Quantifying Greenhouse Gas (GHG) Emissions Associated with Global Seafood Production

Last Updated on May 13, 2025

Table of contents

1 About **3**

2 FAO Data Assembly **4**

2.1 Join FAO Data 4

2.1.1 Remove non-target species 4

2.1.2 Add species information 4

3 Merge Emissions Datasets **6**

3.1 Join Emissions Data 6

4 Results **7**

4.1 Overall Comparisons 7

4.2 Visualizations 10

4.2.1 Trends in emissions-per-unit-catch by ISSCAAP species group 10

1 About

This Quarto book documents the steps in the Emissions Pipeline.

2 FAO Data Assembly

2.1 Join FAO Data

FAO Global Capture Production data was downloaded as .csv files in a zipped folder. The following .csv files were used in this analysis:

- `Capture_Quantity.csv` (catch quantity)
- `CL_FI_COUNTRY_GROUPS.csv` (country information)
- `CL_FI_SPECIES_GROUPS.csv` (species information)

2.1.1 Remove non-target species

Prior to joining the .csv files, "PISCES", "CRUSTACEA", "MOLLUSCA", and "INVERTEBRATA AQUATICA" were filtered out of the major groups represented in the `CL_FI_SPECIES_GROUPS.csv`. Additionally, ISSCAAP group 82 (Corals) was removed. These species were assumed not to be the target species of the fishing gear types ("fishing", "squid_jigger", "drifting_longlines", "pole_and_line", "other_fishing", "trollers", "fixed_gear", "pots_and_traps", "set_longlines", "set_gillnets", "trawlers", "dredge_fishing", "seiners", "purse_seines", "tuna_purse_seines", "other_purse_seines", "other_seines", and "driftnets") represented in the broadcasting emissions dataset.

ISSCAAP groups 41 and 51, representing freshwater crustaceans and freshwater molluscs respectively, as well as the species "River eels", were filtered out because any emissions associated with freshwater collection would have been eliminated during the intersection of the FAO regions shapefile and the emissions grid. Therefore, it is assumed that none of the resulting emissions can be attributed to fishing for freshwater species.

2.1.2 Add species information

The analysis is conducted with species distinguished by a unique numeric code in the `identifier` column, and then additional species information is joined back to the final table. Species information was obtained from a modified version of the `data-keys/master_species_key.csv` created by Danielle Ferraro and Gordon Blasco

and provided by emLab. Some species in the resulting FAO dataset were not represented in the master_species_key.csv, so the missing species were added from the `FAO CL_FI_SPECIES_GROUPS.csv`.

3 Merge Emissions Datasets

3.1 Join Emissions Data

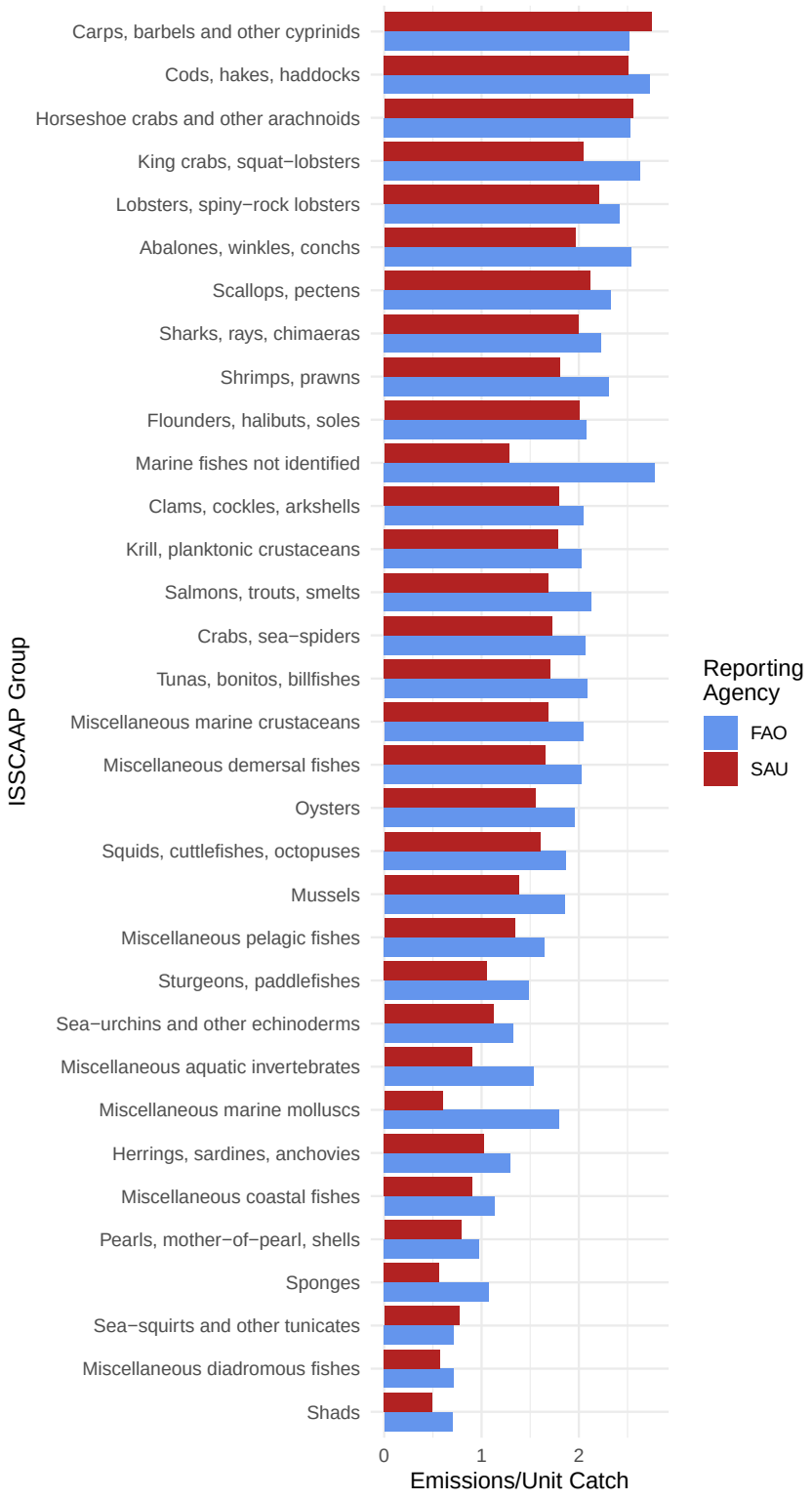
describe emissions datasets

4 Results

4.1 Overall Comparisons

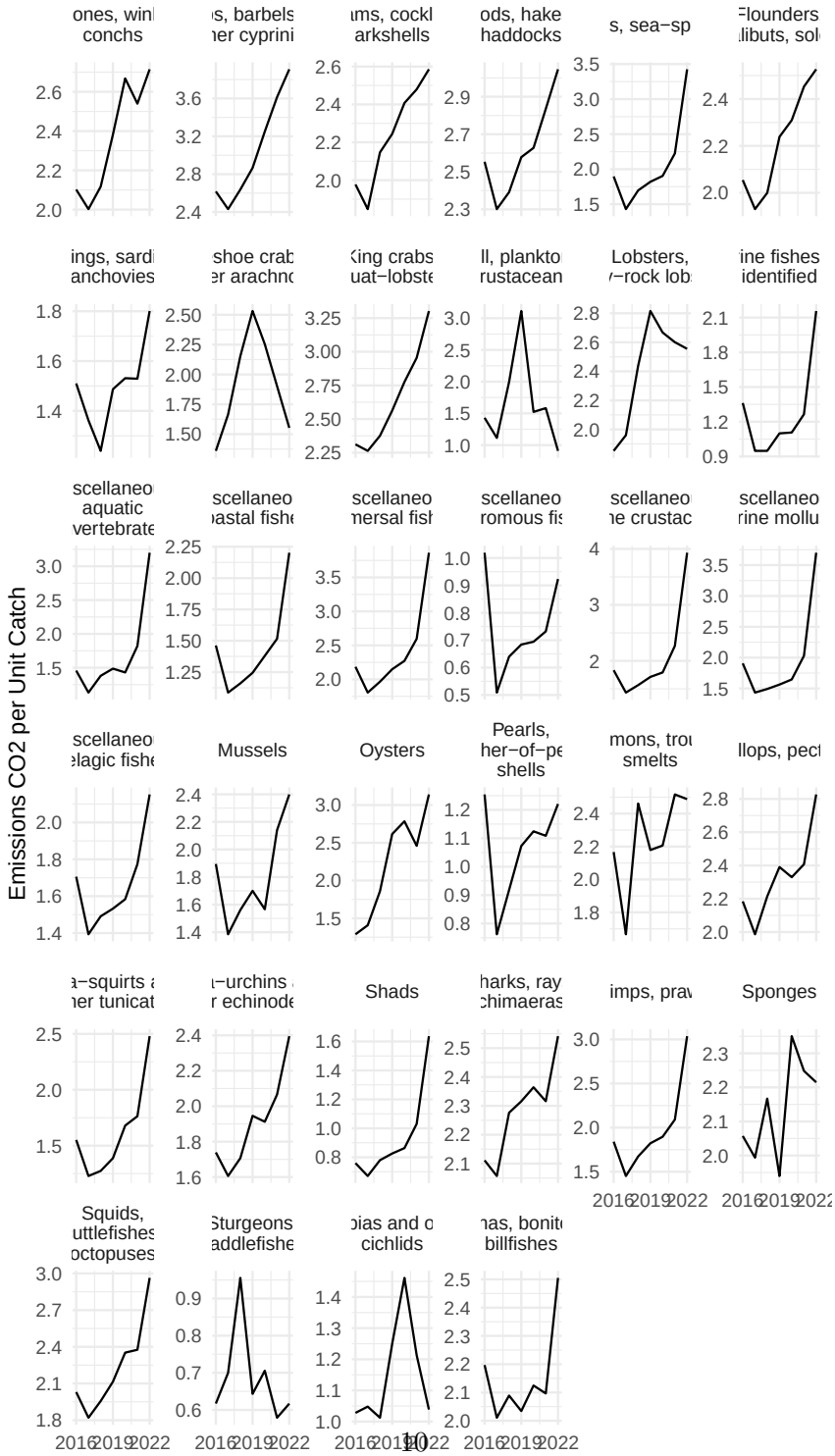
```
[1] "FAO emissions-per-unit-catch: 4.56."
```

```
[1] "SAU emissions-per-unit-catch: 3.76."
```

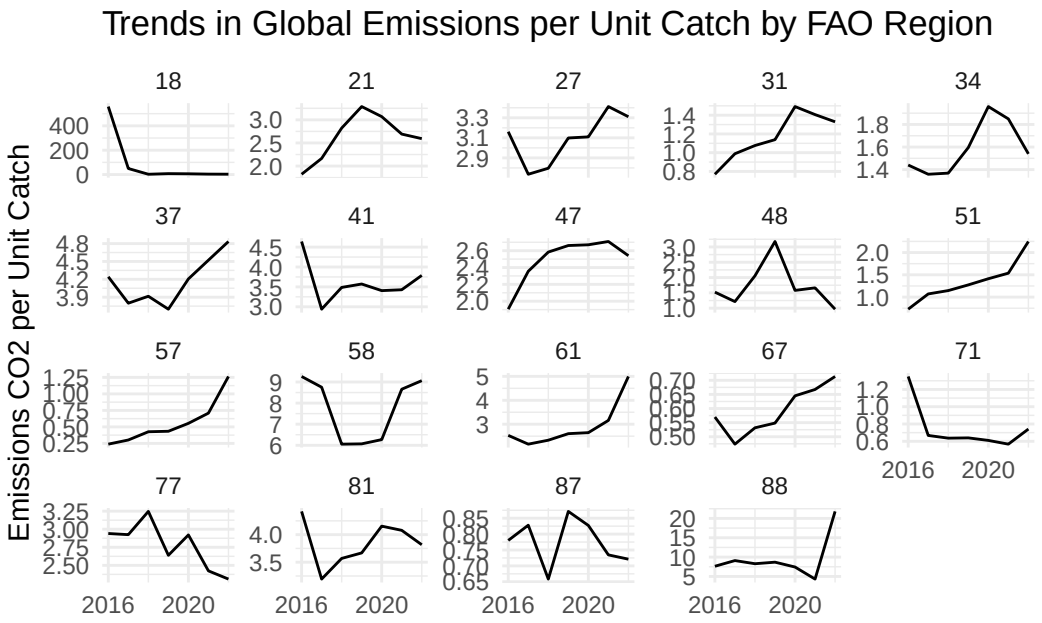

Carps, barbels and other cyprinids
Cods, hakes, haddocks
Horseshoe crabs and other arachnoids
King crabs, squat−lobsters
Lobsters, spiny−rock lobsters
Abalones, winkles, conchs
Scallops, pectens
Sharks, rays, chimaeras
Shrimps, prawns
Flounders, halibuts, soles
Marine fishes not identified
Clams, cockles, arkshells
Krill, planktonic crustaceans
Salmons, trouts, smelts
Crabs, sea−spiders
Tunas, bonitos, billfishes
Miscellaneous marine crustaceans
Miscellaneous demersal fishes
Oysters
Squids, cuttlefishes, octopuses
Mussels
Miscellaneous pelagic fishes
Sturgeons, paddlefishes
Sea−urchins and other echinoderms
Miscellaneous aquatic invertebrates
Miscellaneous marine molluscs
Herrings, sardines, anchovies
Miscellaneous coastal fishes
Pearls, mother−of−pearl, shells
Sponges
Sea−squirts and other tunicates
Miscellaneous diadromous fishes
Shads
ISSCAAP Group
0
1
2
Emissions/Unit Catch
Reporting Agency
FAO
SAU

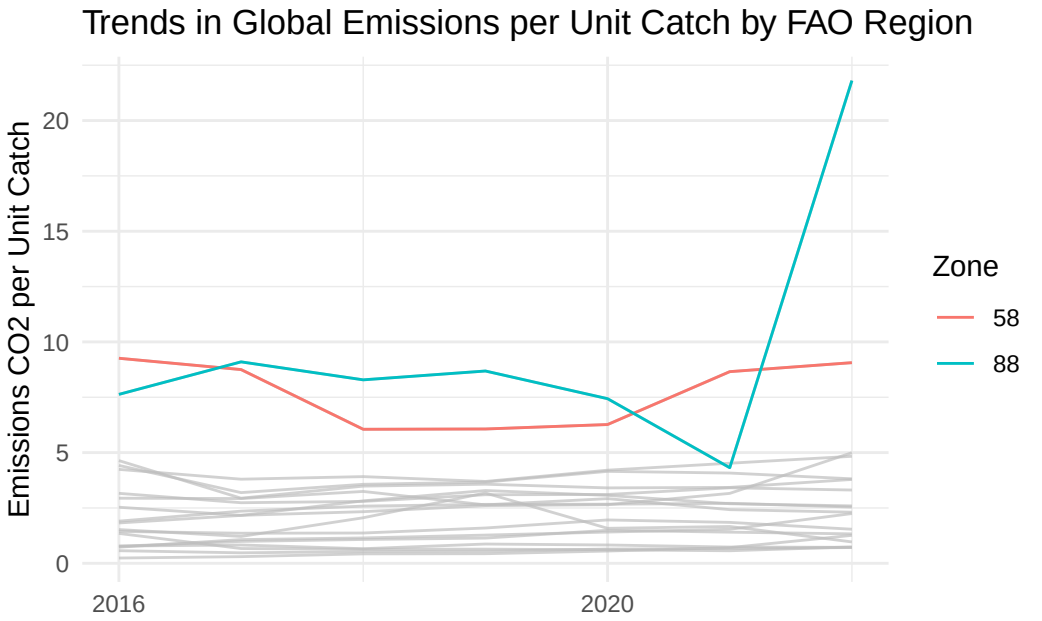
4.2 Visualizations

4.2.1 Trends in emissions-per-unit-catch by ISSCAAP species group



4.2.1.1 Trends in emissions-per-unit-catch by FAO region





```
# A tibble: 6 x 1
  major_group
  <chr>
1 CRUSTACEA
2 INVERTEBRATA AQUATICA
3 MOLLUSCA
4 PISCES
5 no_fao_species_catch_data
6 unknown_species
```

TEST