

DAILY LOG SHEET	**Vaseux Lake Bird Observatory**					DD	MM	YEAR
						02	08	2020
START TIME: 5:00		END TIME: 11:30				SEASON DATE:		2

OBSERVERS (See legend for explanation of coverage calculations.)	Skill 1,2,3	Obs. Hours	Role	Skill converted Obs. hours Skill 1=1 2=1/2	**WEATHER**	After Opening	**Census** @ Start	After Closing
BIC: Matthias Bieber	1	6.5	BIC	6.5	Wind Direction	/	/	NW
Anna Skwirkhina	2	6.5	BA	3.25	Wind Strength	0	0	2
Dick Cannings	1	1.5	Census	1.5	Sky Condition	4	4	4
					Temperature	18.3	18.2	26.3
					Synopsis: Smoke from nearby wildfires			
				11.25				

Visitors (name/group & # of ppl):	**CENSUS**	Start Time	End Time	Initials
Group from South Okanagan Naturalist Club 8 ppl		6:30	8:00	AJB

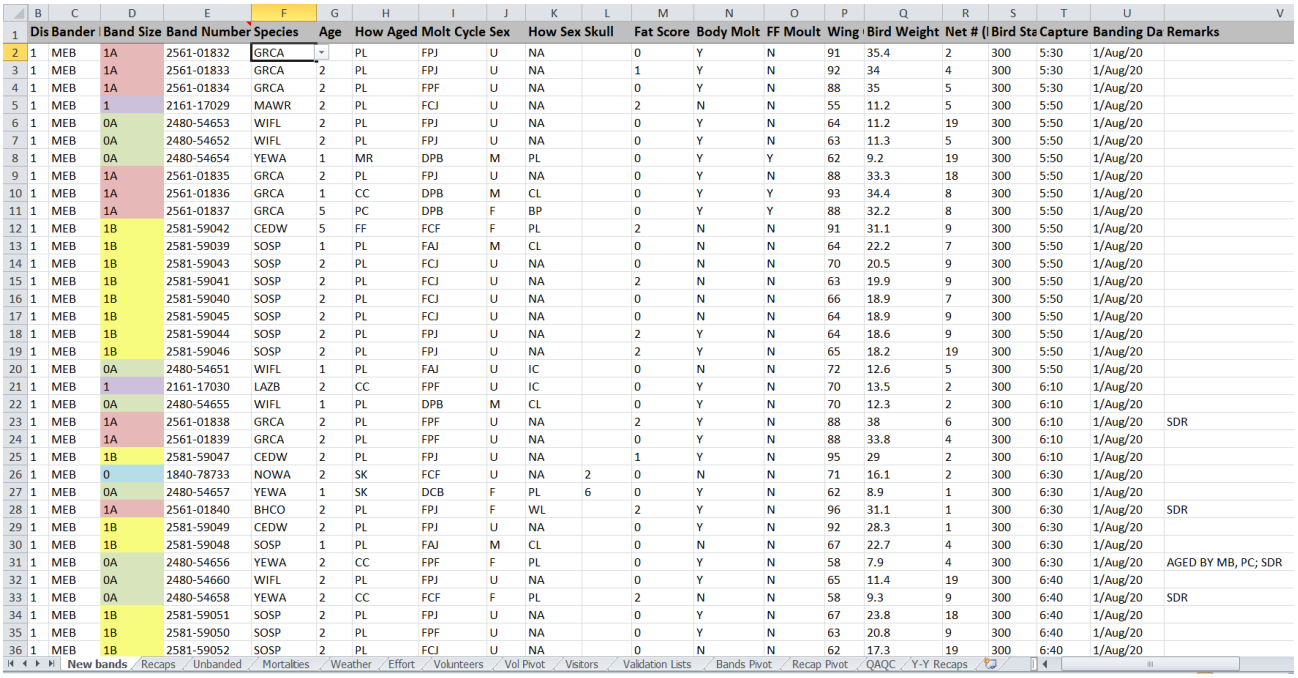
NETTING EFFORT					**STATION TOTALS**	Today's #s	Season to date
# Nets Opened	Time Opened	Time Closed	Net #s Not used	Subtotal Net hours			
10	5:00	11:00	10, 17, 18, 20	+ 60	# Banded	67	202
				+	# Species Banded	19	27
				+	# Recaps	15	35
				+	# Species Recaps	7	12
				+	Census Spec. Total	36	
				+			
				+			
			Total # of Net hours	= 60	Estimated Species Total For Area	47	

Coverage Code Calculations	
Observer cov. = Total observer hrs into coverage code: **0** = < 1hr; **0.5** = 1 – 4.4; **1** = 4.5 – 7.9 **1.5** = 8.0 – 11.4; **2.0** = 11.5 – 14.9; **2.5** = 15hrs	1.5
Net cov.= Total net hrs into coverage code:**0** = 0 – 4hrs; **0.5** = 4.1 – 23; **1** = 23.1 – 42; **1.5** = 42.1 – 61; **2** = 61.1 – 80; **2.5** = 80 – 84hrs	1.5
Final Coverage Code = Net coverage + Observer coverage (5max)	3.0
B.O.D / New /Unusual Species: DCCO flyover on census!	
Birds Seen Outside Period:	
Flora & Fauna of Interest: Western Yellow-bellied Racer, Mule deer	
Deviations from protocol or other brief comments: Net lanes 10, 17, 18 & 20 still flooded	
Recapture #'s from other years/locations:	

A sheet that explains how to fill out the Daily Log Form entitled "Daily Log Explanation Sheet" can be found in the "Banding Forms" folder (see Appendix 5).

Appendix 4: VLBO Banding Spreadsheet

Example of electronic VLBO Banding Spreadsheet



Dis	Bander	Band Size	Band Number	Species	Age	How Aged	Molt Cycle	Sex	How Sex	Skull	Fat Score	Body Molt	FF Molt	Wing	Bird Weight	Net #	Bird Sta	Capture	Banding Da	Remarks
1	MEB	1A	2561-01832	GRCA		PL	FPJ	U	NA		0	Y	N	91	35.4	2	300	5:30	1/Aug/20	
1	MEB	1A	2561-01833	GRCA	2	PL	FPJ	U	NA		1	Y	N	92	34	4	300	5:30	1/Aug/20	
1	MEB	1A	2561-01834	GRCA	2	PL	FPF	U	NA		0	Y	N	88	35	5	300	5:30	1/Aug/20	
1	MEB	1	2161-17029	MAWR	2	PL	FCJ	U	NA		2	N	N	55	11.2	5	300	5:50	1/Aug/20	
1	MEB	0A	2480-54653	WIFL	2	PL	FPJ	U	NA		0	Y	N	64	11.2	19	300	5:50	1/Aug/20	
1	MEB	0A	2480-54652	WIFL	2	PL	FPJ	U	NA		0	Y	N	63	11.3	5	300	5:50	1/Aug/20	
1	MEB	0A	2480-54654	YEWA	1	MR	DPB	M	PL		0	Y	Y	62	9.2	19	300	5:50	1/Aug/20	
1	MEB	1A	2561-01835	GRCA	2	PL	FPJ	U	NA		0	Y	N	88	33.3	18	300	5:50	1/Aug/20	
1	MEB	1A	2561-01836	GRCA	1	CC	DPB	M	CL		0	Y	Y	93	34.4	8	300	5:50	1/Aug/20	
1	MEB	1A	2561-01837	GRCA	5	PC	DPB	F	BP		0	Y	Y	88	32.2	8	300	5:50	1/Aug/20	
1	MEB	1B	2581-59042	CEDW	5	FF	FCF	F	PL		2	N	N	91	31.1	9	300	5:50	1/Aug/20	
1	MEB	1B	2581-59039	SOSP	1	PL	FAJ	M	CL		0	N	N	64	22.2	7	300	5:50	1/Aug/20	
1	MEB	1B	2581-59043	SOSP	2	PL	FCJ	U	NA		0	N	N	70	20.5	9	300	5:50	1/Aug/20	
1	MEB	1B	2581-59041	SOSP	2	PL	FCJ	U	NA		2	N	N	63	19.9	9	300	5:50	1/Aug/20	
1	MEB	1B	2581-59040	SOSP	2	PL	FCJ	U	NA		0	N	N	66	18.9	7	300	5:50	1/Aug/20	
1	MEB	1B	2581-59045	SOSP	2	PL	FCJ	U	NA		0	N	N	64	18.9	9	300	5:50	1/Aug/20	
1	MEB	1B	2581-59044	SOSP	2	PL	FPJ	U	NA		2	Y	N	64	18.6	9	300	5:50	1/Aug/20	
1	MEB	1B	2581-59046	SOSP	2	PL	FPJ	U	NA		2	Y	N	65	18.2	19	300	5:50	1/Aug/20	
1	MEB	0A	2480-54651	WIFL	1	PL	FAJ	U	IC		0	N	N	72	12.6	5	300	5:50	1/Aug/20	
1	MEB	1	2161-17030	LAZB	2	CC	FPF	U	IC		0	Y	N	70	13.5	2	300	6:10	1/Aug/20	
1	MEB	0A	2480-54655	WIFL	1	PL	DPB	M	CL		0	Y	N	70	12.3	2	300	6:10	1/Aug/20	
1	MEB	1A	2561-01838	GRCA	2	PL	FPF	U	NA		2	Y	N	88	38	6	300	6:10	1/Aug/20	SDR
1	MEB	1A	2561-01839	GRCA	2	PL	FPF	U	NA		0	Y	N	88	33.8	4	300	6:10	1/Aug/20	
1	MEB	1B	2581-59047	CEDW	2	PL	FPJ	U	NA		1	Y	N	95	29	2	300	6:10	1/Aug/20	
1	MEB	0	1840-78733	NOWA	2	SK	FCF	U	NA	2	0	N	N	71	16.1	2	300	6:30	1/Aug/20	
1	MEB	0A	2480-54657	YEWA	1	SK	DCB	F	PL	6	0	Y	N	62	8.9	1	300	6:30	1/Aug/20	
1	MEB	1A	2561-01840	BHCO	2	PL	FPJ	F	WL		2	Y	N	96	31.1	1	300	6:30	1/Aug/20	SDR
1	MEB	1B	2581-59049	CEDW	2	PL	FPJ	U	NA		0	Y	N	92	28.3	1	300	6:30	1/Aug/20	
1	MEB	1B	2581-59048	SOSP	1	PL	FAJ	M	CL		0	N	N	67	22.7	4	300	6:30	1/Aug/20	
1	MEB	0A	2480-54656	YEWA	2	CC	FPF	F	PL		0	Y	N	58	7.9	4	300	6:30	1/Aug/20	AGED BY MB, PC; SDR
1	MEB	0A	2480-54660	WIFL	2	PL	FPJ	U	NA		0	Y	N	65	11.4	19	300	6:40	1/Aug/20	
1	MEB	0A	2480-54658	YEWA	2	CC	FCF	F	PL		2	N	N	58	9.3	9	300	6:40	1/Aug/20	SDR
1	MEB	1B	2581-59051	SOSP	2	PL	FPJ	U	NA		0	Y	N	67	23.8	18	300	6:40	1/Aug/20	
1	MEB	1B	2581-59050	SOSP	2	PL	FPF	U	NA		0	Y	N	63	20.8	9	300	6:40	1/Aug/20	
1	MEB	1B	2581-59052	SOSP	2	PL	FCJ	U	NA		0	N	N	62	17.3	19	300	6:40	1/Aug/20	

New bands | Recaps | Unbanded | Mortalities | Weather | Effort | Volunteers | Vol Pivot | Visitors | Validation Lists | Bands Pivot | Recap Pivot | QAQC | Y-Y Recaps

Banding tab

Date	Temp 1	Temp 2	Temp 3	Sky 1	Sky 2	Sky 3	Wind str 1	Wind str 2	Wind str 3	Wind dir 1	Wind dir 2	Wind dir 3	Smoke?	Other Wildlife Species	Comments
01-Aug	16.1	17.5	33.4	1	1	1	0	0	2	NA	NA	NW	N	3 racers	
02-Aug-20	14.7	12.5	28.9	0	0	0	0	0	5	NA	NA	SW	N	3 WYBR, 1 WTGS, 5 river otter	
03-Aug-20	15.5	13.7	24.1	1	1	1	0	0	0	NA	NA	NA	N	2 WTGS	
04-Aug-20	9.9	11.1	25.1	0	0	0	0	0	2	NA	NA	SW	N	1 WTGS, 3 CGSN	
05-Aug-20	11.5	11.5	25.6	0	0	0	0	0	0	NA	NA	NA	N	1 WYBR, WTGS, CGSN	
06-Aug-20	18.4	18.3	24	2	1	1	1	1	0	N	N	NA	N	3 CGSN, WYBR	
07-Aug-20	14.5	15.1	20.3	1	1	1	0	0	1	NA	NA	W	N	1 CGSN, 1WTDEER, 1 MUSKRAT	
08-Aug-20	12.7	12.2	21.6	2	1	1	0	0	2	NA	NA	W	N	3 WTGS	

Weather tab

Date	Obs Start	Obs End	Nets Opened	Nets Closed	# Nets O	Net Hrs	Net Cov Code	BIC hrs	BA Hrs	Census taker	Obs 1 Name	Obs 1 hrs	Obs 1 Skill	Conv Hrs	Obs 2 Name	Obs 2 hrs	Obs 2 Skill	Conv Hrs
01-Aug	5:00	11:30	5:00	11:00	10	60	1.5	6.5	6.5	Dick Cannings	Matthias Bieber	2	1	2	Anna Skurikhina	6.5	2	3.25
02-Aug	5:00	11:30	5:00	11:00	10	60	1.5	6.5	6.5	Dick Cannings	Matthias Bieber	6.5	1	6.5	Anna Skurikhina	6.5	2	3.25
03-Aug	5:00	11:30	5:00	11:00	10	60	1.5	6.5	6.5	Alex Bodden	Matthias Bieber	6.5	1	6.5	Anna Skurikhina	6.5	2	3.25
04-Aug	5:05	11:35	5:05	11:05	10	60	1.5	6.5	0	Eva Durance	Matthias Bieber	6.5	1	6.5	Kristen Mancuso	2	1	2
05-Aug	5:05	11:35	5:05	11:05	10	60	1.5	6.5	6.5	Matthias Bieber	Matthias Bieber	6.5	1	6.5	Anna Skurikhina	6	2	3
06-Aug	5:05	11:35	5:05	11:05	10	60	1.5	6.5	6.5	Matthias Bieber	Matthias Bieber	6.5	1	6.5	Anna Skurikhina	6.5	2	3.25
07-Aug	5:10	11:40	5:10	11:10	10	60	1.5	6.5	6.5	Dick Cannings	Matthias Bieber	6.5	1	6.5	Anna Skurikhina	6	2	3

Effort tab (part 1)

Date	Obs 4 hrs	Obs 4 Skill	Conv Hrs	Obs 5 Name	Obs 5 hrs	Obs 5 Skill	Conv Hrs	# Obs	Total Obs hrs	Conv Obs Hrs	Obs Cov Code	# Visitors	Net Hr Details	Comments
01-Aug								3	10	6.75	1	0	Nets 15, 20, 10, 17 closed due to water	Very hot and muggy day
02-Aug								3	14.5	11.25	1.5	1	Nets 15, 20, 10, 17 closed due to water	
03-Aug								3	15	11.75	2	0	Nets 15, 20, 10, 18 closed due to water	
04-Aug								3	10.5	10.50	1.5	0	Nets 15, 20, 10, 19 closed due to water	
05-Aug								2	12.5	9.50	1.5	0	Nets 15, 20, 10, 19 closed due to water	
06-Aug								3	18.75	12.63	2	0	Nets 15, 20, 10, 19 closed due to water	
07-Aug	1.5	1	1.5	Nathan Earley	1.5	1	1.5	5	21.5	15.50	2.5	0	Nets 15, 20, 10, 19 closed due to water	

Effort tab (part 2)

Appendix 5: Habitat Assessment Form

Form H1: MAPS Habitat Structure Assessment (HSA) form

Location code: _ _ _ _ Station code: _ _ _ _ Date: (m/d/y) __/__/ **2020** Surveyed by: _____ 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: _____

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

Percentage of station comprised of this habitat type (from station map): ____% National Vegetation Classification Standard Alliance: _____

Pattern code of this habitat type (1-12): _____ Average height of: Tree canopy _____m, Shrubs _____m, Herbaceous vegetation _____m

Vegetative Layers	Cover[1] <5, 10, 20,...see below...90, >95	Pattern 1-12	Number of Species	Vegetation types within each layer *Estimated percentages must add up to 100%* Conifer	Broad	Forbs & ferns	Grass-like	Main species *e.g. Vaccinium ovatum, Poa pretensis Quercus rubra, Q. alba, Pinus contorta*
Upperstory: >15m				%	%	%		
Midstory: 5 -15m				%	%	%		
Understory: 0.5 - 5m				%	%	%	%	
Ground cover*: <0.5m				**Woody**	**Nonvascular**	**Forbs & ferns**	**Grass-like**	
Live vegetation	%			%	%	%	%	
Dead vegetation	%		leaves	twigs	branches	old logs	recent treefall	
Total non-vegetative	%	NA see text p.13	rock	stones or gravel	dirt or sand	water	human-made	

Non-vegetative Features	Estimate %	Pattern 1-12	Circle one or more features of cover type					Comment
Running water	%		seep/trickle canal	very small brook (<0.5m)	small stream (0.5-2.0m)	large stream (2.0-5.0m)	river (>5m)	
Standing water	%		pond/lake <50m² | >50m²	for livestock <50m² | >50m²	marsh/bog <50m² | >50m²	seasonal occasional	permanent other	
Human-made Corridors	%		paved road	gravel track	dirt break	mown path	boardwalk other	
Human-made Structure	%		building culvert	fence dam	bridge channel	powerline wall	tower other	

General description of habitat type including habitat age:

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 | icestorm
Other:	write here

Number of snags (>1m tall, >10cm diam.): 0 | <5 | 5-15 | >15

Management / Disturbance history:

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----5%--------15%--------25%--------35%--------45%--------55%--------65%--------75%--------85%--------95%----100%										

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

Appendix 6: Site Photo Reference Guide

C1A-VLBO-Sep20

C1B-VLBO-Sep20

C2A-VLBO-Sep20

C2B-VLBO-Sep20

C3-VLBO-Sep20

C4-VLBO-Sep20


C5-VLBO-Sep20


C6A-VLBO-Sep20


C6B-VLBO-Sep20


C7A-VLBO-Sep20


C7B-VLBO-Sep20


C8A-VLBO-Sep20


C8B-VLBO-Sep20


C8C-VLBO-Sep20


C8D-VLBO-Sep20


C9A-VLBO-Sep20


C9B-VLBO-Sep20


C10A-VLBO-Sep20


C10B-VLBO-Sep20


C11A-VLBO-Sep20


C11B-VLBO-Sep20


N1E-VLBO-Sep20


N1W-VLBO-Sep20


N2E-VLBO-Sep20

 N2W-VLBO-Sep20	 N15E-VLBO-Sep20	 N15W-VLBO-Sep20
 N20N-VLBO-Sep20	 N20S-VLBO-Sep20	 N4N-VLBO-Sep20
 N4S-VLBO-Sep20	 N5N-VLBO-Sep20	 N5S-VLBO-Sep20
 N6N-VLBO-Sep20	 N6S-VLBO-Sep20	 N7N-VLBO-Sep20
 N7S-VLBO-Sep20	 N8N-VLBO-Sep20	 N8S-VLBO-Sep20
 N9N-VLBO-Sep20	 N9S-VLBO-Sep20	 N10E-VLBO-Sep20

 N10W-VLBO-Sep20	 N17E-VLBO-Sep20	 N17W-VLBO-Sep20
 N18N-VLBO-Sep20	 N18S-VLBO-Sep20	 N19N-VLBO-Sep20
 N19S-VLBO-Sep20		

Appendix 7: Data Directories

Banding Forms

All data forms including the VLBO Banding Spreadsheet can be found on the station laptop and back-up hard drive at: Documents -> VLBO -> Banding Forms.

The most recent field ready versions of these forms are located in the “Forms to Print” folder within this directory.

Data Submission

Direct digital entry of the banding data makes keeping up with data entry much more manageable, but the census, obs and ETs must still be entered from paper, after they are collected. This should be done on a daily basis to avoid back up. The VLBO Banding Spreadsheet is designed to be directly imported into BandIt on the station laptop. Once imported, any errors identified by BandIt must be corrected. After all the data are entered and checked, the BIC sends the DET data and a BandIt export of the banding data (both excel files) to Wendy Easton (CWS, Station permit holder), who approves and passes them on to Birds Canada.

Data Archives

Banding data are organized by year on the station laptop and back-up hard drive within the directory: Documents -> VLBO. Within each year’s folder, the various data sets are organized into the following folders: “[Year] Banding”, “[Year] CMMN”, and “[Year] Photos”.

Location data (gpx and kml/kmz files for net locations, census route, count area, etc.) are saved in: Documents -> VLBO -> GPS.

Habitat data, photos, and other documents related to habitat assessments are saved in: Documents -> VLBO -> Habitat

Online copies of the above data are stored in the Google drive associated with the VLBO Gmail: vlboinformation.com

Appendix 8: Equipment Maintenance

Field equipment is an essential component of VLBO and as with any field operation, good care and maintenance of the equipment plays an important role in keeping the station running. All of VLBO's equipment is stored in the banding trailer during the banding season and off season, with the exception of the station laptop and data binders which the banders may want to take home for data entry. The station laptop should not be stored in the banding lab over the winter.

VLBO has about 150 bird bags which typically last about a week before needing to be washed. They are used once, flipped inside out and used one more time inside out. Fresh bags, bags used once, and dirty bags should be kept separated so they do not get mixed up. Dirty bags must be washed using natural, unscented detergent. Any bags with holes should be discarded

Keeping mist nets in good shape is crucial for constant effort mist-netting operations. Daily use, accidental tearing by personnel and visitors, and the occasional deer run-through takes a toll on the nets, and as such, some effort should be made to repair holes using the net repair kit. Typically, banders at VLBO spend time mending nets on slow days, particularly in October. Nets with many large holes should be replaced but any individual panels without prominent holes can be saved for use in repairing other nets. Usually VLBO receives about 5 new nets every year from CWS.

Requests for major equipment needs (e.g., new banding pliers) should be made to the station Chairperson at the end of each season.

Appendix 9: Emergency Information

In case of an incident at the station, contact Sharon Mansiere (250-328-2206) or Margaret Holm (250-462-8587).

Call 911 for emergencies. The nearest emergency services are as follows with alternate **contact info** for less serious incidents:

Service	**Location**	**Contact**
Hospital	South Okanagan General Hospital 911 McKinney Rd, Oliver, BC	Phone: 250-498-5000 Ambulance: 1-800-461-9911
Police	RCMP 425 Similkameen Ave, Oliver, BC	Phone: 250-498-3422
Fire Station	Okanagan Falls Fire Hall 5013 11 Ave, Okanagan Falls, BC	Phone: 250-497-5700

Health and Safety Precautions

Even though VLBO is not remote, various health and safety concerns may still be encountered at the station. It is an uncontrolled field environment and unpredictable events can occur. All personnel should be safety conscious by showing up fit and rested and being aware of the potential hazards of field work. In addition to the typical slips, trips and falls, some of the more serious hazards at VLBO are:

Ticks and Lyme Disease: Ticks have become more prevalent at VLBO in recent years during the summer until early to mid-August. Most ticks encountered are the generally harmless Dog Ticks (aka Wood Tick, *Dermacento*r genus) but Deer Ticks (aka Black-legged Ticks, *Ixodes* genus) can be present and Lyme Disease has been contracted at VLBO in the past. Always do a tick check after visiting the station. More info on ticks: https://www.canada.ca/en/public-health/services/diseases/lyme-disease.html

Bears: Black bears frequent the station (usually at night) but also at times during the day. Info on bare awareness can be found here: https://www.pc.gc.ca/en/pn-np/mtn/ours-bears/securite-safety/ours-humains-bears-people

Heat and sun exposure: Temperatures and high humidity at VLBO can combine to create uncomfortably hot conditions in August. Info on how to deal with extreme heat: https://www.canada.ca/en/health-canada/services/sun-safety/extreme-heat-heat-waves.html