Commercial King Mackerel Trip Sampling in NC, Differences in Fishing by State District

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Data Sources

Length samples have been collected by the Trip Interview Program (TIP) and several state agencies since 1981. These samples are collected by port agents at docks where commercial catches are landed throughout the Atlantic and Gulf coasts. Trips are randomly sampled to obtain trip, effort, catch and length frequency information. Occasionally there has been quota sampling to obtain age structures on fish that are rare in the catch (extremely large and small fish). These non-random samples are identified in the data to allow removal from analyses were non-random samples are not appropriate.

Commercial catch data has been collected by state and federal personnel as a cooperative data collection effort since the early 1970s. The NMFS houses this data in the Accumulated Landings System (ALS), located on the Oracle server at the Southeast Fisheries Science Center in Miami. The ALS houses landings data for the Atlantic and Gulf States beginning in 1962.

Trip data was obtained from the Fisheries Logbook System (FLS) housed in Miami at the SEFSC. The Fisheries Logbook System records the fishing and non-fishing activity of fishermen who are required to report their fishing activity via logbooks submitted for each trip. Data were refined to those records that could be assigned a county, gear, year with landings in NC. Data on trips taken in NC that landed king mackerel were available from 1993 to 2007.

Methods

Sample data was obtained from the TIP Online database (NMFS/SEFSC), which is a data set of all sampling data from commercial catches by participating partners. The data used were a subset of this data, which contained commercial samples that were identified as having no sampling bias. These data were further limited to those that could be assigned a year, gear, state and area. Those data that had unknown year sampled, gear used, sampling state or sampling area were deleted from the file. Further, only gears belonging to hook and line or gill net gear types were used.

Sample data was joined with landings data from ALS by year, gear and area. ALS data was also limited to those data that could be assigned a year, gear, state and area. Data in the ALS and sample data were assigned a state and an area based on landing and sample location. Areas assigned to the data corresponded to the Atlantic area where no mixing

occurs, the Gulf area where no mixing of occurs, and the area where mixing of Atlantic and Gulf stocks occurs. NC district were assigned based on county of landing (Figure 1).

Logbook data were assigned to district based on the county of landing. Further, those trips that had unknown or suspicious areas were dropped from the analysis (5 trips). Gear was assigned to gill net or hook and line gear based on gear codes reported in the FLS. Other gears were dropped as they did not represent a significant number of trips.

Results

Since 1979, 95% of NC gill net landings and 61% of hook and line and gill net landings (combined) (Table 1) have come from the Northern District. Unfortunately, only 1984 and 1991 had sampling of gill net gear for king mackerel from the Northern District, with sampling fractions (pounds sampled/pounds landed) of 3.8% and 1.7% respectively. There has been no king mackerel sampling recorded from this district since 1992 (Gloeckner, 2008). This indicates that vessels landing in the Northern District are using gill net gear more frequently than vessels landing in the central or Southern Districts.

By number of trips, the Northern District had a mean number of gill net trips of 60.6 (sd =102.6) and mean number of hook and line trips of 57.7 (sd=150.7) across years from 1993 to 2007. The Central District had a mean number of trips for gill nets of 3.6 (sd=3.2) and 17.2 (sd=34.4) for hook and line. The Southern District had a mean number of trips for gill nets of 1.7 (sd=1.2) and 41.7 (sd=77.6) for hook and line (Figure 2). This indicates that that the sampling occurring in the rest of the state is not representative of the gear distribution among trips in the Northern District. Only 1985 had any gill net samples in the other districts.

For trips by logbook area fished (Figure 3), the Northern District had most of its landings from logbook area 3575, the Central district from area 3476 and the Southern district from areas 3377 and 3477 (Figure 4). So sampling in the Central and Southern Districts are not capturing fish from area 3575, which dominates trips in the Northern District, but sampling in the Central District captures data from 3476 which is adjacent to area 3575, which dominated landings in the Northern District.

NC averages around 98% of the gill net landings in the Atlantic no mixing zone from 1990-2006. This indicates that samples from NC are seriously lacking for characterization of the gill net fishery. However, gill net landings in the Atlantic no mixing zone only represent on average 6.3% of the yearly landings of king mackerel. Gill net samples from 1981-2006 only have an N of 173, while hook and line has an N of 35,535. Although $p<.000$ for a test of different mean lengths between gears, the small sample size and lack of normality (possible sampling bias) for gill net introduces doubt as to whether this mean is accurate (Figure 5) and a comparison of length composition, reasonable. The hook and line fishery dominates the king mackerel landings, so as long as that gear is sampled adequately, the length compositions from hook and line should describe the size distribution of the landings.

Literature Cited

Gloeckner, D.R. 2008. Commercial King Mackerel Sampling Fractions for North Carolina by District. SEDAR 16 AW-??.

Table 1. Proportion of NC landings from Northern District for gill net and gill net and hook and line combined.

Year	Gill Net	Gill Net and Hook and Line
1979	0.993203986	0.745592404
1980	0.956499402	0.667781948
1981	0.96031514	0.698827535
1982	0.988026711	0.749482429
1983	0.998045627	0.667201308
1984	0.976545661	0.479305828
1985	0.661459181	0.528452482
1986	0.454844607	0.568672444
1987	0.657734814	0.635035927
1988	0.980642815	0.521446153
1989	0.927626653	0.590812552
1990	0.643517523	0.742758408
1991	0.482707873	0.635863107
1992	0.715492093	0.653557375
1993	0.493035359	0.570834022
1994	0.992003114	0.502342304
1995	0.995060326	0.595429073
1996	0.99124126	0.552007597
1997	0.992177361	0.534561441
1998	0.99178124	0.65477073
1999	0.989164549	0.698647057
2000	0.997497725	0.658163813
2001	0.993027616	0.612793377
2002	0.997485812	0.462246708
2003	0.993465551	0.410784464
2004	0.993657959	0.674087526
2005	0.996862604	0.72964975
2006	0.996494243	0.632252087
Mean	0.94691439	0.614252184

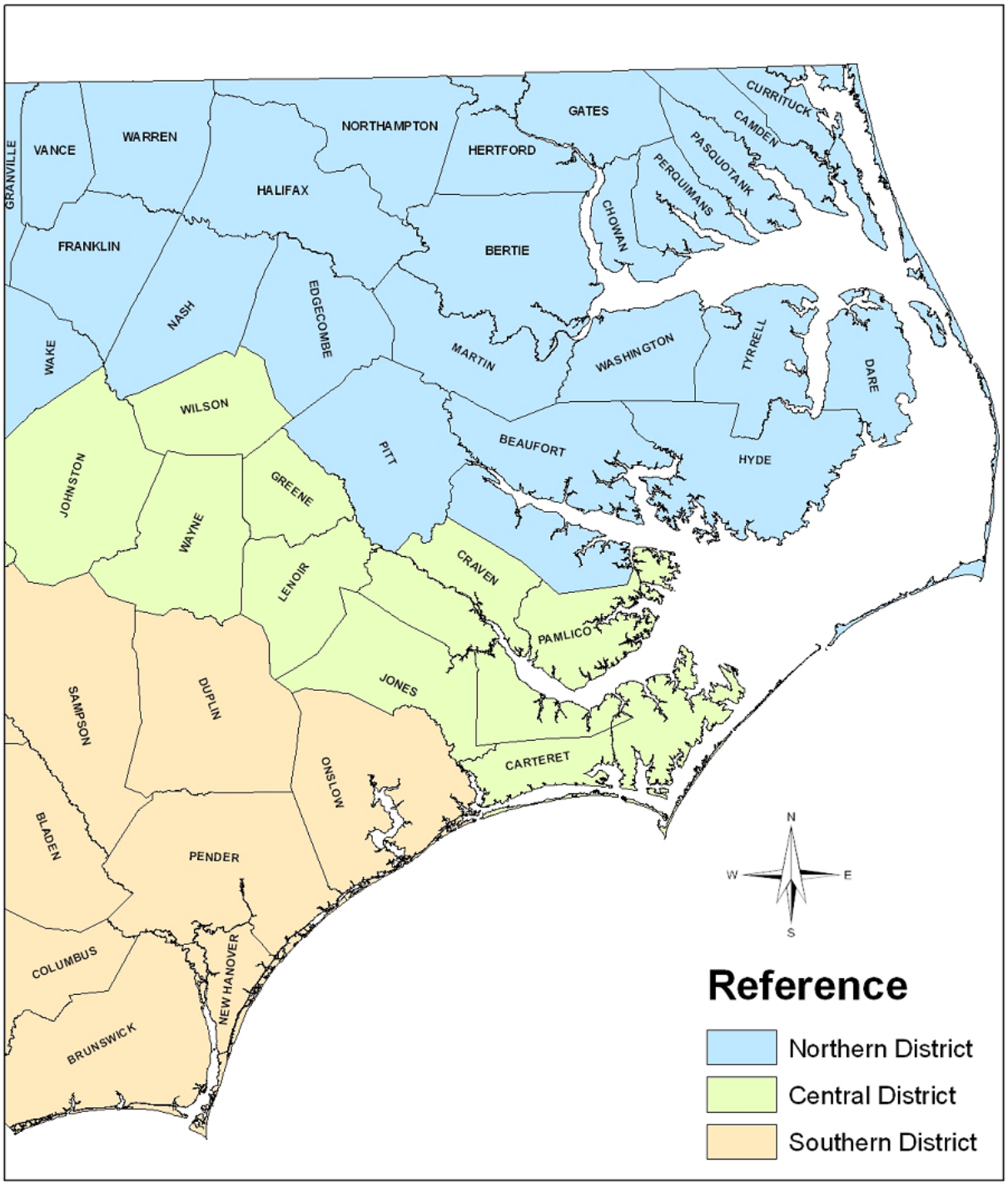

Figure 1. Map of NCDMF districts included in analysis.

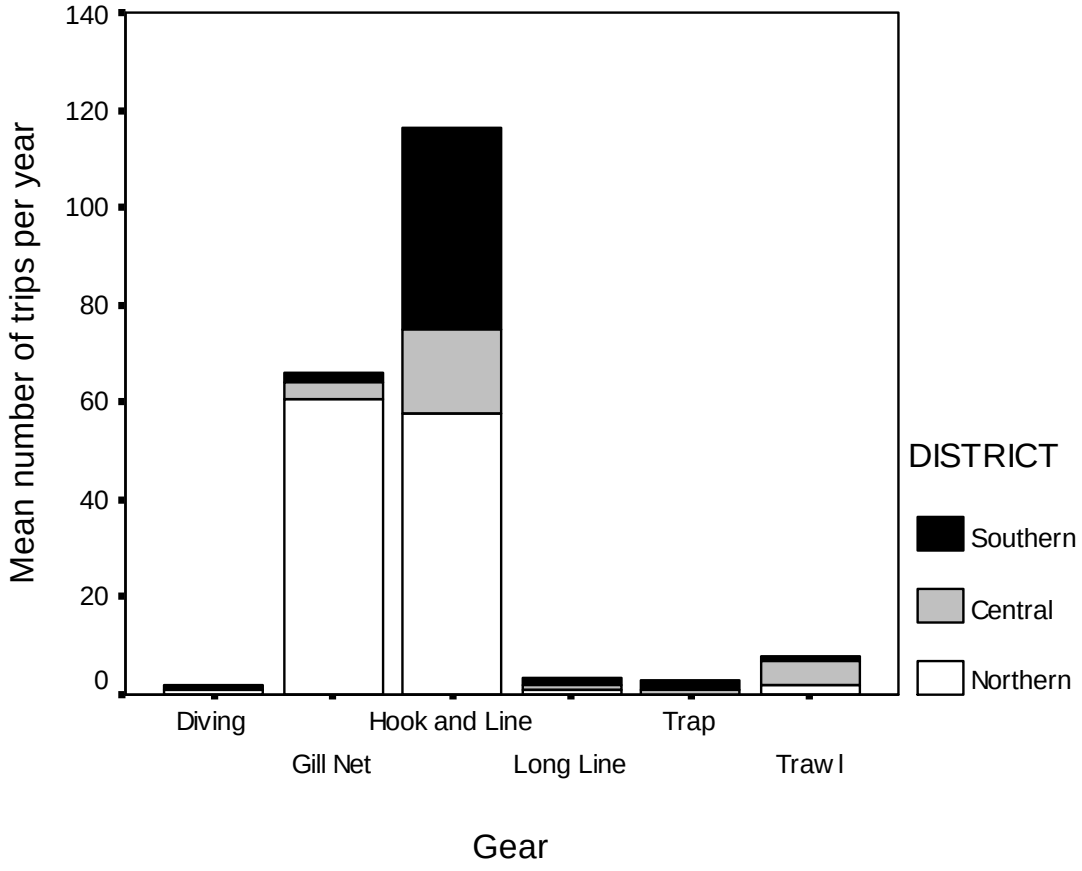

Figure 2. Mean number of trips per year landing king mackerel by gear and district.

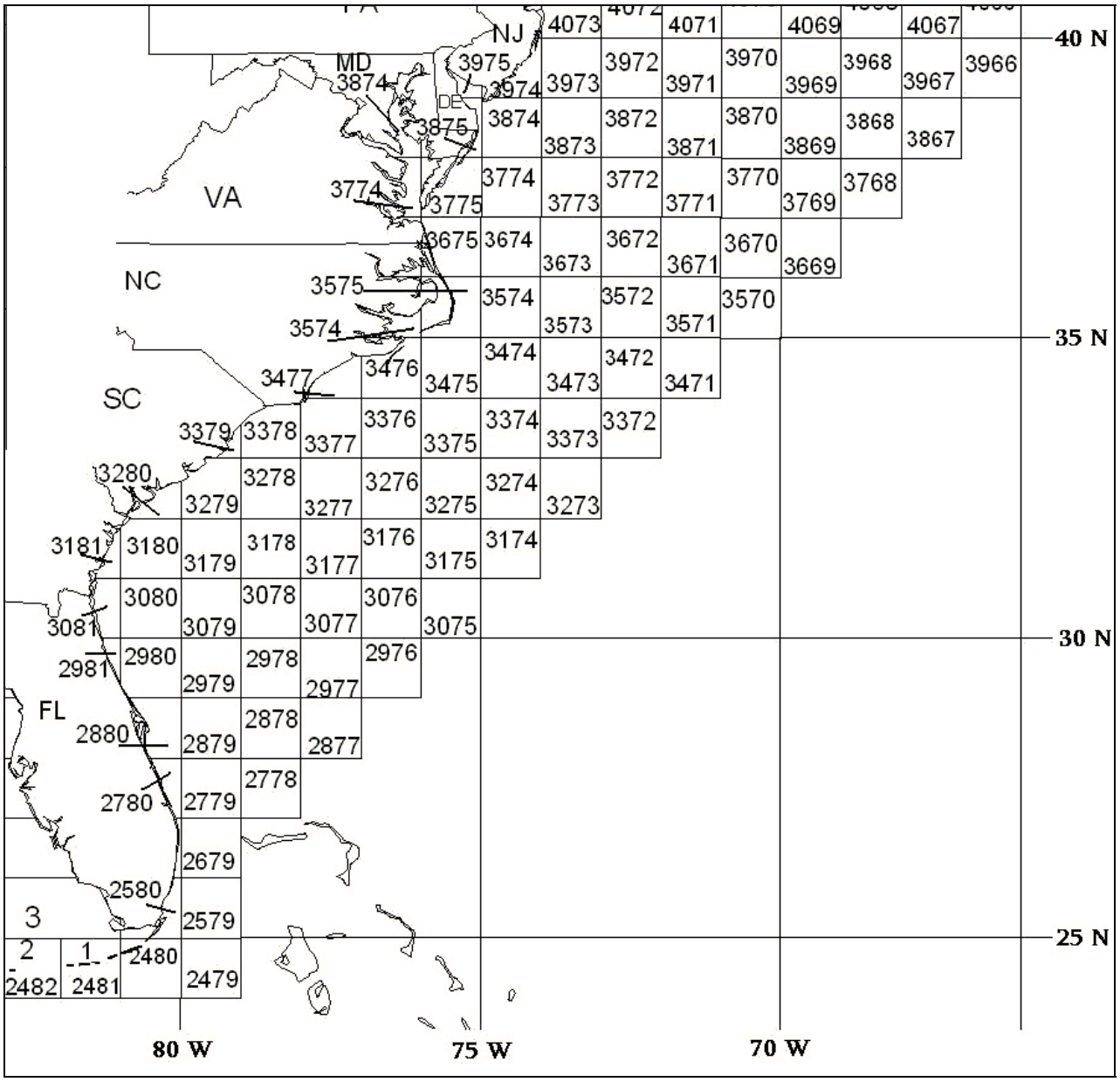

Figure 3. Map of area codes used by the logbook program.

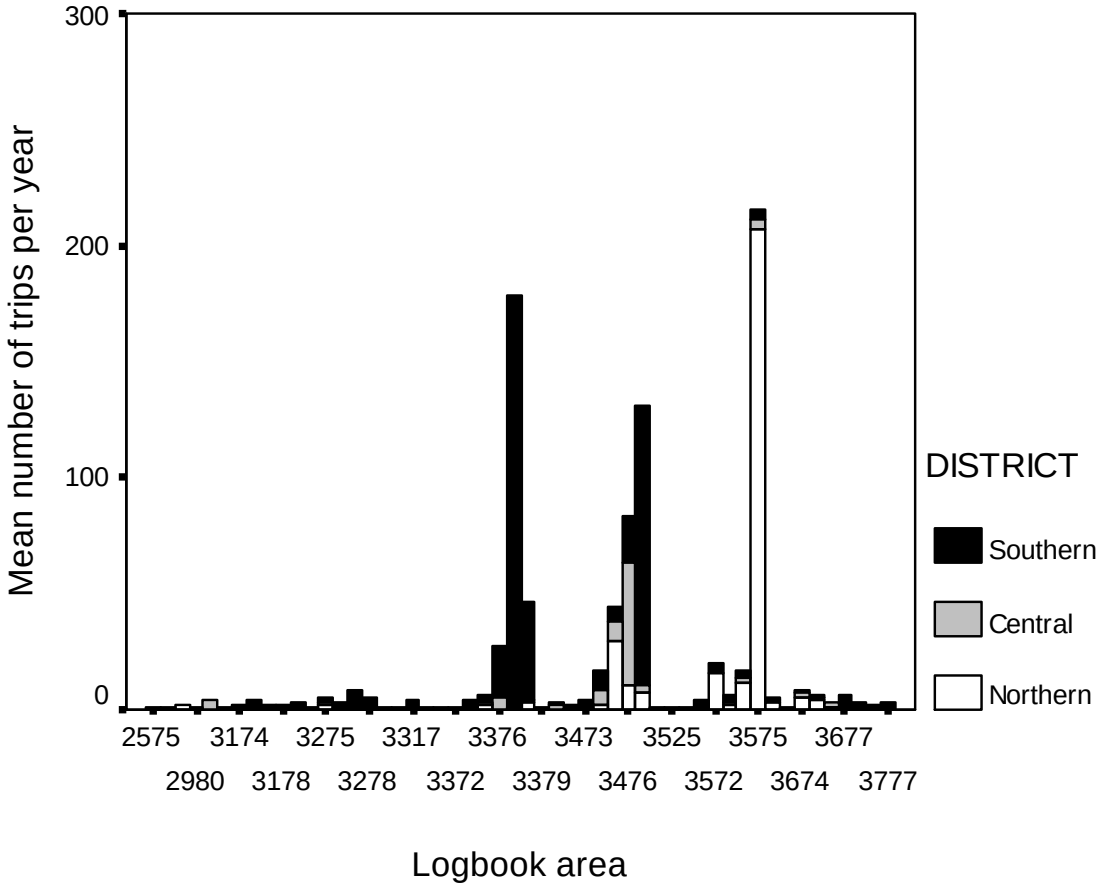

Figure 4. Mean number of trips per year landing king mackerel by logbook area and district.

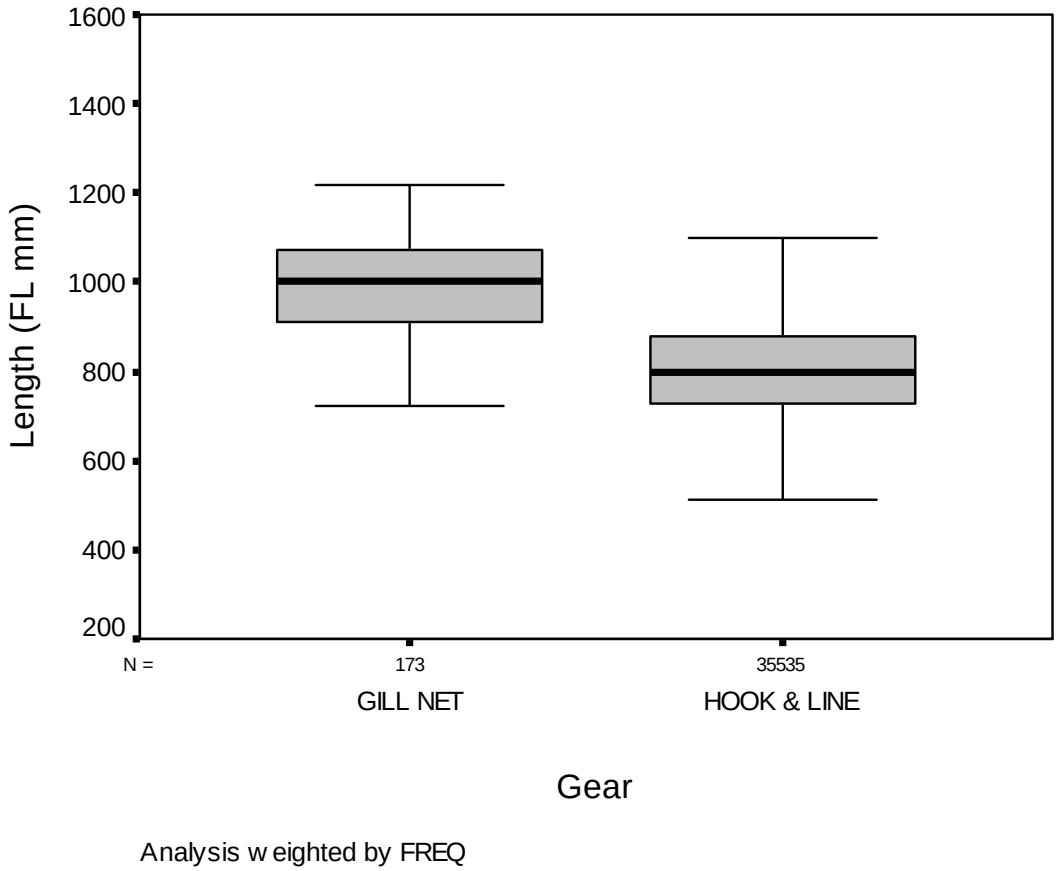

Figure 5. Boxplot of mean length of king mackerel (FL-mm) in the Atlantic no-mixing zone (1981-2006).