

South Florida/Caribbean Network

National Park Service
Inventory and Monitoring Division



Standard Operating Procedure SL05

Training—Version 1.1

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Purpose

This standard operating procedure (SOP) describes the training required for participants to collect spiny lobster monitoring data.

Revision Log

Revision Date	Author	Changes Made	Reason for Change	New Version #
3/24/2020	Lee Richter	1) Updated species identification section to include spotted lobster, queen conch, and urchin 2) Updated capture technique to include snare 3) Added list of Contacts	1) Species now included in survey. Trainees need to know how to identify them 2) Use of snare or tickle stick and net is surveyor preference 3) Removed from Narrative	1.1

Source Protocol

This SOP is derived from SOP 7 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

Accurate lobster surveys require participants to be proficient in the following skill sets:

1. Species identification;
2. Habitat characterization;
3. Circular plot layout;
4. Ability to detect spiny lobster, when present;
5. Visual estimation of carapace length;
6. Ability to capture lobster effectively without injury; and
7. Ability to measure carapace length and assess biological condition of lobster.

In-water training is the best way to demonstrate and learn these skill sets, though the participants should familiarize themselves with species identification, methods, and the biological characteristics to be recorded prior to entering the water. The in-water training is split into two sections. In the first, emphasis is put on species identification, visual estimation of carapace length, ability to capture lobster, and assessing the biological condition of the lobster. The second section focuses on plot layout and habitat characterization. Once trained, new divers are paired with an experienced surveyor when actual surveys are conducted.

Species Identification

Participants making observations must be competent in the identification of spiny lobster (*Panulirus argus*). the primary focus of this monitoring protocol is the spiny lobster (*P. argus*) and secondarily, the spotted lobster (*P. guttatus*). The two species live in similar environments and have minor differences in appearance, so proper identification of each of these species is necessary. Spotted lobsters are generally smaller, covered in many small white spots and are more reclusive, hiding in darker recesses in the reef (Figure 1). Other species of lobster may be encountered, but they are rare. The Spanish slipper lobster (*Scyllarides aequinoctialis*) is occasionally found in the parks, but does not resemble the spiny lobster in appearance. The most recent edition of Reef Creature Identification:

Florida and the Caribbean by Humann et al. (2013) is a good resource for lobster species identification.

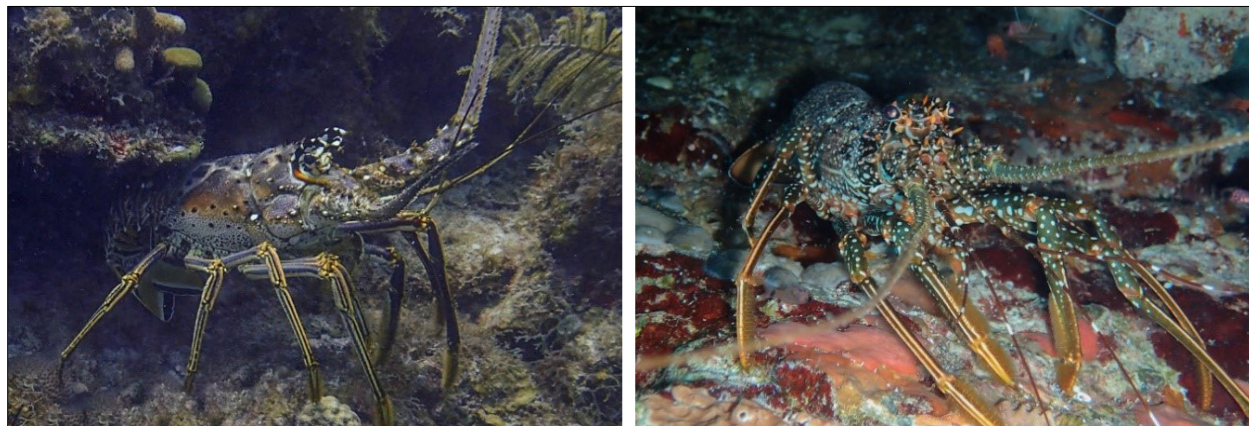


Figure 1. A spiny lobster (*Panulirus argus*) is pictured on the left. A spotted lobster (*Panulirus guttatus*) is pictured on the right. The spotted lobster is generally smaller than the spiny lobster and covered with small white spots. Spotted lobsters also tend to be more reclusive, hiding in darker recesses of the reef during the day.

Queen conch (*Lobatus gigas*) and long-spined urchin (*Diadema antillarum*) data are collected opportunistically as part of this protocol. Participants will be adept at identifying these species and differentiating them from similar conch and urchin species found in the Caribbean.

Habitat Characterization

All participants must be familiar with the habitat classification scheme used in the stratified survey design for the park unit in which the surveys will take place (Appendix A: *Benthic Habitat Classifications in Florida* and Appendix B: *Benthic Habitat Classifications in the U.S. Virgin Islands* [Richter et al. 2018]). Participants must be capable of distinguishing habitat types and classifying the abiotic characteristics (e.g., abiotic footprint, surface relief coverage) of the habitat that is measured.

Plot Layout

Participants must be able to lay out the circular plots following the decision rules presented SFCN SOP SL04 *Lobster Data Collection and Survey Methods—Version 1.1* (SFCN 2020a). A new diver is paired with an experienced surveyor when actual surveys commence. The experienced surveyor lays out the plots until the new diver feels confident they can do so accurately. The new diver can then lay the plots under the supervision of the experienced surveyor.

Ability to Detect Spiny Lobster

The spiny lobster is a cryptic species and uses hard-bottom structure for shelter during the daytime. They can be difficult to detect. It is imperative that observers are trained how to adequately search for lobster. This includes looking in cracks, crevices, and caves in the reef structure, as well as under ledges and overhangs. In many cases, only the lobster antennae may be seen protruding from a shelter. Observers that develop a “search image” for this will be able to detect lobsters more effectively. There will be situations where the complexity of the reef habitat is such that not all

shelters can be adequately searched by a diver. The goal is to ensure that all shelters that are possible to search at a site will be adequately searched during a survey.

Capture of Spiny Lobster

This protocol uses either a snare or a tickle stick and net to capture spiny lobster. of the surveyor decides which tool they will use to attempt captures of lobsters. Both capture methods require skill and practice to capture lobster effectively without injuring them. Appropriate training includes how to use each tool and covers the situations where one method may be preferable over the other.

A tickle stick is a thin stick about 1 meter (3.2 feet [ft]) in length with a bent tip. When a lobster is encountered, the bent tip is gently placed under the tail or body of the lobster to coax it out into the open. If done too aggressively, the lobster will frighten and try to escape by flipping its tail and moving quickly backwards. A flat-bottomed net is placed behind the lobster (in between the lobster and the den), so that when the lobster is then startled, it swims backwards into the net (Figure 2). The open side of the net can be placed on the bottom, making it more difficult for the lobster to escape. Once the lobster is inside the net, hold with a gloved hand to measure the actual carapace length and record the biological condition of the lobster. Participants should be generally familiar with how to do these tasks prior to in-water training for capturing lobster.

A snare may also be used to capture lobster. The snare consists of a loop on the end of a stick that is tightened around the tail of a lobster to prevent escape. During the 2019 sample season, we found a snare preferable to a tickle stick and net when lobsters were in hard-to-reach places deep inside the reef. However, the snare was less effective at capturing smaller lobsters. Prior to capture, if an observer notices a lobster has eggs, a tickle stick and net is used rather than a snare in order to lessen the potential of harm to the eggs. It is important to obtain accurate size data for lobsters observed to have eggs, though extra care should be taken when handling these berried lobsters (Tom Matthews, Associate Research Scientist, Florida Fish and Wildlife Conservation Commission, pers. comm. October 21, 2019).

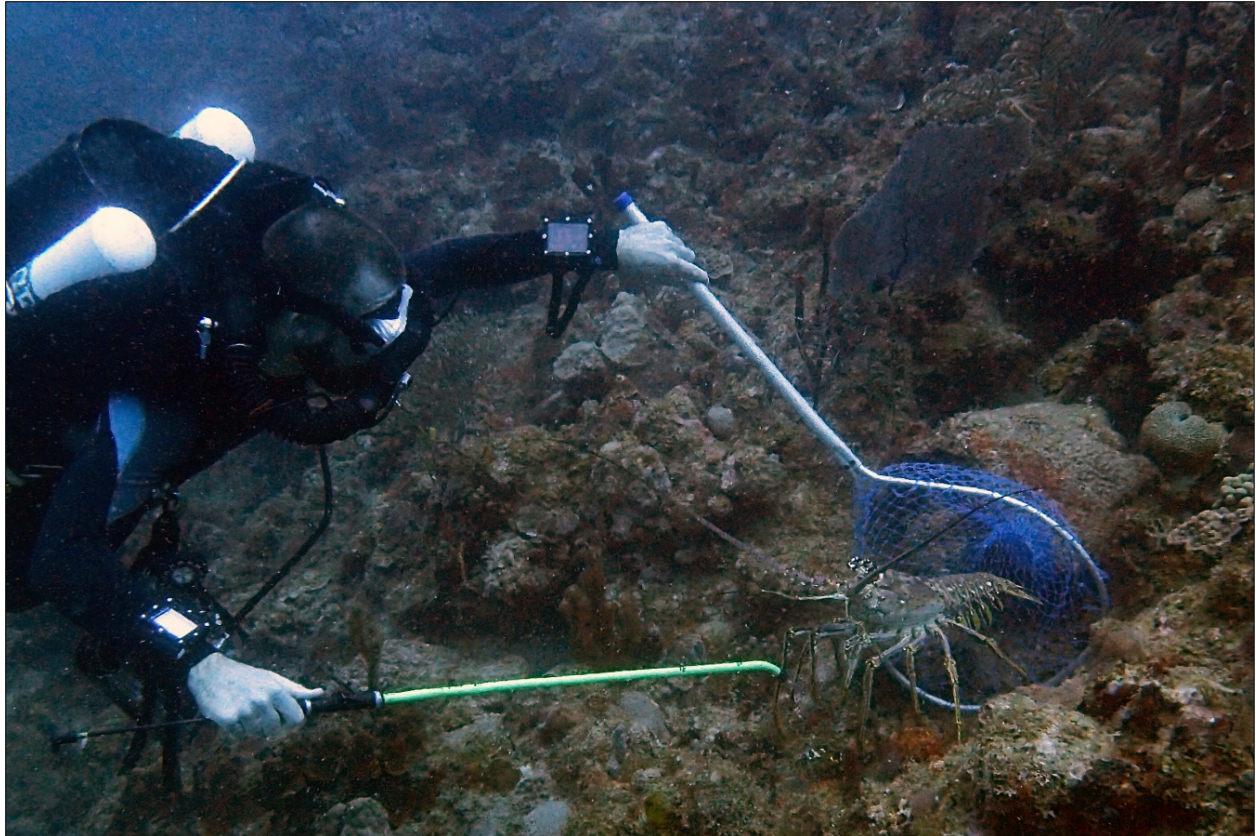


Figure 2. A diver demonstrating how to catch a lobster that has been coaxed out into the open with a tickle stick and net placed behind (Photo by Jeff “CCR” Miller).

Biological Characteristics

Prior to surveying, participants must familiarize themselves with how to identify the following characteristics once captured:

1. Actual carapace length (to the nearest millimeter).
2. Sex (male or female).
3. Molt condition (pre-molt, post-molt, or intermolt).
4. Presence and condition of eggs (orange or brown).
5. Presence and condition of a spermatophore or “tar-patch” (eroded or fresh).

South Florida/Caribbean Network SOP SL04 (SFCN 2020a) presents basic information and figures on how to identify these characteristics, but participants should also refer to other literature, images, or an experienced lobster surveyor for further information. Identifying these traits is confirmed during in-water training when possible. However, some conditions (e.g., pre-molt, presence of brown eggs) may be too infrequent to be adequately assessed during in-water training of new divers.

In-water Training: Size Estimation, Capture, and Characteristics Assessment

In-water training is separated into two parts. The first portion focuses on how to search for lobster effectively, species identification, carapace length estimation, capture, and biological condition assessment. This is most effective if the in-water training occurs in an area where many lobster are expected to be seen. No plots are established for this section of training so new divers may interact with as many lobsters as possible.

1. An experienced observer (trainer) brings the new diver(s) to a location where many lobster are expected. A suitable test area should also be relatively shallow, with visibility exceeding 10 meters (32.8 ft), and with minimal current.
2. If possible, the trainer should try and locate a spotted lobster (*P. guttatus*) to compare with the spiny lobster (*P. argus*). The spotted lobster, which look most similar to the spiny lobster, is typically smaller and more reclusive, hiding in darker recesses in the reef.
3. The trainer should locate a spiny lobster. The trainer first estimates its carapace length. The trainees also estimate the carapace length. Following the visual estimates, the trainer demonstrates how to capture the lobster effectively. If captured successfully, the trainer demonstrates how to handle the lobster without injury. The trainer also demonstrates how to measure the actual carapace length with a measurement aid and identify any key biological characteristics of the lobster. The trainer then releases the lobster.
4. Another spiny lobster should be located. The trainer and all the trainees visually estimate the carapace length. A trainee is then given an opportunity to capture the lobster. If captured successfully, the trainee measures the actual carapace length with a measurement aid and records biological characteristics. The trainer provides guidance or notes any new characteristics if observed.
5. For the rest of the dive, the trainees are given the opportunity to find, estimate size, capture, and assess as many spiny lobsters as possible.
6. Following the dive, the trainer and trainees compare the visual estimates of carapace lengths to the actual carapace lengths recorded. Estimates should be within 20 millimeters (0.6 inches [in]) of the actual length. Additional training is provided for a trainee that exhibits consistent and considerable (greater than 20%) error until error rates are less than 20%.

It is important to note that the ability to visually estimate carapace length can be honed throughout the actual surveys. The visual estimates can continuously be compared to the actual recorded values. Use these comparisons to generate a correction factor for individuals, when enough samples have been accrued.

It is unlikely that all of the biological characteristics (e.g., a pre-molt lobster) will be seen during the training. The trainee should however be comfortable with the identification of most of the characteristics and know where and how to identify less-frequently observed traits. Once training is

completed, the new diver will carry a camera with them so they can document characteristics they are unsure of and confirm them with an experienced surveyor.

In-Water Training: Circular Plot Establishment and Habitat Characterization

The second portion of in-water training focuses on circular plot establishment and habitat characterization. Here, the trainees are assessed as to whether they can establish a pair of circular plots (comprising the whole survey sample) following the decision rules in SOP SL04 (SFCN 2020a). Trainees must be able to characterize the habitat according to the “habitat assessment” section in that same SOP. Plot layout in-water training occurs in a few different habitats so the trainee gains experience with how circular plots may differ among surveys.

1. Before entering the water, the trainer verbally discusses the decision rules and methods in order to establish the circular plots at each site. The trainer also answers any questions the trainees may have prior to entering the water.
2. The trainee attempts to establish a circular plot under the supervision of the trainer.
3. Once the trainee has established the plot properly, they will characterize the habitat in the plot using the datasheet, the “habitat assessment” section in SOP SL04. The trainer also does this and compares with the trainee after surfacing.
4. If any lobster are encountered in the plot, the sizes are visually estimated, an attempt at capture made, and pertinent biological characteristics recorded. This is done by the trainee and trainer for comparison. This step will also task load the trainee in a manner that is representative of an actual survey.

Surveys Conducted by New Divers, Post-Training

A new diver’s first lobster surveys will occur with an experienced lobster surveyor. The experienced surveyor will provide guidance and answer any questions. The new diver will also be calibrating their size estimates by comparing their size estimates to those of the experienced surveyor and with actual measurements of captured lobsters. It is recommended that during actual surveys, the experienced diver establishes the circular plots (SOP SL04) until the new diver understands and can execute the decision rules of establishing circular plots correctly in a variety of habitats and situations. Regardless of experience, after a survey both divers discuss how the survey was laid out, compare habitat characterizations, and discuss any notable observations of lobster during the survey.

Size Estimation Calibration

Prior to a sampling event it is important that all participants are able to estimate carapace length sizes underwater consistently. Estimating size of plastic lobster models is a great way to calibrate size estimation among participants. The carapace lengths of the models are known and the participants can directly compare their estimates to the actual lengths. All surveyors practice size estimation until their estimates are consistently within 20 millimeters (0.6 in) of the actual length. A measuring aid (e.g., the ruler on the side of many clipboards or markings on the tickle stick) may be used to aid in estimation, as it would be used on an actual survey.

Data Entry and Proofing Training

All participants should be instructed on data entry methods and be familiar with SFCN SOP SL06 *Data Entry, QA/QC, and Management—Version 1.1* (SFCN 2020b) before using the database. Once data entry is complete, participants will be briefed on how to perform basic QA/QC checks of the data. The data manager will assist in this process.

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