# Annual Report on the Implementation of the Terms and Conditions of the 2009 Biological Opinion for the Gulf of Mexico Reef Fish Fishery

**National Marine Fisheries Service**
**National Oceanic and Atmospheric Administration**

**For Public Distribution: Confidential Data Have Been Removed**

**December 20, 2010**

## 1. Introduction

Fishers engaged in the Gulf of Mexico (GOM) reef fish fishery use bottom longlines and vertical lines to target a variety of species, including snappers, groupers, tilefish, jacks, and other assorted species. The National Marine Fisheries Service (NMFS) began placing observers on GOM reef fish fishery vessels in the second half of 2006 and continues to sample the fishery. On October 13, 2009, a new biological opinion (BiOp) on the GOM reef fish fishery was completed and the corresponding incidental take statement (ITS) was issued. This included several reasonable and prudent measures (RPMs) to minimize the impacts of future takes of sea turtles by the Gulf reef fish fishery and to monitor levels of incidental take. These RPMs require NMFS to: (1) avoid and minimize take through outreach and education; (2) minimize future gear impacts through research; and (3) monitor the frequency, magnitude, and impact of incidental take. Non-discretionary terms and conditions (T&Cs) are specified for each of these RPMs.

This report satisfies T&C no. 17 requirement that annual bycatch reports be prepared by NMFS. In accordance with the requirements of the new BiOp, this document contains information on captures of sea turtles in the bottom longline portion of the U.S. Gulf of Mexico (GOM) reef fish fishery for 2009[1]; a summary of the methods and data used; and the distribution of observed and total fishing effort for the bottom longline component of the Gulf reef fish fishery. Also included in this annual report, as specified under T&C no 17, are: (1) data on the release condition of each bycatch record; (2) the results of periodic reviews per T&C No. 9[2]; (3) a summary of any projects conducted or funded in accordance with T&C No. 3[3]; and (4) a description of NMFS' progress in improving quantitative stock assessments of the primary incidentally-caught species per T&C No. 12[4]. T&C no 17 also specifies that the annual report include bycatch estimates and catch per unit effort (CPUE). The number of sea turtle takes in 2009 are too few and clustered. However, given the T&C requirement, extrapolations of bycatch estimates using methods employed in previous reports (*i.e.,* SEFSC 2008 and 2009) were conducted, and as stated in the 2008 and 2009 reports, the 2010 extrapolated estimates are based upon sparse data sets (*i.e*. sea turtle takes) and should not be assumed to be reasonable without potentially invoking large assumptions regarding unobserved events.

To comply with government regulations, confidential information has been removed from this public version of the Annual Report.

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[1] For the purpose of this report, takes of sea turtles (hereafter "takes") refers to sea turtles that were incidentally captured during fishing operations.

[2] T&C 9 specify requirements pertaining to observer data collection and recordkeeping.

[3] T&C 3 requires NMFS to conduct or fund projects to:

(1) characterize the fishery to better understand the variations and similarities among the fleet in fishing gear and techniques,

(2) characterize its interactions with sea turtles and small tooth sawfish, and

(3) explore potential fishing gear and fishing behavior modifications that reduce adverse impacts from this fishery.

[4] T&C 12 requires NMFS to improve its quantitative stock assessment of the primary incidentally caught species and to report progress towards this goal annually.

## 2. Education and Outreach

### 2.1. *Description of Outreach Plan*

The Reef Fish outreach plan for the Gulf of Mexico is designed to meet the requirements of the Terms and Conditions of the Biological Opinion by training permitted participants in the Reef Fish fisheries as well as government officials from both State and Federal Agencies, and non-governmental organizations (NGOs). This requires in-person training and education of commercial and recreational fishermen on: (1) identification of sea turtle species, (2) how to use required and recommended sea turtle gear-removal equipment, (3) the "Careful Release and Protocols for Sea Turtle Release with Minimal Injury," and (4) the importance of maximizing gear removal to maximize post-release survival of sea turtles. This activity was accomplished by working with the Gulf of Mexico Fishery Management Council (GMFMC) and identifying groups to contact and offer training.

### 2.2. *Summary of Outreach Activities with Fishermen and the General Public*

Outreach activities have been conducted for both Commercial and Recreational (for-hire) fishermen. Training has been conducted for commercial fishers in the following Texas ports: Brownsville, Port Isabel, Port Mansfield, Corpus Christi, Port Aransas, Rockport, Palacios, Freeport, Galveston, and Port Arthur. In Louisiana the ports of DuLac, Leeville, and Venice were covered. Alabama was covered at a Gulf of Mexico Fishery Management Council meeting in Port Clear. Florida workshops were conducted in Destin, Panama City, Apalachicola, Tarpon Springs, Madeira Beach, Cortez, and Stock Island.

Recreational fishermen received training in the following Texas locations: Port Isabel, Port Mansfield, Corpus Christi, Port Aransas, Rockport, Freeport, and Galveston. Training was conducted in Louisiana at the port of Venice. Mississippi training was conducted at the Mississippi Charter Boat Association in Biloxi, Mississippi. Alabama training was conducted at the Orange Beach Charter Boat Association in Orange Beach, Alabama. In Florida, recreational fisher training was conducted in Destin, Panama City, Apalachicola, Carrabelle, Panacea, Steinhatchee, Crystal River, Tarpon Springs, Longboat Key, Fort Meyers, Naples, Marathon, and Key West.

### 2.3. *Summary of Outreach Activities with Federal and State Agency Partners*

Training is conducted on a regular basis with the Florida Fish and Wildlife Commission's (FWC) Enforcement Academy in Quincy, FL; NOAA Office of Law Enforcement; USCG Fisheries Training Center Group in New Orleans; and Texas Parks and Wildlife Law Enforcement in McAllen, TX. Observers and researchers of all NMFS-sponsored programs are trained to handle and carefully release sea turtles and each may also conduct public outreach in the course of their duties. In addition, these training sessions have been opened to State, Federal, and private partners and will continue to be open. For example, in 2006 NMFS trained personnel with the Gulf and South Atlantic Fisheries Foundation in Galveston (2 observers), Miami (2 observers), and Panama City (3 observers). Training of FWC personnel working on a smalltooth sawfish research program has occurred 4 times (5 researchers in 2005, 2 in 2007, 3 in 2009 and 1 in 2010). Since 2005, NMFS also trained personnel representing the J.L. Scott Aquarium, Miami Seaquarium, Gulf Islands National Seashore, North

Carolina Sea Grant, Nova Southeastern University, Aquatic Release Corporation and captains and crews of multiple pelagic longline vessels.

## 3. Research Activities

### 3.1. *Fishing Gear Research*

NMFS is conducting a pilot study,, ***Characterization of Target Catch CPUE as a Function of Bait Soak Time in the Gulf of Mexico Bottom Longline Reef Fish Fishery: A Pilot Study to Examine Potential Sea Turtle Mitigation Measures***, to investigate the potential of gear soak times as a method for reducing sea turtle interactions and mortality on reef fish bottom longlines. This fishery-dependent project will characterize the catch per unit effort of the primary target species as it relates to bait soak time in the GOM reef fish bottom longline fishery. The hypothesis is that target catch interact with the gear soon after it is deployed, or as it is being retrieved. If the results of the proposed study support this hypothesis, fishers could reduce the gear soak time without having a significant effect on the target catch. A reduction in gear soak time has the potential to reduce sea turtle mortality associated with bottom longlines. To date, three commercial longline vessels have been contracted to conduct 40 fishing days each.

### 3.2. *Sea Turtle Release Research*

NMFS conducted two research projects to investigate potential sea turtle bycatch reduction measures. The first project examined the effects of hook size, bait type, baiting technique, and animal size on the frequency of loggerhead turtles, *Caretta caretta*, ingesting a baited hook during controlled trials. The results of this study have been submitted for publication to **Endangered Species Research**, and the manuscript is currently in revision. The second study used appendaged hooks to determine whether the appendage could reduce the severity of sea turtle interactions. This project examines the effects of appendaged hook size, bait type, baiting technique, and animal size on the frequency of loggerhead turtles, *Caretta caretta*, ingesting a baited hook. The results of this study will be analyzed and published.

## 4. Coastal Logbook Data

### 4.1. *Data Collection Methodology*

Landings and fishing effort of commercial bottom longline vessels operating in the Gulf of Mexico have been monitored by NMFS through the coastal logbook program conducted by NMFS. The program collects catch and effort data by fishing trip for vessels with permits to fish in a number of fisheries managed by the GMFMC. The coastal logbook program began in 1990 with the objective of a census of reef fish fishery permitted vessel activity with the exception of Florida where a 20% sample of vessels was targeted. Beginning in 1993, the sampling in Florida was increased to require reports from all vessels permitted in the reef fish fishery.

For each fishing trip the logbook data base includes a unique trip identifier, the landing date, fishing gear deployed, areas fished, number of days at sea, gear specific fishing effort (e.g. longline: number of sets, number of hooks per set, length of the longline), species caught and weight of the

landings in pounds. Multiple areas and gears fished may be recorded for a single fishing trip. Data were filtered to remove records that were missing effort data or had clearly erroneous data (e.g. more than 24 sets/day, longline lengths more than 25 miles). In addition, trips that reported fishing in both regions were also excluded as coastal logbook data are trip based and therefore, effort cannot be apportioned among areas. Only three trips in 2009 reported fishing in both the eastern and western Gulf of Mexico. Those trips reported a total of 70 sets and 67,900 hooks fished.

The data were limited to those trips that targeted reef fish. Reef fish targeted trips were defined as trips by those vessels that did not have a commercial directed shark permit. In addition, trips by vessels that did have a commercial directed shark permit and that landed 2/3 by weight species other than sharks were also defined as reef fish targeted trips. The data were stratified by region: eastern Gulf of Mexico and western Gulf of Mexico. The eastern region was defined as statistical areas 1-10; the western region included statistical areas 11-21. Those regions were defined by the reef fish observer program.

Three measures of effort were summarized for the reef fish fishery: number of trips, number of sets, and total hooks fished. Hook hours fished could not be used as a measure of fishing effort because of inconsistent reporting of the time spent fishing. In some cases fishers reported hours fished per set, but other fishers reported total hours fished. In many cases it was not clear which "hours of fishing" had been reported. Summaries of trips, sets, and total hooks fished are provided in Table 1 for both regions (east and west) during 2009.

### 4.2. *Coverage Levels*

All vessels with permits to land federally managed species (other than swordfish and tunas) in the Gulf of Mexico were required to report landings and effort information to the coastal logbook program.

### 4.3. *Reported Effort*

Summaries of trips, sets, and total hooks fished are provided in Table 1 for both regions (eastern and western Gulf of Mexico) during 2009.

### 4.4. *Calculated Effort*

All reef fish effort, as defined in section 4.1, reported to the coastal logbook program (less filtered data as defined above) was included in the totals provided in summary Table 1. More detailed (disaggregated) values showing reef fish effort (trips, total hooks and sets) for each sub-region, target species, permit type, period and season are presented in Table 2.

### 4.5. *Reported Discards*

In August 2001, NMFS initiated a program to collect commercial fishing vessel discard data from Gulf of Mexico fisheries. A reporting form was developed that supplemented the existing coastal logbook forms that were already mandatory for those fisheries. Each year, data collection for the discard logbook program involved a 20% random sample of the vessels with Gulf of Mexico reef

fish, king mackerel, Spanish mackerel or shark permits. To assure that the sample was representative of vessels with those Federal permits, the universe of permitted vessels was stratified by gear fished. A random sample (weighted by fishing effort reported in the previous year) was selected, without replacement, from each stratum. Fishing gear strata included hand line, electric reel (bandit rig), trolling, bottom longline, trap, gillnet, and diving. The selected fishers were instructed to complete a supplemental discard form for every fishing trip that they made. Trips with no discards were reported as such. Reported data included the numbers of discards by species, estimated condition of the animal when released, reason for release (due to regulations or unmarketable/unwanted), and the fishing area where the animal was discarded. No turtles or smalltooth sawfish were reported as released from bottom longline vessels in the Gulf of Mexico during 2009.

## 5. Observer Data

### 5.1. Background

There are currently two mandatory NMFS observer programs in the Gulf of Mexico that monitor the commercial reef fish sector: the Shark Bottom Longline Observer Program (SBLOP) and the Reef Fish Observer Program (RFOP). The information contained in this report summarizes data collected from the RFOP and SBLOP during the 2009 Gulf of Mexico commercial reef fish season.

For the SBLOP, observations of the shark-directed bottom longline fishery in the Atlantic Ocean and Gulf of Mexico have been conducted since 1994 (e.g. Hale and Carlson, 2007, Hale et al., 2007, Morgan et al. 2009, Hale et al., 2009; Hale et al., 2010). Currently 222 U.S. fishers are permitted to target sharks (excluding dogfish) in the Atlantic Ocean and Gulf of Mexico, and an additional 276 fishers are permitted to land sharks incidentally. Amendments to the Consolidated Atlantic Highly Migratory Species Fishery Management Plan based on updated stock assessments have eliminated the major directed shark fishery in the U.S. Atlantic (NMFS 2007). Because of the overlap with vessels targeting reef fish and shark within the same trip and vessels possessing directed shark permits (Hale and Carlson, 2007), observers boarded trips regardless of the indicated target species. Thus, data presented in this report are restricted to Gulf of Mexico reef fish targeted trips (i.e., bottom longline trips that targeted grouper, snapper, and tilefish, as well as sharks).

With respect to the RFOP, Amendment 22 to the Gulf of Mexico Fishery Management Council's (GMFMC) Reef Fish Fishery Management Plan dictates mandatory observer coverage. In July 2006, in collaboration with the commercial fishing industry and the GMFMC, NMFS implemented a mandatory observer program to characterize the commercial reef fishery operating in the U.S. Gulf of Mexico (Scott-Denton et al. 2010a; Scott-Denton et al. 2010b). The fishery consists of approximately 890 federally permitted vessels (SERO, 2010). The primary gears used include bottom longline, electric (bandit) reel, hand lines, and more recently, modified buoy gear. Although numerous reef fish species are retained, the predominant targets of these fisheries are groupers and snappers.

### 5.2. Data Collection Methodology

NMFS observers were placed on commercial reef fish vessels operating throughout the Gulf of Mexico based on random selection stratified by season, gear, and region. For the SBLOP, vessels possessing current valid directed shark permits were randomly selected for coverage, with a target coverage level of 4-6% based on previous years effort in the coastal fisheries logbook. Because of dual permits, vessels targeting reef fish and shark within the same trip as well as vessels possessing directed shark permits (Hale and Carlson, 2007) were boarded regardless of the indicated target species. Actual observer coverage level for 2009 was 1.2%.

In the RFOP, proportional sampling effort, based on coastal logbook data, among seasons and gears in the eastern and western Gulf of Mexico was recommended by NMFS in 2006, and used thereafter for vessel selection stratification purposes. In 2009 increased coverage was directed toward the bottom longline fishery in the eastern Gulf of Mexico to monitor protected species. Shrimp statistical zones were used to delineate area designations. Conventionally, statistical areas 1 – 9 represent the west coast of Florida, 10 – 12 delineate Alabama/Mississippi, 13 – 17 depicted Louisiana, and 18 – 21 denote Texas. For the reef fish fishery, statistical zones 1 – 10 were selected to represent the eastern Gulf and zones 11 – 21 for the western Gulf. Seasonal categories were: January through March; April through June; July through September; and October through December. The primary gear types assessed included bottom longline, modified buoy gear, bandit reel, and hand line. The latter two gear types were combined to represent the vertical line fishery. For the RFOP the target coverage level is 4.8%, a level calculated to give a CV of 0.3 for the fishery. Mandatory observer coverage for the reef fish fishery is currently 1.7% of the total sea days reported in the 2009 coastal logbook data.

For both programs, selection letters requiring observer coverage were issued to the permit holder via U.S. Certified mail approximately one to two months prior to the upcoming fishing season. Once the permit holder receives the selection letter, he or she is required to make contact with the observer coordinator and indicate intent to fish during the upcoming fishing season. If the permit holder intends to fish, the observer coordinator deploys an observer to the port of departure. Vessels were required to have a current Commercial Fishing Vessel Safety Examination decal prior to the selection period for mandatory observer coverage. Once deployed, the observers collect data pertaining to vessel, gear, location and biological information. For each set (the location of gear placement at a defined time), the type, number and construction material of the fishing gear were recorded. Latitude, longitude, depth, and environmental parameters including sea state and bottom type were recorded at the start of each set. The total time the gear remained in the water (soak or fishing time) was calculated. Fishery data were obtained from each set. Discarded and retained species were processed, recording length, weight, and condition when brought onboard and, if necessary, condition at release. Sightings or capture of sea turtles (and other protected species) were recorded in accordance with NMFS protocol (NMFS 2008). Data pertaining to sea turtle interactions were reported to NMFS for sea turtle mortality assessment.

### 5.3. Highlights of the 2009 Observer Programs

Trip, set/haul, gear and fishing characteristics by program for the 2009 commercial reef fish season are depicted (Table 3). Effort by statistical zone (Table 4) and by statistical zone and season (Table 5) are given. Sea day and percentage coverage levels are depicted in Table 6. The number and

disposition of catch in percentage by project are given in Tables 7 through 10. Protected resource interactions occurred only in the RFOP and are shown in Table 11.

### *5.3.1. Shark Bottom Longline Targeting Reef Fish (SBLOP)*

There were 70 SBLOP hauls or sets on 4 trips (Table 3) that were observed targeting shallow-water reef fish (mainly red grouper, *Epinephelus morio*) or deepwater grouper/tilefish (mainly yellowedge grouper, *Epinephelus flavolimbatus*, and tilefish, *Lopholatilus chamaeleonticeps*) in the Gulf of Mexico (Table 7). The mainline length of these gears ranged from 1 to 6.5 nm with an average of 4.4 nm. The bottom depth fished ranged from 23 to 143 fm with an average of 73.6 fm, and the number of hooks ranged from 327 to 1590 hooks with an average of 1123 hooks fished. Circle hooks sized 13/0 were the only hook utilized (100% of hauls). The average soak duration (the time from when the last hook entered the water until the first hook was hauled back) was 2.0 hr.

There were 6,636 individual animals caught on observed bottom longline hauls targeting reef fish in the Gulf of Mexico (Table 7). Teleosts comprised 89.6% of the catch, followed by sharks (10.2%), invertebrates (0.1%), and batoids (0.1%). Deepwater shark species comprised 48.2% of the shark catch, small coastal shark species comprised 45.0%, and large coastal sharks comprised 4.1%. Prohibited sharks including the bigeye sixgill shark, *Hexanchus vitulus* and the dusky shark, *Carcharhinus obscurus*, made up 2.7% of the catch. Red grouper was the most frequently caught species of teleost (35.6%), and smooth dogfish, *Mustelus canis*, was the most frequently caught species of shark (40.1%).

### *5.3.2. Reef Fish Bottom Longline (RFOP)*

There were 753 sets on 33 trips (Table 3) observed targeting shallow-water reef fish, mainly red grouper, or deepwater grouper/tilefish, mainly yellowedge grouper, and tilefish, Family Malacanthidae in the Gulf of Mexico (Table 8). The length of the mainline for this gear ranged from 1.5 to 12.0 nm with an average of 5.4 nm. The bottom depth fished ranged from 20.3 to 198 fm with an average of 66.2 fm. Approximate hook count ranged from 150 to 2,300 hooks with an average of 954.1 hooks fished. Circle hooks were deployed on all sets with size 13/0 the dominant (57.2%). The average soak duration (the time from when the first hook entered the water until the last hook was hauled back) was 5.3 hr.

There were 35,196 individual animals caught on observed bottom longline sets targeting reef fish in the Gulf of Mexico (Table 8). Red grouper (37.2%), yellowedge grouper (15.0%), blueline tilefish, *Caulolatilus microps* (8.0%), tilefish (5.6%), and red snapper, *Lutjanus campechanus* (4.9%), were the species caught most frequently.

### *5.3.3. Reef Fish Modified Buoy Gear (RFOP)*

There were only a few trips and vessels observed targeting primarily red grouper using modified buoy gear in Gulf of Mexico (Table 9). Due to data confidentiality rules, actual numbers are not presented in this report.

### *5.3.4. Reef Fish Vertical Line (RFOP)*

There were 1,671 sets during 49 trips (Table 3) observed targeting shallow-water reef fish (mainly red grouper) and snapper in the Gulf of Mexico (Table 10). The bottom depth fished ranged from 1.0 to 118.5 fm with an average of 28.7 fm, and the number of hooks ranged from 1 to 215 hooks with an average of 22.2 hooks fished. Circle hooks were deployed on most (90.6%) sets with size 13/0 the dominant (32.4%). The average soak duration was $\leq$ 1.0 hr.

There were 14,304 individual animals caught on observed vertical line sets targeting reef fish in the Gulf of Mexico (Table 10). Red grouper (24.7%), vermilion snapper, *Rhomboplites aurorubens* (20.4%), red snapper (17.6%), red porgy *Pagrus pagrus* (10.8%), and gag grouper, *Mycteroperca microlepis* (5.3%), were the species caught most frequently.

### *5.3.5. Protected Species Interactions*

No interactions with protected resources (sea bird, sea turtle, sawfish, or marine mammal) were observed for shark bottom longline vessels targeting reef fish, modified buoy gear, and vertical line vessels in the Gulf of Mexico (Table 11). However, for the bottom longline fishery, six loggerhead sea turtles interactions were observed in 2009 (Tables 11 and 12). Table 13 provides a summary of takes, gear characteristics, capture and release conditions, and final disposition of sea turtles documented by the observer program.

## 6. Data Analysis

### 6.1. *Discussion*

NMFS made two prior estimates of total bycatch in the Gulf of Mexico commercial bottom longline reef fish fishery (i.e., SEFSC 2008 and SEFSC 2009). Following Pennington (1983), both reports used the delta lognormal model to estimate bycatch but made it clear that this model may not be appropriate as it is very likely that the rules for attaining the approximation of normality using the binomial distribution (i.e., as used in the delta-lognormal approach) are violated because of low sample sizes[5] and frequency of occurrence. Both reports stated, "In any case, the extrapolated estimates based upon sparse data sets [(*i.e*. sea turtle takes)] should not be assumed to be reasonable without potentially invoking large assumptions regarding unobserved events."

A statistical examination of the above reports showed that sample size and incidences of sea turtle interactions were indeed very low in the reef fish bottom longline fishery. The confidence interval estimation was also based on the assumption that all samples are non-correlated – an assumption that did not hold true since strong correlation exists between bycatch rates and successive sets. A strong clustering effect attributed to the sampling protocols was also noted. Furthermore, although the delta-lognormal approach has been used to estimate bycatch for other

[5] Approximately 40 positive observations are needed to determine the type of distribution. In this case, however, the low sample size and interaction rates do not allow for verification of the lognormal distribution assumption.

species and/or fisheries, the approach was not robust enough to handle situations with highly limited or sparse data.

In addition to concerns with the estimation methodology, NMFS questioned whether or not the effort data obtained from logbooks and used for the expansion of bycatch rates to total take estimates had been appropriately restricted to ensure that the bycatch rates were only multiplied by the applicable effort. Such restrictions would include any gear restrictions to ensure that only reef fish bottom longline effort is used as well as time-area restrictions to provide estimates only when and where interactions take place. Only one of the reports (i.e., SEFSC 2008 and not SEFSC 2009), considered these issues, but only peripherally in reference to extrapolations to the western Gulf of Mexico (a large and unobserved strata). Walters (2003) cautioned against this type of extrapolation to unobserved spatial strata. It was also noted that further stratification, e.g., by statistical area, while more appropriate and less tenuous than the design stratification used in the previous NMFS reports (SEFSC 2008, 2009), would exacerbate the low sample size problem.

The data considered in this report (i.e., the 2009 Gulf of Mexico Reef Fish Fishery observed bycatch of loggerhead sea turtles) have the same limitations as the data for years 2006 thru 2008. For example, only 6 loggerhead sea turtles were observed taken in two clustered events. Of 37 observed trips of 823 sets, one trip observed five captured loggerhead sea turtles and another trip observed the capture of a single loggerhead sea turtle. As noted above, the delta-lognormal approach is not appropriate for analyzing this type of data as it ignores clustering and the data are not likely to fit the assumption that the non-zero CPUE's are drawn from a lognormal distribution. Hence, calculation of bycatch estimates using the SEFSC 2008 and 2009 methodology is no longer considered appropriate. However, in an effort to meet the T&C requirement, extrapolations of bycatch estimates utilizing the methods employed in previous reports (i.e., SEFSC 2008 and 2009) are provided in the Appendix.

### 6.2. *Improvements in Quantitative Stock Assessment*

NMFS has made progress towards the goal of improved quantitative stock assessment by developing a proposal with the Northeast Fisheries Science Center entitled, ***Quantitative Evaluation of Alternative Analytic Approaches to Analyses of Anthropogenic Impacts on Marine Turtle Populations***". The science centers and their respective regional offices are currently discussing how to proceed with funding this work. If funded, the proposed work will develop and utilize a variety of quantitative assessment tools to evaluate the risks and benefits associated with various impact assessment approaches. This process will enable identification of the most sensitive assessment parameters, which can be useful when prioritizing research and data collection effort. In their recent review, the National Research Council (National Research Council, 2010) identified filling critical data gaps as part of their primary recommendations to improve sea turtle assessments. In this regard, NMFS has made progress towards filling these data gaps, e.g., when sensitivity analysis from NMFS' recent loggerhead sea turtle assessment (SEFSC, 2009) was used to provide the rational for the successfully funded proposal to collect much needed growth and survivorship data for pelagic stage loggerheads.

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**Table 1. Effort by combined statistical zones reported to the coastal logbook program during 2009. Effort summaries included only those trips that targeted reef fish (as defined in the text).**

| Effort Measure | East Gulf (areas 1-10) | West Gulf (areas 11-21) |
|---|---|---|
| Number of trips | 669 | 97 |
| Number of sets | 14,243 | 2,510 |
| Total hooks fished | 15,352,269 | 2,381,550 |

**Table 2. Detailed effort reported to the coastal logbook program during 2009. Effort included only those trips that targeted reef fish (as defined in the text).**

| Year | Subregion | Target[1] | Permit[2] | Period[3] | Season[4] | Trips | Tot_hooks | Sets |
|---|---|---|---|---|---|---|---|---|
| 2009 | east | mixed | * | * | Closed | * | * | * |
| 2009 | east | mixed | * | * | open1 | * | * | * |
| 2009 | east | other | 0 | 1 | Closed | 65 | 1,638,375 | 1,474 |
| 2009 | east | other | 0 | 1 | open1 | 244 | 6,438,294 | 6,018 |
| 2009 | east | other | 0 | 2 | Closed | 51 | 861,550 | 1,015 |
| 2009 | east | other | 1 | 1 | Closed | 53 | 1,295,650 | 1,021 |
| 2009 | east | other | 1 | 1 | open1 | 171 | 4,406,000 | 3,649 |
| 2009 | east | other | 1 | 2 | Closed | 45 | 718,500 | 1,020 |
| 2009 | east | shark | * | * | Closed | * | * | * |
| 2009 | east | shark | 1 | 1 | open1 | 39 | 41,550 | 76 |
| 2009 | west | other | 0 | 1 | closed | 19 | 568,650 | 611 |
| 2009 | west | other | 0 | 1 | open1 | 56 | 1,831,100 | 1,893 |
| 2009 | west | other | * | * | open1 | * | * | * |
| 2009 | west | shark | * | * | closed | * | * | * |
| 2009 | west | shark | * | * | open1 | * | * | * |
| 2009 | west | shark | * | * | closed | * | * | * |

Legend:

[1] Target = determined based upon percentage of catch, i.e.,
(>2/3 shark = shark, >2/3 reef fish = other, mixed = no 2/3 majority)

[2] Permit = 1 vessels had directed shark permits

[3] Period = 1 January – July

[4] Season = open or closed large coastal shark season

* Data not presented due to data confidentiality rules

**Table 3. Trip, set, and gear characteristics for all observed Shark Bottom Longline Observer Program (SBLOP) and Reef Fish Observer Program (RFOP) sets targeting reef fish species in the Gulf of Mexico in 2009.**

| | Shark Bottom Longline Observer Program (SBLOP) | | Reef Fish Observer Program (RFOP) | | |
|---|---|---|---|---|---|
| | Reef Fish Targeted | | Bottom Longline | Modified Buoy | Vertical Line |
| Number of Trips | 4 | | 33 | --[1] | 49 |
| Trip Length (days) | 7-14 ($\bar{x}$ =10.5) | | 4 – 19 ($\bar{x}$ =12.0) | --[1] | 1 – 16 ($\bar{x}$ =4.04) |
| Number of Vessels | 3 | | 28 | --[1] | 43 |
| Total Sets | 70 | | 753 | --[1] | 1671 |
| Sea Days | 42 | | 397 | --[1] | 198 |
| Bottom Depth (fm) | 23 – 143 ($\bar{x}$ =73.6) | | 20.3 – 198 ($\bar{x}$ =66.2) | --[1] | 1.0 – 118.5 ($\bar{x}$ =28.7) |
| Mainline Length (nm) | 1 – 6.5 ($\bar{x}$ =4.4) | | 1.5 – 12.0 ($\bar{x}$ =5.4) | --[1] | - |
| Mainline Material | Cable (100%) | | Cable (95.9%) | --[1] | Monofilament (72.1%) |
| Mainline Test (lbs) | 1500 | | 900 – 4000 ($\bar{x}$ =1649.1) | --[1] | 15 – 1200 ($\bar{x}$ =268.3) |
| Gangion Length (ft) | 6 – 8 ($\bar{x}$ = 6.5) | | 2.5 – 11 ($\bar{x}$ =6.4) | --[1] | - |
| Gangion Material | Monofilament (100%) | | Monofilament (100%) | --[1] | |
| Distance Between Hooks (ft) | 38 – 54 ($\bar{x}$ = 43.5) | | 7.0 – 75.0 ($\bar{x}$ =23.5) | | |
| Rod Mount | - | | - | - | Fixed (65%)<br>Portable (35%) |
| Reel Type | - | | - | - | Hand (40.9%)<br>Electric (39.8%)<br>Hydraulic (19.3%) |
| Number of Hooks/Set | 327 – 1590 ($\bar{x}$ =1123) | | 150 – 2300 ($\bar{x}$ =954.1) | --[1] | 1 – 215 ($\bar{x}$ =22.1) |
| Type of Hook | Mustad (50%)<br>Eagle Claw (50%)<br><br>Circular (100%)<br><br>Offset (50%)<br>10° (100%)<br>Straight (50%) | | Mustad (76.8%)<br>Eagle Claw (20.1%)<br><br>Circular (100%)<br><br>Offset (58.4%)<br>10° (78.0%)<br>5° (11.8%)<br>Straight (41.6%) | --[1]<br><br><br>--[1]<br>--[1]<br>--[1]<br>--[1] | Mustad (82.1%)<br><br><br>Circular (90.6%)<br><br>Straight (69.5%) |
| Hook Size | 13.0 (100%) | | 13.0 (57.2%)<br>14.0 (24.8%)<br>15.0 (12.1%) | --[1]<br>--[1] | 13.0 (32.4%)<br>8.0 (14.8%)<br>14.0 (14.5%) |
| Total Hooks Set 2009 | 78,637 | | 654,539 | --[1] | 37,123 |
| Average Soak Duration (hrs)[2] | 0.3 – 15.6 ($\bar{x}$ = 2.0) | | 1.1 – 28 ($\bar{x}$ =5.3) | --[1] | <0.1 – 12.8 ($\bar{x}$ =0.67) |
| Total Hours Fished (2009) | 138.4 (n=70 sets) | | 3629.3 (n=686 sets) | --[1] | 1104.5 (n=1638 sets) |
| Total Hook Hours 2009 | 145481.8 | | 3,576,511.2 | --[1] | 29,168.83 |

[1] Data not presented due to data confidentiality rules
[2] Calculated differently

**Table 4. Effort by statistical zone for all observed Shark Bottom Logline Observer Program (SBLOP) and Reef Fish Observer Program (RFOP) sets targeting reef fish species in the Gulf of Mexico in 2009.**

| | Shark Bottom Longline Observer Program (SBLOP) | | Reef Fish Observer Program (RFOP) | |
|---|---|---|---|---|
| Statistical Zone | Reef Fish Targeted | | Bottom Longline | Vertical Line |
| 1-10 | | | | |
| n | 70 | | 539 | 1569 |
| Hooks Set | 78,637 | | 546,959 | 33,097 |
| Hours | 138.4 | | 2931.8 | 1007.3 |
| 11-21 | | | | |
| n | 0 | | 147 | 69 |
| Hooks Set | 0 | | 107,580 | 3986 |
| Hours | 0 | | 697.5 | 97.2 |

**Table 5(a-c): Observed reef fish bottom longline effort for the Gulf of Mexico (GOM) in trips, sets, and hooks from the Shark Bottom Longline Observer Program (SBLOP) and Reef Fish Observer Program (RFOP) by year and season. The Gulf of Mexico is divided into east and west strata at 88 degrees W longitude. Observed mixed trips (shark targeted sets and grouper or tilefish targeted sets) were shown as a proportion of non-shark target sets. Season 1 was January through June, and Season 2 was July through December.** * Data not presented due to data confidentiality rules.

| 5a: TRIPS | | | | | |
|---|---|---|---|---|---|
| | | Eastern GOM | | Western GOM | |
| Year | Season | SBLOP | RFOP | SBLOP | RFOP |
| 2009 | 1 | 4 | 24.34 | 0 | 7.65 |
| 2009 | 2 | 0 | * | 0 | 0 |
| 5b: SETS | | | | | |
| | | Eastern GOM | | Western GOM | |
| Year | Season | SBLOP | RFOP | SBLOP | RFOP |
| 2009 | 1 | 70 | 544 | 0 | 171 |
| 2009 | 2 | 0 | * | 0 | 0 |
| 5c: HOOKS | | | | | |
| | | Eastern GOM | | Western GOM | |
| Year | Season | SBLOP | RFOP | SBLOP | RFOP |
| 2009 | 1 | 78,637 | 594,249 | 0 | 129,645 |
| 2009 | 2 | 0 | * | 0 | 0 |

**Table 6. Number of sea days for all gear types for Reef Fish Observer Program (RFOP) sets and industry in the Gulf of Mexico in 2009.** * Data not presented due to data confidentiality rules.

| | Reef Fish Observer Program (RFOP) | | Industry | |
|---|---|---|---|---|
| | Sea Days | | Sea Days | Percent Coverage |
| Longline | 397 | | 7164 | 5.5% |
| Modified Buoy | * | | - | - |
| Vertical Line | 198 | | 28,954 | 0.7% |
| Total | * | | 36,118 | 1.7% |

**Table 7. Number caught (n) and disposition of catch in percentage for all Shark Bottom Longline Observer Program (SBLOP) sets targeting reef fish in the Gulf of Mexico in 2009. Disposition of catch divided into kept (K), discard dead(DD), discard alive (DA), and discard uncertain (U).**

| Scientific Name | Common Name | n | % K | % DD | % DA | % U |
|---|---|---|---|---|---|---|
| *Epinephelus morio* | Red grouper | 2115 | 33.7 | 0.9 | 65.4 | 0.0 |
| *Caulolatilus microps* | Blueline tilefish | 1170 | 20.9 | 76.5 | 2.6 | 0.0 |
| *Lopholatilus chamaeleonticeps* | Tilefish | 898 | 0.0 | 1.8 | 98.2 | 0.0 |
| *Epinephelus flavolimbatus* | Yellowedge grouper | 885 | 99.3 | 0.6 | 0.1 | 0.0 |
| *Squalus cubensis* | Cuban dogfish | 273 | 0.0 | 2.9 | 97.1 | 0.0 |
| *Carcharhinus acronotus* | Blacknose shark | 195 | 0.5 | 3.6 | 95.9 | 0.0 |
| *Ophichthus rex* | King snake eel | 188 | 30.9 | 13.8 | 55.3 | 0.0 |
| *Urophycis floridana* | Southern hake | 136 | 89.7 | 0.0 | 10.3 | 0.0 |
| *Lutjanus campechanus* | Red snapper | 117 | 0.0 | 3.4 | 96.6 | 0.0 |
| *Rhizoprionodon terraenovae* | Atlantic sharpnose shark | 109 | 0.9 | 3.7 | 94.5 | 0.9 |
| *Epinephelus niveatus* | Snowy grouper | 70 | 92.9 | 7.1 | 0.0 | 0.0 |
| *Mustelus canis* | Smooth dogfish | 52 | 5.8 | 0.0 | 94.2 | 0.0 |
| *Haemulon album* | Margate grunt | 40 | 95.0 | 0.0 | 5.0 | 0.0 |
| *Epinephelus drummondhayi* | Speckled hind | 32 | 96.9 | 3.1 | 0.0 | 0.0 |
| *Merluccius sp.* | Hakes | 27 | 66.7 | 29.6 | 3.7 | 0.0 |
| *Mycteroperca bonaci* | Black grouper | 27 | 92.6 | 0.0 | 7.4 | 0.0 |
| *Coryphaena hippurus* | Dolphinfish | 19 | 100.0 | 0.0 | 0.0 | 0.0 |
| *Echeneis naucrates* | Sharksucker | 19 | 0.0 | 0.0 | 100.0 | 0.0 |
| *Mycteroperca phenax* | Scamp grouper | 19 | 100.0 | 0.0 | 0.0 | 0.0 |
| Muraenidae | Moray eel family | 18 | 33.3 | 16.7 | 50.0 | 0.0 |
| *Seriola dumerili* | Greater amberjack | 18 | 72.2 | 0.0 | 27.8 | 0.0 |
| Tetraodontidae | Puffer family | 18 | 0.0 | 0.0 | 100.0 | 0.0 |
| *Carcharhinus falciformis* | Silky shark | 16 | 0.0 | 6.3 | 93.8 | 0.0 |
| *Neomerinthe hemingwayi* | Spinycheek scorpionfish | 16 | 87.5 | 0.0 | 12.5 | 0.0 |
| *Lutjanus griseus* | Gray snapper | 11 | 90.9 | 0.0 | 9.1 | 0.0 |
| *Lutjanus synagris* | Lane snapper | 10 | 90.0 | 0.0 | 10.0 | 0.0 |
| *Synodus foetens* | Inshore lizardfish | 10 | 90.0 | 0.0 | 10.0 | 0.0 |
| *Carcharhinus obscurus* | Dusky shark | 9 | 0.0 | 0.0 | 100.0 | 0.0 |
| *Hexanchus vitulus* | Bigeye sixgill shark | 9 | 0.0 | 22.2 | 77.8 | 0.0 |
| *Sarda sarda* | Bonito | 9 | 100.0 | 0.0 | 0.0 | 0.0 |
| Congridae | Conger eels | 8 | 75.0 | 0.0 | 25.0 | 0.0 |
| *Sphyraena barracuda* | Great barracuda | 8 | 75.0 | 25.0 | 0.0 | 0.0 |
| *Galeocerdo cuvier* | Tiger shark | 5 | 0.0 | 0.0 | 60.0 | 40.0 |
| *Remora remora* | Remora | 5 | 0.0 | 0.0 | 100.0 | 0.0 |
| *Pristipomoides aquilonaris* | Wenchman snapper | 5 | 100.0 | 0.0 | 0.0 | 0.0 |
| *Carcharhinus limbatus* | Blacktip shark | 4 | 0.0 | 0.0 | 100.0 | 0.0 |
| Elasmobranchii | Sharks | 4 | 0.0 | 0.0 | 100.0 | 0.0 |
| *Gymnothorax funebris* | Green moray eel | 4 | 0.0 | 25.0 | 75.0 | 0.0 |
| *Scianops ocellatus* | Red drum | 4 | 0.0 | 0.0 | 100.0 | 0.0 |
| *Seriola sp.* | Amberjacks | 4 | 50.0 | 0.0 | 50.0 | 0.0 |
| Serranidae | Seabass family | 4 | 100.0 | 0.0 | 0.0 | 0.0 |
| Asteroidea | Sea stars | 3 | 0.0 | 0.0 | 100.0 | 0.0 |
| Majidae | Spider crabs | 3 | 0.0 | 0.0 | 100.0 | 0.0 |
| *Opsanus pardus* | Leopard toadfish | 3 | 66.7 | 33.3 | 0.0 | 0.0 |
| *Paralichthys sp.* | Flounders | 3 | 66.7 | 0.0 | 33.3 | 0.0 |
| *Thunnus atlanticus* | Blackfin tuna | 3 | 100.0 | 0.0 | 0.0 | 0.0 |
| *Balistes capriscus* | Gray triggerfish | 2 | 100.0 | 0.0 | 0.0 | 0.0 |
| *Calamus bajonado* | Jolthead porgy | 2 | 100.0 | 0.0 | 0.0 | 0.0 |
| *Dasyatis americana* | Southern stingray | 2 | 50.0 | 0.0 | 50.0 | 0.0 |
| *Ginglymostoma cirratum* | Nurse shark | 2 | 0.0 | 0.0 | 50.0 | 50.0 |
| *Muraena retifera* | Reticulate moray eel | 2 | 100.0 | 0.0 | 0.0 | 0.0 |
| *Mycteroperca microlepis* | Gag grouper | 2 | 100.0 | 0.0 | 0.0 | 0.0 |
| *Rachycentron canadum* | Cobia | 2 | 50.0 | 0.0 | 50.0 | 0.0 |
| Scorpaenidae | Scorpionfish family | 2 | 100.0 | 0.0 | 0.0 | 0.0 |
| *Scyliorhinus retifer* | Chain catshark | 2 | 0.0 | 50.0 | 50.0 | 0.0 |
| *Synodus intermedius* | Sanddiver lizardfish | 2 | 0.0 | 50.0 | 50.0 | 0.0 |
| *Carcharhinus plumbeus* | Sandbar shark | 1 | 0.0 | 0.0 | 100.0 | 0.0 |
| *Caulolatilus cyanops* | Blackline tilefish | 1 | 0.0 | 0.0 | 100.0 | 0.0 |
| *Diplectrum formosum* | Sand perch | 1 | 100.0 | 0.0 | 0.0 | 0.0 |
| *Epinephelus cruentatus* | Graysby grouper | 1 | 0.0 | 0.0 | 100.0 | 0.0 |
| *Epinephelus itajara* | Goliath grouper | 1 | 0.0 | 0.0 | 100.0 | 0.0 |
| *Gymnothorax moring* | Spotted moray eel | 1 | 0.0 | 100.0 | 0.0 | 0.0 |
| *Lutjanus analis* | Mutton snapper | 1 | 100.0 | 0.0 | 0.0 | 0.0 |
| *Pagrus pagrus* | Red porgy | 1 | 100.0 | 0.0 | 0.0 | 0.0 |

**Table 8.Number caught (n) and disposition of catch in percentage for all Reef Fish Observer Program (RFOP) Bottom Longline sets targeting reef fish in the Gulf of Mexico in 2009. Disposition of catch divided into kept (K), discard dead (DD), discard alive (DA), used for bait (B), discard uncertain (U), and discard unknown (X).**

| Scientific Name | Common Name | n | % K | % DD | % DA | % B | % U | % X |
|---|---|---|---|---|---|---|---|---|
| *Epinephelus morio* | Red Grouper | 13110 | 46.60 | 13.00 | 40.15 | 0.00 | 0.21 | 0.05 |
| *Epinephelus flavolimbatus* | Yellowedge Grouper | 5266 | 99.22 | 0.23 | 0.09 | 0.00 | 0.30 | 0.15 |
| *Caulolatilus microps* | Blueline Tilefish | 2810 | 56.51 | 26.55 | 14.70 | 1.92 | 0.32 | 0.00 |
| Lopholatilus chamaeleonticeps | Tilefish | 1967 | 97.36 | 1.07 | 0.36 | 0.00 | 1.22 | 0.00 |
| *Lutjanus campechanus* | Red Snapper | 1712 | 33.06 | 16.88 | 48.71 | 0.00 | 1.23 | 0.12 |
| *Ophicthus rex* | King Snake Eel | 1373 | 0.15 | 7.79 | 48.36 | 42.61 | 1.09 | 0.00 |
| *Rhizoprionodon terraenovae* | Atlantic Sharpnose Shark | 1083 | 1.57 | 35.36 | 60.20 | 0.09 | 2.77 | 0.00 |
| *Mustelus canis* | Smooth Dogfish Shark | 960 | 0.10 | 1.98 | 96.77 | 0.00 | 1.15 | 0.00 |
| *Epinephelus niveatus* | Snowy Grouper | 802 | 99.38 | 0.62 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Mycteroperca phenax* | Scamp | 608 | 96.05 | 1.32 | 2.30 | 0.00 | 0.33 | 0.00 |
| *Pagrus pagrus* | Red Porgy | 423 | 89.60 | 0.95 | 3.78 | 4.26 | 1.42 | 0.00 |
| *Mycteroperca microlepis* | Gag | 364 | 92.31 | 1.65 | 5.77 | 0.00 | 0.27 | 0.00 |
| *Urophycis regia* | Spotted Hake | 336 | 1.79 | 71.43 | 0.30 | 15.18 | 11.31 | 0.00 |
| *General Sharks* | Sharks Grouped | 316 | 1.90 | 11.71 | 85.44 | 0.00 | 0.95 | 0.00 |
| *Epinephelus drummondhayi* | Speckled Hind | 308 | 94.48 | 3.90 | 1.62 | 0.00 | 0.00 | 0.00 |
| *Caranx ruber* | Bar Jack | 267 | 0.37 | 28.46 | 70.41 | 0.00 | 0.75 | 0.00 |
| *Ophichthus puncticeps* | Pale Spotted Eel | 266 | 0.00 | 1.88 | 2.26 | 95.11 | 0.00 | 0.75 |
| *Urophycis floridana* | Southern Hake | 215 | 0.00 | 62.33 | 2.33 | 20.00 | 15.35 | 0.00 |
| *Urophycis cirrata* | Gulf Hake | 167 | 0.00 | 38.92 | 7.78 | 0.60 | 52.69 | 0.00 |
| *Neomerinthe hemingwayi* | Spinycheek Scorpionfish | 164 | 96.95 | 2.44 | 0.00 | 0.00 | 0.61 | 0.00 |
| *Seriola dumerili* | Greater Amberjack | 149 | 45.64 | 7.38 | 37.58 | 4.03 | 5.37 | 0.00 |
| Gymnothorax nigromarginatus | Blackedge Moray | 141 | 0.71 | 11.35 | 26.24 | 57.45 | 4.26 | 0.00 |
| *Brotula barbata* | Bearded Brotula | 134 | 87.31 | 11.19 | 0.75 | 0.00 | 0.75 | 0.00 |
| *Seriola sp.* | Jack (Genus) | 114 | 0.00 | 4.39 | 62.28 | 0.00 | 33.33 | 0.00 |
| *Echeneis naucrates* | Sharksucker | 96 | 1.04 | 1.04 | 71.88 | 25.00 | 0.00 | 1.04 |
| Squalus | Dogfish (Genus) | 92 | 0.00 | 41.30 | 56.52 | 0.00 | 2.17 | 0.00 |
| *Calamus bajonado* | Jolthead Porgy | 74 | 98.65 | 1.35 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Euthynnus alletteratus* | Bonito | 74 | 0.00 | 10.81 | 0.00 | 89.19 | 0.00 | 0.00 |
| *Gymnothorax sp.* | Moray (Genus) | 72 | 0.00 | 4.17 | 4.17 | 84.72 | 4.17 | 2.78 |
| *Mustelus sp.* | Dogfish Shark | 72 | 0.00 | 1.39 | 95.83 | 0.00 | 2.78 | 0.00 |
| *Galeocerdo cuvier* | Tiger Shark | 63 | 0.00 | 1.59 | 95.24 | 0.00 | 3.17 | 0.00 |
| *Rhomboplites aurorubens* | Vermilion Snapper | 61 | 62.30 | 11.48 | 24.59 | 1.64 | 0.00 | 0.00 |
| *Epinephelus nigritus* | Warsaw Grouper | 57 | 98.25 | 0.00 | 0.00 | 0.00 | 1.75 | 0.00 |
| *Gymnothorax kolpos* | Blacktail Moray | 55 | 0.00 | 1.82 | 1.82 | 96.36 | 0.00 | 0.00 |
| *Gymnothorax moringa* | Spotted Moray | 55 | 0.00 | 14.55 | 32.73 | 52.73 | 0.00 | 0.00 |
| *Sphyraena barracuda* | Great Barracuda | 55 | 18.18 | 12.73 | 7.27 | 61.82 | 0.00 | 0.00 |
| *Gymnothorax vicinus* | Purplemouth Moray | 54 | 0.00 | 7.41 | 3.70 | 88.89 | 0.00 | 0.00 |
| *Coryphaena hippurus* | Dolphin | 53 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Lutjanus synagris* | Lane Snapper | 51 | 86.27 | 7.84 | 5.88 | 0.00 | 0.00 | 0.00 |
| *Sphyrna lewini* | Hammerhead Scalloped Shark | 49 | 2.04 | 6.12 | 85.71 | 0.00 | 6.12 | 0.00 |
| *Thunnus atlanticus* | Blackfin Tuna | 45 | 77.78 | 4.44 | 4.44 | 13.33 | 0.00 | 0.00 |
| *Lutjanus griseus* | Gray Snapper | 44 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Carcharhinus leucas* | Bull Shark | 42 | 0.00 | 2.38 | 97.62 | 0.00 | 0.00 | 0.00 |
| *Helicolenus dactylopterus* | Blackbelly Rosefish | 40 | 25.00 | 45.00 | 30.00 | 0.00 | 0.00 | 0.00 |
| *Raja eglanteria* | Clearnose Skate | 38 | 0.00 | 0.00 | 21.05 | 78.95 | 0.00 | 0.00 |
| *Carcharhinus limbatus* | Blacktip Shark | 36 | 13.89 | 36.11 | 47.22 | 0.00 | 2.78 | 0.00 |
| Centrophorus granulosus | Gulper Shark | 35 | 0.00 | 14.29 | 85.71 | 0.00 | 0.00 | 0.00 |
| *Squalus cubensis* | Cuban Dogfish | 35 | 0.00 | 14.29 | 85.71 | 0.00 | 0.00 | 0.00 |
| *Opsanus pardus* | Leopard Toadfish | 33 | 0.00 | 9.09 | 57.58 | 33.33 | 0.00 | 0.00 |
| *Rachycentron canadum* | Ling Cobia | 31 | 48.39 | 3.23 | 48.39 | 0.00 | 0.00 | 0.00 |
| *Carcharhinus falciformis* | Silky Shark | 30 | 0.00 | 33.33 | 66.67 | 0.00 | 0.00 | 0.00 |

**Table 8. *Continued*. Number caught (n) and disposition of catch in percentage for all Reef Fish Observer Program (RFOP) Bottom Longline sets targeting reef fish in the Gulf of Mexico in 2009. Disposition of catch divided into kept (K), discard dead (DD), discard alive (DA), used for bait (B), discard uncertain (U), and discard unknown (X).**

| Scientific Name | Common Name | n | % K | % DD | % DA | % B | % U | % X |
|---|---|---|---|---|---|---|---|---|
| *Heptranchias perlo* | Sevengill Shark | 30 | 0.00 | 26.67 | 73.33 | 0.00 | 0.00 | 0.00 |
| *Carcharhinus plumbeus* | Sandbar Shark | 29 | 0.00 | 6.90 | 93.10 | 0.00 | 0.00 | 0.00 |
| *Ginglymostoma cirratum* | Nurse Shark | 27 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| *Seriola rivoliana* | Almaco Jack | 25 | 52.00 | 0.00 | 12.00 | 12.00 | 24.00 | 0.00 |
| *Synodontidae* | Lizardfish (Family) | 24 | 0.00 | 8.33 | 20.83 | 66.67 | 4.17 | 0.00 |
| *Trachinocephalus myops* | Snakefish | 23 | 0.00 | 4.35 | 8.70 | 86.96 | 0.00 | 0.00 |
| *Synodus poeyi* | Offshore Lizardfish | 21 | 0.00 | 23.81 | 19.05 | 57.14 | 0.00 | 0.00 |
| *Cynoscion nothus* | Silver Seatrout | 20 | 0.00 | 50.00 | 0.00 | 5.00 | 45.00 | 0.00 |
| *Scyliorhinus retifer* | Chain Dogfish | 20 | 0.00 | 5.00 | 90.00 | 0.00 | 5.00 | 0.00 |
| *Synodus foetens* | Inshore Lizardfish | 20 | 0.00 | 10.00 | 15.00 | 75.00 | 0.00 | 0.00 |
| *Carcharhinus signatus* | Night Shark | 19 | 0.00 | 26.32 | 73.68 | 0.00 | 0.00 | 0.00 |
| *Lutjanus analis* | Mutton Snapper | 19 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Sciaenops ocellatus* | Red Drum | 19 | 0.00 | 5.26 | 94.74 | 0.00 | 0.00 | 0.00 |
| *Carcharhinus acronotus* | Blacknose Shark | 18 | 11.11 | 16.67 | 72.22 | 0.00 | 0.00 | 0.00 |
| *Sphyrna mokarran* | Great Hammerhead Shark | 18 | 22.22 | 11.11 | 55.56 | 0.00 | 11.11 | 0.00 |
| *Urophycis sp.* | Hake (Genus) | 16 | 0.00 | 31.25 | 12.50 | 6.25 | 50.00 | 0.00 |
| *Balistes capriscus* | Gray Triggerfish | 15 | 93.33 | 0.00 | 6.67 | 0.00 | 0.00 | 0.00 |
| *Centropristis ocyurus* | Bank Seabass | 14 | 0.00 | 28.57 | 14.29 | 42.86 | 14.29 | 0.00 |
| *Etelis oculatus* | Queen Snapper | 14 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Opsanus beta* | Gulf Toadfish | 14 | 0.00 | 21.43 | 78.57 | 0.00 | 0.00 | 0.00 |
| Grouper (Genus) | Mycteroperca | 13 | 92.31 | 7.69 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Pristipomoides aquilonaris* | Wenchman | 13 | 23.08 | 23.08 | 0.00 | 7.69 | 46.15 | 0.00 |
| *Seriola zonata* | Banded Rudderfish | 12 | 0.00 | 8.33 | 75.00 | 16.67 | 0.00 | 0.00 |
| *Diplectrum formosum* | Sand Perch | 11 | 0.00 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 |
| Hexanchus griseus | Six Gill Shark | 11 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| *Muraena retifera* | Reticulate Moray | 10 | 0.00 | 10.00 | 10.00 | 80.00 | 0.00 | 0.00 |
| *Anisotremus surinamensis* | Black Margate | 9 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Lagocephalus laevigatus* | Smooth Pufferfish | 9 | 22.22 | 11.11 | 66.67 | 0.00 | 0.00 | 0.00 |
| Hexanchus vitulus | Bigeye Sixgill Shark | 8 | 0.00 | 12.50 | 87.50 | 0.00 | 0.00 | 0.00 |
| *Mycteroperca bonaci* | Black Grouper | 8 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Saurida brasiliensis | Largescale Lizardfish | 8 | 0.00 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 |
| *Scorpaena sp.* | Scorpionfish | 8 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Acanthocybium solandri* | Wahoo | 7 | 85.71 | 14.29 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Centropristis philadelphica* | Rock Seabass | 7 | 0.00 | 14.29 | 42.86 | 14.29 | 28.57 | 0.00 |
| *Lutjanus vivanus* | Silk Snapper | 6 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Squalus acanthias | Spiny Dogfish | 6 | 0.00 | 33.33 | 66.67 | 0.00 | 0.00 | 0.00 |
| *Calamus nodosus* | Knobbed Porgy | 5 | 80.00 | 0.00 | 20.00 | 0.00 | 0.00 | 0.00 |
| *Caranx hippos* | Common Crevalle Jack | 5 | 0.00 | 0.00 | 60.00 | 40.00 | 0.00 | 0.00 |
| Dasyatis sabina | Atlantic Stingray | 5 | 0.00 | 0.00 | 20.00 | 20.00 | 60.00 | 0.00 |
| *Haemulon album* | Margate | 5 | 80.00 | 0.00 | 20.00 | 0.00 | 0.00 | 0.00 |
| *Isurus oxyrinchus* | Shortfin Mako Shark | 5 | 20.00 | 40.00 | 40.00 | 0.00 | 0.00 | 0.00 |
| *Negaprion brevirostris* | Lemon Shark | 5 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| *Ocyurus chrysurus* | Yellowtail Snapper | 5 | 80.00 | 0.00 | 0.00 | 20.00 | 0.00 | 0.00 |
| Ophidiidae | Cusk-eel (Family) | 5 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Carcharhinus isodon* | Finetooth Shark | 4 | 0.00 | 25.00 | 75.00 | 0.00 | 0.00 | 0.00 |
| *Carcharhinus obscurus* | Dusky Shark | 4 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| *Carcharhinus porosus* | Smalltail Shark | 4 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| *Dasyatis americana* | Southern Stingray | 4 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| Gymnothorax saxicola | Honeycomb Moray | 4 | 0.00 | 0.00 | 25.00 | 75.00 | 0.00 | 0.00 |
| Tetraodontidae | Puffer (Family) | 4 | 0.00 | 0.00 | 75.00 | 0.00 | 25.00 | 0.00 |

**Table 8. *Continued*. Number caught (n) and disposition of catch in percentage for all Reef Fish Observer Program (RFOP) Bottom Longline sets targeting reef fish in the Gulf of Mexico in 2009. Disposition of catch divided into kept (K), discard dead (DD), discard alive (DA), used for bait (B), discard uncertain (U), and discard unknown (X).**

| Scientific Name | Common Name | n | % K | % DD | % DA | % B | % U | % X |
|---|---|---|---|---|---|---|---|---|
| Calamus | Porgy (Genus) | 3 | 66.67 | 0.00 | 0.00 | 33.33 | 0.00 | 0.00 |
| *Calamus leucosteus* | Whitebone Porgy | 3 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Carangidae* | Jack (Family) | 3 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| *Caranx crysos* | Blue Runner | 3 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| *Holocentridae* | Squirrelfishes (Family) | 3 | 0.00 | 33.33 | 66.67 | 0.00 | 0.00 | 0.00 |
| Istiophorus platypterus | Sailfish | 3 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Mustelus norrisi* | Florida Smoothhound Shark | 3 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| *Paralichthys lethostigma* | Southern Flounder | 3 | 33.33 | 33.33 | 0.00 | 0.00 | 33.33 | 0.00 |
| *Seriola fasciata* | Lesser Amberjack | 3 | 33.33 | 0.00 | 66.67 | 0.00 | 0.00 | 0.00 |
| Syacium gunteri | Shoal Flounder | 3 | 0.00 | 33.33 | 66.67 | 0.00 | 0.00 | 0.00 |
| *Xiphias gladius* | Swordfish | 3 | 66.67 | 33.33 | 0.00 | 0.00 | 0.00 | 0.00 |
| Bothidae | Flounder (Family) | 2 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| *Calamus calamus* | Saucereye Porgy | 2 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Caulolatilus intermedius | Anchor Tilefish | 2 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Conger oceanicus | Conger Eel | 2 | 0.00 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 |
| *Gymnothorax funebris* | Green Moray | 2 | 0.00 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 |
| *Holocentrus adscensionis* | Squirrelfish | 2 | 50.00 | 0.00 | 50.00 | 0.00 | 0.00 | 0.00 |
| Opsanus tau | Oyster Toadfish | 2 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| *Pomatomus saltatrix* | Bluefish | 2 | 0.00 | 50.00 | 50.00 | 0.00 | 0.00 | 0.00 |
| *Pristigenys alta* | Short Bigeye | 2 | 0.00 | 50.00 | 50.00 | 0.00 | 0.00 | 0.00 |
| *Scomberomorus cavalla* | King Mackerel | 2 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Sphoeroides sp | Pufferfish (Genus) | 2 | 0.00 | 50.00 | 50.00 | 0.00 | 0.00 | 0.00 |
| *Sphyraena sp.* | Barracuda (Genus) | 2 | 0.00 | 0.00 | 50.00 | 0.00 | 50.00 | 0.00 |
| Squatina dumeril | Angel Shark | 2 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| *Trichiurus lepturus* | Atlantic Cutlassfish | 2 | 0.00 | 50.00 | 50.00 | 0.00 | 0.00 | 0.00 |
| Alopias vulpinus | Common Thresher Shark | 1 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| Caelorinchus caelorhincus | Saddled Grenadier | 1 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| *Calamus proridens* | Littlehead Porgy | 1 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Caulolatilus chrysops* | Goldface Tilefish | 1 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dasyatis sp. | Stingray (Genus) | 1 | 0.00 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 |
| Dasyatis sayi | Bluntnose Stingray | 1 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| *Epinephelus adscensionis* | Rock Hind | 1 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| *Epinephelus guttatus* | Red Hind | 1 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| Eptatretus springeri | Gulf Hagfish | 1 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| *Gymnura micrura* | Smooth Butterfly Ray | 1 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| *Haemulon aurolineatum* | Tomtate | 1 | 0.00 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 |
| Hyperoglyphe perciferomis | Barrelfish | 1 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Lagodon rhomboides* | Pinfish | 1 | 0.00 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 |
| Lepophidium | Cusk-eel (Genus) | 1 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Libinia sp.* | Spider (Genus) Crab | 1 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| *Lutjanus cyanopterus* | Cubera Snapper | 1 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Merluccius albidus | Offshore Hake | 1 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ophichthidae | Snake Eel (Family) | 1 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| Ophichthus ophis | Spotted Snake Eel | 1 | 0.00 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 |
| Raja | Skate (Genus) | 1 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| *Sphoeroides nephelus* | Southern Pufferfish | 1 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Syacium papillosum* | Dusky Flounder | 1 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| *Synodus intermedius* | Sand Diver | 1 | 0.00 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 |

**Table 9. Number caught (n) and disposition of catch in percentage for all Reef Fish Observer Programs (RFOP) Modified Buoy sets targeting reef fish in the Gulf of Mexico in 2009. Disposition of catch divided into kept (K), discard dead (DD), discard alive (DA), used for bait (B), and discard uncertain (U).**

| Scientific Name | Common Name | n | % K | % DD | % DA | % B | % U |
|---|---|---|---|---|---|---|---|
| *Epinephelus morio* | Red Grouper | 498 | 46.18 | 4.42 | 49.40 | 0.00 | 0.00 |
| *Lutjanus campechanus* | Red Snapper | 12 | 75.00 | 0.00 | 25.00 | 0.00 | 0.00 |
| *Diplectrum formosum* | Sand Perch | 4 | 0.00 | 0.00 | 75.00 | 25.00 | 0.00 |
| *Rhizoprionodon terraenovae* | Atlantic Sharpnose Shark | 4 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 |
| *General Sharks* | Sharks Grouped | 3 | 0.00 | 0.00 | 0.00 | 0.00 | 100.00 |
| *Lutjanus synagris* | Lane Snapper | 2 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Mycteroperca microlepis* | Gag | 2 | 50.00 | 0.00 | 50.00 | 0.00 | 0.00 |
| *Rhomboplites aurorubens* | Vermilion Snapper | 2 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Seriola zonata* | Banded Rudderfish | 2 | 0.00 | 50.00 | 50.00 | 0.00 | 0.00 |
| *Centropristis ocyurus* | Bank Seabass | 1 | 0.00 | 0.00 | 0.00 | 100.00 | 0.00 |
| *Opsanus pardus* | Leopard Toadfish | 1 | 0.00 | 0.00 | 0.00 | 100.00 | 0.00 |
| *Synodus foetens* | Inshore Lizardfish | 1 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 |

**Table 10. Number caught (n) and disposition of catch in percentage for all Reef Fish Observer Program (RFOP) Vertical Line sets targeting reef fish in the Gulf of Mexico in 2009. Disposition of catch divided into kept (K), discard dead (DD), discard alive (DA), used for bait (B), discard uncertain (U), and discard unknown (X).**

| Scientific Name | Common Name | n | % K | % DD | % DA | % B | % U | % X |
|---|---|---|---|---|---|---|---|---|
| *Epinephelus morio* | Red Grouper | 3539 | 55.69 | 6.64 | 37.33 | 0.00 | 0.28 | 0.06 |
| *Rhomboplites aurorubens* | Vermilion Snapper | 2914 | 91.18 | 2.95 | 3.57 | 1.75 | 0.55 | 0.00 |
| *Lutjanus campechanus* | Red Snapper | 2512 | 53.74 | 7.17 | 38.26 | 0.24 | 0.56 | 0.04 |
| *Pagrus pagrus* | Red Porgy | 1544 | 99.29 | 0.06 | 0.00 | 0.58 | 0.06 | 0.00 |
| *Mycteroperca microlepis* | Gag | 755 | 40.79 | 0.13 | 59.07 | 0.00 | 0.00 | 0.00 |
| *Scomber japonicus* | Chub Mackerel | 608 | 0.00 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 |
| *Lagodon rhomboides* | Pinfish | 561 | 0.00 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 |
| *Haemulon aurolineatum* | Tomtate | 288 | 0.00 | 0.00 | 1.04 | 98.96 | 0.00 | 0.00 |
| *Scomberomorus cavalla* | King Mackerel | 283 | 96.11 | 1.06 | 2.47 | 0.35 | 0.00 | 0.00 |
| *Mycteroperca phenax* | Scamp | 180 | 87.78 | 2.78 | 8.33 | 0.00 | 1.11 | 0.00 |
| *Lutjanus synagris* | Lane Snapper | 137 | 97.08 | 0.73 | 1.46 | 0.73 | 0.00 | 0.00 |
| *Balistes capriscus* | Gray Triggerfish | 77 | 66.23 | 5.19 | 28.57 | 0.00 | 0.00 | 0.00 |
| *Lutjanus griseus* | Gray Snapper | 69 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Ocyurus chrysurus* | Yellowtail Snapper | 66 | 46.97 | 9.09 | 43.94 | 0.00 | 0.00 | 0.00 |
| *Haemulon plumieri* | White Grunt | 60 | 51.67 | 0.00 | 1.67 | 46.67 | 0.00 | 0.00 |
| *Seriola dumerili* | Greater Amberjack | 60 | 13.33 | 1.67 | 85.00 | 0.00 | 0.00 | 0.00 |
| *Diplectrum formosum* | Sand Perch | 52 | 0.00 | 0.00 | 1.92 | 96.15 | 1.92 | 0.00 |
| *Euthynnus alletteratus* | Bonito | 43 | 0.00 | 2.33 | 2.33 | 93.02 | 2.33 | 0.00 |
| *Centropristis striata* | Black Seabass | 42 | 50.00 | 2.38 | 45.24 | 0.00 | 2.38 | 0.00 |
| *Etelis oculatus* | Queen Snapper | 36 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Seriola zonata* | Banded Rudderfish | 35 | 5.71 | 14.29 | 40.00 | 40.00 | 0.00 | 0.00 |
| *Coryphaena hippurus* | Dolphin | 28 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Calamus nodosus* | Knobbed Porgy | 20 | 85.00 | 0.00 | 15.00 | 0.00 | 0.00 | 0.00 |
| *Seriola rivoliana* | Almaco Jack | 19 | 78.95 | 0.00 | 21.05 | 0.00 | 0.00 | 0.00 |
| *Balistidae* | Triggerfish/Filefish (Family) | 18 | 0.00 | 0.00 | 94.44 | 5.56 | 0.00 | 0.00 |
| *Caranx hippos* | Common Crevalle Jack | 18 | 0.00 | 5.56 | 94.44 | 0.00 | 0.00 | 0.00 |
| *Centropristis ocyurus* | Bank Seabass | 18 | 0.00 | 0.00 | 5.56 | 94.44 | 0.00 | 0.00 |
| *Epinephelus flavolimbatus* | Yellowedge Grouper | 18 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Carcharhinus acronotus* | Blacknose Shark | 17 | 0.00 | 5.88 | 94.12 | 0.00 | 0.00 | 0.00 |
| *Sciaenops ocellatus* | Red Drum | 16 | 0.00 | 18.75 | 81.25 | 0.00 | 0.00 | 0.00 |
| *Epinephelus niveatus* | Snowy Grouper | 15 | 73.33 | 26.67 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Mustelus canis* | Smooth Dogfish Shark | 15 | 0.00 | 6.67 | 93.33 | 0.00 | 0.00 | 0.00 |
| *Rhizoprionodon terraenovae* | Atlantic Sharpnose Shark | 14 | 0.00 | 21.43 | 78.57 | 0.00 | 0.00 | 0.00 |
| *Scomberomorus maculatus* | Spanish Mackerel | 14 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Carcharhinus limbatus* | Blacktip Shark | 13 | 0.00 | 7.69 | 84.62 | 0.00 | 0.00 | 7.69 |
| *General Sharks* | Sharks Grouped | 12 | 0.00 | 8.33 | 83.33 | 8.33 | 0.00 | 0.00 |
| *Calamus bajonado* | Jolthead Porgy | 11 | 81.82 | 0.00 | 18.18 | 0.00 | 0.00 | 0.00 |
| *Decapterus punctatus* | Round Scad | 10 | 0.00 | 20.00 | 0.00 | 80.00 | 0.00 | 0.00 |
| *Remora remora* | Remora | 9 | 0.00 | 11.11 | 88.89 | 0.00 | 0.00 | 0.00 |
| *Echeneis naucrates* | Sharksucker | 8 | 0.00 | 0.00 | 87.50 | 12.50 | 0.00 | 0.00 |
| *Epinephelus drummondhayi* | Speckled Hind | 8 | 50.00 | 25.00 | 25.00 | 0.00 | 0.00 | 0.00 |
| *Carangidae* | Jack (Family) | 7 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| Caulolatilus cyanops | Blackline Tilefish | 7 | 57.14 | 28.57 | 14.29 | 0.00 | 0.00 | 0.00 |
| *Sphyraena barracuda* | Great Barracuda | 7 | 0.00 | 14.29 | 57.14 | 28.57 | 0.00 | 0.00 |
| *Epinephelus nigritus* | Warsaw Grouper | 6 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Pristigenys alta | Short Bigeye | 6 | 0.00 | 16.67 | 83.33 | 0.00 | 0.00 | 0.00 |
| *Cynoscion sp.* | Seatrout (Genus) | 5 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Ginglymostoma cirratum* | Nurse Shark | 5 | 0.00 | 0.00 | 80.00 | 0.00 | 20.00 | 0.00 |
| *Holocentridae* | Squirrelfishes (Family) | 5 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**Table 10. *Continued*. Number caught (n) and disposition of catch in percentage for all Reef Fish Observer Program (RFOP) Vertical Line sets targeting reef fish in the Gulf of Mexico in 2009. Disposition of catch divided into kept (K), discard dead (DD), discard alive (DA), used for bait (B), discard uncertain (U), and discard unknown (X).**

| Scientific Name | Common Name | n | % K | % DD | % DA | % B | % U | % X |
|---|---|---|---|---|---|---|---|---|
| *Synodus poeyi* | Offshore Lizardfish | 5 | 0.00 | 20.00 | 0.00 | 80.00 | 0.00 | 0.00 |
| *Calamus leucosteus* | Whitebone Porgy | 4 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Epinephelus itajara* | Goliath Grouper | 4 | 0.00 | 50.00 | 50.00 | 0.00 | 0.00 | 0.00 |
| *Opsanus pardus* | Leopard Toadfish | 4 | 0.00 | 25.00 | 75.00 | 0.00 | 0.00 | 0.00 |
| *Paranthias furcifer* | Creole-Fish | 4 | 50.00 | 0.00 | 25.00 | 0.00 | 0.00 | 25.00 |
| *Rachycentron canadum* | Ling Cobia | 4 | 75.00 | 0.00 | 25.00 | 0.00 | 0.00 | 0.00 |
| *Seriola sp.* | Jack (Genus) | 4 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| *Acanthocybium solandri* | Wahoo | 3 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Caranx crysos* | Blue Runner | 3 | 0.00 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 |
| Diplodus holbrooki | Spottail Pinfish | 3 | 0.00 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 |
| *Epinephelus adscensionis* | Rock Hind | 3 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Equetus umbrosus* | Cubbyu Drum | 3 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Lutjanus analis* | Mutton Snapper | 3 | 66.67 | 0.00 | 33.33 | 0.00 | 0.00 | 0.00 |
| *Pomatomus saltatrix* | Bluefish | 3 | 0.00 | 0.00 | 66.67 | 33.33 | 0.00 | 0.00 |
| *Pristipomoides aquilonaris* | Wenchman | 3 | 66.67 | 33.33 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Calamus proridens* | Littlehead Porgy | 2 | 50.00 | 0.00 | 0.00 | 50.00 | 0.00 | 0.00 |
| *Equetus iwamotoi* | Blackbar Drum | 2 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Galeocerdo cuvier* | Tiger Shark | 2 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| *Gymnothorax moringa* | Spotted Moray | 2 | 0.00 | 50.00 | 50.00 | 0.00 | 0.00 | 0.00 |
| Haemulon | Grunt (Genus) | 2 | 0.00 | 50.00 | 50.00 | 0.00 | 0.00 | 0.00 |
| *Hemanthias leptus* | Longtail Bass | 2 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Malacanthus plumieri* | Sand Tilefish | 2 | 50.00 | 0.00 | 50.00 | 0.00 | 0.00 | 0.00 |
| Mycteroperca | Grouper (Genus) | 2 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Orthopristis chrysoptera | Pigfish | 2 | 0.00 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 |
| *Synodontidae* | Lizardfish (Family) | 2 | 0.00 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 |
| *Balistes vetula* | Queen Triggerfish | 1 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Caranx ruber* | Bar Jack | 1 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| *Carcharhinus brevipinna* | Spinner Shark | 1 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| *Carcharhinus falciformis* | Silky Shark | 1 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| *Carcharhinus plumbeus* | Sandbar Shark | 1 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| *Epinephelus guttatus* | Red Hind | 1 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Gymnothorax nigromarginatus | Blackedge Moray | 1 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| *Gymnothorax sp.* | Moray (Genus) | 1 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| Lopholatilus chamaeleonticeps | Tilefish | 1 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Mycteroperca bonaci* | Black Grouper | 1 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Negaprion brevirostris* | Lemon Shark | 1 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| *Ophicthus rex* | King Snake Eel | 1 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| Ophidiidae | Cusk-eel (Family) | 1 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Opsanus beta* | Gulf Toadfish | 1 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| *Priacanthus arenatus* | Bigeye | 1 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Sarda sarda* | Atlantic bonito | 1 | 0.00 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 |
| Sardinella aurita | Spanish Sardine | 1 | 0.00 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 |
| *Scorpaena sp.* | Scorpionfish | 1 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Sphyrna sp.* | Hammerhead (Genus) Shark | 1 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| *Squalus cubensis* | Cuban Dogfish | 1 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| *Thunnus atlanticus* | Blackfin Tuna | 1 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**Table 11. Protected species interactions for all observed Shark Bottom Longline Observer Program (SBLOP) and Reef Fish Observer Program (RFOP) sets targeting reef fish species in the Gulf of Mexico in 2009.**

| | Shark Bottom Longline Observer Program (SBLOP) | | Reef Fish Observer Program (RFOP) | | |
|---|---|---|---|---|---|
| | Reef Fish Targeted Trips | | Bottom Longline | Modified Buoy | Vertical Line |
| Sea turtles | 0 | | 6 Loggerheads | 0 | 0 |
| Marine mammals | 0 | | 0 | 0 | 0 |
| Sea birds | 0 | | 0 | 0 | 0 |

**Table 12: Observed takes of loggerhead sea turtles by bottom longline trip and set in the eastern Gulf of Mexico by fishers targeting reef fish in 2009. Season 1 is January to June (Season 2 is July to December). RFOP is the Galveston Laboratory's reef fish observer program. See Table 13 for more information on each turtle.**

| Year | Season | Trip | SetId. | Hooks | Species | Number | Program |
|---|---|---|---|---|---|---|---|
| 2009 | 1 | 11 | 16 | 1800 | *Caretta caretta* | 1 | RFOP |
| 2009 | 1 | 11 | 18 | 1800 | *Caretta caretta* | 1 | RFOP |
| 2009 | 1 | 11 | 22 | 1800 | *Caretta caretta* | 1 | RFOP |
| 2009 | 1 | 11 | 24 | 1800 | *Caretta caretta* | 1 | RFOP |
| 2009 | 1 | 11 | 26 | 1800 | *Caretta caretta* | 1 | RFOP |
| 2009 | 1 | 12 | 4 | 2050 | *Caretta caretta* | 1 | RFOP |

**Table 13. Summary takes, capture and release conditions, gear characteristics, and final disposition of sea turtles documented by the observer program.**

## 2009

| Species | Area | Hook Type | Offset (deg.) | Bait | Bait Size (g) | Capture Condition | Final Disposition | Hook Location | Hook Removed? | Entangled Capture? | Entangled Release? | Line Left (ft) | CL Est. (ft) | CCL (cm) | SCL (cm) | Straight N-N (cm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Loggerhead | GOM | C-13/0 | 0 | Unknown | Unknown | alive, injured | Released alive | beak internal, lower jaw | Yes | No | No | 0.00 | | 66.8 | 63.8 | 64 |
| Loggerhead | GOM | C-14/0 | 0 | Squid | Unknown | comatose/ unresponsive | discarded marked dead/unresponsive carcass | beak internal, unknown | Yes | No | No | 0.00 | | 75 | 69 | |
| Loggerhead | GOM | C-14/0 | 0 | Squid | Unknown | alive, injured | Released alive | beak internal, unknown | Yes | No | No | 0.00 | | | 68.2 | |
| Loggerhead | GOM | C-14/0 | 0 | Squid | Unknown | alive, injured | Released alive | swallowed, hook visible to insertion pt | Yes | No | No | 0.00 | | | 66 | |
| Loggerhead | GOM | C-14/0 | 0 | Squid | Unknown | comatose/ unresponsive | discarded marked dead/unresponsive carcass | swallowed, hook visible to insertion pt | Yes | No | No | 0.00 | | | 58.2 | |
| Loggerhead | GOM | C-14/0 | 0 | Squid | Unknown | other | discarded marked dead/unresponsive carcass | beak internal, unknown | Yes | No | No | 0.00 | | | 68 | |

# Appendix

**Extrapolated Total Takes of Loggerhead Sea Turtles in the Gulf of Mexico (GOM) by Year and Season in the Bottom Longline Portion of the Reef Fish Fishery**

T&C no 17 specifies that the Annual Report on the Implementation of the Terms and Conditions of the 2009 Biological Opinion for the Gulf of Mexico reef Fish Fishery include bycatch estimates and catch per unit effort (CPUE). The number of sea turtle takes in 2009 are too few and clustered. However, given the T&C requirement, extrapolations of bycatch estimates using methods employed in previous reports (*i.e.,* SEFSC 2008 and 2009) were conducted (Table A1), and as stated in the 2008 and 2009 reports, the 2010 extrapolated estimates are based upon sparse data sets (*i.e*. sea turtle takes) and should not be assumed to be reasonable without potentially invoking large assumptions regarding unobserved events.

**Table A1**. **Extrapolated total takes of loggerhead sea turtles in the Gulf of Mexico (GOM) using a delta lognormal model by year and season, in the bottom longline portion of the reef fish fishery based on observations by NMFS' Shark Bottom Longline Observer Program (SBLOP) and the Reef Fish Observer Program (RFOP). All input data needed to document these estimates are provided in the annual report.**

| Year | Season | Eastern GOM | | | Western GOM | | |
|---|---|---|---|---|---|---|---|
| | | Takes | 95% CI | CV | Takes | 95% CI | CV |
| **SBLOP** | | | | | | | |
| **2009** | 1 | 0.0 | - | - | - | - | - |
| **2009** | 2 | 0.0 | - | - | - | - | - |
| Sum SBLOP stratified | | 0.0 | - | - | - | - | - |
| **RFOP** | | | | | | | |
| **2009** | 1 | 48.5 | 22.5 – 104.4 | 0.41 | 0.0 | - | - |
| **2009** | 2 | 0.0 | - | - | - | - | - |
| Sum RFOP stratified | | 48.5 | 22.5 – 104.4 | 0.41 | 0.0 | - | - |
| Weighted sum of stratified estimates | | 35.0 | 14.4 – 85.3 | 0.48 | 0.0 | - | - |