S68-DW-13: Marine Recreational Information Program Metadata for the Atlantic, Gulf of Mexico, and Caribbean regions

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Marine Recreational Information Program

I. Description

The Marine Recreational Information Program (MRIP), formerly the Marine Recreational Fisheries Statistics Survey (MRFSS), is conducted by the NOAA National Marine Fisheries Service (NMFS) to provide estimates of catch per unit effort, total effort, landings, and discards for six two-month periods (waves) per year. MRIP provides estimates for three main recreational fishing modes: shore-based fishing (SH), private and rental boat fishing (PR), and for-hire charter and guide fishing (CH). MRIP also provides estimates for headboat mode (HB) in the mid and north Atlantic regions.

II. Methodology

Recreational catch, effort, and participation are estimated through a suite of independent but complementary MRIP surveys. Catch data are collected through dockside angler interviews in the Access Point Angler Intercept Survey (APAIS), which samples recreational fishing trips after they have been completed. Interviewers collect data on the number of fish caught, length and weight of landed fish, and angler-specific information about the fishing trip. Catch types are defined by MRIP as follows:

- Type A Catch: Fish that are caught and brought back to the dock in a form that can be identified by samplers. This catch type is also called observed harvest.
- Type B1 Catch: Fish that are caught, released dead, used for bait, or filleted, and are identified by individual anglers. This catch type is also called unobserved harvest.
- Type B2 Catch: Fish that are released alive and identified by individual anglers. This catch type is also called released.

Effort data are collected from telephone and mail-based interviews designed to sample and estimate the recreational fishing activities of selected households within two-month waves. Catch rates (catch-per-unit-effort; *CPUE*) from dockside intercept surveys are combined with telephone and mail-based effort estimates to estimate total landings (A+B1) and discards (B2) by species, year, wave, region, state, fishing mode, and area fished (inland, state, and federal waters):

$$Catch = CPUE_{APAIS} * Effort_{Mail/Phone}$$

Fish reported to have been discarded alive (B2) are not seen by APAIS interviewers and so neither the identity nor the quantities of discarded fish can be verified. The size and weight of discarded fish are also unknown for all modes of fishing. Consequently, MRIP only provides estimates of discards in units of numbers.

Unobserved harvest (B1) is also not seen by APAIS interviewers. Mean weight obtained from type A fish are used to obtain estimates of B1 fish in weight.

Catch estimates from the early years of the survey are highly variable with high proportional standard errors (PSE's), and sample sizes in the dockside intercept portion have been increased over time to improve the precision of catch estimates.

For Hire Survey

MRIP for-hire effort estimation officially changed from the Coastal Household Telephone Survey (CHTS) to the For-Hire Survey (FHS) in 2000 for the Gulf of Mexico and East Florida and in 2004 along the Atlantic coast, north of Georgia. The CHTS randomly samples across all residents of coastal households (random digit dialing) to obtain information about the angler's recreational fishing trips in the previous two months. This approach did not adequately cover the for-hire fishing modes as the majority of anglers that fish on for-hire boats reside either out-of-state or within a coastal state but not in a coastal county (i.e., outside the 25-50 mile CHTS coverage area) (Papacostas and Foster 2018). Conversely, the FHS samples from a continuously updated directory of known for-hire vessels to exclusively target the for-hire fishing mode. The FHS also collects trip information

within a 7-14 day recall period to minimize the potential for recall errors. Following these improvements, the FHS produces 'significantly more efficient, precise, and credible charter angler effort estimates than the traditional MRFSS method' (Van Voorhees et al. 2002).

Redesigned APAIS

In 2013, MRIP implemented a new APAIS sampling process to improve survey performance and reliability (Carmichael & Van Voorhees 2015). The most important design changes include improved protocols for interview assignments and changes to the randomization of assignments so that they better cover the target population (Foster et al. 2018) and are summarized below.

- Full Day Sampling- The old APAIS design directed samplers to visit sites during 'peak' hours, resulting in inadequate coverage of anglers that return to the dock during the night and early daytime hours. Sampling is now stratified by time of day to ensure the entire 24-hour period is covered (Van Voorhees et al. 2013).
- Multi-site clustering- Site assignments under the old APAIS design consisted of individual sites only, but samplers were given discretion in deciding how much time to spend sampling at each site or to move to 'alternate' sites.

Such decisions were based on attaining a specified number of interviews and resulted in many incomplete sampling assignments, which required rescheduling (Van Voorhees et al. 2013). It also resulted in unknown and inconsistent sampling probabilities, complicating attempts to account for the unequal probability sampling design of the APAIS in the estimation of catch rates and their variances (Sminkey et al. 2019, Van Voorhees et al. 2019). Under the new APAIS design, access sites with low levels of expected fishing activity are clustered into multi-site units prior to site selection; high fishing activity sites are not clustered. Depending on their randomly drawn assignment, interviewers then spend an entire sampling period (i.e., 6 hours) at a high activity site or divide their time between multiple low activity sites (Van Voorhees et al. 2013). This sampling design maximizes both sampling efficiency (i.e., number of interviews) and the spatiotemporal extent of the survey (Papacostas & Foster 2018).

- Design based estimation- Interview assignments, which now include explicit instructions to sample at a particular site(s) and time(s) (i.e., 'controlled selection'), are based on a fully formalized, random sampling process with known selection probabilities. Therefore, current estimation methods are now fully weighted to account for the complex sampling design of APAIS (Foster et al. 2018, Sminkey et al. 2019, Van Voorhees et al. 2019).

- Multi-mode sampling- The initial MRIP method only allowed anglers fishing in the assigned fishing mode to be interviewed. In the new APAIS sampling design, the fishing mode strata has been replaced by an exclusive site grouping (i.e., primarily charter boat, private boat, or shore-based fishing), allowing samplers to randomly sample any angler-trip and provide summary counts of all angler trips, regardless of mode. This change maintains stratification related to fishing mode but increases the overall productivity of samplers and their success in intercepting the less predictable charter mode (Papacostas & Foster 2018).

Fishing Effort Survey

In 2018, effort estimates of the private boat and shore fishing modes from the CHTS were replaced by the Fishing Effort Survey (FES). Advancements in communications technology and shifts in public perceptions and attitudes resulted in diminishing rates of coverage and response, minimizing the efficiency and effectiveness of the CHTS. For example, in 2016, CHTS response rates were less than 10% and, for the first time, most U.S. households were wireless-only and unavailable for sampling by the CHTS sampling design (Papacostas & Foster 2018). The telephone-based CHTS is also more likely to underestimate fishing prevalence and total fishing effort than the FES. CHTS data are collected from

individuals that (1) may not have been involved in any of the household's fishing activities (i.e., the 'gatekeeper' who answers the phone) or (2) are not provided the necessary time to remember all fishing activities that occurred throughout the previous two-months (Andrews et al. 2014, SEDAR 2019). Conversely, the mail-based FES provides households more time to consider the survey request, determine who should respond to the survey, consult personal records, or discuss the survey with other members of the household. The address-based sampling design of the FES also provides nearly complete coverage of coastal states, not just anglers with landlines (Andrews et al. 2014, Rago et al. 2017). The FES sampling design is stratified by angler license status, as informed by the National Saltwater Angler Registry, because licensed anglers are much more likely to report fishing than general population samples (Andrews et al. 2013). Taken together, the FES yields 'higher quality data by providing nearly complete coverage of coastal states, much higher response rates, and more efficient sampling' (Papacostas & Foster 2018) that is less susceptible to biases associated with recall errors and the 'gatekeeper' effect (Andrews et al. 2014, Rago et al. 2017).

Domain Estimation

Domain estimation is used to create custom estimates by sub-levels of the stratified estimation design. Typically, these domains are sub-state geographic divisions

based on county groups (NOAA Fisheries 2020). Intercepted trips returning to the specified domain are identified in the intercept survey data. Estimates are then calculated within this domain using standard design-based estimation which incorporates the MRIP design stratification, clustering, and sample weights.

III. Temporal coverage

The survey first began in wave 2 (March/April) of 1981. Sampling is not conducted in Wave 1 (January/February) north of Florida because fishing effort is very low or non-existent, with the exception of NC, where wave 1 has been sampled since 2006. In the South Atlantic and Gulf of Mexico, from 1981 to 1985, headboats and charterboats were combined into a single for-hire mode. Beginning in 1986, headboats were excluded from the MRIP survey in these regions to avoid overlap with headboat estimates from the Southeast Region Headboat Survey (SRHS), conducted by the NMFS Lab in Beaufort, North Carolina. In the North and Mid-Atlantic, from 1981 to 2003, headboats and charterboats were combined into a single for-hire mode. Beginning in 2004, with the implementation of the FHS in these regions, separate and more accurate estimates of effort are provided for each for-hire sector: headboat and charterboat.

IV. Spatial coverage

MRIP currently covers all coastal Atlantic states from Maine to Florida and Gulf of Mexico states from Florida to Mississippi. MRIP provides estimates for the following sub-regions and states:

- North Atlantic (Maine, New Hampshire, Massachusetts, Rhode Island, and Connecticut)
- Mid-Atlantic (New York, New Jersey, Delaware, Maryland, and Virginia)
- South Atlantic (North Carolina, South Carolina, Georgia, and East Florida)
- Gulf of Mexico (West Florida, Alabama, Mississippi, and Louisiana*)
- Caribbean (Puerto Rico*)

* Louisiana and Texas are not covered by the APAIS as they utilize separate, state-run recreational fishing data collection programs. Louisiana was included in MRIP from 1981 to 2013. Puerto Rico was included in MRIP from 2000 to 2017. Coverage ceased as a result of the effects of Hurricane Maria. Efforts are underway at MRIP to resume coverage of Puerto Rico.

V. Data Source Contact

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VI. Field Descriptions

Estimate Variables: Catch and Effort estimates (see Appendix 1)

Intercept Survey Variables: Trip, Catch, and Size intercept data (see Appendix 2)

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