

South Florida/Caribbean Network

National Park Service
Inventory and Monitoring Division



Standard Operating Procedure SL06

Data Entry, QA/QC, and Management—Version 1.1

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Purpose

This standard operating procedure (SOP) describes data entry, QA/QC, and management procedures for individual divers and data managers.

Revision Log

Revision Date	Author	Changes Made	Reason for Change	New Version #
3/24/2020	Judd Patterson	Added a line about a new database that will be under development soon, and updated the data distribution section to reference park protected data agreements.	The Access database is slightly out of sync with the latest protocol, but a new database should be ready later in 2020. The distribution section was updated to ensure that it was in sync with park protected data agreements.	1.1

Source Protocol

This SOP is derived from SOP 8 in the Virgin Islands reef fish monitoring protocol:

- Bryan, D. R., A. J. Atkinson, J. S. Ault, M. E. Brandt, J. A. Bohnsack, M. W. Feeley, M. E. Patterson, B. I. Ruttenberg, S. G. Smith, and B. D. Witcher. 2013. A cooperative multiagency reef fish monitoring protocol for the U.S. Virgin Islands coral reef ecosystem. Natural Resource Report NPS/SFCN/NRR—2013/672. National Park Service, Fort Collins, Colorado.

Introduction

Data management is an important multilevel process that involves all participants. Steps taken to manage the data once they have been collected include data entry, proofing, and storage. The specific steps and the person responsible for each step are outlined in Table 1 and explained in detail in the following sections.

Table 1. Data entry and proofing steps, responsible person, and forms and programs used.

Steps	Responsible Person	Forms / Programs Used
1. Field data collection	Diver	Lobster datasheet & Boat log
2. Scan datasheets and boat logs and store on server	Diver	SFCN server
3. Enter datasheets and boat logs and proof against the originals	Diver	SFCN lobster database
4. Save photos to server	Diver	SFCN server
5. Save GPS files to server	Field lead	SFCN server
6. Verification of entered data against datasheets	Second Diver	SFCN lobster database
7. Storage of hard copies of datasheets and boat logs	Diver	Conference room (FL) or SFCN file cabinet in VIIS visitor center (VI)
8. Check that all data have been entered and accounted for	Data Manager	SFCN lobster database
9. Run automated QA/QC checks and proof data; mark as accepted or certified (dependent on existence of QAP)	Marine Ecologist and Data Manager	SFCN lobster database
10. Data storage on server and upload to IRMA Data Store	Data Manager	IRMA Data Store

Post Field Procedures

After a site visit, the datasheets and boat logs should be scanned and saved on the SFCN server in the following location:

- Z:\SFCN\Vital_Signs\Lobster\data\scanned_datasheets\PARK\YEAR

Additional PARK and YEAR subfolders should be created as needed to organize the files. After scanning, the original datasheets should be subset by diver to facilitate data entry.

Data Entry Procedures

Divers are responsible for accurately entering their data into the database within one month of collection. Memory of the sampling event will fade with time, so entering data as soon as possible after collection is recommended. The current database is in Microsoft Access, but a new database is under development with assistance from the Central Office in Fort Collins. This SOP will be updated once the new database is completed.

Opening the Database

1. Open the SFCN Lobster Data by browsing to Z:\SFCN\Vital_Signs\Lobster\data\SFCN_Lobster.accdb.
2. A Startup screen will appear and display buttons for various Database Tasks.

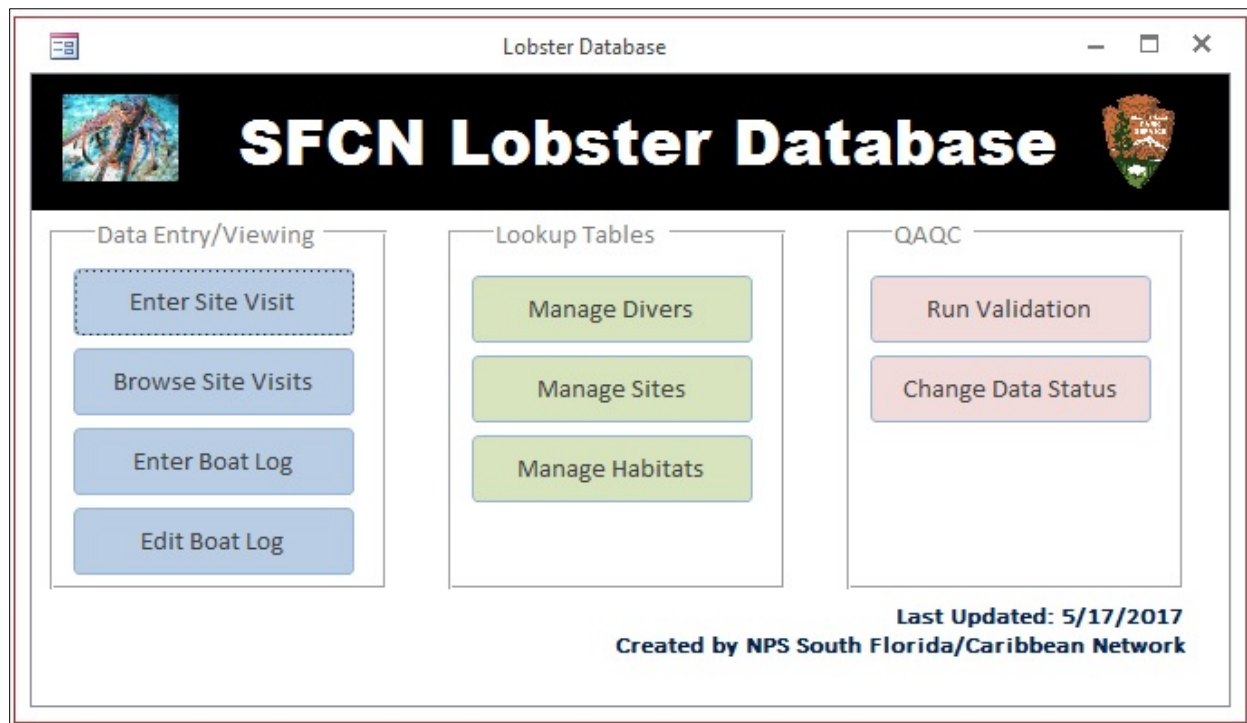


Figure 1. Screenshot of startup screen.

Entering a Site Visit

1. Click on the button for “Enter Site Visit.”
2. A new form will display and show the site visit data entry screen.

SFCN Lobster Database

Site Visit

Observer Park Site ID Start Time Visibility (ft)
Buddy Date Plot End Time % Plot = Habitat
Depth (ft)

Lobsters ☐ No Lobsters Found

Quadrant
Estimate of CL (mm)
Measure of CL (mm)
Sex
Molt Condition
Eggs
Spermat
Distance to edge (m)
Notes

Observed Habitat Type

Abiotic Footprint %

Sand
Rubble
HardB

Surface Relief Coverage %

<0.2 m
0.2-0.5 m
0.5-1.0m
1.0-1.5m
>1.5 m

Verified Date
Verified By

Figure 2. Site Visit data entry screen.

3. Referring to the original datasheet, enter each of the parameters across the top, including “Observer,” “Buddy,” “Park,” “Date,” “Site ID,” “Plot,” “Start Time,” “End Time,” “Depth (ft),” “Visibility (ft),” and “% Plot = Habitat.”
4. Select the appropriate value from the “Observed Habitat Type” drop-down list.
5. Fill in the appropriate values for “Abiotic Footprint %” as whole numbers. An automated check ensures the values total 100 (%).
6. Fill in the appropriate values for “Surface Relief Coverage %” as whole numbers. An automated check ensures the values total 100 (%).
7. If no lobsters were found by a diver in the quadrants surveyed in the circular plot, tick the “No Lobsters Found” box and data entry is complete.
8. If lobsters were found, continue to the “Lobsters” subform and enter “Estimate of CL (millimeter),” “Measure of CL (millimeter),” “Sex,” “Molt Condition,” “Eggs,” “Spermat,” “Distance to edge (m),” and “Notes” for the first lobster.

9. Additional lobster can be added to this plot by clicking the new record button (inside the red square below) and repeating step 9.

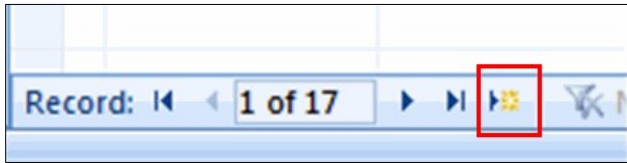


Figure 3. Additional lobster can be added to this plot by clicking the new record button (inside the red square below) and repeating step 9.

10. Leave the “Verified Date” and “Verified By” fields blank during initial data entry. These will be filled in during verification by a second person in the “Data Verification and Additional QA/QC” section below.
11. Once all lobsters have been entered for a site, click “Add Site Visit” to bring up a new form to add data collected from other sites. Close the form after all data have been entered.

Entering a Boat Log

1. Click on the button for “Add Boat Log.”
2. A new form will display and show the boat log data entry screen.

A screenshot of a web browser window titled 'tbl_Boat_Log'. The page header includes 'SFCN Lobster Database' and 'Lobster Survey Boat Log'. Below the header is a table with the following columns: Park, Date, Dive of Day, Site Name, Est. Time, Dive Team, Diver A, Diver B, Latitude, Longitude, Target Habitat, GPS #, and Notes. The table is currently empty, showing only the first row of headers. At the bottom of the page, there is a status bar that reads 'Record: 1 of 1' and a search bar.

Figure 4. The boat log data screen.

3. Referring to the original boat log, enter each line across the top, including “Park,” “Date,” “Dive of Day,” “Site Name,” “Estimated Time,” “Dive Team,” “Diver A,” “Diver B,” “Latitude,” “Longitude,” “Target Habitat,” “GPS #,” and “Notes.”
4. As each line is added, a new, blank line will appear. Continue typing in additional boat log rows.
5. Close the form after all boat log rows have been entered.

Saving GPS Data

One person is designated as a field lead who will collect the GPS units upon returning from the field each day. The tracks from the GPS units are downloaded and saved as a .gpx file to the server at this location:

- Z:\SFCN\Vital_Signs\Lobster\spatial_info\GPS_tracks\PARK\YEAR

Create additional PARK and YEAR subfolders as needed to organize the files. The naming convention for the individual GPX files should be: YYYYMMDD_PARK_lobster_GPS#_track.gpx.

- “YYYYMMDD” is the year, month, and day the track was collected.
- “PARK” is the four-letter code of the park unit where the surveys were conducted.
- The word “lobster” identifies the track as a lobster survey.
- “GPS#” is the name of the GPS that was used to collect the data. This should match the GPS# column values found in the boat log (SFCN SOP SL04 *Lobster Data Collection and Survey Methods—Version 1.1* [SFCN 2020]).
- The word “track” identifies the file as a track file.

For example, a file named 20170424_Biscayne NP_lobster_GPS4_track.gpx would be a track file during a lobster survey that was completed in Biscayne NP on April 24, 2017 on GPS #4.

Saving Photos

All photos are saved to the SFCN server by the individual diver who took them. In the event a diver does not have access to the SFCN server, the photos may be saved on a local server, then transferred and organized on the SFCN server by the lobster project lead. All photos taken at a site (slate photos, habitat photos, egg/spermatophore photos, and any miscellaneous photos) are saved to a site-specific folder on the SFCN server following the naming convention below:

- Z:\SFCN\Vital_Signs\Lobster\images\Survey_photos\YEAR\PARK\SITE

The YEAR, PARK, and SITE subfolders may not have been created yet for the sample event when photos are downloaded to the server. The photos themselves are not renamed, but the subfolders will need to be created to identify the year (e.g., 2017), park (e.g., BISC), and site (e.g., 1011) at which the photos were taken.

The four habitat photos taken at each site are preceded by a photo of the datasheet with the site name clearly visible. Use this photo of the slate to organize the subsequent photos into the respective site folders.

Data Verification and Additional QA/QC

Each diver must enter their data within one month of each survey and then conduct a 100% review of their data after entry into the database to ensure it was accurately entered from the datasheets. Early data entry is preferred as it is easier to remember surveys and catch any mistakes. Subsequent proofing of the data, using copies of the originals, may be done by the diver as long as the entry and proofing tasks are separated by several days. This will serve as an independent verification of 100% of the entered data.

Quality Assurance Methods during Data Collection

There are several methods in place during data collection itself that ensure that consistent, quality data are collected during surveying:

- When divers are deployed at a site, coordinates of their deployment point are written on the boat log as a backup, while the towed GPS serves as the primary record of location.
- Each diver independently completes the habitat assessment of a site to be compared at the surface following a survey. Divers communicate and ask questions and review each other's data and interpretation of percent habitat cover and habitat classification. The habitat photos may be consulted by the lobster project lead or marine ecologist if a discrepancy between divers cannot be resolved in the field.
- All surveyors practice size estimation of plastic models of lobster prior to a sampling event to ensure that estimation methods are routinely calibrated among observers.
- Estimates of lobster size are taken prior to capture of lobster to measure actual size. A comparison of estimates, when compared to the actual sizes of captured lobsters, provide real-time calibration of size estimation during a sample event.

Verifying Site Visit Data

1. Click on the button for "Edit Site Visit."
2. A new form will display and show existing site visits.
3. Use the forward and backward navigation arrows at the bottom of the form to move between records and locate the batch of records that need verification by a second diver.
4. Review each of the entered values and compare it to the original datasheet. Be sure to check both site level fields and all lobster observations. Correct errors in the database as they are found. If there are questions about what was written on the original datasheets, consult the diver who recorded the original data. Bring major or recurring errors to the attention of the data manager and marine ecologist.
5. When verification of a site is complete, fill in the "Verified By" and "Verified Date" fields at the bottom of the form and move to the next record.

6. Repeat steps 3–5 until all records have been verified.

Verifying Boat Log Data

1. Click on the button for “Edit Boat Log.”
2. A new form will display and show existing boat log entries.
3. Use the scroll bars to locate the batch of records that need verification by a second diver.
4. Review each of the entered values and compare it to the original boat log. Correct errors in the database as they are found. If there are questions about what was written on the original datasheets, consult the diver who recorded the original data. Bring major or recurring errors to the attention of the data manager and marine ecologist.
5. When verification of a site is complete, fill in the “Verified By” and “Verified Date” fields at the bottom of the form and move to the next record.
6. Repeat steps 3–5 until all records have been verified.

Additional QA/QC

Once all data for a season have been entered and verified, the data manager will check to make sure that all survey sites are accounted for and will run QA/QC checks to ensure a complete data set. The marine ecologist will review the data to look for any unusual aspects (e.g., anomalous or missing) in the data set and flag any suspicious values. Any suspicious values will be brought to the attention of the surveyor to be either validated or corrected. In extreme circumstances a site or a portion of a site’s data may have unresolvable errors and may need to be invalidated with the approval of the marine ecologist or protocol lead. The checks that are run will include, but are not limited to:

- Check that all assigned sites were completed.
- Check that data (boat log, lobster, and habitat data) have been entered and verified.
- Check that all required fields were entered.
- Check that the fields under “Abiotic footprint %” and “Surface relief coverage %” each add up to a total of 100% on a site visit.
- Check that all site visits have lobsters or the “No lobster found” box is checked.
- Flag plots where one or more divers recorded habitat classification that deviated from the expected habitat (from benthic map) and provide these to the marine ecologist/protocol lead to determine if they are explainable (e.g., visibility or drop location) or should be removed from analyses.
- Check the GPS track logs and the planned coordinates to make sure sampling occurred in the appropriate area. Any sites that originated outside of the target cell should be reviewed by the marine ecologist and/or the protocol lead.

Data Storage and Distribution

Data will be stored locally on the SFCN server where it will be included in routine SFCN onsite and offsite backups. Each year after verification/validation and certification are completed a new cumulative version of the database will be uploaded to the National Parks Service's Integrated Resource Management Applications portal (IRMA). The version that will be accessible to the public will have specific locations of surveys obscured according to park protected data agreements. This is done because the spiny lobster is a commercial species and specific locations of surveys are considered protected data.

Literature Cited

- Bryan, D. R., A. J. Atkinson, J. S. Ault, M. E. Brandt, J. A. Bohnsack, M. W. Feeley, M. E. Patterson, B. I. Ruttenberg, S. G. Smith, and B. D. Witcher. 2013. A cooperative multiagency reef fish monitoring protocol for the U.S. Virgin Islands coral reef ecosystem. Natural Resource Report NPS/SFCN/NRR—2013/672. National Park Service, Fort Collins, Colorado. Available at: <https://irma.nps.gov/DataStore/Reference/Profile/2195859> (last accessed June 2020).
- South Florida/Caribbean Network. 2020. Lobster data collection and survey methods—Version 1.1. South Florida/Caribbean Network Standard Operating Procedure NPS/SFCN/SOP—SL04. South Florida/Caribbean Network, Palmetto Bay, Florida. Available at: <https://irma.nps.gov/DataStore/Reference/Profile/2275700> (last accessed June 2020).