Replication package for: "Seafood Traceability Program Design: Examination of the United States' Seafood Import Monitoring Program"

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*Due to the size of intermediate and final output files, these are not included in this repository. All code and source data needed to replicate the results, however, are included. Please ensure the following folder structure, in addition to the folders provided in the repository, before running code to produce all data, figures, and tables for the paper.

- Main (repository)
  - Output Data/
    - 3a_species_group_linkages/
    - cn8_HTS_linkage/
    - HTS_2016_2018_link/
    - HTS_species_group_linkages/
    - Import_analysis/
    - NOAA_imports/
    - Production_analysis/
  - Paper_figs_tables/
    - iuu/
      - iuurisk/
    - mislabel/
  - Source Data/ (provided in repository)
  - STATA do files/ (provided in repository)
  - …

Code files should be run in the following order to clean all data, then reproduce results from the paper:

00_Main.R should be run first. This automatically runs the following:
1. Linkage_3A_nmfs_group.R
2. Linkage_HTS_nmfs_group.R
3. Linkage_HTS_CN8.R
4. Linkage_HTS_2018_2016.R
5. 01_FAO_3A_prod.R

STATA files in "STATA do files" folder should be run next in order:
1. 01_clean_imports.do
2. 02_trade_linkages.do
3. 03_SIMP_analysis_AMBIO_final.do

Simp_map.R should be run last

Source data

All trade and production data are publicly available for download. The mislabeling data is described in more detail in the Supplemental Information and is provided as part of this repository. Natural Earth shapefiles are also free to download. All data needed to run the code in this repository are included in the Source Data folder.

- FAO Production data (FAO, 2023)
  - Source Data/FAO/fao_prod_07_12_2023.csv
  - FishstatJ production data by country, species (3A), and production source

- NOAA import data (NOAA Fisheries, n.d.)
  - Monthly imports, all available years, all months, all countries, query by NMFS species group
    - Choose "Detailed report, no aggregation"
    - Run query, then select "2. Detailed Report"
  - 133 separate csv files, named by query, saved to Source Data/NOAA_imports/byspeciesgroup
  - Files downloaded by year, saved to Source Data/NOAA_imports/byyear
- SIMP treatment
  - Final rule HTS codes (FR 2016-29324)
    - Source Data/SIMP_treatment/manual_HTS_codes_from_final_rule.xlsx
    - Copied directly from final rule in the federal register (not available in downloadable format)
  - Posted 3A codes (NOAA Fisheries, 2019)
    - Source Data/SIMP_treatment/3A_SIMP_2018_manual_species_groups.xls
    - This is the posted excel, manually edited the formatting so that each observation has a species group (in original excel, codes are listed under species groups). Done to make import to R easier. Original posted excel here: Source Data/SIMP_treatment/Posted_3A.xls
- EUMOFA live weight conversion factors (EUMOFA 2021)
  - Source Data/EUMOFA/DM_Annex 7 - CF by CN-8 from 2001 to 2021.xlsx
- ITC IUU data (US ITC, 2021)
- IUU Fishing Index (Poseidon, 2024)
- Mislabeling Data (Luque and Donlan, 2019)
  - See the Supplemental Information for more detail
- NaturalEarth (n.d.)
  - Shape files used to create Figure 2 (left)

Output data descriptions
The linkage process to create databases used in the analysis is described in detail in the Supplemental Information. We start by generating a set of linkage tables used to match up data sources.
- Linkage table from FAO 3-alpha codes to NMFS species groups
  - Output Data/3a_species_group_linkages/link_3A_species_group.xlsx
  - First use NMFS table of 3A to species group for SIMP species only, not available for all species
  - Develop linkage for remaining (non-SIMP) species using the following steps:
    - For every NMFS species group, first check using the group name as a search through species names (primary method).
    - Then search scientific names
    - Ad-hoc additions based on internet searches of genuses, other changes from consulting with team members (e.g., Josh Donlan)
- Linkage from reported Harmonized Tariff Schedule (HTS) code to NMFS species group using query names to define NMFS species group (see Supplemental Information for more detail)
  - Output Data/HTS_species_group_linkages/link_HTS_speciesgroup.xlsx
  - Byproducts removed from trade data, list of HTS codes saved to excel: "Output Data/HTS_species_group_linkages/byproducts_hts_speciesgroup.xlsx"
  - Unspecified codes saved to excel: "Output Data/HTS_species_group_linkages/unspecified_HTS_species_group.xlsx"
    - Cannot get a unique match from HTS code to NMFS species group for these.

- All HTS codes that are 1) not byproducts and 2) do not fit into a specific NMFS species group are put into the "Unidentified species" catchall
    - Note: for some Pike codes, there are "*" in the HTS number
        - We overwrite and drop this "*", assuming that this is shorthand for any number that falls in the last digit place
        - Affected codes: 030269205*, 030559000*
- Link HTS codes to Combined Nomenclature-8 (CN8) codes for live weight conversion
    - Output Data/cn8_HTS_linkage/us_hts_cn8.xlsx
    - Using manual assignment based on a search of commodity descriptions, but choose more specific codes when available (using the common digits of US HTS and EU CN8, plus manual checking product/commodity descriptions)
    - Manually assign by searching product names in EUMOFA data
        - By default, use live/fresh codes where NOAA product name matches name of EUMOFA commodity (typically CF=1).
        - Where no match, use early digits from HTS code to search CN8 codes for a match.
        - If still no match, use similar species and/or internet searches for genus/species scientific names.
- Link 2018 HTS codes back to less-refined 2016 codes
    - Output Data/HTS_2016_2018_link/HTS_2016_2018_link.xlsx

We then generate two processed datasets: FAO production data and NOAA import data.
- Output Data/01_FAO_3A_prod.dta
    - Download FishstatJ, choose "Global production workspace," then dataset "Global production by production source 1950-2021 (Release date: March 2023)"
    - Reshape from wide to long and clean, then assign NMFS species group using linkage table
- Output Data/Import_analysis/imports_full.dta
    - Combine yearly import data into one file for analysis
    - Imports to the U.S. (live weight, raw weight, and 2016 USD) by HTS code, product name, and origin country.
    - HTS-country level information on IUU from the ITC report (US ITC, 2021)
    - Country-level IUU from the IUU Fishing Index (Poseidon, 2023)
    - Mislabeling Data by species group (Luque and Donlan, 2019)

Tables and figures used in the final paper
All tables and figures for the main paper are outputted to the Paper_figs_tables folder. Supplemental Information tables and figures are outputted to the Paper_figs_tables and Output Data folders.

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