

Estimated Incidental Take of Manta Ray, *Manta birostris*, in the Spanish Mackerel Gillnet
Fishery

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Background

NOAA Fisheries Service-Southeast Regional Office is conducting Endangered Species Act Section 7 consultations on various fisheries operating in the Southeast region. The Southeast Regional Office has requested information relative to the take of manta ray, *Manta birostris* in the Coastal Migratory Pelagic Fishery. This document summarizes that information.

Overview

The Southeast Gillnet Observer Program has adapted to the changes of the Florida- Georgia shark gillnet fishery since the program began in 1993 (e.g. Mathers et al. 2018). There are currently about 500 total directed and incidental shark permits issued for the southeastern U.S. Atlantic coast and Gulf of Mexico, while the number of gillnet fishers changes from year to year. Gillnet effort targeting large coastal (LCS) and small coastal (SCS) sharks declined as a result of Amendments 2 and 3 to the Consolidated Atlantic Highly Migratory Species Fishery Management Plan. LCS and SCS targeted gillnet effort has continued to decline in the last five years, such that it has become almost nonexistent. Fishers have consequently increased effort targeting finfish, including Spanish mackerel *Scomberomorus maculatus*, and king mackerel *Scomberomorus cavalla*, in the Coastal Migratory Pelagic Fishery, with varying types of gillnet gear. However, a small amount of shark targeted gillnet effort continues to be observed. The Southeast Gillnet Observer Program, in its continuing efforts to adapt to the fishery, currently covers anchored (sink and stab), strike, or drift gillnet fishing, regardless of target, by vessels that fish year-round from Florida to North Carolina and the Gulf of Mexico.

Methods

Prior to analysis, data were excluded from the observer data set that did include the target “mackerel” as recorded by the observer prior to the set of the fishing gear and for years prior to 2010. Following Richards (2006), a standard binomial model was used to estimate probability and the coefficient of variation (CV) of capture per set. The 95% confidence intervals were estimated using the “Wilson” interval, which has been shown to have a reasonable coverage particularly for extreme probabilities (see Brown et al. 2001).

As the estimation of confidence intervals for the binomial has been noted to be problematic (see Brown et al. 2001), the delta approach (Pennington 1983) was also used to estimate the mean and variance of takes per set. Extrapolation to estimate total takes by the fishery was simply the multiplication of either catch per set or probability of catch per set by the total effort (extracted from the logbooks).

Total effort data reflects all 2010 through 2020 gillnet trip reports received by the Coastal Fisheries Logbook Program. Trip target determination was made by using the proportion of Spanish mackerel catch to the rest of trip landings. A “mackerel” landing percentage greater than or equal to 66.6% was considered a mackerel directed trip.

Four gillnet types are reported to the Coastal Fisheries Logbook: Strike, Drift, Anchor, and Other. These types are coded and reflected in the summary as follows:

Strike – Gear code: ‘475’ - gear name: ‘GILL NETS, DRIFT, RUNAROUND’

Drift – Gear code: ‘470’ - gear name: ‘GILL NETS, DRIFT, OTHER’

Anchor – Gear code: ‘480’ gear name: ‘GILL NETS, STAKE’

Other – Gear code: ‘425’ gear name: ‘GILL NETS, OTHER’

However, given the nature of the data and that most gillnet effort is reported as “OTHER”, bycatch estimates were derived for the gillnet fishery regardless of gillnet type.

Results

Interactions with manta rays were observed only in 2018 for gillnet sets targeting Spanish mackerel. The expanded take estimate for that year was 16.4 individuals (Table 1). Confidence limits were 2.9-89.1 using the Wilson interval or 3.2-84.1 using the delta approach.

Table 1. Estimated total take of manta rays for southeast gillnet fishery targeting Spanish mackerel.

Year	Expanded take	Method	Lower confidence limit	Upper confidence limit
2018	16.4	Binomial-Wilson	2.9	89.1
2018	16.4	Delta- Pennington	3.2	84.1

Literature cited

Brown, L.D., Cai, T.T. and DasGupta, A. 2001. Interval estimation for a binomial proportion. *Statistical science*. 16:101-133.

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