SEAMAP

Bottom Longline Survey Operations Manual

Gulf States Marine Fisheries Commission
2404 Government St
Ocean Springs, MS 39564

March 24, 2022

SEAMAP Bottom Longline Survey Objectives

1) Conduct a seasonal bottom longline survey in water depths <10 meters to assess the seasonal abundance and distribution of fishes with priority given to the August-September time period.

2) Collect biological samples for life history analysis.

Longline Survey Design

The SEAMAP Bottom Longline Survey began in 2008 when Mississippi started sampling the inshore waters off Mississippi. Alabama and Texas joined the Bottom Longline Survey in 2010 while Louisiana began sampling in 2011. All partners use the same gear and fishing technique. A one nautical mile longline is used with one hundred 15/0 circle hooks on 3.66 m gangions. Gear is fully deployed, allowed to soak for 60 minutes then retrieved. Catch data are collected as catch comes aboard. Additional biological samples are collected from target species. Environmental data is collected at each site.

Until 2014 each partner randomly selected stations off their coast independent of other states. There were discrepancies among the partners regarding number of stations sampled, the frequency of sampling, the size of the sampling universe, and the depth strata targeted. In an effort to make the bottom longline data as useful as possible in federal and state stock assessments, the SEAMAP Subcommittee began an effort in 2014 to develop a protocol for station selection procedures. This effort sought to better standardize the sampling effort among the partners and develop a more uniform design and resultant data set. At the March 2015 SEAMAP Subcommittee meeting, firm station selection protocols were established.

Vessel Requirements

Bottom longline projects can be supported by a variety of vessels. The size and capacity of a vessel are directly related to cruise duration capabilities and accommodations for scientific crew. Regardless of size, all vessels should be equipped with adequate communications, navigational, and Coast Guard approved safety equipment. All vessels should be equipped with a self-contained longline reel that can hold several miles of the mainline monofilament, and either hydraulic or electrical power system capabilities sufficient to run the longline reel during deployment and retrieval of the gear. Vessels should also be able to safely operate within the sampled depth strata, which can be as shallow as 3 m.

Survey Equipment, Gear, and Bait

Mainline

- Mechanical driven longline spool that holds a sufficient length of 4mm diameter monofilament. (e.g. Lindgren-Pitman Super Mini Spool)
- 4mm (approximately 454kg test) clear monofilament for mainline construction

Gangions

- 3mm diameter (approximately 320kg test) monofilament for gangion construction
- 15/0, 0-offset, steel circle hooks (e.g. Mustad 39960ST-DT)
- # 148 Snap - 8/0 swivel (e.g. Hi-Liner Snap-148-8/0)

- An appropriate size aluminum double sleeve (e.g. Hi-Liner Vrimps-HL3.5)
- 55 gallon barrels (2), for gangion storage
- Crimping tool

High Flyers

- High flyers (2), each rigged with monofilament to a 148 snap with 8/0 swivel (e.g. Lindgren-Pitman High Flyer Complete)

Weights

- Weights (3), each rigged with monofilament to a 148 snap with 8/0 swivel

Bait

- Atlantic mackerel (*Scomber scombrus*) for bait

Gangion Development and Storage

Each longline deployment will include 100 gangions. Each gangion should be 3.66 m in total length, as measured from the tip of the longline snap to the tip of the circle hook. Each gangion will consist of a 15/0 circle hook (Figure 1) attached to one end by means of an appropriate size sleeve and a 148 snap with 8/0 swivel (Figure 2) attached to the other end by means of an appropriate size sleeve. The sleeves should be crimped to fasten each sleeve to the monofilament line. Care should be taken to ensure that sleeves are neither too loose (line will pull through) or too tight (sleeve will cut into line and reduce strength under tension). Do not crimp over the edge of the sleeve as this will reduce the strength of or damage the monofilament line.

A 55-gallon plastic barrel (Figure 3) can be used to store the gangions to minimize tangling. Notches are made around the top of the barrel, and gangions are fed into the barrel clip first in an organized manner resulting in the hook being slid into a barrel notch. As long as gangions are fed into the barrel in order, and in one direction (i.e. clockwise), they can be removed easily from the barrel in order from the opposite direction (i.e. counter-clockwise). Fifty gangions are easily stored in a barrel.

Station Selection and Sampling Frequency

Sampling occurs during three seasons Spring (April-May), Summer (June-July), and Fall (August-September). Sampling is conducted in waters defined by the 3-10m depth contour. NMFS Statistical Zones (Figures 4-5) are used as guides to ensure effective distribution of sampling effort. Stations are proportionally allocated and randomly distributed within the 3-10m depth contour in each statistical zone based on the proportion of those depths present. Since the 3-10m depth strata is smaller in some statistical zones relative to other statistical zones, each statistical zone is allocated at least two stations during each season in order to ensure adequate sampling coverage. Partners usually survey the stations that occur off their state boundaries for each season. When seasonal effort cannot be accomplished due to weather or mechanical problems the partners should decrease effort proportionally across their area. The Gulf States Marine Fisheries Commission selects all stations for all seasons and annually distributes them to the partners.

Given the limited number of samples that can be conducted during the Bottom Longline Survey, the large area of the statistical zones, and spatial autocorrelation of most fish species, station

locations are buffered 4 nautical miles. The 4 nautical mile buffer is in an effort to not duplicate catch data from closely located stations and also not to influence catch per unit effort of nearby stations. The 4 nautical mile buffer was based upon examining the cruising speed of several carcharhinid shark species, as well as typical current rates for the area. Cruising speed for several carcharhinid sharks was 0.68 to 1.17 m/s. This speed would imply that the shark can travel 1.3 to 2.2 nautical miles during the 60 minute bottom longline soak time. Oceanographic current rates examined determined that average monthly current speeds for the survey area ranged from 0.06 to 0.46 m/s, with instantaneous measured ranges from 0.002 to 2.09 m/s. Considering a maximum current speed of 2 m/s, the bait scent plume would cover 3.9 nautical miles during the 60 minute bottom longline soak time. As currents greater than 2 m/s may impact the integrity of the high flyers and considering the bait plume has the potential to affect a subsequent station, when current rates are at or exceed 2 m/s, it is recommended that no longline sets should be conducted until currents diminish.

Sampling effort by each partner must have a two week buffer between consecutive seasons. For example, if the last day of spring sampling was conducted on May 30th, summer sampling should not begin until June 15th.

Gear Deployment (Set) and Duration of Fishing

Sampling is conducted during daylight hours only, between sunrise and sunset. Gear should not be deployed until 30 minutes after sunrise and should be set 90 minutes before sunset. Gear soak time is sixty minutes. This time is calculated as the time between deployment of the second high flyer to end the set, to the time of retrieval of the first high flyer to begin haulback.

It is imperative that the time of deployment and retrieval of each high flyer is documented in order to fully describe the fishing effort for each site. The times to document are: first high flyer deployed (beginning of the set), second high flyer deployed (end of the set), first high flyer retrieved (beginning of haulback) and second high flyer retrieved (end of haulback). The time between second high flyer deployment to first high flyer retrieval should be sixty minutes.

There are a number of situations that can affect the haulback duration including; high catch rates where data reporting requirements and tagging necessitate slowing the retrieval process, large fish entangling gangions and other gear components, gear entanglement with bottom obstructions and sea turtle encounters. If the haulback is delayed, some of the deployed hooks soak for more than the standard sixty minutes. However, since the time event is recorded for the final high flyer brought aboard to end the haulback, extended haulback times are documented and can be used for later reference.

Gear soak time is an important element in calculating fishing effort (catch per unit effort, CPUE, expressed as the number of captures by species/100 hook hr). Minimum data elements required for each station are listed at the end of this document in the section titled "Bottom Longline Survey Data Format." All data elements listed **MUST** be collected at each station.

Deployment Orientation

Every effort should be made to deploy the longline parallel to the depth contours with reasonable effort made to maintain a uniform bottom depth. In situations of high winds, the Captain may

decide to set into the wind, against the depth contour, to ensure safety of the crew and lessen the chance of gear entanglement with the vessel upon retrieval. Maintaining a uniform set depth can be difficult and might not be feasible when setting gear along areas of high relief or in high winds or currents. Gear is set from the stern of the vessel and communications between the deck crew and helmsman are maintained (via hand held two-way radios if necessary). Set procedures are standardized and should be maintained for consistent effort.

Bottom Topography

Inherent to broad-based bottom longline surveys is the likelihood of encountering a variety of bottom types and profiles. If there is concern with the bottom topography the Captain should scan the designated station area using the vessel's echosounder to assess the bottom profile and determine if it is safe to deploy the gear. Using an echosounder to assess bottom type is often complicated by a number of factors that include bottom depth, bottom type (soft bottom verses hard bottom), sea conditions, vessel speed, and echosounder settings. It is recommended that experienced ship helmsmen operate echosounders since a number of variables may affect generated displays.

Procedures for Moving Stations

For cases where the station is not within the required depth stratum, the station can be moved as far as needed to reach the correct depth. Please notify the SEAMAP Coordinator that the original station was not within the 3-10m depth stratum and record the actual depth at the original station. Examining the sea bottom topography with an echosounder prior to a bottom longline set can help prevent gear damage and survey delays. When the bottom profile of a site is deemed unsafe (i.e., high relief, hard structure) by both the Captain and Field Party Chief, the station may be moved 1.0 nm in any direction from the originally selected point provided a newly selected point does not fall outside of the predetermined depth strata (3-10 m) or selected statistical zone. For most surveys this is generally sufficient for relocating a set. For those cases when a 1.0 nm move does not provide an equivalent station, the station is dropped. In some cases, it is necessary to move stations due to ship traffic, commercial or recreational fishing activity, shoals or other factors that preclude setting 1 nautical mile of longline gear. The same 1.0 nm shift protocol should be used for these situations.

Bait Preparation

Prior to arrival at a station, the Atlantic mackerel (*Scomber scomber*) used for bait should be thawed, not to the point of being soft, and cut so each piece is only slightly larger than the hook width (Figure 6). All bait should be double hooked through the skin to help it stay on the hook longer and minimize lost bait during deployment.

Deployment Guidelines

The longline is usually deployed off the stern of the vessel. Mainline should be run off the spool and guided through blocks until it leaves the vessel. If the position of the longline reel is not optimal, the mainline may then be redirected by the use of a series of monofilament blocks to the point of setting or haulback. The longline reel, rail roller, and blocks should be inspected and greased regularly and protected from the elements when not in use.

The first high flyer (HF1) is attached to the free end of the monofilament mainline and is deployed overboard (GPS location and time should be recorded). The vessel will begin its forward movement, allowing the line to drift off the stern. After a scope of mainline equivalent to three times the bottom depth is deployed, the first bottom weight is attached to the mainline. Immediately after attaching the first weight, gangion attachment should begin. Vessel speed while deploying the longline should be 4-5 knots (8.3-9.2 km/hr) depending on the sea conditions. Gangions should be attached to the mainline equidistant apart (every 19 m) throughout the set. Given the variety of vessels used across partners it is the duty of each Field Party Chief to ensure correct gangion spacing based on a visual reference point. This may include a mark on the rear deck, float or line off the stern, or any means to standardize intervals between the previous gangion and the clip-on station in association with the bait barrel. At the midpoint (50 hooks deployed, approximately 0.5 nm from the first weight), a middle weight should be deployed, followed by continued gangion deployment. After all gangions have been attached a scope of mainline equivalent to three time the bottom depth should then be deployed at which point it can be cut, attached to the second high flyer (HF2) and released from the vessel (GPS location and time should be recorded). Mainline deployed between the end weights should be 1 nautical mile. This distance cannot be evaluated by high flyer coordinates due to scope of line, drift, currents and movement of the mainline caused by animals caught on the gear.

Environmental Data Collection

After the gear is deployed and is fishing, the vessel should move to the midpoint of the line. Environmental data should be collected including: water temperature (°C; surface, mid, bottom), water salinity (surface, mid, bottom), water dissolved oxygen (mg/L; surface, mid, bottom), water depth (m), and Secchi depth (m). A CTD is the preferred method for collecting environmental data, but backup gear should be available if a problem with the CTD occurs.

For Secchi depth, only take Secchi readings during daylight hours and from the shady side of the boat. Secchi depth is measured with a standard white matte finish, 30 cm or 52 cm diameter Secchi disc. The Secchi disc is used to measure transparency of sea water (approximate index) and is dependent upon the available illumination, limiting measurements to daylight periods only. Daylight hours may be defined as being from one hour after sunrise to one hour before sunset. Either standard-sized Secchi disc can be used. For inshore stations, there is no difference in the readings depending on size. For very clear offshore water, the larger size disc should be used. DO NOT wear sunglasses during the measurements. Lower the Secchi disc with a rope marked in meters on the shaded side of the ship. Lower the disc until it is just perceptible. Note the depth of the disc in meters. The measurement is made from the water surface to the disc. Continue lowering until the disc is no longer visible and again note the depth of the disc. Average the two depths and record the resulting depth in the appropriate blocks on the data sheet, observing one indicated decimal place.

Haulback Guidelines

Gear haulback occurs on either the side or stern of the vessel. The blocks used to guide the mainline during set can be used for haulback, or sometimes a roller mounted on the ship's cap rail is used for retrieval. The vessel is positioned so that it can back down on the mainline while it is hauled in by the winch. The mainline should never be pulled through the water to the boat, as this can lead to snags and subsequent damage to gear and the surrounding bottom habitat.

The vessel should back down to the first high flyer (HF1) that was deployed. The high flyer should be brought onboard and unclipped from the mainline (time should be recorded). The mainline should then be fed through the blocks and attached to the winch line by means of a blood knot or crimped. The vessel should then retrieve the mainline and the winch should reel in the line at a speed that ensures the mainline is not being pulled. Vessel speed can vary from 0 - 5 knots depending on sea conditions. Weights and gangions should be removed from the mainline as they are brought onboard. Often the capture of large specimens or numerous captures necessitates a slowing or stopping of the vessel. When the second high flyer (HF2) is boarded, the time should be recorded.

Circumstances may arise where the mainline must be retrieved from the second high flyer (HF2), the time should still be recorded, but a note should be made in the comment field noting what happened and what time the last hook was retrieved. The appropriate operation code should be recorded. This situation would arise when the mainline snaps after retrieving the first high flyer. The mainline would then be retrieved from the second high flyer. The comment should also note approximately after which hook or where along the mainline the break occurred.

Biological Data Collection

Biological data collected for captures generally includes (but is not limited to); stretch total length (TL mm), fork length (FL mm), standard length (for teleost species, SL mm), precaudal length (for sharks, PCL mm), sex (if externally visible), reproductive development stage (if identifiable), and whole weight (WGT kg). The LENGTH field details whether the length measurements were actual measurements or were estimated measurements. Specimen photographs that are cataloged with station number identifiers (or even specific hook numbers) are valuable for confirming identifications. External tagging (for tag and release studies) is an important component of longline studies. Documentation of the tag information for fish tagged prior to release is integral. For specimens kept for biological sampling, a marking or tag should be placed on the animal and documented on the data sheet so the fish can be matched up when worked up.

Use of a catch landing sling operated with hydraulic cranes facilitates accurate length and weight measurements for catch that typically would be too large to land on deck. A landing sling constructed with a stainless steel frame and mesh-panel landing basket can be used to haul large specimens to the ship's rail or onboard for collection of biological data, conduct accurate tagging, and for tissue sampling (Figure 7). The landing sling can be equipped with an electronic scale. The landing sling can be used aboard larger research platforms and requires little or no vessel modifications. Alternatively, large fish can be estimated for length and tagged by means of a tagging pole prior to release from the gear.

Gear Damage and/or Loss

Gear damage can lead to lost survey time. Often gear damage can be minimized by being cognizant of bottom features at set locations, maintaining proper set direction, and maintaining proper vessel orientation during haulback (e.g., caution not to tangle the line in the propeller). However, gear damage can occur even during the best of circumstances. Notations concerning gear damage are made in the data sheet comment section and are a matter of record for associated bottom longline data. If appropriate, an operation code can be listed to detail the damage, but also

include details in the comment section. Data collected from sets with gear damage are not disregarded. It is however, important to document any problems that did occur (e.g. number of gangions lost, need to haulback from second high flyer, mainline entangled, etc.)

To minimize gear loss, it is imperative that gear is checked prior to deployment to ensure proper fishing and catching activity is maintained. It is recommended this check be done during every haulback so damaged gear is immediately pulled out and does not accidentally get reused. If hooks are bent or dull, or if monofilament is kinked or has abrasions, the gear should be replaced immediately.

Bottom Longline Survey Data Format

Station and Environmental Data Format

DATE (date in MM/DD/YYYY format)

VESSEL_NO (text field with name of vessel or SEAMAP number if vessel has a SEAMAP number)

SOURCE (FL, AL, MS, LA, TX, or US)

SEAMAPSTATION (A concatenation of the six digit date, BL and station number for the day) – station 2 on March 16, 2012 would have a SEAMAP Station Number of 031612BL02

ENV_LAT (Enter vessel position when collecting environmental data in degrees, minutes, and hundredths of minutes, observing indicated decimals and entering trailing zeros)

ENV_LON (Enter vessel position when collecting environmental data in degrees, minutes, and hundredths of minutes, observing indicated decimals and entering trailing zeros – make sure that all values are negative in the Gulf of Mexico)

SECCHI (depth in meters of the Secchi depth – record to 1 decimal point)

DEPTH (depth in meters of where the environmental data was sampled – record to 1 decimal point)

TIMEENV (military time for start of the collection of environmental data) HHMM

TEMPSUR (temperature in degrees Celsius taken at the water's surface – record to 1 decimal point)

TEMPMID (temperature in degrees Celsius taken at the water's middle depth– record to 1 decimal point)

TEMPBOT (temperature in degrees Celsius taken at the water's maximum depth – record to 1 decimal point)

SALSUR (salinity in psu measured to 1 decimal point)

SALMID (salinity in psu measured to 1 decimal point)

SALBOT (salinity in psu measured to 1 decimal point)

DOSUR (dissolved oxygen (mg/L) measured to 1 decimal point)

DOMID (dissolved oxygen (mg/L) measured to 1 decimal point)

DOBOT (dissolved oxygen (mg/L) measured to 1 decimal point)

HF1LAT (Enter latitude position of starting High Flyer in degrees, minutes, and hundredths of minutes, observing indicated decimals and entering trailing zeros)

HF1LON (Enter longitude position of starting High Flyer in degrees, minutes, and hundredths of minutes, observing indicated decimals and entering trailing zeros – make sure that all values are negative in the Gulf of Mexico)

HF1STIME (military time for deployment of the starting High Flyer)

HF1ETIME (military time for retrieval of the starting High Flyer)

HF1DEPTH (depth in meters of the starting High Flyer)

HF2LAT (Enter latitude position of ending High Flyer in degrees, minutes, and hundredths of minutes, observing indicated decimals and entering trailing zeros)

HF2LON (Enter longitude position of ending High Flyer in degrees, minutes, and hundredths of minutes, observing indicated decimals and entering trailing zeros – make sure that all values are negative in the Gulf of Mexico)

HF2STIME (military time for deployment of the ending High Flyer)

HF2ETIME (military time for retrieval of the ending High Flyer)

HF2DEPTH (depth in meters of the ending High Flyer)

TIMESOAK (minutes that the line fished for HF2STIME – HF1ETIME)

GEARCODE (see Appendix 1 for a list of gear codes, multiple gears can be used with each one separated by a comma)

HOOKSIZE (Size of the hooks used on the bottom longline)

HOOKSDEPLOYED (Number of hooks deployed)

HOOKSRETRIEVED (Number of hooks retrieved – to be used for CPUE calculations)

OPCODE (Operations code – required to be filled in if something goes wrong during the station – see Appendix 2 for a list of operation codes)

COMMENT (any comments about the station or environmental records)

Biological Catch Data

SEAMAPSTATION (use the station number from the station record – this is the primary key to link the catch data to the station and environmental record)

GENUS (genus id)

SPECIES (species id)

BIOCODE (taken from the SEAMAP biocode list)

SEX (M = male, F = female, U = undetermined, or N = not examined – can be filled in later for teleost fish or immediately for elasmobranchs)

PCL (pre caudal length in mm, sharks only)

SL (standard length in mm)

FL (fork length in mm)

TL (stretch total length in mm)

DW (disc width for rays or carapace width turtles in mm)

LENGTH (measured (M) or estimated (E) – was the recorded length an estimated length (larger specimens) or was it a measured length)

WGT (recorded in kg)

INITIALCOND (Initial condition of the specimen upon capture as it is brought to the vessel) See Appendix 3 below for initial condition codes

RELCOND (Release condition of the specimen) See Appendix 4 below for release condition codes

TAGNUMBER (Include the tag number here if the fish was tagged for mark and recapture purposes)

FISHID (identifier for each fish – start with the source code from above followed by a three digit number that increases sequentially in the form AL002 for the second fish caught by Alabama)

SAMPLES (list any biological samples that were taken – otoliths, gut contents, gonads, etc.)

COMMENT (other samples taken or other events associated with the catch record)

Figure 1. A 15/0, 0-offset, steel circle hook used in the SEAMAP Bottom Longline Survey.

Figure 2. A # 148 Snap - 8/0 swivel used in the SEAMAP Bottom Longline Survey.

Figure 3. A 55-gallon plastic barrel used to store the gangions to minimize tangling.

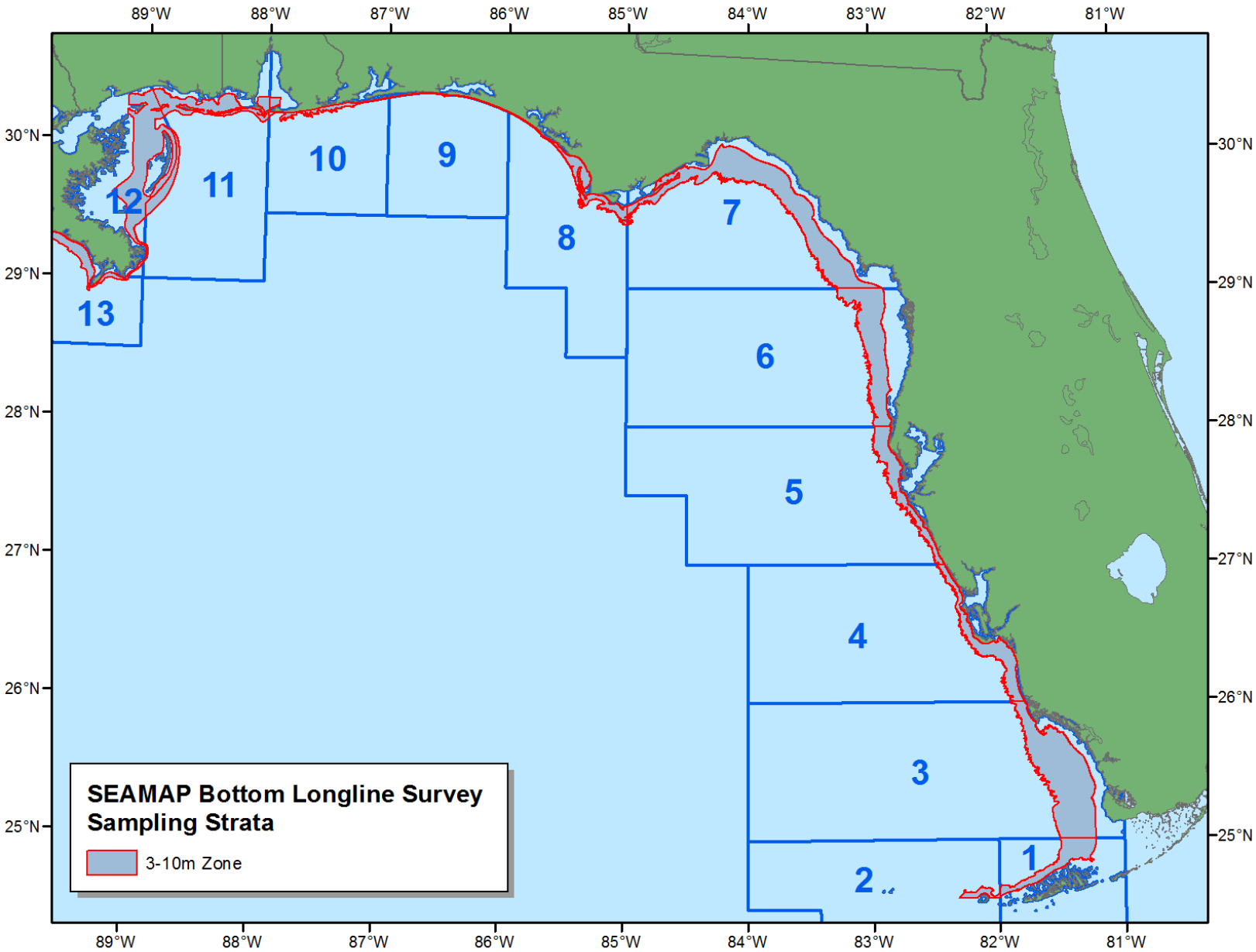

Figure 4. The NMFS Statistical Zones and 3-10m depth strata within the eastern Gulf of Mexico.

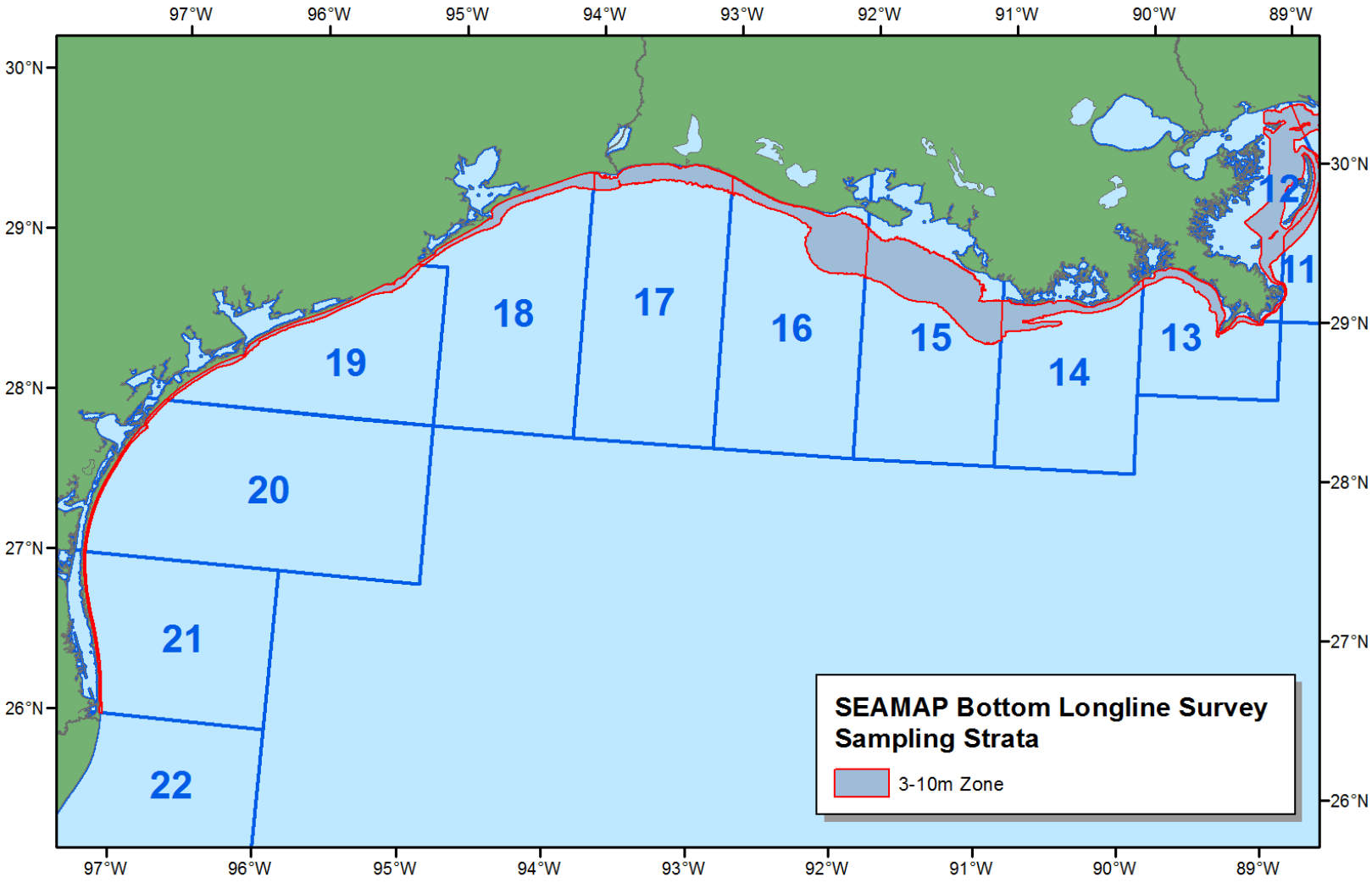

Figure 5. The NMFS Statistical Zones and 3-10m depth strata within the western Gulf of Mexico.

Figure 6. Atlantic mackerel (*Scomber scomber*) showing the approximate size chunks to be used for baiting the hooks.

Figure 7. A landing sling constructed with a stainless steel frame and mesh-panel landing basket being used to haul weigh and measure a tiger shark (*Galeocerdo cuvier*). For more information on constructing a landing sling see Grace, M.A., W.B. Driggers, J. Forrester, and N. Hopkins. 2007. Landing sling use increases data accuracy and sampling opportunities for large marine fishes captured during fishery-independent longline surveys. Fisheries Research. Vol. 88. p. 146-149.

Appendix 1: Gear Codes

CODE GEAR TYPE

*T	TRAWL, STAR
01	COMBINATION--SS+CC
02	COMBINATION--SS+PR
03	COMBINATION--CC+PR
04	COMBINATION--SS+CC+PR
05	COMBINATION--FM+SS
06	COMBINATION--FM+SS+PR
07	COMBINATION--FM+PR
A	ASSORTED
AC	BIOSONICS ACOUSTIC SYSTEM
BB	TRAWL, BIB
BC	BOTTLE CAST
BG	BATHYTHERMOGRAPH (CTD, STD)
BL	LONGLINE , BOTTOM
BS	SEINE, BEACH
BT	TRAWL, BEAM
CA	CHLOROPHYLL, EXTRACTION
CC	CAMERA, CLOSED CIRCUIT TELEVISION
CD	DREDGE, CLAM
CM	CURRENT DOPPLER
CR	CORAL REEF MODUAL
CS	CONTINUOUS FLOW SYSTEM
CT	TRAP, CRAB
DL	DEEP LINE
DN	PLANKTON, DOUBLE NEUSTON
OR	NEKTON
DR	SURFACE DRIFTER
DV	DIVING
EF	TRAWL, FISH, EXPERIMENTAL
ES	TRAWL, SHRIMP, EXPERIMENTAL
FD	TRAWL, FISH DEFLECTOR
FE	TRAWL, FISH EXCLUDER
FL	FLUORESCENCE, CONTINUOUS FLOW SYSTEM
FM	FATHOMETER
FP	FISH PUMP
FT	TRAWL, FISH
FX	FLUORESCENCE, IN SITU
GN	GILL NET
MO	PLANKTON, MOCNESS
MQ	MARQUESETTE
MS	TRANSMISSIVITY
MT	TRAWL, MIDWATER
NN	PLANKTON, SINGLE NEUSTON OR NEKTON
NS	NETSONDE
OB	LONGLINE, OFF-BOTTOM
OD	ODOMETER
OF	OVERFLIGHT
OH	OXYGEN, TITRATION, HACH KIT
OI	OXYGEN, SENSOR, IN SITU
OO	OXYGEN, SENSOR, ON DECK
OR	OYSTER RAKE
OW	OXYGEN, TITRATION, WINKLER
OX	OXYGEN, SENSOR, CTD
OY	OXYGEN, SENSOR, Sonde
PN	PLANKTON, GENERAL (BONGO, ETC.)
PR	PROFILER, 3.5 KHZ SUB-BOTTOM
PS	SEINE, PURSE
PT	TRAWL, SCALLOP
QD	DREDGE, QUAHOG
RE	SALINITY, REFRACTOMETER
RF	RECORDING FATHOMETER
RG	PLANKTON, RING NET
RL	TAG RELEASE
RN	ROUND NET
RR	ROD AND REEL
RS	TRAWL, NON-STANDARD
RT	ROTENONE
RV	REMOTELY OPERATED VEHICLE (ROV)
S5	TRAWL, MONGOOSE
S6	TRAWL MONGOOSE
SA	SALINITY, AUTOSAL
SB	SALINITY, BECKMAN RS5
SC	CAMERA, STILL
SD	DREDGE, SCALLOP
SE	SECCHI DISC
SF	SALINITY, CONTINUOUS FLOW SYSTEM
SH	TRAWL, SHUMAN
SI	SALINITY, SENSOR, IN SITU

GR BOTTOM GRAB OR CORE SAMPLER
HL HANDLINE
HO TRAWL, HIGH OPENING BOTTOM
IT TRAP, ICHTHYOPLANKTON, ILLUMINATED
JP JACKPOLE
KP LONGLINE, KALI POLE
KT TRAWL, WING
LL LONGLINE, SURFACE
LN LIFT NET
LP SEINE, LAMPARA
LR TRAP, LOBSTER, REED
LT NIGHT LIGHT
LW TRAP, LOBSTER, WIRE
MC CAMERA, MOVIE
ML MISCELLANEOUS- DETAIL IN COMMENTS
MN MICROPEKTON

SL SALINITY, BENCH TOP/LABORATORY
SJ SQUID JIG
SM TRAWL, STANDARD MONGOOSE
SN TRAWL, SEPARATOR
SO SONAR
SS SONAR, SIDE SCAN
ST TRAWL, SHRIMP
SX SALINITY, CTD
SY SALINITY, Sonde
T3 TEMPERATURE SCS
TA TEMPERATURE, CONTINUOUS FLOW SYSTEM
TB TEMPERATURE, BECKMAN RS5
TC TEMPERATURE, CTD
TD DREDGE, TUMBLER
TE TRAWL, TURTLE EXCLUDER
TF TEMPERATURE, FLUKE
TG TROLLING GEAR
TH TEMPERATURE, THERMOMETER

TI TEMPERATURE, SENSOR, IN SITU
TM TEMPERATURE, BUCKET
TN TRAWL, TRY NET
TO TEMPERATURE, SENSOR, ON DECK
TR TRAP, FISH
TS SEINE, PURSE, TURTLE
TT TRAWL, TWIN
TU PLANKTON, TUCKER TRAWL
TV TRAP VIDEO
TY TEMPERATURE, Sonde
UD DREDGE, UNSPECIFIED
VC CAMERA, VIDEO
VD VERTICAL DRIFTLINE
VJ VISUAL OBSERVATION
VL VERTICAL LONGLINE
V2 VERTICAL LONGLINE WHERE EACH FISH IS IDENTIFIED TO HOOK
VP VERTICAL PROFILE
WI WEATHER INSTRUMENT
WT TRAP, LOBSTER, WOOD
XB EXPENDABLE BATHYTHERMOGRAPH (XBT)

SEAMAP Examples of Gear Code Use

For Salinity - Reading obtained by CTD: BG, SX

For Oxygen - Reading obtained by CTD: BG, OX

Sample obtained from bottle cast for titration by the Winkler method BC, OW

For Temperature - Reading obtained by CTD: BG, TC

Scenario Example -

Procedures at a SEAMAP station included a CTD profile, a Secchi disc reading, and a bottom longline.

BG, TC, SX, SE, OX, and BL

Highlighted gear codes are ones that are typically used during the Bottom Longline Survey. Other gear codes may be used, but typically you will use the highlighted gear codes.

Appendix 2: Operation Codes

A	Mainline cut
B	Retrieved line from second high flyer
C	Mainline caught in prop
D	Gangion caught in prop
E	Lost high flyer
F	Extended soak time (details in comments)
H	Hooks lost
K	Bad weather stopped operation
L	Lost whole rig
M	Miscellaneous (detail in comments)
Q	Vessel issues resulting in the vessel not being able to operate properly

Appendix 3: Initial Condition Table

Initial Condition Code	Description
A	Status upon capture - Alive (body movements or nictatating eyelid reacts when tapped on eye)
D	Status upon capture - Dead (not moving and non-responsive)
K	Kept
P	Predation
X	Released Dead – No longer used

Appendix 4: Release Condition Table

Release Condition Code	Description
1	Swim Burst
2	Strong Swimming
3	Sluggish Swimming
4	Float/Sink