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1. PREFACE

The purpose of this Bird Monitoring and Banding Manual is to provide the basic information to safely and productively conduct bird banding at Vancouver Island University (VIU). It was compiled by Eric Demers, Ph.D., R.P.Bio., based on numerous publications from various authorities. These include the North American Banding Council, the Canadian Bird Banding Office (Environment Canada), the US Bird Banding Laboratory (US Fish and Wildlife), protocols from other bird banding stations in Canada and the Canadian Council on Animal Care. The relevant publications are listed in the REFERENCES section. All personnel involved in banding operations are required to become familiar with this document and with other referenced material as described in the TRAINING section.

Since this manual is intended to be a practical field manual, it emphasizes what procedures should be followed and how, and places little stress on why particular approaches have been chosen. The purposes of bird banding generally, and recommended methods of running a bird banding program, are explained in detail in Blancher et al. (1994) and Hussell and Ralph (1996).

2. INTRODUCTION

The objectives of the bird monitoring and banding program at VIU are:

1. to obtain data on neotropical migrant and resident landbird species, in a scientifically rigorous manner, in order to contribute to regional and continent-wide efforts to monitor changes in population levels of these species;
2. to provide practical educational and training opportunities for VIU students, including in regular courses, directed studies and research project opportunities; and,
3. to conduct public demonstrations where people of all ages can learn about bird identification, ecology, evolution and conservation.

These goals are achieved by conducting bird banding operations. During each bird banding session, wild birds are captured using mist nets, extracted, identified to species, banded and measured, and released unharmed. All operations are conducted under permit and according to procedures prescribed by the Canadian Bird Banding Office of the Canadian Wildlife Service.

3. BANDING ETHICS

Bird banding is used around the world as a major research tool. When used properly and skillfully, it is both safe and effective. The safety of banding depends on the use of proper techniques and equipment and on the expertise, alertness and thoughtfulness of the bander. The handling of birds is a privilege, not an inherent right. The bander’s essential responsibility is to the bird. In no situation should data or personal pleasure be placed ahead of the health and welfare of the birds. Every bander must strive to minimize stress placed upon birds and be prepared to accept advice or innovation that
may help to achieve this goal. Banders must ensure that their work is beyond reproach and assist fellow banders in maintaining the same high standards.

All banding at VIU follows the Bander’s Code of Ethics (see Appendix I), which applies to every aspect of banding. Bird handling, extraction from mist nets and banding are extremely delicate processes that require lengthy training by experienced personnel. Therefore, anyone wanting to get hands-on experience will be required to follow the training procedures as described in the TRAINING section.

All banding activities at VIU must be conducted according to the requirements set out by the Canadian Council on Animal Care and as approved by the VIU Animal Care Committee. Banders should not consider that some injury or mortality is inevitable or acceptable in banding. Every injury or mortality must result in a reassessment of the banding operation, with appropriate action then applied to minimize the chance of repetition. Birds that are obviously stressed from cold or handling should be released immediately, even if unbanded, as extended periods of stress can lead to death. Likewise, nets should be shut if large volumes of birds are being captured that threaten the ability to extract and process birds in a safe and timely manner. Birds should not be held for more than one hour from time of extraction; those that have been waiting for processing longer than this should be released unbanded. It is essential that any casualties and/or injuries encountered be recorded. Please refer to the BIRD WELFARE section for further details.
4.3. Visitors

Banding operations are run with an open-door policy but, whenever possible, visitors should provide advanced notice to the BIC before they show up. Visitors are welcome and encouraged to view banding operations. All visitors must be instructed not to touch any equipment or any birds, without consent from the BIC. No dogs or pets are allowed during any banding operations. Group visitation is discussed in the PUBLIC EDUCATION section.

5. MIST NETTING

5.1. Net Specifications and Deployment

The mist nets used for bird capture are 12 m long by 2.6 m high panels, made of 75 denier / 2 ply black polyester yarn, with 30 mm mesh size (Figure 1). Horizontal shelf strings (trammels) of thicker, stronger thread are woven through the mesh at the top and bottom of the net and at equal distances in between to form four shelves. Each shelf string ends in a loop designed to fit over a net pole. These nets are effective in capturing most passerines (e.g., flycatchers, thrushes, warblers, sparrows, etc.), and near passerines (e.g., woodpeckers).

Each net is strung between two poles anchored by guy-ropes, which hold it upright and taut. The shelf strings form pockets of netting. Birds fly into the net and usually drop into the pockets and become entangled. Nets are set so that the lowest shelf string is at knee height. Some adjustment may be required depending on landscape topography or to prevent birds captured in the lowest shelf from resting on the ground or in wet grass.

Figure 1. A mist net ready for operation (from NABC, 2001a).
The selection of suitable sites for mist nets must generally consider factors such as the likely movements of birds, vegetation structure and height, accessibility, proximity to a bird processing site, slope, type of ground surface, possible depth and type of water, wind exposure, and public access. If the site is in vegetation, a cleared space of 1 m must be created on each side and at each end of a net to allow proper access. Additional details on net deployment are available in the *North American Banders Study Guide* (NABC, 2001a).

### 5.2. Netting Operations

The use of mist nets requires certain favourable weather conditions. In general, nets are not operated under the following conditions:

- temperatures in direct sun above 25°C, as birds may become overheated or hyperthermic;
- temperatures below 0°C;
- snow or steady rain heavier than a light mist or drizzle; or,
- sustained strong winds or intermittent gusty winds that can potentially blow the nets into nearby vegetation.

On a typical banding day, 10-15 mist nets are operated from 30 minutes before sunrise and for a 6-hour period (i.e., until 5.5 hours after sunrise). Nets are checked at least every 30 minutes. Situations in which birds may be at greater risk of injury, such as with potential presence of predators or threat of rain, require that nets be checked more frequently, if not closed altogether. If bird capture volume is too high, or personnel availability too low, to maintain a minimum 30-minute net check schedule, some nets should be closed until capture volume decreases or more personnel are available.

Ideally, two or more experienced people check nets during each round, starting at opposite ends of the net circuit and always meeting somewhere along the way. This ensures that if one person encounters a lot of birds or a difficult extraction, help from another extractor is always on the way. Two-way radios should be used for effective communication between members of the banding team.

When checking nets, it is important to walk the full extent of every net and check each net carefully, paying special attention to the bottom shelf. Even with nets set high off the ground, it is possible to pass by a bird lying still and hidden in grass. To avoid this, it is recommended to lift the bottom shelf of every net checked.

If nets will remain set up at the end of a banding session until the next banding day, then each net must be closed, furled tightly and secured so that no bird is captured outside of banding operations.

### 5.3. Bird Extraction

Most birds that fly into a mist net do not struggle immediately. The bird will eventually begin to grasp with its feet and flutter its wings. In general, the longer a bird is left in a net, the harder it may be
to get out. This is particularly true of a bird that can fit part of its body or the bend of the wing through the mesh.

When approaching a net to extract birds, it is important to always look down the length of the net to see if one bird appears to require more immediate attention (e.g., recently fledged birds, a bird caught by one leg or one wing, smaller birds). These birds should always be extracted first, even if it means passing up “good” or easier birds.

Removing a bird is normally a one-person operation; two people handling one bird rarely enhances the operation (except for raptors). Extraction generally consists in reversing the process of entry. Therefore, the first step in any extraction consists in figuring out from which side the bird entered the net. Because the tail is the last to enter, its position provides a clue about how the bird entered the net, and it is virtually always hanging in a pocket on the side opposite from where it entered.

Various methods are used to remove birds from mist nets, although all extractors will be trained in and are encouraged to use the “body-grasp” method of extraction (Ralph, 2005). This method surpasses other methods in ease of learning, speed of extraction and reduced injury rate. The body-grasp method involves slipping the fingers around the body of the bird, underneath the encumbering net, and then lifting the bird out of the enfolding layers of netting, focusing on the bird’s body, not on the tangle of netting that its feet may have made. When the net is freed from around their wings and head, most birds actually “let go” of netting that may, at first glance, appear to be badly tangled around their feet and toes.

A trained extractor should extract most birds in under 1 minute (often 15-30 seconds each). Occasional birds will be much more entangled in the nets, requiring more than the minimum amount of time to extract. Therefore, any extractor having difficulty extracting a bird should always ask for assistance from a more experienced extractor to avoid extending handling stress for that bird. As a last resort, it is acceptable to carefully cut one or a few strands of a net in order to free a bird that appears to be stressing rapidly. Any bird judged to have been through a stressful extraction and displaying signs of stress should be released immediately unbanded or taken to the BIC for further evaluation based on severity of stress. Please refer to VIU Standard Operating Procedure No. ACC-010, which describes common signs of stress and the actions to be taken based on the severity of stress.

Banded birds that are recaptured within the same day are released at the net to avoid repeated processing. This is especially true for recently fledged birds (i.e., birds in full juvenal plumage and/or in active heavy moult) and nesting females. Band numbers can be written down or remembered. Band numbers can be written down or remembered for data records. Also, hummingbirds and any bird not covered by the banding permit must be released unbanded.

Once extracted, each bird is placed in a “bird bag” (23 cm x 30 cm lightweight cotton) closed with draw strings that are looped around the neck of the bag, while being transported back to the banding table or while waiting for processing (see next section). Only clean bird bags should be used. Extractors should carry enough clean bags with them to accommodate the birds on each net check round. Each
net is numbered and correspondingly numbered cloth pegs are attached to the guy-ropes. A numbered peg is attached to each bird bag to keep track of the capture net on data sheets.

6. BANDING PROCESS

BANDING typically takes place at a banding table equipped with all the necessary banding tools, data sheets and reference guides. Ideally, there are two people involved in the banding process: a bander and a scribe. Although the bander handles the birds, the scribe has a very important job. Scribing data without error for dozens of birds in a day, often in the face of distractions of many kinds (e.g., visitors), can be a real challenge. The scribe must ensure data are recorded accurately, otherwise their scientific value is compromised. Additional personnel may assist in banding or bird processing as directed by the BIC.

The banding process for most birds typically involves the following steps which are detailed further in the sections below:

- species identification;
- band application;
- age and sex determination;
- fat score;
- biometrics; and,
- photography (if applicable).

Birds that are already banded from a previous capture day (recaptures) are processed just like newly captured birds, except that no band is applied. Priority is given to small birds (because of their higher per gram metabolic demand compared to larger species), recaptures, and recently fledged young and nesting females. Recently fledged young and nesting females are always returned as soon as possible to the vicinity of the nets where they were extracted.

A skilled bander should be able to process a bird completely in about 1 minute. In cases where more data must be collected, for photography or for training purposes, a bird can be handled for up to 5 minutes. However, the bander must continually monitor the condition of the bird by looking for signs of stress such as closed eyes or open gape, and immediately release any bird showing signs of stress. Please refer to VIU Standard Operating Procedure No. ACC-010, which describes common signs of stress and the actions to be taken based on the severity of stress.

6.1. Holding Birds

The proper way to handle a bird is the safest way. To ensure the bird’s safety during handling, it is crucial to use appropriate grips, as described below. Some birds will defecate, scratch, bite, and some are capable of inflicting a little pain or discomfort on the bander. In any case, frustrations should never be taken out on the bird. If a bird struggles free, it is crucial to resist the urge to reach for it; otherwise there is a risk of pulling all of the tail feathers and injuring the bird. Birds are usually held in the non-
dominant hand (e.g., right-handed banders hold birds in their left hand), leaving the dominant hand free to manipulate the banding equipment.

6.1.1. Bander’s Grip

The “bander’s grip” (Figure 2a) is the best and safest way to hold a small or medium-sized bird during the entire banding process. The bird is held with its neck near the base of the gap between the forefinger and middle finger, and the wings are contained against the palm of the hand. The remaining fingers and thumb are closed loosely around the bird’s body, forming a “cage.” This hold leaves the bird’s legs free for banding. Gently pinching the tarsus at the metatarsal joint (heel) between thumb and forefinger of the hand holding the bird helps prevent the bird from struggling with its feet. With this method, most measurements can be made simply by lifting the thumb away from the bird’s body.

6.1.2. Photographer’s Grip

The “photographer's grip” (Figure 2b) is used primarily to hold birds while photographing them because it maximizes the amount of plumage in view, briefly to transfer them from one bander to another, or to examine certain features. For this hold, the bird’s legs are held in a “scissor” grip, as near to the body as possible, between the forefinger and middle finger, and the bird’s tarsi are held between the thumb and forefinger. The bird will be able to flap its wings, but it should not be able to rock back and forth or from side to side. The free hand can be placed over the bird’s back to keep its wings from flapping until ready for photography or to transfer to another bander. Never hold a bird only by the lower part of its legs. Birds should not be held in this grip for longer than necessary because they will be using additional energy trying to escape.

![Figure 2. (a) Bander’s grip; (b) photographer’s grip (from NABC, 2001a).](image-url)
6.2. Bird Identification

Proper identification of any bird to be banded is essential. Only individuals of known species can be banded; unidentified species must be released unbanded. Identification should always be confirmed with the BIC. Birds in the hand can be surprisingly challenging to identify without the benefit of habitat, behaviour and vocalization. Banders must be familiar with the Identification Guide to North American Birds, Part I by (Pyle, 1997). Field guides by Sibley (2000) and the National Geographic Society (2011) are also very useful references.

6.3. Band Selection and Application

During banding, uniquely numbered (typically 9 digits) lightweight aluminum bands are placed on the leg of the bird, which allow tracking of individual birds throughout their lifetime. In North America, all bands are obtained from the US Fish and Wildlife Bird Banding Laboratory, and they can only be ordered by a licensed bander.

Bands come in various sizes designated by a number or a number-letter combination, ranging from 0A to 9C. Like shoe size, this number is for identification only; the actual size of the band is measured by its inside diameter. Selection of band size is determined by the size of the bird’s leg (the tarsus for most birds). Generally, a band is said to be a good fit if, when closed properly, it can rotate and slide freely up and down the tarsus without slipping over the ankle joint or down over the bird’s toes. Recommended band sizes are provided in Pyle (1997). If in doubt, a leg gauge can be used to determine the proper band size for a given individual.

While holding a bird in the bander’s grip, the bander can use his/her dominant hand to handle the banding pliers. All bands are supplied closed and must first be opened. Banding pliers usually have a split pin, which is used for opening the band (Figure 3a). The band is placed over the pin, with the seam of the band oriented exactly toward the tip of the pliers so that, when the pliers are opened, the band opens evenly. This evenness is important to assure that the band also can be closed evenly. The band should be opened just enough to fit over the bird’s leg.

Figure 3. (a) Banding pliers, showing holes in the jaw and the split pin opening a band; (b) applying and closing a band, including the 90° band rotation (from NABC, 2001a).
A pair of banding pliers has holes in its jaws that fit one or more standard band sizes. When the pliers are used to close a band placed in the right-sized hole, the band will close properly without overlapping or leaving a gap between the ends of the band (Figure 3b). Use of the proper pliers’ hole is important to avoid overlapping the band and crushing the bird’s leg. The bird’s toes can be held with thumb and forefinger to immobilize the leg and expose the tarsus. Once closed, the band is rotated 90° and pinched again in the appropriate hole of the pliers to provide complete and tight closure (Figure 3b). Once installed, the band number must be read to the scribe to ensure that it is recorded properly, it is legible and that the bird is not inadvertently released unbanded.

Bands that are too loose, too tight or worn down need to be removed. Removing a band can be difficult, especially if it is tight against the tarsus. Band removal should always be performed by the BIC with assistance of another volunteer. Refer to Appendix II for details on band removal methods.

6.4. Age and Sex Determination

Age and sex determination is the most technically challenging part of the banding process, which requires expertise and skill usually gained over many years of study and field experience. The procedures used are outlined in *The North American Banders Study Guide* (NABC, 2001a) and *The North American Banders’ Manual for Banding Passerines and Near Passerines* (NABC, 2001b). In addition, the technical information for individual species are provided in Pyle (1997). All banders must become familiar with these important references.

Many criteria can be used to determine the age of birds. In general, feather shape, colour and condition are used to determine a bird’s age with a basic understanding of the bird’s moult strategy (Figure 4). In contrast to old feathers, new feathers appear smoother, with more colour and sheen. Abrasion wears away the outer edges of older feathers, which is most noticeable on the tips of flight feathers and tail feathers. Other criteria used in age determination include eye colour, pattern of skull ossification and the presence of breeding characteristics (see below).

![Figure 4](image-url)  
**Figure 4.** The wear and shape of the tail feathers by age. (a) Juvenile feathers typically become more abraded than adult feathers; (b) the “corner” effect on adult feathers is absent or reduced in juvenile feathers (from NABC, 2001b).
A bird is aged according to the number of calendar years it has survived. Birds in their first calendar year are designated hatching year (HY) birds until 31 December of that year. On 1 January of the next calendar year, the bird is considered to be in its second calendar year (SY) even though it may be only 6 to 7 months old. Birds of most species can only be aged precisely during their first and second calendar year. In this case, a bird may be aged after hatch year (AHY) in its second or more calendar year, after second year (ASY) in its third or more calendar year, etc. Therefore, an ASY bird may be any age greater than calendar age 2.

Sex determination can be simplified in species that take on different plumages for each sex (sexually dimorphic). However, some species do not display any sex difference in plumage (sexually monomorphic), or the differences are not apparent during their early age or at all times of the year. Therefore, other characteristics must also be used to determine sex.

The best method for determining the sex of sexually monomorphic birds during the breeding season is by the presence of the cloacal protuberance in males or the brood patch in females (Figure 5). All species develop at least one of these characteristics, at least partially, and most are reliably sexed by them during the late spring and summer months. External cloacal protuberances are developed by males to store sperm and to assist with copulation. Brood patches are developed by females in order to transfer body heat to eggs or young. The bander blows the feathers apart in the vent or belly region to view the cloacal protuberance or brood patch, respectively. Other criteria used in sex determination include eye colour and wing length.

![Figure 5](a) A cloacal protuberance in a male; (b) brood patch in a female (from NABC, 2001b).

6.5. Fat Score

Birds store fat as a readily accessible source of energy, especially during migration. Birds that have little or no fat during migration probably have just arrived and will need to spend a few days
replenishing their stores. Birds with large amounts of fat are probably ready to depart on the next phase of their journey. Fat content is a good general indicator of the condition of the bird.

Birds store fat in the furcular hollow (or “furculum” where the throat joins the body), lower abdomen, and sides of the body beneath the ribs and underneath the wings (Figure 6a). Fat deposits can be examined by blowing apart the body feathers. When present, fat deposits are visible through the skin, which appear as yellowish or orangish masses contrasting with the burgundy-coloured muscular areas. The relative amount of fat in the furcular hollow and on the bird’s body is recorded on a scale from 0 (no fat) to 5 (heavy) (Figure 6b).

Figure 6. (a) Location of visible fat deposits on birds; (b) representation of increasing fat in the furculum (neck hollow) (from NABC, 2001a).

6.6. Biometrics

Many measurements are taken which are used in identification, age/sex determination and to assess the bird condition, including wing length, tail length and weight. Wing length is measured (to the nearest 1 mm) as the wing chord or unflattened wing length (Figure 7a) using a ruler with a perpendicular metal stop fixed at one end. The wing should be as close to a natural resting position as possible, ensuring that all flight feathers lie in their natural alignment. Tail length is measured (to the nearest 1 mm) as the distance between the tip of the longest tail feather and the point at which they protrude from the skin (Figure 7b). A ruler is inserted between the two central tail feathers and the end is pushed firmly against the feather roots (i.e., the point of insertion of the feathers). Birds are normally weighed as the last step of the banding procedure. Body weight (to the nearest 0.1 g) can be quickly and accurately measured with an electronic scale and the bird confined in a weighing cup. Other measurements that may be taken for some birds include length of specific flight feathers, bill depth, width or length, or tarsus length.
6.7. Releasing Birds

Birds should never be thrown into the air or released high above the ground, as they may be unable to fly properly as a result of disorientation or wing strain. It is best to hold the bird in the bander’s grip, crouch down low so they will not fall, and simply open the palm downwards onto your other hand. A gentle nudge may aid departure.

6.8. Record Keeping

The primary reason for banding birds is to collect useful, reliable data, and to store these data in a manner that makes them readily accessible for analysis. Success of the banding and recovery reporting system depends on international cooperation among the Banding Offices, all banders, researchers and the public. Therefore, the banding operation must keep careful track of all birds banded and recaptured.

At the time of banding, each bird’s band number, species, age, sex, fat score, wing and tail length, weight, date and time captured, number of the capture net, and any relevant comments must be recorded. The following information must also be recorded for the day’s operation:

- location of banding operation;
- number of nets used;
- hours of operation;
- weather conditions (temperature at net opening and closing, cloud cover, precipitation, wind direction and speed);
- names of personnel and visitors; and,
- a summary of the day’s activities, including a tally, and details of any unusual events, injury or casualties.

Figure 7. (a) Measuring wing length; (b) measuring tail length (from NABC, 2001a).
7. BIRD WELFARE

A “casualty” is defined here as any debilitating injury or death. Such casualties are rare in any good banding operation, but birds can be injured or die in even the most careful banding operation. While the goal is zero casualties, the risk can never be completely eliminated, if only because predation is always a risk. Although they are rare, every casualty must be judged not only as an unfortunate and deeply regrettable accident, but also as an important learning experience. Banding casualties are usually caused by predators, bander inexperience, bad practice or faulty equipment. A combination of common sense, forethought and awareness minimizes the risk of casualties. The North American Banders Study Guide (NABC, 2001a) provides a detailed review of the causes of injury and death.

A recent review of mist netting by 22 banding organizations in the United States and Canada reported average rates of injury and mortality of 0.59% (1 in 169) and 0.23% (1 in 435), respectively (Spotswood et al., 2011). Therefore, casualty rates must be monitored and should ideally be maintained well below these values.

All personnel involved in banding operations are required to become familiar with and abide by the following VIU Standard Operating Procedures (SOP) (copies are included at the end of this document):

- VIU SOP No. ACC-010 – Monitoring Stress and Injury in Birds during Bird Banding.
- VIU SOP No. ACC-011 – Euthanasia of Birds during Bird Banding.

All stressed birds and casualties (injury or death) must be reported to the BIC immediately. The BIC is responsible for making all decisions in the case of injury or fatalities. If an incident occurs, immediate action must be taken to prevent further casualties and an examination of the banding operation is required in order to reduce the chances of such events reoccurring. All casualties must also be recorded, including the date, species, net or location found, and any other pertinent information such as the circumstances surrounding the incident and what course of action was taken.

“Orphaned” birds should be left alone, unless they are faced with imminent threat. Parents will care for many birds on the ground, so unless it is clear that a young bird is abandoned, its chances are better if left alone. Fledglings may be carefully placed in a tree to get them beyond the reach of predators. Contrary to popular lore, the parents can’t “smell” human scent and will not desert a bird that has been handled by humans.

8. PERSONNEL INJURIES AND DISEASES

8.1. Physical Risks

Banders should always strive to minimize physical hazards around the project area. At all times, steps should be taken to minimize tripping hazards. Logs and branches should be cleared off paths around the netting area, stumps cut down to ground level, and any guy-rope should be clearly marked with flagging tape.
Most songbirds are quite harmless, with the exception of shrikes and raptors, which can draw blood with their sharp talons and hooked bill. Large-billed seedeaters (e.g., grosbeaks) can inflict painful bites, although they rarely draw blood. One way to reduce their mobility is to use the “straitjacket” grip. This is a variation on the standard bander’s grip in which the head is held nearer the tips of the first and second fingers, which are then straightened somewhat.

Several species, such as jays, starlings, most blackbirds and woodpeckers, have strong toes and sharp claws. Banding many of these can take its toll on banders’ hands. Scratches can be lessened by using another variation on the bander’s grip in which legs are immobilized between the third and fourth fingers for most of the banding operation.

Raptors will sometimes be caught in mist nets designed to catch passerines, although most large raptors will typically “bounce” out of the net and fly away. Most hawks and owls can inflict varying amounts of damage with their bill or talons. Raptors and shrikes may only be extracted and banded by experienced extractors/banders or the BIC. Except for small-bodies species, raptors should be extracted and banded by a two-person team.

It is impractical (and often ineffective) to use leather gloves to handle raptors. When extracting a raptor from a mist net, the bird’s attention should be diverted while the legs are grabbed by waving a hand so the bird looks away from the hand that is to grab the legs. From this point on, the person holding the bird must concentrate on not releasing, or even easing, the grip on the legs while the bird is freed from the net. Once out of the net, rather than putting the bird in a bag and having to grab the legs a second time, it is better to keep holding the bird, effectively immobilizing it so it cannot strike with its talons, flap its wings or bend down to bite. Placing a bird bag or cloth over the bird’s head can help reduce the bird’s movements. The person not holding the bird can carefully proceed with banding the bird, always being mindful of the position of the talons.

8.2. Diseases and Disorders

Birds may suffer from a number of infections. Most of these, fortunately, are peculiar to birds, but some may be shared with other animals, including humans. Banders contracting curious symptoms are strongly advised to seek medical attention and to inform their doctor of their contact with wild birds. As a general precaution, regular washing of the hands with hand sanitizer or soap is recommended, especially before drinking or eating. Never place bird bags in the mouth and avoid inhaling dust from bird bags, which should be washed or cleaned out regularly.

Salmonellosis is a bacterial infection, common in mammals and birds. In humans, it is most likely to be contracted from the feces of birds that frequent garbage dumps, feed lots and bird feeders. Because it is commonly found in dead birds that are simply “found dead,” personal hygiene is especially important after handling dead birds. Symptoms are acute enteritis and diarrhea.

The risk to humans associated with infectious viral diseases such as avian pox, avian flu and West Nile Virus While are low, but again personal hygiene and frequent hand washing is warranted. It is important to avoid ingesting, inhaling or getting excrements, bird blood or other body fluids in contact
with open cuts and scratches. Along with these precautions, it is important to reduce transmission of infectious diseases from one bird to another by not bringing captured birds into contact with other birds’ excretions. Therefore, frequent hand washing of hands, equipment and bird bags is recommended.

Rabies is potentially communicable, not via birds, but from bats. Although bats are not typically caught in mist nets used during the day, any bat captured in a mist net must be extracted carefully while wearing gloves. Any bander suffering a bite from a bat is advised to seek medical treatment.

Banders should be aware of toxic plants occurring in their banding area (e.g., giant hogweed, stinging nettle, poison ivy, etc.). Strong-footed species such as blackbirds and jays that have been foraging in patches of these plants can cause irritation if the skin is punctured by their claws, allowing the toxin to penetrate under the skin. Prevention is effected by care during handling and by frequent hand washing using soap. Additional information about toxic plants can be obtained from E-Flora BC (http://www.geog.ubc.ca/biodiversity/eflora) and published plant guides. The BIC will notify personnel about toxic and other hazardous plants in the project area.

9. TRAINING

Bird banding is both a delicate art and a precise science. It should come as no surprise that it requires not only sensitivity and knowledge, but also extensive training. This is in the interest of the birds’ safety and in the interest of gathering accurate and useful information. Removing birds from a mist net is mostly a matter of common sense and logic, but it only comes with much experience. Net extraction must be learned under the supervision of an experienced person. Applying a band on a bird can be learned fairly quickly, but obtaining meaningful and accurate age and sex data from all banded birds requires extensive knowledge acquired by handling thousands of birds at all times of the year. Therefore, no one should expect to become an expert bird bander after just a few banding days.

Individuals who are new to bird bandings (students or other volunteers), with little or no training elsewhere, must be approved for training by the BIC. Trainees will be required to read this manual and the North American Banding Council study guides (NABC, 2001a, b), the Introduction pages of Pyle (1997), and any other assigned readings. In addition, trainees will be required to receive any training as approved and recommended by the VIU Animal Care Committee.

Trainees should be aware that training may be discontinued for persons who demonstrate poor dexterity, eyesight or aptitude for extraction or banding, poor judgement or any reason at the discretion of the BIC.

A structured, graduated training program is followed for volunteers who want to assist in banding operations. Details are provided in Appendices III and IV.
10. PUBLIC EDUCATION

Formal banding demonstrations are typically scheduled well in advance. Only well-trained, experienced banders should give the demonstrations; trainees can scribe and generally help out until they are sufficiently adept at the entire process. Visitors are not permitted to handle the birds and should be discouraged from touching them. Occasionally and with approval from the BIC, visitors may release birds that have been placed on their open hand. Photography of birds in the hand is acceptable, but it should be kept as brief as possible and avoid the use of flash photography.

11. REFERENCES


APPENDIX I. The Bander’s Code of Ethics (from NABC, 2001a)

1. Banders are primarily responsible for the safety and welfare of the birds they study so that stress and risks of injury or death are minimized. Some basic rules:
   - handle each bird carefully, gently, quietly, with respect, and in minimum time
   - capture and process only as many birds as you can safely handle
   - close traps or nets when predators are in the area
   - do not band in inclement weather
   - frequently assess the condition of traps and nets and repair them quickly
   - properly train and supervise students
   - check nets as frequently as conditions dictate
   - check traps as often as recommended for each trap type
   - properly close all traps and nets at the end of banding
   - do not leave traps or nets set and untended
   - use the correct band size and banding pliers for each bird
   - treat any bird injuries humanely

2. Continually assess your own work to ensure that it is beyond reproach.
   - reassess methods if an injury or mortality occurs
   - ask for and accept constructive criticism from other banders

3. Offer honest and constructive assessment of the work of others to help maintain the highest standards possible.
   - publish innovations in banding, capture and handling techniques
   - educate prospective banders and trainers
   - report any mishandling of birds to the bander
   - if no improvement occurs, file a report with the Banding Office

4. Ensure that your data are accurate and complete.

5. Obtain prior permission to band on private property and on public lands where authorization is required.
APPENDIX II. When and How to Remove a Band (from NABC, 2001a)

Please refer to The North American Banders Study Guide (NABC, 2001a) for a more thorough treatment of this topic.

When to Remove a Band

Bands that are too loose, too tight or worn down (sharpedged or hard to read) need to be removed. Getting a band safely onto a bird’s leg is simple. Getting one off, however, can be difficult, especially if it is tight against the tarsus. Band removal should always be performed by the BIC with assistance of another volunteer. Any removed illegible band must be returned to the Bird Banding Office (along with information about the bird and any replacement band) to be etched and read.

If a band rotates freely and slides up and down without pinching the tarsus or causing foreseeable injury, it should be left on, even if it is the “wrong” size. On occasion, it may be better to slightly “oval” a band that is marginally too small rather than risk band removal.

How to Remove a Band

Circlip pliers are frequently used for band removal because they have fine, angled tips, enabling their insertion between a band and a bird’s tarsus. When the handles of these pliers are closed, the tips open, thus opening the band. When removing a band with circlip pliers, all leverage must be applied to the band and none to the leg. As during banding, the tarsal joint must be supported throughout the whole process. The band and tarsal joint can be held by the thumb and forefinger, ensuring that the band cannot move during opening. Insert the tips of the pliers so that they are on either side of the seam of the band. Gradually apply pressure to the circlip pliers, opening the band a little at a time and readjusting the plier tip in the opening band until it is open far enough to be taken off the leg.

If the band is too tight against the leg to use circlip pliers, it can be removed by applying blunt-end pliers to either sides of the band to pry open the band (required two blunt-end pliers). This method works best if one person holds the bird in the bander’s grip and the person removing the band holds a pair of pliers in each hand. The pliers are pressed firmly on the band on either side of the seam of the band, and the band is slowly pried open without applying pressure on the tarsus until it is open far enough to be taken off the leg.

After the band is removed, the BIC will determine whether another band will be applied, and whether to destroy or reuse the band, depending on its condition.
APPENDIX III. Bander Training Levels (from Vancouver Avian Research Centre)

A structured, graduated training program will be followed for anyone who wants to assist in banding operations. The purpose of the training program is to ensure that banders are fully trained and evaluated before handling birds and that the welfare of the birds is always the top priority. The criteria listed in Appendix IV are used to evaluate the progress of trainees.

Individuals involved in banding operations are encouraged to maintain a personal log to document their experience. At a minimum, this should consist of the total number of birds extracted, the total number of birds banded, and the identity and number of each species banded. This information is often requested to volunteer at other banding stations and is required to apply for a banding permit.

General - Level 1

Level 1A – Visitor

Any guest with no or unknown banding / bird handling ability. Not able to participate in activities, except holding birds for release.

Level 1B – Return Visitor

Guest who may have visited on multiple occasions (e.g., spouses, friends of regular volunteers, etc.), but has not received any formal training. No extraction or banding allowed. May hold birds, but only with direct supervision. May be introduced to scribing and other non-handling related activities.

Extraction - Level 2

Level 2A – Training Extractor

Individual involved in an extraction training program. No extraction without direct one-on-one supervision from the BIC.

Level 2B – Beginning Extractor

Individual who has completed an extraction training program. May perform net extraction of birds that are not badly tangled, but must still be supervised by a Level 2D extractor.

Level 2C – Intermediate Extractor

Able to extract most species of birds unsupervised, but willing and understands the need to call for help when needed.
Level 2D – Advanced Extractor

Able to extract all birds, unsupervised. Can supervise other Level 2B and 2C extractors.

Banding - Level 3

Level 3A – Training Bander

Individual involved in a banding training program. No banding without direct one-on-one supervision from the BIC. Must have received theoretical training or attended a course or workshop.

Level 3B – Beginning Bander

Individual who has completed a banding training program. May band birds supervised by a Level 3D bander.

Level 3C – Intermediate Bander

Individual who has banded a significant number of birds (hundreds) of multiple species. Can age and sex birds reliably and has shown due care in bird handling and processing. Can accurately identify the majority of local species. Can band with minimal supervision, but not independently. ID / band / ageing / sexing must be confirmed with Level 3D bander before bird is released. Can hold birds in multiple grips.

Level 3D – Advanced Bander

Individual who has continued to work on her/his skills and has banded a large number of birds (thousands) of most of the species that can be encountered. Must have banded in all four seasons of the year and show complete familiarity with banding terminology and protocols. Able to identify all local species of birds and show an ability to use resources to identify possible rarities. Accurate with bird processing and with aging and sexing techniques. Able to use all handling grips quickly and safely. Able to band and release birds unsupervised. Able to record accurate data and know the measurement ranges of common species.

Bander-in-Charge - Dr. Eric Demers

Bander licensed by the Bird Banding Office of the Canadian Wildlife Service who oversees the entire operation and has decision-making authority. Level 2D extractor and Level 3D bander who has worked at various banding stations during multiple seasons. Can use sound judgment and reasoning to make tough decisions independently. Responsible for animal care requirements and adherence to applicable protocols and standard operating procedures. Responsible for the data integrity and reporting requirements. Provides theoretical / classroom, extraction and banding training. Addresses media requests or guests, and ensures that banding activities are beyond reproach.
APPENDIX IV. **Bander's Report Card** (from North American Banding Council)

**Background Material**
- Understand how banding fits into scientific studies

**Erecting, Opening, and Closing Nets**
- Choose an appropriate netting site and appropriate net
- Correctly set up nets unaided
- Properly furl and unfurl nets
- Take in and store nets and associated equipment properly

**Operation and Extraction**
- Judge how many nets to use safely and check them frequently and carefully
- Demonstrate an astute, accommodating approach to extraction
- Extract a variety of species quickly and safely
- Deal proficiently with tricky situations
- Recognize and repair nets that are in poor condition

**Identification and Handling**
- Recognize all target species, and release a bird unbanded if identification cannot be made with virtual certainty
- Appreciate the importance of minimizing handling time while not compromising safety
- Use the bander’s grip on a variety of species
- Use the photographer’s grip safely
- Transfer a bird from hand to hand safely
- Handle a variety of “awkward” species
- Release a variety of species correctly

**Banding**
- Select correct band size
- Read band numbers correctly
- Apply a band correctly
- Recognize when and how to correct an improperly applied band
- Know when and how to remove a band safely
- Place birds in bags, and carry and hang them correctly
- Recommend when bags need cleaning

**Biometrics**
- Use and accurately read measuring devices (rulers, balances, calipers)
- Correctly and accurately measure various anatomical features
- Accurately score fat deposits

**Ageing and Sexing**
- Correctly use guides for ageing and sexing
- Accurately use skull ossification
- Correctly use other characteristics for age determination
- Correctly use colour, size, brood patch, and cloacal protuberance for sex determination

**Field Data Collection and Data Management**
- Record data clearly, legibly, and accurately on field sheets
- Able to recognize and take description of or photograph rarities or unusual birds
- Maintain complete and accurate daily logs
- Proof and correct banding sheets

**Ethics and Injuries**
- Know and practice the Bander’s Code of Ethics
- Show familiarity with all aspects of animal care and welfare requirements
- Show excellent awareness of injury prevention
- Demonstrate ability to treat minor injuries
- Recognize and demonstrate the need for euthanasia
- Assess whether a specimen is worth preserving
- Record details of all injuries and casualties

**Health and Safety of Banders**
- Demonstrate a responsible attitude towards potential injuries from birds
- Demonstrate a responsible attitude towards physical hazards in the banding area

**Public Relations**
- Communicate effectively with the public about banding
- Communicate effectively using banding data