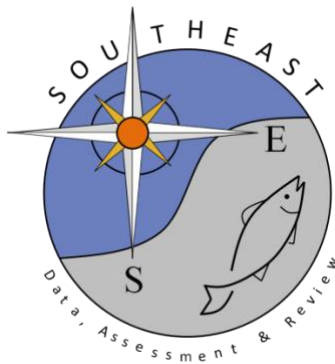


# Spatial analysis of Southeast Regional Headboat Survey Catch Records

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# Spatial analysis of Southeast Regional Headboat Survey Catch Records

## Methods

This analysis is based on catch records from the Southeast Regional Headboat Survey using data from 1973 to 2018.

Data have been filtered in the following ways:

1. Duplicate rows have been removed (i.e. only one occurrence of a duplicate row is retained)
2. Trips where the number of anglers is zero were excluded (either these are errors or they do not count as fishing events)
3. Four-digit location values were determined for as many records (rows of data) as possible:
  - a. If the LOCATION field has fewer than four digits, consider it invalid and change to NA
  - b. If the LOCATION field four or more digits, use the first four digits
  - c. If LATITUDE and LONGITUDE fields are available, combine to yield four-digit code (LOC4Dig) indicating 1X1 degree quadrat.
  - d. Values of LOC4Dig that did not correspond to a grid of quadrats between 37 and 24 degrees north latitude and between 98 and 73 degrees west longitude, that contained at least some marine or estuarine waters were considered invalid. These values were filtered out of the data set.
4. Trips lasting longer than one day were excluded (<3% of records).

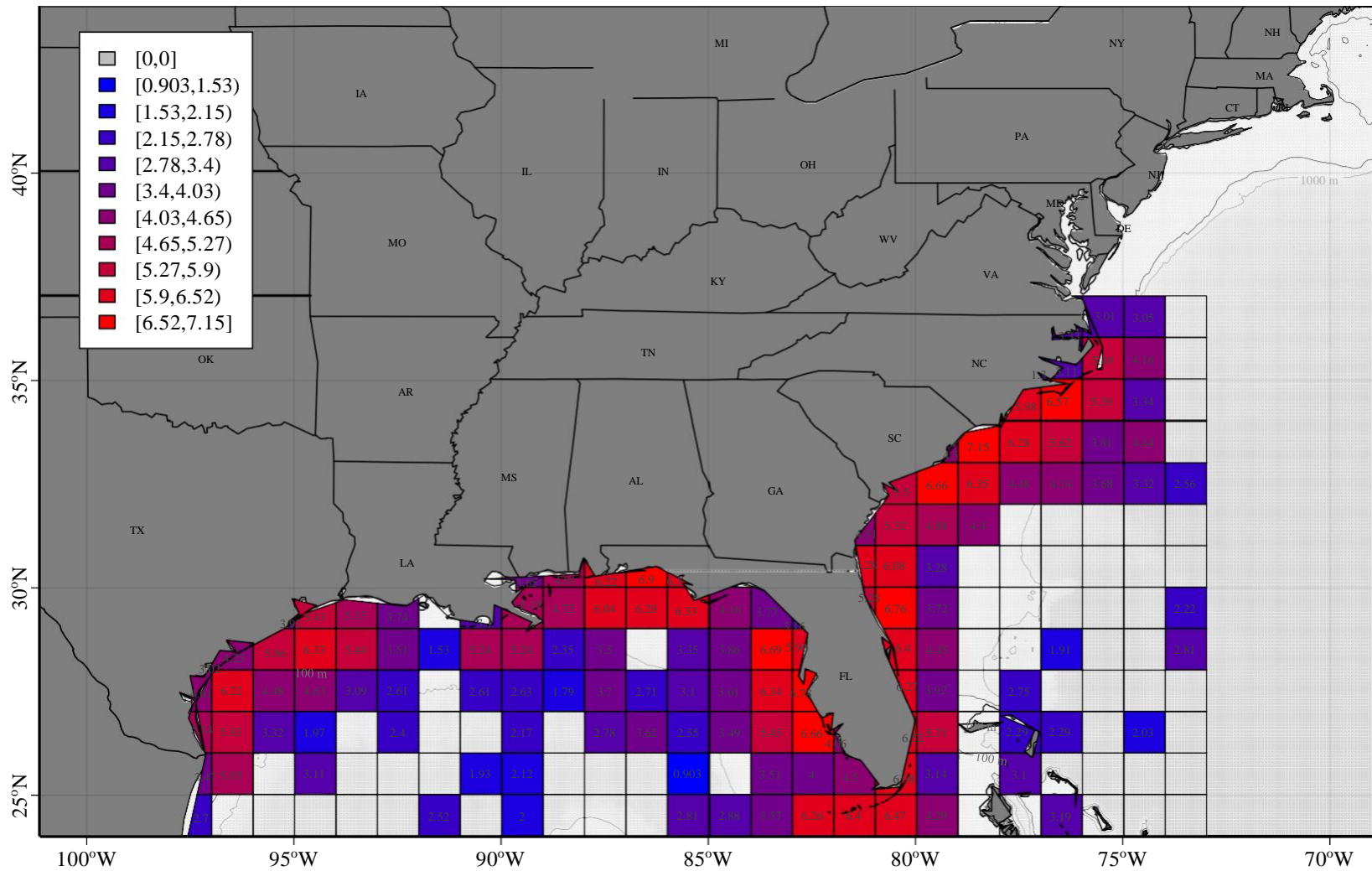
The number of fish reported as caught, released alive, or released dead (CAUGHT + REL\_LIVE + REL\_DEAD) were summed for each record to compute the total number of fish (nFish) associated with each record. For a small number of records where nFish = 0, the species code was considered invalid, changed to 999, and excluded from analysis. To estimate a single value of nFish for each LOC4Dig polygon, nFish for unique records were summed. To aid in displaying a discernible gradient of values in plots, nFish was transformed as  $\log_{10}(\text{nFish}+1)$ .

In estimating effort, the number of hours each angler fished was estimated from the tripType code, which corresponds to a range approximating the trip duration. The midpoint of each range was used to estimate the mean number of angler hours (per angler). The number of anglers on the trip was multiplied by the mean number of angler hours to estimate the total number of angler hours for the trip (anglerHoursTotal; i.e. effort).

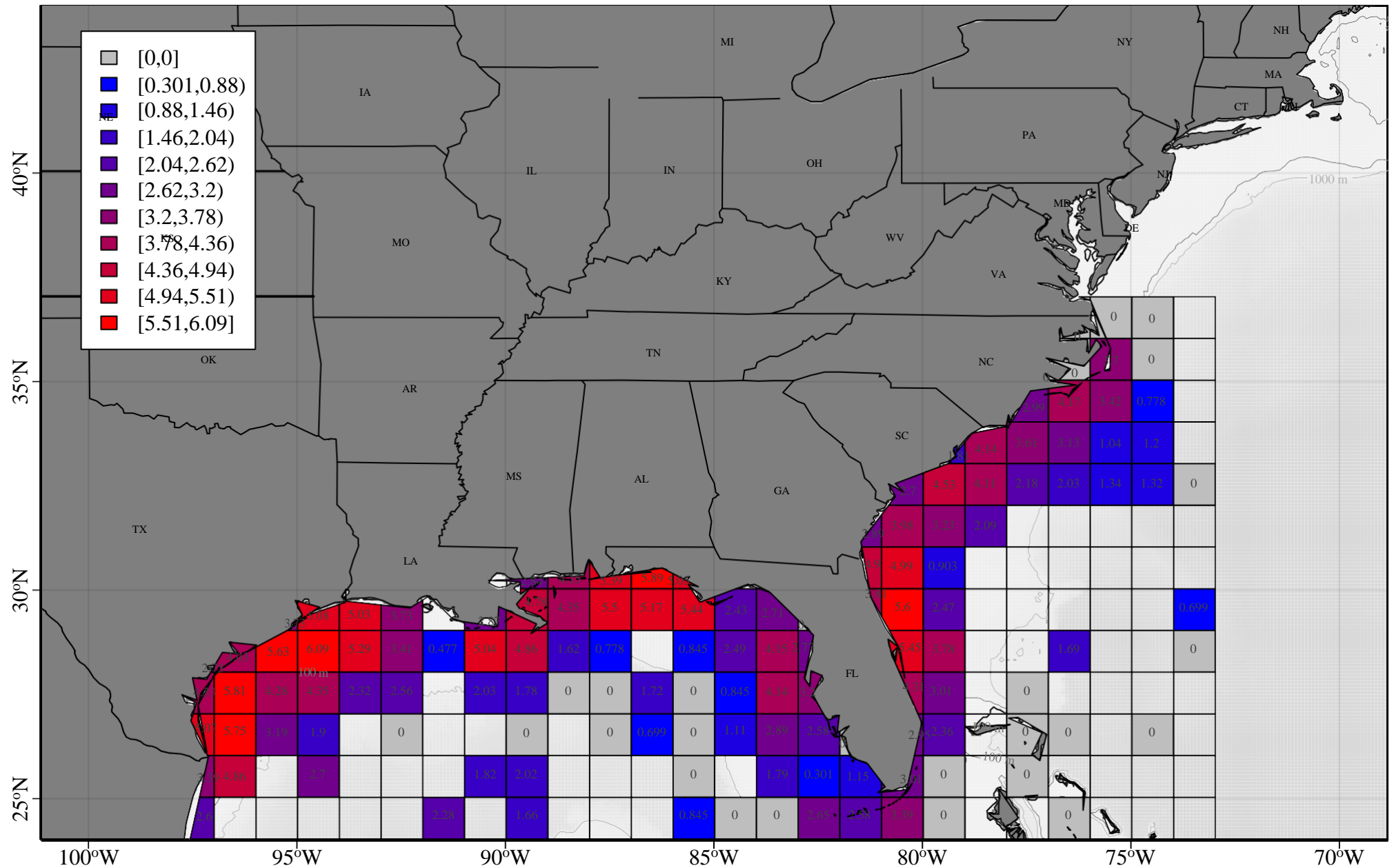
A concatenation of LOC4Dig, YEAR, and MONTH yields the grouping variable LOC4DigYrMo. Catch per unit effort (CPUE) was calculated at the scale of LOC4DigYrMo as  $\text{nFish}/\text{anglerHoursTotal}$ . To estimate a single value of CPUE for each LOC4Dig polygon a mean CPUE was calculated among values for each LOC4DigYrMo. To aid in displaying a discernible gradient of values in plots, CPUE was converted to units of nFish per 10000 angler hours, and transformed as  $\log_{10}(\text{cpue}+1)$ .

In all plots, positive values were binned into 10 bins of even width, associated with a gradient of color, with an additional bin for zero values in gray. Bin ranges are displayed a legend with associated colors using interval notation to indicate which bin the limits are included in. Polygons where catch was caught by fewer than 3 vessels are considered confidential and filled in black. Polygons that are not filled indicate that no fish of any species, in this data set, have been caught there. Numeric values are plotted in each polygon and confidential values are abbreviated "conf".

all species  
[log10(nFish+1)]



# Lutjanus campechanus [log10(nFish+1)]



# Lutjanus campechanus

## [log10(cpue+1)]

