

SOUTH CAROLINA RED DRUM/COASTAL SHARK LOGLINE SURVEY

DATA ACKNOWLEDGEMENT AND DATA CAVEATS

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I. ACKNOWLEDGEMENT

The following survey design, protocols, and data caveats are included to assist the data user in acquiring a thorough understanding of the survey before querying the SEAMAP-SA database for South Carolina's Department of Natural Resources (SCDNR) Red Drum/Coastal Shark Longline Survey (SC-LLS) data. The data user is responsible for reading all of the following text and fully comprehending every aspect of the requested data. Each requestor is solely accountable for any further analysis, manipulations, or presentations. It is also the responsibility of the data user to cite and acknowledge SEAMAP and the SC-LSS (see [SEAMAP-SA Intellectual Property protocol](#))

II. BACKGROUND

The SC-LLS is a National Marine Fisheries Service funded fishery independent longline survey conducted by SCDNR since 2007. The primary objective of the SC-LLS is to develop a sampling protocol that provides a fisheries independent index of abundance for adult red drum and various species of coastal sharks. Additional objectives of the SC-LLS include:

- To conduct fishery independent longline sampling on adult red drum to develop information on catch per unit effort (CPUE).
- To collect biological information (size, sex, etc.) and samples (otoliths, gonads, fin clips etc.) from subsamples of the red drum catch in order to determine size at age, recruitment to the spawning population, and genetic composition of the stock.
- To tag adult red drum for the collection of migratory and stock identification data.
- To tag and measure small coastal and large coastal sharks, caught incidentally to red drum sampling, for inclusion in the COASTSPAN (Cooperative Atlantic States Shark Pupping and Nursery Survey) database.
- To disseminate accomplishments and results to the Atlantic States Marine Fisheries Commission (ASMFC) and National Marine Fisheries Service (NMFS) for inclusion in stock assessment efforts.

This survey will provide South Carolina with the resources necessary to develop a fishery-independent index of abundance for adult red drum occurring in estuarine and nearshore waters that will be used in future stock assessment work. Tagging of red drum, otolith ageing, and genetic analysis of tissue will allow for additional information on migratory behavior, stock

identification, and escapement rates from specific cohorts as well as provide a means to evaluate the age structure of the adult population.

III. METHODOLOGY

Study Area

Four major estuaries (Winyah Bay, Charleston Harbor, Saint Helena Sound, and Port Royal Sound) along the coast of South Carolina are sampled with equal effort and frequency (Figure 1). During each time period, 30 locations are selected at random from a pool of predetermined locations. Locations within strata were initially identified from previous sampling efforts, suggestions from fishing guides, and from identification of habitat types similar to areas known to be productive. Figure 1 also shows the overlap of SC-LLS sites with two other estuarine sampling projects in SC: an electrofishing survey in brackish water rivers and a trammel net survey in shallow estuarine habitats. The overlap of these surveys allows for individual year classes of red drum to be tracked from the time they are juveniles until they join the adult population.

Beginning in 2007, 30 locations were selected at random from a pool of 54 (Winyah Bay), 40 (Charleston Harbor), 101 (St. Helena Sound) and 88 (Port Royal Sound) possible sites per stratum. Approximately equal sampling effort among the four strata has continued since 2007, the only changes being that some sampling locations have been added or deleted in each stratum as part of our exploration of suitable sampling habitat. And some locations had to be omitted simply on the basis of inaccessibility. Our current locations within site are as follows: 51 (Winyah Bay), 43 (Charleston Harbor), 81 (St. Helena Sound) and 78 (Port Royal Sound).

Since 2007, there have been some changes to the temporal sampling schedule (Table1). In 2007, sampling spanned from July through November. In 2008, sampling began in March and ended in December. In 2009, due to vessel problems early in the season, and low catches of red drum and sharks in the spring, the survey began in July. In 2010 and 2011, efforts were focused from late summer through late fall to maximize potential for catches of both red drum and coastal sharks, making most efficient use of funds. Also, time blocks were condensed beginning in 2010 from two months to six weeks (August 1 – September 15, September 16 – October 31, November 1 – December 15). The same number of locations continued to be sampled within each stratum per time period, but with a more focused effort during the time of increased likelihood of encountering both red drum and coastal sharks. While the decision was made to sample in the late summer through late fall, the use of three defined time periods has been implemented. Each of the four strata continues to be sampled equally during each time period (30 stations/stratum/time period).

Gear

The longline survey is conducted with bottom longline gear from the *R/V Silver Crescent*; a 52-foot shallow draft vessel equipped with two, 1-mile longline reels. Groundlines are constructed of 600 # test monofilament and are approximately 536 m long (0.33 mile stations). Stop sleeves are placed on the groundline at 30 m intervals. Terminal gear is clip-on, monofilament gangions spaced at 15 m intervals (120 and 40 hooks per line respectively). Gangions consists of a 2.5mm diameter stainless steel longline clip with 4/0 swivel, 0.5 m of 200# test monofilament and a

15/0, Mustad tuna circle hook. Approximately 10 – 14, 40-hook longline sets are made per day at a depth of 7–22 m during daylight hours. Hooks are baited with Atlantic mackerel (*Scomber scombrus*) or striped mullet (*Mugil cephalus*). The sets are anchored and buoyed at each end. Since the primary emphasis is on obtaining red drum and sharks in good condition for tagging, gear soak times are short (30 minutes). In live-bottom coastal waters, the rate of bait loss due to crabs and small fish is quite high and longer soak times would be unlikely to increase catch rates.

IV. RESULTS

Environmental and Habitat Data

For each location, soak time, number of hooks, wind direction, wind speed, and coordinates (lat-longs in degrees, minutes seconds) are recorded. Parameters measured at each location include water depth and air temperature (°C), and a YSI Pro 2030 field meter is used to determine water temperature (°C), salinity (ppt), and dissolved oxygen (mg/L) at a depth of approximately 2-3 meters.

Catch Data

All individuals captured were processed at the species level and were measured to the nearest millimeter (mm) for standard, fork, total length, or disc width (SL, FL, TL or DW), or a combination according to the morphology of the species.

Captured red drum are brought onboard to be measured (CL and TL in mm) and processed. Most fish are released alive. However, a small number are dead on arrival at the boat (DOA), and some fish are collected for brood stock (Charleston Harbor) or sacrificed for biological investigations (age, reproductive status, sex, stomach contents). If a red drum is drumming, it is noted. A fin clip sample is collected from each fish in order to identify stocked fish or recaptured individuals, and to investigate stock structure. Red drum are tagged with a Hallprint nylon dart tag beneath the second dorsal fin and a Passive Integrated Transponder (PIT) tag between the first and second dorsal fins, if they were not already tagged. If a red drum is recaptured, numbers of tags are recorded, and tags are replaced if they have been lost or damaged. If a red drum appears abnormally stressed, those individuals are released without tagging to increase chances for survival. All fish were scanned to detect the presence of a PIT tag in case the external tags had been lost.

Most coastal shark species (with the exception of sharpnose sharks and large nurse sharks) are tagged with external plastic cattle tags in the first dorsal fin, using a leather punch and tag applicator. Sharks that are too large to pull onto the boat are tagged with a stainless steel dart tag using a 6-foot long tagging pole.

Table 1. South Carolina Red Drum Longline Survey (SC-LLS) historical sampling periods.

Sample Year	Sample Period
2007	<ul style="list-style-type: none">• Period 1 - July 10 to August 9• Period 2 - September 13 to October 23• Period 3 - November 4 to November 20
2008	<ul style="list-style-type: none">• Period 1 – March 26 to April 30• Period 2 – May 13 to June 17• Period 3 – July 9 to August 19• Period 4 – September 12 to October 23• Period 5 – November 5 to December 4
2009	<ul style="list-style-type: none">• Period 1 - July 27 to August 14• Period 2 – October 5 to October 29• Period 3 – November 3 to November 20
2010	<ul style="list-style-type: none">• Period 1 – August 3 to September 15• Period 2 – September 29 to October 20• Period 3 - November 1 to December 15
2011	<ul style="list-style-type: none">• Period 1 – August 8 to September 13• Period 2 - September 23 to October 27• Period 3 - November 3 to November 21
2012	<ul style="list-style-type: none">• Period 1 - August 9 to September 12• Period 2 - September 26 to October 31• Period 2 - November 1 to December 3

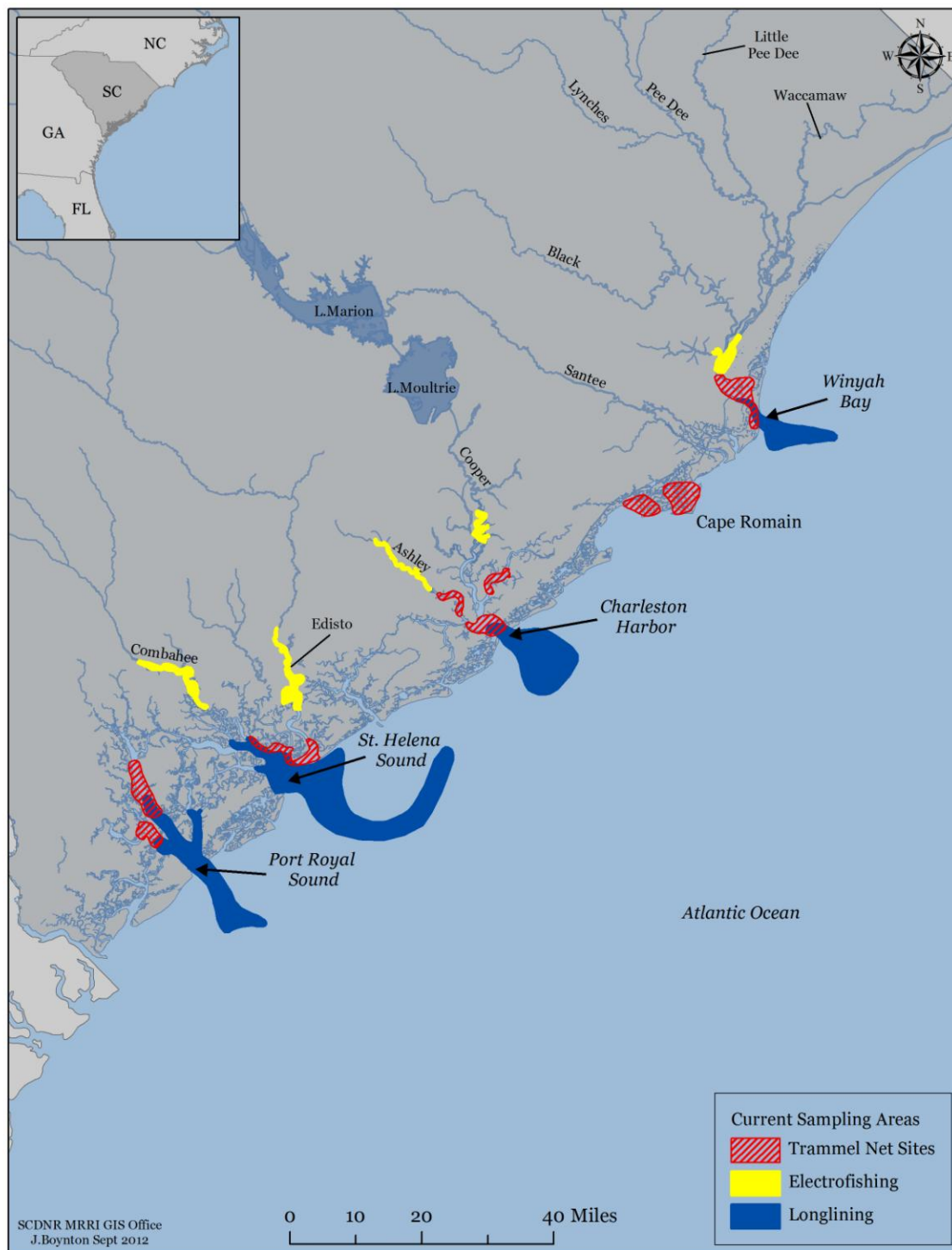


Figure. 1. Map of red drum sampling sites. Trammel net and electrofishing samples target sub-adult red drum, while longline efforts captured adult red drum. Recently trammel net sites were established in Port Royal Sound (southern most estuary); however, for the time frame of this report fish tagged in those efforts have probably not recruited to the adult population yet.