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Description of data sources used to quantify shark catches in commercial and recreational fisheries in the U.S. Atlantic Ocean and Gulf of Mexico

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Introduction

Quantitative information on the marine resources caught and sold commercially in the United States (U.S.) Atlantic Ocean and Gulf of Mexico (GOM) is collected by a variety of state and federal agencies. These data are collated by the National Oceanic and Atmospheric Administration (NOAA) Fisheries Service (henceforth called "NOAA Fisheries") Northeast Fisheries Science Center (NEFSC) for Atlantic states Virginia and north (referred to as the "northeast region"), and by the Southeast Fisheries Science Center (SEFSC) for states along the GOM and Atlantic states of North Carolina and south (referred to as the "southeast region"). Data from many sources are used to evaluate trends in shark catches and to assess changes in size over time since limited biological information is collected in some of these programs.

Dealer submitted data, containing information on highly migratory species, may be found in three databases. The SEFSC collects landings data from dealers with a Highly Migratory Species (HMS) permit (Atlantic shark, Atlantic swordfish, and/or Atlantic tuna in the BAYS group of bigeye, albacore, yellowfin, and skipjack) and stores these data in the Pelagic Dealer Compliance (PDC) system. The SEFSC also maintains a database, the Accumulated Landings System (ALS), of state collected trip ticket data from state licensed dealers. The NEFSC collects data from dealers and combines these data with state-collected, electronically submitted data from state licensed dealers in the states in the Commercial Fisheries Database Service (CFDBS).

The SEFSC also manages two vessel logbook programs for vessels in the pelagic and coastal fisheries that fish in federal waters of the southeast region. The coastal fisheries data are maintained by the Coastal Fisheries Logbook Program (CFLP) and the pelagic fisheries data are maintained by the Highly Migratory Species Pelagic Logbook Program from the Atlantic Highly Migratory Species Program (referred to as the Pelagic Fisheries Logbook, or PFL).

Catch and effort data for commercial fisheries are also collected by observer programs. Observer data are unique partly because they distinguish between bycatch (released alive or discarded dead) and landings. There are three scientific observer programs that collect data for sharks: the Shark Bottom Longline Observer Program (SBLOP), the Pelagic Longline Observer Program (PLLOP), and the Shark Gillnet Observer Program (SGNOP).

Recreational landings data are collected by state and federal agencies. Currently three databases exist, from which recreational landings of sharks are estimated: the Marine Recreational Fishery Statistics Survey (MRFSS), the NOAA Headboat Survey (Headboat), and the Texas Parks and Wildlife Department's (TXPWD) survey. There is a fourth recreational data source, the Large Pelagic Survey (LPS), which also collects shark data but from which catch estimates have not typically been produced.

The objective of this report is to describe the sources of catch data for sharks in the U.S. GOM and Atlantic Ocean, which are directly used in stock assessments of these marine resources.

I. Commercial Fisheries

a. Landings statistics

There are three federally maintained systems that store data reported by licensed seafood dealers. The Pelagic Dealer Compliance (PDC) system contains data from federally permitted HMS dealers, the southeast general canvass data (GCD) in the Accumulated Landings System (ALS) contains state collected data on all marine resources from state trip tickets, and the northeast general canvass data in the commercial fisheries database service (CFDBS) houses both federally and state collected data on all species from dealers in the northeast region and primarily landings that occur in that region. Summary reports of shark landings from these three databases are compiled and sent bimonthly to the HMS Division of NOAA Fisheries to monitor fishery quotas. Non-reporting dealers, reporting timeliness, and details of potential illegal shark fishing are included in quota monitoring reports.

i. *Pelagic Dealer Compliance Data*

The PDC program began in 1993 under the name Swordfish Dealer Compliance, and was known as the Quota Monitoring System from 1997-2002. The data are collected by the SEFSC from dealers located in the southeast region (North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, Texas, Puerto Rico, and the U.S. Virgin Islands) who maintain a federal HMS dealer permit [Atlantic sharks and/or Atlantic swordfish issued by SERO, and/or Atlantic tuna in the BAYS group (bigeye, albacore, yellowfin, and skipjack) issued by NERO]. Dealers must have a federal permit in order to purchase these species from federally permitted vessels.

Selected dealers are required to submit landings reports (purchases) for any species in the HMS management group purchased from U.S. vessels fishing in the GOM and/or Atlantic Ocean (including adjoining state waters) on the "Dealer Reporting for Highly Migratory Species" form (OMB#0648-0040). Reports are summarized by species and must be submitted twice a month within 10 days of each reporting period (by the 25th for the period from the 1st to the 15th; and by the 10th for the period from the 16th to the end of the month). All dealers with one or more of these HMS permits are selected to report.

Data collected for the PDC include federal permit number(s), dates of the reporting period, species purchased (if any), total dressed weight for each species over the reporting period, price paid per pound for those species on the last day of the reporting period, names and identification numbers of the vessel(s) from which HMS products were purchased, and the vessel's date, port and state of landing. If no HMS transactions were conducted during the reporting period, a report indicating this is still required. All submitted reports are date-stamped with the date received, and then are

both visually and electronically checked for potential errors before the data are transferred into master Oracle tables. The PDC database contains a higher degree of species-specific shark landings than the ALS (discussed below). Landings data are received within one to twenty-five days of purchase, which is sufficient for quota monitoring purposes.

Despite the enhanced information on shark species composition and timeliness of the data, there are some limitations with the PDC data. For example, although a federal HMS permit is required for dealers to purchase sharks from federally permitted vessels, it is not required for dealers purchasing sharks from vessels that fish only in state waters (i.e. no federal permit). Therefore, this database does not represent total shark landings, but should represent all shark landings made by a majority of shark dealers. It should be noted that some states (e.g., Florida and states managed by the Atlantic Fishery Management Council) have adopted/are considering changes to their regulations requiring all state dealers who purchase sharks to obtain a federal shark permit regardless of the area where the shark was caught (state or federal waters). Due to the summary nature of the reporting form, precise locations of landed sharks cannot typically be determined, nor can any information be determined concerning the areas of catch of the HMS species. Because catch locations are unknown, shark landings are reported to the HMS Division by the state where the dealer's facility is located rather than the actual landing location. The state of Florida is split into East Coast, West Coast, and Inland, and sharks purchased at dealer facilities in the Florida Keys are assigned to the West Coast (and thus the Gulf of Mexico). Price per pound and vessel information is not submitted by all dealers, and gear information is not collected. There is currently no enforcement in place for non-compliant (under- or non-reporting) dealers; therefore, despite measures that are taken to encourage compliance, some under-reporting of shark landings is likely, especially for historical records.

ii. General Canvass Data in the Accumulated Landings System (ALS)

The ALS is a regional database for landings statistics for the southeast region (excluding Puerto Rico and the US Virgin Islands), and has been maintained by NOAA Fisheries and its predecessor since the early 1960s. Historically, landings information was collected by field agents stationed at fishing ports throughout the southeast. Beginning in 1985, states began implementing trip ticket programs, with eight states (from Texas to North Carolina) maintaining such programs by 2005. Through these state programs and because of previous cooperative agreements, the SEFSC continues to receive landings data (summarized, see below) from the respective state agencies and stores these data in the ALS. States require all seafood dealers to maintain licenses, therefore all seafood dealers, not only those with federal permits for sharks, report to the states. This program was also known in the past as southeast general canvass.

A trip ticket is a record completed by the dealer, which lists information about the marine resources landed/sold per fishing trip. It is submitted to the state where the landing occurred and/or where the dealer is located, dependent upon the state's regulations. These tickets include data on dealer name and license number, species, weight (dressed or whole), fishing location, gear, price per pound, vessel name and

identification number, date of landing, and state of landing. Prior to each state implementing trip tickets, information on gear and fishing location was solely estimated by the port agent, but more recent data are reported directly by the dealers. Trip information, such as fishing location and gear, is summarized for the entire trip. Additionally, this information is not always supplied or may be estimated by the dealer, who must get this information from the vessel. For this reason, port agents remain involved in assessing accuracy of trip ticket data; however, even this information may be estimated and thus not always accurate.

Trip ticket data from each state are summarized by species, dealer, month, gear, fishing area, and state of landing prior to submitting to ALS. Although shark landings are reported to states in dressed weight, all weight information contained within ALS is whole weight. Therefore, each state first converts their data to whole weight before submitting to SEFSC. Most states use a conversion of 1.39 for shark landings; however, North Carolina uses a conversion factor of 2.0 and Alabama uses a factor of 1.60. Various individuals within the SEFSC, primarily port agents, are responsible for coordinating the transfer of data from the respective states fisheries data collection program to the SEFSC.

The ALS data represent total landings from all licensed seafood dealers located in the southeast region for all commercially important marine species over a long period of time, but several caveats should be noted. The most notable drawback to ALS for shark stock assessment purposes is the high degree of reported "unclassified sharks" (rather than to species) on state trip tickets, particularly for the earlier part of the time series. This may stem, at least in part, from the fact that prior to July 2008, sharks were mostly landed as "logs", i.e. gutted, with fins and heads removed, making species identification difficult. Recent regulatory changes (federally required in 2008, state required in 2008-2009) now require fins to remain attached to sharks through landing. A second deficiency of the system, particularly for quota monitoring purposes, is the time that elapses between landings and the availability of the data. Although trip tickets are required to be submitted generally by the end of the next month following a transaction (the submission date may vary slightly by state), an average lag of three to six months exists between report submission by the dealers to the state and data availability to the SEFSC. Some data from states are available to the SEFSC in as few as two months, while others have taken as long as 18 months. It should be noted that due to confidentiality agreements, North Carolina dealers are not identifiable in ALS, and thus landings by these dealers cannot be compared between federally collected and state collected data to remove duplicate landings. Finally, landings within ALS with a state of landing recorded as '00', typically indicate the landings occurred in Florida but were transported to another state and will be reported by that state.

iii. Northeast landings data and the Commercial Fisheries Database Service (CFDBS)

As of May 1, 2004 all seafood dealers issued a federal permit by NERO were mandated to submit their landings data for each trip electronically. Prior to this time, a time-intensive data collection process was in place, in which federal data were collected by

port agents, and state data were obtained through the trip ticket programs. These data were entered with the Commercial Data Entry System (CODES) program and transmitted to the CFDBS, where data were updated and maintained. This process could not be expedited in a manner required for HMS shark and swordfish quota monitoring; therefore, a separate "dealer weigh-out" (WO) database (likened to a northeast general canvass) was established. Although all newly reported data were incorporated into the WO database, any data updates made by port agents within the CFDBS were never incorporated into the database. The 2004 and later amendments to the 'Fisheries of the Northeastern United States' regulations, which require dealers who maintain a permit for any regulated northeast species to submit landings electronically "by midnight of the first Tuesday following the end of the reporting week," along with changes to the regulations and the northeast data entry process allowed the dissolution of the WO database and the use of current and complete data through CFDBS.

Electronic reporting by northeast permitted dealers is either accomplished through Standard Atlantic Fisheries Information System (SAFIS) or via another "available electronic reporting mechanism approved by NMFS". SAFIS is an application created by NERO to allow reports to be accepted electronically through a state electronic reporting program. These regulations, requiring electronic reporting, affect all dealers issued a permit by NERO, including those dealers located in the southeast region. Dealers located in the southeast region who previously reported landings of certain species to the SEFSC and other species to NEFSC, were required to continue reporting in the same manner to SEFSC and report all landings to the NEFSC. In 2005, regulations were amended (see below) and the duplicative reporting requirements were eliminated. Dealers in the states of the northeast region with requirements to report to their states through the Atlantic Coastal Cooperative Statistics Program (ACCSP) are not required to report using SAFIS, and some federally permitted dealers in the northeast states are not required to report electronically at all (i.e., dealers issued federal permits only by SERO; northeast permits which do not require electronic reporting); however, all landings data are eventually added to CFDBS through the ACCSP and by port agents using CODES in each of these cases, respectively. Quality controlled data from SAFIS, ACCSP, and CODES are merged into the CFDBS and are transmitted weekly.

Dealers provide data on each trip. This currently includes dealer name and permit number, vessel name and permit number or hull number, a trip identifier for each trip from which fish are purchased or received from a commercial fishing vessel, date of purchase, species landed, amount of species by market category, price paid by species, port landed, and gear. If no fish are purchased or received during a reporting week, a report so stating must be submitted.

Originally, electronic reporting of all species purchased by a dealer holding a northeast managed species permit was required, regardless of the state of landing. Effective May 1, 2005, dealers were no longer required to report species not managed by the northeast (e.g., sharks, swordfish) if the landings occurred outside of the northeast region. Therefore, situations may exist where a northeast dealer purchases HMS products from a vessel landing in the Caribbean or state in the southeast region, but do not include

these landings in their electronic report. Provisions were made in the past that allowed these dealers, or local port agents, to enter HMS data for northeast dealers; however these data may be incomplete. Efforts are underway to ensure these data are being entered.

North Carolina is part of the southeast region, but many of the species under the northeast fisheries management plans (e.g., dogfishes) are found off the coast of North Carolina. For this reason, North Carolina is not considered outside of the northeast region, and North Carolina dealers are required to report all landings to NERO. However, dealers in North Carolina with HMS permits are still required to report all HMS products to the SEFSC. Because of this overlap, inconsistencies have been observed when comparing CFDBS with PDC for some North Carolina dealers (e.g., different species reported; different weights reported). There are also problems when northeast dealers purchase shark products landed in the southeast region. A small percentage of these landings may have been omitted or overlooked due to confusion as to which region should house the data. Finally, shark dealers in the northeast that are not required to submit electronically, but are required to report to their local port agents, are not monitored for compliance.

b. Logbook programs

There are two commercial logbook programs that include shark data: the Commercial Fisheries Logbook Program (CFLP) and the Atlantic Highly Migratory Species Logbook (AHMSL, also referred to as the Pelagic Fisheries Logbook, or PFL) under the Highly Migratory Species program. The CFLP was implemented by the SEFSC in 1990 as a logbook program for vessels with federal GOM reef fish permits, along with a similar program for vessels with federal snapper-grouper permits in the South Atlantic region (the east coast of Florida to North Carolina). In 1993, these programs were expanded to include vessels with federal shark permits, and again to include Spanish and king mackerel permits in 1999. This logbook is frequently referred to as the "Coastal Fisheries Logbook". The AHMSL was initiated in 1986 as a Pelagic Longline Logbook, primarily covering vessels that used pelagic longline gear. The AHMSL now includes vessels that use other gear types (e.g., harpoon, buoy gear, handline, gillnet, etc.) to target HMS. The AHMSL is frequently referred to as the "Pelagic Fisheries Logbook" or "Pelagic Longline Logbook".

A major difference between the two logbook programs is that the AHMSL was designed to provide catch-per-unit-effort (CPUE) data, and therefore focuses on data for each time the gear is set, while the coastal fisheries logbook encompasses fisheries with different gear types, many of which are deployed too frequently to be recorded by set. Therefore, catch and effort data in the AHMSL are reported for each gear deployment ("set-based"), while these data are reported in the CFL for the entire trip (time between when the vessel leaves port and when it returns, or "trip-based").

i. Coastal Fisheries Logbook (CFL)

Federal vessel permit holders for the coastal fisheries were initially selected at random to report. The random selection included about 20% of the GOM reef fish vessels in Florida and 100% of those permit holders outside of Florida. In 1992, the vessel selection process was modified to include 100% of the vessels in the GOM reef fish fishery, and this requirement remains in place. New permits have not been issued for the GOM reef fish fishery since May 8, 1992, therefore new vessels enter the fishery only by purchasing an existing permit from a vessel leaving the fishery. Also in 1992, the coastal fisheries logbook program was expanded to include vessels with federal permits in the south Atlantic snapper-grouper fishery. As was executed initially with the GOM reef fish program, logbooks were sent to 20% of the vessels issued a permit for this fishery. In 1993, logbooks were required for 100% of the south Atlantic snapper-grouper fishery, and vessels were required to report for every trip. While the forms were basically the same for both fisheries (save the heading), they were processed by different facilities and entered in different databases, depending on the fishery (Beaufort, NC for snapper-grouper; Miami, FL for Gulf reef fish).

Beginning in 1993, vessels fishing for sharks were required to obtain a shark permit and to submit logbooks for each trip. The shark logbook form was very different from the coastal fisheries logbook until 1995, when coastal shark fishers were issued coastal fisheries logbook forms and the shark logbook was discontinued. After September 1997, a single form for all coastal fisheries was created, and all forms were maintained and processed in Miami, FL. Also in 1997, fishers with king and Spanish mackerel permits were required to report all trips in which these species were caught and/or landed. In 1998, a moratorium was promulgated for the snapper-grouper fishery, and new permits were no longer issued for this fishery, similar to the 1992 regulations for the GOM reef fishery. In 2001 and 2002, respectively, the SEFSC began programs to collect information on estimates of discards and on monetary fishing expenditures. Discard data are collected using a supplemental form, which is sent to 20% of fishers using a stratified random design. Cost data are collected on a modified logbook form.

Data reported in the coastal fisheries logbook include information regarding the vessel and trip details, gear(s) used, and catch. Although the information is collected on a single logbook, the data are separated and stored in three Oracle tables and linked by a unique schedule number. The “vessel” portion of the logbook includes the vessel id, dates of departure and offloading, number of crew, dealer whom fish were sold, and state and county where fish were landed. The “gear portion” includes gear type(s), quantity of gear type used and number of times deployed, effort (typically calculated by SEFSC; number of gear by number of times gear was deployed), total time fished, length of line or net, and/or mesh size of traps or gillnets. The “catch” information includes the species caught, weight either in dressed weight or gutted weight (typically dressed weight for HMS products), gear type, and area where the majority of the fish were caught. Depth information (for the majority of the species reported) is also included and has been collected since 2007. Vessels that fish exclusively in state waters and do not possess a federal permit are not required to submit logbooks to this program.

ii. Atlantic Highly Migratory Species Logbook (AHMSL)

The AHMSL was initiated by the SEFSC in 1986 in response to a commitment the U.S. made to provide swordfish landings data to the International Commission for the Conservation of Atlantic tunas (ICCAT). It also provided a means of calculating effort in the swordfish fisheries in the US Atlantic Ocean and Gulf of Mexico. In 1993, a similar program began for vessels fishing with a federal shark permit. Catch and effort data have been reported by fishers who have HMS permits, and logbooks are required to be completed for every set in which HMS species are targeted and landed with pelagic longline gear. Logbooks are not required for these fishers when HMS species were not caught, but "no fishing" reports are required for each calendar month in which these species were not caught and/or landed. In 1999 the logbook was redesigned to include a trip summary, with one trip summary completed per trip and separate forms for each set. Occasionally, fishers have reported only one set form for an entire trip; for these trips, total effort cannot be calculated. If HMS species (other than swordfish) are caught by gear other than surface longlines, they are typically reported on the CFL.

In order for a submitted logbook to be considered complete, a Trip Summary form, Set Form(s), and weigh-out or tally sheets (receipts itemized by species from the dealer) must be included. The Trip Summary form collects the vessel identification and name, contact name and phone number, the name of the vessel's operator, NHID (New Hampshire ID) number, the port and state of departure and landing, dates of departure, landing, and offload, dates of the first and last set, the number of sets in the trip, the number of crew, dealers sold to and the respective state trip ticket numbers. Each Set Form collects information indicating the species targeted for that set, gear used and quantity of gear type used, bait type, the set begin date, begin set time and end set time, the haulback begin date, begin haulback time and end haulback time, latitude and longitude at the beginning of the set, and surface water temperature. Data on the number of each species kept and 'thrown back' (alive or dead) and the estimated pounds kept, and the number of protected species encountered are also collected. The number of each species and their individual weights, primarily as reported on the weigh-out sheets are recorded in the Domestic Longline System (DLS) for each trip. The DLS contains data beginning in 1979, but data prior to 1986 came from fishers who voluntarily submitted personal logbook information.

c. Observer programs

There are three scientific observer programs that collect data for sharks: the Shark Bottom Longline Observer Program (SBLOP), the Pelagic Longline Observer Program (PLLOP), and the Shark Gillnet Observer Program (SGNOP).

i. Shark Bottom Longline Observer Program (SBLOP)

The SBLOP began operations in 1994, and observers were placed on shark-directed fishing trips by the Commercial Shark Fishery Observer Program (CSFOP) at the Florida Museum of Natural History. From 1994-2001 observer coverage was voluntary, but became mandatory beginning in 2002 under the federal management plan for Atlantic highly migratory species. In 2005, the responsibility for the fishery observer program was transferred to the SEFSC Panama City (FL) Laboratory. Under this program, a

subset of vessels was selected for coverage at random from a pool of those with directed shark fishing permits; however, the vessels were covered regardless of the target species. Beginning in 2007, major restrictions on coastal shark fishing were put into place because of 2006 quota overages and stock assessment outcomes. The 2007 Amendment 2 to the Consolidated Atlantic Highly Migratory Species Fishery Management Plan established drastic quota and trip limit reductions, and established a sandbar shark (*Carcharhinus plumbeus*) research fishery. Vessels participating in the research fishery are required to carry an observer and allowed to land a limited number of sandbar sharks. As such, landing sandbar sharks outside of this fishery is prohibited.

Because of the changing nature of coastal shark fisheries in the southeastern US, observer coverage has been somewhat adaptive. Currently, in addition to the 100% coverage of the sandbar shark research fishery, the SBLOP collects catch and bycatch information on bottom longline vessels with directed shark fishing permits that target coastal sharks, grouper, snapper, and tilefish. In addition to effort data, individual fish caught on each trip are identified, length is measured or estimated, and the disposition is recorded (kept, released alive, discarded dead). See Hale et al. (2010) for a detailed description of the fishery and observer coverage.

Data are collected on gear characteristics for each set (number and size of hooks, length of mainline, etc.), along with environmental parameters, and each fish caught is identified and either directly measured or its size is estimated by the observer. Sharks are sexed when possible, and biological samples are collected from a subset of animals that are kept by the fishers. The entire catch is recorded by the observer.

ii. Pelagic Longline Observer Program (PLLOP)

The PLLOP began in 1992, and is administered by the SEFSC Miami Laboratory. Pelagic longline vessels with active HMS permits are randomly selected for coverage, which ranges from the Grand Banks to Brazil in the Atlantic and the Gulf of Mexico. Pelagic longline vessels target swordfish or tuna, and most sharks are caught as bycatch in this fishery. Data collected include vessel and gear information, along with individual species identifications, lengths, boarding status, and fate. The entire catch is required to be observed by the observer for each trip (Keene *et al.*, 2007).

iii. Shark Drift Gillnet Observer Program (SGNOP)

The SGNOP began in 1992, and has adapted coverage of gillnet boats in the southeastern U.S. as the regulations on catch, gear, and target species have changed. The program began as a means of monitoring gillnet vessels during the right whale calving season (15 Nov-1 Apr). During this time period, 100% observer coverage was required for shark gillnet (> 5 in stretch mesh) boats fishing between West Palm Beach, FL and Sebastian Inlet, FL. Outside the right whale calving season, a level of observer coverage was established to provide estimates of marine mammal and sea turtle interactions (Carlson and Baremore, 2003), and only covered vessels fishing in Florida and Georgia. In 2005, the program was expanded to include all vessels holding a directed shark permit that fished with sink gillnet gear. Coverage was further expanded in 2006 to include all gillnet vessels regardless of target or method of fishing (sink, strike, or drift). Mandatory

100% observer coverage of shark gillnet vessels during the right whale calving season was rescinded in 2007, with a closed area established in its place from 15 Nov-15 Apr. Thus, from 2007 forward, the SGNOP covered all anchored, strike, or drift gillnet vessels fishing from Florida to North Carolina year-round (Passerotti *et al.*, 2010).

Data collected by on board observers include gear characteristics, environmental parameters, and species identification and lengths. Because of the large numbers of fish caught in gillnets, sizes of fish are estimated as the net is hauled aboard, but up to 10 fish of each species caught are directly measured by the observer. The number of each fish species caught is directly counted by the observer as the net is hauled aboard, and the entire catch is observed.

II. Recreational Fisheries

a. Marine Recreational Fishery Statistics Survey (MRFSS)

Recreational fishing statistics, including catch, effort, and participation, have been collected by NMFS since 1981. Data are collected using telephone surveys of fishing effort along with access-site intercepts of anglers. Telephone surveys are targeted at two main groups: private boat anglers and for-hire (charter or party boat) anglers. The former anglers are surveyed by the coastal household telephone survey (CHTS), while the latter are contacted by the for-hire telephone survey (FHS).

The CHTS is limited to households located in coastal counties, with correction factors derived from the point intercept survey for non-coastal residents and tourist anglers. Surveys are conducted year-round for the Gulf of Mexico region, excluding Texas, which conducts its own recreational fishing survey. The Atlantic region north of Florida is surveyed ten months out of the year (March-December), except for New Hampshire and Maine, which are only surveyed for six months (May-December). Households are chosen by computer-assisted random digit dialing, and only landlines of non-business residences are included in the survey. Samples are allocated for each county in proportion to household populations.

To account for low sample size on charterboat effort, data were originally grouped by five year periods. The FHS was implemented to address under coverage of charter and party boat angler effort, as the majority of for-hire anglers are not coastal residents. Standardized FHS procedures ("new method") were finalized in 2000 for the Gulf of Mexico, and in 2005 for the Atlantic Coast states north of Florida. This survey overlaps with other for-hire vessel monitoring. Unlike the CHTS, the entire vessel is the target of the FHS survey, and vessels are selected at random from a universe of known for-hire vessels in all states. Sampling is stratified by vessel type, state, and selection period, along with other accessory information. The current method selects 10% of boats within each stratum, with a minimum sample size of three vessels. Participants report fishing activity for one week previous to the call, then the profile for each for-hire fishing trip. Data collected include area fished, number of anglers, hours of fishing activity,

fishing method, and target, if applicable. Advance notice is given to participants, and alternative reporting methods are also made available.

The access-point angler intercept survey occurs at public marine fishing access points, including boat ramps, piers, beaches, jetties, marinas, and bridges. Information collected includes species, number of species, length and weight of individual fishes, and angler-specific data. Interviews and measurements are completed on-site by trained field staff, and sites and dates are selected based on a proportionally random basis so that areas with higher effort are sampled more often. Data from non-coastal residents are used to calculate the adjustment factors for the phone surveys. Estimates from the two phone surveys are expanded by the intercept survey adjustment factors to get the estimates per county, which are summed to calculate state-level effort estimates.

b. Southeast HeadBoat Survey (Headboat)

The Headboat survey began in 1981 in the South Atlantic coast, and in 1986 in the Gulf of Mexico. Because MRFSS also surveyed headboats from 1981-1985, estimates for the Headboat survey are not used until 1986 for all areas. Total catch per trip is reported by logbook for all headboat vessels fishing from Texas through North Carolina. Logbooks are collected dockside every two weeks by port agents from NMFS, though some are mailed in by the boat captains. Additional onsite surveys are conducted by port agents at the end of the trip, for comparison with logbooks and for biological sampling. Logbooks are mandatory for headboats, but compliance can vary by year and location. The Headboat survey substitutes missing reports with data from similar vessels or time periods.

The survey was inconsistent in Louisiana in 2002-2006 due to lack of funding in 2002-2004 and the effects of Hurricane Katrina in 2005 and 2006. No trip reports were collected in Louisiana in 2002, but 2001 trip reports were used as a substitute to generate estimated numbers caught. In 2003, very few trip reports were made, but these were used to generate the estimates. From 2004 to 2006 there were no trip reports or fish sampled, and no substitutes were used, so there are no estimates or samples from 2004 to 2006. However, the MRFSS FHS included the vessels usually covered by the Headboat survey in their charter mode estimates for these years thereby eliminating this hole in the headboat mode estimates.

c. Texas Parks and Wildlife Department Marine Recreational Fishing Survey (TXPWD)

The primary method of assessing recreational fisheries effort is a creel (or access-point) survey run by the Texas Parks and Wildlife department. Creel surveys were initiated in 1974, and the current survey method was adopted in 1983. Angler interviews are initiated at boat-access sites throughout the state, with 1,000 surveys conducted annually resulting in approximately 14,000 interviews. Fish from each fishing party are identified to species, counted, and six randomly selected fish from each species are measured for total length. Anglers are asked about their county of residence, the time and location of

fishing, and the fishing gear/bait used to catch each fish. One member of the angling party is randomly selected to answer questions regarding target and satisfaction with the fishing trip.

d. Large Pelagics Survey (LPS)

The LPS is designed to provide estimates of recreational fishing effort for large pelagic species, including sharks. Recreational fishing trips targeting large pelagic species make up a small proportion of the total recreational effort, therefore the LPS was designed to obtain a higher level of sampling of these trips. This survey has occurred since 1992, and includes the Atlantic states from Virginia north to Maine. A dockside survey focuses on private and charter boat captains completing large pelagic-targeted trips, while a telephone survey targets captains holding an HMS permit. Effort from the LPS is estimated by boat, rather than by angler, with further information collected on target species, tournament participation, fishing method, location, and water depth and temperature.

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