



Georgia Basin Ecological Assessment  
and Restoration Society

# Purple Martin Colony Monitoring Manual

Georgia Basin Ecological Assessment and Restoration Society (GBEARS)



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## 1. INTRODUCTION

Purple Martin (*Progne subis*) are familiar and common breeding birds in Canada and the United States. These colonial nesting neotropical migrants are the largest of the swallow family (Hirundinidae) that occur in North America. Their summer nesting ground range extends primarily from central North America to the east coast, with Canadian populations hugging the USA border, and there fewer smaller populations breeding in the west.

The Western Purple Martin (*P. subis arboricola*) are a genetically distinct subpopulation of *P. subis* and is the only subspecies occupying breeding grounds west of the Rocky Mountains in British Columbia. Their breeding range is limited to southwestern British Columbia and extends south into the USA west of the Rocky Mountains to southern California, and possibly to northern Mexico (Cousens and Lee, 2012). In British Columbia, nesting sites are restricted to marine piling sites at the edge of coastal lowlands surrounding the Georgia Strait and Gulf Islands. Historically, these birds would nest in natural cavities in riparian areas, fire-killed stands, and Garry Oak parklands.

With human development and introduction of invasive species such as the European Starling and House Sparrow, the supply of natural cavities has become increasingly rare. The reduction in natural nesting cavities led to the decline in Western Purple Martins to about five known breeding pairs in the mid-1980s. Thanks to the effort of volunteer naturalists who set up a nest box recovery program, Western Purple Martins now nest almost exclusively on pilings along marine coastline in nest boxes of varying colony sizes. In 2018, the British Columbia population of Western Purple Martins was approximately 1200 known breeding pairs (B.C. Conservation Data Centre, 2019). The increased population is good, but with no natural nesting cavities, the population can only be sustained if volunteers continue to maintain and supplement the artificial housings (Cousens and Lee, 2012).

The Western Purple Martin contains a unique pool of genetic diversity, and until 2006, was listed as Threatened (Red-List) in British Columbia, whereinafter the species was downlisted to Vulnerable and later Special Concern designation (Blue-List).

The objectives of this project are to:

1. Provide a long-term records of breeding performance of Western Purple Martins in the Georgia Basin; and,
2. Maintain and monitor artificial nest box colonies for Western Purple Martins in British Columbia.

## 2. NEST BOX LOCATIONS

Since 2002, the Georgia Basin Ecological Assessment and Restoration Society (GBEARS) in Nanaimo, BC, has coordinated the BC Purple Martin Stewardship and Recovery Program. Since then, the GBEARS has continued the nest box monitoring program that began in 1986. There are currently about 70 marine nest box sites (of which only 50 are active) and another 20 freshwater nest box sites, together making up approximately 1,500 nest boxes. These boxes are distributed around the Strait of Georgia and extent up to the Lower Fraser River valley as far as Cheam Lake. The colonies are separated into six regions: North Vancouver Island (Campbell River to Deep Bay, including Quadra and Hornby Island), Central Vancouver Island (French Creek to Cowichan Bay, including Gabriola, Protection and Ruxton Islands), Gulf Island (Saltspring, Galiano, Maybe, and Pender Islands), South Vancouver Island (Goldstream, Sooke, Victoria area, Saanich Peninsula, and Sidney Island), Sunshine Coast (Powell River and Texada Island), and Lower Mainland (Vancouver east to Cheam Lake).



Figure 2. Example of nest boxes on pilings at the French Creek Marina.

### **3. FIELD OPERATIONS**

#### **3.1. General weather and timing**

Western Purple Martins begin arriving at the colonies in early April, but annual variation depends greatly on migration weather conditions (Cousens and Lee, 2012). Older adults will arrive before younger adults, and this causes asynchrony in nesting timing. Years of rain and poor spring weather conditions may result in delayed migration and breeding, which can lead to reduced breeding success.

Nest building occurs between May and June, and early arriving birds can begin laying eggs between late May to mid-June while later birds will begin laying between June and early-July. The nesting season in BC is only about 70-100 days long, and it takes  $\leq 60$  days for nesting to be initiated. After this, the nesting cycle takes  $\geq 50$  days from first egg laid to nestling fledging, so for Purple Martins in BC there is only time for one clutch in the season (Cousens and Lee, 2012).

In years of favourable weather and high food availability, this timeline may be shifted earlier, and older birds may already be incubating eggs when younger birds arrive. In years of poor weather and low food availability, this timeline may be shifted later, and early/late birds may end up synchronized. If the weather is poor for an extended period of the summer, birds may opt to not put effort into breeding that year at all (Cousens and Lee, 2012).

#### **3.2. Band reading**

Band reading is collecting “recapture” or re-sight data. It is important to look for banded adults in colonies to see who is returning, and how the birds are dispersing. Band reading is best done during nest building period, May-June, when adults are active around the colony, but are not spending all their time in their boxes on eggs.

Band reading is a straightforward activity. Using a spotting scope, you watch birds sitting around their nest boxes and look for those with bands. It is important to watch boxes until you are sure there are no banded adults that belong to those boxes because birds can be quite active and will come and go in the time you are watching. You may also notice more than one banded bird per box, and this could be a mated pair, or could also just mean that some birds are just hanging around boxes that don't belong to them. Sometimes subadult/second-year birds will check out the nest boxes of adult birds who arrived before them. It is still important to retrieve this recapture data on birds that are not necessarily associated with a nest.

When you notice a banded bird, you want to make note of four things:

- 1) The banding scheme. Which leg has the aluminium band and which leg has the coloured band (also what colour it is). The banding scheme helps narrow down when the bird was banded, and every year has a different scheme. All Western Purple Martins banded in BC have either blue or gold bands.
- 2) The digits on the coloured band. The numbers on the coloured band is the same as the last three digits on the aluminium federal band. If the aluminium band is more easily read than the colour band (depending on how the bird is perched), you may also opt to read the federal band and make note of the last three digits on the bottom row. There are 4 digits on the top row of the federal band and 5 digits on the bottom row.
- 3) The letter on the coloured band. The letter which comes after the digits on the coloured band is important in determining the year the bird was banded as every year has a different letter.
- 4) The nest box associated with the bird.

If you can get all these things, that is ideal. Sometimes it is not possible to obtain all this information, but partial recapture data is still helpful. Additionally, sometimes the letter on the coloured band may be determined based on the banding scheme if you are working with subadult birds (see 3.2.1 for ageing Purple Martins).

### **3.2.1. Ageing and sexing Purple Martins**

The age codes typically used are HY (hatch year), SY (second year), ASY (after second year), and AHY (after hatch year). Some birds may be aged as TY (third year) or ATY (after third year) but given that many birds are highly variable with intermediate plumage, it is not entirely reliable to use these codes without having the bird in the hand. Important features to look at are the undertail coverts and overall body plumage (Pyle, *et al.*, 1987, Hill, n.d.).

#### **SY♀**

- Undertail coverts: highly variable. The most definitive undertail coverts of this age/sex category are pure white, or mostly white with brown shafts.
- Body plumage: variable. The upperparts are brown with slight bluish-green tinge. The forehead and underparts are brownish, without purple feathers.
- Intermediate birds are sometimes difficult to distinguish from ASY females, and thus can only be reliably aged as AHY.

#### **ASY♀**

- Undertail coverts: highly variable. The most definitive undertail coverts of this age/sex category have brown shafts with rich brown colouring on the feather vanes themselves.

- Body plumage: variable. The upperparts are dark steely purplish, often mixed with grey. The forehead and underparts are greyish to whitish. Some older females may show a few purple feathers on the underparts and could possibly be mistaken for a SY male if the undertail coverts are not properly examined.
- Intermediate birds are sometimes difficult to distinguish from SY females, and thus can only be reliably aged as AHY.

#### SY ♂

- Undertail coverts: variable. The undertail coverts of this age/sex category are greyer (compared to the whiter undertail coverts of females) and can have between a few to several purple feathers.
- Body plumage: highly variable. Upperparts and underparts very similar to ASY F, but with more purplish feathers in the underparts. Often, the throat has many small irregular patches of purplish feathers.

#### ASY ♂

- Undertail coverts: little variation. The undertail coverts of this age/sex category are the easiest to recognize. Feathers are entirely purple, or they are mostly purple and edged with tan borders.
- Body plumage: consistent. Upperparts and underparts are uniformly and entirely dark steely purplish.

When reading bands, you want to make sure you make note of the age of the individuals you are reading. This ensures you aren't miss reading bands (say you read a bird that you thought was a SY male, but looking through the banding data later, you realise is an ASY female with more purple in the throat than expected). Additionally, since nestlings cannot be sexed, sexing these "recaptured" (or re-sighted) birds gives more information for records of these banded birds.

### **3.3. Nest box checks**

Nest box checks occur approximately every two weeks, weather and tides allowing. To check most colonies, a ladder will be required to access the nest boxes. Colonies on the water or at marinas require a high tide to access, and beach sites require a low tide to access.

Most boxes will have a loose nail keeping the door shut, so to check the contents of the nest, the nail must be removed. The door will open easily, and carefully you can reach inside to feel what is going on inside. Purple Martins will build their nest in the back of the box, so it is not sufficient to only feel around at the entrance of the next box. The eggs and nestlings will likely be as far back as possible in the box.

### 3.3.1. Weather conditions

When checking nest boxes, make sure to be aware of the conditions you are heading out into. Many of the boxes are places quite high on the pilings, so a high tide will be necessary to safely check the boxes with a ladder. Additionally, as with most ornithological work, avoid disturbing birds and nests in poor weather (high winds or rain).

### 3.3.2. Nest building

Western Purple Martins build their nests in May-June. When checking colonies before eggs laying begins, the nesting activity at the colony is assessed by the seeing how many nests are being built, and their quality. Purple Martins will line their nests with grass, leaves, twigs, and sometimes even shells. The better the quality of nests and nesting material used often indicates older and more experienced breeders.

Nest codes to record when there are no eggs present:

- FLN – fledged nest.
- FOE – female on eggs. If there is a female in the nest and you are unable to fully count the clutch of eggs, you may use this code.
- FOY – female on young. If there is a female in the nest and you are unable to count the nestlings, you may use this code.
- LN – lined nest. New nest lining is typically green leaves.
- MT – empty box. There is no nest material, old or new.
- NM – some nest material only.
- NS – nest start. There is more than just a little bit of nest material, but still not a completed nest.
- ON – old nest. Often just a mud lining from previous years.
- ONM – old nest material. Similar to ON, but there may be a few old leaves that do not look or feel fresh from this year.
- PM – pile of maggots. This happens when there are long dead nestlings in the nest.
- TR – trace of nest or nest material.
- ULN – unlined nest. This nest is full but not lined with fresh green leaves.

These are the original codes for when the project started, but it is clear that there is some ambiguity in the categories. For example, it is difficult to distinguish between NM and TR, or between ON and ULN. In these cases, use your best judgement to choose a code, and keep more detailed notes about the state of the nest in the comments of your data.

### **3.3.3. Eggs**

The egg laying period takes between 3-7 days (depending on clutch size), with one egg being laid per day. Females incubate for an additional ~18 days (can vary between 16-22+ days).

When checking nest boxes for eggs, it may be necessary to move some nesting material to properly count the number of eggs. Females often cover their eggs to hide them when they are away from the nest, so there may be more eggs in the nest than you initially counted.

When recording the number of eggs in a nest, you may also be able to make note of egg temperature (W or C, warm or cold respectively), if there are any undeveloped eggs that didn't hatch, and if there are any broken eggs in the nest.

### **3.3.4. Hatching and mean hatch date**

After ~18 days of incubation, successful clutches will hatch. It is important to have been monitoring the colonies before this so to estimate the average hatching date for the colony.

### **3.3.5. Post-hatching monitoring**

When checking boxes that have hatchlings inside, consult the size chart (if one is available) to determine how many days old the nestlings are. It is important to know how old the nestlings are because they can be banded when they are 9-20 days in size. Sometimes in years of poor weather, development is slower, so a bird at 9 days may only be the size of a 7-day old bird in years of good weather. You cannot band nestlings too early as their legs are only properly developed at 9 days old (or later). You also do not want to band nestlings when they are too old, because you do not want to force fledge them. Force fledging is when the nestlings fledge prematurely, and typically these birds do not survive as they do not have properly developed flight feathers. If unexpectedly encountering a nest with older nestlings (>20 days old), you can prevent force fledging by plugging the hole for approximately 10 minutes so they can calm down. Be sure to remove the plug before leaving the area.

When scribing data for these nest boxes, make sure you indicate how many nestlings there are and how old they are by “#nestlings: #days d”. If there are dead nestlings, you can also record this data.

### **3.3.6. Banding nestlings**

When the nestlings are of appropriate age/size (9-20 days), they can be banded. This is best done with two people, one person to band the nestlings, and the other to record the data and help open

bands in preparation. Take all the young out of the nest box and place them in a bird bag. Proceed to band each young (with the correct banding scheme) and inspect them for parasites. Return each young in a bird bag and replace them in the nest box after banding. Ensure that both bands are upright when the bird is in a standing position, so that they are easy to read while re-sighting bands.

The required data include: the band number (federal band and colour band), the letter on the colour band, date, bander ID, nest box number, and any additional comments. Nestlings cannot be sexed, so the sex remains as unknown for all nestlings.



Figure 3. Banding a 9-day old Purple Martin nestling. This bird has an aluminium band on the left leg, and a gold colour band on the right leg.

#### 4. LITERATURE CITED

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