

THE PALOMARIN HANDBOOK

Point Blue's Landbird Procedures Manual
for the Palomarin Field Station



Version 17.2
Last updated Mar 2018

THE PALOMARIN HANDBOOK

~ Point Blue's Landbird Procedures Manual for the Palomarin Field Station ~

Seventeenth Edition

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Point Blue Contribution Number 503 [original edition, 1980]

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This handbook is dedicated to the Palomarin Interns of 1979 and 1980 who had to do without the help of a handbook. These interns were Geoff Geupel, Kathy Keane, Janet Kjelmlyr, Tom Pogson, Peter Pyle, David Sherman, and Ken Warheit. Their creativity, dedication, and constant comments and suggestions made it happen. In particular we acknowledge Janet Kjelmlyr who had the perseverance to see it through.

“At first glance, the work described in this handbook might seem overwhelming. It is not. The work is hard, but certainly rewarding, and we are sure that your experiences here will be educational as well as enjoyable.” – Spring 1980 Volunteers

We are especially grateful to David DeSante, who co-authored the first edition with the 1979/80 interns and whose vision provided the groundwork for Palomarin.

Since the original edition, many biologists have helped to shape the “handbook” into its current form. In particular, Denise Hardesty, Anne King, Maureen Flannery, Dennis Jongsomjit, and Diana Humple played critical roles. Additionally, several others have made and continue to make important contributions including Hilary Allen, Grant Ballard, Daniel Barton, Xeronimo Castañeda, Renée Cormier, David Cothran, Mark Dettling, Thomas Gardali, Heather Gates, Sue Guers, Sacha Heath, Aaron Holmes, Scott Jennings, Michael Lynes, Christopher McCreedy, Melissa Pitkin, Libby Porzig, Lars Pomara, Miko Ruhlen, Sandy Scoggin, Stacy Small, and Diana Stralberg. Many others have helped improve the handbook over the years and we sincerely apologize to those of you not listed here, and extend our gratitude to you as well.

Like past revisions of the handbook, this version updates and clarifies data protocols as necessary.

We also are grateful to Hilary Allen for the cover art.

Because the handbook has gone through so many revisions, from so many people, for over two decades, we have decided not to list authors. This handbook is truly a collective work and is always a “work in progress.”

All [people] are [siblings], we like to say, half-wishing sometimes in secret it were not true. But perhaps it is true. And is the evolutionary line from protozoan to Spinoza any less certain? This also may be true. We are obliged, and bitter though it may be for some to hear, that all living things on earth are kindred.

Edward Abbey

You have agreed to aid in a program of scientific research on the population biology of landbirds. The data that you will be helping to collect will contribute to increase our understanding of the natural world, to the advancement of science, and to the conservation of species and habitats. It is important that your data are **ACCURATE AND COMPLETE**. Collecting and recording data in a standardized way is the backbone of any monitoring program. Adherence to the methodology in this handbook ensures the integrity of the Palomarin Data, past, present, and future. If you have any questions, or are unsure of identification, measurement, or procedure, please ask. Communication is essential to all biological research.

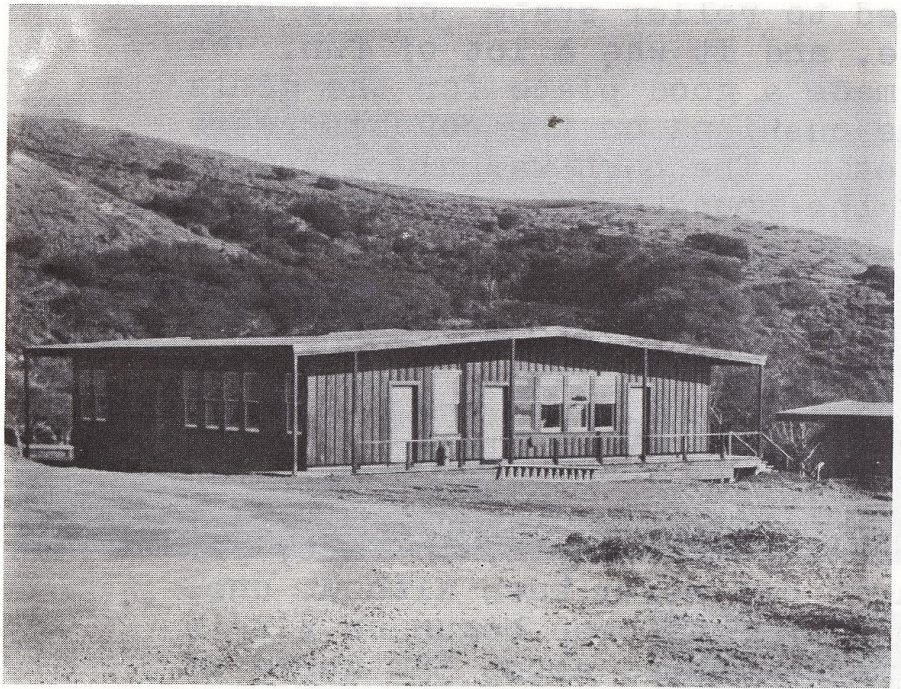


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INTRODUCTION

Point Blue Conservation Science (Point Blue, founded as Point Reyes Bird Observatory in 1965) is dedicated to conserving birds, other wildlife, and ecosystems through science, partnerships, and outreach. Originally encompassing research only on the central California coast, our current projects range throughout western North America and Antarctica, and are conducted in the earth's three major ecosystems: marine, estuarine, and terrestrial. Our science operations are organized into key areas and disciplines ("Groups"): Pacific Coast & Central Valley; Sierra Nevada; California Current; Education and Outreach; Climate Adaptation; Emerging Projects & Partnerships; and Informatics & IT. Point Blue is headquartered in Petaluma, CA, about an hour northeast of Palomar.

The Palomar Field Station, founded in 1966 and formerly serving as Point Blue headquarters, is the site of one of the longest continuously-running datasets on landbird demography in North America. Palomar and its data have contributed to a range of studies that include investigations of life history, demography, and climate change as well as the development, improvement, and validation of many field methods. The primary objectives at Palomar are to:

1. Monitor landbird response to local and regional environmental change.
2. Provide a baseline understanding of the relationships between birds and their environment so that we may better predict how birds will respond to future environmental conditions.
3. Provide training to the next generation of field biologists, conservationists, and ecologists, focusing on the importance of proper field techniques, a deep foundation in natural history, and encouraging creative and critical thinking about the natural world.

Palomar achieves these objectives through two programs, the Breeding Biology Program and the Biomonitoring Program.

The Breeding Biology program is a long-term study of reproductive success, individual fitness and territory density of landbirds, with a focus on populations of Wrentit, Song Sparrow, Nuttall's White-crowned Sparrow, Spotted Towhee, Swainson's Thrush, Wilson's Warbler, and California Scrub-Jay, many of which are known-aged and individually color-banded. It has been conducted in a standardized fashion since 1979, with some modifications to the protocol made since; various nest monitoring efforts also occurred in 1966-1978. Research is carried out on a 36-ha (89-acre) study plot consisting of coastal scrub and Douglas-Fir forest which has been undergoing dramatic habitat succession since this study began. The primary objectives of the program are to 1) determine annual changes in territory density of all birds on the study area; 2) investigate the many factors that influence reproductive success, fitness, and survival, especially for Wrentit, Song Sparrow, Nuttall's White-crowned Sparrow and Wilson's Warbler; and 3) determine the response of the bird community to changes in weather and habitat, particularly successional changes in the plant community. The methodology of this long-term study involves nest searching and monitoring, territory mapping, and vegetation assessment.

The Biomonitoring Program is a long-term standardized mist-netting/banding study designed to gather data on the reproductive success, annual survival, and population dynamics (trends) of landbirds, and to relate these data to environmental changes. The banding data is also used to look at other factors that affect bird populations including phenology (e.g., arrival/departure times for migrants, dates of breeding), morphometrics and molt. In recent years, we have been studying the full annual cycle of many migrant species using geolocator technology to determine migratory connectivity of both breeding and wintering species. The methodology of this program involves the standardized operation of an array of mist nets that have been operated since 1979, with some modifications to the protocol made since; semi-standardized monitoring of this array also took place in 1976-1978, with different protocols in operation from 1966 to 1975. This project provides an independent measure of reproductive success and annual survival for both study and non-study species, a means for color-banding individuals, and a database to compare with other studies of population trends (e.g., Breeding Bird Survey). It also provides a place where the public can observe science at Point Blue. In fact, over 50 classes per year (ranging from elementary school to college and adult groups) and thousands of visitors come to Palomar to observe our mist nets in operation. In addition, we conduct mist-netting at other locations in West Marin – including one located above the main Palomar nets and four in riparian habitat – with similar objectives.

CHAPTER 1: Breeding Biology Program

IMPORTANT: Appendix 3 provides an outline of “gridder” responsibilities.

Part 1: Study Species

The bird community surrounding the Palomarin field station is rich with species diversity. Of the many species present, there are seven study species that are among the most common and will be the focus of our efforts during the field season. All other species are considered non-study species and efforts to nest search for these will be minimal, and spot mapping – which will still occur for them – will not involve individually color-banded individuals. To capture the most meaningful and robust data, the study species have been split into two groups, Priority 1 and Priority 2. Assignment to these groups considered the difficulty of finding their nests, sample size, the long-term investment in understanding their population dynamics at Palomarin, and the time resources available for nest searching. The following is a description of the three groups and the effort that will be committed to each:

Priority 1 Study Species (Wren tit, Song Sparrow, Nuttall’s White-crowned Sparrow, Wilson’s Warbler): (1) conduct targeted nest searching; (2) monitor all nests found; (3) conduct territory mapping, including seeking identities of color-banded individuals; (4) color band adults (including target netting), Hatch-Years and nestlings (only adults in Wilson’s Warblers) for most informed territory mapping; (5) conduct nest closeout and nest veg on all nests; and (6) create digital territory maps in ArcView.

Priority 2 Study Species (Swainson’s Thrush, Spotted Towhee, California Scrub-Jay): (1) do not conduct targeted nest searching for them but when see obvious clues, can choose to search for (in a limited timeframe, e.g., <10 minutes); (2) monitor all nests found; (3) conduct territory mapping, including seeking identities of color-banded individuals; (4) for all but Swainson’s Thrush, color band adults (including target netting), Hatch-Years and nestlings for most informed territory mapping; (5) conduct nest closeout and nest veg. Note that Swainson’s Thrushes were color banded 2012-2014 so some individually-marked birds may be encountered, but color-banding was dropped because it is difficult to see their color bands in this habitat type.

Non-Study Species: (1) do not conduct targeted nest searching for them; but when see obvious clues, can choose to search for (in a limited timeframe, e.g., <10 minutes), and will fill out a nest card for all nests found incidentally or through behavior; (2) monitor open-cup nests whose content are visible, but not cavity / pendulum / high nests where contents cannot be observed; (3) conduct territory mapping, although there is no color banding; (4) do not color band or target net adults or Hatch-Years, and do not federally-band nestlings; (5) for open-cup nests that were monitored, conduct nest closeout only (not veg); and for non-observable nests that were not monitored, do not do closeout or veg. Note that American Goldfinches, California Towhees and Bewick’s Wrens were color banded in recent years, so some individually-marked birds may be encountered.

Part 2: Censusing/Spot Mapping

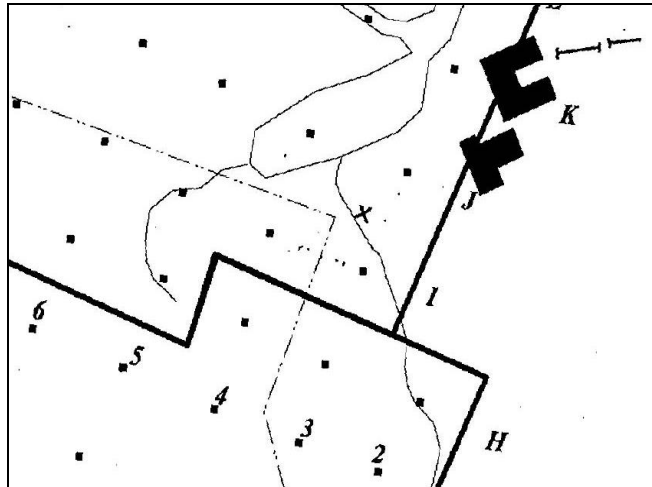
The census/spot mapping effort provides information on breeding density, territorial behavior, nesting success, and post-fledging dispersal.

A. Collecting Census Data in the Field

- 1) You will be on your grid an average of 6 days per week, about 6 hours each morning. Spend one of those mornings in such a manner that the entire grid is covered, with all accessible parts being thoroughly searched. Each census should take between five and six hours, beginning soon after sunrise.
- 2) In the early season (March) the idea is to become acquainted with the geography of your grid and find out which individuals/species are around and singing. Begin by systematically working along each row or a block of grid points. Copies of the previous year’s first and second brood territory maps can be taken into the field to help locate and identify color-banded individuals. **Every** color-banded individual should be accounted for every census period.
- 3) Record, on the Point Blue Census Data Sheet, all birds seen on the grid, except swallows and Turkey Vultures. A map showing the colors associated with the grid lines should be taken with you into the field, and can be permanently attached to the back of your clipboard. Primary attention should be given to singing males, especially those that are countersinging. (Note that female Wren tits also sing and defend territories.) Birds seen flying over the grid without stopping can be casually noted on the data sheet in order to add precision to the Daily Journal (Chapter 6).

Record Data as follows using a black pen:

- a) Fill out the headings on the sheet: grid #, census # and period (censuses are numbered sequentially from your first day on the grid), date, your name, and page #. Record your starting and ending time. Record this information daily, and make sure all data is legible and complete.
- b) Record your location and the time at the start of each row, at the time of completion of the census.
- c) Record bird location. Grid stakes are spaced 30m apart. Each is marked with two colors of survey flagging, which indicate the stake's location by row (letter) and column (number). (*Note that many of the grid stakes are no longer standing or have been swallowed by thick vegetation. In some cases, flagging is tied in a tree or shrub with the same color coded system (row color on top of column color)). The space between stakes can be conceptually divided into 16 blocks approximately 7.5m² (both the column and the row are divided into quarters). Use these subdivisions (denoted with letters after the column number and numbers after the row letter) to record the location of the bird to the nearest 1/16 of a grid point. For example, if a bird was observed at the X in the diagram below (along the Nature Trail near the parking lot), its location would be recorded as **I2 3A**.



- d) Record movements using arrows in conjunction with the grid point (can be in notes if doesn't fit in location box):
 - D 8 (bird flew into D 8 from unknown location).
 - C1 9 → D 8 (bird flew from C1 9 to D 8).
 - C 9 → (bird flew from C 9 to unknown location).
 - C 9 → (bird flew past C 9 without stopping).
- e) Record the species using its four letter AOU species code.
- f) Record the age and sex (if known), and if a flock is observed the number of individuals.
- g) Record the colorband combination(s). When reading colorbands read **the left leg first, from top to bottom**. Underline colors that were positively read. For example, WBK/S indicates that the Silver band, and white (W) and black (K) colorbands were positively identified but the observer was not fully confident of the blue (B). Often data gathered in the future will reveal the bird's identity. If you find out the band was misread correct it in red ink. Please **do not** change the raw data. Birds without bands should be recorded as - / - and birds with only a silver band on the right leg should be recorded as - / S.
- h) Record the following behavior (in order of importance) using the following codes:
 - S(circled) = seen singing (the territorial song)
 - S = heard singing
 - COP = Copulation: make an extra effort to get colorbands of both birds involved
 - DIS = display (courtship)
 - AGG = aggression
 - FOR = foraging
- i) Record, in prose, any pertinent notes, particularly details of associations between individuals, interactions with nest predators, and nesting details. Describe all interesting behaviors. **These notes are often very useful for determining territory boundaries, breeding status, and inform our knowledge of natural history.**

- j) Clearly indicate on the data sheet when different encounters are of the same bird, when birds are associated together, and most importantly, where singing birds are countersinging or are known to be different. **Countersinging information is especially important for defining territories.** See sample Census Sheet below for details of how to record this information (CS, DIFF, SAM, with lines connecting the two rows of data).
- k) Census data should be processed and entered daily; if recording data in field notebook, data must be transcribed to a census data sheet and proofed. (see below).

Point Blue COASTAL SCRUB CENSUS DATA SHEET

PAGE 1

CENSUS #/PERIOD 50 / 10 DATE 05 / 21 / 16

START TIME 6:00

END TIME 10:45

OBSERVER WJJ

Time	Location Of Bird	Species	Age/Sex	Color Bands	Behavior	Notes	Grid
6:10	L315A	BEWR	M	NS	S		
6:15	M315	SWTH	U	NS	C		
6:15	M15	PUFI	M	NS	(S)		
6:30	O6C	NWC	M	NS	S		
+ 6:35	N216	WREN	M	S/MBR	(S)	↓S	
6:35	N16	WREN	(F?)	NS	(C)	↑N	
6:45	N316	JTEJ	U	NS	(M)	→E	
6:50	N215C	SOTO	(F?)	NS	(C)	R.NW 76g	
6:50	N15B	SPTO	M	-/-	(S)		
8:45	P24	BEWA	M	NS	S		
8:45	O20	BEWR	M	NS	S	>CJ	
8:55	N318C	BEWR	M	NS	S		
8:55	N218C	SPTO	M	NS	S		
+ 9:00	N216	NWCS	M	KY/S	(S)		
9:00	N216	ANHU	F	NS	(C)		
9:00	N316	SPTO	M	NS	S		
9:10	D18	WREN	✓	NS	(C)		
9:15	N318	WREN	M	NS	(S)	→O319	
+ 9:40	M16	WREN	F	S/KPO	(C)	Nest!	
9:55	N318C17	PUFI	M	NS	(S)		
+ 10:10	L218C	SPTO	M	S/GBM	(S)		
10:15	M26B	WREN	M	NS	S		
10:25	N232	BEWR	M	NS	S		

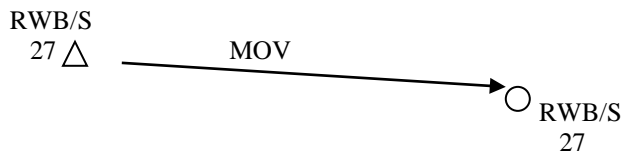
Modified in 2006: added start, end time, and census period

B. Recording Census Data

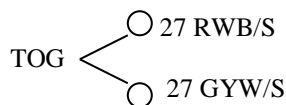
At the beginning of the season, you will create a Grid Binder in which you will store all data sheets associated with your grid. These include the sheets described below in 1 and 2, as well as filled out Census Data Sheets, and first and second brood maps.

All data collected on the Census sheet should be compiled daily as follows: **Do not** get behind in processing these data, as it will affect your ability to find and monitor nests effectively.

- 1) Entering data into your grid binder.
 - a) **Record the morning's coverage of the grid.** Use the GRID EFFORT SHEET and include:
 - the grid points covered
 - the proportion of the total grid covered
 - the timing
 - the total hours spent
 - b) **For any of the color-banded species where individual identification is reasonably certain,** tally it on the LIFE HISTORY TALLY SHEET in the appropriate census period. It is easiest to arrange them by mated pairs, with territories numbered sequentially as nests are located. Update this sheet daily to help make sure you encounter each individual on the grid at least once per census period.
- 2) **Spotmaps:** A hand drawn spotmap, showing the locations of all encounters, will be made for each species for each census period. These Census Period Spotmaps will be updated daily.
 - a) Start with a blank grid map at the beginning of each Census Period; fill in the species, year, and census period as appropriate. After each day spent in the field, transfer encounter information from the Census Field Data Sheet to the appropriate species' Census Period Spotmap.
 - b) Use RED ink for observations that you see and BLACK ink for observations that you hear.
 - c) Map the encounter by drawing a triangle for singing individuals and a circle for non-singing individuals at the exact location of the observation. Write the color band combination, partial combination, or other identifying notes (i.e. -/- if definitely unbanded, -/S if silver-banded on right leg, ?? if legs were not seen, or NS if the bird was heard but not seen) next to the point. Write the date (only the day's date is necessary, since census periods are half-months) beneath the color combo.
 - d) Record movements of the bird with the appropriate arrows and label MOV, i.e.



If multiple birds were seen together, connect their circle/triangle with a line and write TOG, i.e.



Use the same format and the following codes to indicate if two birds were displaying (DIS), copulating (COP), fighting (aggression, AGG), are known to be different (DIF), were countersinging (CS), or are known to be the same (SAM),

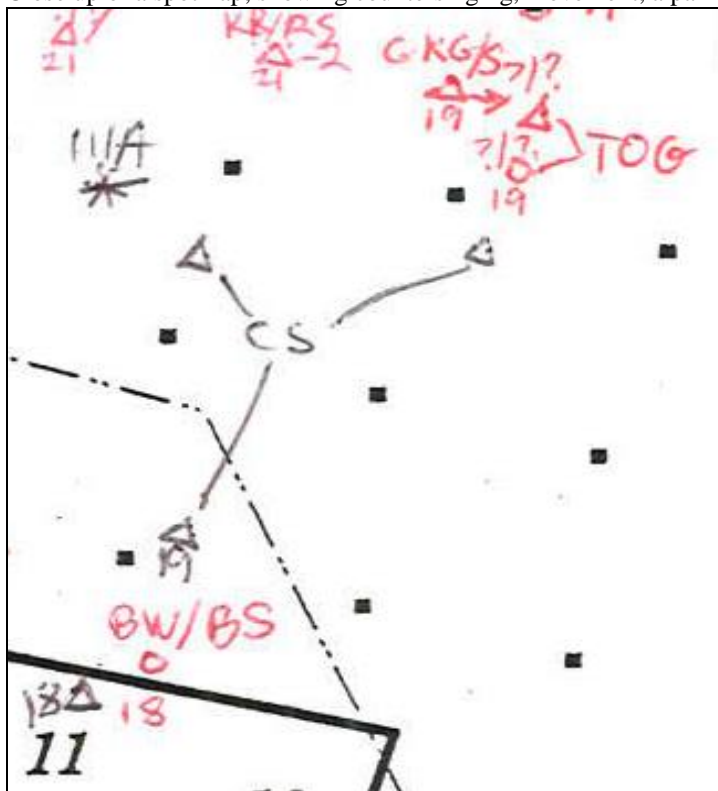
- e) If a flock was involved, write the date only once. Next to it write all the color bands that were read. Write the total number of birds (of that species) involved in the flock, i.e.

RWB/S KBG/S
27 GYW/S RRR/S -9 birds
OOM/S -/S

- f) Map the locations of any nests active during that Census Period with an asterisk and the nest number and attempt:

* 01A

Close up of a spotmap, showing countersinging, movement, a pair together, and a nest.



Use RED ink for observations that you see and BLACK ink for observations that you hear.

- g) Also create a map for any NON-AVIAN NEST PREDATORS that are encountered. Use the same map for all species.
 - h) Mist net captures of study species (including SWTH): Any study species captured at the Palo or Uppers nets will be recorded daily by the banders onto the Mist Net Capture sheet located in the data room. Gridders should check this sheet daily and add these captures onto their grid spot maps at the location of the net, trap, or nest. If the sighting was when the bird was first colorbanded, place an N (= netted), T (= trapped), L (= banded in nest as a local), GN (= grid nets), or PS (= special capture) in the notes section of each encounter.
- 3) Computer data entry:
- a) **Encounters:** *only individuals with confirmed color combos will be entered into the encounter database.* For all individuals for which you saw complete colors in the field, confirm that those colors exist by looking for them in allnumb.dbf (banding data, all years) and/or encounter databases (encount-copy_thru[YEAR].dbf for prior years; enct[YEAR].dbf for the current year), to see if they've been encountered since. Once the color combo has been confirmed, enter the data in enct[YEAR].dbf for the current year.
To enter your enct data electronically, follow the directions in **Chapter 3, Part 5** of this handbook.

GRID EFFORT SHEET

GRID 1 YEAR 2007

Date	Census #	Census period	Part of grid or points covered	Full Grid			Breeding Bird Census Plot		
				Start	Finish	Total Hours	Start	Finish	Total Hours
3/17/07	1	6	G1 quickly	0740	1200	4.6			
3/18/07	2	6	G1 ¹ / ₂ of it. up to A7 up to A7	0750	1153	4.0			
3/19/07	3	6	G1-G3 to G4 G7 F6-F8	0755	1205	4.1			
3/22/07	4	6	G1 - G4-D5	0840	1138	3.0			
3/23/07	5	6	G1 - Mid to NE part	0750	1210	4.3			
3/24/07	6	6	G1 - SE, then mid to NE	0735	1215	4.6			
3/25/07	7	6	G1 - F-H / D-C, 12a-13	0735	1130	4.0			
3/27/07	8	6	E→G, 13→19 (west)	0735	1240	5.0			
3/28/07	9	6	G→Y, 1→5 / Broke for meeting	0728	1240	3.0			
3/31/07	10	6	D→H, 2→6, 9→14	0735	1300	5.5			
3/31/07	11	6	C→G, 10→19	0800	1217	4.25			
04/01/07	12	7	C→G, 15→19, 6	0802	1315	5.10	1150	1250	1.0
04/02/07	13	7	E→G, 16→19, D→G, 4→5	0715	1230	5.25	1100	1230	1.5
04/03/07	14	7	C→G, 8→12, 13→14 (E-D), E→F, 4→5	0730	1200	4.50	0730	1200	4.5
04/04/07	15	7	E→G, 15→19 only west end of plot	0720	1240	5.2	-	-	-
4/05/07	16	7	C→G, 11→13, 16→18	0830	1230	4.0	0830	1115	2.75
4/06/07	17	7	C→G, 11→18	0745	1230	4.75	0845	1145	2.25
4/19/07	18	7	H, 2→3 / 2→A 6-7 / E→G, 16→18	0740	1300	5.4	0745	1000	2.25
4/10/07	19	7	C→G, 7→13	0715	1230	5.25	0715	1230	5.25
4/12/07	20	7	F→G, 9→12 + 15→19	0715	1300	5.75	0720	1300	2.5
4/13/07	21	7	E→G, 5→10, 14→19	0730	1230	5.0	1030	1200	1.5
4/15/07	22	7	E→G, 11→19 / B→D, 7→10	0735	1245	5.0	0800	0915	1.25
4/16/07	23	8	D→G, 8→12 / E→G, 15→18	0735	1215	5.1	0735	1030	3.00
4/18/07	24	8	C→G, 9→13 / F→G, 16→18	0720	1200	4.5	0720	0950	2.5
4/19/07	25	8	F→G, 10→15	0745	1145	4.0	1100	1145	0.75
4/21/07	26	8	F→G, 14→19. walked quickly thru F-11	0850	1250	4.0	-	-	-
4/23/07	27	8	F→G, 14→18 / C→G, 11→13	0740	1245	5.0	1200	1245	0.75
4/24/07	28	8	C→G, 10→12 / 15→17	0740	1215	4.5	0740	1140	4.0
4/25/07	29	8	E→G, 10→13 / 2, A, B, G, 0→3	0705	1210	5.0	0705	1035	3.5
4/26/07	30	8	E→G, 11→13 / 18→19	0810	1130	3.5	0810	1010	2.0
4/27/07	31	8	E→F, 14→17 / F→G, 10→13	0830	1230	4.0	0915	1230	3.25
4/28/07	32	8	E→G, 14→19	0735	1115	3.75	-	-	-
5/2/07	33	9	C→G, 9→13	0945	1215	2.50	0945	1215	2.5
5/3/07	34	9	D→G, 15→19, 10→11	0800	1245	4.75	1055	1215	1.75
5/5/07	35	9	B→G, 9→13	0800	1100	3.00	0800	1100	3.00
5/6/07	36	9	B→E, 8→11, 14→16	0710	1125	4.25	0710	0945	2.50
5/7/07	37	9	B→G, 10→19	0745	1245	5.00	0915	1245	3.50
5/9/07	38	9	B→E, 8→10 (east part of G1), 11→15	0710	1315	6.00	0710	1230	5.25
5/10/07	39	9	C→G, 10→13, C→G, 14→18	0705	1000	3.00	0705	0830	1.50
5/11/07	40	9	C→E, 9→13	1145	1415	2.50	1145	1415	2.50

Modified in 2006: enlarged "part of grid" column by removing unnecessary start, finish, total columns. Also added a spot to list Breeding Bird Census Plot name and a page numbering location.

C. End-of-Census Period tasks

The year is divided into 24 census periods, each 1/2 month in length (days 1-15, 16-30 (31)). The census periods are numbered sequentially from the beginning of the calendar year. An ACTIVE census period is one in which the grid has been completely covered at least twice.

- 1) **Territory Maps:** At the end of each census period, territories are drawn in pencil on each species' spotmap for that census period. This is especially important for study species as they will get a new spotmap at the beginning of each census period. Spotmap data for non-study species may be recorded on the same spotmap for several census periods. Show all territories as they existed on the grid during that census period.
 - a) Territories should be based on:
 - Positive sightings of the pair of color-marked birds. Particularly of the male's singing posts, and the male and female's movements.
 - Sightings (or songs heard) of non-positively identified birds that fit the territory (as seen on the census period Spotmaps).
 - Territory boundaries are drawn based on an accumulation of detections over the season. Use dashed lines for territories for which you didn't follow birds, or didn't detect them across the whole territory.
 - b) The following should not be considered when determining territory boundaries:
 - Post-fledging movements off the territory.
 - Sightings before the territory was established.
 - Encounters of unusual movements or wanderings.
 - c) Within each territory write:
 - The territory number (by chronology of the nest finding). Territories without nests will be assigned numbers during 'Grid Wars'.
 - The identity and age of the male and female (if space permits).
 - d) Examples of how to determine and denote cohorts:

If the banding data says:		The cohort should be written:
Age	Year bird was first banded	Bird's cohort is
1 (nestling/local)	2014	14L
2 (HY)	2014	14
3 (AHY)	2014	(13)
4 (SY)	2014	13
5 (ASY)	2014	(12)
0 (unknown)	2014	(14)

- A local bird is a bird that was banded as a nestling
 - () around the cohort indicates that the bird is at least that old (the bird could in fact be older)
 - No parentheses around the cohort indicates that the bird was micro-aged when first caught.
 - Notes:
 - Indicate 'Locals' with 'L'.
 - Use -/- for unbanded birds.
 - Use ?? for a bird whose legs were never seen.
 - Use ?/S or S/? for birds that were definitely banded but the color bands were not read.
 - Use just ? if you are uncertain the female actually existed.
 - For unmated males, clearly mark 'UNMATED MALE'.
 - Put () around colorbands for birds whose identity is uncertain. (This corresponds to a parent cohort precision of *.)
 - e) Mark the exact location of all nests found in each territory with an asterisk * and the nest identification #.
- 2) **Census Period Behavioral Summary:** A standardized form on which you rate the behaviors of each color banded individual seen during the Census Period. The first rating (how well you know birds) is a cumulative (entire season) rating. The other ratings apply only to the current census period.
 - a) How well do you know this bird (cumulative knowledge)
 - 1 = hardly at all;
 - 2 = a little;
 - 3 = lots;
 - 4 = best friend.
 - b) Association to observer (conspicuousness)
 - 1 = very shy;

- 2 = shy;
- 3 = conspicuous;
- 4 = very conspicuous.
- c) Association with mate (togetherness)
 - 1 = never together;
 - 2 = sometimes;
 - 3 = usually;
 - 4 = always together.
- d) Aggressiveness to conspecifics (members of the same species)
 - 0 = no data;
 - 1 = meek;
 - 2 = mellow;
 - 3 = testy;
 - 4 = aggressive.
- e) Aggressiveness to predators (include jays)
 - 0 = no data;
 - 1 = meek;
 - 2 = mellow;
 - 3 = testy;
 - 4 = aggressive.
- f) Aggressiveness to other birds (non-jays)
 - 0 = no data;
 - 1 = meek;
 - 2 = mellow;
 - 3 = testy;
 - 4 = aggressive.
- g) Amount of singing
 - 0 = none;
 - 1 = very little;
 - 2 = some;
 - 3 = lots;
 - 4 = all the time.

- 3) Census Period Write-up: Write a brief (one or two paragraph) summary of the status and behavior for each of the study species on the back of the BEHAVIORAL SUMMARY SHEET. This sheet is placed in the grid binder in front of the TERRITORY MAP (see below) so that the map and write-up are visible together. The summary should include information on the presence or absence of breeding migrants (WIWA and SWTH), the status of territory establishment, and the overall breeding status of each species (i.e. most pairs are incubating, have nestlings, are attempting second broods, etc.). Look at previous years for more insight into what to write.

D. First and Second Brood territory maps- Grid Wars!

There will be two meetings, called Grid Wars, with Geoff Geupel to proof your data. Geoff has proofed the territory maps every year since gridding began, and Grid Wars is an important part of our standardization. It is very important to have all materials fully prepared for Grid Wars. Your supervisor will let you know at least a week in advance of when Grid Wars will be, and will be extra-available for questions in the days leading up to them. A few notes regarding Grid Wars:

- 1) To prepare for both Grid Wars, you will need to have all of your raw data, Spotmaps, and Census Period territory maps complete, organized, and in presentable form. You will also need to create draft First/Second Brood (for study species) and Final Brood (for non-study species) territory maps in pencil for all species. These will be roughly equivalent to Census Period 10/14 territory maps, but should generally reflect overall territories as they existed through that half of the season. Add territory numbers, color combos, and nest locations as you would for census period territory maps.
- 2) Grid Wars 1 will be in early June, covering data collected in Census Periods 6-10. It will result in the compilation of First Brood Territory maps for all study species as well as a draft Final Brood maps for non-study species that will be revisited at the second Grid Wars.
- 3) Grid Wars 2 is at the end of July, covering data from Census Periods 11-14 (and assessing changes since Census Periods 6-10). Grid Wars 2 will result in Second Brood Territory maps for study species and finalization of Final Brood maps for non-study species.
- 4) After the First/Second Brood territory maps have been finalized and approved during Grid Wars, they should be digitized via ArcView (for priority 1 study species only) (Appendix 6).

A Final Territory Map (Second Brood)

Grid 2
 Species SOSP
 Year 2007
 Census Period _____
 Color Band _____
 Age _____ Sex _____
2nd Brood Final



Part 3: Nest Finding and Monitoring

Nest monitoring provides a direct measure of reproductive performance including clutch size, brood size, nestling condition, and number of young fledged. This method allows identification of important habitat features and insight into habitat requirements, species coexistence, and life history strategies. Determining the outcome of nests allows us to calculate nest survival, and measuring vegetation around nests may help identify habitat characteristics that influence it. This information may provide important insight into vulnerability of species to decimation or perturbation.

A. A caution

It is imperative that our research does not influence the survival of a nest. Hence, we employ field techniques to minimize impacts and measure our disturbance. The following are some general rules:

1. Initial finding of a nest can create the most distress to adults and disturbance to the nest site (depending on stage). Distress calling by the adults should never be allowed to continue for over 5 minutes.
2. Do not approach a nest when California Scrub-Jays, Steller's Jays, or any other potential nest predators are present. Even if no predators are visible, always do "dummy nest checks"; check bushes without nests when approaching and leaving the area of the nest. When checking nests never leave a dead end trail to the nest, and minimize physical disturbance to the area around the nest.
3. You (and one other intern during nestling banding) should be the only person visiting an active nest. Do not allow visitors, friends or photographers to visit active nests unless permission is given.
4. In general, use a pen or "nest dozer stick" to check nests. This prevents your scent from being left on or near a nest.
5. Be quick and accurate during nest checks and nestling banding.
6. Never use flagging or other visible markers to mark nests.
7. After finding a nest, memorize the area and write down a description as to how to find the nest again.

B. Nest Finding

*The following is considered a supplement to the field training you will receive.

The behavioral characteristics and clues described below work effectively for a variety of species. However, all species, and even individuals, differ in nest placement and behaviors near the nest. The patience and alertness of observers, and their familiarity with the habitat and behaviors of species are the most important characteristics used to locate nests. Spend a lot of time in the field, pay close attention to vocalizations, and use the literature to help know the study species.

Several techniques and strategies will aid in finding nests at any stage: Wear dark, natural-colored clothing, and use trees and bushes to help make you less conspicuous. You should walk carefully and quietly, causing as little disturbance as possible. Human disturbances often cause birds to cease their normal behaviors and hide, limiting your chances of observing nesting behavior. Keep a sharp eye and ear out for any movement in the bushes or on the ground. You will often watch moving bushes to determine a bird's location and movements. Where the vegetation stops moving, the nest may be located. When observing a territory for which you have not found a nest, begin by situating yourself in an open or elevated area with a good view. Often by sitting for 20 minutes or so you will eventually see one or both of the parents. It is also useful to move around, using different paths across the territory to increase the probability of encounters. Females can also be detected by call notes, although species differ in the types of sounds. Some females give chip or call notes just prior to leaving, or just after leaving, the nest. This is a contact communication note to the mate, often answered by the male. Take the time to observe and learn the differences in these calls in different species.

In most species nesting on the grids, only the female builds and incubates. Wrentits and wren species are common exceptions to this at Palomarin, with males also partaking in these tasks. The behavioral cues described here as pertaining only to females apply also to males of these species. Additionally, female Wrentits will sing and defend territory.

The most effective way of finding most nests is by locating and following females. If a female disappears into a tree or shrub, the nest is probably in or next to it. Be aware that a female can enter one patch of vegetation and sneak unobserved to a different patch, then after visiting the nest leave by the same route to give the appearance of nesting

in the first patch. Memorize the area where the female disappeared and choose potential nesting sites before approaching. Moving quietly, begin tapping potential nest shrubs with a "nest dozer" stick and listening for a flush if the female is incubating.

In many species, nest site preference seems to be an evolutionarily conservative trait; species prefer their nest to be in particular patch types or fine scale vegetation/structural configurations. Wrentits prefer to nest in California sagebrush where it occurs, but will commonly nest in coyote brush, poison oak, and Douglas firs with appropriate structure) and appear unconcerned about cover from below. Therefore, getting under shrubs and looking up is an excellent method for finding Wrentit nests. Song Sparrows choose locations that have good cover from below such as grass growing up into a bush or blackberry. White-crowned Sparrows in disturbed areas seem to prefer Douglas firs.

Most pairs will make several nesting attempts over the course of a breeding season, resulting in one or two successful broods. After a nest failure, birds will begin to rebuild at a new site within a day or up to a week or more; gridders should check often on a pair that has recently had a nest failure, as they often build quickly, and it is easier (and better data) to find a nest during building than during laying or incubation. After a successful nest, sparrows may begin another brood in as little as 8 days (average is 10), often while the male is still tending to the fledglings of the previous brood. Wrentits may attempt a second brood in about 30 days. Throughout the season you should know the nesting status of every pair holding territories on your grid. This will allow you to anticipate when new nests may be started, leading to more efficient coverage of the grid.

Do not allow disturbance to continue too long without the nest being located, return the following day to gather more clues and locate the nest. The following are additional clues for finding nests at different stages.

1. Building

Finding a nest during building provides the most useful data for survival and number of young. **Look for birds carrying nest material.** Many birds will carry very fine material, not obvious upon casual inspection, such as spider webbing, lichens, and hair for lining nests. Thus you should look closely with binoculars at the bill of any bird you encounter. If you are close to the nest, the bird may not visit the site to build and may even drop nest material. Such behavior is an indication that the observer is near the nest but should move away because disturbance is becoming significant.

2. Egg-laying

This is the most difficult stage for finding nests because the female may only visit the nest when she lays an egg, and lays one egg per day. The female will sometimes sit on the nest during egg-laying when weather is particularly harsh or to try to conceal it when you are nearby. Nest visitation becomes more frequent with more eggs in the nest.

Both parents can be attentive to the nest, checking on it or looking at it when they are nearby. A good cue is a female staying in an area without actively feeding. Copulation often occurs very near the nest, frequently on the same bush or tree.

3. Incubation

The female will seem to "vanish" when she begins incubating, and the male increases singing. Listening for a flush while examining likely nest bushes is the best way to find nests at this stage. If you haven't found the nest, keep track of the time intervals of observing the female. Most passerine females are off the nest for 6-10 minutes and on for 20-30 minutes. If the female has been followed for more than 30 minutes without results, then she probably is not incubating a nest. Since both Wrentit parents incubate, one may sit on the nest for 30 or more minutes, and thus this rule does not apply.

Females may seem to be foraging with more urgency. A long flight after foraging is probably a return to the nest. When the female is off the nest, the male may quietly guard the nest or follow her. Males may use singing perches that are in direct view of the nest, sometimes looking down at it.

4. Nestling stage

Finding nest during the nestling period is the easiest. Both males and females of all species will bring food to the nestlings and remove fecal sacks. Males tend to be less cautious and are easy to follow. However, adults become easily excited during this stage and will often scold loudly. It is imperative that we do not cause excessive distress calling or interfere with the normal feeding routine. If you see a parent drop food you are very close to the nest *and* having an impact on survival. Move back and observe from a distance, then re-approach the area when the parent(s) has left to collect more food.

C. Nest Monitoring

Nests must be checked every 1 to 4 days to determine its status. **Careful attention to checking nests is critical for data quality.** Time your nest checks strategically in order to get the closest possible determination of the following dates, which are major events in the nest cycle: **clutch completion date, hatch date, and fledge or fail date.** Knowing these dates allows you to make the most accurate possible determinations of nest outcome. In the absence of signs of disturbance or definitive clues from parental behavior, timing may be one of your best guides as to nest outcome. **Determining outcome is one of the most important aspects of nest searching/monitoring.** Note for nest checks: checking a nest too often may cause unnecessary disturbance to pair. Check a nest as frequently as is necessary to determine the above mentioned major events (generally every 3-4 days outside of transition periods, and without allowing more than 4 days between checks), but always be aware of how your actions are affecting a pair and the survival of the nest! Don't check nests in inclement weather (e.g., heat, cold, rain) when a parent may need to be on the young or eggs to ensure a safe temperature of nest contents – ask your supervisor if you are unsure about current conditions.

In situations where you are concerned about disturbing a nest during the nestling period and don't want to approach the nest too closely (e.g., nest requires significant disturbance to vegetation to access), consider checking the nest from afar by observing the parents for 15-30 mins to determine whether they are feeding their nestlings. If after 30 mins you have not seen the parents to confirm that the nest is still active, approach the nest to see the contents. Please note: if nestlings are close to fledging age you will want to see the contents of the nest (rather than observing from afar) in order to more accurately determine fledge date. Discuss these situations with your supervisor.

Number of days that nests have eggs or young is used to calculate daily mortality rates, by the Mayfield method (to be discussed). Knowing the date of at least one major nest event, such as clutch completion or hatching, allows us to determine “nest age” upon finding by simply counting backwards, using our knowledge of the “period days” of each species (also see “Describing young” below).

Determining dates

First egg laid or clutch completion date: Birds lay one egg a day. If you find a nest under construction, or during laying, you can easily determine date of first egg or date of clutch completion within 24 hours.

Hatch date: **Nests should be checked more frequently near estimated hatching time.** If a nest is located with a full clutch, it is difficult to predict hatch date. Therefore, nest contents should be checked more frequently. It's hatch day when: You see an egg with hairline fractures or a nestling breaking out of the egg OR only part of the clutch has hatched and the nestlings are still pink and egg-sized, sometimes even rolled up into egg-sized balls OR nestlings are pink and naked and egg-sized, and there may be some shell in the nest. Adult passerines usually carry shell fragments out of the nest immediately after hatching.

Date of fledging or failure: **Nests should be checked the day before expected fledging, and every second day thereafter** if fledging did not look imminent. If fledging does look imminent, check the nest every day, but only approach every other day. You know it is fledge day when nestlings that were in the nest yesterday are seen perched on the edge of or right near the nest OR nestlings are seen exiting the nest OR there are signs of fledging, like fecal matter around the nest and/or a flattened rim and the nest had nestlings in it the day before. Try to find the parents to determine whether they are feeding fledglings or potentially beginning to renest if the nest had failed rather than fledged.

Caution: Nestlings near fledge age may jump from the nest if startled during nest checks. Approach smoothly and quietly, not making sudden gestures or noises. If nestlings do jump (fledge), make a note of it when you record fledge date.

Make a note of KNOWN FIRST EGG, CLUTCH COMPLETION, HATCH, and FLEDGE/FAIL DATES in large letters on the comment line of both the nest cards and the nest record sheets (see Recording Nest Data, below). Enter these dates directly into the computer, rather than letting the nest program calculate them for you.

Methods for checking nests

NEVER APPROACH A NEST WHEN A PREDATOR IS KNOWN TO BE PRESENT. Make a note of it, and return later, when the coast is clear.

Checking understory nests: To reduce human scent at the nest, always use a nest stick to part vegetation. Get in the habit of handling the nest stick only by one end, and wash or rinse your hands after eating, smoking, etc. (note: even though you might look cool, smoking is bad for your health). To minimize impact to vegetation around nest and to

avoid making a direct path to the nest, try using different approaches to the nest. Also, check “dummy nests” (shrubs without nests) on your way to and from the nest in order to fake out predators. Do not make a dead-end trail to the nest.

Checking canopy or other high nests: If you have a high nest of a priority 1 study species (see Chapter 1, part 1) use a mirror pole and, if necessary, a ladder. Nests that are awkward to access may require 2 people to check, one to manipulate the mirror pole, and another to look into mirror with binoculars. Also, check “dummy nests” (in other trees or other locations in same tree) on your way to and from the nest in order to fake out predators, repeating your use of ladder and mirror pole, if used. Do not make a dead-end trail to the nest. Nests that are too high to check with a mirror pole and ladder should be observed from a distance with binoculars, and parental behavior described. When monitoring very high nests or cavity nests you may have to wait up to thirty minutes before observing activity at the nest. For these nests, try re-positioning yourself once or twice before leaving the area. Always indicate on the nest record sheet how long you waited at the nest before leaving the site. There’s a big difference between “No activity observed in 5 minutes” and “No activity observed in 30 minutes.” Return to these nests at least once before assuming it is inactive. If you are observing a high nest, indicate the number of minutes that you observed the nest under the “minutes at nest” column on the nest card. Make sure to reference in the notes section that the nest was observed from afar. *The same should be done for a nest that you choose not to approach during the nestling stage and instead want to check from a distance.

Cavity nests: If the nest is within reach with a ladder, a dental mirror and a flashlight can be used with some cavity nests. Otherwise, we rely on observation of parental behavior to determine status of cavity nests.

Describing nest contents

Only record nest contents when confirmed by direct observation. In the case of nests which you can’t see directly into, describe adult behaviors observed, and avoid jumping to conclusions about nest contents. For instance, an adult bird sitting on a high nest could either be incubating eggs or brooding small young. In this case, write “Adult on nest for 20 minutes, no food carries observed,” rather than “Adult on eggs.”

Whenever you see a bird traveling to its nest with something in its bill, attempt to determine what it is and describe it in a few notes. Food and nest material carries can easily be confused! Keep in mind that some birds (hummingbirds, Bushtits) add material to nests even while incubating or brooding, so don’t assume a nest material carry means an empty nest. Also, in some species, such as cavity nesters, adult birds carry food to their incubating mates. Avoid assumptions about nest contents. Rather, just write something like “Adult observed carrying food into nest cavity.” Later, once the nest is inactive, it may be easier to determine the stage the nest was in by looking back over your notes, and making some simple calculations based upon timing and the nest cycle of the species.

It may sometimes be necessary to flush a “tight sitter” (won’t flush even though you are at the nest). Tight sitters will return to their nests within a minute or two of your departure. If you are uncertain of which stage of the cycle the nest is in, you will need to quickly and quietly flush the bird to check nest contents, unless you are POSITIVE that you know the status (e.g., on full clutch, 4 nestlings, etc.). In general however, you should check the contents of the nests. Exceptions would be nests that are very difficult to get to and/or those where disturbance is difficult to avoid.

DO NOT guess what the nest contents are. If you don’t know, indicate that, and note the situation. Other biologists will refer to your notes, and the more descriptions you make on your nest record sheet to justify your conclusions, the more valuable your data will be.

Describing eggs: Carefully count eggs and make a brief description of patterning and coloration. Some eggs, those of sparrow species in particular, can be easily confused with Brown-headed Cowbird eggs. Develop a sharp eye for egg design from the beginning.

Describing young: It is important to describe nestling development every time nestlings are observed on a nest check. When a nest is located with young, you should estimate age of nestlings (with hatch day age = 1 day old). The following types of notes are suggested for describing nestling development: Are young pink and naked? Are their eyes closed or open? Can they hold their heads up? Do they beg from you when you part the vegetation? Do they have down or pin feathers covering their bodies? Have primary “pin” feathers begun to break from the sheath, looking like little paintbrushes? Are they fully feathered? Alert and jumpy? Sitting upright in nest or snoozing in a pile? As you take more notes and become more experienced observing nestling development, you will become a better judge of their age. Counting nestlings can be challenging: get an accurate count, but if you’re uncertain, note that.

Estimating age of young: It is important to learn how to accurately age nestlings in order to determine accurate hatch dates and banding dates. Nestlings look and develop differently for different species, but the most important indicator for aging all nestlings are the pin feathers on their wings. A few days into development (3-4 for SOS and

5-6 for WREN) pins will begin to emerge from the nestlings wings. Prior to this, wings are fleshy and bare. A few days after the pins have emerged (day 6-7 for SOSP and day 9 for WREN) the end of the pins will begin to break sheath indicating that the bird is nearly ready to be banded. When you come upon a nest with nestlings (during find as well as on subsequent nest checks) **always check the wings of the nestling**. Determine whether or not the pins have emerged or whether the emerged pins have broken yet.

Use A Guide to Nestling Development and Aging in Altricial Passerines to help age nestlings, especially Song Sparrows and Wrentits. A hard copy is available in the library and online at: <http://library.fws.gov/BTP/altricialpasserines07.pdf>.

Identifying cowbird young: Examine young closely...do they all look alike? Brown-headed Cowbird young grow more rapidly and are generally more aggressive in the nest than host young. The size differential should become obvious after the first few days of the nestling cycle, and you might realize that one or more nestlings look weird. For instance:

Cowbird young have flesh colored gape, while Song Sparrows have yellowish-orange.

Cowbird skin is pinkish, while Song Sparrow skin is yellowish.

Cowbird mouth is deep pink, Song Sparrow's red.

Determining outcome of nest

Always describe in a sentence or two how you've determined nest outcome. Take notes on anything and everything you see happening at the nest.

Nest Depredated: Careful and detailed observations should be recorded if a nest predation event is observed or suspected. If a nest is found empty, check the nest structure and immediate area for evidence. Any evidence (e.g., shell fragments, hole in nest, nest torn up) should be fastidiously noted. Always make note of potential predators observed near nests or on nest plots. If the nest is empty and intact with no physical evidence of predation, you may have to rely on timing, based on date of clutch completion or hatch date, to help you determine whether that nest was predated or fledged.

Fledged Young: Immediately prior to fledging, nestlings commonly perch on nest edge, flattening it, and leave fecal droppings. Try to verify fledging by looking for fledglings, listening for adult alarm calls or begging calls of the young. Fledglings normally do not move very far in the first couple of days. Some species or individuals may carry food up to 24 hours or longer after predation of their nest, including to unrelated fledglings from neighboring territories. If you are uncertain whether an empty nest fledged or failed, and you do not see young or parents at the time of the nest check, return to the nest later that day or on the following day to make a final attempt at observing adults with young near the nest.

Failure due to cowbird activity: Copious notes should be provided to substantiate this outcome. Were some or all of the host bird's eggs removed from the nest? Was the host bird ever seen at the nest after parasitism occurred, or do you suspect abandonment? Did the nest, at any point, contain both host young and cowbird young? Did the number of young change over the course of the nest cycle? Once parasitism is suspected, be sure to carefully count eggs and young at each nest check, as surprising events can take place in parasitized nests! Even if all host eggs are removed from the nest upon parasitism, continue to check the nest until well after the expected hatch date, to determine whether the host is still incubating the cowbird egg. See *Describing young* section above for notes on how to tell cowbird young from host young.

Abandoned or deserted nest: You should be really certain before making this determination - in some cases, nests have been observed from laying to fledging with no adult ever being seen! Before giving up monitoring a nest, be certain that eggs are *way* past the point of hatching, or that, in the case of a very high or cavity nest, that adults are *definitely* not visiting the nest anymore. Also, a newly constructed nest may sit empty for a week to ten days before the first egg is laid. When you locate an empty nest, assume it is active and check it discreetly for at least ten days until giving up on it. At some point the nest may start being deconstructed; this would be a good opportunity to find their new nest! If you call a nest abandoned or deserted, explain exactly why you believe it to be so.

Failure due to weather: Describe weather event and how it directly or indirectly affected the nest. Did a cold rainstorm or unusual hot spell occur? Did nestlings die, adult disappear, etc.?

Other mortality factors: Other types of failure observed in past seasons include the following:

Impact of human activities, such as mowing or fence construction - describe activities and any communication that went on with responsible parties, if known

Structural failure of vegetation supporting nest - describe which plants collapsed, at what stage in the nest cycle, and how nest was directly impacted (whether nest contents fell out, nestlings died, eggs broke, adults were seen or not seen at nest afterwards, etc.)

Outcome unknown/uncertain: It is okay if you are uncertain about nest outcome as this is sometimes unavoidable. It is better to call an outcome unknown rather than hazarding a guess. If you have a lot of "unknown" outcomes, take a

look at your monitoring methods, re-read the above segments, and talk to your supervisor about ways to improve your nest monitoring techniques.

The role of natural history writing in nest monitoring Data collection is a process of systematically encoding observations so that they can be entered into data analysis schemes. These schemes are obviously valuable, but they do not necessarily convey the stories of what you are witnessing from day to day. A numeric translation of an event does not necessarily describe all the fascinating incidents, circumstances, patterns, and exceptions to those patterns to which you are privy. These observations are extremely valuable data. These notes will allow other biologists to interpret your work. Natural history writing (even in the form of brief notes) and data collection should accompany and complement one another.

If you feel creatively constricted by the minuscule “comment” lines on the nest record sheets, fill up the back of the page...that’s why paper has two sides! Just be sure that dates accompany all comments.

D. Recording Nest Data

Upon finding a nest, record the following information on the **Point Blue Nest Card**. This is done in the field. You should tape a copy of these codes to your clipboard as a reminder. The nest card contains the following fields:

-Year

-Species: 4 character code for species

-Nest #: the territory number and nest attempt

Together, the Species and Nest # create the Nestid which is typically a 9-character code: the first 4 characters are species code, next 4 are grid number and nest number by unique territory (placing “0” in front of territory 1-9) in order of number found for that species on that particular grid (i.e., WRENG101 for first Wrentit nest on Grid one), the last character is the attempt for a given territory (i.e., WRENG101A for first attempt, WRENG101B for second attempt, etc.). This can be done when you return to the office if you don’t remember the next ID or attempt in order. For polygamous territories (typically males with >1 female), territories should be e.g., G23(1)A and G23(2)A. And if you have a female nesting with more than one male throughout the season (e.g. the first male disappeared; serially polygamous), nest ID with the first male would be written: G12A(A) (with any following attempts written G12A(B), G12A(C), etc.), and with the second male would be written G12B(A) (with any following attempts written G12B(B), G12B(C), etc.).

-Results: this is filled out once the nest becomes inactive

-Obs: initials of the finder

-Loc: this is the grid point location of the nest (see Part 6 Section A under “Entering a new nest” on how to correctly record nest location.)

-Male and Female: this is where you record the color bands of parents (once you are in from the field, verify the combos and add the cohort)

The following information is collected upon find of the nest *and* on subsequent nest checks:

-Date: only month and day is necessary

-Time: this is the time of finding the nest or time of nest check

-Minutes at nest: this refers to the minutes that you were near enough to the nest to cause the parents disturbance (~1 m from nest). Generally minutes at nest will be 1. Cases where minutes at nest may be more is if you are sitting by the nest for a long time without knowing while you search for the nest, or if a nest is particularly difficult to check. If you are checking a high nest, indicate the number of minutes you spent observing the nest from a distance in “mins at nest” and make sure to clarify in the notes, and to mark “nest contents seen” as “N”.

-Nest contents seen: this is a simple Y or N. Contents of the nest may not be seen if the nest is too high to see into or if you decide not to flush a parent (if you suspect you know the contents from previous checks).

-Notes: include adult behavior, description of how you found the nest, and any other helpful or interesting information. When possible, estimate the age of the young for SOSP and WREN young using the nestling aging guide.

-Status/Contents of nest: Indicate the stage of the nest: B for building followed by a number indicating percent built (ex. B75), E for eggs followed by # of eggs (ex. E4), or Y for young followed by # of young (ex. Y3). When you come upon an inactive nest at a nest check, this is also the field in which you indicate the suspected outcome of the nest. See Part 6 Section A under “Entering a new nest” for further explanation.

-Estimate age: If you come upon a nest with nestlings, try your best to get an accurate estimate of the age of the nestlings (in days). See section under “Describing contents” above for how to age nestlings.

-Conspicuous*: (Conspic): how the adults acted around the nest before becoming disturbed. This is a rating of the bird's behavior around its nest prior to becoming disturbed or distressed. Rate the male and female separately.

1 = Extremely elusive and shy. Will not approach the nest with you anywhere around.

- 2 = Somewhat shy.
- 3 = Somewhat conspicuous.
- 4 = Very conspicuous; unconcerned or oblivious to your presence; goes to nest w/ you standing nearby.
- 9 = Parent not detected

-Flush: this is a rating of how close you get to the bird before it actually flushes from the nest.

- 1 = you don't see the bird flush but were reasonably certain that it was on the nest.
- 2 = Flushes when you were 1-3 m away.
- 3 = Flushes when you are within 1 m. Tight sitter.
- 4 = Flushes only upon being nearly touched. Very tight sitter.
- 9 = Not applicable; no evidence that the parent was on the nest or didn't try to flush.

-Distress*: this is a rating of the bird's behavior after it is flushed from the nest or after it is disturbed. Rank male and female separately.

- 1 = Very little disturbance. Bird quiet, moves away silently.
- 2 = Little disturbance. A little distress calling.
- 3 = Moderate disturbance. Repeated distress calling & conspicuous perching behavior, single feign.
- 4 = Very disturbed. Loud alarm calling, or repeated feigning (Wrentits).
- 9 = Parent not detected

*If only one parent is observed and you are unsure which parent it is, write behavior code on the line between the male and female boxes. For data entry, the unknown adults are distinguished by suffix u1 (unknown 1) and u2 (unknown 2) as opposed to the male and female (e.g., consp_m vs. consp_u1).

Record the following information on the **back of the nest card**. This information is only recorded at the time of finding the nest:

Rateabove: Number code rating the degree to which the nest has cover from above.

- 0 = Nothing hiding the nest. Perfectly exposed.
- 1 = Very poorly hidden.
- 2 = Poor to medium hidden.
- 3 = Medium hidden to well hidden.
- 4 = Very well hidden.

Ratebelow: Use the above number codes to rate the degree to which the nest has cover from below.

Rateappr: Ranking of vegetation patch around nest and/or nest bush and how well an adult bird can approach the nest without being observed.

- 0 = Nest bush totally in the open. The bird can only gain access to its nest by a totally exposed flight or walk.
- 1 = Approach very poorly hidden. Only one way the bird can get to the nest without being seen (0 to 25%).
- 2 = Poorly to medium hidden (25 to 50%).
- 3 = Medium to well hidden (50 to 75%).
- 4 = Approach very well hidden. The bird may go to its nest perfectly hidden from virtually any direction (>75%).

Humanpath: Number code for rating a new human-caused path to nest (e.g., the path you have created while finding or checking the nest. Do not rate already existing paths).

- 0 = No path whatsoever.
- 1 = You might detect a footprint or two but it is unlikely another person would notice it.
- 2 = Little to medium path.
- 3 = Medium to large path.
- 4 = Trail created directly to the nest.

Finddist: Number code for rating the amount of disturbance caused to the parents (e.g., amount of distress calling) during the finding of this nest.

- 0 = no disturbance
- 1 = minor disturbance
- 2 = low to medium disturbance
- 3 = medium to high
- 4 = high disturbance

Findmeth: Cues used to find nest (record most useful).

- PB = parent behavior
- F = flushed parent off nest while walking past.
- SS = systematic search.
- NBC = non-behavioral clue.
- L = luck. Found nest without looking for it.
- PY = previous year. Found nest based on knowledge of nest location from previous year.
- YB = young's behavior led observer to nest.

Timespent: Total time spent finding nest (in minutes). Only include time spent the day of finding; include time spent observing parental behavior.

Numparvis: Total number of parental visits during nest finding efforts.

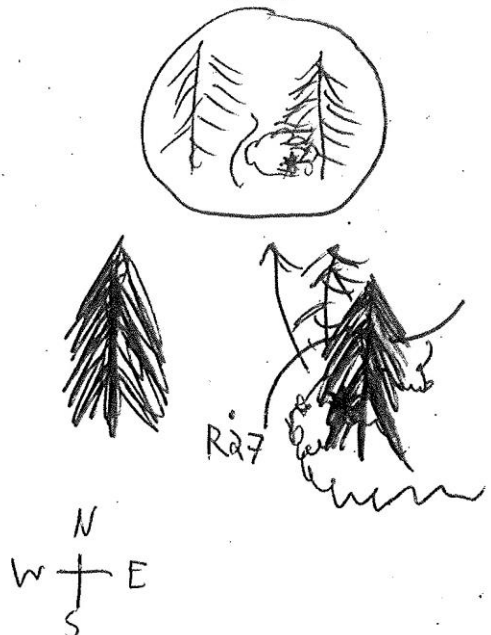
Searchrad: Radius of search area (in meters).

Numprevtry: Number of previous days you have spent time trying to find this nest.

Nest Site Description: Describe the nest site in prose and with a map. This description should be sufficiently detailed to allow anyone to locate the nest. Include information on what species of plant(s) that the nest is located in, how high from the ground the nest is located, how well hidden, etc.

Front and Back of Nest Card

YEAR 2016		RESULTS P4e		MALE OY/RS		CONTENTS B=building E=eggs Y=young	ESTIMATE AGE	CONSPI BEFORE		FLUSH	DISTRESS AFTER		
SPECIES WREN		OBS WJS		FEMALE MYG/s				M	F		M	F	
month	time	min. at nest	nest cont seen (Y/N)										
4/11	9:00	1	Y	Followed material away to nest.		B90	-	2	2	9	2	2	T
4/13	11:50	~2	Y	OY/RS heard singing but not seen		B99	-	9	9	9	9	9	T
4/17	10:35	~2	Y	No individuals heard or seen near nest.		B100	-	9	9	9	9	9	T
4/21	13:05	1	Y	Unknown individual on 1 egg.		E1	-	9	9	4		2	T
4/24	11:10	1	Y	Unknown individual on 4 eggs.		E4	-	9	9	4		1	T
4/28	12:10	1	N	Parent not flushed		E4	-	9	9	9		1	T
5/02	6:55	1	Y	No parents at nest, nest empty		P4e	-	9	9	9	9	9	T

<p>FINDING DATA (circle one) RATE ABOVE: 0 1 2 3 4 RATE BELOW: 0 1 2 3 4 RATE APPROACH: 0 1 2 3 4 HUMAN PATH: 0 1 2 3 4 FIND DISTURBANCE: 0 1 2 3 4 FIND METHOD: F P B L S S N B C Y B P Y TIME SPENT: 120 mins NUM PARENT VISITS: 4 SEARCH RADIUS: 5m NUM PREVIOUS TRY: 3</p>	<p style="text-align: center;">MAP</p>  <p>The map includes a circular inset at the top showing a bird's nest in a tree. Below it is a compass rose with 'N' at the top, 'S' at the bottom, 'E' on the right, and 'W' on the left. To the right of the compass rose is a sketch of a tree with a path labeled 'Rd 7' leading to it.</p>
<p>NEST SITE DESCRIPTION: East of Rd 7 by PISME. Under PISME branch under coffee berry in dense fern .3 m off ground.</p>	

Before going into the field each day, make sure you know which nests need to be checked. Take the appropriate nest cards with you into the field. Every time you check the nest, fill out another row on the Nest Card (date, time, notes, contents, parental conspicuousness, flush distance, parental distress).

The **Nest Record Sheet** remains in the data room at all times, and is the hard copy of the nest data. The nest card is the “field” copy of the data. Be sure to copy all data (finding information and nest check data) from the card to the sheet on the day it is collected. Therefore, if the card is lost or destroyed in the course of field work, no data will be lost. Put a “T” in red ink next to the line of data on the field copy of the nest card to indicate that the data have been transcribed to the nest record sheet, and a horizontal dash in red ink on the line of data on the nest record sheet to indicate it has been entered into the computer. Bringing the card into the field, for all nests that are monitored, ensures that all necessary data is collected in the proper manner. For non-study species whose nests are not monitored (cavity / pendulum / high nests where contents cannot be observed), write “NEST NOT MONITORED” on card/sheet, and file both in office.

Make sure to fill out a line under the “nest checks” section on the nest record sheet on the day that you find a nest in addition to filling out the “finding data” section.

Aside from copying all of the data from the Nest Card onto the Nest Record Sheet, there are a few additional fields that you will fill in on the Nest Record Sheet:

1. In addition to the parents’ **Color combos**, you will also fill out the **Cohort** (year of birth) of both parents (be sure to use the database to confirm that the color combo you saw is correct). Refer to Part 2 Section C for information on how to correctly determine a bird’s cohort.
2. **Results:** use Red ink (fill in on both the Nest Card and the Nest Record Sheet). Use 2-5 character codes for the outcome, i.e.: Fledged, Preyed Upon, Abandoned, and or Parasitized. Examples: F3 = fledged 3 (only host young); FBHCO = fledged cowbird, P4e = preyed upon 4 eggs, A2y = abandoned 2 young; F2P1y = fledged 2 and 1 young preyed upon, P = preyed upon (unknown if eggs or young), W3y = death by weather, 3 young, UNK = nest outcome unknown, no clues as to outcome of nest or nest not re-checked.

The Results at the top of the Nest Record Sheet should include a description of why you believe that to be the result of the nest (ex. 2 fledglings seen; parents seen with food; nest destroyed- suspect failure, etc).

3. At the bottom of the page there is a section for **Closeout precision codes** which will be filled out once the nest becomes inactive and the results of the nest are confirmed. Instructions on filling out precision codes are in Part 6 Section A under “Result Codes”.
4. There is also a section for filling out **First egg, Clutch, Hatch, and Fledge or Fail (Florfa) Dates**. Fill out this information to the best of your knowledge following the guidelines in Part 6 Section A under “Result Codes”.
5. For nests in which nestlings are banded, record the **Color Combinations** and **Band numbers** given to nestlings as well as the **Date** which they were banded.
6. Coordinates of the nest in Decimal Degrees. GPS use detailed in Appendix 6.

Point Blue – Palomarin NEST RECORD SHEET

RESULTS (with description): P2 P2y 2 young dep. before hatching

FINDING DATA	
Date <input type="text" value="3/31/16"/> (date found in d/y)	Time <input type="text" value="0935"/> (time found)
Nestid <input type="text" value="W R E N G I O 2 . A"/> Finder <input type="text" value="MFC"/>	
Findcont <input type="text" value="B90"/> gridpt <input type="text" value="G16A"/>	
rateabove <input type="text" value="2"/> ratebelow <input type="text" value="1"/> rateappr <input type="text" value="2"/> humanpath <input type="text" value="1"/> finddist <input type="text" value="0"/>	(disturbance during finding)
findmeth <input type="text" value="PB"/> timespent <input type="text" value="120m"/> numparvis <input type="text" value="5"/> searchrad <input type="text" value="10m"/> numprevtry <input type="text" value="2"/>	(# of parental visits during finding) (m) (# previous attempts to find nest)
Male color combo <input type="text" value="S/WKR"/> ♂ Cohort <input type="text" value="13"/>	Female color combo <input type="text" value="YOB/S"/> ♀ Cohort <input type="text" value="14"/>
MaleParPre: # (known) * (not known)	FemParPre: # (known) * (not known)

NEST CHECKS

Date	Time	Min. @ nest	Nest cont. seen (Y/N)	Contents: B= Building E= Eggs Y= Young	Estimate young age	Conspic.		F L U S H	Distress		Comments: Describe nestling development (pin feathers, etc), nesting clues (material carry, mate-feeding, fecal sacs, feeding young, noisy babies, nestling size, behavior), signs of fledging, damage to nest, cowbird/host eggs, adult behavior, etc.
						M	F		M	F	
3/31/16	0935	1	Y	B90	-	2	2	0	1	1	No parent on nest, saw MC 71.2 high, large search radius
4/3/16	0800	1	Y	B95	-	9	9	9	1	1	only slightly scaded after approaching nest
4/6/16	0755	1	Y	E 1	-	2	2	9	9	0	parents heard but not seen
4/10/16	1104	1	Y	E 4	-	9	2	4	9	2	parent on nest, heavy dust
4/14/16	1212	1	Y	E 4	-	2	9	4	1	1	YOB/S on nest
4/16/16	0939	1	Y	E 4	-	2	9	4	1	1	YOB/S very chill
4/23/16	0211	1	Y	E 4	-	2	9	4	9	1	YOB/S on nest
4/27	1018	1	Y	Y 4	3	9	9	4	9	1	
4/30	1036	1	Y	Y 4	6	1	9	4	9	1	
5/4	1108	2	Y	Y 2	10	9	1	9	9	2	Banded nestlings; only 2 nestlings in nest.
5/6	734	1	Y	Y 2	12	9	9	9	9	9	
5/9	0933	1	Y	Y 2	15	9	2	9	9	2	nestlings in nest
5/13	0954	1		E 2		9	9	9	9	9	empty nest

Closeout precision codes:	Cownumegg: <input type="text" value="0"/>	Fledgenum: <input type="text" value="2"/>	Firstegg: <input type="text" value="4/6/16"/>	Hatchdate: <input type="text" value="4/25/16"/>
Resultpre: <input type="text" value="4"/>	Status: <input type="text" value="1"/>	Hatchnum: <input type="text" value="4"/>	Flgnumpre: <input type="text" value="4"/>	Frsteggpre: <input type="text" value="1"/>
Prst: <input type="text" value="0"/>	Clutchsize: <input type="text" value="4"/>	Hatnumpre: <input type="text" value="2"/>	Cownumfled: <input type="text" value="0"/>	Clutchdate: <input type="text" value="4/9/16"/>
Cowprst: <input type="text" value="0"/>	Clusizepre: <input type="text" value="2"/>	Cownumhat: <input type="text" value="0"/>	Failcause: <input type="text" value="FY"/>	Cludatpre: <input type="text" value="2"/>
Observer Days (for supervisor use only): D1: _____ D2: _____ D3: _____				

Nestling Information:	Color combo	Band number	Band date
	• OY0/S	23216054A1	5/4/16
	• PS/60	232160542	5/4/16

NEST SITE DESCRIPTION and MAP on back

E. Banding Nestlings

Nestlings of all study species will be banded, and these individuals are known as “locals.” Non-study species will never be banded. – Not all study species nestlings are color-banded (Wilson’s Warbler and Swainson’s Thrush): see special handling notes for instructions. All gridders must receive in-the-field training before banding nestlings. Make sure the nestling banding kit (maroon backpack) has everything you need and everything works (i.e., bands, clipboard, calibrated Pesola or electronic scales, etc). Two people are required to band nestlings, one of which should be an experienced bander. Pick out available color combinations before removing young from the nest, but be aware that smaller nestlings will need to have two bands on each leg, while larger ones can get 3 and 1. Nestlings should be banded when the primaries break sheath (see below). If you band later than this be extra careful that the nestlings (especially Song Sparrows!) do not jump out of the nest (use two hands when removing and replacing them, one to cover the top of the nest and one to do the grabbing). If primary sheath is already broken when the nest is found, nestlings should be banded as soon as possible; however, if the sheaths are more than ~8-10mm broken, consider not banding the nest (we want to avoid force fledging a nest). If possible avoid banding early in the morning or during cold or wet periods. Place all nestlings in one bird bag. Collect the following data: fat, weight, tarsus length, length of longest exposed primary feather (from end of sheath to end of feather) and percentage of feathers that have broken sheaths on (1) head, (2) body (back and under-parts). A small box or plastic cup can make weighing easier. Be careful to examine nestlings closely to determine whether any are Brown-headed Cowbirds. Gridders should enter and proof banding data (skip weather and net hours) for locals on the day it is collected.

<u>Species</u>	<u>Band Day (hatching day = day1)</u>	<u>Band Size</u>
California Scrub-Jay	?(10-12)	3 or 3A or 3B
Wrentit	10	1
Swainson’s Thrush**	? (8-10)	1B
Wilson’s Warbler**	? (7)	0A**
Spotted Towhee	7	1A or 2 (MEASURE THE LEG)
Song Sparrow	7	1 or 1B (MEASURE THE LEG)
N. White-crowned Sparrow	7	1B
Brown-headed Cowbird	same day as host	1B or 1A (MEASURE THE LEG)

**Nestlings of these species should *only* be banded with a silver band ; WIWA nestlings are silver banded on the LEFT leg to allow for more color combo options if they are captured as adults.

Part 4: Trapping and Netting on the Grids

* Check with your supervisor before target netting or trapping on the grids or elsewhere. Always trap or net with an experienced bander

1. Traps and/or special nets can be used to catch and band specific individuals for various purposes (e.g., unbanded study species, excluding SWTH, need to be colorbanded).
2. The two field banding kits that can be used for trapping and netting on the grids are 1) the gridder kit; and 2) the bander off-site kit. Be sure that no one needs these kits before using them. They each contain Random Color Banding Sheets for the Palomarin area.
3. In general, traps should be baited and LOCKED OPEN early in the morning of the day prior to trapping. They should be baited again and SET on the morning of trapping. One large handful of “chick” (not “hen”) scratch” is generally sufficient to bait one four-cell Potter trap. For jays, they should be baited and locked open for longer period, and the bait should be bread, cheetos, or other large/bright food items.
4. Traps (or nets) should be checked about every 15- 30 minutes, or more frequently if conditions are unfavorable. If you are using playbacks, net(s) should be checked very frequently (approx. every 10 min). All birds should be processed IN THE FIELD at the location of capture. On the banding sheet, record location as PA, and Site as the nearest grid stake. A grid map showing all trap and/or net locations should be kept and updated for each grid.
5. If you recapture a color-banded Study Species that is missing one or more bands, try to replace the missing band(s); for former study species, leave them as is. To find out which ones are missing, you should check the original banding record on the computer or look in the notebook listing band numbers and colorbands (the “masterbook”). If you do not have this book (there is one in the gridder kit and the off-site kit) or your bird is not in the book you must make a trip into the data room. This may not be possible if you are trapping away from the banding lab, so be sure to take this book with you before trapping. If you can't replace it with the proper combination let it go as is and keep a list of such birds so that you can replace the missing bands the next time it is captured. NEVER CHANGE A BIRD'S COLOR BAND COMBINATION.

Part 5: Nest Vegetation Measurement or “Veggie” Protocol

A group veggie training will occur as soon as there is an inactive nest. The gridding supervisor will then do a few veggies individually with each gridded. Plant lists with codes can be found where all other forms are filed. They can also be found here: Z:\Terrestrial\programs_and_projects\palomarin\Palodata\Veg\paloveg_resources.

It is important to learn the different plant species as the season progresses, this will ensure that ALL plants are accounted for during vegetation surveys. Ask your supervisor as there are many resources in the library to help with identification.

As soon as a nest becomes inactive (either fledged or failed) and the fledglings have left the area, it is your job to measure the vegetation associated with the nest. Vegetation measurements provide information on types of habitats chosen by species and the consequences of particular habitat choices to nest success. Don't bother doing a veggie for nests never observed active.

For species that may frequently reuse nest material but is not known to reuse the nest itself (e.g. Wrentits), you can tie a small piece of dark green flagging directly underneath a nest upon discovering that it is inactive so that nest vegetation information can still be collected even if the nest is quickly and completely taken apart

There are two parts to a nest veggie: Closeout measurements, done for all monitored nests, which measure vegetation supporting and concealing the nest; and Vegetation measurements, done for Study Species only, which measure the vegetation around a nest within a 1.5 m radius.

Equipment needed to do a “veggie” are: a Point Blue Nest Vegetation Form, densiometer, clipboard, pen, compass, nest stick, Wiens Pole, tiny ruler, GPS unit and a 1.5m quadrant measuring rope.

Be sure to fill in all the info at the top of the sheet (your Initials, date, Nest ID).

A. Closeout measurements

1. Plantht: height of plant (**in centimeters**) that nest is in.
2. Htfrgrd: height to top of nest (**in centimeters**) from the ground. Please note that for nests which you cannot get an accurate measurement to the top of the nest (e.g., in small firs), estimate the height to the nearest half meter (keeping your measurement in cm). For nests that you cannot see or do not feel comfortable making a reasonable estimate, 999 the htfrgrd field and provide a range of height in the notes (e.g. “between 5-7 m up”)
3. dbh: measured diameter (**in centimeters**) at breast height for tree species, and at 10 cm height for shrubs.
4. Dist_edge: shortest distance (**in centimeters**) from the nest edge to the edge of the vegetation it is in, be it vertical, horizontal or diagonal.
5. Plantsp1
6. Plantsp2
These measurements denote the plant species that the nest is in, dominant plant coming first, i.e. if 2/3 of a nest was supported by *Artemisia* and 1/3 by *Baccharis*, plantsp1= ARCA11 and plantsp2 = BAPI
NOTE: Each plant species has a 4-6 letter code denoting its scientific name. These plant species codes (of all the plants of Palomarin) are located in the data room. Ask your supervisor for a list of the most common plants encountered at Palo, as well as an orientation of the various resources (herbarium and binders) that are available to you to help you identify plants that you encounter in the field.
7. Nestcncl1
8. Nestcncl2
The plant species or other substrates primarily responsible for concealing the nest, i.e., a plant that provides cover, but is not necessarily supporting the nest. Use the 4-6 letter codes.
9. Nest dimensions (note: carry a ruler in the field for these measurements and take these measurements as soon as you find the nest depredated or fledged since it's not uncommon for birds to tear apart their nests for re-use):
 - a. Outsidedia: Diameter (at widest point) of nest as measured from the outer edges, **in mm**.
 - b. Insidedia: Diameter (at widest point) of nest as measured from inner edges, **in mm**.
 - c. Outsidedph: Depth (at deepest point) of nest as measured from top to bottom of cup outside, **in mm**.
 - d. Insidedph: Depth (at deepest point) of nest as measured within, **in mm**.

B. Nest Vegetation Measurements

- 1) **Wiens Pole:** Place the wiens pole at nest (directly beside it), making sure it is vertical. Starting at the ground (0-10cm), count the number of times a plant hits the pole in each of the 10cm bins, working your way upwards to the final bin (140-150cm). If a single plant or leaf touches the pole more than once, count each of the touches separately.

For nests that are higher than 150cm, take the same wiens pole measurements (from the ground up to 150cm) directly under the nest.

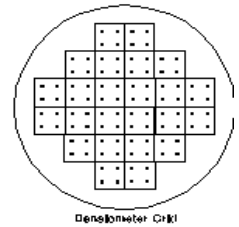
For the remaining nest veg measurements, set up a 1.5 m radius measuring system with a rope extended in each cardinal direction.

- 2) **Cover:** Use the “Cover helper sketches” to help you estimate cover within the 1.5 m radius circle. Sketch in the shapes of shrubs, bare ground, etc. as if seen from directly above. Use these as a tool to facilitate cover estimation. For each of the categories, imagine that all other categories have been eliminated (so that you are only looking at shrubs and nothing else, or PSME, or litter, etc.) – what percentage of the circle is being covered? Estimate the following categories independent of each other. Each of the following categories can individually equal anywhere between 0-100%. The sum of all of the categories will be at least 100%, though often will be more (because you may, for example, have a layer of shrubs covering the entire area of the circle, under which is a layer of litter covering the entire area of the circle).

*Note that for high nests, enter 999s for any information that isn’t known.

- a. **Total Shrub Cover:** Estimate the percent of the area that is covered by shrubs, including Douglas-fir. **A shrub is any plant with woody stems** that does not meet the criteria to be considered a tree (see Tree Data below). California Blackberry, Bracken and Sword Fern, and Hairy Honeysuckle are considered shrubs. Rushes and thistle are not considered shrubs, even though nests may be built in them. Please ask your supervisor if you are unsure if a certain species qualifies as a shrub.
 - b. **True Shrub Cover:** Estimate the percent of the area that is covered by shrubs, excluding Douglas fir. A shrub is any plant with woody stems that does not meet the criteria to be considered a tree (see Tree Data below). California Blackberry, Bracken Fern and Hairy Honeysuckle are considered shrubs. Rushes and thistle are not considered shrubs, even though nests may be built in them. Please ask your supervisor if you are unsure if a certain species qualifies as a shrub. True shrub cover and PSME cover can add up to more than Total shrub cover.
 - c. **PSME Cover:** Estimate the percent of the area that is covered by Douglas fir. True shrub cover and PSME cover can add up to more than Total shrub cover.
 - d. **Forb Cover:** Estimate the percent of the area that is covered by the “forb layer” which includes forb species and all non-woody plants. This also includes grasses.
 - e. **Logs/Stumps:** Estimate the percent of the area that is covered by logs (any fallen dead wood).
 - f. **Litter:** Estimate the percent of the area that is covered by litter (any other dead plant material on the ground).
 - g. **Bare ground:** Estimate the percent of the area that is bare ground (soil/rocks).
 - h. **Water:** Estimate the percent of the area that is water
- 3) **Shrub Data:**
- a. Identify and list the species of Shrubs present in the sampling circle. Use the standard six character codes for each plant species. Include any plant species whose foliage is within the circle (even if the stem is outside of the circle). Make sure that you know the difference between forbs, shrubs, and trees.
 - b. For each of the shrub species listed, measure the lowest (the top of the living foliage of the lowest individual of each species) and highest (top of the living foliage of the tallest individual of each species) and estimate the average height in the sampling circle. All measurements in cm.
 - c. Count the number of stems of each species at 10 cm from the ground. Thus, if a single stem divides into two stems below 10 cm it is counted as two, but if it divides above 10 cm it is counted as one. For blackberry species (e.g., *Rubus ursinus*), estimate stems to the nearest 10.
 - d. Estimate the percent of the total Shrub cover that is made up of each species. Because they are proportions of the total shrub cover, the estimates of percent cover should add up to 100%. Please note that this is not a measure of the proportional 3 dimensional area of each of the shrub species, but rather a measure of the cover of each species as seen from directly above (i.e. if one of the shrub species is especially dense and bushy, this does not, necessarily, contribute to it having a higher proportional cover).
 - e. For high nests that you are unable to get accurate heights for the various shrub species, provide the species of shrubs that are present in the circle, but enter 999s for any information that is unknown.
- 4) **Forb Data:**
- a. Identify and list the species comprising the forb layer within the sampling circle. Use the standard six character codes for each plant species. Generally, only forb species covering more than 5% of the circle are listed individually, and grass species are often lumped together as annuals or perennials. If there are several different forb species that individually make up <5% but combined make up >5%, refer to this lump of species as “FORB” in the forb species column of the forb data. Unknown grass species can be lumped together as “UGRAS” (or “PGRAS” or “AGRAS” if you can identify as perennials or annuals). An unknown forb species that makes up >5% can be called UFORB or FORB1, FORB2, etc, (if you have more than one unknown forb species each making up >5% of the circle).

- b. For each line of the forb species data (be it an individual species or a lumped species category such as FORB or UGRAS), measure the lowest (the top of the living foliage of the lowest individual of each species) and highest (top of the living foliage of the tallest individual of each species) and estimate the average height in the sampling circle. All measurements in cm.
 - c. Estimate the percent of the total Forb cover that is made up of each species. Because they are proportions of the total forb layer cover, the estimates of percent cover should add up to 100%.
- 5) **Tree Data:**
- a. List all species of trees present within an 11.3 m radius of the nest (note this is a larger radius than for the other vegetation data). **Individual trees should only be included here if they are at least 5 m in height, have a diameter at breast height (dbh) of at least 8 cm, and the trunk itself is inside the 11.3 m radius** (i.e., those trees with just foliage in this circle are excluded; note, this is a different approach than used for the PSME shrub category, above, in which the trunk/stem does not need to be in the circle).
 - b. Count the number of trees that fall in to each dbh size category, and the number that are snags (dead trees that are self supporting; becomes a log when it is no longer self supporting).
- 6) **Canopy Cover:**
- a. Use a densiometer to measure the canopy cover in the middle of each of the four quadrants around the nest.. Stand with the densiometer at hip height (elbow to your side with forearm extended and the densiometer in your palm). Make sure that the densiometer is level using the leveling bubble below the mirror. The densiometer is a convex mirror with a grid of 24 squares etched into it. Imagine 4 uniformly spaced dots in each square of the grid, as illustrated (see figure below), and count the number of dots covered by vegetation. When percent canopy cover is high, it is easier to count dots not covered and subtract the total from 96. Always record number of dots covered, not number uncovered. Do not break the squares into 4 imaginary squares and try to decide if each one has greater or less than 50% cover. The 4 squares within a square method introduces bias because individuals tend to decide close calls more frequently in one direction than another. Avoid counting trunks as cover when possible, particularly when they make up a substantial portion of the cover. Step away from the trunk if necessary.
 - b. Also record the height range (in m from the ground) of the vegetation reflected in the mirror for each densiometer reading. The low of the range will never be below your hip height (~1 m). For lower vegetation for which you can get a more accurate measurement, measure in m to one decimal place. For higher vegetation (i.e. tall trees) measure to the nearest meter or half meter. (If you cannot access a quadrant to take a densiometer reading, then enter “999” in the data box.)
 - c. Canopy Height: This is used for nests that have trees (>5m tall, DBH >8 cm) within 11.3 m of the nest. Choose a point in the canopy that represents the average height of the top of the canopy within 11.3 m of the center of the plot (i.e. ignore lone trees that emerge above the main canopy when taking this measure). Estimate the average height in meters.



Vegetation data should be entered onto the computer and **proof-read**. Please see your supervisor for more information.

Point Blue Nest Closeout and Nest Vegetation Form Initials KDS Date 06/07/2016

Nest Id: W R E N G 2 0 2 B Palomarin 2016
 GPS Loc: Datum

CLOSEOUT DATA

Plantht (cm) 125 Htfrgrd (cm) 88 DBH (cm) 2.5 Dist_edge (cm) 33
 Plantsp1 BAPI Plantsp2 TODI Nstcncl1 BAPI Nstcncl2 RUUR
 Nest size measurements (all in mm)
 Outsidedia 60 Insidedia 42 Outsidedph 62 Insidedph 34

NEST VEGETATION DATA

Wiens Pole

0-10 cm	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
2	0	2	3	0	3	4	2	4	2
100-110	110-120	120-130	130-140	140-150					
5	0	1	0	0					

Cover:

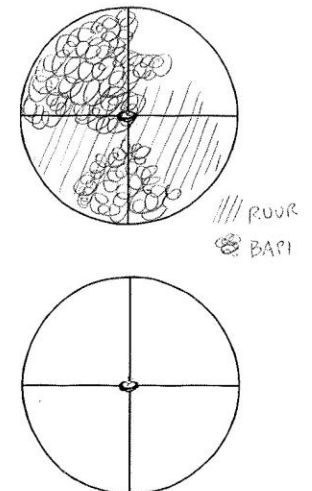
Total Shrub Cover	True Shrub Cover	PSME Cover	Forb Cover	Logs/Stumps	Litter	Bare Ground	Water
95	95	0	12	0	100	0	0

Canopy Ht (m) 7

Shrub Data:

Shrub Species (woody plants)	Avg. Ht (cm)	Range (cm)		# stems (count at 10cm)	% cover (relative)
		Low	High		
BAPI	130	50	177	2+2+2+3=9	50
TODI	140	70	190	15+16+13+1=45	10
RUUR	100	15	140	49+10+36+8=103	40

Cover helper sketches



Forb Data:

Forb Species (all non-woody plants)	Avg. Ht (cm)	Range (cm)		% cover (relative)
		Low	High	
JUNC	80	20	115	40
UGRAS	135	135	175	33
FORB	2	1	5	27

Tree Data:

Number of Trees within 11.3 m radius plot . Trees must be at least 5m tall with DBH ≥ 8 cm

Tree Species	8 – 23 cm DBH	23 – 38 cm DBH	> 38 cm DBH	Snags
PSME		1		

Canopy Cover:

Densiometer readings, taken in middle of each quadrant, and range (in m to 1 decimal pt) for veg. shown in densiometer

	dens	range		dens	range		dens	range		dens	range
1	10	2.5 - 7	2	16	1.2 - 3.5	3	31	1.2 - 7	4	46	1.2 - 1.8

C. Transect Vegetation Protocol

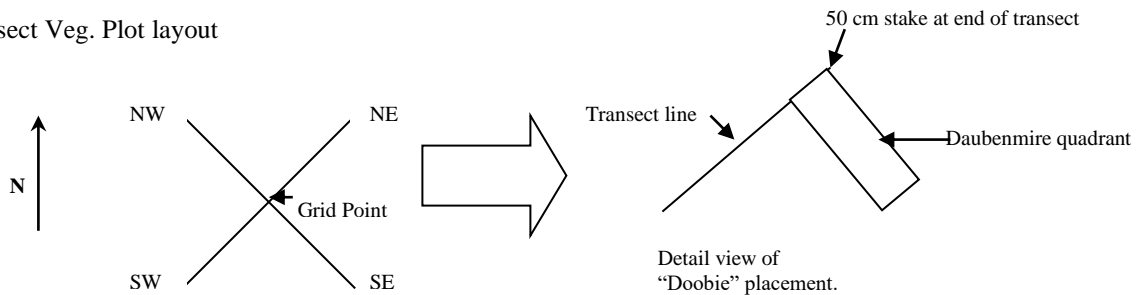
Since 1981, field biologists at Palomarin have been collecting standardized vegetation transect data. This allows a better understanding of how the structure and composition of the plant community at Palomarin has changed over time, and how this change or lack of change effects bird populations and communities. Eight line transects are completed each breeding season at permanent grid point locations (Table 1). This data is collected in the first week of July by both the gridders and banders. Data were not collected in 1986, 1987, 1988. In 1981, 2000, and 2008, an additional 32 transects were measured (Trees and Shrubs only). See grid metadata for more information.

Table 1: Plot locations and 5 meter “doobie” direction

	Plot location	5 meter
Grid 1	B3	NE
	D12	SW
	E8	SE
	G18	SW
Grid 2	J16	NW
	M9	NE
	P10	NW
G4	N23	SW

Each grid point becomes the center point of the plot with 4 transect lines extending 10 meters northeast, northwest, etc. (see figure below). There is a 50 cm. rebar at the end of each 10 meter transect as well as an additional one at 5 meters in a single direction, specified in Table 1. Information is collected on Forbs, Shrubs, and Trees, each with a unique and specific methodology which is explained below. All data should be recorded on the Palomarin Vegetation Transect Data Sheet. Bring survey flagging to mark any rebar stakes that are difficult to find.

Transect Veg. Plot layout



Forbs

Forbs are sampled at all five 50 cm rebar stakes described above. The “doobie” (Daubenmire quadrat) is placed pointing clockwise (if looking down from a bird’s-eye-view), short side against the transect line and with the rebar stake nestled in the outside corner of the quadrat. A forb is any non-woody (herbaceous) plant. Measure the following information:

- i. Record the forb species using the standardized 6 letter scientific code (USDA6). For unknown forbs, collect a specimen outside the “doobie” area and identify it with your available resources at Palo.
- ii. Measure the percent coverage of each species in the “doobie” at three heights (1) on the ground, (2) at 30 cm and (3) at 60 cm. Also, record percentage of litter, bare soil, and water at ground level. Each height measure should be recorded separately in the specified column on the data sheet. Percent values do not need to sum to 100%, round down or up accordingly.
- iii. Each plot has an extra “doobie” at 5-meters in a transect line direction that is specified in Table 1 and marked with rebar. The above forb information should also be taken at this stake.

For measuring both Shrubs and Trees, extend a meter tape from the center rebar (grid point) to the 10-meter 50 cm. rebar, making sure to run it through rather than over any vegetation to get it in as straight a line as possible. To save time, do Shrubs and Trees together for each direction, then move to the next direction. Record all individuals intersecting the transect (crossing the tape). Similar data are taken for both Shrubs and Trees (see below for additional data taken for each):

- i. Record species using the standardized 6 letter scientific code (USDA6).

- ii. For **every** individual that crosses the tape (even if it's just one little branch) take a linear measurement from the first crossing to the last crossing. Measure in meters to the closest cm. Consider blackberry clumps as one individual.

Shrubs:

A shrub is defined as any woody plant less than 5 meters tall. Here we are recording data for **individual shrub plants** along the transect line. Note that some shrubs can only be included as a clump (e.g. blackberry). For Shrubs also record the following information:

- i. The percent of the plant alive (record 0 if plant appears to be dead or with no live foliage)
- ii. Record maximum height of each individual intersecting the transect (regardless of whether or not the maximum height is on the transect line). This measurement is taken in meters to the nearest cm.
- iii. Measure perpendicular width of each individual at widest point.

Trees:

A tree is defined as a woody plant greater than 5 meters tall and with a diameter at breast height (dbh) of at least 8 cm. For Trees also measure the following:

- i. DBH measured for each trunk, or of largest trunk for clumps (measured in meters). A clump of trees functioning as one tree is counted as one tree. Separation of clump into individual trees is determined by the ability to walk between the trees.
- ii. Record the maximum height of each individual tree (regardless of whether or not the maximum height is on the transect line). Only one measurement if a clump.
- iii. Record number of trunks divided at the ground within a tree clump.

D. Other vegetation protocols

- i. Net Vegetation measurements: Completed in 2007, next scheduled to be done in 2013 and 2018. See end of Landbird Biomonitoring Program chapter for details.
- ii. Habitat Structure Assessment (HSA) measurements: This MAPS protocol describes habitat at each of the banding site. It was completed in 2006, 2012, and 2017, and is next scheduled to be done in 2022. See end of Landbird Biomonitoring Program chapter for details.

Palomarin Transect Vegetation Data Sheet

GRID 2 POINT M9 PERSONNEL SJ et al DATE 7/5/07

All measurements should be in cm. unless otherwise stated.

HERB				SHRUB							
	Species	0 ft.	1 ft.	2 ft.		Species	% Alive	From	To	Ht.	Width
NE	Litter	85	-	-	NE	BAPI	80%	85cm	215cm	94	132cm
	Ground	15	-	-		BAPI	70	218	302	150	200
colbump yarkan B	HELA 4	3	3	3		BAPI	20	403	411	120	100
	SACH 11	8	-	-		BAPI	40	402	402	120	130
						BAPI	60	403	446	35	30
						BAPI	70	516	554	90	50
						BAPI	30	549	575	55	30
						BAPI	50	567	573	80	125
						BAPI	60	594	598	100	90
						BAPI	40	590	642	60	50
						BAPI	50	609	657	80	80
SE	litter	100	-	-	SE	RUR	55	14	521	85	950
honey suckle		20	7	3		BAPI	45	416	571	125	115
	grass	30	35	3		BAPI	30	573	640	80	90
	vc+mos	2	2			BAPI	60	638	650	98	113
						BAPI	30	650	757	110	145
						BAPI	40	747	849	110	150
						BAPI	10	967	1000	45	55
SW	litter	100	-	-	SW	RUR	50	45	424	78	490
honey	1	10	2	0		BAPI	25	92	334	120	70
	Grass	5	8	1		BAPI	20	216	251	84	47
						BAPI	0	326	362	60	48
						BAPI	35	409	532	83	130
						RUR	30	517	649	52	450
						BAPI	15	586	644	100	290
						BAPI	85	665	700	50	21
						BAPI	25	685	789	95	85
						RUR	70	727	800	16	70
						BAPI	40	847	931	160	158
NW	Litter	100	-	-	NW	BAPI	35	40	95	53	70
	SACH 11	8	0	0		BAPI	20	44	139	65	80
						RUR	80	119	182	25	30
						BAPI	70	205	206	30	11
						BAPI	40	213	223	60	50
						BAPI	30	227	241	48	80
						BAPI	25	251	265	45	35
Dir.	5 Meter Doobie					RUR	60	198	426	70	270
NE	Bare ground	10	0	0		BAPI	50	289	392	85	50
	Litter	90				BAPI	20	450	537	130	70
HOLA	Net grass	3				RUR	70	480	836	120	410
	Grass	40				BAPI	40	552	655	120	100
	CHPO	20				BAPI	40	656	837	160	130
	HELA 4 ^{cow}	1				BAPI	30	850	890	80	55

Modified July 2006: Changed format of "Trees" and moved to rear side. Took up new space on front with more "Shrub" rows for each direction. Removed "ft./inches" on shrub Ht. and Width. Added "All measurements should be in cm. unless otherwise stated." Removed "Any Extra Herbs". Added heading to rear side. Added "Form saved at", below.
Form saved at Z:\Terrestrial\management_general\forms_and_protocols\transect_veggies

Part 6: Nest and Nest Vegetation Data Entry Protocols

A. Entering Nest Data

Enter data for every nest on the day it is found and/or checked. This will enable the Nest Check Schedule and proofing procedures to be accurate and efficient.

You must enter ALL nest find and nest check data for the Nest Program to work properly.

To Enter a New Nest:

1. Open FoxPro. Select Program>Do, then navigate to z:\terrestrial\programs_and_projects\palomarin\palodata\nest\annual_data\[year]\[grid]. Then select nest2M_PALO.FXP. (Make sure List Files of Type is set to program) This will take you to the nest program main menu.
2. Select "Enter new nest" from the main menu
3. Enter data, referring to the **Nest record fields** section of the **Protocol for Point Blue nest data entry** outlined below.
4. Push "Ctrl + End" to save and return to main menu.
5. Select "Edit nest-check data" from the main menu.
6. Enter the Nestid for the new nest that you just entered. The nest program creates a nest check with the data that you entered under "Enter new nest", however there is additional information that you will need to enter here.
7. Enter data in the fields that have been left blank on the nest check.
8. Push "Ctrl + End" to save and return to main menu.
9. Once finished entering new nests, select "Exit nest program"

To Enter nest checks:

1. Open the Nest program following step 1 above
2. From the menu, choose "Enter nest checks."
3. Enter data, referring to the **Nest Check fields** section of the **Protocol for Point Blue nest data entry** outlined below.

To Display nest check schedule:

This function helps you keep track of when you need to check each nest.

1. Open the Nest program following step 1 above
2. From main menu screen, choose "Display Check Schedule". The computer will display a list of all active nests and how many days it has been since last checked.

Protocol for Point Blue nest data-entry

* Point Blue uses one database structure for all nest data from different projects; therefore you will see some fields when entering data that we don't collect data for at Palo. These fields are marked with brackets around them. Leave these fields blank when entering data. Fields marked with an asterisk are used only at Palo.

Mark each of your nest record sheets (or portion thereof) as entered with an E, or each line of data with a horizontal red line next to the first field, indicating entered. See below for how to indicate proofing status.

Nest record fields

Date: Date nest was found, month/day/year (e.g. 04/27/2001).

Time: Time that nest was found, 24 hour format (e.g. 1400 = 2 pm).

Nestid: 9 character code identifying specific nest. First 4 characters are species code, next 2 are grid/plot (Palo grids are 2 characters, i.e. G1), next 2 are nest number for given species, and the last character is the attempt (i.e., A for first, B for second, etc.). Examples: SOSPG101A.

Finder: Initials of person who found the nest.

Findcont: This is a 6 character field to describe the contents of this nest when found. Must be entered in the following format: First character (B, E, Y, P, O) is for the most advanced contents of nest – note that E and Y only refer to natal eggs and natal young (if found with BHCO, this information will be filled out in the nest check entry associated with the nest find). The next characters are for number of eggs or young, or percent built in the case of nest building.

Examples: B40 = found building 40% complete; B100 = found completely built; E4 = 4eggs; Y2E1 = 2 young 1 egg; Y4 = 4 young; PY2 = found during predation of 2 young; OeU = found empty used (*note: OeU is not typically used at Palomarin anymore because we don't fill out nest cards for old nests; this is used at other projects, in special cases, or may be in database for historic years).

- Please note that there is a difference between the way that result codes and find contents are written. The order of numbers and letters, as well as the use of uppercase vs. lowercase is important.

[**Locdir:** Compass direction (in degrees) to same reference point.]

***Gpoint:** 6 character code for location of nest on Palo grids, e.g.: D2 13c. If location is right on a grid line, enter 0, i.e., F 17 should be entered as F0 170; F7 should be entered F0 070.

***Maleparent:** 5 characters for colorbands of male parent, such as "KKW/S".

***Maleparpre:** Character for precision to which male parent is known. Usually "#" for absolutely known. Use "*" if there is some reason to question the identity of individual.

***Maleparco:** 5 characters for male parent's cohort (the year they hatched). Include "L" at the end of the cohort for local birds.

***Malecopre:** Character for precision to which male parent's cohort is known. "#" for exact, "*" for "at least" (same as parenthesis on your maps and write-ups).

***Femalepar:** 7 characters for colorbands of female parent, such as "KKW/S".

***Femparpre:** Character for precision to which female parent is known. Usually it will be "#" for absolutely known. Use "*" if there is some reason to question the identity of individual.

***Femparco:** 5 characters for female parent's cohort (the year they hatched). Include "L" at the end of the cohort for local birds.

***Femcopre:** Character for precision to which female parent's cohort is known. "#" for exact, "*" for "at least" (same as parenthesis on your maps and write-ups).

Rateabove: Number code rating the degree to which the nest has cover from above.

0 = Nothing hiding the nest. Perfectly exposed.

1 = Very poorly hidden (<25%).

2 = Poor to medium hidden (25 to 50%).

3 = Medium hidden to well hidden (50 to 75%).

4 = Very well hidden (>75%).

Ratebelow: Use one of the above number codes to rate the degree to which the nest has cover from below.

Rateappr: Ranking of vegetation patch around nest and/or nest bush and how well an adult bird can approach the nest without being observed.

0 = Nest bush totally in the open. The bird can only gain access to its nest by a totally exposed flight or walk.

- 1 = Approach very poorly hidden. Only one way the bird can get to the nest without being seen (<25%).
- 2 = Poorly to medium hidden (25 to 50%).
- 3 = Medium to well hidden (50 to 75%).
- 4 = Approach very well hidden. The bird may go to its nest perfectly hidden from virtually any direction (>75%).

Humanpath: Number code for rating a new human-caused path to nest (e.g., the path you have created while finding or checking the nest. Do not rate already existing paths).

- 0 = No path whatsoever.
- 1 = You might detect a footprint or two but it is unlikely another person would notice it.
- 2 = Little to medium path.
- 3 = Medium to large path.
- 4 = Trail created directly to the nest.

Finddist: Number code for rating the amount of disturbance caused to the parents (e.g. amount of distress calling) during the finding of this nest. Rate together.

- 0 = no disturbance
- 1 = minor disturbance
- 2 = low to medium disturbance
- 3 = medium to high
- 4 = high disturbance

Findmeth: Cues used to find nest (record most useful).

- PB = parent behavior
- F = flushed parent off nest while walking past.
- SS = systematic search.
- NBC = non-behavioral clue.
- L = luck. Found nest without looking for it.
- PY = previous year. Found nest based on knowledge of nest location from previous year.
- YB = young's behavior led observer to nest.

Timespent: Total time spent finding nest (in minutes). Only include time spent the day of finding; include time spent observing parental behavior.

Numparvis: Total number of parental visits during nest finding efforts on the day of find.

Searchrad: Radius of search area (in meters).

Numprevtry: Number of previous days you have spent time trying to find this nest

Nest Check fields

The following fields are entered each time that you enter a nest check.

Nestid: Use the same Nestid as when you first entered the nest.

date: date of nest check.

time: time of nest check (24 hour format).

min at nest: This is a numeric field for minutes spent at the nest (in roughly a 1m proximity; i.e., close enough to cause distress to the parents or a response from a predator). For most checks this should be only 1 minute, but difficult to access ones or ones with content that is hard to see may take longer. For high nests, record the number of minutes that you spent watching the nest to try to determine the nest stage, and make sure to record "N" for nest contents seen.

contseen: This field should be filled with either a Y or N. If the nest is too high to see the contents, or you are checking the nest in between stages and decide against flushing a parent from a nest (so you don't see the contents), then enter N. Otherwise, you should be looking at the contents of the nest during most checks.

status: 6 character field for the contents of, or apparent status of this nest when checked. When the nest is active this should be filled with either a B for building/built, E for eggs, Y for young, followed by a number indicating percent build or number of egg and/or young. When the nest is no longer active this field should be filled with a P for preyed upon, A for abandoned, or W for weather related failure, followed by the number of E (eggs) or Y (young) that were preyed upon (or abandoned, etc.). Follows similar rules as **findcont** above, in NEST RECORD FIELDS.

nyage: age of young (host, not cowbird) in days, with hatch day = 1. Only necessary if nest is found with young. Enter a 0 in this field if the nest is being built or incubating.

cowstat: Same as **status** above, except for cowbirds only.

cyage: age of cowbird young in days. Only necessary if nest is found with cowbird young.

conspic_m(or f,u1,u2): four different fields (with values 1 – 4) for the conspicuousness of the parents when the nest is checked. Enter 9 for no data or parent not detected. See Part 3 Section D on page 17 for more detail.

distress_m(or f,u1,u2): four different fields (with values 1 – 4) for the distress of the parents when the nest is checked. Enter 9 for no data or parent not detected. See Part 3 Section D on page 17 for more detail.

To Enter Closeout data:

Toward the end of the season, gridders assess all of the nests that were found on their grid to determine various aspects of the outcome of each nest. This information is filled in on the nest record sheet and then entered into the nest program.

1. Open the Nest program following step 1 outlined on page 31.
2. From main menu screen, choose “Close-out nest(s) (requires nest checks)”. You can either closeout a nest individually or choose to closeout all of your nests at once.
3. Enter data, referring to the **Result Codes** and **Nest Closeout and Proofing Codes** sections outlined below. Make sure that all of the information is filled in on the nest record sheet before entering the data into the nest program. Additionally, if you have exact dates for clutch complete, hatch day, or fledge day enter these prior to closing out the nest referring to the **Dates and Date Precisions** section on page 38.

Result Codes

Results: 20 character field for the confirmed outcome of this nest. This field is a series of letters and numbers describing the outcome (fledged, parasitized, preyed upon, abandoned, weather related failure, or unknown) and stage (natal young, cowbird young, eggs, or neither) of the nest when it is found to be inactive. Examples of various results are outlined below.

*If there are multiple outcomes, report fledging first (if applicable)

Result prefix:	Example:	Definition of scenario:
F – fledged	F3	Fledged 3 natal young
	FBHCO	Fledged cowbird
	F1F1BHCO	Fledged 1 natal young and 1 cowbird
	F2P1y	Fledged 2 natal young, 1 natal young preyed upon
P – preyed upon	P3y	Preyed upon 3 young
	P4e	Preyed upon 4 eggs
	P	Nest preyed upon (unknown if eggs or young- time of predation event was too close to hatch date to determine which)
	Pe	Preyed upon with an unknown number of eggs (hadn’t yet observed complete clutch)
	Py	Preyed upon with an unknown number of young (observed nest with at least one nestling, but more likely hatched before predation event occurred)
A – Abandoned	A2y	Abandoned 2 young
	A4e	Abandoned 4 eggs
	AB	Abandoned prior to eggs
W – Weather	W3y	Death by weather 3 young
O – Other	O	Failure caused by trampling by cattle/humans, or other event not explained by predation, weather, ,or abandonment
UNK - Unknown	UNK	Nest outcome unknown (e.g., findcont=OeU), no clues as to outcome of nest or nest not re-checked.

*Please note that there is a difference between the way that result codes and find contents are written. The order of numbers and letters, as well as the use of uppercase vs. lowercase is important.

Resultpre: Character code for precision to which the *result* (as determined above) of this nest is known. When there is more than one result (e.g. F3P1y) the resultpre corresponds to the first reported outcome (e.g. resultpre corresponds to the precision of fledging for a nest with the result F3P1y).

1 = all fledglings seen, or predation observed, or abandonment indisputable (refer to failcause for definition). Use when you have clear and complete evidence to support the result.

- 2 = at least 1 fledgling or dead nestling seen, or egg fragments seen, or nest disturbed supported by timing. Partial, physical evidence to support the result.
- 3 = failed – nest found empty and timing makes fledging of the nest impossible (including if failed with eggs but above categories do not apply; do not use if nestlings had any chance of “jumping”). No physical evidence but result is clear because of timing.
- 4 = repeated food carries by the adults suggests success, or timing of next attempt suggests either success or failure (varies by species). Suggestive evidence supports the result.
- 5 = timing suggests success (nestlings seen within 3 days of predicted fledge date), supported by physical evidence (nest empty and intact, poop on sides).
- 6 = adults distress calling or giving no evidence of fledglings. Small amount of suggestive evidence to support the result.
- 7 = uncertain; nest empty with no disturbance, no clues from adult behavior or timing.
- 8 = unknown (e.g. nest not rechecked; nest found after use).
- 9 = no data

*If there are multiple outcomes, Resultspre refers to the chicks that fledged (if applicable)

Nest Closeout and Proofing Codes (see “Dates and date precision” below *before closing out your nests*)

Prst: (Predation status) Numeric code for timing of failure due to predation, parasitism, or abandonment, or fledging, or results unknown (refers to natal eggs/young only - see Cowprst below).

- 0 = not applicable (fledged at least 1 natal young or results unknown- these two scenarios distinguished from one another based on other result fields)
- 1 = preyed upon during laying.
- 2 = preyed upon during incubation, or holes in egg(s)
- 3 = preyed upon during nestling phase.
- 4 = abandoned prior to any eggs.
- 5 = abandoned during laying stage (includes weather, trampling, other) or natal eggs fail due to parasitism.
- 6 = abandoned during incubation stage (includes weather, trampling, other) or natal eggs fail due to parasitism.
- 7 = abandoned during nestling stage (includes weather, trampling, other) or natal young fail due to parasitism.
- 8 = probable predation timing unknown.
- 9 = probable fledging timing unknown.

Cowprst: Numeric code for timing of predation, fledging, or abandonment of Cowbird eggs or young.

- 0 = fledged at least 1 Cowbird young, or no cowbirds (these two scenarios are distinguished from one another based on the other cowbird fields).
- 1 = preyed upon during laying.
- 2 = preyed upon during incubation.
- 3 = preyed upon during nestling phase.
- 4 = abandoned prior to any eggs.
- 5 = abandoned during laying (includes trampling, lightning strikes, etc.).
- 6 = abandoned during incubation stage (includes trampling, lightning strikes, etc.) or cowbird eggs don't hatch but natal eggs do.
- 7 = abandoned during nestling stage (includes trampling, lightning strikes, etc.) or cowbird young don't fledge but natal young do.
- 8 = probable predation timing unknown.
- 9 = probable fledging timing unknown.

Broodstat: Character code for brood number, “brood status”

- 1 = 1st known brood attempt
- 2 = 2nd, 3rd, 4th, 5th, 6th attempt at 1st brood
- 3 = 2nd brood attempt (first known attempt for the 2nd brood)
- 4 = 2nd, 3rd, 4th, attempt at 2nd brood
- 5 = 3rd brood attempt
- 6 = 2nd, 3rd, attempt at 3rd brood
- 7 = 4th brood attempt
- 8 = unknown brood attempt
- 9 = no data

Clutchsize: Size of the completed clutch (host eggs only) based on observations of nest or published or local information. Enter average local clutch size for nests that you are unsure of clutch size (unmonitored nests, high nests, cavity nests, etc) and enter 0 for a nest that failed prior to lay.

Clusizepre: character code for precision to which the *Clutchsize* is known.

2 = found on or before laying and complete clutch observed.

4 = same # of eggs (full clutch) observed at least twice

5 = number of eggs counted only once after female flushed.

6 = estimate based on brood size or single observation of a normal full clutch.

7 = nest contents never observed; estimate based on published or local data.

8 = unknown.

9 = no data/not applicable

Cownumegg: Number of cowbird eggs.

Hatchnum: Number of host eggs that hatched in this nest. Enter average local clutch size for nests that you are unsure of hatch number (unmonitored nests, high nests, cavity nests, etc) and enter 0 for a nest that failed prior to hatching.

Hatnumpre: Character code for precision to which the *Hatchnum* is known.

2 = observed prior to and after hatching.

4 = estimate based on observed brood size.

5 = estimate based on brood size observed late in nestling period only.

6 = estimate based on number fledged.

7 = nest contents never observed; estimate based on published or local data.

8 = unknown

9 = no data/not applicable

Cownumhat: Number of cowbird nestling

Fledgenum: Number of host fledglings from this nest. Enter average local clutch size for nests that you are unsure of fledge number (unmonitored nests, high nests, cavity nests, etc) and enter 0 for a nest that failed prior to fledging.

Flgnumpre: Character code for precision to which the *Fledgenum* is known.

2 = all fledglings observed or seen leaving the nest.

4 = estimate based on observing and counting all nestlings within 4 days of the fledge date.

5 = estimate based on single count of brood more than 4 days from fledging.

6 = estimate based on observed clutch size.

7 = nest contents never observed; estimate based on published or local data.

8 = unknown.

9 = no data/not applicable

Cownumfled: number of cowbirds fledged.

Failcause: Two character code for cause of failure, if any. If successful, choose FY or FB as appropriate.

UN = unknown because not revisited

FY= at least 1 young seen leaving or in vicinity of nest or colorbanded young seen or caught in nets

FB = adults behaving as if dependent fledglings nearby, but no young seen or caught; or fledged based on physical or suggestive evidence

FC = fledged at least 1 host young with cowbird parasitism

PO = predation observed

PE = probable predation, nest empty and intact (no physical evidence)

PD = predation, damage to nest structure, eggs, or nestlings (physical evidence)

AB = nest abandoned prior to eggs

DE = deserted (abandoned) with eggs or young

CO = failure due to cowbirds

CF = fledged cowbird only

WE = failure due to weather

HA = failure due to human activities

OT = other.

Banddate: Date of banding for nestlings.

B1-B5: Band numbers of up to five nestlings (nine digits each).

[Clumpwidth: Maximum width of clump in which nest plant is located, in m.]

[Perpwidth: Width of clump perpendicular to maximum clump width, in m.]

[Maxclumpht: Maximum height of clump in which nest plant is located, in m.]

Plantht: Height, in cm, of nest plant.
Htfrgrd: The height of the nest, in cm, from the ground.
Plantsp1: 6 character code for scientific name of primary plant species that nest is in.
Plantsp2: 6 character code for scientific name of secondary plant species that nest is in.
Nstcncl1: Primary object concealing nest; typically plant species but could be log, etc. Use 4 letter code.
Nstccncl2: Secondary object concealing nest.
Shrubdbh: The diameter at breast height, in cm, of the nest plant. Diameter at 10 cm if shrub.
Dist_edge: The distance, in cm, of the nest from the closest edge of the plant.
[Canopycov: The canopy cover of the nest area (as measured by densiometer).]
[Concealab: Percent to which the nest is concealed from directly above.]
[Concealbe: Percent to which the nest is concealed from directly below.]
[Concealno: Percent to which the nest is concealed on the north side.]
[Concealso: Percent to which the nest is concealed on the south side.]
[Concealea: Percent to which the nest is concealed on the east side.]
[Concealwe: Percent to which the nest is concealed on the west side.]
[Compdir: Compass direction from center of nest substrate to nest location.]
[Totalcover: Percent of cover offered by nest plant (compare to same species in area), also thought of as “percent alive.”]
Lat & Lon: Location of nest in Decimal Degrees or Universal Transverse Mercator (from GPS or USGS Quad).
Datum: Datum for UTME and UTMN. Default is WGS84.

To Enter Known Nest Dates

If you know the exact date of Clutch Completion, Hatch and/or Fledge Dates for a particular nest, enter the dates into the nest program before closing out that nest.

1. Open the Nest program following step 1 outlined on page 32.
2. From main menu screen, choose either “Enter a clutch completion date”, “Enter a known hatch date”, or “Enter a known fledge or failure date”.
3. Enter any known dates and precision code referring to the **Dates and Date Precisions** section below.

If you do not know the exact date for clutch completion, hatching and/or fledging, within 2 days (nest checks every fourth day), leave them blank and the Nest Program will calculate them based on your nest check data and average laying, incubation, and nestling periods. If you do know these dates within 2 days, enter them, as they may be more accurate than the program’s calculation.

Dates and Date Precisions: These precision codes should be filled in the closeout program and on the NEST RECORD SHEET and entered by you before closing out your nests.

Firstegg: Date that first egg was laid.

Frsteggpre: 1 character code for precision to which the *Firstegg* is known.

- 1 = date entered or proofed by gridder/supervisor, confirmed to make sense, and is moderate to high precision (i.e., were able to date the nest to within ~1-4 days because know lay date, age of young, hatch date, or fledge date)
- 8 = date entered or proofed by gridder/supervisor, confirmed to make sense, BUT low precision (i.e. cludatepre=8; know approximate time of season but could be off by as much as ~2 weeks, e.g., if find nest with full clutch and on next check it has been depredated)
- 9 = date has either not been proofed by gridder/supervisor or its proofing / confirmation status is unknown (was computer generated); or no data / not applicable

Clutchdate: Date that clutch was completed.

Cludatpre: character code for precision to which the *Clutchdate* is known.

- 2 = exact date known (within 24hr)
- 4 = date known within 2 days (4 days between checks) **or** exact *hatch* date known
- 5 = date within 3 (6 days between checks)
- 6 = known within 5 days
- 8 = unknown, or known only based on species specific clutch time
- 9 = no data

C = indicates that the clutchdate has been computer generated. Please note that a C should be changed to a number above after assessing (and changing if necessary) the computer generated date.

Hatchdate: Date that first egg hatched.

Hatdatpre: character code for precision to which the *Hatchdate* is known.

2 = exact date known (within 24hr)

4 = date known within 2 days **or** exact clutch or fledge date known

5 = date within 3 days

8 = unknown

9 = no data

C = indicates that the hatchdate has been computer generated. Please note that a C should be changed to a number above after assessing (and changing if necessary) the computer generated date.

Florfadate: Date that nest either fledged or failed (i.e., the date halfway between last date the nest was observed active and first date nest was found inactive; or date known to a greater accuracy than that, including date of first known fledge if known to fledge across multiple days)

Fledatpre: 1 character code for precision to which *Florfadate* is known.

2 = exact date known (within 24hr)

4 = date known within 2 days (4 days between checks) **or** exact hatch date or clutch completion date known.

5 = date within 3 days (6 days between checks)

8 = unknown

9 = no data

C = indicates that the florfadate has been computer generated. Please note that a C should be changed to a number above after assessing (and changing if necessary) the computer generated date.

The closeout program will calculate the following values:

Dpr: The date the nest was first observed preyed upon.

Dup: Most recent date that nest was observed to be active.

P: Computer determined predicted date of fledging or failing (last day active)

E: Computer determined date of first egg (first day active)

P1, P2, and P3: computer calculated values for the entire time the nest may have been active (potential), with P1=laying, P2=incubation, and P3=nestling periods.

D1, D2, and D3: computer calculated values for the entire time the nest was observed active, with D1=laying, D2=incubation, and P3=nestling period.

If you are not using the closeout program or the program fails, fill these in manually (see your supervisor).

To Proof Nest Data:

At the end of the season, close out all nests by entering "all" from the close out menu. This will find certain types of errors in the nest check data. When these problems are resolved, proof data using "Proof Nest Data" menu item. The program will run through all entered nest data and display problems on the screen. Errors are stored in a database called "nesterr.dbf" Try to resolve all errors listed, then proof again. Unresolved errors should be brought to the attention of your supervisor.

Manually proof all your data at the end of the season, or at the completion of a nest, by proofing from the raw data against the screen (in BROWSE mode rather than through the nest program, as it's much easier). Mark each of your nest record sheets (or portion thereof) as proofed with a "P" (e.g., it should say "E+P"), or each line of data with a vertical red line through the horizontal red line (that was next to the first field, indicating entered), now indicating that record has been entered and proofed.

B. Entering Nest Vegetation Data

Nest vegetation data is entered in four files, Nestveg1.dbf, Nestshr.dbf, Nestforb.dbf, and Nesttree.dbf (described below). Each of these files corresponds to a different section of the Nest Closeout and Vegetation Form. Again, these databases contain some fields which we do not collect data for at Palo; leave these fields blank. These are not entered through a program but simply by accessing the database in Visual FoxPro, typing SET CARRY ON and hitting return (if entering multiple on the same day), and then typing APPEND and hitting return.

1. Be sure the supervisor has created current year's files.
2. Open FoxPro, then open: Z:\terrestrial\programs_and_projects\palomarin\palodata\nest\annual_data\PALO[year]nests\grid[X]_[year]. There should be separate files for nestveg1, nestshr, nestforb, and nesttree data.
3. Select the appropriate file for the data you are entering, type SET CARRY ON in the command box, hit return, type APPEND in the command box then hit return again.
4. Enter your data in the appropriate fields.
5. When finished, hit Ctrl+End to close the box and save your data.
6. Mark all your datasheets as entered with an "E" next to each section as you enter it.
7. Proof all your data, potentially in a batch and not one record at a time, by first selecting the appropriate file for the data you are proofing, and typing BROWSE in the command window.
8. Manually proof all your data by proofing from the raw data against the screen, and then mark each of your nest veg sheet sections (or sections within) as proofed with a "P" (e.g., it should say "E+P", now indicating that record has been entered and proofed).

Nest veg1 contains the fields described below.

FIELD NAME	DESCRIPTION
METTERRAD	Radius of veggie
YEAR	4 numbers for the year
STATE	2 characters for the state abbreviation
REGION	Up to 9 characters for region or county name
SITE	2 characters for specific site abbreviation
NESTID	8 characters for identifying code for individual nest. Should match the code used for nest data entry
USE	T or F for use or non-use site
CANOPYHT	Avg. height of the top of the canopy within 11.3 m
TOTSHRBCOV	3 numbers for total shrub cover % including PSME
TRUSHRBCOV	3 numbers for shrub cover % within plot, excluding PSME
PSMECOV	3 numbers for shrub cover % PSME only
FORBCOV	3 numbers for forb cover % within plot
LOGS	3 numbers for percent of ground cover which is logs
LITTER	3 numbers for percent of ground cover which is litter
GROUND	3 numbers for percent of ground cover which is bare ground
WATER	3 numbers for percent of ground cover which is water
DENS1-4	Canopy cover measurements using a densiometer
D 1-4 LOW/HIGH	Measurement in m (to one decimal place) of lowest and highest canopy levels within the densiometer reading
W10-150	3 numbers for stem hits on Wiens pole

Nestshr.dbf contains the following fields.

FIELD NAME	DESCRIPTION
METERRAD	Radius of veggie plot
YEAR	4 numbers for the year
NESTID	8 characters for identifying code for individual nest. Should match the code used for nest data entry
USE	T or F for use or non-use site
SHRUBSP	4 characters for each shrub species
AVGHTCM	Average height in sampling circle of shrub species
HT LOW/HIGH CM	3 numbers for number lowest and highest height of shrub species
STEMS	Count the numbers of stems at 10cm
COVER	Percent of total shrub cover of each species within sampling circle

Nesttree.dbf contains the following fields.

FIELD NAME	DESCRIPTION
YEAR	4 numbers for the year
NESTID	8 characters for identifying code for individual nest. Should match the code used for nest data entry
USE	T or F for use or non-use site
TREESP	4 characters for each tree species
DBH8to23	3 numbers for number of trunks of species listed in TREESP for DBHs of 8-23 cm.
DBH23to38	3 numbers for number of trunks of species listed in TREESP for DBHs of 23-38 cm.
DBHGR38	3 numbers for number of trunks of species listed in TREESP for DBHs greater than 38 cm.
SNAGS	3 numbers for number of snags for the species listed in TREESP
STUMPS	3 numbers for number of stumps for the species listed in TREESP

Nestforb contains one record for each forb species. Fields are explained below:

FIELD NAME	DESCRIPTION
YEAR	4 numbers for the year
NESTID	8 characters for identifying code for individual nest. Should match the code used for nest data entry
USE	T or F for use or non-use site
FORBSP	4 characters for each forb species
AVGHTCM	Avg. height in sampling circle of forb species
HT LOW/HIGH CM	3 numbers for number lowest and highest height of forb species
COVER	Percent of total shrub cover of each species within sampling circle

Mark all your datasheets as entered with an “E” next to each section as you enter it. Manually proof all your data by proofing from the raw data against the screen (in BROWSE mode rather than through the nest program, as it’s much easier, especially if proofing multiple records in the same stretch), and then mark each of your veg sheet sections as proofed with a “P” (e.g., it should say “E+P”, now indicating that record has been entered and proofed).

C. Entering Transect Vegetation Data

1. Be sure the supervisor has created current year's files.
2. Open FoxPro, then open:
Z:\terrestrial\programs_and_projects\palomarin\palodata\veg\VegTrans\annual_data\<year>. There should be separate files for herb, shrub, and tree data.
3. Select the appropriate file for the data you are entering, type SET CARRY ON in the command box, hit return, type APPEND in the command box then hit return again.
4. Enter your data in the appropriate fields.
5. To specify the 5 meter doobie, add "5" to the direction.
6. When finished, hit Ctrl+End to close the box and save your data.
7. Mark all your datasheets as entered with an "E" next to each section as you enter it.
8. Proof all your data, potentially in a batch and not one record at a time, by first selecting the appropriate file for the data you are proofing, and typing BROWSE in the command window.
9. Manually proof all your data by proofing from the raw data against the screen, and then mark each of your transect veg sheet sections as proofed with a "P" (e.g., it should say "E+P", now indicating that record has been entered and proofed).

Part 7: End of the Season Write-ups

End of season write ups are intended to summarize the breeding season. They also provide a mechanism for you to further summarize your observations and provide details that only you may know.

For each territory of all priority 1 species do a write-up. For priority 2 species with a nest, parent/s known or you have any useful information, please also do a write-up.

Begin each territory at the top of a new sheet of paper and use the format below (numbers, letters, and headings). See examples in the data room from previous years.

1) Heading:

- a) Date of writing and your initials
- b) Species
- c) Territory #
- d) Pair

Pair Description:

2) History:

- a) Nesting status during previous years
- b) Date of male's first song
- c) Date male and female were first seen together

3) Territory:

- a) Location: qualitatively describe the size of the territory relative to previous years; speculate on causes of any change.
- b) Habitat:
 - i) Briefly describe the habitat included in the territory.
 - ii) Mention any preferred singing posts and/or foraging areas.
- c) Dynamics: describe any change in territory location or usages that have occurred during the spring. Speculate on the causes of such changes.

4) Behavior (discuss each individual separately) and pair description

- a) Particular idiosyncrasies (if any) in behavior or plumage.

- b) Describe any interesting behavioral sequences, particularly any changes of mate and any unusual sexual, or aggressive or strange behavior.
- c) Any behavior observed with predators

Nests and Results:

- 5) Nesting Attempts
 - a) Number of nests found.
 - b) Number of nests not found.
 - c) Total number of young believed to have fledged (be sure to check encounter and banding databases when you are writing this section to see if any nestlings that you thought did not survive did in fact make it).
- 6) Individual Nest Write-up Discuss separately each nest found and nests that were not found.
 - a) Location
 - i) Briefly describe location
 - ii) Qualitatively rate degree of hiding in prose.
 - iii) Discuss any interesting particulars of the nest.
 - b) Finding: describe (with an eye toward predation) how difficult it was to find the nest.
 - c) Clutch size
 - d) Clutch completion date.
- 7) Results: describe the outcome of each nest found, including fledging date and fate (if known) of any fledglings, or give date of predation and speculate on the cause of nest failure. Include brief description of how the nest results were ascertained (e.g. fledglings seen, nest ripped apart).

Individual Bird Write-ups for Non-Territorial Individuals

- a) Make sure all information is complete on your tally sheets. This should suffice for the write-up.
- b) Add any notes about these birds, i.e., behavioral sequences, location on the grid, timing, etc. that seem important. This is especially true of breeders on other grids that were seen on your grid, and of all "Locals."

CHAPTER 2. The Landbird Biomonitoring Program

Bird banding is an integral part of all Palomarin studies; banded birds become recognizable as individuals, which is vital to our monitoring efforts. Most species we catch are banded with the standard aluminum US Geological Survey Biological Resources Division (USGS/BRD) band. Six species are banded with a unique combination of plastic or pinstriped-metal color bands, as well as with the USGS/BRD band (Appendix 1). When recaptured, all species are individually identifiable by reading their USGS/BRD band numbers. All banding is done in cooperation with the U.S. Geological Survey's Bird Banding Laboratory (BBL) in Laurel, Maryland, and data from each banded bird is submitted to the BBL in the form of computerized schedules.

Birds netted at our constant effort mist-nets are banded in the banding lab or banding station, while those captured on the grids are processed in the field. The processing of a bird is complete when the bird is released unharmed. Ability increases with practice. Gentle hands and patience come from you. When in doubt, don't be afraid to ask; the bird's safety is at stake.

Part 1: What and Where in the Banding Lab

Please become familiar with the locations of all items in the banding lab (detailed below). Some of this will happen during banding, but you should take some time to go through the lab early in your time here as a bander to familiarize yourself with it. You will be working carefully and quickly when processing birds. Please return all items to their proper places so that others can find them.

A. Informational Aids to Banding

Identification Guide to North American Birds, Part I (a.k.a. "The Pyle Guide")

This guide is located on the banding counter. Published initially in 1987 as the *Identification Guide to North American Passerines*, a revised and expanded edition was published in 1997. It is used as the primary reference along with the Tabular Pyle (below). It contains measurements, figures, and illustrations to aid in aging and sexing, as well as detailed information on molt and subspecies identification. We generally have copies available for sale.

The Tabular Pyle

This manual, organized in a 3-ringed binder, puts the information from Pyle's *Identification Guide to North American Birds* into a generally more user-friendly table format. The information on how to age birds in particular is organized more effectively for most banders' purposes, but it sometimes oversimplifies ageing and sexing criteria.

Ageing North American Landbirds by Molt Limits and Plumage Criteria: A Photographic Companion to the Identification Guide to North American Birds

Located beneath the banding counter, this photographic guide provides visual aids and in-depth explanations of molt limit patterns to increase the ability of banders aging birds. This is not a guide meant to be used during processing, but instead to be familiar with and read – at least once – while you are learning about molt limits.

Palomarin Bird Special Handling Notes

This important banding resource contains instructions for special procedures or specific notes to be taken for many species captured at Palomarin and offsites. To know if a species has special handling notes, check for a page number for that species under "Palo Page" on the frequently captured species list on the banding lab wall or in the offsite kit. This book also contains keys for a handful of species that we could capture but that are not in the Pyle Guide, such as raptors and California Quail.

Handbook of Field Methods for Monitoring Landbirds

Located on the counter in the banding lab, this handbook provides a good overview of various monitoring methods, including mist netting. It is particularly useful for background information on selecting the appropriate monitoring methods and establishing a monitoring program. It is also useful for the description of different techniques for removing birds from nets. Banders should read this handbook, especially the section on banding.

The Bird Banding Manual

Located on the shelves in the banding lab, this manual consists of two volumes. Volume I contains detailed information on Federal Bird Marking and Salvage Permits, on metal bird bands, on the reports that are submitted to the Bird Banding Laboratory, and on the codes used in submitting these reports. It contains a complete listing of North American birds, their American Ornithologist's Union (AOU) species numbers (probably some have changed) and their recommended band sizes (also may have changed). Included as well is a wealth of general and administrative information about banding. Volume II contains valuable information on banding techniques. Be generally familiar with the material in this manual. Updated versions are found online at the BBL website.

Masterbook

Located in the Offsite kit, this contains an inventory of all color-banded birds by band number and color combination. If a color banded bird missing one or more bands is caught, its original combo can be looked up and the missing band(s) replaced. Remember it is CRITICAL that we never change a bird's color band combination, even birds with duplicate combos, unless your supervisor has authorized this for an individual bird. It is updated periodically, the date of the last update shown on each page, so any birds given color combos since the last update will only be found on the computer database. At Palomarin birds missing bands can be looked up on the computer.

The Banders' Safety Handbook

This handbook was recently compiled by biologists at the Institute for Bird Populations and the Long Point Bird Observatory. Located in the Library, it includes a lot of useful information on the basics of safely operating a mist netting station. Most of these guidelines are followed here at Palo and our other stations. However, there are a few things that contradict guidelines presented in this handbook. The most significant one is the use of rehabilitation centers; never take a bird that has been captured in the nets to a rehab center. Always follow the guidelines in the Palomarin Handbook when there is a discrepancy between it and the Safety Handbook.

Palomarin Information Sheets

Attached to the wall of the banding lab are a number of information sheets that provide "Alpha" (4-letter) and AOU (4 number) codes and recommended band sizes for our common western bird species, information for determining racial identification in White-crowned sparrows, information for various banding procedures (such as skulling, fat, molt, cloacal protuberance, brood patch, and wing wear determinations), and a complete listing of species color banded at Palomarin. Please become completely familiar with all of these Information Sheets. Use in conjunction with the criteria in this handbook. They can also be found in the binders of the offsite kit.

NABC (North American Banding Council) Manuals

These handbooks describe banding processes in detail and can be found in the library. There is a general banding "Study Guide" and specific manuals for Passerines, Hummingbirds, Raptors, and a Trainers manual. You should at least read the Study Guide and guide to banding Passerines while you are a Palo Bander.

Study Skins

Point Blue maintains a small collection of study skins. These can be of considerable help in identifying various warblers and difficult species as well as getting familiar with other local species. The specimens are housed in a specimen cabinet in the banding lab. Feel free to handle and use them, particularly during the beginning of your internship. They are for educational, not archival, usage. On a slow day, you may wish to share some of them with visitors.

Band Inventory Book

A large binder kept under the counter in the banding lab. This is where all strings of bands are kept track of. See B. Tools and Equipment (below) for details on starting new strings.

Freezer Catalogue Book

Every bird placed in the specimen freezer beneath the building must also be entered in the Freezer Catalogue. This blue book is located in the library on the countertop. See Part III section H on how to document and package dead birds. If a bird is taken out of the freezer for any reason (i.e. made into a mount or study skin), this should be entered in the freezer catalogue under "Fate". Most specimens are later sent to museums.

B. Tools and Equipment

United States Geological Survey/Biological Resources Division Bands (Silver Bands)

Metal bands are supplied by the Bird Banding Laboratory and are stored in strings of 100 bands, numbered sequentially. Current band strings are placed on stiff wire holders and are kept on the banding lab wall. To accommodate different leg diameters, bands come in sizes X, 0A, 0, 1, 1B, 1A, 2, 3, 3A, 3B, 4, 4A, 5, 6, 7A, 7, 7D, 8, 9, 9C. At Palomarin we rarely use sizes larger than 3, and do not apply lock-on bands to larger raptors (which therefore get released unbanded). There are two special single-species strings for *Empidonax* flycatchers (size 0 and 0A). Separate strands are used for *Empids* because of the unique notes taken on these species. Captures of these species are recorded on their own banding sheets that coincide with their string. Size X bands (for hummingbirds) do not come pre-formed, as other bands do, but must be cut and shaped from a sheet.

When a current string of bands is finished, replace with a new string from the lab drawers (we also have extra strings in the offsite and gridded kits). A Ziploc bag in each drawer holds any partial band strings to be used first, before using complete strings. If there are no partial strings for the desired size, attempt to use the next sequential string. Sign out whatever bands you take in the blue Band Inventory Book, noting the bands you take and the location (Palo or Palo offsites) and date (month and year) in pencil. These inventoried bands are used by all Point Blue projects, hence it is critical that we track what project each string is checked out for.

The Banding Data Sheet

Point Blue uses Banding Data Sheets for recording all banding and recapture data. Each band string has its own Banding Data Sheet, as do recaptures (R). A new sheet is started for the following reasons: a band string is finished (write "END OF STRING" at the bottom); there is no room on the back for additional notes (write "NO ROOM ON BACK" at the bottom); all rows on the current sheet have been filled in; at the beginning of a new calendar year for every band string (write "END OF YEAR" at the bottom). When starting a new sheet fill in the page number, band size, year, and all other information at the top of the banding sheet (on both sides) so that you will be ready for the next bird. When sheets are completed, make sure all fields including initials and bander names are filled out.

Blank banding sheets are stored in the data room in a drawer labeled data forms. Hummingbirds, *Empidonax* Flycatchers, and nestlings (for gridders) each have their own banding sheets, the back of which describe the special notes or measurements that are taken for each. Current banding data sheets for Palomarin are kept in a binder. When a sheet is completed and the data has been entered, it is filed in the binder for that year in the data room.

Color Bands

Color bands are in plastic containers in the top drawer of the banding table. There are currently ten solid colors: black (K), white (W), red (R), emerald (E), lime (L), yellow (Y), blue (B), orange (O), pink (P), and mauve (M). The sizes we use are "XF"/size 1 (0.33 cm diam.) fitting Wrentits and smaller Song Sparrows; "XCS"/size 1B (0.37 cm diam.) fitting Nuttall's White-crowned Sparrows and larger Song Sparrows; "XB"/size 2 (0.52 cm diam.) fitting Spotted Towhees; and "X3"/size 3 (0.56 cm diam.) or size 3A/3B fitting California Scrub-Jays. In addition to plastic color bands, there are size 0A pinstriped-metal color bands used only for Wilson's Warblers and larger California Scrub-Jays. Wilson's Warblers should never be banded with plastic color bands. Please tell your supervisor if you notice any colors or sizes getting low.

Color Band Sheets

Color Band Sheets for use in the Palomarin study area are kept in 3-ring binders in the banding lab (beneath the counter) and the offsite and gridded kits. If necessary, sheets can be swapped between these binders. Make sure there is always at least one sheet per species in each binder, and immediately notify your supervisor of a shortage *before* you come close to running out. When a page is completed, file it in the appropriate binder in the data room. You should NEVER photocopy a color band sheet.

Banding Pliers

These specially tooled pliers have extensions to open the metal bands and split holes to close them. The small pliers have a small hole for sizes 0A-1, and a large hole for sizes 1B and 1A. On the large pliers, the small hole is used with band size 2 and the large hole is used with band size 3. There is also an extra-small plier for size X (Hummingbird). Be careful to use them correctly, both for bird safety and the longevity of the pliers.

Band Removers

Every now and then, a mistake is made - a metal band is put on the wrong leg, or overlapped slightly, or the wrong band size is used. The Band Remover has slender tips which curve to fit between the band and the bird's leg and open it for removal. As with the banding pliers, band removers must be used with care since a bird's leg is thin and can be easily broken. Note especially that these work opposite from normal pliers. Banders should practice opening and closing removal pliers before using them on a live bird. Wire from the strings of bands is also available and should be saved to aid in the removal of bands when removers won't work.

Color Banding Tool

A special aluminum tool is used to open plastic colorbands and then to place them on a bird's leg. There are two sizes: the smaller one for use with XF, XCS, and XCL-sized color bands; a larger one for use with XB and X3 sizes. They are kept inside the plastic containers holding the color bands.

Soldering Iron

For large-billed birds that may remove their color bands (Spotted Towhee and size 3 California Scrub-Jay), we must seal the bands with a battery powered soldering iron. The soldering iron lives in its charger in the data room by the weather computer. There are three: one for Palo, and one to be taken to Uppers (PGUP) when banding occurs there (and returned afterwards), and one for the gridder kit.

Leg Gauge

A flat piece of metal with notches corresponding to the different band sizes helps us determine the correct band size for each bird. Slide the notch over a bird's tarsus so that its widest axis spans the notch. There should be just a slight gap on either side of the leg. Note that there is a recommended size for each species, and this tool is only used if the leg looks larger or smaller, or if 2 sizes are recommended.

Electronic Scale(s)

The electronic scale at Palo is stored in the top drawer underneath the lab table when not banding, and there is a battery-operated scale in the offsite kit; both are capable of rapid and accurate readings to 0.1 g. Most birds are weighed by placing them head down into one of the different-sized weighing cups. Hummingbirds can be placed on their backs for the short time it takes to weigh them. You should keep your hands close by all birds when weighing them, but be sure not to injure them by grabbing if they start to flap. These scales are very sensitive and must be calibrated each time they are moved (i.e., when first setting up or if banding station is moved during the day). Calibration procedures are detailed below in the section on processing a bird.

Wing Rule: A metal rule with an L-shaped end is used to measure wing chord to the nearest mm.

Tail Rule: A clear plastic ruler, with the measurements beginning flush at the end of the ruler, is inserted between the inner two rectrices of the tail, and measures the longest tail feather to the nearest mm. This is also used for measuring crown length.

Calipers: Measurements involving individual wing and tail feathers, bill length, width, and depth, crown, and tarsus length are best made with a pair of electronic calipers which can easily and accurately be read to 0.1 mm.

Magnifying Glasses and Optivisors: A magnifying glass lamp and Optivisors are available for examining grooves on hummingbird bill, the degree of skull pneumatization, and other fine details of bird's feathering or morphological structures.

Bird Bags and Clothespins

Birds are transported from the nets to the banding lab by means of special bird bags closed by a drawstring. These drawstrings should be kept free of knots so that one's hand can be inserted entirely into the bag to remove a bird

without fear of injury or escape. To prevent accidents when carrying occupied bags, please insert fingers through loops formed by the drawstrings. It is not recommended to put more than one bird in a bag. Numbered clothespins corresponding to each net can be placed on the bags to identify the net the bird was captured in. At the banding lab, bags hang from hooks labeled with the net numbers while the birds wait to be processed. Dirty bird bags not appropriate for reuse should be set aside and not re-used until washed, and those that held potential pox birds especially so. It is preferred to put a bird in an unused bag, but as long as the bag is fairly clean, it is okay to reuse a bag. Even at very slow sites banders should be sure to always take at least 10 or so empty bags on a run.

Bird Hot Box: A box seated on a heating blanket is available to hold birds in bird bags for short periods if they are weak, are being detained for detailed examination, to warm up cold or stressed birds, or for birds that show wing strain upon release and are easily recaptured. It should be turned on at the start of the banding day, and turned off when banding is finished for the day. There is a travelling hotbox in the offsite kit. **Do not place hummingbirds in the hotbox.**

Field Banding Kits

There are generally two field banding kits: one for the gridders and one for the off-sites (e.g., Muddy Hollow). These are kept in the banding lab and contain all the essential tools for banding. Before going out into the field each day double check that all equipment and data sheets are in the kit. An inventory for the offsite kit is posted on the banding lab wall and should be checked regularly. At least weekly, all contents should be inventoried; and nightly, before visiting an off-site, the most important contents should be inventoried, to prevent accidentally leaving any equipment behind. An inventory of the gridded banding kit is kept in the gridding data binder.

Banding Lab Laptop

The computer onto which banders do the majority of their data entry is stored in the bottom drawer of the banding counter. It can also be used for personal use, but remember that work needs of any sort supersede that. Please turn on the laptop when you start your banding day so that if you need to look up a bird during the day you can do so without any wait (e.g., if you capture a bird with missing color bands, or you want to show a visitor a recapture's history). Please inform your supervisor immediately if you encounter any problems with the laptop, large or small.

Supplies to Carry with You

Banders should carry a pocket knife with scissors and toothpick, a field notebook and pen, at all times, and may want to wear a carabiner to attach bird bags to binoculars (this is personal gear and not provided). Always care at least 10 empty bird bags, even on slow days, and more at busier sites. Additional useful items to carry: extra rope; gloves to wear on cold mornings when not handling birds; and pocket Hot Snapz for keeping hands warm.

Hummingbird Band Kit

Hummingbird bands are made at Palo out of a flat sheet of metal bands. Interns will receive training in how to make hummingbird bands. A blue plastic tray containing the active sheet of bands, small scissors, shaping tool, sanding pad, banding pliers, and tweezers is kept in the top banding drawer. There are two options for handling hummingbirds during banding, a small nylon sock (which also can be used for handling during processing) or a large fuchsia, mesh bag. See section below on making hummingbird bands.

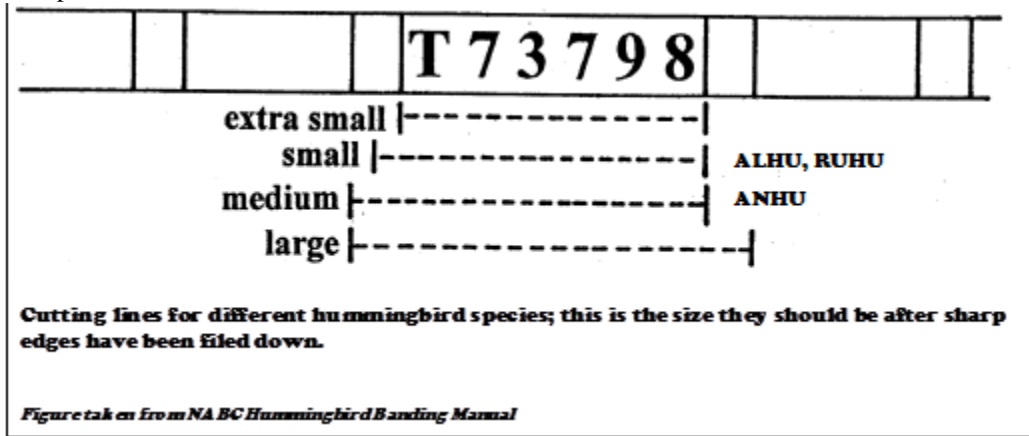
Making hummingbird bands

Hummingbird bands must be cut out of a flat sheet of metal bands, sanded so that no sharp edges remain, cut to the correct length with special cutters, formed into a ring with a special tool, and applied to the hummingbird's leg by means of the hummingbird banding pliers. It is a delicate operation and takes practice and patience. You will be trained by your supervisor. Generally we keep two sizes on hand, Medium (6.0mm) for Anna's Hummers and Small (5.6mm) for Rufous and Allen's. If different species are captured, use the recommended band size. If we do not have the recommended size preformed (e.g, we may not always keep 5.4 and 5.8mm bands on-hand), then do not band the hummingbird. Despite what it says in the Pyle Guide for some of the larger hummingbird species, **never put a size 0A band on a hummingbird.**

The North American Banding Council provides recommended banding sizes for each hummingbird species, and we follow these criteria when cutting bands.

- Allen's (and unknown ALHU/RUHU) = 5.6 mm
- Anna's = 6.0 mm

- Black-chinned = 5.6 mm (male), 5.8 mm (female)
- Broad-billed = 6.0 mm
- Broad-tailed = 5.6 mm (male), 5.8 mm (female)
- Buff-bellied = 6.0 mm
- Calliope = 5.4 mm
- Costa's = 5.4 mm
- Lucifer = 5.6 mm
- Ruby-throated = 5.4 mm (male), 5.6 mm (female)
- Rufous (and unknown RUHU/ALHU) = 5.6 mm
- White-eared = 6.0 mm



Part 2: Running the Standardized Nets

A. General Information

See also Appendix 2 for a summary of bander responsibilities.

Nets

At Palomarin there are twenty 12-meter mist nets permanently located at fourteen individually numbered sites on or along the edge of Grid 2. Eight of these sites are along the edge of the Arroyo Hondo and are referred to as the "forest nets". Six of the forest sites (5.0, 2.1, 10.1, 8.5, 8.4, and 8.3) each hold two nets, stacked one above the other, and the remaining two sites, 10.2 and 10.3, each hold one 12-m net. All nets have a mesh size of 30 mm. Never replace a net with one of the wrong size mesh (we have 36 mm nets for target netting, so always check the mesh size before replacing a net). Notify your supervisor if you are getting low on new nets.

When to Operate the Nets

Nets at Palomarin are run year-round, every day except Monday (weather permitting) from 1 May to the day before Thanksgiving, and three days/week (Saturday, Sunday and Wednesday) during the remaining four months (Thanksgiving -30 April).

Make-up days at Palo: Days that are lost due to weather are made up on the next available day. We aim for about 1500 net hours/month during December-March, and about 3500 net hours/month during May-November. In Dec-Apr, make-up days are scheduled so that no more than 2 days of banding will occur consecutively. If weather prevents you from getting "minimum net hours," on one day, then you can band 2 full days after that since the first day technically didn't count as a banding day (e.g., can band on Monday if Saturday was a half-day). If there are no make-up days already scheduled, typically lost weekend days are made up the very next Monday, and lost midweek days the following Tuesday (which will get moved to Thursdays if a Monday make-up day needed to be scheduled), always aiming for as early as possible to increase the likelihood of fitting in the make-up day that week. If there are already make-up days scheduled, it will typically be scheduled on the next available Tuesday. A lost banding day in May-Nov is made up on the next available Monday within one month of the lost day. If there aren't any available Mondays within one month, the day is not made up, until we start accumulating "many" (>4) not-made-up lost days for the season; therefore, these need to be tracked seasonally on the calendar by the supervisor. At that point, we start scheduling make up days for Mondays > 1 month away, but only within the season (never extending into the next season unless it's within the one month of the lost day). Our normal "winter" (Dec-Apr) rescheduling system is not impacted by this except that days lost then are not made up in summer (May onwards).

Nets are also run at nearby sites (Uppers, Pine Gulch, Muddy Hollow, Redwood Creek, and Lagunitas Creek) once every period. Periods are 10 days long, except during fall migration (mid-August to 31 October) when they are 7 days long. Dates of operation may vary from year to year, or site to site; currently PGUP, PIGU, and MUHO are run year-round and RECR and LACR May-Oct. These off-site are scheduled for as early in the period as possible, to ensure highest likelihood of completion should bad weather occur, and are made up later in the period if net hours are not made or banding is canceled. Setting up and opening nets should be quick and efficient once you are familiar with the sites. Sites where no poles are stored must be at least partially set up the eve of banding. You should always leave 3 full days between banding days at offsites. For example, if you band at MUHO on Sept 1 (and got minimum net hours), then you should not band there again until Sept 5.

A full day of mist-netting consists of 2/3 or more of the full net hours for that site (80-120 net hours at Palomarin or 40-60 net hours at an off-site of 10 nets [44-66 at RECR]); if less than that is reached, a make-up day is scheduled (see above).

Nets are also run opportunistically at the Palo Experimental Array (PEXA) near the field station, typically in conjunction with PN, to increase captures for school groups or for intern training during slow periods. This unstandardized array of nets was established to experiment with placing nets elsewhere throughout the grids, to increase captures in the above scenarios, and to get additional study species color banded. The number and locations of nets may vary over time but generally are standardized within a season (there are currently 5 nets). There is flexibility in the opening and closing times for PEXA (does not follow same rules outlined for our standardized stations). We do not keep track of net hours for PEXA nets or target nets, but it must be recorded in the daily journal and the banding calendar that the PEXA or target nets were run that day. Opening time and the net numbers that are opened should be recorded on the whiteboard during the banding day for net run tracking purposes

There are three primary weather situations in which the nets should not be run or should be closed. They are moisture, wind and excessive heat. These situations are outlined in the Operation section below.

Off-site Nets and Equipment

Always be sure to set up nets in the same place. One end may have a section of PVC pipe stuck in the ground in which the net pole slides, or there may just be a well established hole in the ground. Each net lane should have 2 ropes at each end tied out at about a 45° angle from the pole. Once the ropes are tied to the poles, you can push them up or down to increase or decrease tension. The nets should be kept tight enough to avoid sagging. They should never touch the ground or ground vegetation, which can get badly tangled in the nets and easily damage them, nor should birds captured in the bottom trammel hit the ground. In addition, birds can be easily overlooked or get wet from dew when caught in a bottom bag that is too close to the ground. It is helpful to put appropriately numbered clothes pins on each of the nets when setting up in the morning, especially at a busy site. Clothes pins can be used to mark full bird bags during early morning rushes and newcomers have an easier time learning the net numbers. **Make sure to thoroughly check that you have everything before going to an offsite (see inventory checklist), each and every time, or else something will be forgotten.**

At some of the sites, poles are taken down at the end of each day of operation; if they are also removed from the site be sure the correct number of poles are brought in the morning and taken away after banding. Always double count nets when you're leaving to make sure that none have been left behind! Also, be sure to check that the extra nets (1-2 depending on site and time of year) are also in the kit every day before leaving the site. At sites where poles remain, any net lanes that are likely to be visible to the public should have the poles removed or stashed.

B. Staffing and Volunteers

A minimum of 2 banders is required to run the nets. If very busy, other interns or staff can be asked to help. In general, more than 4 banders in the lab at once causes too much confusion. Banders are scheduled at least a week in advance with names recorded on the calendar in the library. In general, banders will have 1-2 days off each week, weather permitting, and generally will not band more than six days in a row. It can be helpful to have a third bander when operating PEXA in conjunction with PN, especially if there will be a class visiting.

Volunteer banders are people who generally visit about once a week to help out. Their abilities vary greatly. Please be certain they have had adequate Palomarin training before allowing them to extract or process a bird, and until

they are very experienced always monitor their activities closely. A conservative rule of thumb is to require a minimum of 5 visits by a volunteer before having them extract a bird, although some volunteers may do so earlier if they appear more advanced. If any questions or concerns regarding a volunteer arise, check in with your supervisor. After each visit by a volunteer, the banders who worked with him/her must fill out a summary of that day in the volunteer notebook.

C. Operation

Running the Nets

- 1) Begin opening nets 15 minutes after local sunrise (current opening time in red on the banding calendar). Place the trammel lines approximately 18 inches apart (46 cm), with the bottom trammel high enough that a bird caught in the bottom pocket would not hit the ground or get caught in the vegetation. The distance of the trammels should produce a pocket of 4-6 inches; variation in individual nets sometimes results in trammel distances of slightly greater or less than 18 inches in order to produce the 4-6 inch pocket. The double-stacked forest nets are raised as high as possible with the two ends of the net at the same height.
- 2) Nets are checked every 30 minutes (up to 45 minutes in ideal weather conditions, preferably outside the breeding season, and if you are busy processing; or more often if weather conditions are unfavorable, i.e., extreme cold, high winds, light precipitation, or high heat). All birds captured should be brought in individual bird bags to the banding lab for processing.
- 3) Nets should be closed in the following situations. Keep track of the total hours each net is open and the reasons for closing (see Section E below). **REMEMBER THAT THE SAFETY OF THE BIRDS IS OUR TOP PRIORITY.** If many birds are being caught, the below scenarios will have a larger effect, as birds will remain in the nets for longer periods.
 - a) **Moisture.** Nets must be closed if the precipitation is heavy enough for the birds' feathers to become wet so that they lose their insulating power. Some days, fog may be heavy enough to cause this. If water droplets are present on the nets on consecutive runs, after have been flicked off on the previous run, you should likely close unless conditions have lessened or appear to be starting to lessen. This generally causes closure of the whole station, even if the forest nets are dry; but if just heavy fog or mist this might only involve closing the individual nets that are accumulating droplets.
 - b) **Wind.** Nets should be closed if wind is strong enough for netted birds to be blown about in the net, causing severe tangling or injury. Some nets are more affected by wind and may have to be closed before others. Some signs that indicate these conditions include the bowing out of the trammel lines or severe rippling along a net. In general, all nets should be closed if winds are steadily blowing over 16 kmph (10mph) or regularly and consistently gusting over 24 kmph (15mph), because the study area at that point is compromised and bird activity substantially decreased, even if nets are safe; note, sometimes this assessment is made even if the wind gauge is not registering that high.
 - c) **Heat.** Under conditions of excessive heat and direct sunlight, especially with a lack of wind, netted birds can quickly overheat and die. If the birds you are catching are panting or all show signs of stress, it may be time to check nets more frequently or to close some. On hot days birds should not remain in exposed nets for more than 20 minutes, and on the hottest days (*for your area!*) even short net checks of 15-20 minutes can leave birds exposed for too long. Heat is rarely an issue at Palomarin, but there will be a handful of days in the summer or fall which may be too hot.
 - d) **Cold.** If temperature is below freezing, wait to open nets until after the temperature has risen to freezing (0 degrees). When temperature is at or above freezing but below 5 degrees (i.e., 0-4 degrees), it is generally preferable to check nets more frequently (every 15-20 minutes) or to do continuous net runs rather than to open late.
 - e) **Predation.** If a predator (i.e. Accipiter, Bobcat) is discovered to be preying on the birds in the nets, or appears to be carefully watching a net, the net or nets in question should not remain open.
 - f) **Few or only protected nets remaining open.** In some situations, if for any of the above reasons only half or less of the nets remain open, or if at Palo all the exposed nets (5.0, 5.5, 5.6, 1.4, 2.3, and 2.4) are closed, then the rest generally have to be closed on the next run. This is to avoid a capture bias in nets that consistently remain open longer. This is not a blanket rule and many things must be taken into consideration; remaining nets may stay open if they are still catching many birds and/or only a small number of net hours are still needed for a "full" day. Reasons to close all nets may be: leaving the rest open would provide too much of a bias; it is impossible to get a full day with the remaining nets; or conditions in

the open nets are near to being too windy/too hot/etc. A full day of mist-netting consists of 2/3 or more of the full net hours for that site (80-120 net hours at Palomarin or 40-60 net hours at an off-site (44-66 at RECR) of 10 nets).

- g) **High capture rates.** There are many ways to handle busy banding days (see page 52); in some instances, it may be helpful or necessary to close one or more nets, at least temporarily, to get a handle on the number of birds needing to be processed (begin with those nets farthest from the banding station).
 - h) **A note about weather and scheduled classes** (caveat to closing nets in some of the above circumstances): Nets may be left open in questionable (if safe) conditions under special circumstances (such as intermittent rain, or rain cessation after a time of day where you can no longer get your net hours in); please see Part 4: Interpretation and Education in the Banding Lab, section F, for details on this subject.
- 4) Begin to close the nets exactly six hours after you began to open the first net, and close them in the same order they were opened.
- a) To close, slide all trammel loops except the top one together, then twirl the net so that all the loose material collects in the open top pocket. As you're twirling, lower the top trammel loop so that the top pocket is slowly wound up as well. This can be done with one or two people. Each net should be secured with 3 plastic or rope ties, placed in the middle and at each end (right next to the loops where the mesh begins). This prevents the net from unfurling overnight and allows for easy opening the next day. Be certain the loops are secured and cannot fall open.
 - b) Even if some nets were closed earlier in the day, be sure to walk around and double check that each one is properly closed to prevent accidentally leaving a net open overnight.
 - c) When no banding occurs for a number of days, and especially if the weather has been windy or stormy, the net trail should be walked daily to ensure that no nets have unfurled to the point of potentially capturing a bird.

Daily Post-banding Wrap-Up Activities

- 1) Record in the appropriate place on the back side of the Daily Journal:
 - a) The time of opening of the first net.
 - b) Closing times and explanation for any nets closed early or not run
 - c) The time of closing the first net at the end of the banding day.
 - d) The total net hours for the day (one net open for one hour is one net hour; a double net open for one hour is two net hours).
 - e) Banding Summary - Write the number of captures of each species for: newly "banded", "recaptures", and "unbanded" birds, separated by age groups. Write the total number of "new" and "recaps", and the total number of species.
- 2) Daily Banding Summary: On the whiteboard outside of the visitor center, we keep a tally of the number of birds captured each month. This should be updated each day at PN, and recaps and new birds can be tallied together (so that each species has one number only). This is so visitors can see what we've been catching.
- 3) Net Hour Sheet: Each banding location has its own net hour page, all of which are stored on a clipboard in the Banding Lab. On this page record the date, opening time, closing time, hours open, total net hours, and hours for each individual net. Include a coded explanation in the margin for any day with less than the complete number of net hours.
- 4) Mist Net Captures of Study Species: During the breeding season, at the end of each day banders will record any color band captures (new or recaps) on this form, which hangs on a clipboard in the data room. Include information on age, sex, and breeding condition and record both adult birds as well as juvenile or HYs. SWTH should also be recorded on this form, even though they do not get colorbanded. This allows gridders to further keep track of what's happening on their grids; gridders check this form daily.
- 5) Data Entry and proofing; see Part 4 on page 68.
- 6) Any net, net pole, or rope that is in disrepair should be replaced or fixed prior to the next banding day. Be sure to label any removed nets with its mesh size and a description of its problems (they are often repaired or donated to programs in Latin America). In addition to general responsibilities, each bander will be scheduled a few hours per week to mend nets.
- 7) Completed Band Strings: After all bands in a string have been used (the last band always has two zeros at the end), please do the following:
 - a) Write "end of string" at the bottom of the data sheet below the last entry. Fill in dates used, band number range, check all bander names and initials are included, and file data sheets in the office.

- b) Start a new banding sheet for the given band size, even if you do not need to use it yet. **BE SURE TO WRITE THE NEXT CONSECUTIVE PAGE NUMBER FOR THAT BAND SIZE AT THE TOP OF THE PAGE.**
- c) Obtain new bands from the drawers under the counter in the banding lab, using any existing partial strings first. In the Band Inventory Book fill out the date and location for the bands you select. Be sure bands are "strung" correctly so that low numbers are used first. If we are low on bands, notify your supervisor ASAP!
- 8) Completed Color Band Combo Forms: after all combos have been used, file in binder in Data Room.
- 9) Take down banding lab: put away laptop, scale, bands, banding equipment; put up chain and change sign.

D. Handling Busy Banding Days

There are a number of ways that you can safely handle busy days. It is good to be prepared beforehand by being familiar with the following guidelines:

1. Try to keep your pace going as fast as possible without letting yourself panic.
2. Put clothespins with net numbers on the net ropes when you open nets in order to keep track of what birds came from what nets; simply put the pins on the bird bags after you extract birds from a net.
3. You can have a couple clothespins marked "priority" to put on stress-prone species and females with brood patches (check for them at the net!), so that when you are busy these can get processed first.
4. Consider having one of the banders scribe.
5. Birds are better off hanging in bags than in nets. No matter how backed up you are at the banding station, don't let your net runs go more than 45 minutes, and only that long in ideal conditions.
6. Move to minimal data if you simply can't keep up. Generally, drop special handling notes, fade, wear and molts first. Bander initials, band number, species, date, time, location and net number are the absolute minimum data to take. Age and sex are also high priority and should be collected whenever possible.
7. If moving to minimal data isn't enough (it generally will be) for you to get a handle on the number of birds needing to be processed, you should consider closing one or more nets (begin with those farthest from the banding station). Take the time to close the net as this will take less time than removing another 10 birds from it on your next run. You can keep the net(s) closed until you catch up with processing.
8. At busy sites, begin the day by writing in your field notebook the first band number of the day for each band size. At busy times, when you get a recap whose band is equal or greater than that band number, you know it's a same day recap and you can just let it go (since you're so busy, don't worry about weighing it even if it's been greater than an hour). Be sure to record this capture on the recapture data sheet as soon as you have time.
9. If necessary you can release other recaps (non same-day recaps) at the net, as long as you write their band number, the net and time, species, and if possible age and sex information in your notebook and transcribe it to the banding sheet later.

E. Bats in mist nets

Wear leather gloves to extract them. Although incidence of rabies is low, if bitten seek medical attention and receive vaccinations (see CDC website for details). There are two ways to hold a bat for their safety: 1) by the tail membrane (preferred); and 2) by the scruff of the neck like a puppy or kitten. Be very careful with the delicate bones of the fingers (that form the wing) and the wing membrane. Avoid pressure on the body so as not to collapse the lungs. The challenge for extraction is usually the thumb, once that is out you are usually close to freeing it.

Part 3: Processing a Bird

A. Identify the Bird to Species

Some closely related species are difficult to tell apart and require special attention and/or measurements to make a positive identification (see Appendix 4). We may catch vagrant or unexpected species that do not normally occur here – so look at every bird carefully and make sure you know why it is NOT a similar species. Do not band a bird until you have confidently identified it to species, and, in some cases (e.g., White-crowned Sparrows), to subspecies. Use Pyle and field guides to identify or separate species. The federal Bird Banding Lab prohibits banding a bird without identification. The only exceptions we make are: *Empidonax* flycatchers that are not possible to separate (despite attempts to do so; species code UNEM); *Selasphorus* hummingbirds that are not possible to separate (despite attempts to do so; species code SPHU); and birds not identified in the field but for which the banders are confident that with the photos, drawings, descriptions and measurements they took, other Palo biologists or experts

will be able to make a positive identification. For species new to the banders, even if easy to identify, photographs are to be taken and shown to their supervisor for confirmation.

1. Once species is determined, see if there are Special Handling Notes for that species. Follow instructions.
2. If a captured bird is unbanded, determine if this is a species we are authorized to band (see below).
3. If a captured unbanded bird is eligible for banding, go to **B. Band Bird**
4. If a captured bird is already banded, go to **D. Record Recapture**

Certain birds that are **released unbanded**. If a bird fits the following criteria, record the capture on the unbanded sheet (code="U", size="NB" for "not banded"), and continue to E. Collect Banding Data. These include:

- a) Hummingbirds at offsites; they are still recorded on their own data form (size NB marked with "HUMMER" to distinguish it from the other NB page). We do not band them outside the Palo Banding Lab because of the technical nature and tools involved in hummingbird banding; instead, we mark them with a non-toxic permanent marker on one of their rectrices.
- b) Federally Threatened or Endangered (T&E) species (e.g., Ridgway's Rail, Least Bell's Vireo, Western Yellow-billed Cuckoo). Note, we DO band Willow Flycatchers as it is highly unlikely any captured here would be the federally-endangered Southwestern subspecies (not discernible in hand). Federal T&E species should be released unbanded as quickly as possible, which might include after appropriate documentation has been taken if needed to confirm the identification. Note, we ARE authorized (via a state permit) to band incidentally-captured state T&E species that are not federally listed (e.g., Willow Flycatcher, Bank Swallow, California Black Rail).
- c) Larger raptors and owls that take a \geq size 4 band, as they require lock-on bands which we do not apply (note, eagles also require special permissions).
- d) California Quail, a resident gamebird for which special permission is required to band (which we do not have for this project).
- e) Waterfowl, a group of hunted species for which special permission is required to band (which we do not have for this project). Note, we do have permission to band pigeons and doves, even though they are hunted.
- f) Unestablished non-native species. Note, we can band House Sparrow, European Starling, Eurasian Collared-Doves as they are established even though non-native.
- g) Species for which we do not have any banding resources for in our kits (e.g., shorebirds), in case there are special banding instructions for them.
- h) Birds that are not banded because of an oversight at the banding lab or because of intentional release due to injury, or if a bird is accidentally released at the banding station. Birds observed escaping at the net or birds that slip out of a bander's hands at the net DO NOT GET RECORDED.
- i) Unbanded birds that die during netting or processing without being banded. These birds should be completely processed just like banded birds and should be placed in the freezer (See Part 3 Section H).

B. Band Bird

- 2) Determine the proper band size for the species using one of the various resources in the lab. If there is uncertainty (e.g., multiple sizes listed, or the leg seems inappropriate for the band size recommended), measure with the leg gauge and use the appropriate size. . If you use a size that is not recommended for that species, include in the notes that this was intentional. If for any reason you don't have a proper size or type of band for a given individual, it must be released unbanded. * Only band a raptor that takes a size 3A or smaller butt-end band. Do not band a raptor that requires a lock-on band (size 4 and up). Process and record larger raptors on the NB sheet.
- 3) Find the correct Banding Data Sheet and band string. *Empidonax* flycatchers have their own data sheets and strings in sizes 0 or 0A.
- 4) Find the correct band # to be used (the next numerical one). If the band is not the next one in the sequence, stop and figure out the problem before proceeding (e.g., Is there a band missing? Are you looking at the correct banding sheet? Is it the first band on a string and you need to start a new sheet? Etc.).
- 5) Record on Banding Data Sheet using black ballpoint pen only (no felt tips, and no corrections with whiteout):
 - a) Bander's initials
 - b) Bander's name and initials at bottom (if not already present)
 - c) Code ("N" for all newly banded birds)

- d) Band #. To prevent mistakes, all nine digits of the band number should be read off the band and then recorded for the first band of each size each day. Time can be saved after the first bird by only reading and recording the last 3 digits.
 - e) Species Code
 - i) AOU #
- 6) Before giving a federal band, determine if the bird is of a species that is to be color banded (See Appendix 1 and list on wall in the banding lab), as you must determine from the next available color combo which leg to place the metal band (and record band number immediately on Color Band Sheet; see **C. Color Band Bird**). Then return here and continue where you left off.
 - 7) Band the bird with the correct band on the proper leg, being careful to use the correct banding pliers' size and pliers' hole size. . . If the bird is not to be color banded, the metal band goes on the right leg (except PSWS - see Palo Special Handling Notes). The band should be placed upside down to facilitate reading when the bird is held in the bander's grip. On large birds (i.e., California Scrub-Jay or Sharp-shinned Hawk) the band should be placed right side up to facilitate band reading in the field.
 - 8) Make sure the band is properly affixed to the leg and completely closed.
 - 9) For color-banded birds, return to **C. Color Band Bird**. If the bird is of a species that is not color banded, go to **E. Record Data**.

C. Color Band Bird (status = 301)

- 1) Choose the next available combination from the Color Band Sheet for that species.
- 2) IMMEDIATELY record on the Color Band Sheet (if this sheet is not properly filled out when color banding a bird, it is probable that the next bird of that species will receive the same color band combination):
 - a) The metal band #
 - b) The date and site.
 - c) Age (HY, AHY, SY, ASY, or U) and sex (M, F or U).
- 3) Record the color band sequence WITH AN ASTERISK AT THE BEGINNING AND END on the backside of the Banding Data Sheet (e.g., *WS/KB*).
- 4) Color band the bird with the proper sequence. The order goes from left leg to right leg and from body to foot (White over Silver on the left and Black over Blue on the right in the example above).
- 5) For size 3 California Scrub-Jays and towhees, which can remove color bands with their bill, be sure to seal the bands with a mini soldering iron.
 - a) Isotip Quick Charging Soldering Iron instructions. The Palo soldering iron stays in the charger in the data room until needed. For the off-site and gridded banding kits, the base also stays in the charger and is only put in the kit the day of use and returned to the charger afterwards, but the tip remains in the kit (and is stored in such a way that it is protected from damage). To use, switch the red button to USE and hold it down (bulb will light up), letting it heat up, for 30-40 seconds. When heated, keep holding button down then hold the tip so that the *side of the point* rests against the crack in the band and rub gently back and forth. Note: it can get so hot that it begins to boil the bands, in which case it can be turned off and still used while cooling. Before your first time using this, it is a good idea to practice sealing bands on study skins or Q-tips. When done, turn it off of USE and return to charger at end of banding day (holds charge for a while).
 - b) Double -check bands before releasing to ensure that seal is good.
- 6) For larger (size 3A/3B) California Scrub-Jays and all Wilson's Warblers, use pinstriped-metal bands instead of plastic bands; see special handling notes for more details.
- 7) Check that combo is correct prior to release

D. Record Recapture

- 1) Find the current Recapture Banding Data Sheet.
- 2) Make sure that the band has been and remains properly affixed to the correct leg.
- 3) Record on the Recapture Banding Data Sheet:
 - a) Bander's initials
 - b) Bander's name and initials at bottom, (if not already present).
 - c) Code ("R" for all recaptured birds).
 - d) Band #. BE SURE TO READ THIS CAREFULLY. READ IT AGAIN AFTER RECORDING IT. If a recapture gets away before its band number can be read, enter 999999999 on the recap page.

- e) Species code
- f) AOU #
- 4) If the bird has color bands, record the color combination on the back of the sheet **WITHOUT AN ASTERISK** (e.g., WS/KB). Unless directed to do so in the Special Handling Notes for the species, do not remove color bands from species that were former study species, to avoid potential impacts to mate choice.
- 5) If the bird has a tag, see if there are **SPECIAL HANDLING NOTES** for that species that provide direction, and follow those instructions. If there are no tag-related special handling notes, **LEAVE THE TAG ON THE BIRD** and record details about the tag and harness; the exception being if the harness appears to be injuring the bird, remove it and put it somewhere safe until you can give it to your supervisor, and record why you did so.
- 6) If the bird happens to be one that was caught earlier that day (“same day recapture”), and it has been an hour or less since the earlier capture, you can release it at this point without collecting any further data. If it has been more than an hour collect only weight and fat, as these can change over that time scale (use 0/U for age sex, and otherwise 9 for other fields through weight).
- 7) If a recapture is a species that should be color banded but is not, first see if it was ever given a color combination by looking it’s bandnumber up in the database or the Masterbook (there is a separate list for birds never color banded), and then either go to **C. Color Band Bird** (if it was never given one) or E. Collect Banding Data. Beware here of Puget Sound White-crowned Sparrow.
- 8) If the bird is already color banded or is a species that is not color banded, go to E. Collect Banding Data (EXCEPTION: Wilson’s Warbler recaptures with plastic color bands, or any birds that have lost one or more color band)
 - *For WIWA that have plastic color bands, remove the plastic color bands (we have learned that they do not fit properly) and replace with a pinstriped-metal band. If possible, choose a pinstriped band with 1 or 2 colors in common with the individual’s original combination.
- 9) If the bird has lost one or more of its color bands, the color combination must be looked up (computer or Masterbook) and the **ORIGINAL** colors replaced. The color combo does not need an asterisk, but it should be noted that it had been missing certain colors and they were replaced.
 - *Note for birds missing a mauve colorband: Because we can no longer order mauve colorbands, if you catch a bird that is missing a mauve colorband, first assess if we have replacement mauve bands in the correct size (see special instructions on color-band bags or canisters or in special handling notes). If we do not have an appropriate size in mauve, (1) try to select an available combo that has *only the same colors* that the bird retained (e.g., if it was WR/MS, and WRR/S is available, go with that); (2) if there isn’t such a combo available, try to select the *most-similar* available combo to the birds original combo (e.g., if it was WR/MS, select WY/RS over BBB/S); (3) in banding record, enter T for NEWCB, and describe logic in notes
- 10) **Changing bands.** If the bird is recaptured with a metal band that is in any way unreadable or unsafe, or will become so with only a little more wear, the band should be changed. The bird is given just one line of data, on the sheet for the new band, and not on the recapture sheet. The code is recorded as “C” for changed band. In the notes carefully record the old band number, reading it twice; then destroy the band. In the banding databases there is a field called “OLDBAND” where the number of the removed band is recorded. If the band is unreadable, record all readable numbers and insert “X” for unreadable numbers. Save the band to have it etched with acid, which can make numbers readable again (see your supervisor). If a bird cannot be rebanded after a band is removed, record the bird on the NB sheet with code = “C” and new bandumb = 0.
- 11) Recaptured hummingbirds (i.e. unbanded with a marked rectrix) at offsites should be recorded on the recapture page, code = R

E. Collect Banding Data

(details also provided in Pyle, on the Banding Lab wall and in offsite notebook, especially figures for sections 1 and 3)

The information below follows data fields as they are presented on the banding data sheets. This may differ from the order in which you collect the data, but is generally in the order we want banders to collect the data (due to data priorities). Age and sex sometimes require other data to first be collected (e.g., skull, reproductive condition) but are sometimes assessed by other characteristics so are listed first. Although listed at the end, ancillary data not specific to the information you glean by the bird in the hand (date, time, location, site) are also high-priority data fields.

1. 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.

2. 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.

AGEING AND SEXING CODES

The following codes are recorded on the banding data sheets and databases to represent assorted criteria which are used for determining the age and sex of birds. These codes are filled in the “how” columns accompanying the age and sex fields. Familiarize yourself with all the criteria and the appropriate situations in which to use them. Below are descriptions of these codes and examples for when and when not to use each one. If you are using a code for a reason that is not outlined in this section, please write in the Notes section, why you are using the code, and check with your supervisor to make sure it was the correct usage of the code. Be sure to take all criteria under consideration when ageing/sexing each bird.

Note that most of these criteria are based on measurements that you collect for each individual bird. Further information regarding specific data collection of these criteria is outlined in the following pages.

- **A – Adult Plumage:** “A” is generally used to determine age HY/SY vs. AHY/ASY. It can be used to distinguish a bird in non-juvinal plumage in the spring/summer (e.g., 3A9; FA9), and it can also be used to describe a bird with a uniform wing (no molt limits) that has undergone a complete molt (e.g., 5AR; FA9) in a species for which HY/SYs will not have undergone a complete molt (and describe in notes in that instance that “A” means uniform wing). See “J” and “H” for comparison. “A” can also be used for birds of unknown age (e.g., if you are sexing a RCKI by plumage but you don’t know if it is an AHY/ASY or HY/SY, you default to “A” for plumage – FA9).
- **B – Brood Patch:** “B” is used for the presence of a brood patch. Most commonly used to sex a bird female (learn the species where males also get a full or partial brood patch) – but can also be used to age a bird AHY (vs. HY).
- **C – Cloacal Protuberance:** “C” is used for the presence of a cloacal protuberance. Most commonly used to sex a bird male – but can also be used to age a bird AHY (vs. HY).
- **E – Eye:** “E” used to age or sex birds based on eye color (e.g. SPTO, WREN, BUSH).
- **F – Feather Wear:** “F” can be used in conjunction with other codes to age a bird, especially in combination with your knowledge of the life history and breeding phenology of the bird. If rects or pp covs are tapered and worn you would use “R” and “V” to describe the shape, but “F” to describe how worn the feathers are. Time of year and species must be taken into account when using this code (e.g., a bird that molts in the fall will be much less worn in fall than in the spring; and a Wrenit generally looks much more ragged than a Wilson’s Warbler at any time of the year).
- **H – 1st Winter Plumage:** “H” is used to describe a bird that has undergone its first prebasic/preformative molt, but retains some feathers that were grown in the nest (“juvinal”) or shows a plumage pattern indicative of the bird’s formative plumage (e.g., duller crown of a first winter Golden-crowned Sparrow, or retained gr covs with buffy tips on a HETH). “H” should not be used to indicate the presence of the molt limit itself (see “L”), but can still be used to describe the *plumage* of the retained versus replaced feathers (e.g., brown versus blue feathers at a molt limit of a bunting). If ageing based on first winter plumage (2H9 or 4H9), then birds that are sexed should also use this code if plumage was the criteria used to sex (FH9 or MH9 not FA9 or MA9). See “J” and “A” for comparison.
- **I – Bill/Mouth:** “I” is used for several characteristics attributed to the bill. Used to age hummingbirds (bill grooving vs. smooth) and jays (roof of mouth color). “I” can be used to describe gape in juveniles (birds should not be aged based solely on the presence of gape), and skull and juvinal plumage trump the use of “I” to age HY birds.
- **J – Juvinal Plumage:** “J” can be used to age a bird by the presence of juvinal plumage or juvinal feathers. Juvinal plumage occurs before the birds’ first prebasic/preformative molt. Juvinal plumage is grown by the nestling and is often more streaked than adult plumage (e.g. SOSP, ORJU). Juvinal feathers are more loosely

textured and generally have fewer barbs, giving them a thin appearance (often most obvious in the undertail coverts). Do not use this code post preformative molt for retained juvenile feathers (see “H” for comparison).

- **L – Molt Limit** “L” is used to age birds when there is an observed molt limit, and when the presence of a molt limit indicates a specific age group. The location of the molt limit, and which feathers are old versus new, should ALWAYS be described if using this code. Beware molt limits from pre-alternate molt that may not indicate an age group, and molt limits in certain species (e.g., woodpeckers) that can indicate more than one age group. Do not use this criteria for birds that have a uniform wing (lack a molt limit) and this is indicative that they are adults, see “A” for comparison.
- **M – Molt:** “M” is used to age birds when they are actively molting (e.g., “I know this WIWA is an AHY because it is replacing primaries, and a HY does not replace any flight feathers”). Do NOT use this code when you see a molt limit and the bird is not molting (see “L for comparison”).
- **P – Primary Shape:** The shape of p10 can be used to help age some species (e.g. BUSH and HETH); and can be used to help sex others (e.g., hummingbirds – use extreme caution and other criteria if using this for hummingbirds). Outer pp shape is generally broader in adult birds vs. most HY/SY, but this reasoning should be used in conjunction with other criteria.
- **R – Rectrix Shape:** “R” can be used help age a bird AHY/ASY vs. HY/SY. Should only be used once a bander is familiar with a species’ relative shapes for HY/SY vs. AHY/ASY because there is much variation of tapered/truncate in a kinglet vs. in a thrush.
- **S – Skull:** “S” is used to age a bird AHY/ASY vs. HY/SY. Should not be used when “micro-aging” a bird (e.g., Skull = 6 cannot be used if you are aging a bird ASY in the spring – you must use plumage or feather shape criteria).
- **T – Tail Length:** Tail length can sometimes be used to help sex some species (e.g. jays). Use caution when using tail length to sex birds.
- **V – Primary Covert Shape:** “V” is used to age birds based on the shape of the pp covs (broad vs. tapered). Should only be used once a bander is familiar with a species’ relative shapes for HY/SY vs. AHY/ASY because there is much variation of broad in a kinglet vs. broad in a thrush.
- **W – Wing Chord:** “W” is mostly used to sex larger birds such as accipiters and may used to sex *some* passerine species that show larger differences between the sexes than most passerines show.
- **X – Other:** This code should only be used if a criterion does not fit any of the other categories. The reason for using “X” should always be written in the notes section.

3. Skull pneumatization. Rated on a scale from 0 to 6 (see below). Record 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.

A pneumatized skull consists of two layers of bone, with space between, connected by tiny "struts". This will appear opaque and grayish with tiny whitish dots. In contrast, a non-pneumatized skull consists of a single thin layer of skull, appearing pinkish and somewhat translucent and, never showing the tiny dots of a pneumatized skull. To determine the degree of pneumatization (ossification), softly blow to part the feathers of the head, then gently rock the skin back and forth over the skull while looking through the skin to the skull. It may be helpful to wet the feathers to keep them parted, and/or to wet the skin to make it more transparent. Proceed from the back of the skull forward looking for either complete or no ossification, or a contrast between the pneumatized and un-pneumatized areas, by the presence or absence of white dots. The degree of pneumatization should be recorded by means of the following scale):

- 0 Skull not pneumatized: 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 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.
- 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.

4. Reproductive condition (Brood patch 0- 4; Cloacal protuberance 0- 3).

a. Brood Patch

To facilitate heat transfer to the eggs during incubation, females (and males of some species; e.g., Wrentits) develop a brood patch: the feathers of the lower breast and abdomen are lost, the skin becomes wrinkled, heavy vascularization commences, and fluid is usually present below the skin. For species in which males can develop a partial brood patch (e.g. vireos), DO NOT use brood patch to assign a sex. The following scale is used to record the sequence of development and regression of a 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.

b. Cloacal Protuberance

As the breeding season approaches, the cloaca of most male birds begins to enlarge and form an obvious protuberance. Their exact purpose has yet to be determined but they may aid in the process of insemination or serve to keep sperm at a lower temperature. The development of the cloacal protuberance is recorded with to the following scale.

- 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 wide near the tip as at the base.
- 3 Very large: diameter considerably larger at the tip than at the base.

Unlike the brood patch, a regressing cloacal protuberance (C.P.) simply goes back down the scale, 3-2-1-0. The relative size and shape of the cloacal protuberance varies greatly among species, being largest and most prominent in sparrows and thrushes and much less prominent in jays and Wrentits.

5. Fat. Record the fat class of the bird (0- 7). Fat appears yellow or orangeish just under the skin and is most easily seen by holding the bird on its back in the banders grip, stretching the head slightly forward along a line parallel to the body, and gently blowing the feathers away from the upper breast to expose the furculum. Be particularly careful to not mistake pink tendon (which is visible in the furculum but then climbs out the furculum on both sides) as fat. Then check under the wing and on the abdomen, again by gently blowing the feathers out of the way. Fat is generally stored in three discreet areas which usually begin filling in the following order:

- 1 The hollow in the furculum (wishbone) just below the throat at the top of the breast muscles,
- 2 The hollow directly under the wing, essentially in the "wingpit,"
- 3 The lower abdomen just anterior to the vent area.

The following scale is used to record fat:

- 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.
- 5 Furculum slightly bulging with fat, abdomen well mounded.
- 6 Furculum bulging greatly, abdomen with greatly distended mound.
- 7 Very large fat pads of the furculum and abdomen meet ventrally

6. Body Molt. Classify as 0, 1, 2, or 3. Gently blow to expose the bases of all the contour feathers on the bird's body and the upper and under wing coverts (both secondary and primary coverts) and the upper and under tail coverts. The presence of pin feathers indicates the early stages of molt. Later stages can be recognized by the scaly feather-sheaths at the base of each growing feather. These sheaths persist until the feather is fully grown. Consider both the number of feathers molting in each tract and the number of tracts with feathers molting. This includes the growth of juvenile body feathers. Body molt should be rated 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 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.

7. Flight Feather Molt. Classify as 0, F, or A. Examine one wing first. If no molt is found, examine the other wing. Molt occurring on only one either is "adventitious" (irregular; not hormonally-produced molt), as regular wing molt should be roughly symmetric; however, it often starts on one wing/side first, or is finishing up on one wing/side last, so if not symmetric, other clues may still suggest to you that this is regular flight-feather molt. Examine the entire tail as birds are quite prone to losing one or a few rectrices. Note that just-fledged individuals growing in their juvenal feathers, and birds that lose their flight feathers in the hand, are not undergoing flight feather molt or adventitious molt as we define it (FFM = 0 for these birds); however you should still record this in the notes section and, for the latter, add the appropriate injury and results code. Although flight-feather molt is scientifically defined as the *growth* of new feathers, our F & A codes are also inclusive of visible feather *loss* (i.e., when you observe missing feathers)

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 (aka "in pin" with no feather broken out of tip).
G = new feather growing. In parentheses record the approximate % of full length that the feather has attained.
N = new feather fully grown.

The following is an example of a way to record the data:

1[∩]: R 1-2 N, 3 G (80%), 4-5 G (40%), 6 S, 7 X, 8-9 0.
L 1-3 N, 4 G (50%), 5 G (30%), 6 S, 7-8 X, 9 0.

2[∩]: R 1 N, 2 G (50%), 3 S, 4 X, 5-6 0, 7-9 N.
L 1 N, 2 G (50%), 3 G (10%), 4 S, 5 X, 6 0, 7-9 N.

REC: R 1-2 N, 3 G (50%), 4 S, 5 X, 6 0.
L 1-2 N, 3 G (50%), 4 S, 5-6 X.

If time is short, forget the % grown on growing feathers. The above would then read:

1[∩]: R 1-2 N, 3 G, 4-5 G, 6 S, 7 X, 8-9 0.
L 1-3 N, 4 G, 5 G, 6 S, 7-8 X, 9 0.

2[∩]: R 1 N, 2 G, 3 S, 4 X, 5-6 0, 7-9 N.
L 1 N, 2 G, 3 G, 4 S, 5 X, 6 0, 7-9 N.

REC: R 1-2 N, 3 G, 4 S, 5 X, 6 0.
L 1-2 N, 3 G, 4 S, 5-6 X.

If time is shorter yet, do only primaries and secondaries on one wing.

8. Feather Wear. Record the degree of wear (0, 1, 2, 3, 4, 5) on the outer 4-5 primaries. This can be helpful in aging as juvenile feathers wear and fade faster than later generation feathers as a result of them all growing simultaneously and at a faster rate. Furthermore, adults molt later than juveniles, so their flight feathers are relatively newer than juveniles. When you encounter inconsistent feather wear among the outer primaries, provide the code that reflects average feather wear (e.g., if have 2-3 feathers with broken tips that would be classified a wear of 4, and the rest have a wear of 2, assign a wear of 3 – and consider describing in notes).

Wing wear should be classified according to the following scale:

- 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. Birds that never have white edging (e.g. Hummingbirds) should never be given a 0.
- 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.

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

Examine the primaries to ascertain the presence and intensity of the difference between that portion of the primary exposed to the sun (tip) and the portion that is covered by the next primary. As the feathers wear and age the

exposed tips fade. Depending upon the species, the exposed tips can be on primaries 4-5 (rounded winged birds) or primaries 6-7 (pointed wing birds). Note that the sometimes *darker* tips (more pigment; prevents against wear and fade) that you sometimes see at the same location is NOT fade; only *paler* tips are fade. Use the following scale to record this fade line (sometimes called the "wear line" by others)

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

10. Wing chord. Record the unflattened wing length (wing chord) to the nearest millimeter using a wing rule. This measurement is in effect a measure of the "size" of the bird, akin to height in humans. The wing should be measured in its natural closed position from the tip of the "wrist" (carpal) joint to the end of the longest primary. Note that the closed wing has a complex curvature in all three dimensions. It is important that no joints be opened along the wing and that the flight feathers are not flattened against the wing rule. Any opening of the wing or flattening of the feathers will tend to lengthen the measurement. Thus, as a rule of thumb, generally take the shortest measurement that seems accurate. Do not measure wing chord (record 999s) if the longest wing feathers are still molting or growing (except nestlings), or are broken.

11. Weight. Record the weight of the bird to the nearest 0.1g by first taring (zeroing) the container best fitted to the size of the bird and then putting the bird upside down in the container on the scale. Hummingbirds are weighed by taring the balance, then placing the bird on its back on the scale. In the field if you have to use a Pesola Balance, record the weight of a bag first then hang the bird in the same bag. Subtract the weight of the bag from the bird+bag weight. For the off-site kit electronic scale, you must calibrate the scale every time you begin a new banding day or move the scale. Calibration procedures are as follows:

- a) Turn scale on and wait about 30 sec.
- b) Press the "cal" button
- c) When the scale begins flashing "200.0g", place the 200.0g weight on the scale. The scale will continue to flash until it registers the weight. If it stops flashing and reads 200.0g, you are done. If it is even 0.1g off, check that the scale is on a firm and level surface and try again.

12. 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 retracts (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

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

14. Time. Record the time of net run to 10 minute accuracy (i.e., record 1340 as "134" and 0715 as "071"). Do not round up, simply write the time without the last number.

15. Location: e.g., PN (standard nets); G1, G2, G4, G5, or OG (Off Grid, incl. CBCH boxes) for local birds; PA (Palo Alternate) for target-net birds on grids; PT (Potter Trap); PS (special captures, i.e. caught in buildings). For

non-Palomarin sites use 4-letter code (e.g., MUHO). For birds from nests on the buildings (swallows), use PH (Palo House). For bird target-netted on Grid 5, record site as GRD5 in lieu of grid stakes.

16. Site: Net number for birds captured via constant effort mist-netting; for birds target netted on the grids, use the closest grid stake; for locals, use the nest number (e.g. 12B); for special captures, write 999 and explain location and method of capture on back of sheet. If you are running a group of potter traps, use the number assigned to that trap, if you are targeting a specific bird from a supplemental trap, record the nearest grid stake as the site. If target netting Off-Grid (loc=OG) or at an offsite, the SITE field for these birds would be “TN”.

17. Notes (including Special Handling Notes). The backside of the banding sheet is dedicated to notes detailing any information that doesn't fit within the confines of the front side (including Special Handling Notes). These may include: any required Special Handling Notes; descriptions and diagnostic /measurements of rare or vagrant species or subspecies; unusual plumage characteristics (also photograph if possible); deformities or abnormalities (bill, feet, eyes, etc.; injury and result details; any information about the capture if it was abnormal (e.g., minimum data taken due to stress). Use indexed numbers on both front and back to match notes with the appropriate front side data.

18. Recheck the band number and the color band sequence if present.

F. Release Bird

1. A bird should be taken back and released at the location of capture if it has:
 - a. color bands
 - b. an active brood patch
 - c. growing tail (= dependent juvenile)
 - d. flock membership (especially Bushtit and California Quail)
 - e. or is a resident species (at any banding site) that are not very mobile; ALWAYS BE SURE TO BRING BACK WRENTITS.
2. Otherwise it may be released from the banding lab. You can use the quick release window in the lab if you are busy but otherwise it is better to take the bird outside and let it go close to the ground in case of injury.
3. Individuals that are captured together should ideally be released together.

G. Addressing Injured Birds

Despite all our efforts to reduce the chance of injuries they will occasionally occur. Some of these are unavoidable, while others result from mistakes that can be learned from and avoided in the future. It is critical that with every injury or mortality, the banders discuss the situation afterwards amongst themselves and with their supervisor in order to a) determine what happened, b) figure out how it can be prevented in the future or what, if anything, could have been done differently, c) communicate this information to the entire crew so everyone gains from this knowledge, and d) mitigate tension or emotions that the banders involved might be feeling about the injury.

1. Treating the injury. Some injuries are minor and will not require treatment, such as dropped rectrices (only technically an injury) or a minor laceration that has stopped bleeding. Others need treatment, which will depend on both type and extent of injury. We do not take birds to rehabilitation centers. Here are some suggestions and guidelines. In some very severe and rare cases euthanasia may be a necessary consideration, but in almost all cases it is better to give the bird a chance to survive. Birds are often capable of surviving even serious injuries.
 - a. Cold. Birds that are cold need to be warmed up immediately. As much as possible this should include about 10 minutes in the hot box (either the electric one at Palo or the one with the warmer in the off-site kit). Before you get the bird to the hot box you can warm it up in your shirt, under your arm or in the car. Be sure that the off-site kit hotbox is not allowed to overheat (it might need to be left open). Always put a bird in a hotbox in a bird bag. Hummingbirds do not get put in the hot box; instead, try to see if it will take sugar water from a dropper or feeder if one is available nearby. Do not give sugar water to any birds other than hummingbirds as it will negatively affect their metabolism.
 - b. Stress. The main ways to deal with stress – indicated by closing eyes, raising head feathers, puffing body feathers, and/or body muscles (especially neck) going limp – are 1) hot boxing the bird, 2) releasing the bird as quickly as possible, as sometimes it just needs to be away from human contact and in its own environment, or 3) raising the bird up and down in your hand (slowly when processing or quickly if in the

- net) to reinvigorate blood flow. Banders must constantly check for signs of stress, which if not immediately attended to can very quickly lead to death.
- c. Heat. Birds that are overheating should be held in the shade so they can cool down (make sure multiple bags hang separately). You can give them droplets of water to drink (can open their bills and insert droplets), and can sprinkle light amounts of water on them as well. They may need to be released early so they can thermoregulate.
 - d. Bleeding. You will need to stop bleeding from any cuts. For non-feathered areas apply rubbing alcohol with cotton or tissue near the cut (e.g. apply to the leg if the cut is on the foot). This causes blood vessels to contract, slowing or stopping the bleeding. Do not apply alcohol directly to the cut (will cause additional pain); alcohol should not be used to sterilize the wound. Alcohol should not be used on feathered areas, as it will affect feather oils. Alum or styptic powder (e.g., QuikStop) also works but is thought to cause additional pain; use this only in feathered areas or if alcohol is not working. Cuts on the bare parts of the legs and feet can be closed up using a small drop of super glue if there is concern about continued bleeding or infection potential. Do not use super glue on any other part of the bird. Do not release the bird until the bleeding has stopped.
 - e. Bleeding from mouth. Two causes of blood coming from a bird's mouth are a cut on the tongue and internal bleeding. If the blood is coming from a small cut on the bird's tongue, continue to process the bird, checking its mouth frequently. If the bird is not doing well, release immediately. If the blood is coming from a severe cut on the tongue (or the tongue was completely severed) or from an internal injury, very minimally process the bird (band if possible and species) and release it. The bird should be given a code 615. If you decide to release the bird even before banding it, the code will be 000. In any case, describe the injury well in the notes.
 - f. Strained wing. Often you will not know that a bird has strained or bruised its wing until it is released and does not fly away properly falling to the ground (which we call "bouncing"). This generally reflects minor muscle damage that will be righted with rest. If you can recapture the bird without causing it excessive stress, do so and put the bird in the hot box, often for 30 minutes. If the bird still has a strained wing when you release it after 30 minutes, put the bird in a relatively safe place outdoors (i.e., not in the middle of a mowed clearing or on a high branch that it can fall off or be exposed to a predator), being sensitive to the temperature (i.e., if it is hot do not leave the bird in the sun, or vice versa).
 - g. Broken leg. This needs to be dealt with case by case, but often requires either 1) splinting the leg with a stick or toothpick and/or scotch or medical tape, or 2) if the break is not splintable but the broken leg will clearly impede the bird or cause excess pain to drag the leg, amputating it and stopping the bleeding. See below for banding protocol.
 - h. Dislocated joints. Attempts should be made to relocate the joint. You will likely want another bander to help in this process.
2. Birds with Broken Legs: banding and the removal of bands
 - a. Unbanded Birds: Bring the bird to the banding lab and treat the injury if possible (see above). Band the bird on its good leg, take the minimal data (species; age and sex if easy), and release the bird as quickly as possible.
 - b. Recaptured Birds: Do the same as for unbanded birds in terms of quick processing. Remove any bands from the broken leg and put metal band on the unbroken leg if possible. For color banded birds this will likely require removing all color bands and letting the bird go only with a metal band.
 3. Birds with Avian Pox or Pox-like symptoms. This is not a banding injury, but is listed in this section because of how we handle it. Note that abnormalities on the feet or around the eyes may be pox, so for anything suspicious we treat it as such. Do not band, weigh, or measure the bird so as to not contaminate processing equipment; clean your hands afterwards (if possible with hot water and soap), and do not reuse the bird bag until washed in hot water. For recaptures, remove the band from a leg if that foot/leg has pox-like symptoms and place it or another band on the other leg if that seems safe to do (washing the removers and pliers – with a 10% bleach solution if available – if you do so, and preferably waiting 10 minutes to reuse). For color banded birds this will likely require removing all color bands and letting the bird go only with a metal band.
 4. Recording the Injury: Always describe the details of all banding accidents (deaths, broken legs, sprained wings, loss of tail or rects, etc.) in the notes, and record injury and resolution codes (see below).

5. Status Codes: Only banded birds with very severe injuries (e.g., broken leg, broken wing, amputated leg) and recaptures that die are given 615 status. Banded birds with less severe injuries are given 300/301 status. Unbanded injured birds are always given status 000.
6. Injury and Result Codes: Whether or not the injury is severe (including if the bird died), it should be given injury and results codes on the back of the data page (along with an explanation) and in the computer:

INJURY & RESULT CODES

***Note, includes non-injury situations we want to capture in a standardized way such as SAMPLE TAKEN & EUCALYPTUS SAP**

INJURY CODES:

- Lost rectrix(ces), or other flight feathers (note which feather tract and # lost)	1
- Injured Wing (incl. wing strain)	2
- Laceration (incl. bleeding after "tongued" and lacerations on wing or leg)	3
- Injured Leg	4
- Leg Amputated	5
- Combination	6
- Suspected Accipiter (or other predator) Induced	7
Confirmed Accipiter (or other predator) Induced	8
- Other (describe fully; includes non-weather related stress, unknown-caused injuries, birds that "bounce" upon release not due to apparent wing strain, and injuries not otherwise listed here).	9
- Sample taken (feathers, blood, cloacal swab, ecto, etc.). Describe sample type in notes.	10
- Eucalyptus sap on head/bill	11
- Weather (heat stress, cold, wet; describe type in notes)	12

RESULT CODES:

Released as is	1
Doctored and released	2
Died	3
Found Dead	4
Hot Boxed	5

H. Storing Dead Birds (net casualties, window kills, road kills, etc.)

We are authorized to have dead birds in our possession; most of these we pass onto museums for use in their collections, or use for our own educational needs. It is important that they be properly packaged and documented. . I

- 1) If their condition allows it, all dead birds should be processed as above (minus the banding or any uncollectable data). Birds other than net or trap accidents should be recorded as special captures (location = PS, for Palo Special), and can be recorded on the data sheets for Palomarin Nets. For birds found dead at offsites outside of nets, location should be that site's 4-letter code and site = 999. Dead unbanded birds are given status 000 and recorded on the unbanded sheet. Dead recaptures are given status 615 and the band is removed and destroyed (but code is still "R"). Give Injury and Results codes to all dead birds.
- 2) Fill out all the information in the freezer log book
 - a) For log number, use the next number in sequence
 - b) Fill out species, initials, date, sex, age, condition (poor/fair/good/excellent), location, and notes with additional details (including what happened)
 - c) Leave "fate" and "taken from freezer" blank – both fields are for when the bird leaves the freezer
- 3) Fill out the Point Blue Specimen Form with much of the same information. Read instructions on bottom of form.
- 4) Please prepare carcasses carefully! A poorly bagged, labeled and catalogued carcass will make a poor specimen and will be thrown away. Wrap carcass in a paper cone (or other wrapping if it's a larger bird, such as a brown paper bag):
 - a) If fresh, open bird's mouth and stick cotton in it to absorb any blood that may leak out
 - b) Make a "cone" with a piece of paper.

- c) Place bird in the cone head first
 - d) Place the bird and data card in a good quality Zip-lock bag (available in cabinet in library).
 - e) Squeeze out all excess air without bending or interfering with the tail and seal bag; if using non Ziploc bag for larger bird, be sure to carefully tape the bag shut.
- 5) Write the species code and catalogue # with permanent marker on the outside of the bag.
 - 6) Place in freezer (under upper building) in designated section.

I. Recording Lost and Destroyed bands

1. Be sure you write a line of data for all bands that were lost as soon as you discover that they are lost. Please write code as “L”, species as “BALO” (band lost), and put in the date and location when and where this was discovered.
2. If any unused bands are very hard to read, are formed improperly, become crimped or in any way not appropriate for use when you place them on a bird, destroy them (bend them so they are unreadable and then throw them away). Be sure to write a line of data for all destroyed bands. Write code as “D”, species as “BADE” (band destroyed), and put in the date and location when and where this occurred. Do not use this code for bands removed from recaptured birds.
3. All other data (other than those mentioned) should be 999ed.

J. Feather Sampling

The special handling notebook will tell you which species we are taking feather samples for in a given season. However, please also collect feathers from any individuals of ANY species that drop their flight feathers, as long as the feather tips did not get contaminated in the process by your hands or another bird’s feces or feathers. Feather samples get used for genetic analysis that can help link populations of a species, and are generally sent to a lab at UCLA. For the targeted species, do not take samples from recaptures to prevent re-sampling the same individual. Only 30 samples per year/winter season in all of West Marin are desired, including both at Palo and at off-sites. Take the outer two tail feathers (one from each side) - when you pluck them, hold them close to the base and pull gently. Be careful not to touch the quill or you'll get some crazy human DNA mixed in. Then put them in the envelopes provided. Keep track of the feather samples in such a manner that you do not take more than 30, occasionally checking how many are at Palo and in the off-site kit for the year. Note on the banding sheet that you collected feather samples (there is an “injury” code for this). Among other things, this will be useful in the future if a bird is aged by its rectrices!

NWCS COMBINATIONS ONLY!!!!!!!

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Never Photocopy a colorband combination sheet.

Colors	Bandnumber	Date	Loc	Age	Sex
WY/WS	1961311070	7/12/04	PN 2.4	HY	U
RGB/S	196131180	9/28/04	PN 2.4	HY	U
BOB/S	186142718	4/3/05	PN 1.4	SY	U
YOY/S	186142787	7/7/05	PN	HY	U
S/BBM	220132591	02/07/06	PN 2.3	SY	U
S/ORM	193165388	06/25/2007	PN 2.4	HY	U
YMW/S	172129586	11/21/06	PN	HY	U
S/GKG	225138627	7/13/2007	PN	HY	U
S/MBW	225138646	7/22/2007	PN	HY	U
BS/MY	225138675	8/05/07	PN	HY	U
BG/GS	193165389	6/25/07	PN	HY	U
BKB/S	225138658	07/27/07	23	HY	U
S/OGM	220187273	10/02/07	SS	HY	U
KS/GM		/ /			
GNW/S	225138659	07/27/07	23	HY	U
MBG/S	225138660	07/27/07	23 PN	HY	U
S/WBM		/ /			
OK/KS		/ /			
S/OBB		/ /			
ROO/S		/ /			
WS/GB		/ /			
MB/OS		/ /			
MS/WG		/ /			
S/BOG		/ /			
S/WKO		/ /			

Part 4. Entering and Proofing Banding Data

Any bird that receives a line of data must be entered into the computer database. It is essential that this data entry be done daily. The longer one waits to enter data the poorer the quality of data.

Banding Data is managed via a series of database files (extension .dbf):

- Mist.dbf – This is where the data goes as you enter it using the banding program. It is banding data that has not been proofed, and will be moved into band.dbf and allnumb.dbf after the daily proof when banders click “Palo Finalize and Backup”.
- Band.dbf – Banding data for the current year only. Includes “Notes” field. Banders make edits for monthly proof here.
- Allnumb.dbf – Combined banding data from current and previous years. For reference only. Do NOT make edits to this database as they will be overwritten. Does not include “Notes” field.
- Allbandpalo.dbf – Palo banding data up to December 31 of the previous year. For reference only. Do NOT make edits to this database as they will be overwritten. Does include “Notes” field.
- Allband.dbf – is the cleanest version of ALL Point Blue banding data. If you find an error in the banding data that is older than the current calendar year, make a note on the “BANDING DATA ERRORS AND PROBLEMS” clipboard in the banding lab. Point Blue’s banding coordinator and the Palo banding supervisor are the **only** people who can make changes to allband. Interns should never modify this database and it is not in the Palodata folder.

A. Entering Daily Banding Data (to be done the day it is collected!)

1. Use the banding computer for all banding data entry. If that computer is unavailable, you can access the banding data through another available computer as well.
2. Choose the Visual FoxPro shortcut to band.exe icon on the desktop. If there is no shortcut: Open Visual FoxPro. Click Program=>Do. Change List of Files Type to “Program” and Drives to “Z:\palo3\user. In Directories go to Z:\terrestrial\programs_and_projects\palomarin\palodata\band. In Do Program File, select band.exe.
3. Hit Caps Lock
4. Select the Data option on the toolbar
5. **Weather:**
 - a. Select Enter Weather Data
 - b. Hit the *Add* button.
 - c. Enter any weather data from the previous day or days not yet entered, including low and high temperatures that are determined from the graph on the weather computer (see chapter 5: Weather Monitoring). Do not enter the current day’s weather until the following day as the low temperature for the day has likely not yet been reached. Fill in “Palomarin” for project.
 - d. Hit the *Exit* button when finished.
 - e. Be sure to mark the raw data as entered (with a horizontal red line next to each record).
6. **Net Hours:**
 - a. Select Enter Net Hours Data
 - b. Hit the *Add* button.
 - c. Fill in all fields on the screen. Enter the whole name (not just initials) for volunteer banders. The additional notes should always include an explanation for any nets that were not run the entire time.
 - d. Hit the *Individual Nets* button to go to the next screen. Do this even if you had a complete banding day or if all of your nets that closed early were closed simultaneously.
 - e. Hit *Add Net Rows* to import records for your date and location of banding. Do this even if you had a complete banding day or if all of your nets that closed early were closed simultaneously.
 - f. If you had a complete banding day or all nets were closed at exactly the same time, hit *Save* (on both screens) and *Exit* now.

- g. If not all nets were open for the same exact period of time, scroll between nets using the *Next Row* and *Previous Row* buttons. Modify the open, close, and hours times accordingly for nets that had different open or closing times. This step is not necessary if all of your nets closed early **and** at the same time (see step e).
- h. If some nets were closed then reopened, enter the first opening time and the last closing time, and fill in the appropriate net hours for that net. Include a description of what happened in the notes, and ignore the error code that this creates when proofing.
- i. If a net is not open at all on a day that there is banding (e.g., you don't open PN net 1.4 b/c a predator was seen nearby) open and close times should be entered as 99.99 and total hours for that net will be zero.
- j. Hit the *Save* button (twice, on both screens) and then *Exit* when finished.
- k. Be sure to mark the data from the net hour sheet as entered (with a horizontal red line next to each record).

7. **Banding Data:**

- a. Select Enter Banding Data
- b. Hit the *Add* Button
- c. Type in all fields for each record, and mark each entered record in the raw data with a horizontal red line (including separately marking the notes on the back side).
- d. The tab and return keys can speed navigation within the banding data entry screen. Tab moves forward one field or button, shift-tab moves backwards one field or button, and Return selects the "default" command button. When finished with one record and ready to add the next record, for example, hitting Return twice and then Tab twice will save your current bird, begin adding a new bird, and navigate to the first field of the new bird. (The Return key doesn't work from the "notes" field. You must tab out of the "notes" field before using Return to select the "Save" button).
- e. Note, with the exception of what is described below for unmeasured crowns in species that we typically measure them, for the ancillary data fields that typically do not get taken (colors, tcr, tail), they can be left blank rather than 999ed.
- f. When completed with all records, hit *Save* and *Exit* buttons.
- g. Below is a list of data fields and corresponding notes. For the most part they are the same as banding data sheet. **PLEASE RECORD 9 FOR DATA NOT TAKEN.**

Field Name	Description of Banding Data Entry Type
SIZE	Band size = 0, X, 1, 2, 3, etc. Use RE for recaps.
INITIALS	Bander's initials
CODE	Band code, i.e. N=new, R = recap, U = Unbanded, C= Changed, L = lost, D = Destroyed.
BANDNUMB	Enter complete band number: if not banded enter a 0. If hummingbirds are banded, replace the alphabetic code with the numbers it represents (Y = 3000, etc).
SPEC	Enter 4-letter species code
AOU	Enter 4-number AOU code
AGE	0,1,2,3,4,5,6,7
HA1	How aged? J,H,A,W,C,B,I,S,T,E,F,L,M,P,R,X, V or 9
HA2	How aged? J,H,A,W,C,B,I,S,T,E,F,L,M,P,R,X, V or 9
SEX	M, F, or U
HS1	How sexed? J,H,A,W,C,B,I,S,T,E,F,M,P,R,X or 9
HS2	How sexed? J,H,A,W,C,B,I,S,T,E,F,M,P,R,X, or 9
SKL	Skull pneumatization: 0,1,2,3,4,5,6
BRP	Brood patch:0,1,2,3,4
CLP	Cloacal protuberance:0,1,2,3
FAT	Fat: 0, 1, 2, 3, 4, 5, 6, 7
MLT	Body molt: 0, 1, 2, 3
FFM	Flight feather molt: 0 (absent), F (flight feather molt), or A (adventitious molt)
WWR	Wing wear: 0, 1, 2, 3, 4, 5
FDL	Fade line: 0, 1, 2, 3
WING	Unflattened wing chord length, in mm
WGHT	Weight in grams to the nearest 0.1g

STAT	000 (not banded), 008 (marked rects), 300 if USGS band only, 301 if color banded, 318 (blood taken, no aux markers), 319 (blood taken, aux markers, 325 (two or more kinds of markers, e.g., geolocator tag + color bands), 615 if severely injured (and banded), 999 for destroyed and lost bands.
DATE	mm\dd\year
TIME	First 3 numbers only, using 24-hr time. (1:15pm becomes "131")
LOC	PN,PS,PA,PT,PH,G1,G2,G4,G5,OG, and 4 digits for offsites (PGUP, PIGU, MUHO), etc.
SITE	Net number or nearest single grid point
TCR	Tail or crown measurement, in mm. For OCWAs and WIWAs whose crowns did not get measured or for individuals with juv plum on head, be sure to enter "999". If crown = 0 for birds in basic or adult plumage, be sure to enter it; do not just leave it blank.
TAR	Tarsus length, in mm
NEWCB	If this is a changed color band combination, or the first time the bird is color banded, use "T" for true. Otherwise "F" for false
COLORS	Color band combination (e.g. OS/OO)
INJ	Injury codes - see above or list under Utilities menu in banding program
RES	Was injured bird released? Treated? See result codes above or in Utilities menu in program
COM	Put a "T" for true if there are notes on back, and if not (or if all of the notes on the back have been entered into any of the fields mentioned above, such as crown or tail measurements), put an "F" for false
PROJECT	Enter appropriate project ("Palomarin" for all west Marin sites)
OLDBAND	# of the band that was removed from the recapture if the band was changed.
NOTES	Enter notes from backside of sheet. Tail length, tarsus measurements, color combinations, etc can be entered in the appropriate fields and do not need to be double-entered.

B. Daily Proof: proofing and printing banding data (to be done the same day the data was collected and entered)
Refer to the pulldown menu in FoxPro banding program for all banding error codes.

1. Before printing out proof, select Run Recap Report under the Proof menu. This allows you to see if there are any data discrepancies between captures.
 - a. If you find that the data collected that day is incorrect, please make changes on the raw data and in the current banding data (using the View/Edit/Make corrections option under the Proof menu). Except for species discrepancies, change the incorrect data to unknown; do not change it to what it was determined on another date.
 - b. If you find that the historical data from the current year is incorrect, please make changes in the raw data and in band.dbf (choose by selecting Open under the File menu). Follow data-changing protocol in "a".
 - c. If you find that data from previous years is incorrect, please put this information on the Banding Data Errors form, on a clipboard in the banding lab, so that your supervisor can make changes to the historical database(s). **DO NOT MAKE ANY CHANGES DIRECTLY INTO ALLBANDPALO.DBF.**
 - d. For birds where you changed the band, you should manually look their records up by their old band number.
 - e. If you cannot find any prior records for that band number or the prior record(s) is of a different species and you are confident the recap number was misread, try to determine the likely number (checking for similar numbers where errors are likely, using both the databases and the band inventory book). If you cannot find a similar enough number but know this is not a foreign recap, after consultation with the banding supervisor or coordinator, 999 the band number and put original number in notes. If you believe this might be a foreign recap, your supervisor will report to the US Bird Banding Lab.
 - f. Document any unresolved discrepancies on the Data Error form and notify your supervisor.
2. Select Proof>daily proof from the menu.
3. At the prompt for printing the proof, put legal size paper in the printer (**be sure to reuse the paper from all daily and monthly proofs**), and select "yes".
4. Proof the data with two people, with one person reading out loud from the raw data and a second person simultaneously looking at the printout for errors. Thoroughly check all error codes, which might mean sifting through old data. A listing of error code meanings can be found under the Utilities Menu. (See **Helpful Computer Hints** at the end of the Palo Handbook for FoxPro commands and ways to look up old data).

5. Put a red vertical line through the first slash on the raw data sheet, making a "+", to show it has been proofed. Also do this for the notes on the back side, only IF all the notes shown are in the printout (otherwise, since the whole notes record has not been proofed, it's not appropriate to mark as such; this will be proofed in the monthly proof). On the printed page put a horizontal red line at the beginning of the line of data if there were no mistakes. If there are mistakes, put a circle at the beginning of the line of data and circle any mistakes. If there are mistakes change the data in red on the printed page.
6. Make corrections in the FoxPro banding program under Proof then View/Edit/Make Corrections *or* by selecting and opening Mist under the File menu. Put a check mark next to each corrected mistake on the printout so you know it has been fixed.
7. Write "entered/proofed/corrected" (EPC), the date, and your initials on top of the proofed computer-printout and file it on the correct shelf. These only need to be saved until the monthly proof is completed, but should be recycled.
8. After all corrections have been made from the proof, choose "Palo finalize and backup" to save the data. This makes backups and moves the banding data from mist.dbf into band.dbf and allnumb.dbf.
9. To make corrections to data that has already been backed up: Open Visual FoxPro. Go to File=> Open. Change List of File Type to Table (*.dbf), Drives to Z:\palo3\user, and Directories to Z:\terrestrial\programs_and_projects\palomarin\Palodata\Band. Select File Name band.DBF. To select a given bandnumber, use the command SET FILTER TO BANDNUMB, hit [enter], type BROW, then [enter] again. (See appendix 5 for more FoxPro tips)

C. Monthly Proof (to be done after all the data for a month has been collected, entered, proofed, corrected, and finalized; in this process we completely proof all the data again - and we still find mistakes!).

Banders are responsible for completing the monthly proof for all banding data each month (this includes nestling data and other gridder kit data).

1. Make sure the correct paper is loaded into the printer (legal sized paper for banding data, letter sized for weather and net hours) - it will be several to many pages.
2. In the band program select Proof, then Monthly proof. Choose the designated month. When the month is 10 or greater, it will only show a *. To choose 11 or 12, click the up arrow the correct number of times. It will still show a *. Check to make sure you are looking at data from the correct month before printing. To print, close the window that just opened (banding data), then click "yes". Printer options will then be displayed. Print double-sided. Do the same for net hours and weather. Proof the data using the same process you use with the daily proof - reading off the raw data; and checking the computer generated error codes for the banding data.
3. Once a line of raw data has been monthly proofed, the "+" sign next to it on the front page of the banding sheet should be circled. For net hour and weather data, for which this is the first proofing process, circle the "-" on the raw data sheets.
4. Once proofing has been completed, check all raw data (weather, net hours, front sides of banding sheets) as well as the entire printout to be sure that all lines of data, both raw and printed, have been proofed.
5. Make corrections by choosing Open under the File menu, and then selecting the appropriate database (band.dbf, nethrs.dbf, or weather.dbf) where you need to make corrections. Find the record that you need to edit and correct it. To delete specific entries, see the "deleting records" section of Appendix 5 (Helpful Fox Pro Hints).
6. For birds where you changed the band (CODE=C), you should manually look their records up by their old band number to look for discrepancies.
7. The notes field is proofed directly on the computer:
 - a. Open Visual Fox Pro
 - b. Go to: File -> Open -> z:\terrestrial\programs_and_projects\palomarin\palodata\band\band.dbf
 - c. Type: INDEX ON SIZE + DTOC(DATE) + STR(TIME) + LOC TO TEMP [enter] (*this will sort the data so it is in the same order as the raw data*). Click "yes" to override the temp.idx files.
 - d. Type: SET FILTER TO DATE=>CTOD("01/01/2009") .AND. DATE=<CTOD("01/31/2009") [enter] (*insert dates to the corresponding month*). You can add .AND. LOC="PN" before [enter] to browse a specific location.
 - e. Type: BROW FIELDS SIZE, CODE, BANDNUMB, SPEC, DATE, LOC, SITE, TCR, TAR, COLORS, INJ, RES, COM, NOTES [enter] (*this will allow you to view all necessary information to proof the notes field*)
 - f. Whether the NOTES record has a "+" next to it (was completely proofed during the Daily proof) or just a "-": after monthly proofing them, circle the "+" or "-" to indicate it has been monthly proofed. This will

make it easy to evaluate if all notes were monthly proofed (see next step). Do not circle the + or – on the backside next to the notes until all of note components (which may include *both* the part of the note, such as tarsus, crown, etc., that was entered into its own field; *as well as* the additional comments) have been proofed.

- g. Once completed, check all raw data to be sure that all lines of data for that month have been monthly proofed (the “+” or “-” are circled).
8. After all corrections are made, go into the band program (band.exe) and choose, under the Utilities menu, “Rebuild allnumb from band and historic project data”. Choose “allbandpalo.dbf” (when it asks you to select your historical database, and “band.dbf” when it prompts you for your current database. This rebuilds the allnumb database (used as a reference during the proofing program) by replacing all the current year’s data with the cleaned up data in band.dbf, as well as cleaned up data in allbandpalo.dbf. **DO NOT MAKE ANY CHANGES DIRECTLY INTO ALLBANDPALO.DBF.**
9. While you still have the banding program open, open the monthly proof again and browse the file to make sure that all error codes that needed to be fixed are now gone. Do not reprint the monthly proof.
10. To make a backup of your updated band.dbf, select, under the Proof menu, “Palo Finalize and Backup”. Write “entered/proofed/corrected”, the date, and your initials on top of the proofed computer-printout and file it on the correct shelf. These only need to be saved for the duration of the year.
11. To make corrections to data that has already been backed up: Open Visual FoxPro. Do File=> Open. Change List of File Type to Table (*.dbf), Drives to Z:\\palo3\\user, and Directories to Z:\\terrestrial\\programs_and_projects\\palomarin\\Palodata\\Band. Select File Name band.DBF. To select a given bandnumber, use the command SET FILT TO BANDNUMB, hit [enter], type BROW, then [enter] again. (See appendix 5 for more FoxPro tips)

Yearly Net Hours Proof

At the end of each year, the general net hours database (not the by net database) is proofed a second time.

Error Codes Defined

- < - Is this really a recap? # was misread or is from another site!
- ? - Bird coded as new found already in database; or color bands inconsistent
- * - Band numbers out of sequence. In addition to this error correctly denoting an issue with the order in which band numbers were entered or alerting the bander to missing bands, this error code often shows up on a recap, or another record that clearly is not a band number out of sequence. In that case, be aware that this code often refers to an error in the line of data either above or below the line in which the * appears. Banders should keep this in mind as they might need to examine records throughout the printout to determine if there is an overall issue.
- ! - Species/AOU mismatch
- # - Total net hours entered don't match sum of net hours by net
- a - Skull < 6, but age > 2 (ignores FOSP,AMRO,SWTH,HETH,VATH)
- b - Bird has BP, but not sexed 'F' (ignores WREN and vireos)
- c - Bird has CP, but not sexed 'M' (ignores WREN)
- C - Code=C, but no oldband data
- D - Net hours not entered for this date
- F - Plumage/age mismatch
- I - Given injury code or 615 status on an earlier capture
- L - Loc not found in location database
- N - Net # not found in net database
- p - PUF1, CAFI or BHGR aged only as 3, but sexed as male. Ignore in fall after molt
- P - Project field is blank
- R - Called a different species on earlier capture
- S - Sexed differently on earlier capture
- W - Weather not entered for this date
- X - Band used on an earlier date than previous band in sequence
- Z - Zeroes in colors or letter O in bandsize

Part 5. Mist Netting Station & Net Vegetation Protocol

On top of assisting the gridders with transect vegetation data collection each summer, current protocol is to collect vegetation data at our mist netting sites two out of every five years, following two protocols:

- **Habitat Structure Assessments** are conducted at the overall mist netting site every five years, and were last done in 2017 (next slated for 2022). These follow Institute for Bird Population protocols (see www.birdpop.org) and are submitted in raw form to IBP, although copies are also stored at Palomarin.
- **Net vegetation data** is conducted at each mist net every five years, last done in 2013, and is next slated to be done in 2018.

Directions for collecting Net vegetation data:

The purpose is to quickly quantify vegetation at net sites in order to detect changes over time that may result in changes to capture probability, and is not meant to quantify the entire area, for which other approaches can be used. Equipment Needed: nest stick, intercept tape, clinometer, densiometer

Section 1. Line Intercept (Tree & Shrub): 5 m line intercept beginning (0m) at the midpoint of the net lane and going perpendicular to the net lane, in each of the two directions (A and B). Include all woody vegetation. Mark each time woody veg crosses line (or above it, for trees). Record cardinal direction that each transect faces (e.g. A faces SE, B faces NW), so that in the future we know which was which.

Section 2. Densiometer: Standing at midpoint of the net lane take a reading facing the middle (45°) of each quadrant. Record the number of points out of 96 (4 equally spaced per square) that are covered by leaves, and height range for each reading (e.g., 2-15 m). Densiometer measurements only include foliage, not dead branches, trunks, or snags.

A few notes:

- Dead portions of trees are included in height and width measurements.
- It's a judgment call on whether it is one or more trees that are sprouting from the ground, like with willows. If you cannot separate out the branches/leaves coming from more than one plant of the same species over the transect you count them as one. If you can separate them out, as you would if there were multiple species, you should, separately measuring where they start and stop, as well as their heights, widths and % alive.

Directions for entering Net Veg data:

Net veg data will be entered into 2 files:

- "NET_VEG1.dbf" – this file contains data for the densiometer (section 2)
- "NET_LINE_INT.dbf" – this file contains line intercept data (section 1).

Steps for entering:

- from any computer, open Visual FoxPro and push "CAPS LOCK" key
- open the file that you wish to enter first (all files are stored under:
Z:\terrestrial\programs_and_projects\palomarin\palodata\veg\net_veg\)
- type SET CARRY ON
- type APPEND
- enter the data from the net veg form (see above for which sections are entered into each database).
- Do not enter decimal place for net number (e.g. at Palo, net 5.0 should be entered as 50).
- Put a red dash at the top of each section after it has been entered.

CHAPTER 3: Censuses and Encounters

Point Blue data entry with CADC

Point Count and Area Search data is entered online via the web page known as CADC (California Avian Data Center). Your supervisor will provide you with information for accessing and entering data via CADC.

Part 1: Point Counts

A. Conducting Point Count Surveys

Point count censuses are conducted during the breeding season to cross-check our known populations and enable us to detect changes in species composition. They are conducted on established transects with points approximately 200m apart. Point count censuses take place two or three times during the heart of the breeding season (April-June). Around Palomarin they are primarily the banders' responsibility but can only be conducted by individuals that know all of the songs and calls of birds at Palomarin and environs. The following protocol is also applicable to point counts at sites other than Palo.

Be sure you have the following:

- Binoculars
- Range finder
- watch which indicates seconds (preferably with timer function and beepy noise)
- at least 2 pens
- field notebook
- sufficient blank data forms
- clipboard
- rubber bands (for holding forms on clipboard)

Depending on the route, census type, and your experience level, you may also need:

- directions and maps
- GPS unit & extra batteries
- cell phone or radio
- field guide
- water and snacks
- spare shoes (because you got soaked during the survey, or were originally biking with clip-in shoes but your chain broke!)

Counts begin approximately 15 minutes after local sunrise and should be completed within 3-4 hours, generally by 10AM. When possible, the order in which points are surveyed should vary between visits. Ideally, observers should also vary among visits.

Do not conduct surveys during weather conditions that likely reduce detectability (e.g., high winds or rain). If conditions change for the worse while doing a count, remaining points can be completed <7 days from the first day, but this should be avoided as much as possible. The location information at the top of the form should be self-explanatory (i.e. region is "Marin" and Location is "Palomarin" or "PALO"). A brief description of the weather should also be written at the top of the form when you start the first census, and any significant changes during the census should be recorded. At each point, the station number and beginning time (24-hour clock) should be recorded. Approach the point with as little disturbance to the birds as possible, and begin your count as soon as you are oriented and are confident you can estimate distances accurately (less than 1 minute).

Point Blue point counts are 5 minutes duration at each point. If something interferes with your ability to detect birds during the 5-minute count, stop the count until the disturbance has passed and start over. Cross out the interrupted data and note what happened on your form.

Every species detected at a point is recorded, regardless of how far from the observer. For unknown species, record "XXXX." For unknown members of various families, use "XX" plus two letters to signify the family – "XXHU" for unidentified hummingbird, for example. You should follow unidentified birds after the completion of a point in order to verify identification. If no birds are detected at a point, write "No birds detected" on your form. For species with recognizable subspecies, only record the subspecies if it was confirmed, otherwise record as the species. For example, if you hear a flicker, record as NOFL; if you see a flicker and confirm that it is red-shafted, record as RSFL. Some point count projects only record these at the species level either; check with project leader.

For each individual detected we record the distance to the detection and the behavior that alerted us to the individuals' presence. Also, for each species we record any indications of breeding status. Make every effort to avoid double counting individuals detected at a single point. However, if an individual is known or thought to have been counted at a previous point, make a note of it, but record its presence at the current point anyway. No attracting devices, recordings, or "pishing" should be used.

Distance: All point counts involve recording distance to detections at some level of resolution. Depending on project, we use either 50m fixed-radius counts, or Variable Circular Plots (VCP), in which the distance to each detection is recorded to the nearest 10m (though this distance may vary by project and habitat type – consult project leader). Both methods also specify whether or not detections were beyond 100m.

Estimating distances requires experience. Before point counts are done you should receive training in distance estimation using range finders when possible. Practice by estimating the distance to known objects. Remember that at Palo, the grid markers are located 30 meters apart, which should help for estimating distances for the grid point counts.

The distance recorded is the distance from the point to the first location an individual was observed, regardless of its behavior. If the bird subsequently moves, *do not change the original distance recorded*. If a bird is flying (but not "flying over" – see below), or perched high in a tree, the distance recorded is to the point at which a plumb line would hit the ground if hung from the point of first observation. This distance should be measured as though a tape were laid across the ground, that is, including any intervening topographic features.

A bird flushed from within 10m of the point when you arrive should be included in the count. Birds that are flushed from farther away should be noted in the margins of the form if they are species that didn't occur during the count.

We record the behavioral cue that alerted us to the presence of the individual - generally "S" for song, "V" for visual, or "C" for call ("D" for drumming woodpecker, "H" for humming hummingbird). If a bird sings after it has been detected via a different cue, circle the original detection cue ("V" or "C"). Juvenile birds are recorded as "J"s regardless of their behavior, and are not included in most analyses.

We record any potential indications of breeding, if noted, for each species as follows:

CO-copulation	FS-fecal sac
DI-territorial display	MC-material carry
DD-distraction display	NF-nest found
FC-food carry	PA-pair
FL-fledglings	

Birds that are flying over but not using the habitat on the study area are recorded in the fly-over column. Birds flying below canopy level, flying from one perch to another, or actively foraging on or above the study area are recorded as described in the previous paragraphs.

PRBO Variable Circular Plot (VCP) Point Count Data Form

Pg. 1 of 5

CA MARIN BORT 05 19 2007 01
 State Region Station Month Day Year Visit
 Renee Cormier PRBO

Name Last Name Address Telephone Email

Point #	Time	Species	≤ 10	10-20	20-30	30-50	50-100	> 100	Fly-overs	Behav. Obs
01	0600	XAWA PSFL WAVI	c		S	S	S	S		
02	0608	PSFL HETH WAVI ORJU WIWR USHU PUFI CORR BTPI		c		S	SS			
03	0615	BEWR WAVI HETH ORJU PSFL CBCH WREN			S	S	SS	SS		
04	0623	BEWR WAVI SPTO HETH WREN CBCH XXHU		v	S	S	S	S		FC
05	0631	BEWR WREN SPTO BUSH NOFL XHU PUFI	cc	S		S	SS	S		

Behav. Obs: AF = aerial foraging, CO = copulation, MC = material carry, FC = food carry, NF = nest found, FL = fledglings, FS = fecal sac carry, DD = distraction display, PA = pair, DI = display

Weather Information: Please estimate temperature, cloud cover (% of sky covered by clouds), and approximate wind speed.
 81 ° F (circle one) 100 % Cloud Cover 11 mph, knots, or kmph (circle one) Wind Speed
 Temperature Cloud Cover Wind Speed
 ENTERED ✓ RUC 7/31 ✓ PROOFED ✓

B. Point Count Data Entry

We use Online Entry.

1. Go to <http://data.prbo.org/apps> via an internet browser.
2. Click “Biologists” Link from the list.
3. Follow the two-step login process using your OpenID or email and password.
4. Select “Point Counts” under **General Purpose Field Observations**
5. Follow the on screen instructions to enter and proof your data. Use the yellow question marks and/or see your supervisor for any questions or for further information.
6. Write “entered” and “proofed”, and the date and your initials on the bottom of the raw data form.
7. File raw data in the appropriate place in the data room.

Part 2: Area Searches

A. Conducting Area Search Surveys.

Area search censuses are time-constraint bird censuses with the census areas defined by habitat. We use the area search method year-round at Palomarin (done every day we band). See clipboard in the banding lab for the Palo area search plot map.

As with point counts, area searches should not be conducted in conditions that significantly reduce detectability (high wind, rain, etc.) and should be conducted within 3-4 hours of sunrise, generally as soon after opening as possible. The “time constraint” nature of area search censuses is an important feature: each census lasts 30 minutes at Palomarin. Observers cover the entire plot in the time allotted. Observers are free to stop the area search (and the clock) to investigate songs, calls, or breeding activity. This may be necessary for identifying species you are not familiar with, however do not be distracted or spend too much time looking for rare birds. At Palomarin, the banding trail is walked counterclockwise on even days and clockwise on odd days.

Unless you know the area well, it will help you cover it properly to walk around before starting to get to know the terrain and boundaries. The “time constraint” nature of area search censuses is an important feature; never extend your time to include “just a few good birds”. Carefully record your starting time when you begin, stay aware of the time throughout the census to ensure both good coverage and correct timing, and keep track of any pauses you take in the 30 minutes (it’s best to use a stopwatch that can be paused). With groups it may be helpful to designate one observer as timekeeper. Additionally, please try to be sensitive to the subjects of your census and in particular do not stay too long near a nest or anywhere where birds are distress calling.

Begin by filling out the observer and census information at the top of the Point Blue AREA SEARCH FORM. Only one address is needed although there may be additional observers; their names go on the bottom of the form. Complete the weather information, consulting the Point Blue Area Search Code Key. During the census, carefully record the name of each species seen or heard on the plot in the species column (preferably use AOU 4-letter code). Record data as described on the enclosed Point Blue Area Search Code Key. For each individual of each species, record a single letter (S=song, V=visual, C=call), in the order of priority explained in the code key. You should change the data, i.e. from a call to a song, if a higher priority observation later occurs for that individual. Recording any special behaviors (such as food carries, flocking, displaying), is strongly recommended but not required; there are respective columns on the form for these observations, following breeding bird atlas methodology. Other species not recorded in the 30 minutes, observed off the plot, or exhibiting interesting behaviors, may be recorded under Notes and Flyovers section. Although there is a code in CADC for flyovers, only enter them in the notes section. For species with recognizable subspecies, only record the subspecies if it was confirmed, otherwise record as the species. For example, if you hear a flicker, record as NOFL; if you see a flicker and confirm that it is red-shafted, record as RSFL.

Observers: At least one observer should be able to identify by sight and sound most of the species likely to be encountered. Observers not familiar with the birds, habitat or methods are encouraged to participate as recorders or counters of easily identified species. Up to 6 observers per plot is acceptable under certain circumstances, but 1 or 2 is preferable. During the census, observers should keep together, **act as one observer**, and record all observations on the same sheet by the designated recorder. Encourage beginners to come along and learn their local birds.

At the end of your area search, be sure to tally the total number of individuals seen of each species, and write the total number of individuals of all species seen at the bottom of the data form.

B. Online Data Entry:

1. Go to <http://data.prbo.org/apps> via an internet browser.
2. Click “Biologists” Link from the list.
There are two different “Biologist” links on the CADC page. For entering Palo Area Searches, use the “New Biologist” link (which is the more prominent “Biologist” link on the CADC page). Let your supervisor know if you are having problems entering your data under the “New Biologist” link.
3. Follow the two-step login process using your OpenID email and password.
4. Select “Area Search” under **General Purpose Field Observations**
5. Follow the on screen instructions to enter and proof your data. Use the yellow question marks and/or see your supervisor for any questions or for further information.
6. Write “entered” and “proofed”, and the date and your initials on the bottom of the raw data form.
7. File raw data in the appropriate place in the data room.

*An additional note for entering Area Searches: “New Biologist” has a code for birds seen flying over; however you should only enter birds seen off plot or flying over in the Notes field on CADC.

Part 3: Winter Bird Census

Winter Bird Censuses (WBC) are done every year to complement our mist-netting and to more fully estimate the number and communities of resident and wintering species. We use a standardized method to count wintering birds on the same (although reduced in size) plots where Breeding Bird Censuses are conducted in the spring and summer.

Winter Bird Censuses (WBC) begin after January 1st and should be completed by the end of February (first week of March if necessary).

The goal is to do approximately 8 weekly visits to each plot (ideally covered by the same observer) during this period. The number of visits should only be less if weather does not allow it, and can be extended to include additional visits if appropriate. There should be at least three days between visits.

There is one plot within each of Grids 1, 2, and 4, and 2 plots within Grid 5 (both can be censused in one day). See the WBC folder in the Data Form filling cabinet for maps and more details.

Conducting the census:

- As with other surveys, this census should begin soon after sunrise.
- The observer walks in an organized manner around the entire plot, varying where they start and finish their censuses between visits. All areas should be thoroughly covered. Depending on the size of the plot and the abundance of birds, this usually takes between 1.5 and 4 hours.
- The data form used is a map of the grid, upon which the observer records Date, Time Start and End, Temperature, Wind Speed, and Sky Condition during each visit.
- On the same map they plot all individuals, by species (4 letter code), where they are detected (grid stakes are spaced 30m apart; each is marked with two colors of survey flagging, which indicate the stake's location by row [letter] and column [number]).
- Effort should be made to determine color combinations on individuals of the appropriate species. The amount of time they spend on this should not compromise the observer's ability to finish the survey during the morning hours.
- Add new flagging to grid stakes as needed during each visit. If you cannot find grid stakes but know the location of where a grid stake should be, tie two pieces of flagging on top of each other (row color on top of column color) and tie up high in a close tree or shrub.

After each census has been completed:

- Fill out Winter Census Sheet with species and tallies for the day for your plot. The two plots on Grid 5 should be done on different sheets.
- Verify complete color combination sightings by looking them up in the appropriate banding database (see **Part 5: Encounter Data**) below for important details.
- Write your verified color combinations on the encounter clipboard (along with appropriate location according to grid stakes), enter them into the encounter database, and proof them (see **Part 5: Encounter Data**) below for protocol. All encounters should be entered weekly, as they are needed whenever we generate new color combos.

Data Summaries Following the completion of all 8 visits:

- Fill out the 4-page Winter Bird Population Study summary sheets. This includes the Coverage and Weather summary sheet and the Tally Sheets for all species over the entire WBC period.
- Put the data (number of each species during each visit) in the excel spreadsheet for your year and plot (z:\terrestrial\programs_and_projects\Palomarin\palodata\wbc\ G[X]_[YEAR]raw_and1991-[YEAR].xls. Enter number of sightings of each individual on each visit on a worksheet called Raw[year], following the format used in previous years.
- Determine mean number of individuals per visit for each species and number of visits where that species was detected. Add the former to the second worksheet within your excel file, which is the summary for all years (summary1991-[YEAR]).
- Determine species richness (number of species observed during all census periods) and the total number of individuals per visit (total number of individuals of all species observed over entire census period divided by total number of visits you made to the plot).
- Using the Excel functions, determine changes (increase/decrease) between your year and the previous year, and between your year and the mean of all previous years. You can do so by making slight changes to the Excel functions used in previous years; ask your supervisor if you need any assistance on this task. NOTE: double check the Excel functions/formulae as they regularly get accidentally modified.
- Do your write-up for your plot and your year, mimicking how this was done in previous years and how it appears in the Journal of Field Ornithology Supplements when these used to be published. We want this to be done as though it may be published one day (which it might). You can save time by simply copying and pasting the previous year's write-up then changing data as appropriate for your year.
- Have your supervisor look over your data and write-up.
- After you have made final changes, the edited version should be printed out and, along with the four page Winter Bird Population Study form, placed together in a designated file for that year in the file cabinet in the data room. Attach to the back of these your daily census maps and winter census sheets for the year.

Part 4: Palomarin Swallow and Chickadee Census

During the breeding season at Palomarin, a weekly census is conducted by the banders of the swallow nests on the field station buildings and the chickadee boxes surrounding the buildings. This census begins on April 1st, and is done once a week through July (or until birds have completed breeding, which can extend into August). Maps of the buildings are kept in the data sheet drawer in the data room. A separate folder is for completed maps for censuses of the given year.

Note that some California Scrub-jays have learned to depredate swallow nests; take the same corvid precautions as you would with a scrub or forest nest.

A. Conducting the Swallow Census

With a clipboard containing a single blank map, all Barn and Cliff Swallow nests and chickadee boxes are checked for contents. Extra effort should be made to record the outcome of the nest when possible (e.g., fledged 4 young). This information should be transferred onto a nest record sheet and kept in the office. Check the nest quickly and move on to the next location, so as to draw less attention to the nest and to prevent high levels of stress in the parents. Keep track of the number of all nests even though some may not be in use.

- **Barn Swallows:** You will need a nest mirror (at the end of a long pole) to check the Barn Swallow nests. Draw in the Barn Swallow nest locations and write the contents on the map.
- **Cliff Swallows:** You will not be able to see the contents, and there will be numerous nests. For these, you can simply write, i.e., “20 building nests” along a wall, and if you see feeding or nestlings note that as well. However, you do not have to establish the status of each Cliff Swallow nest
- **Chestnut-backed Chickadee** – You will need a ladder and possibly a screwdriver and mirror pole to check the 4 chickadee boxes located near the facilities.

Banding nestlings:

Only Barn Swallow and Chickadee nestlings are banded. Do NOT attempt to band Cliff Swallow nestlings, as you will destroy the nest. The ideal time to band nestlings is when their primary feathers have JUST broken through the sheaths (**often approximately on day 6-8**). At this age, their legs are large enough to safely fit a band, but they are not yet large enough that handling them will cause premature fledging. You should **check the nests additional times** (aside from the weekly census) **when suspect the nestlings may be coming of age to band**, so that you do not miss this crucial period. If you grossly miss this age period, it is best to forego banding the nestlings at all, rather than run the risk of premature fledging. When returning nestlings to the nest, hold your hand over the top of the nest until they have settled down to prevent them jumping out.

B. Data entry:

Banding:

Follow normal banding protocol, though the nestling ID's should be tied to their specific nest ID (see below).

Nests:

Questions on nest data entry can be directed to gridders if no supervisors are present. Nests should be given a unique ID code, which includes species code, location (PH for Palo House; G2, etc. for boxes on the grids; and OG for boxes off the grids), nest number, and nest attempt for that particular nest. For example: BARSPH03A. Nests are numbered sequentially as they are initially checked or as they are added to the building. Each species should have an independent numbering sequence.

Nest data should be entered into nest program in the appropriate Swallow/Chickadee data files for that year. Only active nests and nest checks are entered. When new nests are entered, only date, time, nestid, finder, and findcont fields need to be completed. Close-outs are not completed for swallow nests.

Part 5. Encounter Data

When you see a color-banded bird, enter the encounter in the Encount database. This applies to all sightings, whether during a formal census or not. For birds that are seen outside of a formal census, record the raw data on the ‘Color Band Encounters’ clipboard in the data room.

1. Before recording your color band encounter on the posted encounter clipboard in the data room, you must first confirm the combo is real. Look up your color band encounter in both allnumb.dbf (banding data, all years) and/or encounter databases (encount-copy_thru[YEAR].dbf for prior years; enct[YEAR].dbf for current year) to make sure that a bird with those colors exists in either database and has been captured or encountered recently (5 years). See Appendix 5, Helpful FoxPro Hints for instructions on this.
2. After the combination has been confirmed, fill in the color combo and details of the encounter on the data sheet hanging in the data room.
3. Partial color combos: If you did not see all the colors, you should try to figure out the complete combo using the database. For instance, if on a WESJ you only saw WB/S, there might only be one WESJ in the database with white over blue on the left leg. This may not be possible with WREN or SOSP as we have nearly every possible combo “active” at any given time. See Appendix 5 to help you with the appropriate commands. For partial color band combos that you can, **without a doubt**, figure out the real combo, enter that combo as though you saw it - both on the form under combo, and then in the database under the field colors. For partial color band combos that you could not figure out, do not enter these on the form or the database.

If you saw all of the bands, but the bird is missing some color bands, enter the combo that the bird wears in the COLORS field, and enter the true combination in SUSCOLORS. Only enter a true combination in SUSCOLORS if you are certain –without a doubt! – of the birds true identity. Using previous years’ territory data is one way to do this.

Data Entry:

1. From any computer, open Visual FoxPro
2. Push "CAPS LOCK" key.
3. Open the file, located at Z:\Terrestrial\programs_and_projects\Palomarin\Palodata\Encount\[year]\enct[year].dbf
4. Type "SET CARRY ON" if you plan to enter more than one encounter record.
5. Type "APPEND"
6. Enter data that as follows. Do not fill in X_coord and Y_coord unless you know them exactly.

Field	Data	Example
SPEC	Species	WREN
INITIALS	Observer initials	TG
COLORS	band combination	YOB/S
SUSCOLORS	Suspected band combination (used when 1 or more colorbands are missing)	
DATE	date of encounter	04/15/2004
AGE	age of bird (as noted in the field)	0 (unk),1(local), 2(HY), 3(AHY), 4(SY), 5(ASY), 6(TY), 7(ATY)
SEX	(if known)	U=unknown, M=male, F=female
LOC	which grid or location. Be as precise as possible	OG (Off Grid), G1, G2 (Palo Buildings are on this grid), G4, G5, AR (Arroyo Hondo)
ROW	grid row	D2
COL	grid column	5C
SING	territorial song?	Y (yes) or N (no)
NOTE	add comments here by: 1) pushing "CTRL + "page up" 2) type in note (i.e. building nest) 3) push "CTRL" + End"	

7. Push "Ctrl" + "End" (to save)
8. Put a check mark next to the line of data to indicate that it was entered in the computer.
9. Proof the encounters you just entered by reopening the table and typing “browse” to view all entries.
10. When you are sure you’ve reviewed all of the data that you entered, push "Ctrl" + "End" again then check the “proofed” column on the data sheet in red ink.

CHAPTER 4: Interpretation and Education

Part 1: Purpose of Education and Interpretation Programs

Science serves the public best when it is done well and articulated clearly to the widest possible audiences. Hence, we believe that it is a vital part of our work, and that of any scientist or scientific organization, to communicate with and educate the public regarding our research methods and our results. Conducting fieldwork for Point Blue, at all field sites accessible to the public and particularly in the banding lab at Palomarin, provides excellent opportunities to accomplish this goal with organized classes, drop-in visitors and folks who just wander by and ask what you are doing staring into that bush. **In essence, we should all be prepared to discuss clearly and concisely 1) who we are, 2) what we do, 3) why we do it and 4) why it is important to the public.**

Part 2: General Information about Point Blue

Mission Statement: Point Blue Conservation Science, formerly PRBO Conservation Science (founded as Point Reyes Bird Observatory), advances the conservation of birds, other wildlife and ecosystems through science, partnerships, and outreach.

Point Blue is an independent, non-profit (501-3c) research institution. Although we frequently work under contract to State and Federal governmental agencies and other non-profit organizations, our administration is entirely independent from these entities. Many visitors are unaware of this independent status and, in particular, tend to regard us as a part of the Point Reyes National Seashore or Audubon Canyon Ranch.

A. Funding

Like many other non-profit conservation organizations (e.g., National Audubon Society, Nature Conservancy, etc.), we are membership supported. Currently we have approximately 3500 members who contribute a minimum of \$50 each year and sometimes much more. Members provide more than just their dues and other contributions (quite significant but not our main funding source); they are often our first line of contact with the public. Members often drop in at Palomarin; please take the time to make them feel welcome, answer their questions (as you would with any visitor), and thank them for their support of our work. Other important sources of funding include grants from government agencies (e.g., U.S. Forest Service, National Science Foundation), private philanthropic organizations (e.g., Marin Community Foundation), and individuals.

B. Organization

Point Blue has a programmatic structure with a board of directors and scientific advisors, 10 program groups, and a large contingent of research associates.

Groups at Point Blue include: 1) the California Current Group, 2) the Pacific Coast and Central Valley Group (of which Palo is a part), 3) the San Francisco Bay Group, 4) the Sierra Nevada Group, 5) Emerging Programs & Partnerships Group, 6) the Climate Change & Quantitative Ecology Group, 7) Education & Outreach Group, 8) Informatics and IT Group, 9) Development and Membership Group, and 10) Finance & Administration Group.

You can learn a lot about the organization from our website: <http://www.pointblue.org/> and by reading our current and past newsletters: <http://www.pointblue.org/about-pointblue/news-resources/point-blue-quarterly/>. As always, ask your supervisor or other staff if you'd like to learn more about a particular part of our work.

On May 1, 2006, thanks to many generous donors, Point Blue's Headquarters and SF Bay Research Center opened in Petaluma at the northern reaches of San Francisco Bay (address; 3820 Cypress Dr. #11, Petaluma, CA 94954).

Part 3: Palomarin Field Station

A. History

The Palomarin Field Station became Point Blue's second headquarters in July, 1966, when the Bird Observatory was just one year old. At this time, the National Park Service was in the process of acquiring the land that was to become the Point Reyes National Seashore (PRNS) and had just taken over the parcel then known as Rancho Palomarin. Rancho Palomarin had been occupied by a community known as the Church of the Golden Rule, which farmed and grazed the surrounding area. Their school building was converted into the Field Station and all the other buildings (extensive constructions between the Arroyo Hondo and the Coast Trailhead) were razed. Mist netting, trapping, spot-mapping and nest-monitoring projects have been operating continuously ever since, making Palomarin the site of the oldest continuous population studies of birds west of the Mississippi River. In 1979, both the banding and nest-searching protocols were standardized. In 1980 Point Blue's administrative headquarters moved to Galloway Canyon (also known as Pike County Gulch), part of Audubon Canyon Ranch's Bolinas Lagoon Preserve, and in 2006 Point Blue's headquarters moved to Petaluma (see above).

B. Setting

The PRNS is one of ten National Seashores administered by the National Park Service. Together with the Golden Gate National Recreation Area, it is part of over 100,000 acres of public land in western Marin County. First envisioned in the 1930's, purchase of PRNS lands was authorized by JFK in 1962 and completed in 1970. The Seashore is highly varied, including 32,000 acres of wilderness and several large active dairy ranches. There are large areas of Douglas-fir, Bishop Pine and mixed hardwood forest, riparian canyons and coastal scrub which provide excellent opportunities for hiking, swimming, beach-combing etc., and the outer part of the peninsula is world famous for bird-watching, particularly for fall vagrants. The PRNS is also adjoined by the Gulf of the Farallones National Marine Sanctuary which surrounds the Farallon Islands, 18 miles west of Palomarin. The Seashore is a great place to explore, and particularly in the summer months many visitors will ask you questions about it. Please do your best to help them and make them feel welcome.

C. Function

Facilities at Palomarin include the Pacific Coast & Central Valley Group headquarters, Banding Lab, Visitor's Center, staff offices, library, data room, and living quarters for interns and visiting scientists. Several of Point Blue's scientific staff have offices at Palomarin. It is by far Point Blue's most visible and public facility, where many people form their first impression of us; please do your best to ensure that visitors feel welcome and that their needs are met. Because of our location within the PRNS and our proximity to Audubon Canyon Ranch (another well known 'bird' facility), many visitors are confused or uninformed about just who and what we are. Please take the opportunity to introduce them to Point Blue and then give them information about the PRNS or ACR if that is what they need.

Part 4: Interpretation and Education in the Banding Lab

A. Introduction

Although we are biologists first and foremost, dealing with the public is a vital part of our work at all sites, particularly in the banding lab at Palomarin. For reasons already discussed, we cannot expect to be effective as scientists unless we are also effective as interpreters of our work. **However, it is important to keep in mind that safe and thorough handling of the birds comes first, at all times, at all locations!** All of the following guidelines for interpretation and education assume that you are thoroughly comfortable with your ability to engage in them without neglecting the needs of the birds and the data.

B. Making Visitors Welcome

Please greet any visitors you may encounter and direct them to the banding lab and visitor center. Take the opportunity to introduce yourself, the field station and Point Blue as a whole. You may also introduce them to mist netting and inform them of the opportunity to view banding (if nets are closed let them know when banding will take place next). They may also be curious about other work Point Blue does, local bird watching, and/or trails in the area.

C. Taking Visitors on Net Runs

When you are working in the banding lab, please invite visitors to come on a net run and observe you work. Paying attention to the following basic issues will help to make this a positive experience for everyone.

- **Physical Concerns:** The net trail is a loop of about 3/8ths of a mile with about 100 feet of elevation gain and loss, and may be slippery with mud. Elderly, disabled, or injured visitors should be notified of the trail conditions and offered the option of waiting in the visitor center until you return at which point they can observe the banding process; and all visitors should be told when inviting them to join you on a net run that it is a 15-20 minute walk that includes a somewhat-steep hill and uneven, sometimes slippery terrain, in case conditions aren't right for them, or so they know to use caution on the net run.
- **Psychological Concerns:** Many visitors are unfamiliar with mist-netting and banding techniques and are concerned that these methods might be disturbing or harmful to the birds. It is very important that we address this concern by explaining the ways in which our protocols are designed to minimize any disturbance or potential harm the birds might experience, and by reminding visitors that our work is dedicated to helping, not harming, birds and other wildlife. This is an idea that should be repeated often.

It is distressing to all of us when a bird is injured or killed in the course of our work and this is doubly true for visitors who have only a brief time to form an impression of the situation. For this reason, we try to avoid exposing visitors to injured or stressed birds if at all possible. Preventing injury by following the Banders Code of Ethics (see NABC manuals) and safety protocols will minimize likelihood of injury and mortality. If you find a dead or injured bird in the nets while you have visitors with you, please do not draw attention to it if possible. Instead, extract the bird as usual (particularly if the injury is not obvious), put it in a bag and continue the run. If a visitor notices and inquires about the injury, proceed calmly and discuss your concerns for the bird and your plans for treating it. Reassure the visitors that this is a very unusual event, one that we try hard to avoid but can deal with if necessary. You should learn your station's injury rate (< 1%) so that you can talk about the rarity of these situations.

Another technique that works well is the 'tag team' approach. With two banders on the run one can attend to an injured bird while the other continues with the visitors on to the next net. Explain to visitors that the bird is very tangled and that the person extracting needs to concentrate, and that other nets need to be checked. On returning to the lab, if the visitors are unaware of the situation, explain that the bird is stressed and put it in the hot box to 'recover' if necessary. You can then deal with it appropriately after the visitors have left. If the bird needs immediate attention, you may attend to it in another room. If necessary, you may need to ask visitors to leave the lab while you treat an injured bird – if this happens, you can explain that it will help you concentrate and minimize stress to the bird, but you will follow up with the visitors as soon as you are done.

Our injury and mortality rate is very low and these techniques seldom have to be put into practice. Nonetheless, it is a good idea to think about how you might deal with such a situation, in case it should arise. The key concept is simply to avoid letting anyone leave with the impression that birds are regularly becoming injured in our nets. The Mist Netting with the Public Manual (by Melissa Pitkin) includes a more detailed discussion of this topic (pp12-15). You will also discuss potential scenarios with your supervisor, before banding without a supervisor present.

- **Describing and Demonstrating Nets:** Explain and demonstrate the way nets are used to capture birds. Emphasize that the design of the nets protects the birds from injury, and point out the difference between scrub and forest nets, the way nets can be opened and closed, etc. You may also roll and tie a bird bag into a bird-sized bundle

and gently toss it into the net to show visitors how the looseness of the net gently stops the bird's flight and drops it into the 'bag' of the net.

- **Extracting Birds With Visitors:** When you find a bird in a net, point it out to the visitors and instruct them that they must not touch the net while you extract (be very firm about this, particularly if there are children in the group). Engage their curiosity but maintain control of the situation and ensure bird safety. It is a good idea to think ahead of time about what you might say, so you will be able to recite this while still focusing on the primary task at hand. Because our protocol is to have two banders on any net run with visitors, your partner can explain while you extract, so that you can concentrate on the bird – if you are both extracting, you can explain what you are doing if you feel comfortable doing so.
- **Natural History of Palo (and other topics):** Walking the net trail you will often encounter wildflowers, fungi, funnel spider webs, woodrat nests, and many other interesting phenomena that can be observed and discussed with visitors, particularly if there are no birds in the nets. Point out a grid stake and talk about the relationship between the biomonitoring and breeding biology projects. On a clear day draw attention to the Farallones and mention the highlights of the California Current Group's work there. Be sure to talk about our plant phenology monitoring program, even pointing out phenophases that you may see, and explain both how that connects to our attempt to understand impacts of climate change, as well as how it connects to the bird studies we are doing. Getting to know Palomarin and vicinity will enhance both your experience here as well as our visitors'.

D. Interpreting Banding Activities

As always, the foremost goal is bird safety, followed by data quality. Once you are comfortable with banding, the ability to explain your work as you proceed is of great value to our visitors and will go a long way toward helping to build a constituency for conservation biology.

- **Psychological Concerns Revisited:** "Isn't the bird frightened?" is a commonly asked question. Remind visitors that our protocols and procedures are carefully designed to avoid harm to the birds, and that we all receive extensive training. You may also explain that birds are organisms of many impressive instinctive behaviors but they rank fairly low on the scale of cognition. They probably do not 'understand' what is happening to them and are not trying to 'figure it out'. Instead, they react instinctively to our handling, as they might if held by a predator, waiting for an opportunity to free themselves rather than risking injury by struggling.
- **Injury Concerns Revisited:** Visitors will also ask about injury and mortality rates. A good resource is [Spotswood et al. 2011](#). Full citation: *Spotswood EN, Roesch Goodman K, Carlisle J, Cormier RL, Humple DL, Rousseau J, Guers SL, and Barton GG. 2011. How safe is mist netting? Evaluating the risk of injury and mortality to birds. Methods in Ecology and Evolution.* Here is a summary of key points:
 - This study quantified the rates of mortality and injury at 22 banding organizations in the United States and Canada, including Point Blue, and used capture data from five organizations to determine what kinds of incidents occur most frequently.
 - The average rate of injury was 0.59%, while mortality was 0.23% (Palo's were similar to study average).
 - Rates of incident varied among species, with some at greater risk than others (these were in line with what we knew from observational experience, but now we can prioritize birds and take additional precautions for birds that were prone to certain types of incidents).
 - We found no evidence for increased mortality over time of injured birds compared with uninjured birds.
 - At Palo, we continually assess our methods to make sure we are doing everything possible to minimize the risk of incident with every bird.
- **Interpretation of Data Collection:** Explanation of how and why we collect data about birds is the cornerstone of our education and interpretation programs. Most visitors are very interested to see how a live bird is handled and this interest gives us an invaluable opportunity to explain why it is important to collect this kind of information. Relate what you are explaining to well known features of birds' physiology and ecology: Show visitors the data sheets and explain the basics of data handling. After releasing the bird, or if you don't have any birds to show them, you can move on to a discussion of the real heart of the matter: why it is important to collect this kind of information about birds (and other wildlife). You should try to make three main points:

- a. **It is important to conserve populations of birds.** Birds have great aesthetic value and are biologically and economically important. They are vital components of virtually every ecosystem on the earth. One good example of their value in this regard is that a single pair of warblers may inspect and remove herbivorous insects from up to one million leaves of deciduous trees and shrubs during a single breeding season. Multiply this effort by the one billion or so warblers breeding in North America each year and it is clear that extirpation of these birds would have a devastating effect on the health of our forests.
 - b. **Populations of many still-common birds are currently declining.** Understanding how populations are doing and which species are declining, before the situation is critical, allows us to design proactive strategies for these species' recovery and avoid the economic and social costs of threatened and endangered species management. An important corollary to this is the idea that birds are sensitive indicators of the quality of the habitats they occupy. Monitoring demographic parameters of birds, such as population dynamics (trends), productivity (by assessing the ratio of young to adult birds, or through our nest monitoring) and survivorship (using recapture data), can provide valuable information about the health of ecosystems and the efficacy of conservation and restoration management activities. Once we measure variables like survival and productivity (which we can only get through banding!), then we can ask questions like "how are weather patterns, climate change, or habitat influencing these things?" Additionally, for migrant species, we often know very little about where they spend much of the year away from here; our studies of migratory connectivity can help us understand how changes to their wintering or summering grounds away from Palomarin might be additionally influencing their populations.
 - c. **Successful management of birds must be based on careful science.** Sound scientific knowledge of declining species is crucial to any conservation effort. Simply knowing that a species is declining, without understanding any habitat associations or source-sink dynamics that may be present, can lead to ineffective or even harmful conservation projects.
- A good example of more intensive demographic study are the nest monitoring activities conducted by the Palomarin Breeding Biology Project. We've found that nest success of some resident species is significantly higher in undisturbed coastal scrub with its high shrub diversity than in the coyote bush-dominated disturbed scrub; this knowledge is crucial to land managers such as the National Seashore. We've also seen certain species (e.g., Wrentits, Wilson's Warblers, Swainson's Thrushes) increase as the habitat around us has changed, while others (Song Sparrow, White-crowned Sparrows) have significantly declined. Remember to use the appropriate language level for your audience. Some visitors will want all the technical details you can muster, while others will only understand and benefit from hearing the basics.
 - Other Topics for Interpretation: While explaining the basics of conservation biology is our primary goal for interpretation, visitors may also be interested in some basic features of avian ecology, such as migration, molt, territoriality, nest construction, foraging strategies, physiology, etc. Having live birds in the hand provides a unique opportunity to observe the physical manifestations of these processes (recently returned migrant species, feathers in pin, variations in bill shape and size, etc.). Many of our visitors are birders and will be particularly appreciative of information on species identification. Tips about where to see interesting species locally will also be very much appreciated. You can make a friend for life (for Point Blue as well as yourself) by taking a visitor from the East out to see a Wrentit.

Share our data visualizations with visitors (posters against lab bench, laminated sheets on the banding lab desk).

Another topic of interest to 'advanced' visitors is the development of monitoring protocols and technical guides. Take visitors through a species account in the Pyle guide and explain how data gathered at Palomarin helped to develop the guide and how we attempt to correlate seasonal information, such as the presence of a brood patch, with details of plumage or soft parts which can be observed year-round.

- Appropriate 'Hands-On' Activities for Visitors: As a rule, visitors in the banding lab are welcome to observe and photograph birds being banded as closely as they like, as long as this presents no threat or stress to the bird. Do not hesitate to remind visitors, particularly younger ones, to be quiet and respectful of the bird's needs. Remember that you are in control and if you feel that the bird is being stressed or threatened in any way, be polite but very firm in stopping the problem.

Birds should be handled only by trained biologists and interns. However, if you have a hardy species, unstressed and in good condition, and a **very** small group of visitors observing, you may allow the visitors to gently touch the bird's head and back under your careful supervision. Ask them to only use one finger to do this. **Do not attempt this with a class.** Being touched by thirty children, however gentle and well-meaning, is too much to ask of most passerines. Another possibility, appropriate for medium-sized groups and even classes if they are well-behaved, is to allow the visitors to listen to a bird's heartbeat. Holding the bird carefully in the bander's grip, gently place its breast to the visitor's ear. This will be a big thrill for most people, particularly younger children.

- Special Considerations for Classes and Groups: All of the above concepts and guidelines apply equally to interpretation for classes and organized groups as well as drop-in visitors. The most important factor to consider when speaking to a class, as already mentioned, is adjusting your vocabulary and content to the appropriate level. A little practice with different language will allow you to share the most important ideas of our work with students of all ages. Your audience's attention level, body language and questions will tell you if you are engaging them and being understood. If you start to lose your audience, try new vocabulary or a new topic.

Asking questions of visitors is a good way to judge their knowledge and interest level. If they answer your questions easily, give them more information to add to what they know and challenge them with more difficult questions. If your questions stump them, answer them yourself in simple terms, then ask more basic questions to allow the students to participate.

Learning about habitats as an ecological concept is a big key in science education these days; almost every student who visits Palomarin is familiar with the term. Be sure to point out the major features and differences between the two primary habitats at Palomarin (coastal scrub and mixed riparian) while walking the net trail, and try to put your interpretation about birds in this context: "This Swainson's Thrush and this Hutton's Vireo are both birds of the riparian forest, but they have different roles. The thrush lives mostly on the ground, eating insects that eat dead leaves; the vireo likes to stay high up in the trees and eats the insects that eat living leaves". Another important goal is to connect the students' visit back to their daily lives. Ask them what birds they see near their homes or school and discuss those species with them. Do a little career counseling and tell them about how you became a Palomarin intern and what your plans are. Be sure to give the students plenty of time to ask you questions (and tell their bird stories) and, of course, answer them in a friendly and respectful manner. Find a way to turn a weak or strange question into a good one so that everyone will benefit from the answer.

E. "Talking Points" – Organization-specific Information to Know and Share with the Public

On top of the above, here are a few tidbits of knowledge worth making sure that you are very familiar with so that you can share it with the public:

1. Point Blue Conservation Science, founded as Point Reyes Bird Observatory in 1965, is an independent non-profit, member-supported organization. Funded by individual donors, grants through foundations, non-profits, and government agencies.
2. Mission Statement: Point Blue Conservation Science advances the conservation of birds, other wildlife and ecosystems through science, restoration, outreach and partnerships. Our 140 scientists work to reduce the impacts of habitat loss, climate change, and other environmental threats while promoting nature-based solutions for wildlife and people, on land and at sea.
3. We have been studying birds here at the Palomarin Field Station since 1966 (one year after the organization was founded). Point Blue owns the buildings, and the National Park Service (Point Reyes National Seashore) manages the land. We are independent of the NPS but obviously work in close collaboration with them, and they are one of our key partners.
4. Why birds? Birds are excellent indicators of ecosystem health, thus key to wise stewardship. Birds are high on the food chain, and are therefore very sensitive to even small changes in their environment. Bird species are vital components of virtually every ecosystem on the earth, and are relatively easy to detect, thus they are cost-effective to study. They also have their own intrinsic value, and are often watched, studied and conserved because of that. In addition to studying birds, we at Point Blue also study other ecological components.

Weather, habitat, and plants (including phenology) are all studied at Palomarin; and at other projects, we study other components of the system as well (marine mammals, invertebrates, fish – including sharks).

5. Our long-term research efforts, both at Palomarin and on many of our other projects, provide data that helps guide management recommendations for managers and owners of private and public land and ocean.

F. Weather and Scheduled Class Visits

Follow appropriate guidelines (under biomonitoring chapter) for when nets should be closed due to weather variables. If bad weather causes banders to close nets when a group is scheduled:

1. Immediately contact the education staff so that they can notify the group. (Call home numbers and work numbers, located in Palo Kitchen and on Point Blue phone list).
2. If the group can't be reached, effort is made to open nets a half hour before the group arrives, weather permitting (such as intermittent rain, or rain cessation after a time of day where you can no longer get your net hours in), and as long as there are no conflicts with intern day off/make up schedule. This can be coordinated with the banding supervisor. Nets are then left open for the duration of the group visit, after that it's up to the banding protocol.

If nets cannot be opened, education staff/interns will greet the group and show them the banding process, visitor center, and study skins if appropriate.

These are going to be case by case scenarios and hopefully rare occurrences.

G. Signing Up a Class

Teachers may call Palomarin to sign up their classes for a visit to Palomarin. Interns or staff who are not part of the education program should pass the call or message onto an education specialist.

Mist-netting visits and in-class sessions should be scheduled only by Education staff or Education interns. If the caller is interested in scheduling a visit, get one of the above staff to speak to them, or have them call back on the appropriate line (707-781-2555, x 354) to leave a message. **Education staff or the banding supervisor will write the class information on the banding calendar.** Banding days can sometimes be changed to accommodate classes that cannot visit on regular days; always check with the banding supervisor before rescheduling banding days. Teachers can call the business line (868-0655 x-395) early in the day to check on conditions if they like.

CHAPTER 5: Weather Monitoring

Part 1: Taking Weather Data

The weather is to be taken daily at 0800, 1200, 1600 (during Pacific Daylight Time this is 0900, 1300, and 1700); and just before nets are opened on banding days; for days where banders are not banding at PN, but are banding at PGUP, they should collect as much weather data as possible before leaving for Uppers (skipping cloud cover and visibility if not able to assess in the dark). Always record time to the nearest minute. Recording weather data is the responsibility of the interns, and primarily that of the banders on days when mist netting is conducted. **Note that if weather data is missed for a given day or time, please extrapolate rainfall (for the 1200/1300 hours time) and obtain temperature, barometer and wind speed from the weather computer. The rest cannot be taken.**

A. DATA OBTAINED FROM THE WEATHER COMPUTER

WIND

- **Average true wind direction** (direction wind is coming from)
 - Watch the gauge on the weather computer for **30 seconds**
 - If there is no wind record as calm: **CLM**
- **Average wind force and highest gust in km/hr; recorded as average (gust)**, e.g. 8(16)
 - Average wind speed excludes gusts and is recorded first, and is determined from the “1 minute average” on the weather computer screen
 - Highest gust observed is designated by parentheses and is recorded after average; it is determined by looking on the graph on the screen between the 2 right-most vertical bars (representing 1 minute) and reading the highest gust off the graph in that section.
 - If there is no wind nor gust, record a slash or 0 and give the field a “0” in the computer
 - If there is wind but no gust, record gust as equal to the average (**never record as “0”**)

TEMPERATURE

- Recorded to the nearest degree from the weather computer in °C
- Daily high and low are determined from the last 24hr period on the computer graph, from midnight to midnight. See Part 2, below, for directions.

BAROMETER

- Recorded from the computer in inches to the 2nd decimal place. If the computer is not working, record pressure using the barometer on the counter by the computer (be sure to tap on the top of the barometer to free the needle).

B. DATA OBTAINED MANUALLY

CURRENT RAINFALL

- Recorded in **mm** and determined by the **rain gauge outside the banding lab**
 - Rainfall values **recorded in parentheses unless rain gauge was dumped.**
 - **Always record the total amount of rain in the gauge**, not just how much it has rained since last checked.
 - **Always record to the nearest 0.2 mm at the bottom of the meniscus** (each of the smallest marks represents 0.2 mm and the total volume of the gauge is ~25mm)
- The rain gauge is **dumped daily at 1200/1300**
 - Record the amount dumped **without parenthesis.**
- **If rainfall is greater than 25.4mm (=1 inch)** it will spill into the larger compartment. If there is potential that both compartments will be filled before 1200/1300 or if the water needs to be dumped in order to measure the overflow, dump it all out (from both compartments), **record without parentheses and asterisk the rain column with a note to add this amount to the total rainfall amount each time you take weather until and inclusive of the 1200/1300 period when daily/annual rainfall is tallied (then clarify in the 1200/1300 rain that you have included the dumped morning rainfall in this amount)**. The important thing is that the 1200/1300 rainfall amount is the total rainfall in for the last 24 hour period. If you dumped the rain before opening nets (for example, at 0630, you dumped 30mm), at 0630 you would write 30mm without parenthesis, and an asterisk and note; at 0800/0900, you would add 30mm to any amount of rainfall that occurred b/w 0630 and 0800/0900, and put that amount *in* parenthesis; at 1200/1300, you would enter 30mm plus the amount of rain that fell between 0630 and 1200/1300 without parenthesis, and add that amount to the annual rainfall total.

- If rain has **evaporated** from the gauge, **treat it as if no evaporation has occurred** (e.g. if 0.4mm at 0800 and 0.2mm at 1200, record as 0.4mm at 1200)
- **Moisture accumulation recorded only if $\geq 0.2\text{mm}$ (therefore 0.1mm of rain is recorded as 0.0mm)**
 - **Do not dump dew before 1200/1300** even if it is too little to record. However, be sure to dump it at 1200/1300.
- **If rainfall is not taken, especially at the 1200/1300 time, please do your best to extrapolate it.** If it's not obvious what the rainfall was at that hour, ask your supervisor to extrapolate it (but do not leave blank!)

JULY-JUNE CUMULATIVE RAINFALL

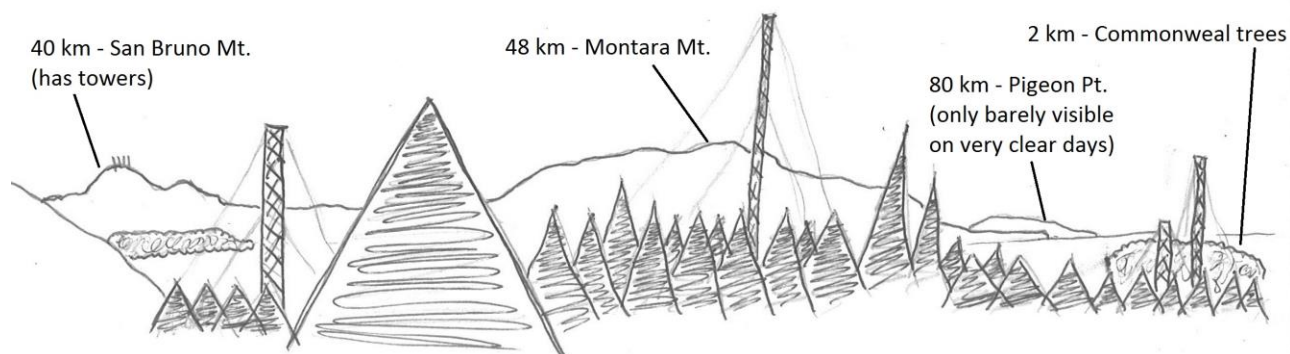
- Represents cumulative rainfall of the season (July 1 – June 30).
- Each day, the 1200/1300 daily total is added to the year total in the appropriate column on the Daily Journal sheet.

VISIBILITY

Visibility is estimated by determining which regional landmarks we can see from Palo. The following guidelines for visibility data were adopted because fir trees on Grid 1 have blocked much of the view since we began collecting visibility data

- On days / times when net runs are being done, banders should make note of the visibility while on their net run.
- Banders should keep their eye on visibility, and should get in the habit of coming in and reporting visibility around 9a.m., if nets are still open at 1p.m., and during opening (they can add visibility to the pre-opening weather when they get back from opening run). If the banders can't get into the office (b/c of birds) whoever is taking the weather will radio or track down a bander and ask them to give them visibility.
- Attempt to estimate visibility during non-banding times, by looking for San Bruno / etc. to the south from the end of the sidewalk, or assessing very low visibility which is easy to do; or, if someone feels like stretching their legs!
- If however we cannot estimate visibility (i.e., is not very low or very high, or no one wants the exercise), the protocol would be to write "999".
- Recorded in **km** using the **furthest visibility** in any direction. See aerial view below for locations of these points. Estimate for distances between Commonweal and the Farallones. Palo is at the star.
 - Coast Guard Station Towers (South down coast) = 1km (nearest towers 0.5km; farthest towers ~1km)
 - Commonweal (South down coast) = 2km
 - Farallones (West, Out to sea) = 29km
 - San Bruno Mt. (South down coast) = 40km
 - Montara Mt. (South down coast) = 48km
 - Pigeon Pt. (South down coast) = 80km

View from banding trail just down the hill from net 1.4:



WEATHER

- Recorded using the **weather codes**
- If **any of the following occur on the study plot use** these codes (use more extreme/heaviest precipitation code if multiple apply):
 - **RAI** - Rain
 - **DRI** - Drizzle
 - **SLE** - Sleet
 - **HAI** - Hail
 - **SNO** - Snow
 - **FOG** – Fog (if fog is present on the study plot including the hills around Palo)
 - If **rainy or drizzling and also foggy** use **RAI/DRI**
- If **none of the above apply use:**
 - **OVC** - overcast, 10/10 cloud cover
 - **BRK** - broken, 6/10 to 9/10 cloud cover
 - **SCT** - scattered, 1/10 to 5/10 cloud cover
 - **CLR** - clear, 0/10 cloud cover

CLOUD COVER

- Recorded for the general area around the field station as **the amount of clouds in tenths (1-10); not in percentage**
- **Fog banks far offshore are not considered, but if it's settled on the hills around Palo, it counts**
- If no clouds enter type as "0" in the computer

CLOUD TYPE

- Recorded for the general area around the field station **using cloud poster on data room door for type and codes**
 - 10 – Stratus (often fog)
 - 20 – Cirrus
 - 30 – Cirro-stratus
 - 40 – Cirro-cumulus
 - 50 – Alto-cumulus
 - 60 – Alto-stratus
 - 70 – Stratocumulus
 - 80 – Cumulus
 - 90 – Cumulo-nimbus/Nimbostratus
- **The presence of two distinct cloud types** is recorded as a combination with the first number corresponding to the most abundant type (e.g. record 71 if clouds 70 and 10 but mostly 70)

C. COLLECTING DATA AT OFFSITE BANDING SITES

When banding at an offsite, collect weather data when you open nets, midway through the day (approx. 0900-1000) and when you close nets.

WIND

- Use a compass to determine direction, and the Kestrel wind gauge to measure the average and gust wind speeds in kmph.

TEMPERATURE

- When you arrive at the banding site, hang the thermometer from the offsite banding kit in a place that will remain shady through the entire day of banding. Read temperature to the nearest degree Celsius.
- **DON'T FORGET THE THERMOMETER WHEN YOU LEAVE!!**

Record WEATHER, CLOUD COVER and CLOUD TYPE as described above.

Record "999" for RAINFALL, VISIBILITY, BAROMETER

Enter "999" for high and low temperature.

Recording weather at PGUP: on a day when nets are run at PN and PGUP, do not take weather at PGUP. On a day when PGUP is run and PN is not, record weather at Palo before heading to Uppers.

Part 2: Entering the Weather Data and Obtaining Past Weather Data from the Computer

Weather data is entered every day that banding is conducted, in conjunction with the banding data. All previous unentered days are entered at that time. See section under entering daily banding data (Chapter 2).

Unknown or incomplete information should be entered as 9s in the computer, but attempts should be made to acquire the temperature and rainfall. Rainfall, particularly at the 1200/1300 time, should be extrapolated based on the rainfall taken before and after the missing data. Historical temperature and barometer for any hour can be determined with the weather program by:

1. Select “Reports” then “Daily Summary” from the toolbar.
2. Choose the date you wish to view and the time increment (1 hour).
3. Be sure to record **outside** temp for the particular hour you need.

The high and low temperatures can be determined from the graph on the weather computer screen for previous days by:

1. View via **Reports > Daily Summary**
2. Select the date for which you want to view high/low temps and click “**Display Report**”
3. Look to see that the pattern in temperature throughout the 24 hours makes sense
 - If it does: use the max/min as high/low
 - If it doesn’t: have your supervisor help assess the situation

CHANGING WEATHER COMPUTER & WEATHER SOFTWARE (in the event of a power outage, daylight savings time, etc.).

- Stop recording weather
- Change time/date on computer (bottom right)
- Open WeatherView32 but do not start monitoring weather
- Setup > Weather station properties > Logger (click yes when prompted)
- Hit button “set station time to system time” and close
- Select “Monitor Weather”

CHAPTER 6: Daily Journal and Bird List

Part 1: The Daily Journal

The Palomarin daily journal is a very useful resource that will frequently be accessed for the information it contains. It is also a very important log of Palomarin culture and history. You are encouraged to delve into the journals from previous years, located on the library shelves, to get a sense of their value (see what happened the day you were born!).

Each week an intern will be assigned as journal keeper (see Palo Living, below, for more weekly chore details). If it is your week on journal and you will be away for an evening, you must find someone to take over the role for that night. The journal should be completed every day, this is best accomplished in the evening around dinner time, when most people are present. Note, a journal sheet is also filled out for each Offsite banding day. In the journal record:

1. The personnel present (staff and interns). Include last names on the first day of that person's presence and/or departure to avoid confusion. For subsequent days, include the initials for all personnel at Palo (staff and interns).
2. Provide a brief prose description of the day's weather.
3. Provide a brief summary of the day's activities person-by person. Record any highlights.
4. Study species notes - provide pertinent information on each study species.
5. Provide a species-by-species summary of the day's banding. Include numbers banded, not banded, and recaptured (same day recaptures not included in recapture tally). Also include the times the nets were opened and closed, total number of net hours, and details of any nets that were closed early. This is completed by the banders.
6. Provide a complete list of all birds seen, heard or caught at Palomarin (in check-list order) and conservatively estimate number of individuals for each species. The Palomarin area is defined as the grid boundaries to the north, west, and south, and extending east as far as the stream (Arroyo Hondo). You can include birds that are outside of the Palo area *as long as* the bird was detected by an observer who was standing on grid. Grid 5 is tallied separately but on same data sheet or in parentheses specifying Grid 5. Tallying Accipiter (and other bird-eating raptors) and nest predators is extremely important. *For all first-known-sightings of the season, and any unusual sightings (even if seen earlier in season), be sure to include documentation about the observation (observer[s], how detected [seen vs. heard], identification criteria used, location, behavior, etc.).
7. Non-avian Nest Predators. Give all sightings that are not tallied on your respective grid data sheets.
8. Provide data on mammals, herps, flowers, insects, and any other natural history notes of interest.
9. Provide poetry, prose, drawings, pictures, and/or stories as the inspiration moves you!
10. Make sure that the headings are filled out (date and/or location) for the front and backside. At Palo the location is Palo or Palomarin, not PN (as that is specific to "Palo Nets" and not the overall study site).

Separate journals are kept for bander off-sites, with the banders who banded at each site responsible for all the above and below steps. The exception is that the Uppers bird list is not done on the Uppers journal sheet but is incorporated into the Palo bird list for the day.

Part 2: Contributing the journal's bird list to eBird

We submit our daily bird lists from both Palomarin and off-site banding to Cornell Laboratory of Ornithology's "eBird" program, allowing easy summarization, organization, and access to our observation data by ourselves and others. The intern assigned to journal for the week is responsible for facilitating the list creation and entering the data. The lists can be entered either daily or at the end of the week before chores are re-assigned.

Directions for bird list data entry to eBird (please note that these may change slightly as Cornell sees fit):

1. Go to www.ebird.org
2. Choose "submit bird observations"
3. If prompted, insert our userid (Palomarin) and password (wrentit)
4. Select appropriate site from "My Locations"; continue

5. Select the date and “Incidental” if the list is for Palo or “Other: Banding” if the list is for a banding offsite; for the Banding protocol you will need to enter the start time, duration, and party size; continue
6. If entering an offsite list, select “Yes” that you are reporting all species encountered (“No” is automatically selected when you are using the “Incidental” protocol), and then follow directions for submitting observations of each species. You may use an “X” for number observed for species for whom you did not feel you got an accurate rough count. You may also add comments for each species if you see fit (notes of identification or unusual behavior). Uncommon species are not on the list as eBird is able to generate lists for the location and time of year that include only expected species. If any species you detected are not on the list, click on the “+Add Species” link in the upper right and type in the name (or four letter code) of the species. You will need to add a comment describing how the species was identified, and then check the box next to “Complete”. If you have a photograph (including of all in-the-hand rarities), this should be placed into the list by simply dragging and dropping the file from the computer to the media upload area for that species. These species should also be brought to the attention of your supervisor.
7. Select submit. If you do not select submit, your observations will be lost.
8. **PROOF the entire day’s entry** – species and number of individuals.
9. Mark on the journal by the bird list that the data has been submitted to eBird.
10. Documenting first-of-year species. After you have entered and proofed the Palo or offsite bird list(s), check to see if you have seen any new species for the year. Click on “Explore Data”, then “Patch Totals” (on the right). In the pale beige box below the heading “Palomarin” or “Palo Offsites” you will see species total numbers in blue for life, year, and month. Click the number for the year and you will see a list of species seen at Palo (and on Grid 5) or all of the offsites along with the date they were first detected. Click on the word “Date” at the top right of the list twice to order them from newest to oldest. If a new species for the year was entered on the date(s) you just entered it will be at the top with the appropriate date. This is exciting! You need to 1) tell your supervisor (in person or by email) and 2) write a short description of how the bird was identified (ask the original observer if it wasn’t you), if this wasn’t done during the bird-list process. In January, you do not need to do those two steps for species you have been seeing all winter.

CHAPTER 7: Plant Phenology Monitoring

Overview

All phenological plant monitoring methods will follow protocols developed by the USA National Phenology Network (USA NPN: <http://www.usanpn.org/>). The USA-NPN’s mission is to serve science and society by promoting broad understanding of plant and animal phenology and its relationship with environmental change. The USA-NPN is a consortium of individuals, agencies and organizations that collect, share, and use phenology data and related information in order to monitor the influence of climate on the phenology of plants, animals, and landscapes.

Study Sites

Plant phenological monitoring will occur at each of our primary study areas, including 3 subsites at Palomarin (2 by the field station and 1 at Uppers) and 1 site at each of our riparian off-sites. Additional sites may be added as deemed appropriate. Sites were chosen for their containment of representative plant species and logistical feasibility (including access and time commitment) of repeated and long-term monitoring. Site locations are as follows (and see separate maps & photos):

1. Palomarin Phenology Site 1: “Palomarin Rain Gauge”; habitat patch behind the banding deck and between the rain gauge and parking circle.
2. Palomarin Phenology Site 2: “Palomarin Visibility Stump”; habitat between the parking circle and parking lot, directly adjacent to the fir stump that is used (at least while conditions allow) to check visibility in direction of Montara Mtn.
3. Palo Grids Uppers Site 1: vicinity of the banding station at Uppers (between nets 7 & 8).
4. Pine Gulch Phenology Site 1: vicinity of the banding station (edge of riparian by net 8); two plants are at creek-end of net 4.
5. Muddy Hollow Phenology Site 1: vicinity of the banding station (corner of parking lot by sign and between nets 1 and 2).

6. Redwood Creek Phenology Site 1: vicinity of the banding station in field between nets 6 & 3.

At each site, representative plant species will be selected and monitored. Each site has a checklist of plant species and the locations of representative plants to be observed each time it is visited.

Timing:

- Palomarin: the two Palomarin sites near the buildings will be visited approximately weekly by staff or interns. The 3rd Palomarin site, at the Uppers banding station, will be monitored during every constant effort mist-netting visit following the same rules described below for riparian sites, including throughout winter.
- Pine Gulch, Muddy Hollow, Lagunitas Creek, and Redwood Creek: Each of the riparian sites (1 site per location) will be monitored for plant phenology during every banding visit (excluding repeat visits within the same period due to incomplete banding days from inclement weather). This amounts to once per banding period, with periods 7-days long from mid-August through October, and 10-days long November through mid-August. Pine Gulch and Muddy Hollow will be monitored year-round, and Redwood Creek and Lagunitas Creek only in spring through fall, as per the banding schedule.

Species List for Each Site:

For plant species, we will monitor 1-5 individuals of each of 3-5 species at each site. All individual plants will be marked to ensure repeatability. A map and/or photo of the site shows the exact locations of the plants (See: Z:\Terrestrial\programs_and_projects\palomarin\Palodata\plant_phenology\PointBlue_phenology_protocols\Palomarin_Phenology_MapsPhotosCoordinates_AllSites for coordinates, maps and images showing plant locations; these should also be available during each phenology survey).

Species Descriptions

Internally-generated species descriptions and/or photographs, that add onto the information in the NPN or CPP species profiles but are generated from our own experiences doing phenology and will benefit others doing phenology monitoring at our sites, are tracked on a document that is also printed and taken into the field. Interns who have figured out new details, or taken photographs of certain phenophases, should share that with their supervisor, as one of the staff will modify this living document which is stored at:

Z:\Terrestrial\programs_and_projects\palomarin\Palodata\plant_phenology\PointBlue_phenology_protocols\PalomarinPhenologySpeciesDetails.doc

Data Collection and Management

Data Collection

Data for each individual plant will be collected onto the species-specific Plant Phenophase Datasheets (provided on the NPN website) that indicates whether we saw each of the plant phenophases (e.g., emerging growth, ripe fruits). Bring the following into the field: (1) NPN datasheets [blank ones are at Z:\Terrestrial\programs_and_projects\palomarin\Palodata\plant_phenology\NPN_species_profiles_and_datasheets], (2) a clipboard, (3) relevant species profiles (the NPN ones and any profiles available from the CPP site that are on our list, (4) the Palomarin-specific Species Details document-made plant profiles), and (5) the Palomarin-specific maps and photos document showing locations of each study plant. Note that for the NPN species profiles, the descriptions are generalized to that *type* of species (e.g., semi-deciduous shrub) unless the species name is listed in the description, so they may not be perfectly accurate for your species. Once you have been trained on a specific plant, (e.g., 2-3 surveys with a supervisor, it is ok to do phenology by yourself if you feel comfortable with the protocol).

Record what you see; for numbers / percentages, extrapolate from a reasonable section of your plant to the rest of the plant, and/or to areas of the plant (e.g., tops of interior of trees) that you cannot see. Otherwise, we are

encouraged to be highly conservative: if you aren't sure if a phenophase might be present but you're just not seeing it, answer "?"; if for any reason you're uncertain about your estimate of quantity/percentage, record "N/A"; if you don't see if a certain phenophase (e.g., open cones) in the part of a tree you *can* access, but can't see all of the tree even with binoculars because it's too tall, answer "?" instead of "No", switching to "Yes" once you *can* see that phenophase in the area of the tree that you can access (the transition from "?" to "Y" is almost as useful as the transition from "N" to "Y", and more accurate). We are currently excluding the canopy assessment question "*what percentage of the canopy is full with leaves*" due to repeatability issues. All plant phenophases should be recorded regardless if they have changed since the last visit. Above each column, please record observer initials. Please follow-up and resolve any uncertainties about phenophases with your supervisor and fellow interns.

Data Entry

All observations of plant phenology will be reported through the USA-NPN Nature's Notebook, which is an online user interface for data entry and visualization. Data entry will be done the day of collection, both for data management purposes and also to provide the most up-to-date phenological information to the NPN. All hard copies of data forms will be stored at Palomar, and at the end of the year will be scanned and then stored on Point Blue's server in the Raw Data Archive following the same procedures used for all raw data.

Data Entry Steps

1. Go to http://www.usanpn.org/natures_notebook
2. Select LOGIN at upper right (**UserID:** Palo; **Password:** wrentit1 [registered as Palomar Field Station, under email dhumble@pointblue.org])
3. Select GO TO YOUR OBSERVATION DECK
4. Select your site under SITES on LEFT then under Enter Observations select ENTER OBSERVATION DATA (do not need to select any particular plant, it will actually allow you to enter all for the selected site)
5. In the next available column (the previous entry is shown for your convenience), Under Date/Time: select date and time (12-hr format), hit OKAY, and be sure to hit APPLY; can enter up to 2 dates of observations at once
6. Under Report Your Contribution of Time: enter # minutes spent surveying the site (not per plant)
7. Ignore *Report your animal observation methods*
8. Silly as it may seem, fill out *Report on Snow*
9. Fill out data for each plant, and **PROOF** it immediately afterwards
10. In the comments field for each species per visit, put the observer's initials (Observer = XXX) and any comments particular to that day's observations (including any confusion you might have developed or resolved)
11. Hit SUBMIT OBSERVATIONS to save (and DO NOT arrow left or right to browse/edit a different set of dates than the 3 shown when you are doing data entry until you have hit SUBMIT OBSERVATIONS; otherwise you will lose all the observations you've just submitted).
12. Check the data entry box at bottom of appropriate section of data sheet & add "P" for proofed; include data entry date for at least one species on that date

CHAPTER 8: Palomarin Living

General

The appearance and upkeep of Palomarin is very important. Point Blue members, VIPs, outside partners, and other Point Blue staff often drop in unannounced or for meetings. We ask you to maintain an office atmosphere from 9 to 5, during which music should be confined to the lower building. Our fire insurance and general policies do not permit smoking inside any building at Point Blue.

Address and Post Office Box Key

The address for the Palomarin Field Station is:

999 Mesa Road (for UPS/FedEx)

PO Box 1157 (for U.S. Postal Service)

Bolinas CA 94924

Interns and staff are both responsible for getting mail from our post office box in town. Do not get the mail if you are not coming back to Palo soon after, and do not leave other people's mail from the box in your unlocked vehicle.

History

The Palomarin Field Station was once the school house of the communal Church of the Golden Rule. Dr. L. Richard Mewaldt bought the buildings in June of 1966 just prior to their scheduled demolition. The buildings, owned by Point Blue and situated on land owned by the Point Reyes National Seashore, served as headquarters of the Bird Observatory until 1978. It now serves as Point Blue's primary "window to the public" and, on top of housing the Palomarin project itself, it also houses a number of staff working on landbird ecology and other studies in the region.

Dealing with the Public

Palomarin is the primary location where the general public may visit Point Blue. Please take the time and energy to listen and explain what you are doing. Always try your best to be courteous, smiling, and helpful, no matter how busy you are or how difficult their questions are. See Chapter 5: Interpretation and Education for more details.

Visitor Center

The door to the banding lab should be open during banding hours and until evening. Please be sure that: 1) The lights are on when open, 2) Reprints and other materials are adequately stocked, 3) A black working pen is attached to the guest book, and 4) The room is presentable. This is primarily the responsibility of the Visitor's Eye View person (changes weekly) or the banders at Palo on a given day, but all interns should take responsibility.

Selling Merchandise

Sell T-shirts, books, and hats as requested. We accept cash or checks. T-shirts are stored in locked drawers in the Visitor's Center and more are stored in tubs in the storage shed. All sales must be recorded in the appropriate folder kept in the drawer in the data room with the cash box. See instructions in sales ledger.

Living Room/Library

The living room is not really open to the general public. However, visitors, members, park service personnel, and current and former staff and interns drop in regularly. Please be sure that it is presentable at all times. There are numerous references available for your use; this periodical and limited book collection is intended for on-site research use and should not leave the building. Please return all journals when not in use. Scientific manuscripts that have been produced with Palomarin data are all available for you to read in a labeled binder ("Palo Publications") above the copier; originals should also not leave the building. Aside from the herbarium in the Data Room, there are two reference binders above the copier on Palomarin plants. The thermostat that controls the furnace is also nearby. It should be turned down when the last person goes to bed. The library is your communal space but it is also an office space. Please treat it as such. Do not claim any desk space for long term use and do not leave your personal belongings in the library.

***Note: If you have been in poison oak, do not use communal areas such as the library, kitchen, etc. as those susceptible to poison oak may contract it this way. You may only sit on the poison oak bench while you wait to shower.**

Computers

In general, computers in the library and data room are available for personal use. However, any work tasks have priority over personal use. Do not watch videos, download music, etc. on these computers. Get outside!! The weather computer is not to be used for anything except running the weather program.

You can create a personal folder for storing pictures or other items on the server at Z:/terrestrial/personalfolders/[your name]. Please delete this folder when you leave Palo.

Email + Internet Access at Palomarin

Internet services are provided through our network. Interns and other guests can access the guest wireless userid and password on the bulletin board in the library; the wireless is mostly accessible in and just outside the upper building. Please do not stream any videos or do other high-bandwidth activities during working hours, even on days off, as all staff and interns present (and some processes running remotely) are sharing limited bandwidth.

Personal Computers & Handheld Devices

Personal computers and handhelds can be used anywhere at Palomarin. They cannot be connected directly to our server. However, Ethernet cables and wireless internet access are available (see library bulletin board for password). We request that you DO NOT claim a long-term personal desk space within the library (i.e., don't leave your laptop there); the library is a communal space. All users should have anti-virus software on any personal computers if connecting to the wireless; this includes guest visitors who may want access. We also ask that you limit use of your personal computers and handheld devices during breaks when banding at Palo, focusing instead on other work tasks or readings that need to be done or could advance your skills.

Palomarin email list

A Palomarin email list has been set up to facilitate communication between the interns, station managers and other Palo staff regarding data, field work, upcoming events and presentations, the Palo living situation, or any other relevant topic affecting the interns at Palo. The list address is: palo@lists.pointblue.org. Anyone on the list can send an email to it.

Outside

Please look after the restoration area in front of the building, and the Wittgenstein Garden in the back courtyard. Do not park in the access drive way as this blocks access to the trash cans, propane tank and lower building. Visitors are welcome to leave cars in our parking lot overnight. If they ask, suggest to them to park at the far end of the parking lot, or suggest they park elsewhere if our lot is near capacity. Nearby camping, sleeping outside, or sleeping in vehicles parked overnight is not permitted. Neither is hiking anywhere other than on park trails, picnicking away from picnic areas, and other activities on the grids – especially during the breeding season. Any violations of park rules should be reported to PRNS officials (415-663-1092).

Telephones

All phones should be answered with the greeting “Palomarin”, “Palomarin Field Station”, or “Point Blue”. A personal calling card must be used for any long distance calls. The intern number, **415-868-9212** is the number to be given to family and friends for incoming calls. Three phones are on this line: kitchen, laundry room, and the white phone just inside the data room door. The black business phones in the offices are only to be used **after hours** for personal calls (also use a calling card for long distance). Please limit calls on the intern line to 10 minutes or less, as many people are receiving incoming calls on this line. You can schedule a time for someone to call you on an office phone after business hours (the extension number is on the screen), but be sure that they are not calling for you during business hours when staff are stationed at their phones or even working late. There is no cell reception at Palomarin and you must drive to town if you need to use your phones for calls.

Water

Water from the taps comes from Arroyo Hondo and is currently not filtered. Five gallon water jugs are delivered weekly for drinking purposes. The tap water is fine for cooking (when boiled) and cleaning. **Please do everything you can to conserve water**; turn the shower off while soaping and the tap off while brushing teeth or scrubbing dishes. Arroyo Hondo is a very small stream and provides all of Bolinas with water!!

Septic System

The Palo Septic system is sensitive, and needs care and attention. Never flush paper towels or feminine products. Sewage can back-up into the residences if the tanks are full, or if use is too much, too fast for the leach field to keep up. To avoid this, we pump the tanks regularly, but extra precautions should be taken, **especially when it's been raining**: during winter, residents should try to space out activities that require a lot of water (e.g., give the system a break after showering and wait a couple of hours before doing laundry).

If you notice any issues with the system (e.g., toilets backing up or not flushing well, or water coming out of the bathroom floor drain), please report it to your supervisor immediately (and to all other Palo staff and interns) and prevent any more water from going down any drain (including closing the visitor bathroom, and using port-a-potty in parking lot). If water does begin to flow into any carpeted room from the bathroom, you can stop the flow with towels and sandbags placed between the rooms (sandbags are stored in the pump shed).

Supplies

We supply all paper products and soap needed to stock the bathrooms, as well as laundry detergent, dish soap, sponges, and cleaning supplies. If we are running low on any of these items, please let the manager know right away, so he/she can have plenty of time to replenish the supply.

Bunkrooms and Private Rooms

Each of the two bunkrooms has five bunks. Bunkrooms may or may not be co-ed, depending upon intern preference and gender ratio. Bunks are normally first come first serve. If you have special needs or concerns, please ask. You may share your bunk space with visiting researchers who come for short- or long-term stays. Private rooms are maintained for visiting scientists, for which we sometimes get last-minute requests.

Bathrooms

There are two bathrooms in the lower building for staff and interns. Because there may be up to 12 people using the shower and bathroom facilities, it is important for everyone to clean up after themselves. The visitor bathroom in the upper building should not have any personal items stored in it. It is locked on busy weekends or rainy periods to not strain our water supply and septic system, and an out of order sign put up (the key code is written behind where the sign is stored just inside the library, used for staff to access the bathroom when it is locked, or when someone leaves it locked). The port-o-potty in the parking lot is also available and you can direct visitors to that.

Laundry Room

Located in the lower building. There are a washer and dryer here for intern use. Light bulbs, cleaning supplies, extra bedding, toilet paper, etc. are stored in the laundry room.

Kitchen and Communal Dinners

Dinners at Palomarin are often a communal event. At the Wednesday meeting, 2 people will be chosen and written on the calendar for each night of the following week. These 2 people will be in charge of cooking the meal and making sure the kitchen is cleaned that night. Details will be decided amongst the group.

Recycling

Please clean and put kitchen recycling in the appropriate place below the sink: metal, glass, plastic, aseptic containers, and cardboard. Office paper and magazines are recycled in the boxes in the Data Room. One-sided office paper can be reused by printing on the other side.

Compost

(Subject to change depending on composting status). Food scraps can be put into the small can on the counter in the kitchen. Once it is full dump it out into the outside compost bucket and rinse. Most food items are acceptable except for meat and dairy. Tea bags and coffee grounds are fine. If you have a large item, please cut it into smaller portions. **Remove stickers from produce, twist ties, rubber bands, and anything else that is not compostable food.**

Tool shed

Located at southeast corner of the lower building. This is for tool storage. Please return all items when you're finished using them and keep the shed accessible. Note that many things in this shed are used for field work and likely have Poison Oak oils on them. Treat them accordingly and wash with Tecnu after using.

Locking

The Banding Lab / Visitor Center should be locked every evening and unlocked every morning (regardless of whether or not anyone will be at the field station), and the upper building should be locked for any period of time during which no one will be at the field station. The lower building can be locked at the residents' discretion.

Friday Socials

Occasionally we have social gatherings, often including scientific presentations by staff, guests, or outside researchers, on Friday afternoons. Interns are strongly encouraged, and occasionally required, to attend the ones with presentations.

The "Wednesday" Meeting – day subject to change!

There is a weekly intern meeting to: 1) schedule the following week, 2) discuss any problems with data, the living situation, field work, etc., 3) discuss papers of related research topics, and 4) discuss/reassign the weekly chore and cooking schedule (see below). These usually occur Wednesday (unless otherwise notified) at 3:30 pm; and you are required to attend unless you have made other arrangements with your supervisor. The weekly chores are listed below with description of tasks involved.

Chores

All Palo interns are expected to participate in weekly chores. We hope you enjoy your new home at Palo and help us to keep it in good condition. The following three chores are "daily chores"

VISITOR'S EYE VIEW

- Stock visitor center pamphlets. Originals are in the data forms drawer in the data room.
- Library: free of dirty dishes & personal items; loose papers left out should be neatly stacked.
- Visitor's Center: keep tidy, swept; locked and lights out at night; opened and lights on in the morning (banders will unlock if it's a banding day).
- Visitor bathroom swept, mopped, stocked (TP, paper towels, soap)
- 4 windows cleaned (pick ones that haven't been cleaned in a while)

This person will receive \$25.00 at the end of the week, under the condition that the tasks have been completed.

JOURNAL & EBIRD The journal is very useful and an important part of preserving Palo history and daily activities. Please take care in your contributions while making sure that all sections of the journal are filled out (see Chapter 6 for more details). While each week one person takes the lead, all interns contribute to the content.

- Daily bird list with group
- Summarize activities
- Summarize weather
- Tally visitors
- Contribute all 7 days of bird lists for Palo to eBird (www.ebird.org; user name = Palomarin, password = wrentit).
- Look for new species for the year; confirm these have appropriate documentation, and alert supervisor.

GROUNDS PATROL Pick up trash and generally straighten up; sweep decks, walkways, maintain trail to propane tank

- All around the buildings
- Yard
- Kitchen deck
- Parking lot
- Upper building's deck

The remaining chores are done as needed (sometimes daily), but at least once a week.

While the following areas will be kept tidy by everyone using them, the person assigned to these areas will do a more thorough cleaning, described below.

NORTH & SOUTH BUNKROOMS One person assigned to each, someone who stays in the given bunkroom.

- Vacuum floor
- Empty trash
- Keep tidy

NORTH & SOUTH BATHROOMS One person assigned to each, someone who stays in the associated bunkroom.

- Clean shower
- Wash sinks
- Mop floor
- Clean toilets
- Stock TP
- Change garbage.
- Wash and re-hang communal hand towel

HUMMINGBIRD FEEDER, WATER COOLER, LAUNDRY ROOM

- Refill and clean hummingbird feeders as needed (use 1 part sugar to 4 parts water).
- Refill water coolers as needed.
- Keep laundry room tidy, empty trash, sweep/mop floor, avoid build-up of personal items.

BANDING LAB

- The banders will keep the banding lab swept and tidy and trash emptied

DATA ROOM

- Gridders or anyone with a desk here will keep their desks and the data room picked up, organized and clean.

MOP KITCHEN FLOOR & WASH TOWELS

- Floor mopped as needed.
- Dirty dish towels cleaned.

COMPOST, TRASH, RECYCLING DUTY

- Compost containers in kitchen will be emptied by all users but this person is ultimately responsible for them. Rinse them out after emptying.
- Trash taken out as needed.
- Recycling transferred and sorted from kitchen to storage bins outside.
- Transfer paper from large bin in data room to bins outside kitchen.

KITCHEN

Everyone utilizing the kitchen is responsible for its cleanliness.

- Clean personal dishes after each use
- Keep personal food in cupboards and assigned refrigerator
- Wipe counters and table and keep them free from clutter.
- Keep floor swept.
- Communal Dinner Cleanup. The 2 meal preparers are responsible for a clean kitchen before going to bed. This may simply mean encouraging the whole group to join in for a quick, assembly-line-type cleaning!

APPENDIX 1: Intern Evaluation Forms

Part 1. Overview and Use

Evaluation forms are to be filled out by the supervisor for all banders, nest searchers, and point counters at the Landbird Program. These forms describe the skills and talents that are to be developed by each intern over the course of the season. Ideally there will be a mid-season evaluation and a second one at the end of the season (during which the intern also evaluates their experience here). The main purposes of these are as follows:

1. To provide the intern with a list of the skills that they will be expected to learn during their internship (see the blank evaluation forms on the next pages), and that are typically asked about during reference requests. Some of these (such as good data management and data entry, and interpersonal relations) are otherwise often overlooked in their importance. These forms aim to communicate the variety of tasks a good scientist performs.
2. An informal mid-season evaluation allows discussion of supervisor and intern goals and the addressing of any changes that need to be made related to these goals and to field station living.
3. To provide a written evaluation of the skills the intern has learned while at Point Blue, as a reference. For banders who take the North American Banding Council test, the written evaluation provided through that process may be given in lieu of the one shown here.

Part 2. Bander Evaluation

Name: _____ Initials of Supervisor _____ Date _____

	EXCELLENT	GOOD	BASIC	NOVICE
SCRIBING				
FIELD IDENTIFICATION				
IN-HAND IDENTIFICATION				
HANDLING AND BANDING				
MEASUREMENTS				
AGEING AND SEXING				
EXTRACTION				
NET RUNNING AND CARE				
DATA ORGANIZATION/MGMT				
INTERPRETIVE SKILLS				
SENSE OF RESPONSIBILITY				
INTERPERSONAL SKILLS				

Note to supervisor: Feel free to take notes on this form or highlight specific qualities of the bander in question.

SCRIBING

- EXCELLENT is very familiar with codes, is aware of bander errors as they arise and communicates them to the bander, prompts bander for missing information
- GOOD keeps up with speed of bander and has good understanding of codes being used
- BASIC writes legibly and is attentive to bander but is unfamiliar with codes
- NOVICE inattentive to what the bander is saying or writes illegibly; unfamiliar with codes

FIELD IDENTIFICATION

- EXCELLENT identifies almost all birds correctly in flight, by song and by call. Very good birder.
- GOOD good at species identification for at least local avifauna, recognizes oddities as different and can then figure them out to species with guide, knows common songs and calls
- BASIC identifies birds correctly to family, sometimes to species and can generally use field guide to ID ones which are not known immediately
- NOVICE unable to identify even local birds in field

IN-HAND IDENTIFICATION

- EXCELLENT notices species and subspecies variations
- GOOD can ID to species and has good sense of what features to look for to narrow down field with more confusing individuals, such as *Empidonax* flycatchers (wing formula, etc.)
- BASIC can ID most birds to family/genus, and some local ones to species, especially with field guide
- NOVICE unable to identify most birds in the hand, even to family/genus

HANDLING AND BANDING

- EXCELLENT comfortably transfers bird from hand to hand, is very comfortable holding large birds and struggling birds. Safely and calmly removes bands. Remains calm during stressful situations.
- GOOD comfortably maneuvers bird in hand and easily changes banding grip; passes bird between self and other bander with ease and care; can control large birds and struggling birds reasonably well; bands in reasonable speed.
- BASIC comfortable with bander's grip and photographer's grip and bands safely, but not very comfortable maneuvering bird in hand or with struggling birds.
- NOVICE not comfortable handling birds or does not use proper handling methods.

MEASUREMENTS/BIOMETRICS

- EXCELLENT very accurate, willing to compare with other banders for consistency, takes more complicated measurements (i.e. wing formulas) very quickly
- GOOD accurate at taking basic measurements as well as others, knows how to separate species and sexes with such measurements
- BASIC accurate at taking basic measurements, such as wing chord; otherwise not experienced
- NOVICE not very comfortable or accurate taking measurements

AGING AND SEXING

EXCELLENT	very accurate, willing to discuss ageing process with other banders, good at skulling, able to sex and age not only by plumage criteria below, but also good at using molt limits and patterns
GOOD	is good at skulling, and is also able to sex and age relevant species by plumage criteria
BASIC	is familiar with using CP/BP for sexing and juvenile/adult plumage for aging; skulling difficult
NOVICE	not very familiar with basic techniques of aging and sexing

EXTRACTION

EXCELLENT	very good and quick at extracting; has strong sense of how to extract very tangled birds; comfortably uses different handling methods, including body grasp, as needed
GOOD	can extract almost all birds encountered, and is aware of when to get help.
BASIC	can extract most birds that are not badly caught in net, needs help on tangled ones
NOVICE	has difficulty extracting most birds, including ones that are not very tangled

NET RUNNING AND CARE

EXCELLENT	continually “tends” nets during the course of the banding day, keeps track of ones which need further mending, very attentive to weather conditions, takes responsibility for overall running of the banding station and nets
GOOD	aware of nets during the course of the day, adjusts and mends as needed, is responsive to external conditions that warrant net closure
BASIC	knows how trammel should be spaced, is familiar with the conditions which warrant net closure but does not feel comfortable making such calls alone
NOVICE	knows how to open and close nets, but not attentive to the spacing of trammel lines and net care, doesn’t take ownership of the overall running of banding station

DATA ORGANIZATION AND MANAGEMENT

EXCELLENT	very organized, very on top of data, very attentive to detail, needs no prompting from supervisor, encouraging to rest of crew that these things are done and done well
GOOD	is organized, keeps up with data well, needs little prompting from supervisor
BASIC	is somewhat negligent of data entry, proofing, organization, filing, etc.
NOVICE	disorganized, does not appear to feel responsibility to have clean, organized, proofed data

INTERPRETIVE SKILLS

EXCELLENT	engaging with visitors, goes out of their way, very friendly, explains many aspects of Point Blue
GOOD	approaches visitors, is friendly, explains what we do and who we are
BASIC	talks to visitors when they ask questions, but makes little effort otherwise
NOVICE	shy with visitors, not willing to interpret

SENSE OF RESPONSIBILITY

EXCELLENT	takes ownership of the field station, each of the study sites, and the general Palo living environment, by noticing problems or what is lacking and taking initiative to fix the situation, and communicating about items that are helpful for others to be aware of
GOOD	completes all tasks assigned diligently and with attention to quality, and occasionally notices and brings up things that need to be addressed
BASIC	completes most tasks assigned, with variable attention to quality; not very proactive
NOVICE	fails to complete tasks assigned; not proactive and does not take initiative

INTERPERSONAL SKILLS

EXCELLENT	great communication skills, remains calm during challenging discussions, does not feel defensive when his or her calls in the banding lab are challenged, is comfortable making those challenges to others and does so without appearing challenging or insulting, proactive about bringing up conflicts that need resolution with co-workers or supervisor
GOOD	communicates with co-workers, willing to discuss issues, willing to be challenged on his or her banding calls/decisions
BASIC	is personable with co-workers but does not communicate well, has difficulty with confrontations, unlikely to bring up issues that need resolution
NOVICE	communicates poorly with co-workers, defensive/angry when questioned, can be antagonistic

Part 3. Nest Searcher Evaluation

Name: _____ Initials of Supervisor _____ Date _____

	EXCELLENT	GOOD	BASIC	NOVICE
OBSERVER SKILLS				
PATIENCE				
DATA ORGANIZATION				
METHODOLOGY				
DEDICATION				
SENSE OF RESPONSIBILITY				
ORIENTEERING SKILLS				
INTERPERSONAL SKILLS				

Note to supervisor: Feel free to take notes on this form or highlight specific qualities of the nest searcher in question.

OBSERVER SKILLS

- EXCELLENT a nest searching whiz; very in tune with the bird’s behaviors and has a thorough understanding of how to use such clues to find nests.
- GOOD can interpret many behaviors and can use these behaviors to successfully nest search
- BASIC can interpret some behaviors but misses many other obvious ones which would help with nest searching, resulting in fewer nests being found than there could be.
- NOVICE misinterprets most behaviors of birds, or entirely misses observing such behaviors

PATIENCE

- EXCELLENT can follow a bird or remain attentive even with the most reclusive, difficult to follow individuals.
- GOOD can remain with a bird for a long time, remains patient
- BASIC can follow birds for a reasonable amount of time but gets impatient without much activity
- NOVICE lacks patience for sticking with individual birds for very long

DATA ORGANIZATION

- EXCELLENT very organized, very on top of data, very attentive to detail, almost ahead of schedule
- GOOD is organized, keeps up with data well without supervision (e.g. entry, spot mapping, etc).
- BASIC keeps up with data but only with prompting from supervisor, not particularly organized
- NOVICE disorganized and/or messy, does not keep up with nest checks, spot maps, data entry, etc.

METHODOLOGY

- EXCELLENT gets results for all nests, promptly does closeouts and veggies, never misses nest checks, carries out protocols exactly as they should be done, thorough understanding of need for good data.
- GOOD carries out protocols well, gets results for most nests, keeps up with nest checks, good understanding of importance of protocols and collecting good, clean data
- BASIC sometimes misses nest checks, procrastinates on getting veggies done, doesn’t have a sense of the importance of the methods used.
- NOVICE often misses nest checks, very late in getting closeouts and veggies done, many nests w/out results

DEDICATION

- EXCELLENT very driven, never needs prodding, puts in an incredible amount of time into his or her nest plot, whatever is needed to get complete data, above and beyond the “call of duty”
- GOOD driven, committed to his or her nest searching plot, puts in extra effort when needed
- BASIC is driven to do what is required but is not willing to spend extra time or long hours in the field
- NOVICE not driven

SENSE OF RESPONSIBILITY

- EXCELLENT takes ownership of the field station, each of the study sites, and the general Palo living environment, by noticing problems or what is lacking and taking initiative to fix the situation, and communicating about items that are helpful for others to be aware of
- GOOD completes all tasks assigned diligently and with attention to quality, and occasionally notices and brings up things that need to be addressed
- BASIC completes most tasks assigned, with variable attention to quality; not very proactive
- NOVICE fails to complete tasks assigned; not proactive and does not take initiative

ORIENTEERING SKILLS

EXCELLENT	excellent orienteering skills and strong sense of direction.
GOOD	good orienteering skills, is able to re-find nests with ease, good sense of direction
BASIC	can use compass but lacks sense of direction
NOVICE	little sense of direction, has difficulty re-finding nests, lacks compass skills

INTERPERSONAL SKILLS

EXCELLENT	great communication skills, is approachable, willingly approaches others with problems/issues, shares knowledge with others readily, takes advice well, proactive about bringing up conflicts that need resolution with co-workers or supervisor
GOOD	communicates reasonably well with co-workers, friendly demeanor
BASIC	is personable with co-workers but does not communicate well, has difficulty with confrontations, unlikely to bring up issues that need resolution
NOVICE	communicates poorly with co-workers, is not approachable or friendly

APPENDIX 2: Gridder and Bander Intern Responsibilities

Part 1. Gridder Responsibilities

DAILY

- Gridders (as well as banders) are responsible for ensuring that weather data is being taken throughout day

Spotmapping

- Census Data Sheet of all birds seen on the grid. Filled out while on the grids. This data will be used to complete several other data sheets.
- Grid Effort Data Sheet used to record the days coverage of your grid.
- Life History Tally Sheet; update daily to keep track of sightings of all color-banded individuals.
- Data entry of Census Sheets into Encount and onto hand-drawn maps.
- Color-banded mist net capture sheet (hanging in data room)
Check this sheet daily and add any captured or newly banded birds to your spot maps
- Data Entry
 - Nest finds and nest checks
 - Nest Vegetation Data

Nests

- Nest cards are filled out in the field upon finding a nest and during each nest check.
- Be sure to keep track of when nests need to be checked. (Can use Check Schedule in Nest program to help with this)
- Nest record sheets are updated daily by transferring data from the nest cards. These sheets are to remain in the data room at all times.
- Nest Closeout and Vegetation measurements are completed as soon as a nest is inactive. This data is taken on a closeout data worksheet. Download GPS coordinates of all nests into a Waypoint text file.

Nestling banding

- Enter and do daily proof each day that nestling bandings are done. Coordinate with banders in regards to accessing the banding program.

AT VARIOUS INTERVALS THROUGHOUT SEASON

Weekly

- Gridders are responsible for the “rain gauge” plant phenology plot during the spring/summer season. Phenology data is taken on a weekly basis.

- Do assigned weekly readings
- Do assigned weekly field station chores and develop a sense of responsibility towards the general conditions of the field station

Bi-monthly (After each census period)

- Census Period Territory Maps. For each color-banded species, use the Census Period Spotmap to create a pencil territory map. Territory maps are to represent territories as they existed during that Census Period but should not ignore data from previous Census Periods as well.
- Census Period Behavioral Summary for All color-banded species. Also write a brief narrative of the status and behavior during that census period on the back of the Behavioral Summary sheet.
- Meet with field supervisor individually to discuss/review maps, field work etc

First brood map (End of May)

For each species, create a territory map combining all data collected thus far. This will be a digital map for study species (include data from Mar 15-May 31) and pencil for non-study species (data from Apr 1- May 31).

Transect Vegetation (First week of July)

10 line transect “veggies” are completed each season at permanent grid point locations. This task is shared by banders and gridders.

END-OF-SEASON (formatted in checklist format so gridded can track that each step has been done)

Make sure all end-of-census period paper work is complete:

- Territory maps: spotmaps and circled territories for all species, count # of territories for each species, only >50% on grid, record on maps
- Census Period Behavioral Summary
- Census period species writeup; on reverse of behavioral summary.
- Life history tally sheet

For nests:

- Make sure you know the outcomes of all your nests (and that the nest record sheet includes all the info that the gridded used to infer the outcome)!!!!
- Copy the back of your nest cards onto the backs of the corresponding nest sheets.
- All nest precision codes filled out on nest record sheet (note your codes & dates should be modified if the nest program doesn't produce an accurate date, i.e., if you know better!)
- All veggies done- enter and proof all data.
- GPS all nests and provide points to your supervisor (they will show you how to download your points) to upload into ArcView. Work with supervisor to produce an ArcView shapefile and attribute table for all nests found on your grid.
- All nest data (of all types) entered and proofed in FoxPro
- Closeout all nests in FoxPro - fix errors

Territory writeups:

One is written for each territory of each study species on your grid and are intended to summarize the complete breeding season. Refer to all data and notes you have taken throughout the season, as well as to data from previous years, to assist you.

- For the study species, write a summary of all you know for each territory on your grid.
- The standard format to follow and details of the territory writeups begin on page 41 of the handbook. Look at previous years' writeups for examples.
- Save these writeups on the z drive in the writeup folder for the appropriate year, with a separate document for each species(e.g.
Z:\Terrestrial\programs_and_projects\palomarin\Palodata\nest\annual_data\PALO2008nests\Writeups\Grid 1\WREN.doc)

Final brood map:

- Pencil maps for color-banded species, including data for the entire season (through July 31). Non-color-banded species first brood maps are revisited and edited for any changes since May 31
- Digitize first and second brood final maps for study species: in ArcView, create a digital copy of your first and second brood territory maps for the color-banded species. There should be a separate layer for each

map, and each map should have a corresponding attribute table with the territory ID, parent color combo/cohort, etc. See elsewhere in Handbook for complete details.

Scan all raw data

Directions for scanning can be found at:

Z:\Terrestrial\programs_and_projects\palomarin\palo_management\facilities\Scanning_Directions_Palo_ImageRunner3235i.doc (start at #3 and go through #16) *Interns do not have access so be sure there is one in the drawer next to Wrentit or print a new one.*

Create a folder in the appropriate Z drive grid folder (e.g.,

Z:\Terrestrial\programs_and_projects\palomarin\Palodata\nest\annual_data\PALO2010nests\grid4_2010\scanned data sheets) named “Scanned data sheets”. Save like sheets together in the same pdf and use standard names demonstrated in the list below.

The following data sheets should be scanned:

Data sheet	Standard name example
Census field data sheets	G1_censusfielddata_10.pdf
Census period spotmaps for all species.	G1_Spotmaps_10.pdf
1 st and 2 nd brood (color-banded species) and final brood (non color-banded spp.) territory maps.	G1_brood1maps_10.pdf G1_brood2maps_10.pdf G1_finalmaps_10.pdf
Nest record sheets	G1_nestrecord_10.pdf
Nest veggie sheets	G1_nestveggie_10.pdf
Behavior Summaries (both sides)	G1_behavior_10.pdf

Bind all data sheets together or place in the appropriate binder

- Bind Census field data sheets and grid effort sheets together.
- Bind spotmaps, census period behavioral summaries, brood maps, and territory writeups together. Follow the order used in previous years.
- Place nest record sheets and nest veggie sheets in the appropriate binders in the data room (located on a high shelf above where the nest cards live). Be sure that the results, closeout precision codes, and nestling banding info are filled out on each nest record sheet.
- Put a rubber band around all nest cards and place in the appropriate box located in the data room.

Do the closeout and proof step in the nest program

- Wait until all nests are inactive and all nest data is entered. See supervisor for details.

End of Season Proofing

- Check all data sheets and databases to ensure that all fields that should be filled are filled.
- Proof the data (if not already marked on datasheets as proofed) to confirm that the data matches between all hard copies and electronic copies: ie: color combos on nest card, nest sheet, and in NEST program.

Part 2. Bander Responsibilities

Running Nets

- Palo Nets:
Sat, Sun, Wed (& makeup days) from Thanksgiving – April 30
Every day except Monday (weather make-ups on Mondays) May 1 – Thanksgiving.
- Off-site Nets:
PIGU, PGUP, and MUHO once every 10 days Nov 1 – mid-August
RECR once every 10 days May 1- mid-August
PIGU, PGUP, MUHO, RECR once every 7 days mid-August – Oct 31
- PEXA:
Opportunistically in conjunction with PN, often when trying to increase captures for school groups or for intern training, during slow periods, or increase color banding opportunities

Daily Responsibilities (when running nets)

- Collect good banding data!
- Communicate with and try to engage all visitors you see. Do so even when not banding.
- Take responsibility for state of banding data, banding lab, and banding equipment (for Palo and off-sites). For banding equipment:
 - Inventory off-site banding equipment before going into the field each time, in particular checking that there are enough blank banding pages, journal pages, area search forms, color combo sheets for all species, color bands, active and backup strings for each metal band size, relatively fresh hummingbird water, pens, rope, and clean bags (complete list on wall in banding lab)
 - Recharge and replace batteries as needed
 - Wash bird bags as needed, at least weekly
- Collect weather data (prior to opening; 0800/0900; and 1200/1300; and 1600/1700) even if not in data room. (this is primarily an intern responsibility over anyone else working locally)
- Color banded birds:
 - Bird the area during net runs, and read color bands when you can
 - Keep track of *confirmed* color banded bird observations on encounter data sheet in data room. During the breeding season, birds on the grids will be entered by Gridders. Those off the grids should be entered through FoxPro by the observer.
 - During breeding season: fill out “mist net captures of study species” for gridders.
- Nets & trails:
 - Tend nets throughout day and make sure lanes are clear of vegetation and nets are properly set up and as concealed as possible
 - Note status of nets to prioritize net mending needs; fix urgent problems such as broken side trammels or nets in very bad state as they arise
- Train, monitor and engage volunteers, and keep daily account of their abilities/status/problems/etc in the volunteer notebook
- Daily summaries
 - Keep running daily banding tally on whiteboard in banding lab
 - Complete daily banding summary on outside white board for visitors
 - Fill out net hour and banding summary information in Palo journal & on off-site journal page
 - Ensure that banding activities are recorded every night in the Palo journal and on off-site journal page
- Data entry and proofing
 - Enter & proof banding data *daily*
 - Fill out net hour data form and enter for that day
 - Enter all unentered weather data from previous days
 - Enter all offsite bird lists into eBird; follow protocol to document new-species-for-season, checking eBird for any new species for year, and alerting supervisor about the latter. The person responsible for the journal chore will enter the Palo bird lists, but not off-site ones.
- Data management

- File completed data sheets once daily proof has been done (double check that all bander names and initials, and sections at the top of the sheet are complete).
- File all other finished data sheets (e.g., area search forms, journal)
- Do plant phenology weekly at Palo (except during the spring/summer when gridders are responsible for Palo plant phenology) and each time that an offsite is visited
- Keep equipment locked up and banding area cordoned off when not in use
- Update recent bird sightings on white board from BirdBox hotline (415.681.7422), ebird, and North Bay Birds listserve (<http://birding.aba.org/maillist/CA09>)
- Complete schedule on banding calendar 1-2 weeks in advance
- Keep nets in good condition (weekly net mending, ~3 hours each or more if necessary)
- Communicate with banding volunteers as necessary for scheduling
- Do monthly proofing of banding data – finish the proof before the following month has ended. Banders are responsible for monthly proofing all banding data (including nestling/gridder banding data).
- Keep track of problems found in historical data; attempt to solve data discrepancies; communicate both solved and unsolved ones to your supervisor via clipboard
- Ensure that weather data is being taken throughout day even if you aren't in the office or it is your day off
- From April 1st - end of breeding season (August) do weekly swallow nest surveys; band nestling Barn Swallows
- Confirm and enter encounter data collected by banders & other non-gridders
- Do morning area searches of the Palo net area every day that there is banding at Palo
- Conduct weekly winter bird survey (WBC) on grids (Jan-early March), enter color band encounters properly, manage data, and produce data summary and write-up before the termination of your winter internship
- Target net on grids, as per communication with gridders and gridder supervisor
- Do non-native plant removal
- Maintain familiarity with Pyle Guide Introduction, use of the guide for different species, the Photographic Companion to the Pyle Guide, and all relevant sections of the Palo handbook
- Do assigned weekly readings
- Do assigned weekly field station chores and develop a sense of responsibility towards the general conditions of the field station
- Participate in communal data projects (various data entry, proofing, scanning, and analysis projects)
- In winter and other times of year if possible, develop and produce manageable and independent data analysis or outreach projects in coordination with staff
- Participate in various other local field projects that arise, as part of the general Palomarin team (e.g., vegetation surveys, banding nestlings, etc.)

Additional Responsibilities & *Et Cetera* (ETC) Days

Banders will often have work days on which they are not scheduled to band, called *Et Cetera* Days. These are scheduled on the banding calendar just like banding days. On these days, banders are expected to spend the equivalent of a full banding day (6-8 hours), but the work can be done on your own schedule (i.e. you do not have to start at net opening time). The number of etc. days varies by season; in the winter there are more, and banders may take on a small data project.

An ETC Day white board is kept in the office, which lists current priority projects. Additionally many of the tasks listed above can be done on etc days. A portion of your etc time may also be filled with activities that further your own education, such as reading journal articles, studying the Pyle guide, and birding. Ideally, your ETC time should reflect a balance between your personal education and contributing to Palomarin data and field site/equipment maintenance.

APPENDIX 3: Common Avian Species at Palomarin & Riparian Offsites

Study species in **BOLD** (¹Not color banded, ²Nestlings not color banded; see also Chapter 1, Part 1 for priority levels and other distinctions in methodology).

Summer and Winter species will also be encountered during spring and fall migration, and some migrants listed here under Summer actually return from the neotropics in late winter. Additionally, some year-round species are not necessarily resident; instead, migratory individuals occur here during all seasons.

A. Year-round Species

California Quail (CAQU)
Red-tailed Hawk (RTHA)
Sharp-shinned Hawk (SSHA)
Band-tailed Pigeon (BTPI)
Mourning Dove (MODO)
Anna's Hummingbird (ANHU)
Nuttall's Woodpecker (NUWO)
Downy Woodpecker (DOWO)
Hairy Woodpecker (HAWO)
Red-shafted Flicker (RSFL)
Black Phoebe (BLPH)
Steller's Jay (STJA)
California Scrub-Jay (CASJ)
Common Raven (CORA)
Red-breasted Nuthatch (RBNU)
Brown Creeper (BRCR)
Chestnut-backed Chickadee (CBCH)
Bushtit (BUSH)
Pacific Wren (PAWR)
Bewick's Wren (BEWR)
American Robin (AMRO)
Western Bluebird (WEBL)
Golden-crowned Kinglet (GCKI)
Wrentit (WREN)
Hermit Thrush (HETH)
European Starling (EUST)
Hutton's Vireo (HUVI)
Orange-crowned Warbler (OCWA)
Common Yellowthroat (COYE)
Nuttall's White-crowned Sparrow (NWCS)
Song Sparrow (SOSP)
Savannah Sparrow (SAVS)
Spotted Towhee (SPTO)
California Towhee (CALT)
Oregon Junco (ORJU)
Pine Siskin (PISI)
Purple Finch (PUFI)
House Finch (HOFI)
American Goldfinch (AMGO)

B. Summer Species

Allen's Hummingbird (ALHU)
Pacific-slope Flycatcher (PSFL)
Olive-sided Flycatcher (OSFL)
Warbling Vireo (WAVI)
Tree Swallow (TRES)
Violet-green Swallow (VGSW)
Barn Swallow (BARS)
Cliff Swallow (CLSW)
Swainson's Thrush (SWTH)¹
Wilson's Warbler (WIWA)²
Black-headed Grosbeak (BHGR)
Brown-headed Cowbird (BHCO)

C. Winter Species

Red-breasted Sapsucker (RBSA)
Varied Thrush (VATH)
Ruby-crowned Kinglet (RCKI)
Audubon's Warbler (AUWA)
Myrtle Warbler (MYWA)
Townsend's Warbler (TOWA)
Hermit Warbler (HEWA)
Lincoln's Sparrow (LISP)
Puget Sound White-crowned Sparrow (PSWS)
Golden-crowned Sparrow (GCSP)
Fox Sparrow (FOSP)

D. Migrant Species (mainly fall)

Rufous Hummingbird (RUHU)
Willow Flycatcher (WIFL)
Yellow Warbler (YEWA)
Black-throated Gray Warbler (BTYW)
Western Tanager (WETA)

Note: a useful online bird identification learning tool can be found at:

<http://www.natureinstruct.org/dendroica/>

You can set up your own account or use the Palomarin account:

Username: Palomarin Password: wrentit

The Palomarin Field Station's Migratory Bird Phenology

Species	January	February	March	April	May	June	July	August	September	October	November	December
Allen's Hummingbird	█	█	█	█	█	█	█	█	█	█	█	█
Rufous Hummingbird												
Tree Swallow												
Violet-green Swallow												
Barn Swallow												
Cliff Swallow												
Wilson's Warbler												
Warbling Vireo												
Pacific-slope Flycatcher												
Olive-sided Flycatcher												
Western Wood-Pewee												
Swainson's Thrush												
Brown-headed Cowbird												
Black-headed Grosbeak												
Blue-gray Gnatcatcher												
Townsend's Warbler												
Yellow Warbler												
Yellow-rumped Warbler												
Say's Phoebe												
Ruby-crowned Kinglet												
Fox Sparrow												
Golden-crowned Sparrow												
Varied Thrush												

Legend:
 █ Likely occurs
 █ Possibly occurs
 █ Unlikely to occur
 Produced by Garrett Duncan for Spring/Summer 2016 Capstone using eBird and Staff input

The Palomarin Field Station's Migratory Bird Guide

- Allen's Hummingbird – **Range:** Breeds along the California and southern Oregon coast and winters in central Mexico. **In the Field:** Difficult to differentiate from Rufous Hummingbird except adult males if displaying or seen well. **In the Hand:** Use width of R5 tail feather and R2 emargination to separate from Rufous.
- Rufous Hummingbird – **Range:** Breeds from Oregon, Idaho, and Montana to Alaska. Winters from the Gulf of Mexico to Baja California. **In the Field:** Difficult to differentiate from Allen's Hummingbird except adult males if displaying or seen well. **In the Hand:** Use width of R5 tail feather and R2 emargination to separate from Allen's.
- Tree Swallow – **Range:** Breeds across Canada and Alaska to the central United States. Winters from the Gulf of Mexico and the Caribbean islands, through central Mexico to Baja California. **In the Field:** Differentiate from Violet-green Swallow by the iridescent blue-green coloration, lack of white above the eye, and white only extending partyway up sides of rump.
- Violet-green Swallow – **Range:** Breeds in the West from Southern Mexico to Alaska and winters from Northern Mexico to south Central America. **In the Field:** Differentiate from Tree Swallow by the iridescent green and purple coloration, white above the eye, and white extending higher on rump.
- Barn Swallow – **Range:** Breeds across the Northern Hemisphere and winters in equatorial regions and the southern Hemisphere. **In the Field:** From Cliff Swallow by strongly forked tail and blue rump.
- Cliff Swallow – **Range:** Breeds across North America except in the southeastern United States and winters in South America. **In the Field:** From Barn Swallow by square tail, orange rump, and white forehead.
- Wilson's Warbler – **Range:** Breeds across Canada, the Northwest and the Pacific Coast and winters in Central America. **In the Field:** Small yellow bird with black cap.
- Warbling Vireo – **Range:** Breeds across western Canada and the United States excluding the Southeast and winters in Central America. **In the Field:** Plainly colored with a distinct pale supercilium. Philadelphia Vireo similar but yellow on throat and darker crown/lores. Song similar to Purple Finch but does not ascend throughout (goes up and down along same pitch).
- Pacific-slope Flycatcher – **Range:** Breeds along the Pacific coast from California to south Alaska. Winters in Baja California and on the Pacific coast in Mexico. **In the Field:** From other *Empidonax* flycatchers by almond shaped eye ring and by song. **In the Hand:** Bill shape, plumage (including eye ring), and a series of measurements and a formula differentiate these from other *Empidonax* flycatchers.
- Olive-sided Flycatcher – **Range:** Breeds across Canada, in the Rockies, and on the Pacific coast up to Alaska. Winters in southern Mexico and northern South America. **In the Field:** Very large flycatcher with dark gray vest and very distinct song ("Quick three beers!").
- Western Wood-Pewee – **Range:** Breeds in western North and Central America. Winters in South America. **In the Field:** Differentiate from other flycatchers by size, lack of eye ring, light gray vest and song. **In the Hand:** From *Empidonax* flycatchers by wing chord and noticeably-short tarsus; from Eastern Wood-Pewee by measurements.
- Swainson's Thrush – **Range:** Breeds across Canada, Alaska, the Northwest and the Pacific Coast and winters in Central and South America. **In the Field:** Our subspecies closely resembles Hermit Thrush. Use its larger size, 'drip' call and song. **In the Hand:** From Hermit Thrush by P6 that is not emarginated and P9>P6. Also check plumage and wing formula for other *Catharus* thrush species.
- Brown-headed Cowbird – **Range:** Breeds across North America. Winters throughout New England, the South and Mexico. **In the Field:** Large conical bill but sexually dimorphic; males have distinct plumage, black with brown heads; females and juveniles are very uniform gray-brown.
- Black-headed Grosbeak – **Range:** Breeds in the western United States and Mexico and winters in Mexico. **In the Field:** Striking plumage and large cardinal-shaped bill. Check females and hatch-years for Rose-breasted Grosbeak. Song similar to American Robin.

Blue-gray Gnatcatcher – **Range:** Breeds from New England to California excluding the Rockies and Sierras down to Southern Mexico. Winters in Northern Mexico to south Central America and the Caribbean Islands. **In the Field:** Blue-gray colored upperside, long tail with mostly-white outer rectrs, and white eye ring.

Townsend's Warbler – **Range:** Breeds in the Pacific Northwest, British Columbia, and Alaska. Winters along the US Pacific coast and Central America. **In the Field:** Most easily identified by black(ish) mask, chest yellow with black streaks on flanks. Watch for dull individuals that can be confused with Hermit Warbler. Also hybridizes with Hermit Warbler.

Yellow-rumped Warbler – **Range:** Myrtle subspecies breeds from Alaska across Canada and winters along the Pacific coast and from Mexico across the eastern United States. Audubon's subspecies breeds throughout the West and into British Columbia and winters along the US Pacific coast and throughout Mexico. **In the Field:** Distinct yellow rump, crown, and side patches. Among other characteristics, Myrtle has white throat and pale supercilium, Audubon's may have yellow. Must determine subspecies, intermediate individuals are left as unknown (UYRW).

Yellow Warbler – **Range:** Breeds across the United States and Canada excluding Texas and the Southeast. Winters in southern Central America and northern South America. **In the Field:** Distinct yellow face and yellow in the rectrices. Breast sometimes with chestnut streaking depending on sex and age.

Say's Phoebe – **Range:** Breeds from Alaska throughout the West and into Mexico. Winters along the central California coast, in the Southwest and to Southern Mexico. **In the Field:** Pale brown-gray with cinnamon belly and under tail coverts. Wagging or fanning of the tail is typical of phoebes. Call most confusable with Lesser Goldfinch.

Ruby-crowned Kinglet – **Range:** Breeds from Alaska to New England and throughout the West. Winters throughout the West and the southern United States and Mexico. **In the Field:** Very small and greenish with two strong wing bars. Resembles Hutton's Vireo but 'bounces' through the canopy, bill smaller and not blue, legs thinner with yellow soles to feet, and calls are unique.

Fox Sparrow – **Range:** Breeds from Alaska and inland western United States to eastern Canada. Winters along the Pacific coast and from the Southwest to the eastern United States. **In the Field:** A large brown sparrow, with almost no pattering to upperparts, breast with chevron streaking, and bicolored bill.

Golden-crowned Sparrow – **Range:** Breeds in Alaska and British Columbia. Winters along the Pacific coast in the United States and northern Baja California. **In the Field:** A large, long tailed sparrow resembling a White-crowned Sparrow (dull individuals can be confused for HY White-crowns). Variable amount of yellow on forehead, crown, and lores, sometimes with two bold, black crown stripes.

Varied Thrush – **Range:** Breeds throughout Alaska to Northern California. Winters from southern Alaska to southern California. **In the Field:** Distinct plumage and song.

Produced by Garrett Duncan Spring/Summer for 2016 Capstone using Birds of North America and Staff input

APPENDIX 4: Common West Marin Species Difficult to Tell Apart at First Handling.

Be aware of the differences between these species before you've caught one. There are additional species which we are less likely to capture that could also be confused (during migration, anything is possible). Never hesitate to ask another bander or a staff biologist about bird identification if you are unsure. Be sure to take appropriate measurements (see Pyle guide) and photos or do drawings of any birds that you are unsure about.

- Song Sparrow vs. Lincoln's Sparrow vs. Swamp Sparrow (less common)
- Our Song Sparrow (*gouldii*) vs. other subspecies (which don't get color banded*)
- Juvenile Song Sparrow vs. juvenile White-crowned Sparrow
- Nuttall's White-crowned Sparrow vs. Puget Sound White-crowned Sparrow vs. Gambel's WCSP vs. Mountain/Eastern WCSP
- Immature White-crowned Sparrow vs. dull Golden-crowned Sparrow
- Purple Finch vs. House Finch (vs. Cassin's Finch – vagrant)
- American Goldfinch vs. Lesser Goldfinch
- Western Wood-Pewee vs. Willow Flycatcher vs. Pacific-slope Flycatcher (vs. other empids as well)
- Ruby-crowned Kinglet vs. Hutton's Vireo vs. Pacific-Slope Flycatcher
- Swainson's Thrush vs. Hermit Thrush vs. other thrushes (vagrants)
- Yellow Warbler vs. Orange-crowned Warbler vs. female/juv. Common Yellowthroat
- Hermit Warbler vs. Townsend's Warbler (vs. Black-throated Green Warbler – vagrant)
- Allen's Hummingbird vs. Rufous Hummingbird (vs. Broad-tailed Hummingbird)
- Anna's Hummingbird vs. other non-*Selasphorus* hummingbirds (especially Black-chinned)
- Marsh Wren vs. Bewick's/House Wren
- Hairy Woodpecker vs. Downy Woodpecker vs. Nuttall's Woodpecker

APPENDIX 5: Helpful FoxPro Hints

This list of FoxPro Tips should cover everything you will normally do as an intern. You can do much more with this program - see your supervisor if you want to do something more complex, or to get access to a more comprehensive Point Blue Visual FoxPro Tip & Tricks document. Additionally, for more information on these or other FoxPro Commands, type *HELP* + the name of the command for a specific command, or select the HELP option from your upper right-hand screen for general help.

A few things to know about data:

- Data is stored with FoxPro at 4 basic levels:
 - Database:** a collection of tables (see below).
 - Table:** this is an organized collection of data, frequently referred to as a database file (dbf). For example, all banding data for the year 1996 is stored in the table *BAND1996.dbf*.
 - Record:** this is a single line or row of data. For example, all the data taken on a given bird captured on a given day is entered into a single record.
 - Field:** a record consists of one or more fields, or columns of data. For example, some banding fields are band number, species, date, age, etc
- Data is stored in different types. The main ones we use are:
 - character** – can include symbols, letters, numbers, and spaces. When using a command with these fields, you need to put the data in quotes (even if it happens to be a number).
 - numerical** – only includes numbers; a zero at the beginning will get dropped; can include decimal points, the decimal point counts as a digit (e.g., XX.XX has a width of 5 digits). For commands, the data must not be in quotes, and you can include or exclude zero at the beginning.
 - date** – this is in the format XX/XX/XXXX. For commands, use (“04/20/2000”) or CTOD(“04/20/2000”)
 - logical** (True versus False). Commands use .T. or .F. (e.g., SET FILT TO NEWCB=.T.)

A few things to keep in mind:

- You must hit ENTER or RETURN after each command to make it active.
- Commands don’t need to be in ALLCAPS, but the content of the commands must be entered exactly as it appears in the data table (eg., ‘set filt to SPEC= “WREN”’ works but ‘set filt to spec= “wren”’ will not)
- Be sure to NOT combine filters (SET FILT TO) and unique (SET UNIQ ON) commands.
- Be sure to SET UNIQUE OFF in your table if you have at any point SET UNIQUE ON, even if you are closing the table (see below for more on these commands).
- FoxPro commands can either be written in full, or reduced to the first 4 letters of each word of the command (e.g., set filter to *or* set filt to).
- Be sure to enter 999 in fields where no data were taken, especially in fields where a correct value may be 0. (e.g., OCWA crown, tree cover)

A few common error messages and what they mean:

- **Operator/Operand Mismatch:** This means you’ve entered the type of data incorrectly, e.g., not including or including quotes where appropriate (LOCATE FOR COLORS = RK/WS instead of LOCATE FOR COLORS = “RK/WS”; LOCATE FOR DATE = 01/01/1998 instead of LOCATE FOR DATE =CTOD(“01/01/1998”)
- **Invalid function argument value, data type or count:** This could mean you have incorrectly entered data in the command window, or that you again incorrectly accounted for the data type
- **Command contains unrecognized phrase/keyword:** This means you have incorrectly written a command, either using the wrong language or the wrong syntax.
- **File Access Denied:** Someone else is using the FoxPro file you’re trying to modify. Usually a gridder is entering data through ArcView when a bander tries to back up data in BAND.
- **Task Pane Window (feels like an error message).** Want to get rid of that pesky TASK PANE every time you open up Visual FoxPro? Step one: choose OPTIONS in upper right of Task Pane Manager, when it starts upon VFP starting. Step 2 and 3: Click the folder icon on left side of the Task Pane Options window for Task Pane Manager; and then unclick lower right (Open Task Pane Manager every time you open Visual Foxpro).

Basic How To's:

• **OPENING YOUR TABLE**

You have two choices for performing this task:

- Type USE [filename] in your Visual FoxPro command window (being sure to type in the entire path).
- Browse through the database (either go to File > Open, or click the folder icon on the upper left of your screen). For these options, you must change the List of File Types on the bottom of the screen to Table. Note that opening a table opens it to be given a variety of commands, but does not open it for viewing (see Browse, below).

• **BROWSE COMMAND**

To simply look at your entire table, open it then type BROWSE or BROW, then hit ENTER.

• **CLOSING YOUR FILE**

Three choices to close the file that you are currently *viewing* (the table is visible on the screen)

- Hit escape (ESC button).
- Click the X at the top right of the file.
- If you were modifying the table, to save your changes you must either:
 - a) be in (have selected) a field of a record in which you made no changes, or
 - b) do CTRL+ END (hit CTRL first and then END while still pressing down CTRL).

Two choices to close a file you have *open* (ready for commands but not visible on the screen)

- Type CLOSE ALL in the command window.
- Open another file or exit the FoxPro program entirely.

• **EXITING FOXPRO**

Type QUIT in the command window or select the X in the upper right hand corner.

Specific programs (point count, band, etc.) must be closed by selecting File>Quit.

• **LOSING YOUR COMMAND WINDOW**

If you intentionally or accidentally lose your command window (the window within Visual FoxPro that you type all your commands into), simply go to Window> Command Window; or hit CTRL and F2.

• **ENTERING DATA WITHOUT A SPECIFIC PROGRAM (without band.exe, etc.)**

Appending data to a table:

Open a table and type APPEND or APPE, to get a blank copy of a record to enter data in.

Appending with the "set carry on" feature:

Useful if data in any fields will be the same between multiple records (e.g., date or location). Be sure that the current screen is a copy of the record above, then simply TAB through data that is the same or type over any that is different.

1. Type SET CARRY ON
2. Type APPEND.

• **SETTING FILTERS**

The following symbols can be used when filtering or viewing data: = (equal to); > (greater than); < (less than); <= (less than or equal to); >= (greater than or equal to); and <> (not equal to).

To view all records fitting a certain criteria you want (e.g., to view all American Robin records).

1. SET FILT TO SPEC="AMRO"
2. BROW (to view all records under this filter)

Removing/resetting your filter

Several options:

- To undo a filter type: SET FILT TO
- In the command window click on the open command for the table you want.
- If you want to set another filter you can just type it in and the previous one will be undone.
- Closing your table (if you are done with it) will also unset any filters.

Creating a separate table with just your filtered records:

*Note, COPY TO will overwrite any file already existing with the same name. To add data to an existing file, see the APPEND instructions below.

E.g., let's say you want a table just of all AMRO records. 2 options:

1. SET FILT TO SPEC="AMRO"
2. COPY TO C:\AMRO.DBF

Or, in just one step, without having to use the SET FILT TO language, simply:

```
COPY TO C:\AMRO.DBF FOR SPEC="AMRO"
```

Using multiple criteria when you set your filters: the .and./or. functions:

- .AND. filters for records meeting multiple criteria *simultaneously* in different fields, while .OR. will *combine* records meeting multiple criteria within a Field.
To filter for Hatching year Wilson's Warblers (WIWA and HY, different Fields): SET FILT TO SPEC="WIWA" .AND. AGE="2" [Yes, the periods are necessary!]
To filter for banding record from Palo and Uppers (same Field, LOC): SET FILT TO LOC="PALO" .OR. LOC="PGUP".
- Use care if combining .AND. and .OR.
E.g. if you did: SET FILT TO SPEC="WREN .AND. LOC="PALO" .OR. LOC="PGUP",
You would get all WRENs from PALO and *all banding records* from PGUP (the .or. serves to separate the statement).
You could get around this by doing: SET FILT TO SPEC="WREN" .AND. (LOC="PALO" .OR. LOC="PGUP")

Filtering for only a portion of a data string:

If you want to look at all SPTO nests, and have a nestid field (SPTOG203b, 9 characters) but no species field in your nest table, you can filter a substring of your entire data string:

- SET FILT TO SUBS(NESTID,1,4)="SPTO" – this brings up records with the first 4 characters matching SPTO. SUBS is the substring command, NESTID is the Field name, 1 instructs to begin at the first character, 4 instructs to continue for 4 characters, SPTO instructs what to match the first 4 characters to in the selected field.

A couple more examples:

- let's say you want to look up all nests from Grid 2: SET FILT TO SUBS(NESTID,5,2)="G2". (starting at the 5th character and continuing for 2)
 - To look up all first attempts: SET FILT TO SUBS(NESTID,9,1)="A"
- SUBSTR is handy when you see partial color combos in the field.
- If you saw WS/K on a Song Sparrow there are two possible combos: WS/K? and WS/?K.

Type in:

```
SET FILT TO (SPEC="SOSP" .AND. SUBSTR(COLORS,1,3)="WS/" .AND.  
SUBSTR(COLORS,4,1)="K") .OR. (SPEC="SOSP" .AND. SUBSTR(COLORS,1,3)="WS/"  
.AND. SUBSTR(COLORS,5,1)="K")
```

*See the SELECT command below for an even easier method of doing this.

Setting filters to specific dates/years/months/days, etc:

For an exact date

- SET FILT TO DATE=CTOD("05/01/2005")

For calling up a given month/day/year, use the following language:

```
SET FILT TO YEAR(DATE)=2005; SET FILT TO MONTH(DATE)=10; SET FILT TO  
DAY(DATE)=20.
```

Also, you may be interested in looking, for instance, at all records during the first two weeks of August, for all years combined. To do this, you could do the following:

```
SET FILT TO MONTH(DATE)=8 .AND. DAY(DATE)<16
```

(Once you've pulled out the month, day or year from your date field by using the above format, you can treat that part of the field as you would a numeric field, i.e. not using quotes, and using <, >, =).

- **BROWSING OR COPYING A REDUCED LIST OF FIELDS (NOT ENTIRE TABLE STRUCTURE)**

You may just be interested in looking at just a few of your fields, but when you just type BROW the entire set of fields is displayed. You can choose to view select fields without altering the table in any way.

E.g., if you are interested in just one field:

```
BROW FIELD NOTES
```

Or, for multiple fields:

```
BROW FIELDS CODE, BANDNUMB, SPEC, LOC, SITE, DATE
```

To create a new table that only has some of the fields of your original table:

```
COPY FIELDS CODE, BANDNUMB, SPEC, AGE, SEX, LOC, DATE TO [newfilename]
```

- **SELECT – SQL COMMAND: A DIFFERENT WAY OF MANIPULATING DATA**

Visual FoxPro recognizes a version of Structured Query Language (SQL), so if you already know SQL, you can use it in FoxPro. Here we'll focus on the SELECT command, which is the most basic and useful (but also see help on INSERT, UPATE, ALTER TABLE).

Using SELECT instead of setting a filter

For instance, instead of setting a filter for all Song Sparrow banding data at your site and then copying that filter to another file, you can do it with the SELECT command. (a query window pops up with your summary)

```
SELECT * FROM filename.DBF WHERE SPEC="SOSP"
```

Or to create a table with the output you asked for:

```
SELECT * FROM filename.DBF WHERE SPEC="SOSP" INTO TABLE newfilename.DBF
```

Using SELECT to produce a table of reduced fields and data

In the above example, the asterisk* denotes "all fields" and it will produce a table that includes all fields.

To make a separate table or to view a temporary table with only select fields (eg., CODE, BANDNUMB, SPEC, LOC, DATE)):

```
SELECT CODE, BANDNUMB, SPEC, LOC, DATE FROM C:\BAND.DBF.DBF WHERE SPEC="SOSP"
```

And, if you wish to make a separate table from this:

1. SELECT CODE, BANDNUMB, SPEC, LOC, DATE FROM C:\BAND.DBF.DBF WHERE SPEC="SOSP"
2. INTO TABLE C:\BAND.DBF\SOSPBAND05.DBF

Creating a distinct list (an alternative to SET UNIQU ON, below)

To make a unique list of the species captured at a site (PGUP), with no other fields included. Can be copied to a table if you wish to save it.

```
SELECT DISTINCT SPEC FROM bandfilename.DBF WHERE LOC="PGUP"
```

Creating a distinct list with quantities of each included (there is no alternative)

Say you also want number of captures for each species in the list above:

```
SELECT SPEC, COUNT (DISTINCT BANDNUMB) FROM C:\BAND.DBF WHERE LOC="PGUP" GROUP BY SPEC
```

Looking up partial color band combo possibilities with SQL/SELECT:

Easier than the SET FILTER command, above. Say, for example, you saw WS/K on a Song Sparrow in the field. You want to look up the two possible combos WS/K? and WS/?K. Type in:

```
SELECT * FROM C:\ALLNUMB WHERE SPEC="SOSP" .AND. (COLORS LIKE("WS/%K")  
.OR. COLORS LIKE ("WS/K%"))
```

- **COUNTING DATA (COUN)**

This counts the number of records in a given file or filter. Number of records appears briefly near bottom of screen. If they do not, you need to type SET TALK ON afterwards.

```
COUN FOR SPEC="AMRO"
```

*Note: The syntax is identical to those listed above in the SET FILTER commands for looking at various types of data.

- **DELETING RECORDS**

There are many options here. With all but the ZAP option, the records are not permanently deleted until you later use the PACK command. If you have marked records for deletion but not yet PACKED your file, any commands or analyses will include the marked records! So be careful of this feature.

- **To mark an individual record for deletion that you are looking at with the BROWSE function:** Click the small white cell to the left of the record. The cell will then turn black indicating the record is to be deleted.
- **To mark records that share specific data for deletion:**

- DELE FOR SPEC="XXHU" (this marks all unknown hummingbirds for deletion)
- PACK (to permanently delete) (this cannot be done when you are in "shared" format- replace the word "shared" from the end of the command in which you say "use filename.dbf" with the word "exclusive")
- **To delete all records from a given file:**
 1. USE [filename]
 2. ZAP

(thankfully, it will prompt you to see if you are sure you really want to do this, as once you do so it is *permanent*).
- **Deleting records by record number or location in table:**

You can also delete individual records, or adjacent records, by deleting by record number or by next:

 - DELE RECORD 128 (marks record number 128 for deletion)
 - DELE NEXT 10 (marks the current – wherever cursor was when you last browsed the table – and the next 9 records for deletion)
 - PACK
- **Recalling deleted records (only for use if you haven't packed yet)**

Typing RECALL ALL recalls *all* records that have been deleted since the file was last packed. You can also recall a subset of what you deleted. For example, if you deleted all warblers from your table then decided that you should have kept WIWAs, first you get scared that you may have packed your table, then once you realize you haven't yet, you can type RECALL FOR SPEC="WIWA".

APPENDIX 6: GIS Instructions and Resources

A Geographic Information System (GIS) is a computer-based tool that enables geographic data and spatial relationships to be mapped and analyzed. GIS has become a key part of avian monitoring and conservation practices, helping biologists to analyze data at many spatial scales.

We will be using GPS units to mark the location of nests and in some cases birds, and the GIS program ArcView to map these locations and to map territories on your grid.

This appendix provides a basic introduction to mapping terms and definitions, and detailed instructions for tasks you will be performing. Throughout this appendix you will find web links that contain more detailed information regarding the GIS programs you will be using. Appendix 3: Gridder and Bander Intern Responsibilities, contains an overview of GIS related tasks.

Part 1: Basic GIS terms and definitions

Map terms and definitions

A. Coordinate Systems, Map Projections, and Datums

Latitude and longitude coordinates (degrees-minutes-seconds or decimal degrees) are **geographic** coordinates, meaning that they refer to an exact location on the earth's three-dimensional surface. When displayed on a two dimensional surface, geographic coordinates look most accurate around the equator but become increasingly distorted towards the poles. For this reason they are rarely used for mapping and displaying spatial data.

UTM coordinates are projected, or referenced to a map projection (e.g., Universal Transverse Mercator). A **map projection** is a method for **converting and displaying the earth's three-dimensional round surface, which is referenced by geographic coordinates, to the two-dimensional planar surface** of a map. In the UTM coordinate system, your **zone** depends on where you are. At Palo we are in zone 10.

At Palomarin we will mainly be using UTM coordinates except for recording nest location data, which is done in geographic coordinates. For more information on map projections see this USGS webpage: <http://egsc.usgs.gov/isb/pubs/MapProjections/projections.html>

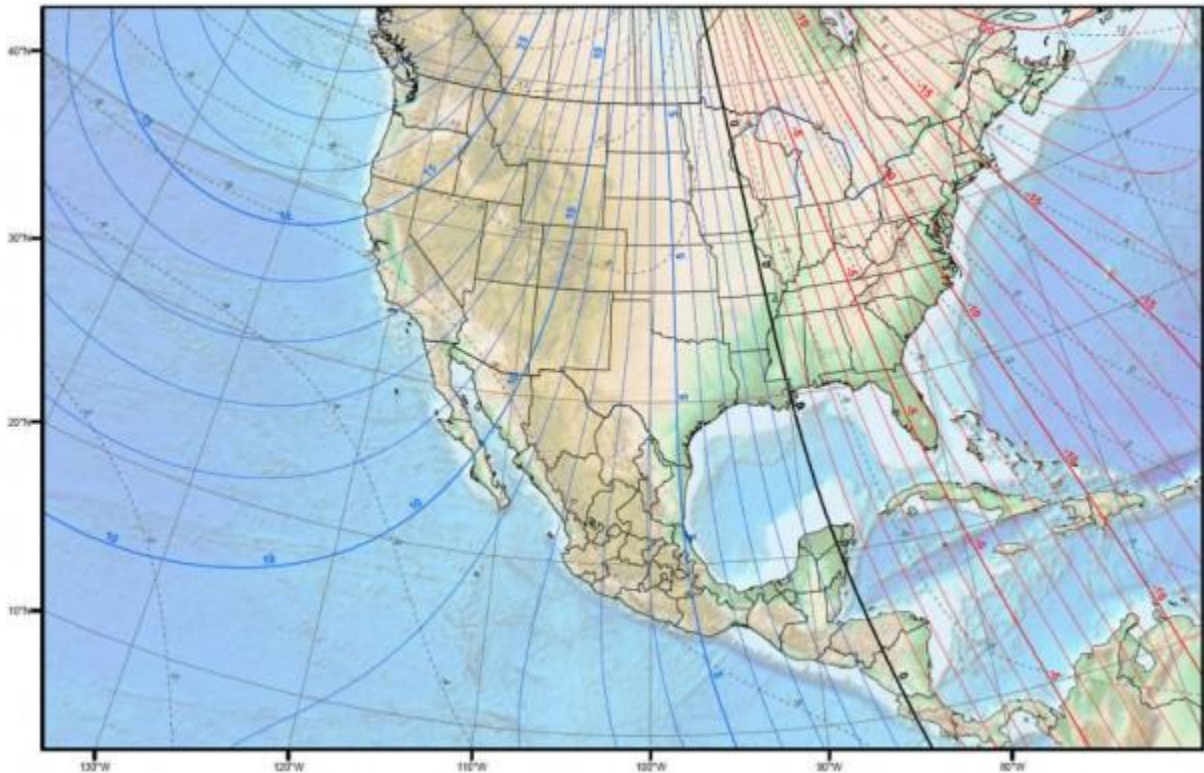
Both projected (e.g., UTM) and geographic (e.g., lat/long) coordinates, must be referenced to a horizontal **datum** (a **base reference** for the coordinate system). A datum is an equation that describes the exact shape of the earth (slightly irregular ellipsoid rather than sphere) and all spatial data need to reference a datum in order to be properly displayed on a map. At Palomarin we use the North American Datum of 1983 (NAD 83). The Point Blue default projection and datum is **UTM NAD83**. For more information on horizontal datums, see this ESRI website: <http://www.esri.com/news/arcuser/0401/datum.html>.

B. True vs. Magnetic North

True north is the axial pole centered at the top of the planet where the meridians of longitude converge. But the magnet in a compass aligns itself with the magnetic field of the planet, which flows between the earth's two magnetic poles and changes from year to year. **Magnetic declination**, is the amount and direction of difference between true and magnetic north, changes with location (fig 2). For declination calculations at a specific site: <http://www.ngdc.noaa.gov/geomag-web/#declination>.

Figure 2. Map of 2010 magnetic declination contours for the continental U.S.

Magnetic Declination Map of North America for the year 2010



Part 2: Using the GPS unit

You will be using the GPS unit to mark nest locations and navigate to different grid stakes. On Grid 5 the GPS unit will also be used to map the location and movement of birds. Carry extra batteries while in the field and turn off the unit when not in use. Occasionally when they die or run out of batteries GPS units may undergo data loss. It's therefore crucial that you download your GPS unit every day.

GPS in the field

Before taking waypoints in the field, the **GPS navigation display** should be set up to match the **coordinate system, horizontal datum, and units** used at Palomarin (setup process reviewed below). Your GPS navigation display **only** controls what you see in the field. When you download coordinates, it is not your GPS unit settings that determine which coordinates you save, but the settings on your download program (see Part 2A this chapter).

A. How to set up your Garmin GPS unit's navigation display

1. Navigate to the **MAIN** menu using either the **PAGE** or **QUIT** buttons.
2. Scroll down to the **SETUP** menu using the multi-directional pad and press **ENTER**.
3. From the **SETUP** menu, go to the **NAVIGATION** or **LOCATION** menu.
4. The **POSITION FORMAT** or **LOCATION FORMAT** menu item is where you will choose the type of coordinates your GPS will display and record. Cursor down, highlight the currently selected value and press **ENTER** to scroll through the list of formats and highlight the appropriate system. For UTM, select **UTM/UPS**; for decimal degrees, select **hddd.ddddd**. The UTM coordinate system will be used to navigate in the field and as the system interface for ArcView. The Decimal Degrees system will be used to record nest locations on the veggie sheets and in the FoxPro database (see Part 2 this chapter).

5. Under the **MAP DATUM** or **DATUM** menu item, highlight NAD83 and press **ENTER**.
6. **CDI Scale settings:** The course deviation indicator (CDI) lets you select the +/- range (sensitivity) of the CDI bar scale, letting you know how much your current course is deviating from your destination waypoint. Keep this at its lowest setting (+/-0.25).
7. Under the **UNITS** menu, select **METRIC**.
8. The **HEADING** or **NORTH REFERENCE** refers to navigating with true or magnetic north (automatic or user-defined). All GPS units on a project should maintain the same settings, especially if you are using your GPS unit to record compass bearings in your directions for the next person who needs to find the points! Record on your directions whether your bearings are true north, magnetic north, and/or what user-deviation (declination) was set when recorded.

B. How to navigate to a waypoint

GPS units differ in their navigation functions, but in general, look for the **NAV** or **GOTO** button. Select the waypoint of interest and choose which window you want to use (compass needle or map) using the **PAGE** button. Grid stakes can be uploaded using the Waypoint+ program as described in Part 2 of this chapter.

C. How to mark nest locations

Nest locations should be marked at the end of the season. On grid 5 nest locations should be marked upon finding so that you can navigate back to the nest for checks. After the nest is marked, the ID code should be entered away from the nest to minimize disturbance.

Navigate to the satellite reception display (bar graph) using either the **PAGE** or **QUIT** buttons and wait until a **3D GPS location** is reported (2D means your accuracy will be low).

1. Hit the **MARK** button to record your position. Use the multi-direction pad to enter the nest ID code. If your unit has an **AVERAGE** function, make sure to select this option and wait a minute or so before selecting **SAVE**.
2. Waypoints can be deleted or edited using the **WAYPOINT LIST** or **POINTS** menu.

GPS in the office

A: Downloading nest locations from your GPS unit:

The following is one process for bulk uploading nest gps coords into nestdat from text file (there may be a better way to do this, but this is how I did it in 2011):

1. First get nest coordinates file ready:
 - Use a micro USB cable to connect the GPS unit to the computer. The computer will read the unit as a storage device, open, copy waypoints to your grids nest folder.
 - Open with GPSU (GPS Utility) and convert to lat/lon (also make sure is NAD83).
 - Select save file as DBF waypoint fileset to produce a dbf file version of the coordinates and name it nestlocs.
2. Open the resulting dbf and use modi stru to (only supervisor can modify structure)
 - 1) rename lat and lon something like latorig and lonorig (be sure these are character), rename name to nestid.
 - 2) make new lat and lon fields but keep them as character.
 - close modi stru and save

3. Copy the data in latorig into lat, and lonorig into lon
(code= REPLACE ALL LAT WITH LATORIG
REPLACE ALL LON WITH LONORIG)
4. take "+" sign off of lat with code= REPLACE ALL LAT WITH SUBSTR(LAT,2,11)
5. do modi stru again and change lat and lon to number with length=20 and decimal=10
 - close modi stru and save
6. Prepare getnestlocs program:
7. rightclick getnestlocs and click run, then click open. you should have a foxpro window come up with the getnestlocs code, and not get any errors. double check nestdat file to make sure it worked.

B. Uploading coordinates to Garmin GPS units

Each ArcView project has a grid point shapefile (gridstakes_adjusted) containing the coordinates of each grid stake on G1-4. To upload these points onto your GPS unit, export the entire file to Waypoint Plus using the Waypoint Express extension and then upload them to your Garmin unit through Waypoint Plus. This will be useful for navigating to any grid stake you cannot find by sight. On Grid 5, this would be useful for uploading and navigating to nest locations.

Convert shapefile to a Waypoint text file

1. Determine the UTM zone and datum for your coordinates (e.g., Zone 10, NAD83) and make sure you have waypoint_express.avx in your esri\avgis_30\arcview\ext32 directory (download from <http://www.prbo.org/tools/gps/gps.htm>). If you are working with a datum other than NAD27, NAD83, or WGS84 contact [a GIS staff person](#) before you continue.
2. Launch ArcView and load the **Waypoint Express** extension from the *File – Extensions* dialog.
3. Select the Gridstakes_adjusted theme from your theme menu and select the points that you want to upload to Garmin using the select tool (no more than 500 total).
4. Make sure that your attribute table contains a unique ID (up to six characters long) by which you can recognize each point (e.g., PALO01). This is called “stakeid” in the Palo projects.
5. Go to the *Waypoint Express – Shapefile → Waypoint* and follow the prompts.
 - Select the **theme** that contains the points you want to upload.
 - Select the field that contains the unique **ID** (stakeid).
 - Input the **coordinate system UTM, zone 10, and datum NAD83**.
 - Name your **Waypoint text file** (comma-delimited text) and pathname when prompted.

Upload Waypoint text file to your GPS unit

1. Turn on your Garmin GPS unit and connect it to your computer’s serial port. Go to *GPS – Port* and make sure the port is set to **COM1** (or whichever port you are using).
2. Launch Waypoint Plus and go to the *File – Configuration – Modes* menu. Set the **coordinate system** of the file you just made to **XXX** and units to **meters**. Then go to the *File – Datum* menu and select the datum that corresponds with your data points (**North America 1983**). It is important that you do this *before* the next step to ensure that it maintains the correct coordinates.
3. Go to *File – Open* and open your Waypoint Plus text file (grid stakes or nest locations). To view and check your waypoint file, go to *Waypoints – List Waypoints*. Make sure that the coordinate system, UTM zone (if the coordinate system is in UTMs you should see a letter appended to the zone number),

easting/northing coordinates, and Waypoint IDs look correct. (If necessary, clear out old waypoint files using *File – Clear – Waypoints* before opening a new file).

4. Select *Waypoints – Upload* and watch your points being uploaded to the GPS unit. If you see them on your GPS unit, you're done!

Troubleshooting

If some or all of your GPS points don't upload, try checking the following:

1. Is your GPS unit turned on and set to the Garmin receiver mode? (As opposed to real-time differential correction mode). If not, you may need to exit Waypoint Plus and restart after turning on your GPS unit.
2. Are your site codes (IDs) unique in their first 6 characters? Waypoint Plus will only read in the first six characters, so if you have multiple points with the same first six characters, only one will be uploaded.
3. Does your Waypoint Plus text file have the proper header? Check the parameters below.

Waypoint Plus files

If you are unsuccessful at converting your shapefile or dbf to a Waypoint Plus text file using the ArcView extension, you may do it manually in a text editor like WordPad. Or you may edit it after exporting from ArcView. Here's what it should look like:

First Line / Header (Datum Parameters)

NAD83: Datum,North America 1983,GRS 80,0,-1.6E-7,0,0,0

NAD27: Datum,North America 1927 mean,Clarke 1866,69.4,-0.37264639,-8,160,176

WGS84: Datum,WGS84,WGS84,0,0,0,0,0

Remaining Lines

1. If your coordinate system is UTM:

WP,UTM,<ID>,<Zone>,<Easting(X)>,<Northing(Y)>,<MM/DD/YYYY>,<HH:MM:SS>,<MM/DD/YYY
Y> <HH:MM:SS>

2. If your coordinate system is Decimal Degrees:

WP,D,<ID>,<X-coord>,<Y-coord>,<MM/DD/YYYY>,<HH:MM:SS>,<MM/DD/YYYY> <HH:MM:SS>

For example, a UTM Zone 10 NAD83 file might look like this:

Datum,North America 1983,GRS 80 ,0,-1.6E-7,0,0,0

WP,UTM,SOSPG401B, 10S ,522698.4461,4198540.266,12/31/1989,00:00:00,05-JUL-05 15:13

WP,UTM,SPTOG401A, 10S ,522876.9083,4198274.711,12/31/1989,00:00:00,04-JUL-05 21:47

WP,UTM,SPTOG402A, 10S ,522876.2141,4198354.465,12/31/1989,00:00:00,04-JUL-05 22:08

WP,UTM,SPTOG402B, 10S ,522870.1313,4198340.758,12/31/1989,00:00:00,04-JUL-05 22:11

Part 3: Using ArcView

ArcView (AV) is a program that allows you to project data onto maps, query and analyze this data, and create high quality maps and data displays. An AV map generally consists of one or more layers, each representing a different **theme**, or collection of data. Each grid has its own project (map) and files for each year, located in V:\gis_projects\Palomarin\spotmap\<year>\Grid<X>.

Our primary uses for ArcView will be to map the locations of territories and nests on the grids.

ArcView Project terms

Projects- Before the start of the season, your supervisor will create a project for each grid, containing themes for the grid boundaries, field station buildings, grid stakes, coast line, and other useful features. When you open ArcView, you will navigate on the server to open the appropriate project window. This window includes several icons marked **Views, Tables, Charts, Layouts** and **Scripts**.

Views-A view is a collection of themes and associated tables that can be projected onto a map and queried.

Tables-To access and edit the data *associated* with your themes, you need to work with **attribute tables**. You will be editing the data in the tables (called attributes) primarily through ArcView.

Layout-A **layout** is a map presentation of your view, often including title, legend, scale bar, and compass arrow. It can also be dynamic, meaning that changes in your data or views will be reflected in the layout map. The same data can be displayed on several different layouts.

Digitizing Your Territories with ArcView

Using ArcView, you can create territory boundaries in a digital format. This digital representation reflects the territories' true geographic coordinates, and it makes spatial analyses (on both site and landscape scales) quite easy. The effects of different spatial features can be related to territory size, nest success, density etc. You will create digital copies of the first and second brood territory maps for the 4 Priority 1 study species..

A. Creating territory polygons

Create themes

1. Open your project by starting ArcView and clicking open. Navigate to V:\Project\Terrestrial\palomarin\spotmap\<year>\Grid<X>\Grid<X>.apr.
2. You will create a new theme for each map; thus there will be two themes for Wrentits, one for the first brood map and one for the second. Click **View**, and then click **New Theme**. Set the theme's Feature Type to Polygon, and then navigate to your project's directory when ArcView prompts you for the new theme's path. Name the theme only after you have opened the last folder in the theme's path, otherwise, the name will revert to "Theme1". The theme name should include: Grid#/Species/brood; e.g. G2_SOSP_1stbrood). Be sure to use underscores instead of spaces. The theme will now show up in the Legend, on the left side of your screen.
3. Look at the legend, and you will notice a dashed box surrounding the checkmark, indicating the theme is in **Edit mode** (the check signifies the theme is turned on/visible). You can only add new territories (or delete old ones) if the theme is in edit mode. New themes are automatically started in Edit mode, but later you can do this manually: activate the appropriate theme, click **Theme** on the top line, then click **Start Editing**.

****Crucial:** Do NOT edit the old themes used to build your spot maps without the help of your supervisor, or a GIS staff person. Once altered in one project, they will be altered in ALL of the projects, and all of the Views that utilize that theme. Hopefully, your territory themes should be the only themes needing edits.

Create and edit territories

1. Now the appropriate theme is activated, and its checkmark is surrounded by a dashed line. Edit away. In the middle of the bottom toolbar is a button with either a or a white . Pull down this toolbar, and select the polygon (the sixth button down), or the ninth and last button (if you wish to butt two territories against each other, without overlapping them).
2. Move the cursor to the appropriate spot on the screen, and begin drawing the first territory by left-clicking once. Each single left-click drops a vertex. The more often you click, the smoother your

curves. Double-clicking at any moment will end the polygon's sketch. Make your digital territories match those on your paper brood maps.

- Once you double-click, the polygon will be surrounded by 8 black boxes. This means that this particular polygon is **Selected**. If it is selected, you can Delete it (by simply pressing the Delete key), or you can select the Pointer tool (black arrow) and drag the entire polygon.
- To edit your polygon use the **Vertex Edit Tool**, the clear arrowhead on the bottom toolbar, just right of the Pointer tool's button. When you select a polygon and click this tool, ArcView will display each of the selected polygon's vertices with clear boxes. To move a vertex, align the cursor over the vertex, hold down the left-click button on the mouse, and drag the vertex to where you want it. To delete a vertex, align the cursor over the vertex and press delete. Also, you can plant the cursor over the polygon's edge, and with a single left click, add a new vertex.

B. Editing territory attributes

For each territory (polygon) you draw, you will give it **attributes**. Attributes are data associated with an ArcView theme, represented by columns in the theme's associated **table** (remember that each row represents an individual feature – point, line or polygon – in the shapefile).

- Once the polygon is drawn, click the **Open Theme Table** button on the top toolbar, towards the left side. The button has a table for its icon. This theme table has horizontal rows called **Records**, and vertical columns called **Fields**. Each polygon you draw will be represented by a record, and each field denotes one of that polygon's attributes. ArcView automatically creates two fields for you: Shape and ID. After you draw your first polygon, open the Theme Table. You will see one record. Its shape is "Polygon" (they will all be "Polygon"), and its ID is 0.
- You will need to add the following fields to each territory map's attribute table:

<u>Theme</u>	<u>Type</u>	<u>Width</u>	<u>Example</u>
Species	(string)	4	SOSP
TerrID	(string)	4	G201
Year	(string)	4	2005
MaleID	(string)	7	WS/KY
MaleCo	(string)	6	1990L
FemaleID	(string)	7	OS/KO
FemaleCo	(string)	6	(2001)

With the attribute table open, choose Start Editing from Table, then Add Field from Edit. In the box that appears, name the new field (e.g. Species), change Type to String, and choose the smallest width that will show all the digits in the new field (4 for Species). Decimal Places can be left at 0.

- Click OK, and a new field (column) called "Species" appears, with a blank cell for the first record, the first polygon you drew. Notice that the first record is yellow indicating that record is selected, and the corresponding territory is selected in the View (map). Pay attention to this highlighting to ensure that you are giving the right polygon the right attributes.
- On the second toolbar are three buttons. The middle button is an I with a pointer, this is the **Edit tool**. Click this, and you will see a hand pointing its index finger in an authoritative way. This allows you to select individual cells on the table. Click on the open cell under "Species", in that first record, and type "SOSP", or whatever species you are drawing territory maps for. Then press Enter. It is important to hit Enter or Tab after every attribute you edit onto the table; otherwise it will not get saved to the table.
- Once added, enter each attribute for the first territory, pressing Enter or Tab after each attribute is typed. Once the record is complete, click the **Select None** tool (the blank piece of paper button) on the top toolbar. This clears all selections, and it is a good habit to always unselect any selections once you are through working on them.
- Close the attribute table, moving back to the view. Draw the next territory (the Draw Polygon tool should still be activated, if not, click it again), open the theme/attribute table, and fill out the next territory's attributes. If desired, you can draw all territories for a given map, then fill in the attribute table.
- Once you have finished drawing your territories for that species, click on **Theme** and **Stop Editing**. ArcView will ask you to save your edits, click Yes.. If you wish to save your Edits without leaving Edit Mode, click **Theme** and **Save Edits**. Finally, any time you **Save Project**, either from the File

Menu or by clicking the Diskette button in the left corner, ArcView will automatically Save Edits and take you out of Edit Mode. Once you Stop Editing, Save the project at any rate, then re-open the theme's table, to ensure that all of your data entries have stuck.

9. Part 4. Basic ArcView Features and Commands

On-line resources available for ArcView:

<http://www.geog.umd.edu/homepage/courses/materials/arcview/avhowto.html>

http://www.cgrer.uiowa.edu/cgrer_lab/gps/gpsdefs.html (glossary)

<http://www.prbo.org/tools/index.html>

Modifying Theme Displays (Legends)

After a theme is activated, you will generally want to change the display so that the map is colored in a way that represents the data of interest. This is done by editing the map's **legend**.

1. From an open view window, double-click on the theme of interest. A dialogue box entitled **Legend Editor** should appear.
2. To manually edit a symbol (e.g. change the color and thickness of territory boundaries), double click on the colored box, and a set of palettes will appear on the screen. Use the buttons on the top of the palette window to switch between palettes. Close the palette window by clicking in the upper left hand corner and selecting **C**lose.
 - The **Fill Palette** allows you to choose a **pattern** for polygon shading. Choose solid black if you want a solid color fill; choose white for a transparent fill. Patterns are useful when overlaying two or more themes. In general we want transparent fill for territories.
 - The **Pen Palette** is used for changing line styles and thicknesses in line coverages.
 - The **Marker Palette** allows you to change symbols used in point coverages.
 - The **Font Palette** lets you choose the font with which you can display text and labels.
 - The **Color Palette** is where you assign colors to your legend symbols. For solids, just designate a foreground color. For patterns, you need to choose both a foreground and background color. *Note: The first box in the color palette is transparent (no color); the second is white.*
3. After you have created a legend, click on the **A**pply button to activate it. If you want to save the legend (often a good idea if you made a lot of manual changes and plan to use it again), click on the **S**ave button.
4. Close the legend window by clicking in the upper left hand corner and selecting **C**lose.

There are several buttons on the ArcView toolbars which can be helpful and time-saving:



The **identify** tool is used to display the attribute values of a feature shown in a view, table or chart. With the WRI maps, you can use it to click on a country and find out its name and associated data.



The **pointer** tool is used to select, move and resize graphics. It is the default tool option, but you will use it most for editing layouts.



The **zoom in** tool is used to zoom in on an area of a view or layout that you define by clicking on a point, or dragging a box with the mouse.



The **zoom out** tool is used to zoom out on a view or layout, centered on a position you choose by clicking on a point.



The **pan** tool lets you pan a view or layout by dragging the display in any direction with the mouse.



The **measure** tool measures distance on a view. After clicking on the tool button, click on a point, drag the mouse, and release on the second point. The distance is indicated on the bottom of the screen, in the distance units you set in the view properties dialogue box.



The **label** tool is used to label a feature in the active theme. After clicking on the tool button, click on the position to label the map with the label field specified in the theme properties dialogue box.



The **text** tool is used to insert or edit text on a view or layout, and is used like the label tool.



The point tool is one of the **drawing and editing** tools available. By clicking and holding on this button, you can drag the mouse to the tool of your choice (point, line, rectangle, etc.).




- Zoom to Full Extent:** Zooms to the full extent (size) of all themes in a view.
- Zoom to Active Theme(s):** Zooms to the extent of the active theme.
- Zoom to Selected:** Zooms to the extent of selected features.
- Zoom In:** Zooms in on the center of a view or layout by a factor of two.
- Zoom Out:** Zooms out from the center of a view or layout by a factor of two.
- Zoom to Previous Extent:** Goes back to the previous extent you were viewing.

Tables

To access and edit the data (also known as attributes) associated with your themes, you need to work with **tables**. Tables are .dbf files that can also be opened and viewed in a spreadsheet program such as Excel or a database program such as FoxPro.

Opening a Table

Through View:

1. Click on the theme of interest in the view window.
2. Select **Theme** and then **Table** from the menu, or click on the  button. A table window and a new menu should appear.

Through Tables:

From the project window, select **Tables**. Then highlight the table of interest and click on the **Open** button. (The .dbf associated with a shapefile will not appear in the tables window until it has been opened from the view window.)

Importing a Table

You may want to create maps of your data by importing database tables (e.g., nest and point count data) into ArcView and associate them with shapefiles.

1. Go to the project window and select **Tables**.
2. Click on the **Add** button. A table window will open, and the file will be added to the list of tables contained in the project.

Sorting a Table

1. Highlight the name of the field by which you wish to sort.
2. In the table menu, select **Field** and then **Sort Ascending** (smallest on top) or **Sort Descending** (smallest on bottom), depending on your preference.
3. The table should now be sorted, and remain sorted within that particular project.

Obtaining Statistics for a Table

For any field in a table, you can obtain the following statistics: sum, count, mean, maximum, minimum, range, variance and standard deviation. These statistics can be helpful in determining what type of classification to use in a legend.

1. Highlight the name of the field for which you want to obtain descriptive statistics.
2. In the table menu, select **Field** and then **Statistics**. A dialogue box with statistics should pop up.

Layouts

For presentation purposes, you may want to create a map **layout**, which is used to prepare views, charts, tables, and other graphics for output from ArcView. A layout typically includes a title, legend, scale bar, and compass arrow. It can also be dynamic, meaning that changes in your data or views will be reflected in the layout map. The same data can be displayed on several different layouts.