

French Frigate Shoals (Kānemiloha‘i) Biological Monitoring SOP Supplement: Field Guide to Data Management



Photo by S. Youngren

French Frigate Shoals

Hawaiian Islands National Wildlife Refuge

Papahānaumokuākea Marine National Monument

INTRODUCTION

This supplement provides a summary version of the French Frigate Shoals (FFS) biological program standard operating procedures (January 2012 version), focusing and expanding on the specifics of data management at the Tern Island Field Station with an emphasis on points that increase data quality and replicability. This supplement was compiled by Sarah Youngren and Dan Rapp during 2011 / 2012 I&M grant funded French Frigate Shoals biological monitoring data quality and analysis project.

TABLE OF CONTENTS

INTRODUCTIONS	3
INTRODUCTION TO THE FIELD STATION.....	3
introduction TO THE FIELD STATION- The MegaFauna	4
introduction TO THE FIELD STATION- The Flora.....	5
introduction TO THE FIELD STATION- The REEF FISHES.....	5
PerSONNEL ARRIVAL TO TERN ISLAND FIELD STATION.....	6
DATA ACCOUNTABILITY: ENTRANCE AND EXIT PLANS.....	6
data management.....	7
INTRODUCTION TO ffs long term DATA set MANAGEMENT.....	7
TERN ISLAND LONG TERM DATA SETS: DATA COLLECTION	8
LONG TERM DATASET: DATA ENTRY AND PROOFING	10
LONG TERM DATASET: DATA ENTRY AND PROOFING	11
DATA PROOFING AND ENTRY – Non-PLOT Data.....	12
DATA PROOFING AND ENTRY –PLOT DATA.....	14
DATA ARCHIVING.....	17
HARD COPY DATA ARCHIVING.....	17
DIGITAL DATABASE MANAGEMENT	19
The refuge folder	19
DIGITAL ARCHIVE ORGANIZATION.....	19
Scanning paper files to pdf (Page 1 of 3) (section complete)	20
Scanning paper files to pdf- continued (page 2 of 3)	21
Scanning paper files to pdf- continued (page 3 of 3).....	22
Bird banding: tern island banding and band management	23
DIGITAL DATA ARCHIVING	24
labeling digital files.....	24
REFUGE FOLDER ORGANIZATION	26
THE WORKING FOLDER	27
DIGITAL ARCHIVE BACKUP	27
PHOTOGRAPHY FOR MONITORING	30

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INTRODUCTIONS

INTRODUCTION TO THE FIELD STATION

Welcome to Tern Island Field Station! During your time on Tern you will be asked to partake at various levels in various aspects of long and short term biological monitoring. You will be responsible for the proper collection, entry, and proofing of most of the data that you collect during your stay on Tern Island. Due to the large variety and complexity of data collection and entry formats the Biological Monitoring SOP is a very large document. This supplement to that document was created to aid in day to day data entry and collection and long term data archival.

To assure that data quality remains as high as possible we ask that you follow this guide and the Biological Monitoring SOP as closely as possible. Inevitably you will run into situations that are not covered, please **discuss with the manager** who will determine a proper plan of action. If you stray from current protocol please take detailed notes and include them in both the digital and hard copies of your data, and note in weekly and annual reports. **Always remember, data is collected and recorded in the way it is, so that it can be used for long term analysis, and will be of much more use if we all attempt to avoid re-inventing the wheel!**

Since 1979, the FWS has maintained a year-round biological monitoring station on Tern Island, providing the longest continuous dataset in Hawaii, and one of the longest in the Pacific. This dataset involves year-round monitoring data for most nesting seabird species from the early 1980's to present.

Field methods employed for seabird population monitoring by FWS include: (1) mean incubation counts, (2) reproductive plot monitoring, (3) outer island surveys, (4) special studies with more narrowly defined foci, and (5) other related monitoring, such as survivorship studies, entrapment monitoring, seal and turtle counts, vegetation and erosion monitoring, shorebird monitoring, studies of artificial habitat, bird banding, weather monitoring, tide monitoring, and vegetation propagation.

After reading the biological monitoring SOP, this document, and receiving the proper training you will be ready to go forth, enjoy your time conducting important monitoring tasks on this wonderful island, and don't forget to return to this document often (every time you enter data)!

Remember, that the only stupid question is the one you do not ask! Tern has a pretty impressive set of data, take pride, and contribute well!

Mahalo.

INTRODUCTION TO THE FIELD STATION- THE MEGAFUNA

Seabird Species Breeding at French Frigate Shoals:

Procellariiformes (tube noses: Albatrosses, Petrels, Shearwaters, Storm-petrels):

BFAL = Black-footed Albatross (add scientific name)
LAAL = Laysan Albatross
BOPE = Bonin Petrel
BUPE = Bulwer's Petrel
WTSW = Wedge-tailed Shearwater
CHSH = Christmas Shearwater
TRSP = Tristram's Storm-Petrel

Pelecaniformes (Tropicbirds, Boobies, Frigate birds):

RTTR = Red-tailed Tropicbird
MABO = Masked Booby
RFBO = Red-footed Booby
BRBO = Brown Booby (nests on La Perouse)
GRFR = Great Frigatebird

Charadriiformes (Terns and Noddies):

GRAT = Gray-backed Tern
SOTE = Sooty Tern
BGNO = Blue-gray Noddy (nests on La Perouse pinnacle)
BRNO = Brown Noddy
BLNO = Black Noddy
WHTE = White Tern

Shorebird Species Wintering at French Frigate Shoals

RUTU = Ruddy Turnstone
GOPL = Pacific Golden Plover
SAND = Sanderling
WATA = Wandering Tattler
BTCU = Bristle-thighed Curlew

Marine Megafauna at French Frigate Shoals

HGST = Hawaiian Green Sea Turtle (summer breeder in atoll)
HMS = Hawaiian Monk Seal (summer breeder in atoll, resident year round)
Spinner Dolphins (rarely sighted but present in atoll)
Humpback Whales (spotted outside atoll during winter months)

INTRODUCTION TO THE FIELD STATION- THE FLORA

This section will have a copy of the Tern Island Field Station plant field guide.

INTRODUCTION TO THE FIELD STATION- THE REEF FISHES

This section will have a copy of the Tern Island Field Station checklist of reef fishes.

For all monitoring be aware of the disturbance caused by humans in the colony, avoid seals and turtles (get low and stay quiet if you come upon one), watch where you are walking so that eggs and burrows don't get crushed, if a RFBO flushes from its nest guard it from the GRFR, and if there are SOTE chicks 3-10 days old don't go in the area! By being observant and cautious disturbance can be kept at a minimum.

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PERSONNEL ARRIVAL TO TERN ISLAND FIELD STATION

DATA ACCOUNTABILITY: ENTRANCE AND EXIT PLANS

Tern Island Data Accountability Form (file in species account journal)

In order to document that all data files are in as complete a form as possible, and to decrease data loss at crew change overs; we ask that all USFWS volunteers and visiting researchers fill out the following form. Fill in name and arrival date, file the document in the species account journal binder, and prior to leaving complete the remainder of the form. For visiting researchers please note how data will be published.

Name _____ Arrival Date _____ Departure Date _____

I have read the following document and will follow the protocols described within. Initials ___ date _____

I will return to this document before collecting or entering any new form of data. Initials ___ date _____

I will complete this document at the end of my stay on Tern Initials ___ date _____

Primary Focus:

Reproductive Success Plots Monitored:

Special Project(s):

Fill out prior to departure at end of time on Tern Island

- All Data that I have collected while on Tern Island has been entered _____
- All Data that I have collected while on Tern Island has been proofed _____
- All field books for monitoring I conducted have been correctly filed and/or passed on _____
- My special project has been completed and a final report written and filed _____

All data collected during stay on Tern is complete: **Managers Initials** _____

Thank you for all of your hard work, those looking back in the future will greatly appreciate the effort you have put forth toward quality data collection! (feel free to use additional page as needed)

DATA MANAGEMENT

INTRODUCTION TO FFS LONG TERM DATA SET MANAGEMENT

Data collection and management falls into four steps that must be completed

1. **Collection:** Weather resistant paper and a pencil (or indelible ink)
2. **Entry:** Field data to excel spreadsheet
3. **Proofing:** Double check that all data is correct
4. **Digital and hard copy archive:** All field data you collect is to remain on Tern, collect data accordingly!

**Don't forget to write that you have entered and proofed data, who you are, and the year.
This will help those looking to use the data you are collecting now with confidence in the future!**

1. **Collection:** All field data on Tern is currently collected on paper, with a pencil. For some reproductive plots and projects data is collected within a bound Rite in the Rain book, others on rite in the rain pages that go into a special binder, and few are collected on non-Rite in the Rain paper. Rite in the Rain paper is specially coated so that it repels water, but use caution if it gets really wet erasing will gouge the paper. **If you take random notes in your field book, be sure to cross them out if they are not pertinent, are duplicates, or are not accurate before you archive your book.** Be sure to fill in all fields. The difference between not checking for a certain item/individual (no data= ND) and finding that item/individual not to be present (not found =0) drastically changes data.
2. **Entry:** All field data on Tern (aside from tide monitoring) is copied directly from field forms to excel spreadsheets which are formatted to be easily transferrable into an access database. Avoid adding new columns or changing formatting to spreadsheets instead add a supplementary tab or spreadsheet. While entering data **if you find entries to be illogical/wrong on any data you are entering, only change data if the person that collected it confirms the correct data. Use a different color pen on the hard copy to cross out (leave original record legible) and write in correct data.**
3. **Proofing:** Data proofing is a time consuming yet important step to data entry. To proof data, check line by line that all data has been correctly copied from field book to excel spreadsheet. While it is more efficient for one person to proof their own data it is much easier to miss mistakes this way. **The most effective way to proof data is as a team of two, one person reading out loud and a second person checking that all entries are correct.** Once you have determined that all data on a page has been entered and entered correctly, write on that page with a different writing instrument than data was originally collected in. Also note on the notes page of the excel spreadsheet what date or page data has been proofed up to. (Is there a monument proofing protocol?????)

- 4. Archive:** Assure that all data being left on Tern Island is complete and legible so that if someone were to return to the digital or hard copy at a later date they could interpret ALL writing/notes. Make sure that all data is labeled with the year, species, who was monitoring, and its state of completeness in entry and proofing.

TERN ISLAND LONG TERM DATA SETS: DATA COLLECTION

Methods for all data collection processes can be found within the Biological Monitoring SOP (most everything is covered in that document, you just have to find it)

- 1. WEATHER DATA:** Daily, field station personnel (one person vs. rotational)

Weather data has been collected daily on Tern Island since 1980. In past times a NOAA weather station was in place and working on Tern Island; however, now all that exists is the data that is collected manually every morning. Please read the Weather Station Instructions within the SOP as this data becomes less useful if methods do not remain consistent!!!!

Please do your best to collect weather data between 0800 and 0900 so that it can be used to accurately detect trends and we do not miss high temperatures for the previous day.

Relative humidity is calculated from the wet and dry thermometers within the weather station box, if the wick dries out RH cannot be calculated, please check that there is water in the reservoir and that wick is intact every time you collect weather data (if both numbers are the same and it is not pouring rain this indicates the wick is dry).

If you find that the door to the weather station box is open, do not collect maximum and minimum temperatures for that day as they are likely incorrect.

- 2. DISTURBANCE/ENTRAPMENT DATA:** Daily, field station personnel, rotational

In an attempt to accurately quantify the level of human disturbance to the wildlife within FFS a detailed disturbance/entrapment log is maintained. Please fill out the log after morning entrapment walks and regarding ANY un-due disturbance caused during the remainder of your time. This includes but is not limited to collapsed burrows (occupied), broken eggs, entrapped wildlife (non-bush), and if any seal or turtle is disturbed by your presence. This log is also used to document daily hauled out seals and basking turtles.

It is very difficult to replicate counts of seals within the bird colony please ONLY count the following areas:

What is visible from the catchment, and around the water tanks.

What you can see from the SE corner looking west on south beach.

East, crab, shell, diesel beaches, and the boat ramp.

If you count seals on south beach or in the colony you may record them in the notes section.

As with the weather data, because seal and turtle counts are collected by multiple individuals on a weekly basis it is very important that everyone follows the same methods. (Other option, manager 1x per week whole island)

3. **BANDING DATA:** As bands are put out and recovered from dead birds or in the colony
The banding data set on Tern spans a longer time series than most other data collections! There are many aspects involved in accurate banding and band reporting, please see the banding section later in the document for further details for methods!
4. **MIC:** At mean incubation period for each species (as close as possible to exact date on calendar)
 - black noddies (BLNO), every 34 days.
 - brown noddies (BRNO), every 35 days.
 - white tern (WHITE), every 36 days
 - red-footed boobies (RFBO), every 46 days
 - gray-backed terns (GRAT), every 30 days
 - red-tailed tropicbirds (RTTR), every 43 days
 - great frigatebirds (GRFR), every 55 days
 - masked boobies (MABO), every 44 days
 - Christmas shearwaters (CHSH), every 52 days
 - a. **Exceptions:** Albatross/shorebird count monthly, WTSH/TRSP/BUPE/BOPE only census
 - b. **Egg nests and chick nests only (only confusing for MABO, one C one E = chick nest)**
 - c. **Skip No Zone/ TRSP zone from meter markers to beach (10% of island)**
 - d. **Make sure everyone is walking in a line and only counting birds once!**
5. **SHOREBIRDS:** Monthly count
 - a. **Walk with the wind so birds take off behind you**
 - b. **Make sure everyone is walking in a line and only counting birds once!**
6. **MARINE DEBRIS:** Collected weekly to document tsunami debris arrival
7. **OUTER ISLAND SURVEYS:** Preferably no less than 1x per month, never more than 1x per week.
8. **VAGRANTS:** Record every vagrant seen, keep track of if that bird is seen again/found dead
9. **SPECIES ACCOUNT JOURNAL:** Bi-monthly
 - a. **Suggest add more parts.**
 - b. **Do more throughout season to complete phenology info**
10. **CHRISTMAS BIRD COUNT:** December Annually
11. **REPRODUCTIVE SUCCESS PLOTS:** Monitoring divided by species between all personnel
 - a. **Demographic Monitoring Plots:** Include adult band reading, chick banding, nest tracking.
 - b. **Non-Demographic Monitoring:** No band reading or banding, nests counted not tracked.
12. **Albatross Demographic Sweeps:** Annual adult band reading and chick banding whole island.

LONG TERM DATASET: DATA ENTRY AND PROOFING

Weekly:

One person will be responsible for **entering** field station data during a given week. Data included: weather, band recovery, disturbance/entrapment, outer island survey, marine debris, and vagrant data. See following pages for how to enter each specific item. Additionally this person will be responsible for **'proofing'** or line by line checking that all data entered the previous week is correct and complete. This individual will also be responsible for conducting a **digital file backup** following completion of their data entry. All individuals are responsible for completing data entry from the current week for all reproductive plots and proofing data from previous week's plots.

Data pages that are complete will be kept in the data binder, either in the un-entered folder, the un-proofed folder, or the to be scanned and filed folder.

Monthly:

The manager is responsible for checking that all data is entered correctly and completely, scanning, and filing hard copies. Additionally monthly temperature loggers from the weather station are downloaded.

TERN ISLAND DATA MANAGEMENT/ACCOUNTABILITY FORM		YEAR	page <input type="text"/> of <input type="text"/>					
	Week 1	Week 2	Week 3	Week 4				
Inclusive Dates (Monday-Sunday)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>				
DATA ENTRY PERSON FOR WEEK <input type="text"/>								
STATION WIDE DATA COLLECTION	<u>LAST WEEK</u> proofed	<u>THIS WEEK</u> entered	<u>LAST WEEK</u> proofed	<u>THIS WEEK</u> entered	<u>LAST WEEK</u> proofed	<u>THIS WEEK</u> entered	<u>LAST WEEK</u> proofed	<u>THIS WEEK</u> entered
	WEATHER	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	BAND RECOVERY FORM	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	DISTURBANCE/ENTRAPMENT	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	OUTER ISLAND SURVEY	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	MARINE DEBRIS	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	VAGRANTS	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
BACKUP REFUGE FOLDER	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
ALL SPECIES PLOT DATA (fill in name below) Includes plots checks and banding data	<u>LAST WEEK</u> proofed	<u>THIS WEEK</u> entered	<u>LAST WEEK</u> proofed	<u>THIS WEEK</u> entered	<u>LAST WEEK</u> proofed	<u>THIS WEEK</u> entered	<u>LAST WEEK</u> proofed	<u>THIS WEEK</u> entered
	1 <input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	2 <input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	3 <input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	4 <input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	5 <input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
ONCE 4 week period completed (manager completes this section)								
Check station wide & plot data for formatting & completeness							<input type="text"/>	<input type="text"/>
Scan all above entered/proofed data pages							<input type="text"/>	<input type="text"/>
File all complete pages in filing cabinets							<input type="text"/>	<input type="text"/>
Scan Tide Station Form and file							<input type="text"/>	<input type="text"/>
Download weather station Temperature Loggers							<input type="text"/>	<input type="text"/>

Figure X. Tern Island Data Management/Accountability Form. Available on refuge folder, current month form is kept in data binder, once completed forms will be included in species account journal.

LONG TERM DATASET: DATA ENTRY AND PROOFING

Each week one person will proof all data from the past week, and THEN enter current week's data. If any data is not in the binder please check with the individual that should have collected it. Manager will scan all files in the 'to be scanned' folder at the end of the month. See following pages for specifics on entry of different forms of data.

DATA ENTRY

COMPLETED FIELD FORMS

1. All completed data sheets will be placed in the 'to be entered' folder within the data binder.
2. Weekly all data collected during that week will be entered into the appropriate spreadsheet.
3. Once entered write on EACH sheet 'entered by' your initials/date in the top right corner.
4. Place a check mark in the 'entered' column for each data type on the accountability form.
5. **Transfer sheet into 'to be proofed' folder within the data binder.**

IN PROGRESS FIELD FORMS

1. Still in progress forms will remain in their normal location except while being entered.
2. Weekly all data collected during that week will be entered into the appropriate spreadsheet.
3. Designate start and stop points by continuing the grid lines into the paper margin for that line, and place a small check mark in the margin next to each line once entered. If new page, at the top of the page write out '√=entered'
4. Place a check mark in the 'entered' column for each data type on the accountability form.
5. **Return form to its proper location.**

DATA PROOFING

COMPLETED FIELD FORMS

1. All data collected during the previous week (in 'to be proofed' folder) will be proofed.
 - a. Check line by line that all data has been entered into the appropriate spreadsheet in the right cell, correctly.
 - b. If it is a judgment call as to what a written letter or number is and you do not agree with how it was entered, clarify with the person that collected the data!
2. Once checked write on EACH sheet 'proofed by': your initials/date in the top right corner.
3. Place a check mark in the 'proofed' column for each data type on the accountability form.
4. **Transfer sheet into 'to be scanned' folder within the data binder once proofed.**

IN PROGRESS FIELD FORMS

1. Proof previous week's data for all topics.
2. Check line by line that all data has been entered into the appropriate spreadsheet in the right cell, correctly.
 - a. If it is a judgment call as to what a written letter or number is and you do not agree with how it was entered, clarify with the person that collected the data!
3. As each line has been proofed place a second small check mark in the margin next to each line. If new page, write out at the top of the page '√√ = proofed'
4. Place a check mark in the 'proofed' column for each data type on the accountability form.
5. **Return form to its proper location unless completed, then transfer 'to be scanned' folder.**

DATA PROOFING AND ENTRY – NON-PLOT DATA

1. **WEATHER DATA: One sheet used for whole month**
 - a. Please do not change formatting in this spreadsheet, it functions by formulas!
 - b. Each month has a data page and a summary page. Fill in the raw data, and then only summary item that needs to be filled in per month is the day of highest rainfall, fill this in on the raw data page and it will automatically fill on the summary page.
 - c. Copy of form available in forms folder in 'working folder' hardcopy stored in radio room.
2. **DISTURBANCE/ENTRAPMENT DATA: One sheet used until filled**
 - a. Copy data as written on field form into spreadsheet, make sure that applicable notes are recorded in the notes section in order to decipher what species was injured trapped etc. (as long as you don't duplicate data, splitting into multiple lines is acceptable.)
 - b. Copy of form available in forms folder in 'working folder' completed hard copy goes in species account journal
3. **BAND RECOVERY FORM: One sheet until filled (see banding section)**
 - a. Copy data from field sheet into appropriate columns, leave non-applicable columns/cells blank.
 - b. When entering band numbers that start with zero, change the cell to text, otherwise leave this cell as a number. All band numbers are entered as just digits, do not enter the dash between prefix and suffix. If a band prefix is only three digits it needs to have a zero added at the beginning.
 - c. Copy of form available in forms folder in 'working folder' completed forms get scanned and hard copy goes back to honolulu
4. **MIC: One sheet per species for whole year**
 - a. The No zone and TRSP areas compromise 10% of the island, area is to meter markers and to water,
 - b. South beach outside the pipe?
 - c. In progress forms stored in species account journal
 - d. Copy of form available in forms folder in 'working folder' yearly forms stay in species account journal
5. **SHOREBIRDS: One sheet for whole year**
 - a. The No zone and TRSP areas compromise 10% of the island, area is to meter markers and to water,
 - b. South beach outside the pipe??
 - c. In progress forms stored in species account journal
 - d. Copy of form available in 'working folder' yearly forms stay in species account journal
6. **MARINE DEBRIS: One sheet per week**
 - a. Count up all the tallies, and write in number for each category, zero is an important number.
 - b. At the end of the spreadsheet is there are no comments, fill in na
 - c. Copy of form available at in 'working folder' hardcopy stored in radio room.
7. **OIS: One sheet per island per visit**
 - a. Copy of form available in 'working folder' hardcopy stored in radio room.
8. **VAGRANTS: One pages per incident**
 - a. If vagrants have been sighted for the week, create a digital copy with photo.
 - b. Copy data into excel, also save digital copy in folder
 - c. Copy of form available at in 'working folder' completed forms stay in species account journal

How to Backup USB working folder

On USB drive keep all working files within one folder, entitled

TERN_ISLAND_WORKING_DATA

After the word data additionally add the date of last backup as “_ddMMYYYY”

Weekly

- 1) Check that all data has been updated on the USB drive for the week (including all plot data)
- 2) Rename the working data with the days date.
- 3) Plug in current backup harddrive (be extremely careful, do not move harddrive AT ALL when it is running, this drive is precious)
- 4) Open TERN_ISLAND_WORKING_DATA_backups folder
- 5) Copy the entire folder over
- 6) Eject both drives and you are done (the date on working folder on the stick now represents the last day it was backed up).

DATA PROOFING AND ENTRY – PLOT DATA

Each week each person will proof all of their data from the past week, and enter current week's data, and if using binder sheets that week's pages will be removed from the field binder.

1. DATA ENTRY (plots using binder pages)

- a. Enter plot data as close to possible after collecting (best done on same day).
- b. Enter plot banding data in excel spreadsheet, and copy to banding schedule.
- c. Fill in line for "entered by" with your initials and the date (use check marks on banding data just as you would with non-plot data)
- d. Once you are done copy pertinent information to pages for the next week.

2. DATA PROOFING

- a. Proof all plot data that was collected during the previous week, check line by line that data has been entered in the right cells.
- b. Proof all banding data collected during the previous week, check both digital copy AND banding schedule!
- c. Completed sets of pages will be bound at the end of the reproductive year. Separate pages by plot and in chronological order, sticky notes or divider pages can be used to keep plots apart.
- d. (*Create cover pages for plot data)

DEMOGRAPHIC PLOTS SPREADSHEET

This standard operating procedure (SOP) will speak to reproductive plots and their application at the Tern Island Field Station. There are two reproductive plot types utilized on Tern Island: demographic and non-demographic plots. Non-demographic plots aim to provide basic numbers for a species such as eggs laid and lost (i.e. died) and chicks fledged and lost. Demographic plots deliver baseline data for a species, like non-demographic plots, but also provide more detailed data where individual nest attempts are followed for the duration of the reproductive season. In order to have effective demographic plots good sample design must be employed as well as good data collection and management practices.

This SOP details the proper use of the Excel demographic database. Data collected from demographic reproductive plots at the Tern Island Field Station will be stored and managed using the demographic database. It will be easiest to understand the demographic database with it open when reading this SOP. The demographic database was built based on the needs of the Tern Island Field Station using the experience and review of the field stations previous and current biologists. The demographic database was built using Microsoft Excel 2010 software: this program will be required in order to use this database. Newer versions of Excel (> 2010) can also be used to operate the demographic database; older versions of Excel (< 2010) may or may not be able to operate the database effectively. **The demographic database is to be used with data collected using the demographic monitoring binder sheets.**

I. 'ReprodRawData' (Reproductive Plot Raw Data)

- a. This sheet is where the raw data that is collected using the demographic plot binder sheets will be entered. The headings within this sheet are descriptive, but if more clarification is needed please see the 'ColumnDescriptionsReprodRaw' sheet within the database. The 'ColumnDescriptionsReprodRaw' sheet provides more detail on the type of data each column accepts (Table 1). Some columns and rows within the 'ReprodRawData' sheet are made to move (frozen) as one scrolls through the sheet, this function should not be altered. **At no point should the formatting within this sheet or any other sheet in the demographic database be altered without permission from the refuge manager, and may result in changes for all species.**

II. 'ReprodRawSummary' (Reproductive Plot Raw Data Summary)

- a. The 'ReprodRawSummary' sheet summarizes the data from the 'ReprodRawData' sheet. The 'ReprodRawSummary' sheet is formula driven; the monitor does not need to enter any data in this sheet except for phonology dates for Tern Island and French Frigate Shoals. **The monitor should not at any point alter the formulas within the 'ReprodRawData' sheet or the formulas within any other sheet in the demographic database; as even a small change to a formula can cause its dysfunction.** This sheet has a proofing tool built in to catch potential data entry errors. The 'PROOFING' column mimics the 'TOTAL' column but it gathers its summary data from different sources. If the 'PROOFING' column entries don't match those of the 'TOTAL' column a data entry error has occurred; the data in 'ReprodRawData' will need to be proofed to find and correct this error. Column headings within this sheet are descriptive; see content in parenthesis for more detail.

III. 'OptSummary' (Optional Data Summary)

- a. This sheet summarizes optional (OPT) columns from the 'ReprodRawData' sheet. It is up to the monitor to build the 'OptSummary' sheet because it summarizes the optional columns the monitor created within the 'ReprodRawData' sheet. The format for the 'OptSummary' sheet can be altered; the monitor should design the 'OptSummary' sheet to function similarly to the 'ReprodRawSummary' sheet. Any columns created in the 'OptSummary' sheet should have descriptive headings to go with them.

IV. 'Notes' (Monitoring Notes)

- a. The 'Notes' sheet should be used to enter notes on monitoring or any other relevant information. A date and plot should always be provided for each note entry. Any notes that are specific for a nest attempt should be entered under the 'NOTES' column in the 'ReprodRawData' sheet. **All text that is entered in the demographic database should be entered in all capital letters.**

V. 'Codes' (Data Collection / Entry Codes)

- a. The 'Codes' sheet provides a table of in use data collection and entry codes. Codes described in the 'Codes' sheet should always be used when collecting and entering data (when appropriate). **New codes should not be made nor should existing codes be altered without permission from the refuge manager.**

VI. 'ColumnDescriptionsReprodRaw' (Column Descriptions for the Reproductive Plot Raw Data Sheet)

- a. This sheet provides descriptions for 'ReprodRawData' sheet required and optional columns. Column descriptions for optional columns will need to be entered each season based on the optional columns created by the monitor. Required column descriptions should not be altered without permission from the refuge manager.

VII. 'Banding'

- a. The 'banding' sheet should be completed as birds are banded within the reproductive plots. The data from this sheet will be used in the annual banding report for the field station and subsequently provided to the USGS Bird Banding Laboratory. A separate SOP has been written on the proper use of this sheet, please see these materials.

VIII. 'JournalSummaries#1' (Journal Entries)

- a. The 'JournalSummaries#1' sheet is to be completed by the primary monitor for each journal period. For more detail on the data that is to be provided for each column please see the 'ColumnDescriptionsJournal' sheet (Table 2). The 'JournalSummaries#1' sheet does not contain any formulas all data entry will be done manually as a way of proofing previously entered data. All rows and columns within the sheet are required.

IX. 'JournalSummaries#2' (Journal Entries for Second Monitor)

- a. This sheet is to be completed by a potential second monitor in the same fashion that the 'JournalSummaries#1' was completed. If a third monitor takes over monitoring duties for the plot a third journal summaries sheet will need to be created.

X. 'ColumnDescriptionsJournal' (Column Descriptions for the Journal Summaries Sheet)

- a. The 'ColumnDescriptionsJournal' sheet details data entry per column for journal summaries sheets (Table 2). All columns and rows in the journal summaries sheets are required. **It goes without saying, but do not alter the column descriptions without permission from the refuge manager.**

XI. 'NestMarkerInventory'

- a. This sheet is to be completed at the end of the reproductive season. All nest marking material should be recovered from plots and inventoried. Any missing nest marking materials will be remade by the next monitor. The numbers of nest markers started with, recovered, and lost will be generated automatically by formulas. The "NEST MARKER #" column should be completed based on the nest markers used for monitoring that species.

DATA ARCHIVING

There are two primary types of data medium utilized and generated at the Tern Island Field Station: hard copy and digital files. Technological advances have blurred the line between these two data mediums, hard copy files can easily become digitized and vice versa. Whether the data medium be hard or digital, the proper archiving of this material is critical to the formation and maintenance of short and long term datasets at the field station.

HARD COPY DATA ARCHIVING

During the 2011 / 2012 field season all hard copy data at the Tern Island Field Station was located, compiled, and inventoried. An inventory database was created using the software Microsoft Excel thus providing the means to search for and locate hard copy data files created and stored at the field station. Any subsequent hard copy data archiving should be logged using this database before being stored following these steps:

1. Confirm that the file(s) to be archived are properly labeled. At minimum each file should be marked with:
 - a. That the data was fully entered and proofed, and the year.
 - b. Whether the file is an original file or a copy of an original file.
 - c. The name(s) of the primary persons responsible for the authorship and/or collection of the contained data.

If to be archived files don't have a designated location for this information please write it in at the top of the file using permanent ink.

2. Access the hard copy data inventory database and enter the files to be archived. The headings within the inventory are descriptive, if more detail is needed on the data required for each column please locate the 'ColumnDescriptions' sheet within the database. Please use the designated codes which are provided in a table in the 'Codes' sheet of the inventory database.
3. Having completed the previous steps the hard copy file(s) can be archived. All archived hard copy data at the field station is organized within three areas within the living quarters (barracks) using filing cabinets, drawers, file boxes, and buckets, with exception to odd shaped items.
 - a. Biology area drawers
 - b. Radio room filing cabinets

c. Archive room filing cabinets, drawers, file boxes, and buckets

Many of the hard copy storage facilities at the field station have been assigned an identification letter and/or number that has been inscribed onto the front of the unit please consult these identification numbers when utilizing the inventory database. To determine where to archive specific hard copy files consult the hard copy inventory to find the location of similar files. In general hard copy data has been organized and compiled into these basic file types and locations:

- a. Banding and band reading data: biology area drawers
- b. Weather and Tide data: radio room cabinet 5, drawer D
- c. Outer island data: biology area drawers; radio room cabinet 5
- d. Reproductive plot data: biology area drawers; radio room cabinet 4
- e. MIC and other count data: biology area drawers; radio cabinet 4 and 5; archive room cabinet 1
- f. Species accounts and annual journals: archive room cabinet 1; radio room cabinet 5; biology area drawers

Any new file folders created when archiving hard copy data must be labeled properly: at minimum include file type and the year the file(s) was created (i.e. collected, written, etc.).

DIGITAL DATABASE MANAGEMENT

Due to the precarious nature of electronic devices such as computers and hard drives at Tern Island Field Station, the only way to avoid irretrievable data loss is to follow a strict data backup plan. In order to not create innumerable copies of slightly modified yet very similar documents a strict organizational scheme should also be followed for data management. Additionally data backup in Honolulu must be documented.

This document will discuss the management and archival of Tern Island's database, including short term backup procedures (on Tern) and long term archival (in Honolulu).

The more time that is spent on keeping data organized and up to date in the short term the more useful it will be in the long term. We ask that all personnel follow this protocol!

NEED TO UPDATE PRACTICES: Data management practices at Tern Island Field station are in need of improvement. Current practices (as of the writing on this SOP) leave much room for creation of errors and data loss. Currently files regarding all aspects of running the field station along with biological monitoring are stored in one folder the 'refuge folder'. This folder is in the range of 60GB of data, and while the organizational scheme (where things are stored) is strong, there is little control over what gets stored in this folder, and little delineation of what is a final version versus a working version of any document. We propose changes in this SOP that will need to be put into place but that should greatly increase data security.

Archived Data Storage: FINAL VERSIONS OF FILES. Last version sent to Honolulu should be version on Tern

Includes all previous versions of methods, and finalized data.

Files can be taken out of this folder but not put into it unless another backup is to be done.

Current Data Storage: Tern Island = Up to date versions of current methods and data. And other files that are needed for day to day tasks.

THE REFUGE FOLDER

DIGITAL ARCHIVE ORGANIZATION

The following is an organizational tree for how the refuge folder should be organized.

Insert Excel image

SCANNING PAPER FILES TO PDF (PAGE 1 OF 3) (SECTION COMPLETE)

An important portion of data archival at Tern Island is creating digital copies of hard copies by scanning to PDF. At the time this SOP was created the Tern Island Field Station was equipped with a Canon DR-2580C document scanner, this SOP will pertain to this model.

VERY IMPORTANT: the presence of this scanner should NOT be taken lightly; it is a very expensive and critical piece of equipment. When in use make sure that unit is set up so that it cannot get knocked to the floor or spilled upon! Please store scanner in designated Pelican Case when not in use.

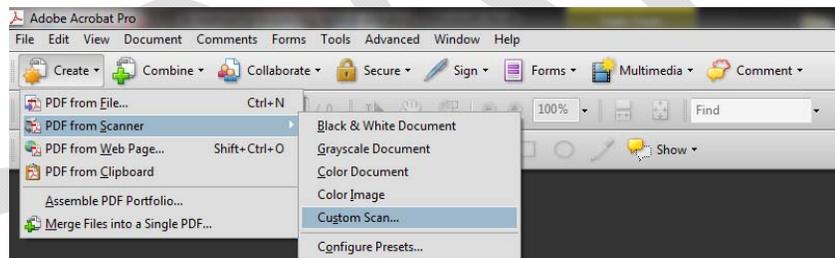
Personal at the Tern Island Field Station should be advised to avoid writing lightly and to the edges of pages, these two factors can make scanning documents very difficult and result in unusable files.

Components required for functional scanning:

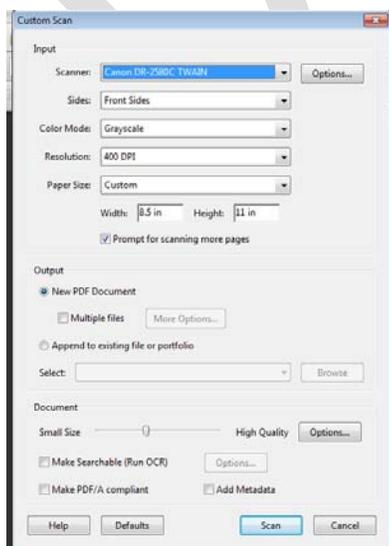
Scanner, usb 2.0 cord, power cord, and functional rollers.

Computer with scanner specific drivers and Adobe Acrobat Pro Installed

- 1. To setup scanner, place on a flat surface with space for pages to come out the back (lever on back left controls if pages curl through scanner or go through flat and come out back). Plug in power and usb cords, connect usb to computer. Turn on scanner with lever switch on front right.**
- 2. On your computer navigate to Adobe Acrobat 9 Pro and open it. With Adobe Acrobat 9 Pro open you will need to follow a specific pathway to create a scanned document:**
 - a. Create → PDF from Scanner → Custom Scan.**



- b. Within Custom Scan customize as follows for optimal scanning (acrobat pro will save these settings between uses!)**



Scanner Chose from list

Sides: This scanner will scan front or both sides

Color Mode: Grayscale- works best for pencil
Black and White- for clear documents
Color- retains color of document

Resolution: Larger resolution creates bigger files
Larger resolution takes longer
300dpi works for most clear scans
Use between 400 and 600 for pencil.

Page Size: To not cut off edges set custom!
Set at 8.5 by 11 inches (IMPORTANT)
Can be set to scan longer pages as well

Prompt for more pages: If have more than one page

2(DO NOT make OCR searchable on initial scan, it takes forever and cannot be undone.

SCANNING PAPER FILES TO PDF- CONTINUED (PAGE 2 OF 3)

- 3. Once you have setup setting, proceed with loading your pages in the scanner.**
 - a. Make sure all staples are removed!!!!
 - b. The scanner will not reliably feed documents that are not crisp and wrinkle free. For less than perfect documents the operator will need to either manually feed each page or observe the scanning to be sure pages feed correctly. (Up to 50 crisp pages can be placed in the feed area; the pages will feed through automatically)
 - c. Place your document in the feed area, be sure that it is seated correctly (i.e. not angled).
 - d. Adjust the width arms so that they match pages being scanned.
 - e. Depending on the condition of the document being scanned, the scanner rollers may need assistance feeding the document. A slight bit of added forward pressure should be enough.
 - f. If the document is especially old and brittle it may be more appropriate to use the flatbed scanner instead of the sheetfed scanner as brittle pages may get destroyed, you will have to download and install another set of drivers but tasks with acrobat pro will be the same..
- 4. Once pages are loaded, click scan (you will get an error if there is no page in feed area of scanner).**
 - a. Once all pages scan (or the scanner detects that there is not paper in the feed area Acrobat Pro will bring up a prompt asking if scanning is complete. If you are finished scanning click done, if you're not finished place another page on the feed tray and click continue scanning.
 - b. If you stop scanning but later decide to add additional scanned pages to a file follow the steps above while the document is open in acrobat pro, these additional scanned pages will be added at the end of the document.
 - c. If a page gets away from you and gets fed into the scanner askew, the scanner will likely jam. If a paper jam occurs you will need to find the open lever on the front of the scanner to lift up the upper unit, at which point you can remove the document. A prompt should appear in Adobe Acrobat 9 Pro notifying you of a paper jam, you will need to delete the jammed paper page from the file and scan it again.
- 5. You will need to check your scan to make sure all data was retained from the original document.**
 - a. Scanners will commonly have trouble picking up faint writing; if this occurs adjust the resolution in the custom scan menu and scan again!
 - b. Check that no writing on the periphery of a document is cut off; if this occurs scan the document again (you can adjust page width in custom scan or try and feed the page straighter on a second try).
 - c. Always try to make sure pages feed as straight as possible, it sometimes helps to scan the document flipped or rotated if there are portions of the page that are wrinkled.
- 6. Once you are satisfied with your scan save following normal conventions.**
 - a. Be sure to label your file appropriately and save in an appropriate location.
 - b. All scanned documents should be saved in portable document format (PDF) file format.
 - c. If you are done adding pages to a particular document, close it, or the next scan will add onto the bottom.
- 7. A tool provided by Adobe Acrobat 9 Pro can make scanned documents searchable.**
 - a. *If you create a searchable document be sure to save a copy of the original scanned document, the OCR Text Recognition is irreversible and may render the document unusable.*
 - b. To perform this action you will need to follow the following pathway from the document dropdown in Adobe Acrobat: OCR Text Recognition → Recognizing Text Using OCR.
 - c. Making scanned documents searchable should only be performed when necessary because the process will drastically increase the file size of the document.

SCANNING PAPER FILES TO PDF- CONTINUED (PAGE 3 OF 3)

8. Scanner Maintenance

- a. Take care of the scanner! Scanners need routine maintenance and cleaning in order to function properly. At the very least compressed air should be used to clean the feed path / area and inside of the scanner of paper particles and dust. See the manual that was provided with the scanner for more details on routine maintenance and cleaning.
- b. A roller replacement kit should be purchased from Canon for the Canon DR-2580C scanner at the Tern Island Field Station. Canon recommends that the roller unit and retard roller be replaced after 100,000 scanned pages. (It is likely that the scanner is reaching the 100,000 page mark, especially after all the scanning that occurred under the scope of the recent I&M project.)

If more detail on the scanner and provided hardware or software is needed please consult the manuals that came with the products; there should be hard and digital copies of these manuals at the Tern Island Field Station. There are no drivers available for this scanner for computers with Mac operating systems.

Scanning in general: Most scanners, this includes the Canon DR-2580C, can be operated with any modern computer that has a USB 2.0 connection. Whichever computer you choose to use will require the appropriate drivers (software) to be installed before the scanner can be operated. Drivers for windows operating systems can be obtained either from the materials that came with the scanner or downloaded from the manufacturer's website. A scanner cannot be operated without specific software which includes drivers. Most scanners will come with everything that is needed to operate them, including all hardware and software. If hardware is lost the manufacturer of the scanner will need to be contacted in order to buy replacement parts. Scanner specific software and documentation can usually be downloaded from the website of the manufacturer at no cost (www.usa.canon.com), but a good internet connection is essential. The software Adobe Acrobat 9 Pro was used to create scanned documents at the Tern Island Field Station when this SOP was written. Adobe Acrobat 9 Pro was not provided by the manufacturer but was purchased separately. It's not necessary to purchase Adobe Acrobat 9 Pro to scan documents, but the software is a great choice because it produces high quality scanned documents and makes scanning very straight forward.

Recommendations:

1. Continue to use Adobe Acrobat 9 Pro software to create scanned documents, update this software as needed. Personal at the Tern Island Field Station should stay up to date with software advances and incorporate these programs at the field station when necessary.
2. Use a flat scanner in addition to the Canon DR-2580C sheetfed scanner for documents too brittle for the latter. Other media to be scanned, such as photos, may fair better using a flat scanner.

BIRD BANDING: TERN ISLAND BANDING AND BAND MANAGEMENT

Banding is a highly regulated/permitted task, and is not something to be taken lightly. Every band put out represents a unique individual who, if all steps are followed correctly, should be able to be identified anywhere it is found throughout its life! **Even if you assist in putting out thousands of bands, make sure that every band is as perfect as you can make it and every record is as complete and accurate as it can be!** Additionally, every band that is put out represents an individual long lived bird who demands your respect (they can't say it out loud, so don't forget)! Don't let these facts scare you, but please, don't forget that you are embarking on an important task to which few are privileged to participate, enjoy it!

There are many levels of complexity involved in bird banding, each individual's level of involvement will vary depending on their level of training and responsibility. This document covers the basics and hard and fast rules for all levels. Everyone should read all levels because even if they are not involved, knowing the end product will make the 'why am I doing it this way' make a bit more sense. Please refer to the biological monitoring SOP if there are any questions, as this document is a summary of many different aspects

1. INTRODUCTION TO BIRD BANDS

- a. Why do we band birds?
- b. What do the numbers mean?
 - i. Prefix Suffix
 - ii. Band sizes
- c. Different Materials (metal and auxiliary)
- d. Who cares about the different bands
 - i. BBL
 - ii. USFWS
 - iii. People that resight birds
- e. Sizes used and what birds get them
- f. Banding Schedules
 - i. How to fill out schedule
 - i. Be neat!
 - ii. Fill in ALL fields
 - ii. Why are they important

2. BANDING

- a. How to you put on bands, or take them off
- b. Banding Pliers and Spreaders
 - i. what are they (best types)
- c. How to hold pliers safely
- d. Importance of practicing new band types.
 - i. types of bands close differently
 - ii. sizes of bands close differently
- e. Importance of directionality and leg
- f. What defines a closed band
 - i. Good vs keep trying
 - ii. When to take off
- g. How to fix bands
- h. What to do if you lose or destroy a band

3. FOUND BANDS

- a. What to do if you find a band
 - i. Metal and Auxiliary bands

4. CAPTURE AND HANDLING

- a. How to catch large birds (covered in albatross banding manual)
 - i. How to approach
 - ii. How to catch
 - iii. How to hold
- b. How to catch small birds
 - i. How to approach
 - ii. How to catch
 - iii. How to hold
- c. How to catch birds that don't want to be caught

5. INTRODUCTION TO BAND MANAGEMENT

- a. Band Inventory (what and where)
 - i. Inventory document
 - ii. Clipboards -in use
 - iii. Cabinet - in inventory
- b. What to do with new bands
 - i. Data recording methods
 - ii. Field Records
 - iii. Banding Schedules
 - i. In use
 - ii. completed
 - iv. Excel spreadsheets
 - i. Field Station Use
 - ii. Reporting
 - v. Recovered Bands

DIGITAL DATA ARCHIVING

Digital files generated at the Tern Island Field Station are archived in the field stations 'refuge folder'. Over the years the refuge folder and its precursors became increasingly disorganized and difficult to use. During the 2011 / 2012 field season the refuge folder was overhauled: all files were reorganized using modern labeling and digital archiving methods. In order to maintain the integrity of the refuge folder specified procedures must be followed.

LABELING DIGITAL FILES

Digital file organizational schemes have varied greatly over time at Tern Island Field Station. The following organizational scheme was followed during a fall 2012 organization of archived data and we request that you attempt to follow the guidelines stated below as closely as possible to improve the ease of organization, archival, and data retrieval for future use.

Main things to consider:

Current backup methods fail to copy file paths that are longer than approx. 250 characters (this includes all drives and folders and file name).

KEEP FILE PATHS AS SHORT AS POSSIBLE!!!

Additionally, file version denotation is paramount, so that in the future anyone can look and quickly determine if any data/protocol/file is a final copy or simply a draft.

- 1. Keep file names short but meaningful (file path cannot exceed 250 characters).**
 - a. Omit words such as a/and/the that add length but do not add meaning
 - b. Use standard abbreviations (don't make up your own abbreviations)
 - c. Omit repetitive words whenever possible.

- 2. Use underscores to delineate words, the first letter of each word should also be capitalized. These two features will make file names easier to discern while allowing file names to be searchable.**
 - a. e.g. Tern_Island vs. Tern Island
 - b. If words are combined without spaces only the first word is searchable.
 - c. If following an abbreviation that is all in capitals use your best judgement.

- 3. If using a date in the file name place at the beginning of the file name. Be sure order is Year Month Day, so file names will sort consecutively.**
 - a. Use YYYYMMDD for most cases (use caution to put month BEFORE day)

- b. Place an underscore between the date and the first word of the file or folder name.
 - c. If the file represents the final draft for the entire year just state year YYYY.
 - i. Always place year at the beginning of the file name.
 - d. For in progress files, you will need to create new copies to represent the most recent revision date, and if it is a draft/version/final. All consecutive draft files will be retained for the season, and all but the final deleted at the end of the season at which point the final needs to be labeled FINAL.
4. **Place words such as draft, final, version at the end of the file name.**
 - a. The version number of a record should be indicated as "V" followed by the two digit version number, and draft or final if applicable.
Eg. V1.5draft or V1.6final
5. **If using numbers for anything other than date, include 0 before numbers 1-9 so that when files are sorted they sort in numerical order**
 - a. e.g 01, 02 ,03, 10, 20, 30 vs will sort 1, 10, 2, 20, 3, 30
6. **If including a personal name in a file name, include the family name followed by initials, no punctuation no spaces**
 - a. John A Smith would become SmithJA
7. **File names for reoccurring events should include the date and a short description**
 - a. In cases such as weekly reports, label all files the same but simply change the data e.g.20120916_FFS_WeeklyReport
8. **Avoid using non-alphanumeric symbols in file names.**
 - a. While & is shorter than and, many file systems cannot deal with many symbols, this step is important for increasing archived data quality.

Label files and folders in such a way that they are identifiable somewhat out of context, and attempt to denote if this is a final draft!

For folders

1. **Date should be added at the beginning of a folder to denote contents**
 - a. **E.g. 1986-99_Census_AllSpecies**
 - b. **If there is no date in the folder name, this implies that this folder contains ALL of the said topic.**

Folder File path

Biological_Monitoring/Avian/Mark_Recapture/Ian Jones/data/ 2003_BOPE_capture_data

Main Folder/Topic Folder/Sub-topic Folder/Category Folder/sub-category/ File Type Folder/Files by year and type

Data: files labeled by year

SOP: files labeled by year

Forms: files labeled by year

Templates: files labeled by year

Summary: files labeled by year

REFUGE FOLDER ORGANIZATION

The refuge folder maintains an organizational framework of folders, the location and naming of these primary folders should never be altered (see below). The addition of primary folders should also be avoided: the framework was designed to simplify the refuge folder while providing more organization.

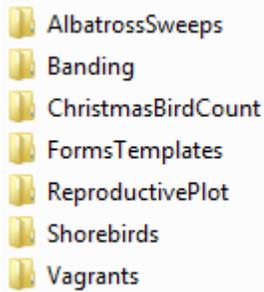
Archived Refuge Folder

- Administrative
- BiologicalMonitoring
- EducationOutreach
- LiteratureLibrary
- Maintenance
- MappingGIS
- Photographs

Biological monitoring Folder

- Avian
- Climate
- Disturbance
- Habitat
- HawaiianGreenSeaTurtle
- HawaiianMonkSeal
- Marine
- OtherWildlife
- Outerisland
- StandardOperatingProcedure

Avian Monitoring Folder



THE WORKING FOLDER

The refuge folder should be modified minimally during the year; any files that need regular access to or modification should be saved from the refuge folder to a working folder operated off a flash drive. Furthermore, any digital files that are created for a given year should be saved to the working folder. At the end of the year files will be archived from the working folder onto the refuge folder. The use of the working folder will help reduce data loss and corruption in the following ways:

- i. Limiting access to the refuge folder will reduce one of the biggest sources of data loss and corruption on the refuge folder: volunteer ignorance.
- ii. The likelihood that multiple copies of the same file will be saved to the refuge folder will be reduced as archiving will occur at the end of the year.

Organization of the working folder will follow the same framework established for the refuge folder, this will make end of year archiving easier.

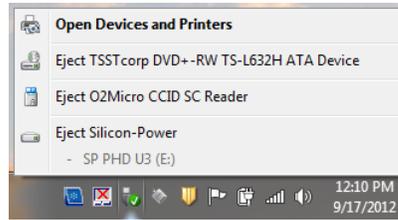
DIGITAL ARCHIVE BACKUP

The refuge folder should be operated from a computer or an external hard drive connected to a computer on a more permanent basis.

The refuge folder should never be operated from the hard drives used for backing up files, this applies to the working folder too.

The refuge folder will be backed up the last Friday of each month and the working folder Friday of each week. If a lot of modifications are made to either the refuge folder or working folder it is recommended they be backed up earlier than their scheduled date. The Tern Island Field Station will at minimum have three hard drives and two flash drives available: two hard drives for backups, one hard drive for Honolulu archiving, one flash drive for the working folder and one flash drive to serve as a replacement. The field station may use multiple different brands of hard drives, but they all will operate similarly. I will now describe the basic steps necessary to backup the Tern Island Field Stations digital databases.

- I. The field stations hard drives and cables should be housed in a medium Pelican Case in the computer room.
- II. Remove one hard drive from the Pelican Case and carry it to the computer you will be using. Insert the USB cable into the hard drive then place the hard drive somewhere where it will not get jostled for the duration of the backup.
- III. With the hard drive secure insert the USB cables opposite end into your computers USB 2.0 port, the hard drive will now become operational. Do not at any point move the hard drive while it is on, hard drives have spinning disks inside them that are very susceptible to damage if the hard drive is moved or bumped during operation (and considering a replacement drive will be a long time coming...this is important).
- IV. It may take a moment or two, but your operating system will bring up a prompt asking if you wish to scan the hard drive. You do not need to scan the hard drive, this process is long and may damage files on the hard drive. Click to bypass this operation and open the hard drive to view the files it contains. At this point you may be hungry, grab a snack, maybe some Cheetos.
- V. You will now need to locate the in use refuge folder and/or working folder. For each folder you will need to delete old dates and insert the current date (ex. 20120917TernIsRefugeFolder).
- VI. Highlight the refuge or working folder then drag and drop it in the open window displaying the contents of the hard drive. The folder will now begin saving, if backing up the refuge folder this may take a considerable amount of time. If the field stations battery bank allows, it may be easiest to perform backups at night when personal will less likely need to use the refuge folder, working folder, or the computer in use for the backup.
- VII. You can walk away from the computer as the backup proceeds. You will need to check on the backup process occasionally to make sure no complications have come up. One common problem when backing up digital databases is having file paths that are too long; the best way to avoid this problem is to follow the provided SOP on labeling. If a pathway comes up too long you will need to skip saving the file and manually locate the file after the backup is complete. Once you locate the file drag and drop it to a folder within the refuge and/or working folder backup for unsaved files. Files paths that are too long must to be corrected before the next scheduled backup date of either the refuge or working folder.
- VIII. Having backed up the refuge and/or working folder to one hard drive you will now need to back it up to a second hard drive: follow the above steps. Make sure to properly eject the hard drive you are using from your computer, don't remove the hard drives USB connection to your computer till it has been properly ejected. Improperly ejecting hard and flash drives can cause irreversible damage.



- IX. When the refuge and/or working folder has been backed up to separate hard drives your job is complete: replace hard drives to their Pelican Case.
- X. At the end of a field season (6 months) a copy of the most recent refuge and working folder should be sent back to Honolulu. A third hard drive should be used for this, and will be replaced by an incoming hard drive as part of an exchange program with USFWS Honolulu offices.

Recommendations:

- I. The exchange of hard drives to and from the Tern Island Field Station for the purpose of archiving refuge and working folders should be maintained.
- II. Personnel at the Tern Island Field Station should be cognizant of new technological advances in the storage of digital information. As solid state drives become more advanced and affordable the field station should phase out traditional spinning disk hard drives.

PHOTOGRAPHY FOR MONITORING

The use of digital cameras as tools for science should be encouraged at the Tern Island Field Station, with the caveat that digital images be properly collected, labeled, and archived. What follows are basic procedures that should be followed when collecting and archiving digital pictures at the Tern Island Field Station.

- i.** An image should be properly framed for the subject matter it is capturing. If an image is too zoomed in or out it can be very hard to interpret. Multiple images of the same subject matter are good idea, though each image should provide new insight or perspective on the subject matter.
- ii.** Take the time to provide an in focus image; too often images are taken in haste and the result is an out of focus image that is no longer useful.
- iii.** Provide a reference for the scale of the subject matter; this would preferably be accomplished with an easily readable tape measure or ruler included in the frame of the picture. Other scale references can also be utilized when in the field: people, vegetation, buildings, etc.
- iv.** Include a white board or something similar within the image that contains pertinent information about the subject matter of the image.
- v.** Images should be labeled with the date and location they were taken, as well a few keywords to denote the subject matter of the image.
 - a.** e.g. 20121004Tern_Is_Entrapped_RFBO

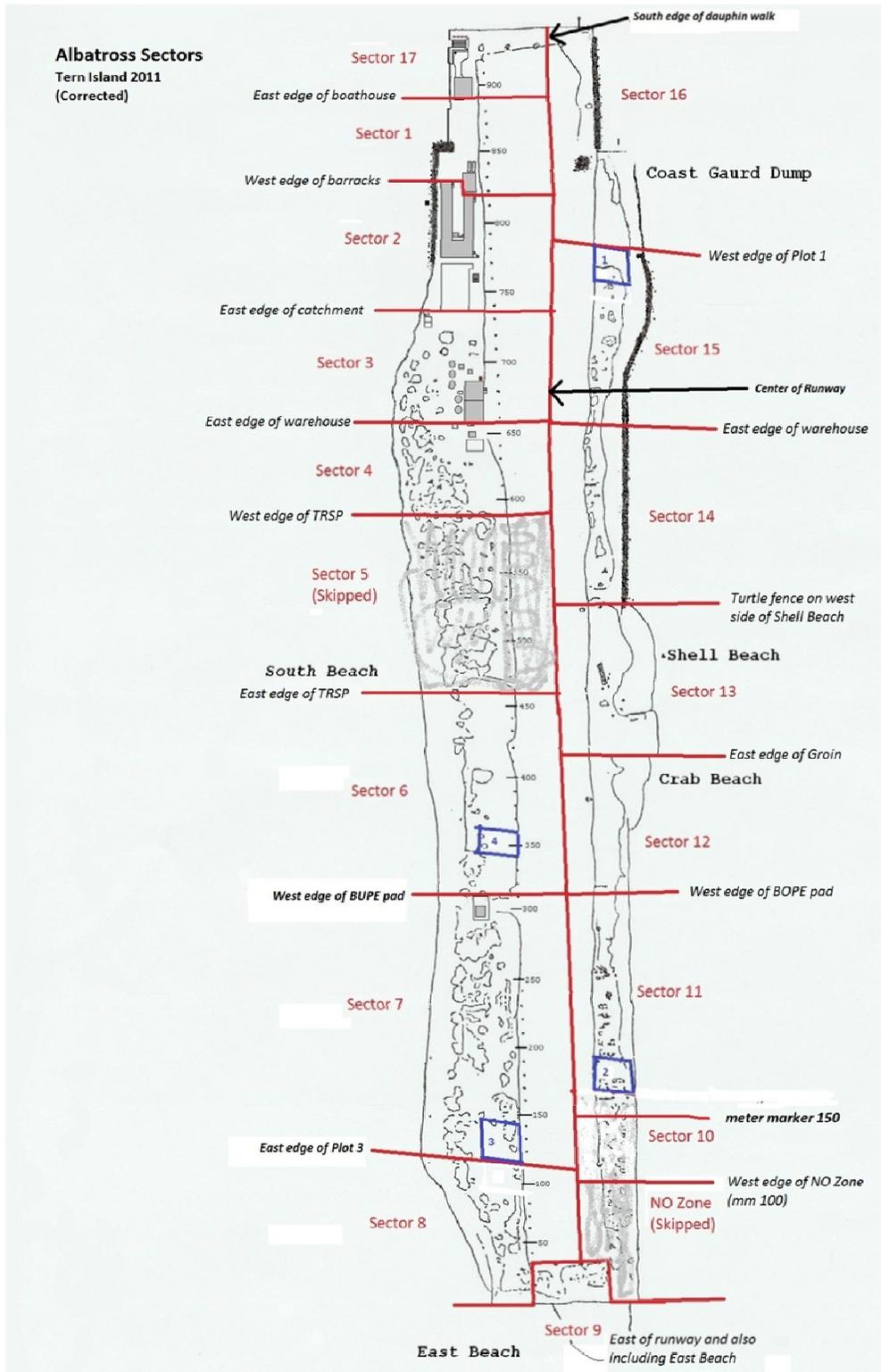


Figure 1. Sector map used during 2011-2012 sweeps, to be followed during 2013 sweeps.

Read and follow the following document!

Albatross Demographic Monitoring Project

Version 1.2

USFWS Standard Operating Procedures for Albatross Demographic Monitoring in the Hawaiian Islands

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Ok. Now that you have read the whole document, a few important things to remember.

For Sweeps:

- 4 total sweeps of each species are conducted, the 4th is a tallywacker sweep.
- Start with BFAL in sector one, work around the island towards sector 17.
- Once BFAL sweep 1 is complete, make sure it is time to start LAAL sweep 1, sector 1-17.

We collect data in field on standard rite in the rain sheets: nesters (double sided, 50 per side), walkers (make sure you indicated which bird is from which sector, this sheet is a bit ungainly)

Date Entered _____ Entered By _____ Date Proofed _____ Proofed By _____

ALBATROSS BAND/RECAPTURE DATA SHEET

Atoll/Islet: **Tern Island FFS**

Page ____ of ____

Observers: _____ # of Observers: _____ Date: _____
 Start Time: _____ Stop Time: _____ Total Time: _____

Species Code (BF or LA)	Age: AHY, L, etc.	FWS Band IF a band is present but not read, enter "Y" IF a band is replaced put the new band # here	New=N Recap=R Replace=RP Destroyed=D	Leg	Color Band		New=N Recap=R Replace=RP	STATUS	SECTOR ID	REPRO PLOT	Nest #	NOTES eg. band replacement (old band #); Sex; injury; oil; status, if not 301, etc.
					Color	Code						
1												
2												
3												
4												
5												

ALBATROSS WALKERS AUX BAND RECORD

RECORDERS:

DATE:

SPECIES:

SWEEP #:

SECTOR:	COLOR	#									
1			51			101			151		
2			52			102			152		
3			53			103			153		
4			54			104			154		
5			55			105			155		
6			56			106			156		
7			57			107			157		
8			58			108			158		

The EXACT same forms are used for all sweeps and both species, for this reason (along with the sheer volume of paper) please be as thorough as possible with completing all fields. Be sure that all sheets include your initials, the date, the page # (x of x for the day or period that you are using one set of data sheets), species, and what sector each bird was in! Remember do NOT put both species on one sheet, (you will see why when it comes time to enter data)!

call signs Alpha, bravo, Charlie... make for fewer mistakes in aux band recording!

Phonetic Alphabet

Character	Pronunciation	Character	Pronunciation
A	Alpha	S	Sierra
B	Bravo	T	Tango
C	Charlie	U	Uniform
D	Delta	V	Victor
E	Echo	W	Whiskey
F	Foxtrot	X	X-Ray
G	Golf	Y	Yankee
H	Hotel	Z	Zulu
I	Indiæ	0	Zero
J	Juliet	1	One
K	Kilo	2	Two
L	Lima	3	Three
M	Mike	4	Fo-wer
N	November	5	Five
O	Oscar	6	Six
P	Papa	7	Seven
Q	Quebec	8	Ait
R	Romeo	9	Niner

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Alpha, bravo, Charlie... make for fewer mistakes in aux band recording!

Don't sacrifice quality for speed, make sure data is recorded accurately!

And make extra, triple, quadruple sure that all information regarding new and replaced bands is as perfect as it can be!!!!

How to deal with hundreds of pages!

For each sweep and species have a designated folder to put completed forms (BFAL 1 in a different folder than LAAL 1). All completed forms both nester and walker can go in this folder (make sure these forms are independently identifiable).

For each sweep for each species, print out a copy of the sector map. Cross out and initial completed sectors (and note sections skipped due to seals, attempt to complete these areas, if not completed make sure to note approx. area and #nests skipped). Once the sweep is complete file this map with the sweep data.

When you finish you will have 8 separate packets of information. BFAL sweep 1-4 and LAAL sweep 1-4. Make sure these packets are binder clipped together, and contain an up to date label of entering and proofing status (sticky notes work well).

What to do with new bands and replaced aux bands?

Copy to banding schedules as you go! Make sure data is complete, update schedule for birds with an existing metal band where their aux band state changed.

Entering

When you go to enter a given sweep; put all the pages in chronological order, making sure all pages from each observer are together. It is then helpful to number the tops of the pages (so if you happen to drop the stack.....), do not cross out the page x of x. As you complete each page fill in your initials and the date at the top, and use a sticky note to denote the portion of the stack that has been entered. If any questionable letters/ numbers are found

Proofing

Line by line, check that all data is correctly entered!

Hard copy data organization is key for this process!

It is very easy to lose data sheets, so make sure they get properly filed!

Seabird and shorebird monitoring at The Tern Island Field Station is founded on five monitoring tools: mean incubation counts (including outer island surveys), mark-recapture studies, banding, and reproductive plots (aka productivity plots).

Our biological work also includes research, protection of species and habitats, habitat restoration, wildlife safety, and related activities. Protocol for our biological work is included in this manual. **Special and short-term project protocol are not included in this manual.** You may refer to appendices of the FFS 10 year plan to find out about our longer range plans and unmet needs. Protocol for non-biological work (e.g., facilities maintenance) are included elsewhere. A summary of monitoring activities by species is included in a table below.

Species	Start Season (year 1, e.g. 2005)	End Season (year 2, e.g. 2006)	MIP
LAAL	29-Oct	28-Oct	64
BFAL	28-Oct	27-Oct	65
BOPE	13-Nov	12-Nov	49
BUPE	18-Nov	17-Nov	44
TRSP	20-Nov	19-Nov	42
WTSB	9-Nov	8-Nov	53
CHSH	10-Nov	9-Nov	52
GRFR	7-Nov	6-Nov	55
RTTR	19-Nov	18-Nov	43
MABO	18-Nov	17-Nov	44
RFBO	16-Nov	15-Nov	46
BRBO	N/A	N/A	N/A
SOTE	3-Dec	2-Dec	29
GRAT	2-Dec	1-Dec	30
WHITE	26-Nov	25-Nov	36
BRNO	27-Nov	26-Nov	35
BLNO	28-Nov	27-Nov	34
BGNO	N/A	N/A	N/A

End of the Reproductive Year

The reproductive year begins before the calendar year. The reproductive year includes those chicks born January 1st or after, so therefore includes those eggs laid one mean incubation period before January 1st. The first day of the reproductive year for each species should be written on Biological Monitoring calendar. Most of the seabird species on Tern start their reproductive year in November.

It is important to keep track of the year to which nests belong if you are monitoring plots during this time of year. Any data collected for each reproductive season should be included in a separate field notebook, and separate spreadsheet. Any new eggs laid on or after the first day of the reproductive year should have different colored flagging than those eggs laid in the previous reproductive year. If you have any question, ask the Refuge Manager.

Additional things we will be sending after final review:

Formats and forms to use for next years reproductive year

Species	Start Season (year 1, e.g. 2005)	End Season (year 2, e.g. 2006)	MIP
LAAL	29-Oct	28-Oct	64
BFAL	28-Oct	27-Oct	65
BOPE	13-Nov	12-Nov	49
BUPE	18-Nov	17-Nov	44
TRSP	20-Nov	19-Nov	42
WTSH	9-Nov	8-Nov	53
CHSH	10-Nov	9-Nov	52
GRFR	7-Nov	6-Nov	55
RTTR	19-Nov	18-Nov	43
MABO	18-Nov	17-Nov	44
RFBO	16-Nov	15-Nov	46
BRBO	N/A	N/A	N/A
SOTE	3-Dec	2-Dec	29
GRAT	2-Dec	1-Dec	30
WHTE	26-Nov	25-Nov	36
BRNO	27-Nov	26-Nov	35
BLNO	28-Nov	27-Nov	34
BGNO	N/A	N/A	N/A

Comprehensive banding manual

Albatross sweep data organization

And all of this will be completed and hopefully less than 50 pages with photos :D