FISHstory – Using Citizen Science to Describe Historic Catches in the U.S. South Atlantic.

FISHstory: uso de la ciencia ciudadana para describir capturas de pesca históricas en el Atlántico sur de los Estados Unidos.

FISHstory - Utilisation de la science citoyenne pour décrire les prises de peche historiques dans l'Atlantique Sud des États-Unis.

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EXTENDED ABSTRACT

The U.S. South Atlantic region has many long-standing data needs and limited data collection resources for federally managed marine fish stocks. Much of the harvest is dominated by recreational fisheries, where data are limited, especially during historic time periods (National Marine Fisheries Service 2019, SEDAR 2015). FISHstory, a pilot project developed through the South Atlantic Fishery Management Council's Citizen Science Program, developed a standardized protocol for archiving and analyzing historic photos from the 1940s to 1970s from a for-hire fleet based in Daytona Beach, Florida. These photos document the beginnings of the for-hire fishery off Florida and are an untapped source of data which can be used to help recreate information on landings and length compositions before dedicated catch monitoring programs began.

The FISHstory project had three primary components: digitizing and archiving historic fishing photos; analyzing historic photos to estimate for-hire landings composition and effort through the Zooniverse online crowdsourcing platform; and developing a method to estimate fish length in historic photos using lumber in the leaderboards where fish were displayed as a scalar. During project development a diverse stakeholder group provided guidance, data end users were consulted, and expert feedback was incorporated to help ensure the data collected would inform management (Byrd et al. 2022). Through the pilot project, historic fishing photos were digitized and archived with key metadata. For the for-hire landings composition component of the project, volunteers were trained to identify and count fish and people in historic photos using the Zooniverse platform. Volunteers identified and counted fish into 16 species or species groups and counted fish that were obstructed and unidentifiable. (See Byrd et al. 2022 for a list of the species/species groups included in the pilot project.) Multiple volunteers classified each photo. A Validation Team of fish identification experts, comprised of fishermen and scientists, verified photos when there was substantial volunteer disagreement. For the length component of the project, a protocol was developed to measure the length of the fish. The protocol was tested for precision and accuracy and applied to King Mackerel, *Scomberomorus cavalla*.

Through the FISHstory pilot project over 1,374 photos were digitized and archived. The photos archived ranged between the years 1949 and 1975. The majority of photos were from the 1960s (67%), followed by the 1950s (16%), and 1970s (13%). All months of the year were represented in the photos, with most having been taken between April and August which likely mimicked the effort in this for-hire fleet.

For the for-hire landings component of the project, over 2,120 volunteers classified 1,000 photos in Zooniverse. One hundred and eighty photos were reviewed by the Validation Team. Comparison of the species counts for photos reviewed by both the volunteers and Validation Team showed agreement for a number of species/species groups. Two species/species groups showed bias in their counts (Black Seabass and Other Snapper) with Validation Team members typically counting more than volunteers. Larger differences were also seen between the Red Snapper and Obstructed Fish counts; however, no biases were seen between these groups. Due to the similarities between the volunteer and Validation Team fish counts, volunteer data were found usable to estimate catch rates for the species/species groups found most frequently in the photos.

To gauge accuracy and precision of the length methodology developed, the protocol was used to measure items of known length. The most recent South Atlantic King Mackerel assessment used 2-inch size bins for length compositions (SEDAR 2020). 96% of the readers' measurements were within 2 inches of the items of known length, demonstrating that the protocol developed could produce measurements precise and accurate enough for use in assessment. All archived photos were reviewed, and King Mackerel were measured when present. King Mackerel length compositions by decade are shown in Figure 2.

The methods developed to analyze historic photos during the FISHstory pilot project show great promise. Volunteers made valuable contributions to the project in multiple ways - by donating photos, volunteering in Zooniverse, and serving on the Validation Team. However, identifying fish in historic photos can be challenging. Through the pilot we have been able to identify ways to simplify data collection to help improve data quality moving forward. We were also excited to learn

Figure 1. An example photo from the FISHstory photo set from a completed fishing trip on the Miss Juanita on July 1, 1961. Photo credit: Rusty Hudson and the Hudson, Stone, and Timmons families .

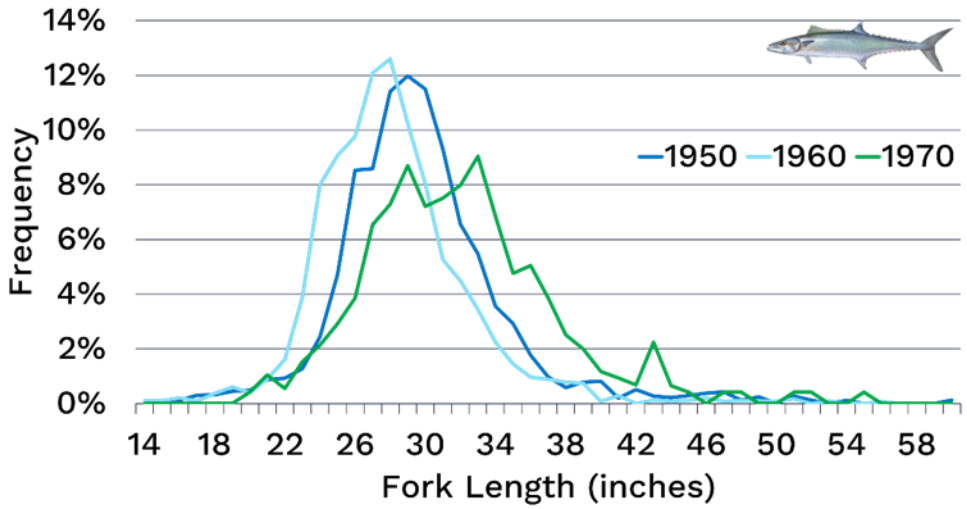

Figure 2. Estimated size distribution of King Mackerel (fork length, inches) by decade based on photos analyzed through the FISHstory pilot project
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that fishermen seemed interested in sharing their photos and stories.

We are currently transitioning FISHstory from a pilot to a full-scale project by pursuing additional funding; expanding the geographic and temporal range of photos by archiving photos from other fishermen and organizations; refining the pilot project protocols to improve efficiency; and estimating length compositions for more species.

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KEYWORDS: fisheries, natural resource management, historic photos, citizen science

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