



Standard Operating Procedure (SOP) 7:

Conducting Mist-netting and Banding V2.1

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Revision History Log

Prev. Version #	Revision Date	Author	Changes Made	Reason for Change	New Version #
1.0	Oct 2006	T. Gardali	Added info on effort – time of day	NPS internal review comments	2.0
2.0	Dec 2018	M Dettling	Updated hyperlinks, name change from PRBO to Point Blue, grammatical and stylistic changes, additional bird evaluation criteria added	Clarity	2,1

This Standard Operating Procedure is available in digital format from [San Francisco Bay Area Network website](#) and the [NPS Data Store](#).

Except where noted, we follow the Institution for Bird Population's (IBP) MAPS (Monitoring Avian Productivity and Survival) Manual for mist-netting and banding (available at <http://www.birdpop.org/maps.htm>; Accessed: June 9, 2009). This Standard Operating Procedure explains any variations from those protocols. Point Blue Conservation Science's forms, programs and database files are available at <http://www.prbo.org/tools/band/band.htm>, and our full protocols are available in our Palomarin Handbook (http://www.pointblue.org/wp-content/uploads/2018/09/HB2018_version17.2_final.pdf; Accessed November 27, 2018). IBP and the MAPS program were created after Point Blue Conservation Science established our own standardized mist-netting procedures, but the creator of the MAPS program came from Point Blue and the protocols are therefore quite similar. Additionally, the manner in which we vary from their protocols does not prevent us from contributing our data annually to IBP, nor does it prevent them from being able to combine our data with data from other MAPS contributors. This SOP also includes our banding form.

Preparation and Equipment

See SOPs # 1 and #3 for equipment needed, scheduling crews, training, and preparing for mist-netting and banding.

Effort

Our effort – frequency, number of hours, and seasonality of netting – differs from MAPS in the following ways:

- We run nets for six hours daily (not five); starting from 15 min past local sunrise. Nets are not operated in rainy or excessively windy conditions.
- We are interested in more than the breeding season and breeding species. We run nets at all of our sites in the fall, and at three of the four sites included in these protocols (Palomarin, Muddy Hollow, and Pine Gulch) during winter months, pending funding allows.
- During the winter months (November-April), we use the 10-day period MAPS advocates during the breeding season, and band each site other than Palomarin once per period. During the fall, however, we shorten our periods to 7-days, and band each site other than Palomarin once per 7-day period. Ten days are too long during fall migration to go between pulses as you could entirely miss waves of birds passing through the area.
- At Palomarin, we conduct mist-netting more intensively than at standard MAPS stations. During the peak of breeding season and through fall (May-November), we run nets six days per week. During winter (December-April), we run nets three days per week (generally Wednesdays, Saturdays, and Sundays), and never more than two days in a row. This is consistent with how Palomarin banding was conducted before the MAPS program was created, and the heightened intensity of effort increases our ability to conduct many analyses.

Data Forms

Instead of the banding sheet provided by IBP to many of its MAPS contributors, we use our own Point Blue Conservation Science banding form (attached). This form meets our specific needs better than the MAPS form would, and has been used at more than 75 banding sites in California and throughout the west. We also provide a copy of our net hour data sheet (for keeping track of the number of hours each net is open for standardization and analysis).

Data Codes

Some of the data codes we use differ from those of MAPS; however, all can be inter-converted. See attached list of codes used by Point Blue Conservation Science, taken from the Palomarin Handbook.

Banding Data Log Codes (from Palomarin Handbook)

Skull pneumatization

Record as 0, 1, 2, 3, 4, 5, or 6. Record it as “9” if unknown or not taken, but get a second opinion if you are unable to determine the skull yourself, especially if without it you will not be able to age this individual.

0. Skull not pneumatized, that is, only a single thin layer of bone covers the entire brain which shows through the thin covering of bone and appears as an unmarked pinkish color. Beware of thick-skinned birds whose skulls can be very difficult to see because the skin itself tends to be rather opaque.
1. A trace of skull pneumatization can be seen at the very back of the skull, usually appearing as an opaque grayish crescent or a very small triangular area. Between 1% and 5% of the skull is pneumatized.
2. Skull less than 1/3 pneumatized. Generally, the posterior part of the cranium has a triangular shaped area of pneumatization that is usually distinctly grayish and contrasts with the non-pneumatized area. The grayish area typically shows the characteristic small whitish dots of a pneumatized skull.
3. Skull greater than 1/3 but less than 2/3 pneumatized. Typically, most of the rear half of the skull is pneumatized as well as a small portion of the front part extending back to the eyes. This front part of the skull is usually difficult to see because the feathers of the forehead are dense, short and difficult to move.
4. Skull greater than 2/3 and less than 95% pneumatized. Non-ossified areas generally show either as two oval spots of pinkish on either side of the cranium or a single spot in the center of the skull.
5. Almost complete pneumatization, between 95-99% complete. These birds show tiny dull, pinkish areas or "windows".
6. Complete pneumatization.

Age

Record age as 0 (unknown), 1 (local, taken from nest to band), 2 (HY, hatched this calendar year, other than nestlings), 3 (AHY, hatched last calendar year or earlier), 4 (SY, hatched last calendar year), 5 (ASY, hatched 2 or more calendar years ago), 6 (TY, hatched 2 calendar years ago), or 7 (ATY, hatched 3 or more calendar years ago). Determine, and record how this was determined, using the “how aged” codes at the top of the banding sheet and described below; determine using Pyle Guide. If aged as unknown, put “9” in each of the how aged categories; if aged with one criteria, put “9” in second criteria.

Reproductive condition

Brood patch (0, 1, 2, 3, 4); Cloacal protuberance (0, 1, 2, 3).

Brood Patch:

0. No brood patch present. Breast more or less feathered. Non-feathered areas of the breast and abdomen smooth without evident vascularization. In some species (hummingbirds) and in

most juveniles, the breast is normally not feathered. This can look like a brood patch to the inexperienced but the area will be smooth and dark red.

1. Smooth skin. A loss of breast and some abdomen feathers, but most of the area is still rather smooth and dark red.
2. Vascularization is evident, some wrinkles are present, and fluid is present under the skin giving the area a pale opaque pinkish color as opposed to the normal dark red muscle color. This is the peak of incubation.
3. Wrinkled. Abdominal skin is thinning, wrinkly and scaly.
4. The vascularization and fluid are entirely gone, and most wrinkles are gone. New pin feathers are present as the area begins to become re-feathered.

Cloacal Protuberance

0. No swelling detected
1. Slight: Shape of the protuberance is often such that it is widest at the base and most narrow near the tip.
2. Moderate: large with a diameter fully as large near the tip as at the base.
3. Very large: diameter considerably larger at the tip than at the base.

Sex

Record sex as U (unknown), M (male), or F (female). Determine, and record how this was determined, using the “how sexed” codes at the top of the banding sheet and described below; determine using Pyle Guide. If sexed as unknown, put “9” in each of the how sexed categories; if sexed with one criteria, put “9” in second criteria. See the species account before using brood patch or cloacal protuberance to sex a given species.

Fat

Record the fat class of the bird (0, 1, 2, 3, 4, 5, 6, 7).

0. No fat in furculum or anywhere on body.
1. Furculum less than 5% filled, abdomen with none or trace.
2. Furculum less than 1/3 filled, abdomen with a trace or thin layer.
3. Furculum half filled in small patches, abdomen with small patches, not covering some areas.
4. Furculum more than 2/3 filled, level with clavicles, abdomen with covering pad, slightly mounded.
5. Furculum slightly bulging with fat, abdomen well mounded.
6. Furculum bulging greatly, abdomen with greatly distended mound.
7. Very large fat pads of furculum and abdomen meet.

Body Molt

Classify as 0, 1, 2, or 3. Juvenal birds growing in their juvenal body feathers are NOT going through body molt, while those molting into their formative or other plumages ARE going through body molt. Body molt should be rated by an overall feeling into the following classes:

0. No body molt. No feathers in sheath or growing.

1. Light body molt. - a few feathers molting from a few feather tracts or a number of feathers (less than 1/2) molting from only one tract. In general, less than 1/3 of the contour feathers on the birds are in molt.
2. Medium body molt. - a number of feathers (generally less than 1/2) are molting from most tracts, or a large number of feathers (generally more than 1/2) are molting from one or a few tracts. In general, from 1/3 to 2/3 of a bird's contour feathers are in molt. A bird molting virtually all of its head feathers but no others (e.g., in spring) should be classified as 2.
3. Heavy body molt - a large number of feathers (generally greater than 1/2) are molting from many or most tracts. In general, greater than 2/3 of the contour feathers on the bird are in molt.

Use notes on the back of the page as necessary to describe the extent and location of body molt especially when it is difficult to make a decision as to the proper classification for a given individual.

Flight Feather Molt

Use the following codes for flight feather molt:

- 0 None
- F Flight Feather Molt (regular) - describe in detail on the back of the data sheet.
- A Adventitious Molt (irregular - due to something other than the annual or semi-annual molt sequence) - describe in detail on the back of the data sheet, if there is time to do so.

When recording wing and tail molt use the following codes:

Prim, pp, or 1` = Primaries

Sec, ss, or 2` = Secondaries

Rec = Rectrices

L = left

R = right

O = old feather still present - identifiable by wear and fading.

X = feather missing.

S = feather still in sheath.

G = new feather growing. In parentheses record the approximate % of full length that the feather has attained.

N = new feather fully grown.

Feather Wear

Record the degree of Primary feather wear (0, 1, 2, 3, 4, 5) on the outer 4-5 primaries.

0. No wear at all, feather edges perfect and without nicks; a light colored edge exists all the way around the feathers including the tips.

1. Very little wear; feather edges only slightly worn and no actual fraying or nicks have occurred; the light colored edge may still exist around the sides of the feathers but not at the tips.
2. Slight wear, some nicks, but most feathers still in almost new condition.
3. Moderate wear, more nicks, most feathers' tips blunted or worn noticeably.
4. Heavy wear, most feathers with nicks, tips worn down significantly. Feather tips often completely off down even to the "fade line."
5. Excessive wear; feathers extremely ragged and torn up; shafts usually exposed well beyond the vane; all the tips are usually completely worn or broken off; one wonders how well the bird can fly.

Fade

Record the degree of Primary feather fade (0, 1, 2, 3).

0. No fade line present.
1. Very faint fade line present; usually visibly only when looking down on the feather in strong light.
2. Moderate fade line present; visible upon close examination without having to look down on the feather in very strong light.
3. Pronounced fade line present; very obvious pale color to the tips of the primaries, easily discernible in any light situations.

Wing chord

Record the unflattened wing length (wing chord) in mm.

Status

- a. 300 for normal silver banded birds
- b. 301 for color banded birds
- c. 000 for unbanded healthy birds (California Quail), dead unbanded birds that were processed, and birds that were not given a band due to oversight, injury or decision, but were brought back to the lab or intentionally released before then [birds that escape before reaching the banding lab are not recorded on the data sheets!]
- d. 008 for unbanded birds with marked rectrices (primarily hummingbirds)
- e. 318 for blood sample taken and no auxiliary markers (see INJURY & RESULTS CODES)
- f. 319 for blood sample taken and has auxiliary markers (see INJURY & RESULTS CODES)
- g. 325 for geolocator-tagged bird that is also color-banded (code used for 2 or more kinds of auxiliary markers)
- h. 615 for severely injured banded birds or dead recaptured birds (see Injured Birds section below).
- i. 999 for BADE/BALO

Date

Month and then day; the year is accounted for on the top of the banding sheet.

Time

Record the time of net run to the nearest 10 minutes (i.e., record 1240 as “124” and 0715 as “071”)

Location

Location, e.g., PN (standard nets), G1, G2, G3, G4, OG (Off Grid), PS (special captures, i.e. caught in buildings), PA (Palo target nets), PT (Palo trap). For locals, use the grid number as above; for non-Palomarin sites use 4-letter code (e.g., MUHO).

Site

Net number (For birds captured on the grids, use the closest grid marker; for locals, use the nest number (i.e. 12B); for special captures, write a line through it (999's in database) and explain location and method of capture on back of sheet.

Notes (including Special Handling Notes)

Write a complete description of any vagrant species or subspecies or any species new or rare to Palomarin, including all relevant and diagnostic measurements. Describe any unusual plumage characteristics that you encounter. Record and describe any deformities or abnormalities that you encounter (deformed bills, feet, eyes, etc.). Also record other pertinent details or circumstances of your capture – e.g., why all the data was not taken for a bird.

Weight

Record the weight of the bird to nearest 0.1 g.

Literature Cited

Pyle, P. 1997. Identification Guide to North American Birds, Part I. Slate Creek Press, Bolinas, California.