

APPENDIX TO:

BEYOND THE FLAG STATE PARADIGM:

*Reconstructing the World's Large-
Scale Fishing Fleet through Corporate
Ownership Analysis*

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APPENDIX A: Supplementary Materials

About this document

This Appendix document accompanies the main report, “*Beyond the Flag State Paradigm: Reconstructing the World’s Large-Scale Fishing Fleet through Corporate Ownership Analysis*”. This document provides additional figures, tables, and methodological details, and regional analyses that complement and expand upon the findings presented in the main report. The materials are intended to offer greater transparency regarding data sources, sampling coverage, analytical methods, and ownership structures, and to facilitate further research and policy development. Readers are encouraged to use this document in conjunction with the main report for a complete understanding of the study’s methodology and results.

Annex I. Distribution of technical vessel data in Seasearcher (GT, LOA) and GFW (gear category)

Distribution of data on GT and LOA:

Data on gross tonnage (GT) were available in Seasearcher for 86.1% of vessels in the population (Annex I - Table 1). GT data availability was below 50% for vessels flagged to Mexico (10.0%), Syria (33.3%), and China (45.1%). This is significant, since China and Mexico are the third and the fourth most important flag countries in the population, respectively. Overall, GT data availability in the sample was very high (97.2%) – it was only below 50% for Tunisia (38.5%) and Algeria (33.3%), together representing 22 vessels (0.3% of the sample).

Sampled vessels for which GT data were available represent 35.6% of the population. This corresponds to an average of $48.8 \pm 24.3\%$ by flag country. Flag countries for which data availability is relatively high include Morocco (79.2%), Chile (68.9%), Namibia (68.0%), and Ecuador (65.9%) (Annex I - Table 1). See Table S5 for an overview of what this represents in terms of GT coverage by flag country.

Annex I - Table 1. Proportion of vessels in the sample and the population for which GT data are available in Seasearcher. The last column shows the percentage of sampled vessels for which GT data are available, as a proportion of the estimated global population of LSF vessels.

Vessel flag	Pop.	GT data available (no. vessels)	%	Sample	GT data available (no. vessels)	%	Sampled with GT data (%)
Russia	2,341	2,309	98.6	1,002	989	98.7	42.2
United States	1,381	1,298	94.0	550	538	97.8	39.0
China	1,159	523	45.1	341	308	90.3	26.6
Mexico	1,148	115	10.0	70	70	100	6.1
Spain	921	873	94.8	203	201	99.0	21.8
Unknown	727	676	93.0	142	142	100	19.5
Norway	663	656	98.9	224	221	98.7	33.3
Colombia	561	538	95.9	21	21	100	3.7
United Kingdom	554	525	94.8	168	166	98.8	30.0
South Korea	439	435	99.1	256	256	100	58.3
Japan	426	372	87.3	160	150	93.8	35.2
Canada	414	408	98.6	188	188	100	45.4
Argentina	400	337	84.3	188	177	94.1	44.3
France	350	314	89.7	101	89	88.1	25.4
Morocco	336	330	98.2	268	266	99.3	79.2
Netherlands	334	257	76.9	83	72	86.7	21.6
Indonesia	300	297	99.0	173	173	100	57.7
Panama	278	274	98.6	120	120	100	43.2
Taiwan	242	193	79.8	88	81	92.0	33.5
Greece	239	203	84.9	70	45	64.3	18.8
Iceland	226	198	87.6	81	80	98.8	35.4
Chile	219	218	99.5	152	151	99.3	68.9
Belize	212	209	98.6	84	83	98.8	39.2
Australia	201	145	72.1	64	59	92.2	29.4
Portugal	199	183	92.0	57	56	98.2	28.1
South Africa	187	179	95.7	81	81	100	43.3
Italy	183	171	93.4	64	61	95.3	33.3
Denmark	180	179	99.4	29	29	100	16.1
Ukraine	169	169	100	51	51	100	30.2
Ghana	158	103	65.2	50	49	98.0	31.0
Ireland	155	147	94.8	44	42	95.5	27.1
Namibia	153	151	98.7	104	104	100	68.0
Germany	134	129	96.3	46	45	97.8	33.6
Poland	132	122	92.4	18	16	88.9	12.1
Honduras	126	125	99.2	64	64	100	50.8
Ecuador	123	118	95.9	82	81	98.8	65.9
Faroe Islands (DK)	117	117	100	65	65	100	55.6
Peru	117	110	94.0	49	47	95.9	40.2
Senegal	111	110	99.1	65	64	98.5	57.7

Vessel flag	Pop.	GT data available (no. vessels)	%	Sample	GT data available (no. vessels)	%	Sampled with GT data (%)
Latvia	102	95	93.1	19	18	94.7	17.6
Lithuania	100	98	98.0	27	27	100	27.0
Philippines	99	96	97.0	73	71	97.3	71.7
Turkey	95	86	90.5	42	39	92.9	41.1
Belgium	87	83	95.4	29	29	100	33.3
Mauritania	85	85	100	49	49	100	57.6
Georgia	82	82	100	48	48	100	58.5
Croatia	81	77	95.1	53	51	96.2	63.0
Vanuatu	75	69	92.0	50	50	100	66.7
Estonia	72	72	100	38	38	100	52.8
St. Vincent & Grenadines	69	69	100	25	25	100	36.2
New Zealand	68	67	98.5	38	38	100	55.9
Sweden	64	56	87.5	17	16	94.1	25.0
Uruguay	62	54	87.1	31	30	96.8	48.4
Venezuela	59	56	94.9	31	31	100	52.5
Mozambique	55	54	98.2	44	44	100	80.0
Greenland (DK)	54	54	100	31	31	100	57.4
Iran	50	42	84.0	22	22	100	44.0
India	48	48	100	44	44	100	91.7
Mongolia	45	44	97.8	13	13	100	28.9
Cuba	43	43	100	13	13	100	30.2
Comoros	43	43	100	9	9	100	20.9
Romania	41	40	97.6	17	17	100	41.5
Angola	40	40	100	30	30	100	75.0
Cameroon	36	34	94.4	19	19	100	52.8
North Korea	35	35	100	20	20	100	57.1
Vietnam	35	20	57.1	12	12	100	34.3
Guinea-Bissau	34	33	97.1	24	24	100	70.6
Finland	32	31	96.9	7	7	100	21.9
Seychelles	31	30	96.8	17	17	100	54.8
Brazil	31	28	90.3	2	2	100	6.5
Cook Islands (NZ)	29	29	100	23	23	100	79.3
Nigeria	29	27	93.1	15	15	100	51.7
Falkland Islands/Malvinas (UK)	25	25	100	20	20	100	80.0
Guinea	25	25	100	17	17	100	68.0
Tunisia	25	15	60.0	13	5	38.5	20.0
Libya	24	23	95.8	13	13	100	54.2
Bulgaria	24	24	100	5	5	100	20.8
Malta	23	22	95.7	11	10	90.9	43.5
Thailand	21	19	90.5	12	12	100	57.1
St. Kitts & Nevis	21	21	100	3	3	100	14.3

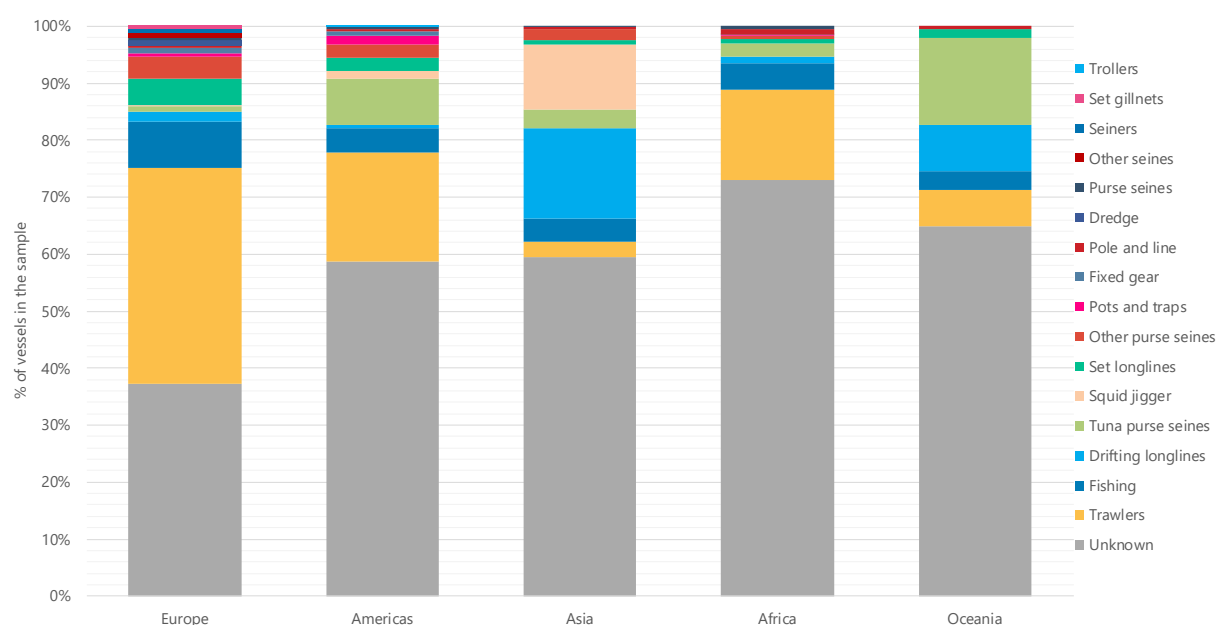
Vessel flag	Pop.	GT data available (no. vessels)	%	Sample	GT data available (no. vessels)	%	Sampled with GT data (%)
Kenya	20	20	100	12	12	100	60.0
Kiribati	20	20	100	11	11	100	55.0
Togo	18	18	100	6	6	100	33.3
Sierra Leone	18	17	94.4	5	5	100	27.8
Myanmar (Burma)	18	17	94.4	4	3	75.0	16.7
Oman	17	17	100	11	11	100	64.7
Fiji	17	13	76.5	4	4	100	23.5
Cambodia	17	17	100	1	1	100	5.9
Côte d'Ivoire	16	16	100	14	14	100	87.5
Micronesia (Fed. States of)	16	16	100	12	12	100	75.0
Algeria	16	10	62.5	9	3	33.3	18.8
Tanzania	16	16	100	5	5	100	31.3
Cyprus	16	14	87.5	3	2	66.7	12.5
Tuvalu	15	15	100	8	8	100	53.3
Equatorial Guinea	15	15	100	5	5	100	33.3
Albania	14	7	50.0	5	3	60.0	21.4
Gabon	13	13	100	8	8	100	61.5
Azerbaijan	13	13	100	7	7	100	53.8
Mauritius	13	11	84.6	6	6	100	46.2
Papua New Guinea	12	10	83.3	6	6	100	50.0
Madagascar	11	11	100	8	8	100	72.7
Guyana	11	11	100	6	6	100	54.5
Somalia	10	8	80.0	4	4	100	40.0
Nauru	9	9	100	9	9	100	100
Saudi Arabia	9	9	100	8	8	100	88.9
Turkmenistan	9	9	100	3	3	100	33.3
United Arab Emirates	9	9	100	2	2	100	22.2
Nicaragua	8	8	100	4	4	100	50.0
Bolivia	8	7	87.5	2	2	100	25.0
Jamaica	8	8	100	1	1	100	12.5
Kazakhstan	7	7	100	5	5	100	71.4
Egypt	7	5	71.4	4	2	50.0	28.6
Curaçao	7	7	100	3	3	100	42.9
Palau	6	6	100	2	2	100	33.3
Congo - Kinshasa	5	5	100	4	4	100	80.0
El Salvador	5	5	100	4	4	100	80.0
Gambia	5	4	80.0	4	3	75.0	60.0
Malaysia	5	4	80.0	3	3	100	60.0
São Tomé & Príncipe	5	5	100	3	3	100	60.0
Solomon Islands	5	5	100	3	3	100	60.0
Israel	5	5	100	2	2	100	40.0
Eritrea	4	4	100	4	4	100	100

Vessel flag	Pop.	GT data available (no. vessels)	%	Sample	GT data available (no. vessels)	%	Sampled with GT data (%)
Kuwait	4	4	100	4	4	100	100
Marshall Islands	4	4	100	4	4	100	100
Cayman Islands	4	4	100	2	2	100	50.0
Cape Verde	4	4	100	1	1	100	25.0
Suriname	4	4	100	1	1	100	25.0
Bahamas	3	3	100	2	2	100	66.7
Dominican Republic	3	2	66.7	2	2	100	66.7
Isle Of Man (UK)	3	2	66.7	2	2	100	66.7
Maldives	3	3	100	2	2	100	66.7
Tonga	3	3	100	2	2	100	66.7
Reunion (France)	3	3	100	1	1	100	33.3
Qatar	2	2	100	2	2	100	100
Saint Pierre and Miquelon (FR)	2	2	100	2	2	100	100
San Marino	2	2	100	2	2	100	100
French Guiana (FR)	2	2	100	1	1	100	50.0
French South. & Ant. Territ. (FR)	2	2	100	1	1	100	50.0
Grenada	2	2	100	1	1	100	50.0
Kyrgyzstan	2	1	50.0	1	1	100	50.0
Moldova	2	2	100	1	1	100	50.0
Sri Lanka	2	1	50.0	1	1	100	50.0
Yemen	2	2	100	1	1	100	50.0
Anguilla	1	1	100	1	1	100	100
Antigua & Barbuda	1	1	100	1	1	100	100
Saint Helena (UK)	1	1	100	1	1	100	100
Slovakia	1	1	100	1	1	100	100

Data on vessel length (LOA) were missing for 975 vessels in our sample (14.0%) and 5,418 vessels (28.5%) in the overall LSF vessel population, making it an unsuitable parameter for accurately describing both the sample and the population. Therefore, these data were not used beyond a brief reference to the average vessel length in the top 10 countries in the sample (Table S11) and the population (Table S12), solely to provide contextual information.

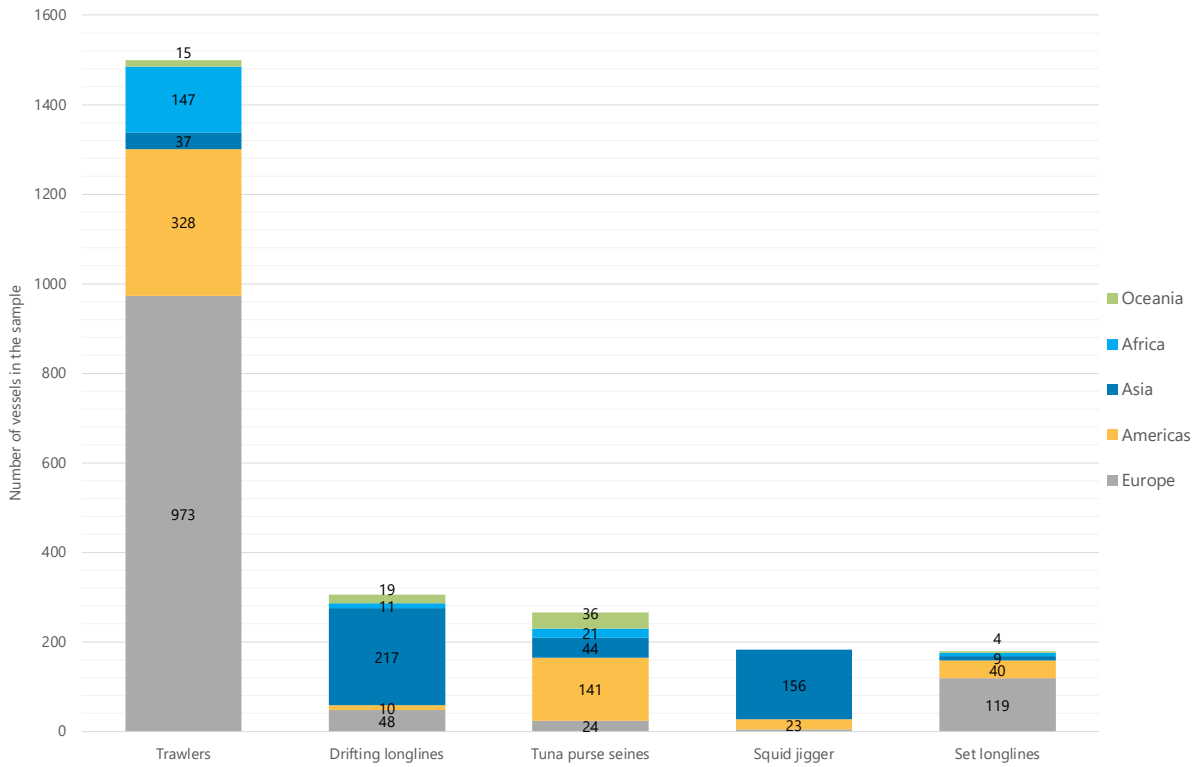
Distribution of data on gear category:

Gear category was defined in Global Fishing Watch for less than half (46.3%) of sampled vessels, and for 5.6% of those, the generic category 'Fishing' was listed. Gear categories per continent are summarized in Annex I - Figure 1. Gear category 'Unknown' was the dominant category for all continents and was the highest for Africa (72.9%). Unknown gears aside, trawlers made up the largest proportion of sampled vessels in Europe (37.8% of European vessels), the Americas (19.0%), and Africa (15.9%). In Europe, smaller categories included 'set longlines' (4.6%) and 'other purse seines' (3.8%). Tuna purse seiners were the second largest category in the Americas (8.2%), and the third largest category in Africa (2.3%). In Asia, the dominant categories were drifting longlines (15.9%) and squid jigging (11.4%). In Oceania, the dominant fleet categories were 'tuna purse seine' (15.3%) and 'drifting longlines' (8.1%).



Annex I - Figure 1. Gear types in the sample, by continent. Gears are ranked from most prevalent (bottom) to least prevalent (top) in the global sample.

Annex I - Figure 2 shows the contribution of each continent to the five dominant fleet categories in the sample, as well as absolute fleet sizes. As much as 85.2% of squid jiggers in the sample were flagged to Asian countries, whereas the tuna purse seine fleet was dominated by flag countries in the Americas (53.0%). Drifting longlines were dominated by Asian countries (71.1%).



Annex I - Figure 2. Contribution of each continent to the five dominant fleet categories in the sample, aside from the categories 'Unknown' and 'Fishing', with the indication of absolute vessel numbers.

Annex II. Discrepancies between Orbis and Seasearcher data

In the Seasearcher export of IMO fishing vessels (n=20,000), 167 flag countries were present, compared to 173 flags in the Orbis export (n=24,223). The following flag countries appeared in the Orbis export but were absent from Seasearcher: Mayotte (France), Guatemala, Martinique (France), Czechia, Paraguay, and Niue (New Zealand).

A total of 5,220 IMO fishing vessels present in Orbis did not have a match in Seasearcher. The top flag countries missing were the United States (n=852), China (n=591), Japan (n=388), Taiwan (n=380), Russia (n=295), and Spain (n=249) (Annex II - Table 1). Conversely, 997 vessels present in Seasearcher did not have a match in Orbis. The top five flag countries were China (n=348), Russia (n=98), Norway (n=63), Unknown (n=54), and U.S.S.R. (n=41). Despite all U.S.S.R. vessels' status being labeled as 'dead' (see below), the presence of this category raises questions about Seasearcher's criteria for data collection and inclusion. It also emphasizes the importance of matching Seasearcher data with Orbis data.

Annex II - Table 1. Top 10 flag countries for which the discrepancy between Orbis and Seasearcher extractions was the greatest. (1) Flag country as included in the Orbis database, and subsequently standardized using the *countrycode* package in R.

Flag country ¹	Orbis vessel count	Seasearcher vessel count	Δ (absolute value)	Orbis x Seasearcher
United States	2,233	1,381	852	1,381
China	1,750	1,159	591	1,159
Japan	814	426	388	426
Taiwan	622	242	380	242
Russia	2,636	2,341	295	2,341
Spain	1,170	921	249	921
Turkey	312	95	217	95
Norway	852	663	189	663
United Kingdom	705	554	151	554
France	494	350	144	350

Annex II - Table 2 shows the status listings in Orbis and Seasearcher for relevant sets of vessels describing discrepancies between both databases. Although not used in the analysis, in the context of data quality assessment, vessel status can offer insights into the impact of excluding certain vessels from the population or sample due to methodological choices. We emphasize that a nuanced interpretation of status listings was not possible based on the information provided by either Orbis or Seasearcher. In what follows, we will assume that 'Active' (Orbis) and 'Live' (Seasearcher) indicate that vessel information (including ownership data) is current, while terms such as 'Dissolved,' 'Status Unknown,' 'In Liquidation,' or 'Inactive' (Orbis), as well as 'Dead' or 'Unconfirmed Existence' (Seasearcher), suggest a potential risk that the information has changed or is likely to change soon.

Annex II - Table 2. Status listings in Orbis and Seasearcher for relevant sets of vessels Not included here: 770 vessels for which flag was unknown according to Orbis.

	Status variable Orbis						Status variable Seasearcher						
	Active	Active (dormant)	Dissolved	In liquidation	Inactive (no precision)	Status unknown	Cancelled Order	Dead	Launched	Live	On Order	Unconfirmed Existence	Under construction
Vessels present in Orbis but not in Seasearcher (n=5,520)	4,743	50	301	3	107	16							
Vessels present in Seasearcher but not in Orbis (n=997)							0	128	3	423	5	433	5
Orbis x Seasearcher (n=19,003)	13,081	188	4,878	11	723	122	31	3,512	17	14,977	41	396	29
Sample (n=6,962)	6,782	155	1	7	0	17	0	0	0	6,916	0	46	0

Following this reasoning, the exclusion from the population of 5,520 vessels present in Orbis risks to have led to a significant underestimation of the LSF fleet, given that ca. 87% of these vessels were considered 'Active'. On the other hand, the impact of excluding 997 Seasearcher vessels was presumably smaller, with only 42% of vessels being listed as 'Live'. Second, among vessels found in both the Orbis and Seasearcher databases, a consistently high proportion was classified as 'Active' in Orbis (ca. 70%) and 'Live' in Seasearcher (ca. 79%). Finally, in the sample, 99.6% of vessels were classified as 'Active' in Orbis, while 99.3% were classified as 'Live'. The latter is an indication that the sample captures mostly recent information, which justifies the conservative approach adopted in this study.

Finally, only minimal discrepancies were found between the Orbis and Seasearcher databases in terms of flag state: only 40 out of 19,003 shared IMO vessels (0.2%) had mismatched flag states. For an additional 139 vessels, the flag was listed as 'Unknown' in Orbis, and as 'U.S.S.R.' in Seasearcher. While it is plausible that these vessels are in fact Russian vessels, this cannot be claimed with certainty. The presence in Seasearcher of vessels flagged to the former Soviet Union is worrisome, however, and it raises serious questions about Seasearcher's criteria for data collection and inclusion.

In conclusion, to enhance future research, a deeper understanding of both data sources should be obtained (e.g., through interviews with experts at both platforms). This could support a more accurate estimation of the global LSF fleet, as well as the selection of a larger, more reliable sample with greater confidence.

Annex III. Notes on ownership data coverage in Orbis

While a detailed investigation into the reasons for limited data coverage in Orbis is beyond the scope of this study, we provide a brief assessment of ownership data coverage both within the sample and across the Orbis database. Annex III - Table 1 shows the vessel flags for which sample coverage in terms of vessel numbers was 30% or less of their estimated national LSF fleets. As highlighted above, data coverage in Orbis is particularly low for Colombia and Mexico (respectively 3.7% and 6.1% of the national LSF fleet sampled). Both countries have sizeable LSF fleets, so this limited representation may introduce bias in the ownership analysis. Coverage is also relatively low for dominant flag and owner countries Spain and China (22.0% and 29.4%, respectively).

To better illustrate jurisdictions with limited data disclosure in Orbis, we now shift our focus to the 24,223 vessels identified in this study (see section **Error! Reference source not found.** of the report). For 9,820 vessels, the Orbis variable 'No. shareholders' was equal to '1' (see Table S1), suggesting that at least some shareholder information is available. However, 633 of these (6%) had missing ISH and GUO-related fields. Further analysis revealed that most of these vessels were flagged to the United States (22%), Spain (7%), and Russia (6%). These proportions remained consistent when considering only the vessels matched in the Seasearcher database (n=19,003), where 491 out of 7,453 vessels (7%) exhibited the same data gaps¹. These gaps were distributed in roughly the same proportions as above, with nearly a quarter (23%) of vessels flagged to the U.S., followed by Russia (6%), Poland (6%), and Spain (5%).

For 14,943 vessels of the 24,223 vessels identified in Orbis (62%), the variable 'No. of shareholders' was equal to '0'. For these vessels no ownership information was available, despite having a record in Orbis. Most vessels were flagged to the United States (10%), Russia (9%), China (9%), Mexico (7%), and Spain (6%).

Annex III - Table 1. Vessel flags for which sample coverage in terms of vessel numbers is <30%. Flag states in the global top 10 in terms of vessel numbers are shaded in grey.

Flag state	Global rank (pop.)	Estimated national LSF fleet	Sampled LSF vessels	% sampled
Colombia	7	561	21	3.7
Cambodia	87	17	1	5.9
Mexico	4	1,148	70	6.1
Brazil	69	31	2	6.5
Jamaica	108	8	1	12.5
Poland	33	132	18	13.6
St. Kitts & Nevis	79	21	3	14.3
Denmark	27	180	29	16.1
Latvia	39	102	19	18.6
Cyprus	90	16	3	18.8
Bulgaria	76	24	5	20.8
Comoros	60	43	9	20.9
Finland	67	32	7	21.9
Spain	5	921	203	22.0
United Arab Emirates	84	9	2	22.2
Myanmar (Burma)	103	18	4	22.2
Fiji	86	17	4	23.5
Netherlands	15	334	83	24.9
Bolivia	109	8	2	25.0
Suriname	121	4	1	25.0
Cape Verde	126	4	1	25.0

¹ For reference, 6,962 vessels were retained in our ownership database (i.e., 7,453 - 491vessels).

Flag state	Global rank (pop.)	Estimated national LSF fleet	Sampled LSF vessels	% sampled
Sweden	51	64	17	26.6
Lithuania	40	100	27	27.0
Sierra Leone	83	18	5	27.8
Ireland	30	155	44	28.4
Portugal	24	199	57	28.6
Mongolia	13	45	13	28.9
France	58	350	101	28.9
Greece	19	239	70	29.3
China	3	1,159	341	29.4

On average, the sample encompasses about half of a country's LSF fleet ($50.2 \pm 23.6\%$). However, it must be noted that countries with few vessels inflate this statistic – coverage of 100% is only found for flag states with fewer than 10 (IMO-registered) vessels, and flag states with a coverage of $\geq 75\%$ all have fewer than 50 IMO vessels, with the exception of Morocco ($n=268$) (Table S5). When only the top 25 flag states in the population are considered, average coverage by flag state is significantly lower ($37.8 \pm 16.5\%$) (Annex III - Table 2). Coverage is especially low ($<10\%$) for Mexico (6.1%) and Colombia (3.7%)².

Annex III - Table 2. Sample coverage for the top 25 flag countries in the population (Orbis x Seasearcher), in terms of vessel numbers and identifiable GT. Also displayed: the 727 vessels for which no flag information was available. See Table S5 for an overview of all flag countries.

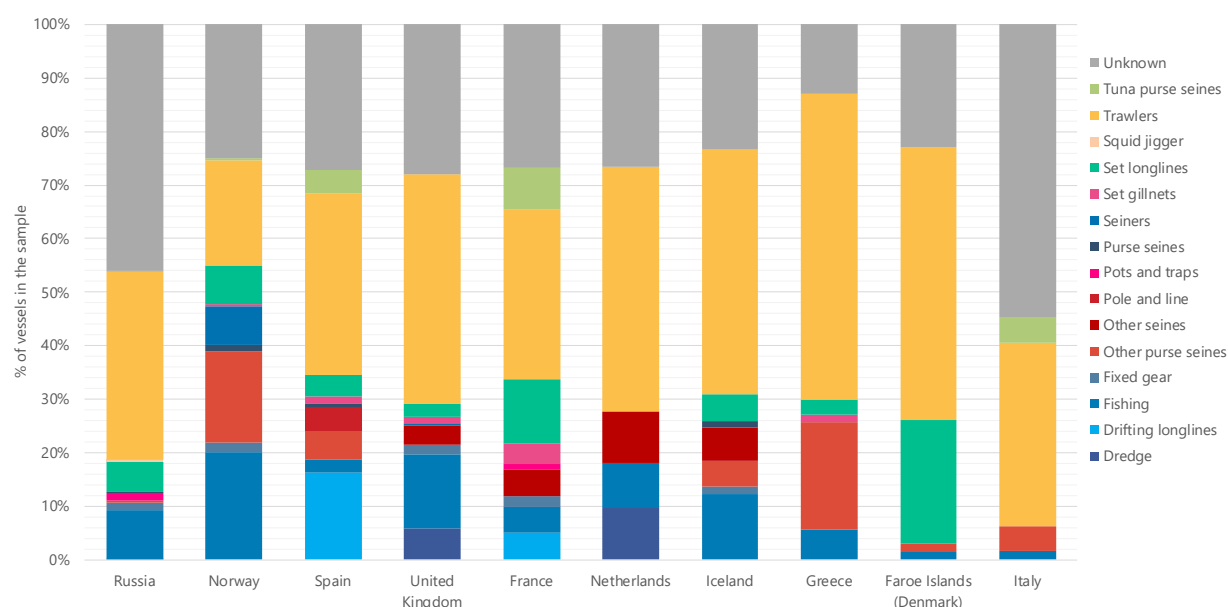
Flag country	Sample		Population		% vessels covered	% GT covered
	No. vessels	GT	No. vessels	GT		
Russia	1,002	1,257,995	2,341	4,349,726	42.8	28.9
United States	550	272,230	1,381	493,329	39.8	55.2
China	341	342,014	1,159	554,299	29.4	61.7
Mexico	70	51,605	1,148	79,329	6.1	65.1
Spain	203	123,890	921	363,869	22.0	34.0
Unknown	142	62,414	727	707,307	19.5	8.8
Norway	224	229,849	663	476,130	33.8	48.3
Colombia	21	13,319	561	29,713	3.7	44.8
United Kingdom	168	71,385	554	164,946	30.3	43.3
South Korea	256	184,211	439	357,874	58.3	51.5
Japan	160	70,612	426	369,703	37.6	19.1
Canada	188	76,665	414	136,462	45.4	56.2
Argentina	188	116,420	400	231,914	47.0	50.2
France	101	50,615	350	102,672	28.9	49.3
Morocco	268	106,394	336	130,328	79.8	81.6
Netherlands	83	24,025	334	81,648	24.9	29.4
Indonesia	173	49,545	300	78,895	57.7	62.8
Panama	120	98,939	278	299,953	43.2	33.0
Taiwan	88	60,618	242	133,373	36.4	45.4
Greece	70	6,049	239	41,792	29.3	14.5
Iceland	81	77,217	226	138,624	35.8	55.7
Chile	152	100,656	219	144,408	69.4	69.7
Belize	84	69,391	212	206,976	39.6	33.5
Australia	64	16,776	201	37,825	31.8	44.4
Portugal	57	39,543	199	104,493	28.6	37.8
South Africa	81	48,490	187	105,737	43.3	45.9

² Other flag countries with low coverage include Brazil (6.5%), and Cambodia (5.9%). However, these countries are less significant in terms of vessel numbers ($n_{pop}=31$ and $n_{pop}=17$, respectively).

Annex IV. Additional information with regards to the sample: gears and target species

Europe

For all main European flag countries, trawling was the most important fleet category (Annex IV - Figure 1). **Russia** is home to a large fleet of deep-sea trawlers targeting whitefish species including Alaska pollock (*Gadus chalcogrammus*), blue whiting (*Micromesistius poutassou*), Atlantic and Pacific herring (*Clupea harengus* and *C. pallasii*), Atlantic and Pacific cod (*Gadus morhua* and *G. macrocephalus*), haddock (*Melanogrammus aeglefinus*) and others (Rossing *et al.*, 2010; FAO, 2022b). **Norway and Iceland** are involved in many of these fisheries due to shared fishing grounds in the Barents Sea, the Norwegian Sea and the North Atlantic (Björgvinsson *et al.*, 2015; Knútsson *et al.*, 2016). The **Spanish LSF fleet** targets multiple pelagic species³ in the Atlantic and the Mediterranean, as well as tuna species in the Indian, Atlantic, and Pacific Ocean. Most vessels are trawlers, followed by longline vessels and purse seiners (STECF, 2022).

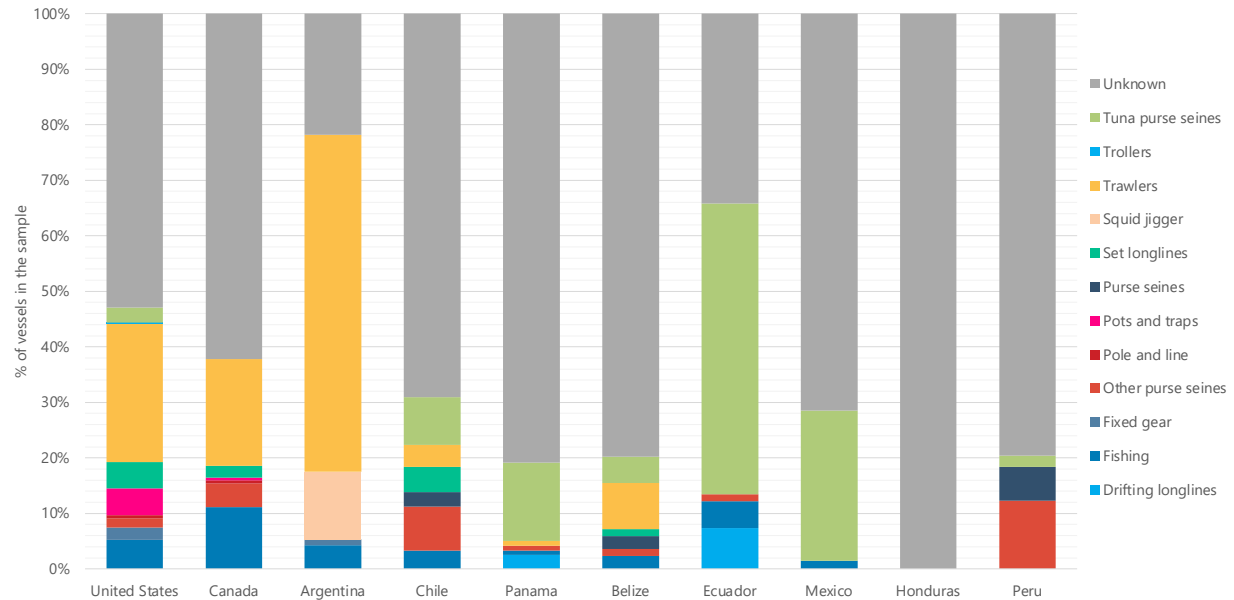


Annex IV - Figure 1. Gear types for the top 10 flag countries in Europe (sample).

Americas

The main fleet categories in the sample were trawlers (U.S., Canada, Argentina) and tuna purse seines (Panama, Belize, Ecuador, Mexico, and Peru) (Annex IV - Figure 2). Key fisheries include the **Argentinian squid jigging fleet**, targeting the Argentine shortfin squid (*Illex argentinus*) in the Southwest Atlantic Ocean (Villasante *et al.*, 2014), the **tuna purse seine fleet in Ecuador** (Miyake *et al.*, 2010; Bucaram, 2016), the **Peruvian purse seine fleet** targeting anchoveta (*Engraulis ringens*) (FAO, 2010a), and the **Chilean jack mackerel fishery** (*Trachurus murphyi*) (GLOBEFISH, 2020).

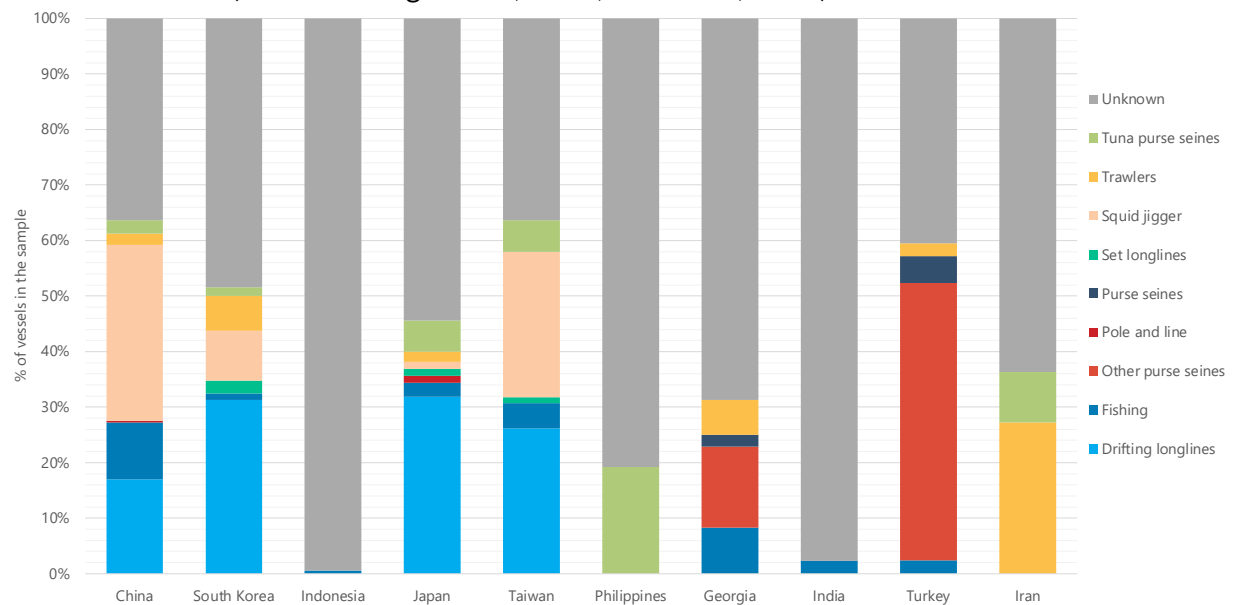
³ E.g., Atlantic mackerel (*Scomber scombrus*), European anchovy (*Engraulis encrasicolus*), sardine (*Sardina pilchardus*), blue whiting (*Micromesistius poutassou*), and Atlantic horse mackerel (*Trachurus trachurus*).



Annex IV - Figure 2. Gear types for the top 10 flag countries in the Americas (sample).

Asia

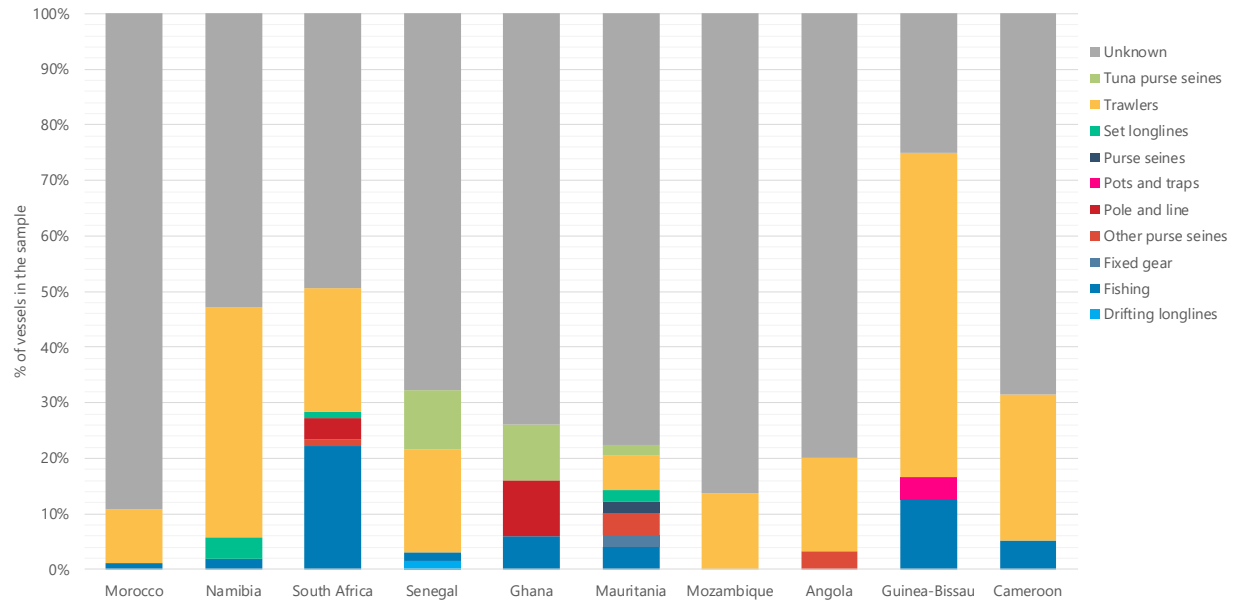
The Asian fleet is diverse in terms of gears used (Annex IV - Figure 3). **China, South Korea, Japan, and Taiwan** are home to specialized distant water fishing fleets. These mainly include **longline fleets** targeting tunas in the Pacific Ocean, **squid jigging fleets** targeting Argentine shortfin squid (*Illex argentinus*) off the Argentinian coast and Humboldt squid (*Dosidicus gigas*) off the coast of Peru and Ecuador (Global Fishing Watch, 2021; Seto *et al.*, 2023).



Annex IV - Figure 3. Gear types for the top 10 flag countries in Asia (sample).

Africa

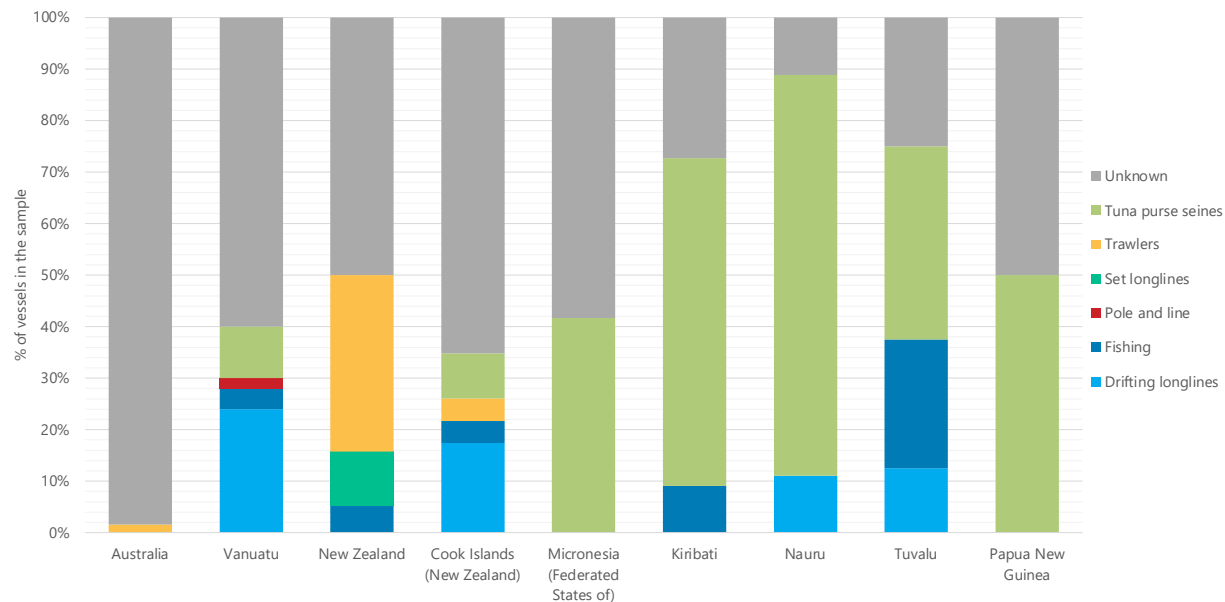
For all main African flag countries, trawling was the most important fleet category (Annex IV - Figure 4). **South Africa, Namibia and Angola** are home to large trawler fleets targeting hake (*Merluccius capensis* and *M. paradoxus*) (Sumaila, 2021). Together, the South African and Namibian fleets account for 23.4% of identifiable African GT in the population. In **Morocco**, trawlers primarily target sardine (*Sardina pilchardus*), and multiple species of cephalopods (FAO, n.d.). In **Ghana, Senegal**, and other West-African countries, industrial fishing vessels target small pelagic fish species such as sardinella (*Sardinella aurita*) and mackerel (*Scomberomorus tritor*) (Sumaila et al., 2022).



Annex IV - Figure 4. Gear types for the top 10 flag countries in Africa (sample).

Oceania

LSF fleets in Oceania are mostly targeting pelagic species such as tunas, with a range of gears (Annex IV - Figure 5). The dominant gear categories are drifting longlines and tuna purse seines. **Vanuatu** is a particularly interesting case for ownership analysis given its status as a flag of convenience and offshore financial center (van Fossen, 2015, 2016).



Annex IV - Figure 5. Gear types for the top 10 flag countries in Oceania (sample).

Annex V. Supplementary tables and figures – unsorted

Table S1. Variables extracted from Orbis for the analysis of vessel ownership. Note that not all variables were used in this study. Variables that were used are indicated with an asterisk (*).

Variable name in Orbis	Description
Company name Latin alphabet (*)	Name of the subject company (in our case: the marine vessel)
Telephone number	In the case of fishing vessels, this is the MMSI number
BvD ID number (*)	A unique company identification number derived from national identification numbers, e.g., the VAT number in case of EU registered companies
Status	Status of the entity's activity: Active, Bankruptcy, In liquidation, Dissolved, Inactive, Unknown
Type of entity	Bank; Financial Company; Insurance company; Corporate company; Mutual & Pension Fund/Nominee/Trust/Trustee; Foundation/Research Institute; Public authorities, States, Governments
Country ISO code (*)	Two-digit country code
NACE Rev. 2, core code (4 digits)	NACE classification for economic activity – core code
NACE Rev. 2, core code - description	NACE classification for economic activity – description
No of shareholders (*)	A metric with value "0" (no shareholders identified) or "1" (shareholders identified)
ISH - Name (*)	Name of the Immediate Shareholder (i.e., the directregistered owner)
ISH - Previously known as name	Self-explanatory
ISH - BvD ID number (*)	See above
ISH - Country ISO code (*)	See above
ISH - Type	See above
ISH - Direct %	The directregistered ownership stake the ISH has in the subject company
ISH - Total %	The total ownership stake the ISH has in the subject company (i.e., through direct and indirectinregistered ownership)
GUO - Name (*)	Name of the Global Ultimate Owner (i.e., the highest corporate entity in the path from the fishing vessel to its ultimate shareholder(s))
GUO - Previously known as name	Self-explanatory
GUO - BvD ID number (*)	See above
GUO - Country ISO code (*)	See above
GUO - Type	See above
GUO - Direct %	See above
GUO - Total %	See above
CSH - Name	Name of the Controlling Shareholder
CSH - Previously known as name	Self-explanatory
CSH - BvD ID number	See above
CSH - Country ISO code	See above
CSH - Type	See above
CSH - Direct %	See above
CSH - Total %	See above

Table S2. Number of vessels in the sample smaller than 20 meters LOA, by flag country. It is important, however, to emphasize the patchy distribution of LOA data in Seasearcher, likely resulting in an underestimation of smaller sized vessels in the sample and population as defined for this study.

Flag country	No. vessels <20m identified in the sample
United Kingdom	18
United States	16
Canada	7
Norway	5
Greece	4
Croatia	3
Spain	3
India	3
Netherlands	2
Italy	2
Denmark	2
China	2
France	2
Seychelles	1
Panama	1
Sweden	1
Japan	1
Russia	1
Taiwan	1
Faroe Islands (Denmark)	1
Germany	1
Australia	1
Belize	1
Marshall Islands	1
Argentina	1
Ireland	1
Total	82

Table S3. Sovereign countries and their overseas territories. (*) British Virgin Islands only appeared as a country of company registration (not a vessel flag). In line with common practice in data classification, Taiwan and Hong Kong were treated as sovereign entities.

Sovereign country	Flag state / Country of company registration (*)
Denmark	Faroe Islands
	Greenland
France	Saint Pierre and Miquelon
	French Guiana
	Reunion
	French Southern and Antarctic Territories
New Zealand	Cook Islands
United Kingdom	Falkland Islands/Malvinas
	Cayman Islands
	Isle Of Man
	Anguilla
	Saint Helena
	British Virgin Islands (*)

Table S4. Vessels flagged to overseas territories and ultimately owned by GUO companies in the corresponding sovereign country (n=110). These were not considered country mismatches in our analysis.

Flag state	Flag continent	GUO country	GUO continent	No. vessels
Faroe Islands (DK)	Europe	Denmark	Europe	57
Greenland (DK)	Europe	Denmark	Europe	30
Cook Islands (NZ)	Oceania	New Zealand	Oceania	10
Falkland Islands/Malvinas (UK)	Americas	United Kingdom	Europe	8
Isle Of Man (UK)	Europe	United Kingdom	Europe	2
Reunion (FR)	Africa	France	Europe	1
Saint Pierre and Miquelon (FR)	Americas	France	Europe	1
French Guiana (FR)	Americas	France	Europe	1

Table S5. Number of vessels and GT per flag state in the population and the sample. The flag states are ranked in descending order according to the number of vessels in the population. The last column indicates the proportion of vessels and GT in the population captured by the sample.

Flag state	Sample		Population		% vessels	% GT
	No. vessels	GT	No. vessels	GT		
Russia	1,002	1,257,995	2,341	4,349,726	42.8	28.9
United States	550	272,230	1,381	493,329	39.8	55.2
China	341	342,014	1,159	554,299	29.4	61.7
Mexico	70	51,605	1,148	79,329	6.1	65.1
Spain	203	123,890	921	363,869	22.0	34.0
Unknown	142	62,414	727	707,307	19.5	8.8
Norway	224	229,849	663	476,130	33.8	48.3
Colombia	21	13,319	561	29,713	3.7	44.8
United Kingdom	168	71,385	554	164,946	30.3	43.3
South Korea	256	184,211	439	357,874	58.3	51.5
Japan	160	70,612	426	369,703	37.6	19.1
Canada	188	76,665	414	136,462	45.4	56.2
Argentina	188	116,420	400	231,914	47.0	50.2
France	101	50,615	350	102,672	28.9	49.3
Morocco	268	106,394	336	130,328	79.8	81.6
Netherlands	83	24,025	334	81,648	24.9	29.4
Indonesia	173	49,545	300	78,895	57.7	62.8
Panama	120	98,939	278	299,953	43.2	33.0
Taiwan	88	60,618	242	133,373	36.4	45.4
Greece	70	6,049	239	41,792	29.3	14.5
Iceland	81	77,217	226	138,624	35.8	55.7
Chile	152	100,656	219	144,408	69.4	69.7
Belize	84	69,391	212	206,976	39.6	33.5
Australia	64	16,776	201	37,825	31.8	44.4
Portugal	57	39,543	199	104,493	28.6	37.8
South Africa	81	48,490	187	105,737	43.3	45.9
Italy	64	18,370	183	47,259	35.0	38.9
Denmark	29	21,898	180	75,169	16.1	29.1
Ukraine	51	26,406	169	356,779	30.2	7.4
Ghana	50	46,752	158	98,967	31.6	47.2
Ireland	44	24,444	155	47,590	28.4	51.4
Namibia	104	111,749	153	140,530	68.0	79.5
Germany	46	16,947	134	90,766	34.3	18.7
Poland	18	19,664	132	141,017	13.6	13.9
Honduras	64	29,535	126	47,651	50.8	62.0
Ecuador	82	66,246	123	83,583	66.7	79.3

Flag state	Sample		Population		% vessels	% GT
	No. vessels	GT	No. vessels	GT		
Peru	49	20,412	117	68,815	41.9	29.7
Faroe Islands (Denmark)	65	53,245	117	90,643	55.6	58.7
Senegal	65	29,060	111	47,826	58.6	60.8
Latvia	19	13,078	102	153,329	18.6	8.5
Lithuania	27	40,925	100	198,452	27.0	20.6
Philippines	73	37,190	99	48,647	73.7	76.4
Turkey	42	17,957	95	31,465	44.2	57.1
Belgium	29	8,212	87	18,936	33.3	43.4
Mauritania	49	16,931	85	33,404	57.6	50.7
Georgia	48	17,787	82	87,479	58.5	20.3
Croatia	53	8,362	81	12,460	65.4	67.1
Vanuatu	50	35,799	75	52,797	66.7	67.8
Estonia	38	14,594	72	83,588	52.8	17.5
St. Vincent & Grenadines	25	11,397	69	140,310	36.2	8.1
New Zealand	38	44,553	68	60,932	55.9	73.1
Sweden	17	7,153	64	16,543	26.6	43.2
Uruguay	31	21,627	62	34,521	50.0	62.6
Venezuela	31	27,448	59	37,539	52.5	73.1
Mozambique	44	12,847	55	16,239	80.0	79.1
Greenland (Denmark)	31	67,826	54	79,171	57.4	85.7
Iran	22	16,822	50	33,675	44.0	50.0
India	44	10,469	48	11,061	91.7	94.6
Mongolia	13	4,735	45	70,335	28.9	6.7
Cuba	13	28,661	43	76,272	30.2	37.6
Comoros	9	3,732	43	103,878	20.9	3.6
Romania	17	38,862	41	107,813	41.5	36.0
Angola	30	18,054	40	22,461	75.0	80.4
Cameroon	19	38,422	36	81,915	52.8	46.9
Vietnam	12	6,517	35	9,860	34.3	66.1
North Korea	20	26,154	35	67,217	57.1	38.9
Guinea-Bissau	24	41,303	34	48,859	70.6	84.5
Finland	7	2,813	32	9,196	21.9	30.6
Seychelles	17	13,174	31	20,120	54.8	65.5
Brazil	2	4,039	31	5,904	6.5	68.4
Nigeria	15	9,380	29	17,327	51.7	54.1
Cook Islands (New Zealand)	23	16,730	29	24,698	79.3	67.7
Tunisia	13	1,275	25	2,636	52.0	48.4
Guinea	17	15,408	25	20,965	68.0	73.5
Falkland Islands/Malvinas (United Kingdom)	20	33,852	25	42,028	80.0	80.5
Libya	13	3,456	24	5,702	54.2	60.6
Bulgaria	5	2,936	24	47,339	20.8	6.2
Malta	11	1,713	23	13,392	47.8	12.8
Thailand	12	5,889	21	13,057	57.1	45.1
St. Kitts & Nevis	3	1,022	21	58,459	14.3	1.7
Kiribati	11	15,173	20	25,112	55.0	60.4
Kenya	12	5,818	20	9,475	60.0	61.4
Togo	6	2,671	18	16,243	33.3	16.4
Sierra Leone	5	2,186	18	53,572	27.8	4.1
Myanmar (Burma)	4	855	18	3,893	22.2	22.0
Oman	11	30,231	17	34,448	64.7	87.8
Fiji	4	575	17	1,922	23.5	29.9
Cambodia	1	705	17	22,472	5.9	3.1
Tanzania	5	5,228	16	14,084	31.3	37.1
Micronesia (Federated States of)	12	12,576	16	17,420	75.0	72.2
Cyprus	3	219	16	23,496	18.8	0.9
Côte d'Ivoire	14	1,673	16	2,409	87.5	69.4

Flag state	Sample		Population		% vessels	% GT
	No. vessels	GT	No. vessels	GT		
Algeria	9	559	16	2,057	56.3	27.2
Tuvalu	8	7,042	15	33,037	53.3	21.3
Equatorial Guinea	5	2,780	15	10,311	33.3	27.0
Albania	5	532	14	1,093	35.7	48.7
Mauritius	6	6,331	13	7,987	46.2	79.3
Gabon	8	2,631	13	11,794	61.5	22.3
Azerbaijan	7	6,481	13	9,423	53.8	68.8
Papua New Guinea	6	9,065	12	12,849	50.0	70.6
Madagascar	8	1,396	11	2,547	72.7	54.8
Guyana	6	1,207	11	13,778	54.5	8.8
Somalia	4	3,145	10	6,167	40.0	51.0
United Arab Emirates	2	1,603	9	16,861	22.2	9.5
Turkmenistan	3	1,710	9	13,332	33.3	12.8
Saudi Arabia	8	2,195	9	2,388	88.9	91.9
Nauru	9	12,669	9	12,669	100	100
Nicaragua	4	4,398	8	6,748	50.0	65.2
Jamaica	1	110	8	639	12.5	17.2
Bolivia	2	1,246	8	7,385	25.0	16.9
Kazakhstan	5	1,863	7	2,559	71.4	72.8
Egypt	4	2,009	7	3,137	57.1	64.0
Curaçao	3	2,853	7	5,867	42.9	48.6
Palau	2	1,319	6	13,761	33.3	9.6
Solomon Islands	3	1,700	5	3,174	60.0	53.6
São Tomé & Príncipe	3	1,545	5	2,896	60.0	53.3
Malaysia	3	1,413	5	2,097	60.0	67.4
Israel	2	214	5	2,274	40.0	9.4
Gambia	4	672	5	982	80.0	68.4
El Salvador	4	8,896	5	9,064	80.0	98.1
Congo - Kinshasa	4	2,448	5	3,022	80.0	81.0
Suriname	1	162	4	415	25.0	39.0
Marshall Islands	4	5,097	4	5,097	100	100
Kuwait	4	653	4	653	100	100
Eritrea	4	700	4	700	100	100
Cayman Islands	2	885	4	3,431	50.0	25.8
Cape Verde	1	863	4	1,283	25.0	67.3
Tonga	2	1,150	3	1,382	66.7	83.2
Reunion (France)	1	875	3	3,230	33.3	27.1
Maldives	2	240	3	1,671	66.7	14.4
Isle Of Man (United Kingdom)	2	520	3	520	66.7	100
Dominican Republic	2	398	3	398	66.7	100
Bahamas	2	9,375	3	11,932	66.7	78.6
Yemen	1	250	2	1,741	50.0	14.4
Sri Lanka	1	592	2	592	50.0	100
San Marino	2	617	2	617	100	100
Saint Pierre and Miquelon (France)	2	729	2	729	100	100
Qatar	2	322	2	322	100	100
Moldova	1	414	2	808	50.0	51.2
Kyrgyzstan	1	509	2	509	50.0	100
Grenada	1	158	2	280	50.0	56.4
French Southern and Antarctic Territories (FR)	1	493	2	542	50.0	91.0
French Guiana (France)	1	129	2	239	50.0	54.0
Slovakia	1	129	1	129	100	100
Saint Helena (United Kingdom)	1	2,300	1	2,300	100	100
Antigua & Barbuda	1	129	1	129	100	100
Anguilla	1	135	1	135	100	100

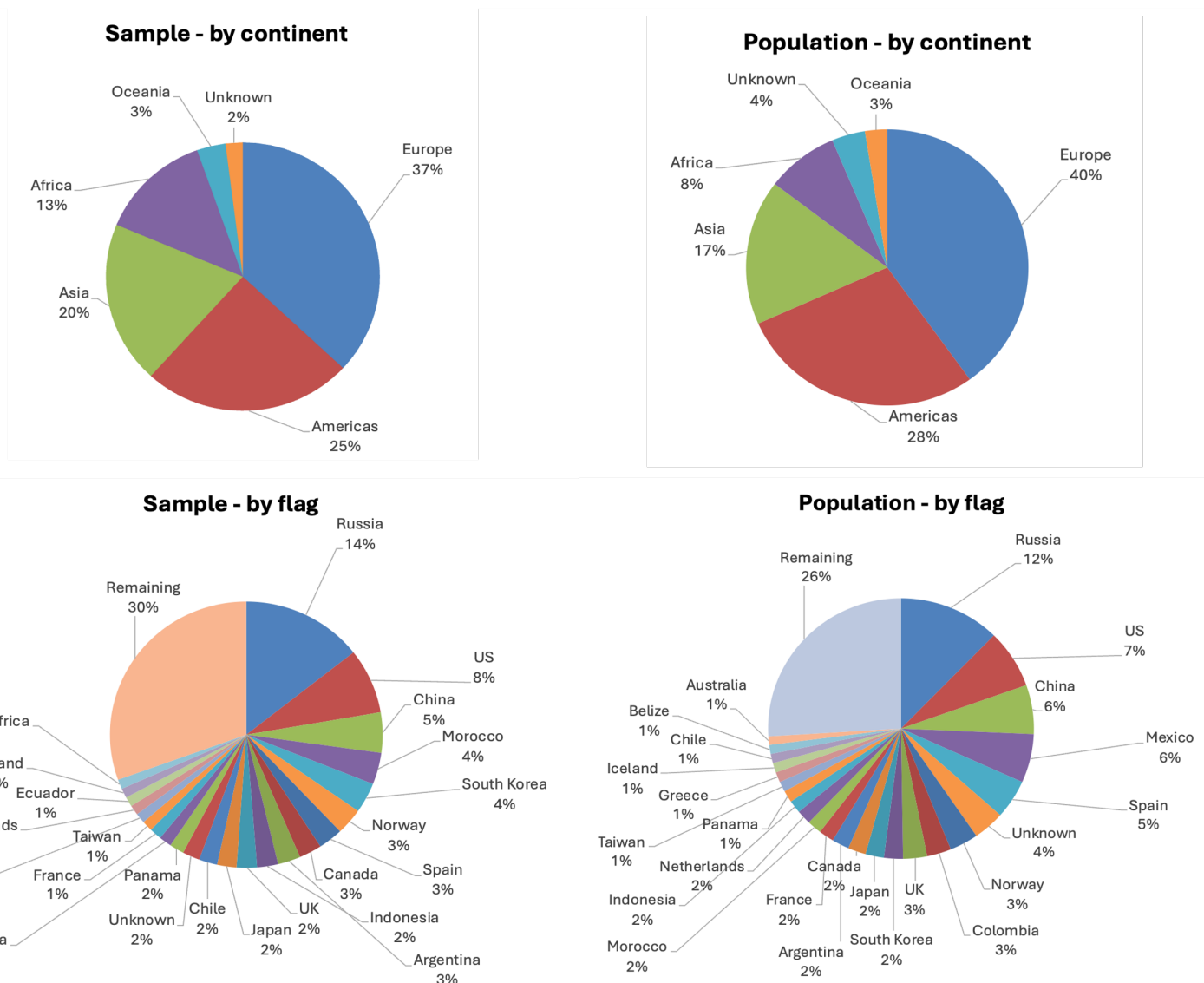


Figure S1. Distribution of fishing vessels across flag countries and continents – sample vs. population. Percentages represent the share of vessel numbers for each flag country in the sample and the population.

Table S6. Distribution of Flag-to-ISH country mismatches for LSF vessels in the global sample. The top 10 ISH countries associated with mismatches are shaded in grey.

ISH continent and country	No. vessels	% of total shifts
Europe	303	36.8
Spain	80	9.7
Norway	33	4.0
Netherlands	25	3.0
United Kingdom	23	2.8
Russia	23	2.8
Denmark	16	1.9
Malta	12	1.5
Ukraine	11	1.3
Iceland	10	1.2
Lithuania	9	1.1
Ireland	8	1.0
France	8	1.0
Italy	7	0.9
Germany	7	0.9
Portugal	7	0.9
Latvia	6	0.7
Estonia	6	0.7
Sweden	5	0.6
Greece	3	0.4
Belgium	2	0.2
Poland	2	0.2
Asia	222	27.0
South Korea	47	5.7
Taiwan	36	4.4
China	27	3.3
Japan	20	2.4
Turkey	14	1.7
Hong Kong SAR China	13	1.6
Singapore	10	1.2
Bahrain	10	1.2
Cambodia	9	1.1
Thailand	7	0.9
Philippines	7	0.9
United Arab Emirates	5	0.6
Cyprus	4	0.5
Malaysia	2	0.2
Maldives	2	0.2
India	2	0.2
Iran	2	0.2
Vietnam	1	0.1
Israel	1	0.1
Georgia	1	0.1
Saudi Arabia	1	0.1
Kazakhstan	1	0.1
Americas	171	20.8
Panama	39	4.7
Belize	27	3.3
United States	25	3.0
Ecuador	13	1.6
Mexico	9	1.1
Canada	7	0.9
Uruguay	7	0.9
British Virgin Islands	6	0.7
St. Vincent & Grenadines	5	0.6

ISH continent and country	No. vessels	% of total shifts
Argentina	4	0.5
Colombia	4	0.5
Cayman Islands	4	0.5
Honduras	4	0.5
Curaçao	3	0.4
Peru	3	0.4
Venezuela	2	0.2
Chile	2	0.2
Trinidad & Tobago	1	0.1
Haiti	1	0.1
Barbados	1	0.1
Nicaragua	1	0.1
Bahamas	1	0.1
Antigua & Barbuda	1	0.1
St. Kitts & Nevis	1	0.1
Africa	89	10.8
Namibia	14	1.7
Liberia	12	1.5
Côte d'Ivoire	11	1.3
Seychelles	9	1.1
South Africa	8	1.0
Morocco	6	0.7
Ghana	6	0.7
Mozambique	5	0.6
Angola	4	0.5
Senegal	3	0.4
Cameroon	2	0.2
Mauritius	2	0.2
Guinea	1	0.1
Congo - Kinshasa	1	0.1
Tanzania	1	0.1
Guinea-Bissau	1	0.1
Gambia	1	0.1
Gabon	1	0.1
Mauritania	1	0.1
Oceania	38	4.6
Vanuatu	11	1.3
Marshall Islands	7	0.9
New Zealand	5	0.6
Kiribati	4	0.5
Australia	4	0.5
Fiji	2	0.2
Papua New Guinea	2	0.2
Tuvalu	1	0.1
Samoa	1	0.1
Micronesia (Federated States of)	1	0.1
Total	823	100.0

Table S7. Global sample – Ownership of Russian, Panamanian, Belizean, and Honduran vessels by foreign ISHs (country). Russia, Panama, Belize and Honduras are the top four flag countries globally for which shifts were observed between the Flag and the ISH level.

Flag country	ISH country	No. vessels	% country shifts at ISH level (of corresponding flag country total)
Russia	Ukraine	9	14.1
	Japan	7	10.9
	Norway	5	7.8
	South Korea	5	7.8
	Seychelles	4	6.3
	Latvia	4	6.3
	Belize	4	6.3
	Denmark	3	4.7
	Iceland	2	3.1
	Cyprus	2	3.1
	Lithuania	2	3.1
	Ireland	2	3.1
	British Virgin Islands	2	3.1
	Poland	1	1.6
	Antigua & Barbuda	1	1.6
	Italy	1	1.6
	Estonia	1	1.6
	Panama	1	1.6
	Hong Kong SAR China	1	1.6
	China	1	1.6
	Malta	1	1.6
	St. Vincent & Grenadines	1	1.6
	Marshall Islands	1	1.6
	Uruguay	1	1.6
	Cambodia	1	1.6
	Kazakhstan	1	1.6
Panama	Spain	9	14.3
	South Korea	8	12.7
	Ecuador	7	11.1
	Mexico	5	7.9
	Taiwan	4	6.3
	United States	4	6.3
	Belize	2	3.2
	China	2	3.2
	Singapore	2	3.2
	Japan	2	3.2
	Curaçao	2	3.2
	United Kingdom	2	3.2
	Vanuatu	2	3.2
	Netherlands	2	3.2
	Nicaragua	1	1.6
	Fiji	1	1.6
	Cambodia	1	1.6
	Hong Kong SAR China	1	1.6
	Turkey	1	1.6
	South Africa	1	1.6
	Ghana	1	1.6
	Liberia	1	1.6
	Argentina	1	1.6
	Malta	1	1.6
Belize	Panama	8	12.9

	Colombia	4	6.5
	United States	4	6.5
	Norway	3	4.8
	Spain	3	4.8
	Denmark	3	4.8
	Mexico	3	4.8
	Singapore	2	3.2
	Estonia	2	3.2
	South Korea	2	3.2
	Morocco	2	3.2
	Taiwan	2	3.2
	United Kingdom	2	3.2
	Iceland	1	1.6
	Samoa	1	1.6
	China	1	1.6
	Latvia	1	1.6
	Honduras	1	1.6
	St. Kitts & Nevis	1	1.6
	Greece	1	1.6
	Cyprus	1	1.6
	Russia	1	1.6
	Belgium	1	1.6
	Seychelles	1	1.6
	Marshall Islands	1	1.6
	Hong Kong SAR China	1	1.6
	Gabon	1	1.6
	Japan	1	1.6
	Ghana	1	1.6
	Cambodia	1	1.6
	Uruguay	1	1.6
	Liberia	1	1.6
	Vietnam	1	1.6
	Lithuania	1	1.6
	Maldives	1	1.6
Honduras	Taiwan	19	38.0
	Panama	4	8.0
	United States	3	6.0
	Thailand	3	6.0
	Spain	2	4.0
	South Korea	2	4.0
	Liberia	2	4.0
	China	2	4.0
	United Kingdom	2	4.0
	Estonia	1	2.0
	Hong Kong SAR China	1	2.0
	South Africa	1	2.0
	Mauritius	1	2.0
	British Virgin Islands	1	2.0
	Haiti	1	2.0
	Gambia	1	2.0
	Singapore	1	2.0
	Maldives	1	2.0
	Belize	1	2.0
	Marshall Islands	1	2.0

Table S8. Global sample of LSF vessels owned by ISHs and GUOs in 138 countries. The delta (Δ) indicates the difference (+ or -) in the absolute number of vessels attributed to an owner country between analysis at the ISH vs. the GUO level, along with the corresponding percentage change.

Continent	Owner country	Vessels owned by ISHs	Vessels owned by GUOs	Δ (no. vessels)	Δ (%)
Europe	Russia	970	959	-11	-1
	Spain	282	460	+178	63
	Norway	254	249	-5	-2
	United Kingdom	196	190	-6	-3
	Denmark	131	130	-1	-1
	France	107	90	-17	-16
	Netherlands	102	121	+19	19
	Iceland	91	95	+4	4
	Greece	75	78	+3	4
	Italy	72	87	+15	21
	Portugal	59	58	-1	-2
	Ukraine	53	55	+2	4
	Croatia	50	51	+1	2
	Ireland	49	48	-1	-2
	Germany	45	39	-6	-13
	Estonia	41	43	+2	5
	Lithuania	32	27	-5	-16
	Belgium	31	32	+1	3
	Latvia	22	22	0	0
	Malta	22	19	-3	-14
	Sweden	21	23	+2	10
	Romania	16	16	0	0
	Poland	12	12	0	0
	Finland	6	6	0	0
	Bulgaria	5	5	0	0
	Albania	5	5	0	0
	Switzerland	0	1	+1	NA
Americas	United States	565	591	+26	5
	Canada	192	194	+2	1
	Argentina	176	126	-50	-28
	Chile	149	143	-6	-4
	Panama	108	68	-40	-37
	Ecuador	92	86	-6	-7
	Mexico	77	77	0	0
	Belize	62	50	-12	-19
	Peru	53	46	-7	-13
	Venezuela	30	32	+2	7

	Uruguay	29	21	-8	-28
	Colombia	23	28	+5	22
	Honduras	19	17	-2	-11
	Cuba	12	12	0	0
	St. Vincent & Grenadines	8	6	-2	-25
	Curaçao	6	3	-3	-50
	Cayman Islands	6	6	0	0
	Guyana	6	6	0	0
	British Virgin Islands	6	5	-1	-17
	El Salvador	4	0	-4	-100
	Trinidad & Tobago	2	3	1	50
	Dominican Republic	2	2	0	0
	Brazil	2	2	0	0
	Nicaragua	1	1	0	0
	Suriname	1	1	0	0
	Bahamas	1	1	0	0
	Barbados	1	0	-1	-100
	Antigua & Barbuda	1	0	-1	-100
	St. Kitts & Nevis	1	1	0	0
	Haiti	1	1	0	0
	Jamaica	0	2	+2	NA
	Bermuda	0	1	+1	NA
Asia	China	357	363	+6	2
	South Korea	300	336	+36	12
	Japan	180	193	+13	7
	Indonesia	169	168	-1	-1
	Taiwan	120	125	+5	4
	Philippines	78	78	0	0
	Turkey	56	56	0	0
	India	44	44	0	0
	Georgia	25	25	0	0
	Cambodia	23	15	-8	-35
	Iran	22	22	0	0
	Thailand	19	23	+4	21
	Hong Kong SAR China	14	11	-3	-21
	Vietnam	14	14	0	0
	Singapore	12	14	+2	17
	Bahrain	10	10	0	0
	United Arab Emirates	9	14	+5	56
	Cyprus	9	6	-3	-33
	Saudi Arabia	9	1	-8	-89
	Azerbaijan	7	7	0	0

	North Korea	6	17	+11	183
	Oman	5	9	+4	80
	Kazakhstan	5	5	0	0
	Malaysia	5	5	0	0
	Myanmar (Burma)	4	4	0	0
	Maldives	4	4	0	0
	Turkmenistan	3	1	-2	-67
	Israel	3	3	0	0
	Kuwait	3	3	0	0
	Qatar	2	2	0	0
	Sri Lanka	1	1	0	0
	Yemen	1	1	0	0
	Mongolia	1	1	0	0
	Lebanon	0	2	+2	NA
Africa	Morocco	253	239	-14	-6
	Namibia	103	93	-10	-10
	South Africa	82	83	+1	1
	Ghana	58	53	-5	-9
	Senegal	54	39	-15	-28
	Mauritania	39	30	-9	-23
	Mozambique	31	9	-22	-71
	Côte d'Ivoire	28	30	+2	7
	Angola	25	9	-16	-64
	Seychelles	20	16	-4	-20
	Tunisia	13	11	-2	-15
	Liberia	13	6	-7	-54
	Guinea	12	12	0	0
	Nigeria	10	10	0	0
	Algeria	9	9	0	0
	Cameroon	9	4	-5	-56
	Gabon	8	5	-3	-38
	Kenya	8	12	+4	50
	Madagascar	7	3	-4	-57
	Guinea-Bissau	6	5	-1	-17
	Libya	6	6	0	0
	Tanzania	5	7	+2	40
	Somalia	4	0	-4	-100
	Mauritius	4	4	0	0
	Congo - Kinshasa	4	4	0	0
	Eritrea	4	4	0	0
	Egypt	4	4	0	0

	São Tomé & Príncipe	3	3	0	0
	Equatorial Guinea	3	3	0	0
	Sierra Leone	3	3	0	0
	Togo	2	3	+1	50
	Gambia	2	2	0	0
	Djibouti	1	1	0	0
Oceania	Australia	66	67	+1	2
	New Zealand	49	50	+1	2
	Vanuatu	49	42	-7	-14
	Marshall Islands	15	13	-2	-13
	Kiribati	13	8	-5	-38
	Micronesia (Federated States of)	9	7	-2	-22
	Nauru	7	7	0	0
	Papua New Guinea	5	4	-1	-20
	Fiji	4	3	-1	-25
	Tuvalu	3	2	-1	-33
	Solomon Islands	3	0	-3	-100
	Samoa	1	1	0	0

Table S9. Distribution of Flag-to-GUO country mismatches for LSF vessels in the global sample. The top 10 GUO countries associated with mismatches are shaded in grey.

GUO continent and country	No. vessels	% of total shifts
Europe	530	48.3
Spain	250	22.8
Netherlands	43	3.9
United Kingdom	32	2.9
Norway	32	2.9
Russia	24	2.2
Italy	22	2.0
Denmark	16	1.5
Iceland	14	1.3
Ukraine	13	1.2
Portugal	11	1.0
Lithuania	10	0.9
Malta	9	0.8
Estonia	8	0.7
Ireland	8	0.7
Germany	8	0.7
Sweden	7	0.6
Latvia	7	0.6
France	5	0.5
Greece	4	0.4
Belgium	3	0.3
Poland	2	0.2
Finland	1	0.1
Switzerland	1	0.1
Asia	276	25.1
South Korea	72	6.6
Taiwan	41	3.7
Japan	33	3.0
China	28	2.6
Turkey	14	1.3
Singapore	12	1.1
Thailand	11	1.0
Hong Kong SAR China	10	0.9
United Arab Emirates	10	0.9
Bahrain	10	0.9
Cambodia	8	0.7
Philippines	7	0.6
Oman	4	0.4

Iran	2	0.2
India	2	0.2
Malaysia	2	0.2
Maldives	2	0.2
Georgia	2	0.2
Lebanon	1	0.1
Vietnam	1	0.1
Israel	1	0.1
Cyprus	1	0.1
Indonesia	1	0.1
Kazakhstan	1	0.1
Americas	179	16.3
United States	48	4.4
Panama	29	2.6
Belize	19	1.7
Ecuador	12	1.1
Canada	12	1.1
Mexico	9	0.8
Colombia	8	0.7
British Virgin Islands	5	0.5
Venezuela	4	0.4
St. Vincent & Grenadines	4	0.4
Cayman Islands	4	0.4
Uruguay	4	0.4
Argentina	4	0.4
Honduras	3	0.3
Peru	3	0.3
Trinidad & Tobago	2	0.2
Chile	2	0.2
Curaçao	1	0.1
Bahamas	1	0.1
Bermuda	1	0.1
Jamaica	1	0.1
Nicaragua	1	0.1
St. Kitts & Nevis	1	0.1
Haiti	1	0.1
Africa	77	7.0
South Africa	13	1.2
Namibia	13	1.2
Côte d'Ivoire	13	1.2
Ghana	6	0.5
Liberia	6	0.5
Seychelles	5	0.5

Morocco	5	0.5
Tanzania	3	0.3
Kenya	3	0.3
Mauritius	2	0.2
Mozambique	2	0.2
Guinea-Bissau	1	0.1
Guinea	1	0.1
Gabon	1	0.1
Gambia	1	0.1
Congo - Kinshasa	1	0.1
Senegal	1	0.1
Oceania	36	3.3
New Zealand	8	0.7
Vanuatu	7	0.6
Marshall Islands	7	0.6
Australia	5	0.5
Kiribati	4	0.4
Papua New Guinea	2	0.2
Samoa	1	0.1
Fiji	1	0.1
Micronesia (Federated States of)	1	0.1
Total	1,098	100.0

Table S10. Global sample – Ownership of Panamanian, Russian, Argentinian, Belizean, and Honduran vessels by foreign GUOs (country). Panama, Russia, Argentina, Belize and Honduras are the top five flag countries globally for which shifts were observed between the Flag and the GUO level.

Flag country	GUO country	No. Vessels	% country shifts at GUO level (of corresponding flag country total)
Panama	South Korea	17	18.5
	Spain	15	16.3
	Taiwan	8	8.7
	Ecuador	8	8.7
	United States	5	5.4
	Mexico	5	5.4
	Singapore	3	3.3
	Colombia	3	3.3
	Portugal	3	3.3
	China	2	2.2
	Venezuela	2	2.2
	Belize	2	2.2
	Japan	2	2.2

	South Africa	2	2.2
	Argentina	2	2.2
	United Kingdom	2	2.2
	Netherlands	2	2.2
	Ghana	2	2.2
	Turkey	1	1.1
	Nicaragua	1	1.1
	Malta	1	1.1
	Indonesia	1	1.1
	Curaçao	1	1.1
	Italy	1	1.1
	Hong Kong SAR China	1	1.1
Russia	United States	10	13.0
	Norway	9	11.7
	Ukraine	9	11.7
	Japan	7	9.1
	South Korea	5	6.5
	Seychelles	4	5.2
	Belize	4	5.2
	Latvia	4	5.2
	Denmark	3	3.9
	Iceland	3	3.9
	Panama	2	2.6
	Ireland	2	2.6
	British Virgin Islands	2	2.6
	Lithuania	2	2.6
	Estonia	1	1.3
	Georgia	1	1.3
	Poland	1	1.3
	Spain	1	1.3
	Hong Kong SAR China	1	1.3
	Italy	1	1.3
	St. Vincent & Grenadines	1	1.3
	China	1	1.3
	Cambodia	1	1.3
	Marshall Islands	1	1.3
	Kazakhstan	1	1.3
Argentina	Spain	43	64.2
	China	7	10.4
	Japan	4	6.0
	South Korea	3	4.5

	Italy	3	4.5
	Russia	2	3.0
	Canada	2	3.0
	Uruguay	1	1.5
	Panama	1	1.5
	Netherlands	1	1.5
Belize	Panama	6	9.2
	United States	5	7.7
	Colombia	5	7.7
	South Korea	4	6.2
	Singapore	3	4.6
	Denmark	3	4.6
	Spain	3	4.6
	Mexico	3	4.6
	Norway	3	4.6
	United Kingdom	2	3.1
	Taiwan	2	3.1
	Morocco	2	3.1
	Estonia	2	3.1
	Belgium	2	3.1
	Iceland	1	1.5
	Greece	1	1.5
	Latvia	1	1.5
	Lithuania	1	1.5
	Hong Kong SAR China	1	1.5
	Vietnam	1	1.5
	Kenya	1	1.5
	Marshall Islands	1	1.5
	Samoa	1	1.5
	Côte d'Ivoire	1	1.5
	Honduras	1	1.5
	China	1	1.5
	St. Kitts & Nevis	1	1.5
	Cambodia	1	1.5
	Japan	1	1.5
	Gabon	1	1.5
	Uruguay	1	1.5
	Portugal	1	1.5
	Russia	1	1.5
	Maldives	1	1.5
Honduras	Taiwan	19	37.3

Panama	4	7.8
United States	3	5.9
Thailand	3	5.9
China	2	3.9
Spain	2	3.9
South Korea	2	3.9
British Virgin Islands	2	3.9
Liberia	2	3.9
Hong Kong SAR China	1	2.0
Estonia	1	2.0
Japan	1	2.0
Gambia	1	2.0
Haiti	1	2.0
Marshall Islands	1	2.0
Jamaica	1	2.0
Mauritius	1	2.0
United Kingdom	1	2.0
Greece	1	2.0
Singapore	1	2.0
Maldives	1	2.0

Table S11. Top 10 sampled flag countries (vessel numbers) in each continent and their relative share of the continent total (vessel numbers, GT). The number of vessels in the population is put between brackets.

	Flag country	No. vessels	% of continent total	GT	% of continent total	LOA (avg.)	SD
Europe	Russia	1,002 (2,341)	39.0	1,257,995	55.4	54.3	23.4
	Norway	224 (663)	8.7	229,849	10.1	43.7	20.2
	Spain	203 (921)	7.9	123,890	5.5	44.0	19.3
	United Kingdom	168 (554)	6.5	71,385	3.1	32.5	14.6
	France	101 (350)	3.9	50,615	2.2	37.0	17.4
	Netherlands	83 (334)	3.2	24,025	1.1	34.0	13.5
	Iceland	81 (226)	3.2	77,217	3.4	46.6	17.7
	Greece	70 (239)	2.7	6,049	0.3	27.2	5.9
	Faroe Islands (DK)	65 (117)	2.5	53,245	2.3	44.3	15.9
	Italy	64 (183)	2.5	18,370	0.8	38.5	17.0
Americas	United States	550 (1,381)	31.9	272,230	25.3	40.0	23.4
	Canada	188 (414)	10.9	76,665	7.1	37.3	17.4
	Argentina	188 (400)	10.9	116,420	10.8	48.9	24.5
	Chile	152 (219)	8.8	100,656	9.4	48.8	11.2
	Panama	120 (278)	7.0	98,939	9.2	55.3	17.2
	Belize	84 (212)	4.9	69,391	6.5	47.1	21.8
	Ecuador	82 (123)	4.8	66,246	6.2	51.0	14.4

	Mexico	70 (1,148)	4.1	51,605	4.8	52.8	18.1
	Honduras	64 (126)	3.7	29,535	2.7	41.9	13.9
	Peru	49 (117)	2.8	20,412	1.9	45.3	15.3
Asia	China	341 (1,159)	25.0	342,014	38.0	64.6	37.7
	South Korea	256 (439)	18.8	184,211	20.5	57.8	11.5
	Indonesia	173 (300)	12.7	49,545	5.5	42.9	11.7
	Japan	160 (426)	11.7	70,612	7.8	55.4	10.8
	Taiwan	88 (242)	6.5	60,618	6.7	57.8	54.4
	Philippines	73 (99)	5.4	37,190	4.1	52.2	11.5
	Georgia	48 (82)	3.5	17,787	2.0	45.8	39.1
	India	44 (48)	3.2	10,469	1.2	29.0	8.7
	Turkey	42 (95)	3.1	17,957	2.0	36.4	12.2
	Iran	22 (50)	1.6	16,822	1.9	50.2	14.4
Africa	Morocco	268 (336)	29.0	106,394	18.9	38.9	8.1
	Namibia	104 (153)	11.3	111,749	19.9	53.4	22.8
	South Africa	81 (187)	8.8	48,490	8.6	42.6	14.0
	Senegal	65 (111)	7.0	29,060	5.2	41.5	17.3
	Ghana	50 (158)	5.4	46,752	8.3	61.7	15.2
	Mauritania	49 (85)	5.3	16,931	3.0	35.6	9.0
	Mozambique	44 (55)	4.8	12,847	2.3	32.6	5.9
	Angola	30 (40)	3.3	18,054	3.2	46.8	16.3
	Guinea-Bissau	24 (34)	2.6	41,303	7.3	62.6	25.6
	Cameroon	19 (36)	2.1	38,422	6.8	68.1	32.2
Oceania	Australia	64 (201)	27.1	16,776	9.3	28.2	9.7
	Vanuatu	50 (75)	21.2	35,799	19.9	49.2	13.4
	New Zealand	38 (68)	16.1	44,553	24.7	50.4	26.5
	Cook Islands (NZ)	23 (29)	9.7	16,730	9.3	47.4	19.5
	Micronesia	12 (16)	5.1	12,576	7.0	54.9	18.6
	Kiribati	11 (20)	4.7	15,173	8.4	64.4	7.4
	Nauru	9 (9)	3.8	12,669	7.0	84.3	47.3
	Tuvalu	8 (15)	3.4	7,042	3.9	64.2	18.5
	Papua New Guinea	6 (12)	2.5	9,065	5.0	68.0	16.7
	Fiji	4 (17)	1.7	575	0.3	29.1	5.5

Table S12. Top 10 flag countries (vessel numbers) in the population (Orbis x Seasearcher) in each continent and their relative share of the continent total (vessel numbers, GT).

	Flag country	No. vessels	% of continent total	GT	% of continent total	LOA (avg.)	SD
Europe	Russia	2,341	30.8	4,349,726	58.6	63.8	28.9
	Spain	921	12.1	363,869	4.9	38.5	19.0
	Norway	663	8.7	476,130	6.4	41.4	16.9
	United Kingdom	554	7.3	164,946	2.2	32.0	16.8
	France	350	4.6	102,672	1.4	34.7	17.0
	Netherlands	334	4.4	81,648	1.1	33.6	19.2
	Greece	239	3.1	41,792	0.6	29.2	14.9
	Iceland	226	3.0	138,624	1.9	41.3	16.9
	Portugal	199	2.6	104,493	1.4	43.5	19.9
	Italy	183	2.4	47,259	0.6	38.2	21.4
Americas	United States	1,381	25.7	493,329	21.5	36.8	22.0
	Mexico	1,148	21.4	79,329	3.5	53.2	17.8
	Colombia	561	10.4	29,713	1.3	35.6	20.1
	Canada	414	7.7	136,462	5.9	37.7	18.0
	Argentina	400	7.4	231,914	10.1	51.5	27.6
	Panama	278	5.2	299,953	13.1	58.4	24.2
	Chile	219	4.1	144,408	6.3	49.7	12.7
	Belize	212	3.9	206,976	9.0	52.6	26.0
	Honduras	126	2.3	47,651	2.1	40.1	15.2
	Ecuador	123	2.3	83,583	3.6	50.0	14.4
Asia	China	1,159	35.9	554,299	27.6	56.8	28.4
	South Korea	439	13.6	357,874	17.8	59.5	15.7
	Japan	426	13.2	369,703	18.4	52.5	26.8
	Indonesia	300	9.3	78,895	3.9	43.1	11.1
	Taiwan	242	7.5	133,373	6.6	44.7	41.1
	Philippines	99	3.1	48,647	2.4	52.3	12.3
	Turkey	95	2.9	31,465	1.6	34.2	11.6
	Georgia	82	2.5	87,479	4.4	54.7	37.8
	Iran	50	1.5	33,675	1.7	53.2	49.5
	India	48	1.5	11,061	0.6	28.7	8.4
Africa	Morocco	336	21.3	130,328	12.4	39.0	8.3
	South Africa	187	11.9	105,737	10.0	45.5	15.3
	Ghana	158	10.0	98,967	9.4	51.2	18.2
	Namibia	153	9.7	140,530	13.4	52.1	20.8
	Senegal	111	7.0	47,826	4.5	43.8	33.6
	Mauritania	85	5.4	33,404	3.2	37.9	12.7
	Mozambique	55	3.5	16,239	1.5	34.2	10.2
	Comoros	43	2.7	103,878	9.9	74.4	29.6

	Angola	40	2.5	22,461	2.1	45.9	15.7
	Cameroon	36	2.3	81,915	7.8	69.7	34.9
	Australia	201	41.7	37,825	12.5	31.3	14.3
	Vanuatu	75	15.6	52,797	17.4	51.3	14.9
	New Zealand	68	14.1	60,932	20.1	46.2	25.2
	Cook Islands (NZ)	29	6.0	24,698	8.2	51.2	21.8
	Kiribati	20	4.1	25,112	8.3	58.9	17.0
	Fiji	17	3.5	1,922	0.6	28.6	3.8
	Micronesia	16	3.3	17,420	5.8	58.9	17.2
	Tuvalu	15	3.1	33,037	10.9	79.0	23.8
	Papua New Guinea	12	2.5	12,849	4.2	66.2	19.2
	Nauru	9	1.9	12,669	4.2	84.3	47.3

Table S13. Country shifts (Flag to ISH) for sampled European fishing vessels. The top 10 ISH countries associated with mismatches are shaded in grey.

ISH continent and country	No. vessels	% of total shifts
Europe	117	64.3
Netherlands	18	9.9
Norway	12	6.6
Ukraine	10	5.5
United Kingdom	10	5.5
Denmark	9	4.9
Spain	9	4.9
Russia	9	4.9
Lithuania	7	3.8
Ireland	6	3.3
Iceland	6	3.3
Latvia	4	2.2
Germany	4	2.2
Sweden	3	1.6
France	3	1.6
Malta	2	1.1
Estonia	2	1.1
Italy	1	0.5
Belgium	1	0.5
Poland	1	0.5
Asia	24	13.2
Japan	7	3.8
South Korea	5	2.7
Cyprus	3	1.6
China	3	1.6
Cambodia	2	1.1

ISH continent and country	No. vessels	% of total shifts
Kazakhstan	1	0.5
Georgia	1	0.5
Israel	1	0.5
Hong Kong SAR China	1	0.5
Americas	22	12.1
Belize	4	2.2
Panama	4	2.2
Canada	3	1.6
British Virgin Islands	2	1.1
Peru	2	1.1
St. Vincent & Grenadines	2	1.1
Cayman Islands	1	0.5
United States	1	0.5
Antigua & Barbuda	1	0.5
Uruguay	1	0.5
Ecuador	1	0.5
Africa	18	9.9
Seychelles	4	2.2
Angola	3	1.6
Cameroon	2	1.1
Senegal	2	1.1
Namibia	2	1.1
Morocco	2	1.1
Congo - Kinshasa	1	0.5
Ghana	1	0.5
Mozambique	1	0.5
Oceania	1	0.5
Marshall Islands	1	0.5

Table S14. Ownership of Russian, UK, and Spanish vessels by foreign ISHs (country). Russia, the UK, and Spain are the top three European flag countries for which shifts were observed between the Flag and the ISH level.

Flag country	ISH country	No. vessels	% country shifts at ISH level (of corresponding flag country total)
Russia	Ukraine	9	14.1
	Japan	7	10.9
	Norway	5	7.8
	South Korea	5	7.8
	Seychelles	4	6.3
	Latvia	4	6.3
	Belize	4	6.3

Flag country	ISH country	No. vessels	% country shifts at ISH level (of corresponding flag country total)
	Denmark	3	4.7
	Iceland	2	3.1
	Cyprus	2	3.1
	Lithuania	2	3.1
	Ireland	2	3.1
	British Virgin Islands	2	3.1
	Poland	1	1.6
	Antigua & Barbuda	1	1.6
	Italy	1	1.6
	Estonia	1	1.6
	Panama	1	1.6
	Hong Kong	1	1.6
	China	1	1.6
	Malta	1	1.6
	St. Vincent & Grenadines	1	1.6
	Marshall Islands	1	1.6
	Uruguay	1	1.6
	Cambodia	1	1.6
	Kazakhstan	1	1.6
United Kingdom	Netherlands	8	50.0
	France	2	12.5
	Spain	2	12.5
	Namibia	1	6.3
	Cayman Islands	1	6.3
	Iceland	1	6.3
	Ireland	1	6.3
Spain	Angola	3	25.0
	United Kingdom	2	16.7
	Senegal	2	16.7
	Cameroon	2	16.7
	Mozambique	1	8.3
	Morocco	1	8.3
	Ecuador	1	8.3

Table S15. Increase (+) and decrease (-) in the number of vessels between analysis at the ISH vs. the GUO level for all owner countries of European LSF vessels. The delta (Δ) indicates the absolute difference in vessel counts (+ or -) between the two levels, along with the corresponding percentage change.

Continent	Owner country	Vessels owned by ISHs	Vessels owned by GUOs	Δ (no. vessels)	Δ (%)
Europe	Russia	947	933	-14	-1
	Norway	229	229	0	0
	Spain	200	220	20	+10
	United Kingdom	164	165	1	+1
	Denmark	123	121	-2	-2
	France	99	84	-15	-15
	Netherlands	95	109	14	+15
	Iceland	85	87	2	+2
	Greece	69	70	1	+1
	Italy	64	68	4	+6
	Portugal	52	47	-5	-10
	Ukraine	52	52	0	0
	Croatia	50	51	1	+2
	Ireland	47	46	-1	-2
	Germany	42	36	-6	-14
	Estonia	36	38	2	+6
	Lithuania	30	24	-6	-20
	Belgium	30	30	0	0
	Latvia	20	19	-1	-5
	Sweden	18	19	1	+6
	Romania	16	16	0	0
	Malta	12	10	-2	-17
	Poland	11	11	0	0
	Albania	5	5	0	0
	Bulgaria	5	5	0	0
	Finland	5	5	0	0
Asia	Japan	7	7	0	0
	South Korea	5	5	0	0
	Cyprus	3	1	-2	-67
	China	3	3	0	0
	Cambodia	2	2	0	0
	Kazakhstan	1	1	0	0
	Israel	1	1	0	0
	Georgia	1	2	1	+100
	Hong Kong SAR China	1	1	0	0
	United Arab Emirates	0	1	1	NA

Continent	Owner country	Vessels owned by ISHs	Vessels owned by GUOs	Δ (no. vessels)	Δ (%)
Americas	Belize	4	4	0	0
	Panama	4	5	1	+25
	Canada	3	3	0	0
	British Virgin Islands	2	2	0	0
	St. Vincent & Grenadines	2	1	-1	-50
	Peru	2	2	0	0
	United States	1	15	14	+1400
	Antigua & Barbuda	1	0	-1	-100
	Uruguay	1	0	-1	-100
	Cayman Islands	1	1	0	0
	Ecuador	1	1	0	0
	Trinidad & Tobago	0	1	1	NA
Africa	Seychelles	4	4	0	0
	Angola	3	0	-3	-100
	Cameroon	2	0	-2	-100
	Senegal	2	0	-2	-100
	Namibia	2	2	0	0
	Morocco	2	2	0	0
	Ghana	1	1	0	0
	Mozambique	1	0	-1	-100
	Congo - Kinshasa	1	1	0	0
	Côte d'Ivoire	0	1	1	NA
Oceania	Marshall Islands	1	1	0	0

Table S16. Country shifts (Flag to GUO) for sampled European fishing vessels. Top 10 GUO countries are shaded in grey.

GUO continent and country	No. vessels	% of total shifts
Europe	160	69.3
Netherlands	32	13.9
Spain	22	9.5
Norway	16	6.9
United Kingdom	16	6.9
Ukraine	10	4.3
Russia	8	3.5
Iceland	8	3.5
Denmark	8	3.5
Lithuania	7	3.0
Ireland	6	2.6
Germany	5	2.2
Italy	5	2.2
Estonia	4	1.7
Sweden	4	1.7
Latvia	4	1.7
France	2	0.9
Poland	1	0.4
Finland	1	0.4
Belgium	1	0.4
Americas	35	15.2
United States	15	6.5
Panama	5	2.2
Belize	4	1.7
Canada	3	1.3
British Virgin Islands	2	0.9
Peru	2	0.9
Cayman Islands	1	0.4
Trinidad & Tobago	1	0.4
St. Vincent & Grenadines	1	0.4
Ecuador	1	0.4
Asia	24	10.4
Japan	7	3.0
South Korea	5	2.2
China	3	1.3
Georgia	2	0.9
Cambodia	2	0.9
United Arab Emirates	1	0.4
Kazakhstan	1	0.4
Israel	1	0.4
Cyprus	1	0.4
Hong Kong SAR China	1	0.4
Africa	11	4.8
Seychelles	4	1.7
Morocco	2	0.9
Namibia	2	0.9
Côte d'Ivoire	1	0.4
Congo - Kinshasa	1	0.4
Ghana	1	0.4
Oceania	1	0.4
Marshall Islands	1	0.4
Total	231	100

Table S17. Ownership of Russian, UK, and French vessels by foreign GUOs (country). Russia, UK, and France are the top three European flag countries for which shifts were observed between the Flag and the GUO level.

Flag country	ISH country	No. vessels	% country shifts at ISH level (of corresponding flag country total)
Russia	Ukraine	9	14.1
	Japan	7	10.9
	Norway	5	7.8
	South Korea	5	7.8
	Seychelles	4	6.3
	Latvia	4	6.3
	Belize	4	6.3
	Denmark	3	4.7
	Iceland	2	3.1
	Cyprus	2	3.1
	Lithuania	2	3.1
	Ireland	2	3.1
	British Virgin Islands	2	3.1
	Poland	1	1.6
	Antigua & Barbuda	1	1.6
	Italy	1	1.6
	Estonia	1	1.6
	Panama	1	1.6
	Hong Kong	1	1.6
	China	1	1.6
	Malta	1	1.6
	St. Vincent & Grenadines	1	1.6
	Marshall Islands	1	1.6
	Uruguay	1	1.6
	Cambodia	1	1.6
	Kazakhstan	1	1.6
United Kingdom	Netherlands	8	50.0
	France	2	12.5
	Spain	2	12.5
	Namibia	1	6.3
	Cayman Islands	1	6.3
	Iceland	1	6.3
	Ireland	1	6.3
Spain	Angola	3	25.0
	United Kingdom	2	16.7
	Senegal	2	16.7
	Cameroon	2	16.7

Mozambique	1	8.3
Morocco	1	8.3
Ecuador	1	8.3

Table S18. Largest GUO companies (≥ 10 vessels) owning European LSF vessels (Orbis data). Only sampled European-flagged vessels are included—any vessels owned by these companies but flagged to non-European countries are excluded.

GUO name	GUO country	ISH name	ISH country	Vessel flag	No. Vessels
Murmanrybprom Joint Stock Company (n=16)	Russia	Murmanrybprom Joint Stock Company	Russia	Russia	6
		Public Joint Stock Company Murmansk Trawl Fleet	Russia	Russia	3
		Joint Stock Company Taurus	Russia	Russia	2
		Jsc Pri	Russia	Russia	2
		Karelian Seafoods Jsc	Russia	Russia	1
		Joint Stock Company Eridan	Russia	Russia	1
		Joint Stock Company Strelets	Russia	Russia	1
Vladkonek (n=15)	Russia	Joint Stock Company Holding Company Dalmoreproduct	Russia	Russia	15
Romania Govt (n=14)	Romania	Ministerul Industriei Alimentare	Romania	Romania	10
		Intreprinderea De Pescuit Oceanic (Pescocean)	Romania	Romania	4
Joint Stock Company Okeanrybflot (n=14)	Russia	Joint Stock Company Okeanrybflot	Russia	Russia	14
Private Joint Stock Company Dalinvestgroupp (n=11)	Russia	Publichnoe Aktsionernoe Obschestvo Nakhodkinskaya Baza Aktivnogo Morskogo Pybolovstva	Russia	Russia	7
		Ooo Korsakov Ocean Fishing Fleet Base (Obbrf LLC)	Russia	Russia	3
		Rybolovnaya Kompaniya Pasifik Marin	Russia	Russia	1
		Royal Greenland A/S	Denmark	Greenland (DK)	6
Gronlands Selvstyre (n=11)	Denmark	Pelagic Greenland A/S	Denmark	Greenland (DK)	2
				Faroe Islands (DK)	1
		Gronlands Naturinstitut	Denmark	Greenland (DK)	1
		Ice Trawl Greenland A/S	Denmark	Greenland (DK)	1
Aktsionernoe Obshchestvo Upravlyayushchaya Kompaniya Dalnevostochnyi Rybak (n=11)	Russia	Polaris	Russia	Russia	7
		Interrybflot Co.,Ltd	Russia	Russia	4
Antey, Limited Liability Company (n=11)	Russia	Antey, Limited Liability Company	Russia	Russia	11
Rybolovetskii Kolkhoz Im. V.I. Lenina (n=10)	Russia	Rybolovetskii Kolkhoz Im. V.I. Lenina	Russia	Russia	8
				Ukraine	2
North Pacific Corporation (n=10)	U.S.	Aktsionernoe Obshchestvo Rybolovetskii Kolkhoz Vostok-1	Russia	Russia	10
Joint Stock Company Ostrov Sakhalin (n=10)	Russia	Public Joint Stock Company Preobrazhenskaya Baza Tralovogo Flota	Russia	Russia	10

Table S19. Country shifts (Flag to ISH) for sampled fishing vessels flagged to the Americas. Top 10 ISH countries are shaded in grey.

ISH continent and country	No. vessels	% of total shifts
Americas	98	34.4
Panama	22	7.7
United States	19	6.7
Ecuador	9	3.2
Belize	8	2.8
Mexico	8	2.8
Uruguay	4	1.4
Colombia	4	1.4
Argentina	3	1.1
Honduras	3	1.1
Curaçao	2	0.7
Chile	2	0.7
Venezuela	2	0.7
British Virgin Islands	2	0.7
Canada	1	0.4
St. Vincent & Grenadines	1	0.4
St. Kitts & Nevis	1	0.4
Barbados	1	0.4
Trinidad & Tobago	1	0.4
Cayman Islands	1	0.4
Peru	1	0.4
Nicaragua	1	0.4
Bahamas	1	0.4
Haiti	1	0.4
Europe	76	26.7
Spain	25	8.8
Norway	11	3.9
United Kingdom	9	3.2
Denmark	6	2.1
Russia	6	2.1
Netherlands	4	1.4
Estonia	3	1.1
Greece	2	0.7
Malta	2	0.7
Iceland	2	0.7
Portugal	1	0.4
France	1	0.4
Ukraine	1	0.4
Latvia	1	0.4
Belgium	1	0.4

ISH continent and country	No. vessels	% of total shifts
Lithuania	1	0.4
Asia	74	26.0
Taiwan	25	8.8
South Korea	15	5.3
China	11	3.9
Singapore	5	1.8
Thailand	4	1.4
Japan	3	1.1
Hong Kong SAR China	3	1.1
Maldives	2	0.7
Cambodia	2	0.7
Vietnam	1	0.4
United Arab Emirates	1	0.4
Cyprus	1	0.4
Turkey	1	0.4
Africa	29	10.2
Côte d'Ivoire	9	3.2
Liberia	7	2.5
Ghana	3	1.1
Morocco	2	0.7
South Africa	2	0.7
Namibia	1	0.4
Guinea-Bissau	1	0.4
Seychelles	1	0.4
Gambia	1	0.4
Gabon	1	0.4
Mauritius	1	0.4
Oceania	8	2.8
Vanuatu	3	1.1
Marshall Islands	3	1.1
Fiji	1	0.4
Samoa	1	0.4
Total	285	100

Table S20. Ownership of Panamanian, Belizean, and Honduran vessels by foreign ISHs (country). Panama, Belize, and Honduras are the top three American flag countries for which shifts were observed between the Flag and the ISH level.

Flag country	ISH country	No. vessels	% country shifts at ISH level (of corresponding flag country total)
Panama	Spain	9	14.3
	South Korea	8	12.7

Flag country	ISH country	No. vessels	% country shifts at ISH level (of corresponding flag country total)
	Ecuador	7	11.1
	Mexico	5	7.9
	Taiwan	4	6.3
	United States	4	6.3
	Belize	2	3.2
	China	2	3.2
	Singapore	2	3.2
	Japan	2	3.2
	Curaçao	2	3.2
	United Kingdom	2	3.2
	Vanuatu	2	3.2
	Netherlands	2	3.2
	Nicaragua	1	1.6
	Fiji	1	1.6
	Cambodia	1	1.6
	Hong Kong	1	1.6
	Turkey	1	1.6
	South Africa	1	1.6
	Ghana	1	1.6
	Liberia	1	1.6
	Argentina	1	1.6
	Malta	1	1.6
Belize	Panama	8	12.9
	Colombia	4	6.5
	United States	4	6.5
	Norway	3	4.8
	Spain	3	4.8
	Denmark	3	4.8
	Mexico	3	4.8
	Singapore	2	3.2
	Estonia	2	3.2
	South Korea	2	3.2
	Morocco	2	3.2
	Taiwan	2	3.2
	United Kingdom	2	3.2
	Iceland	1	1.6
	Samoa	1	1.6
	China	1	1.6
	Latvia	1	1.6

Flag country	ISH country	No. vessels	% country shifts at ISH level (of corresponding flag country total)
	Honduras	1	1.6
	St. Kitts & Nevis	1	1.6
	Greece	1	1.6
	Cyprus	1	1.6
	Russia	1	1.6
	Belgium	1	1.6
	Seychelles	1	1.6
	Marshall Islands	1	1.6
	Hong Kong	1	1.6
	Gabon	1	1.6
	Japan	1	1.6
	Ghana	1	1.6
	Cambodia	1	1.6
	Uruguay	1	1.6
	Liberia	1	1.6
	Vietnam	1	1.6
	Lithuania	1	1.6
	Maldives	1	1.6
Honduras	Taiwan	19	38.0
	Panama	4	8.0
	United States	3	6.0
	Thailand	3	6.0
	Spain	2	4.0
	South Korea	2	4.0
	Liberia	2	4.0
	China	2	4.0
	United Kingdom	2	4.0
	Estonia	1	2.0
	Hong Kong	1	2.0
	South Africa	1	2.0
	Mauritius	1	2.0
	British Virgin Islands	1	2.0
	Haiti	1	2.0
	Gambia	1	2.0
	Singapore	1	2.0
	Maldives	1	2.0
	Belize	1	2.0
	Marshall Islands	1	2.0

Table S21. Increase (+) and decrease (-) in the number of vessels between analysis at the ISH vs. the GUO level for all owner countries of American LSF vessels. The delta (Δ) indicates the absolute difference in vessel counts (+ or -) between the two levels, along with the corresponding percentage change.

Continent	Owner country	Vessels owned by ISHs	Vessels owned by GUOs	Δ (no. vessels)	Δ (%)
Americas	United States	554	565	11	+2
	Canada	185	187	2	+1
	Argentina	173	125	-48	-28
	Chile	148	142	-6	-4
	Ecuador	88	83	-5	-6
	Panama	79	45	-34	-43
	Mexico	73	73	0	0
	Peru	49	42	-7	-14
	Belize	30	24	-6	-20
	Venezuela	29	31	2	+7
	Uruguay	25	18	-7	-28
	Colombia	23	28	5	+22
	Honduras	17	15	-2	-12
	Cuba	12	12	0	0
	Guyana	6	6	0	0
	Curaçao	5	3	-2	-40
	El Salvador	4	0	-4	-100
	St. Vincent & Grenadines	3	3	0	0
	Cayman Islands	3	3	0	0
	Brazil	2	2	0	0
	Dominican Republic	2	2	0	0
	British Virgin Islands	2	2	0	0
	Trinidad & Tobago	1	1	0	0
	Nicaragua	1	1	0	0
	Bahamas	1	1	0	0
	Barbados	1	0	-1	-100
	Haiti	1	1	0	0
	Suriname	1	1	0	0
	St. Kitts & Nevis	1	1	0	0
	Jamaica	0	2	2	NA
	Bermuda	0	1	1	NA
Asia	Taiwan	25	29	4	+16
	South Korea	15	28	13	+87
	China	11	12	1	+9
	Singapore	5	7	2	+40
	Thailand	4	5	1	+25

Continent	Owner country	Vessels owned by ISHs	Vessels owned by GUOs	Δ (no. vessels)	Δ (%)
	Japan	3	10	7	+233
	Hong Kong SAR China	3	4	1	+33
	Maldives	2	2	0	0
	Cambodia	2	1	-1	-50
	Vietnam	1	1	0	0
	United Arab Emirates	1	1	0	0
	Cyprus	1	0	-1	-100
	Turkey	1	1	0	0
	Indonesia	0	1	1	NA
Europe	United Kingdom	27	16	-11	-41
	Spain	25	98	73	+292
	Norway	11	10	-1	-9
	Denmark	6	7	1	+17
	Russia	6	6	0	0
	Netherlands	4	5	1	+25
	France	3	2	-1	-33
	Estonia	3	3	0	0
	Malta	2	2	0	0
	Greece	2	3	1	+50
	Iceland	2	4	2	+100
	Portugal	1	5	4	+400
	Ukraine	1	1	0	0
	Latvia	1	1	0	0
	Belgium	1	2	1	+100
	Lithuania	1	1	0	0
	Italy	0	6	6	NA
Africa	Côte d'Ivoire	9	10	1	+11
	Liberia	7	3	-4	-57
	Ghana	3	3	0	0
	Morocco	2	2	0	0
	South Africa	2	2	0	0
	Namibia	1	1	0	0
	Guinea-Bissau	1	1	0	0
	Seychelles	1	0	-1	-100
	Gambia	1	1	0	0
	Gabon	1	1	0	0
	Mauritius	1	1	0	0
	Kenya	0	3	3	NA
Oceania	Vanuatu	3	0	-3	-100

Continent	Owner country	Vessels owned by ISHs	Vessels owned by GUOs	Δ (no. vessels)	Δ (%)
	Marshall Islands	3	3	0	0
	Fiji	1	0	-1	-100
	Samoa	1	1	0	0

Table S22. Country shifts (Flag to GUO) for sampled fishing vessels flagged to the Americas. Top 10 GUO countries are shaded in grey.

GUO continent and country	No. vessels	% of total shifts
Europe	162	40.1
Spain	98	24.3
Norway	10	2.5
United Kingdom	8	2.0
Denmark	7	1.7
Russia	6	1.5
Italy	6	1.5
Portugal	5	1.2
Netherlands	5	1.2
Iceland	4	1.0
Greece	3	0.7
Estonia	3	0.7
Malta	2	0.5
Belgium	2	0.5
Ukraine	1	0.2
Latvia	1	0.2
Lithuania	1	0.2
Americas	108	26.7
United States	28	6.9
Panama	17	4.2
Ecuador	9	2.2
Mexico	8	2.0
Colombia	8	2.0
Canada	6	1.5
Belize	5	1.2
Venezuela	4	1.0
Argentina	4	1.0
Chile	2	0.5
Uruguay	2	0.5
British Virgin Islands	2	0.5
Honduras	2	0.5
Peru	1	0.2

GUO continent and country	No. vessels	% of total shifts
Bahamas	1	0.2
St. Kitts & Nevis	1	0.2
Trinidad & Tobago	1	0.2
St. Vincent & Grenadines	1	0.2
Jamaica	1	0.2
Bermuda	1	0.2
Cayman Islands	1	0.2
Curaçao	1	0.2
Nicaragua	1	0.2
Haiti	1	0.2
Asia	102	25.2
Taiwan	29	7.2
South Korea	28	6.9
China	12	3.0
Japan	10	2.5
Singapore	7	1.7
Thailand	5	1.2
Hong Kong SAR China	4	1.0
Maldives	2	0.5
United Arab Emirates	1	0.2
Turkey	1	0.2
Vietnam	1	0.2
Indonesia	1	0.2
Cambodia	1	0.2
Africa	28	6.9
Côte d'Ivoire	10	2.5
Liberia	3	0.7
Ghana	3	0.7
Kenya	3	0.7
Morocco	2	0.5
South Africa	2	0.5
Namibia	1	0.2
Gambia	1	0.2
Guinea-Bissau	1	0.2
Gabon	1	0.2
Mauritius	1	0.2
Oceania	4	1.0
Marshall Islands	3	0.7
Samoa	1	0.2
Total	404	100

Table S23. Ownership of Panamanian, Argentinian, and Belizean vessels by foreign GUOs (country). Panama, Argentina, and Belize are the top three American flag countries for which shifts were observed between the Flag and the GUO level.

Flag country	GUO country	No. vessels	% country shifts at GUO level (of corresponding flag country total)
Panama	South Korea	17	18.5
	Spain	15	16.3
	Taiwan	8	8.7
	Ecuador	8	8.7
	United States	5	5.4
	Mexico	5	5.4
	Singapore	3	3.3
	Colombia	3	3.3
	Portugal	3	3.3
	China	2	2.2
	Venezuela	2	2.2
	Belize	2	2.2
	Japan	2	2.2
	South Africa	2	2.2
	Argentina	2	2.2
	United Kingdom	2	2.2
	Netherlands	2	2.2
	Ghana	2	2.2
	Turkey	1	1.1
	Nicaragua	1	1.1
	Malta	1	1.1
	Indonesia	1	1.1
	Curaçao	1	1.1
	Italy	1	1.1
	Hong Kong	1	1.1
Argentina	Spain	43	64.2
	China	7	10.4
	Japan	4	6.0
	South Korea	3	4.5
	Italy	3	4.5
	Russia	2	3.0
	Canada	2	3.0
	Uruguay	1	1.5
	Panama	1	1.5
	Netherlands	1	1.5
Belize	Panama	6	9.2

United States	5	7.7
Colombia	5	7.7
South Korea	4	6.2
Singapore	3	4.6
Denmark	3	4.6
Spain	3	4.6
Mexico	3	4.6
Norway	3	4.6
United Kingdom	2	3.1
Taiwan	2	3.1
Morocco	2	3.1
Estonia	2	3.1
Belgium	2	3.1
Iceland	1	1.5
Greece	1	1.5
Latvia	1	1.5
Lithuania	1	1.5
Hong Kong	1	1.5
Vietnam	1	1.5
Kenya	1	1.5
Marshall Islands	1	1.5
Samoa	1	1.5
Côte d'Ivoire	1	1.5
Honduras	1	1.5
China	1	1.5
St. Kitts & Nevis	1	1.5
Cambodia	1	1.5
Japan	1	1.5
Gabon	1	1.5
Uruguay	1	1.5
Portugal	1	1.5
Russia	1	1.5
Maldives	1	1.5

Table S24. Largest GUO companies (≥ 10 vessels) owning American LSF vessels (Orbis data). Only sampled American-flagged vessels are included—any vessels owned by these companies but flagged to non-American countries are excluded.

GUO name	GUO country	ISH name	ISH country	Vessel flag	No. Vessels
Trident Seafoods Corporation (n=37)	U.S.	Trident Seafoods Corporation	U.S.	U.S.	31
				Belize	1
		Royal Viking Inc	U.S.	U.S.	5
Pescanova SA (n=22)	Spain	Arge Nova SA	Argentina	Argentina	17
		Pesca Chile S.A.	Chile	Chile	3
				Falkland Islands/Malvinas (UK)	
		Polar Limited	UK		2
Lubmain International S.A. (n=17)	Taiwan	Lubmain International S.A.	Taiwan	Honduras	17
Blumar S.A. (n=16)	Chile	Blumar S.A.	Chile	Chile	16
Compania Pesquera Camanchaca S.A. (n=15)	Chile	Compania Pesquera Camanchaca S.A.	Chile	Chile	12
		Camanchaca Pesca Sur SA	Chile	Chile	3
Corporacion Real Corprealsa S.A. (n=15)	Ecuador	Nirsa S.A.	Ecuador	Ecuador	10
				Panama	4
		Pesqueros Unidos Compania Limitada	Ecuador	Ecuador	1
Premium Brands Holdings Corporation (n=12)	Canada	CS Manpar Inc	Canada	Canada	4
		Adams & Knickle Limited	Canada	Canada	3
		Clearwater Fine Foods Inc	Canada	Canada	3
		Grlaciar Pesquera SA	Argentina	Argentina	2
		Arbumasa S.A.	Argentina	Argentina	10
Armadores De Buques Marisqueros S.A. (Arbumasa) (n=11)	Spain	Armadores De Buques Marisqueros S.A. (Arbumasa)	Spain	Argentina	1
State Of Cuba (n=10)	Cuba	Dragnets Puerto Pesquera De La Habana	Cuba	Cuba	6
		State Of Cuba	Cuba	Cuba	2
		Bayamo Fishing S.A.	Cuba	Cuba	2
Jim Pattison Group (n=10)	Canada	Jim Pattison Enterprises Ltd.	Canada	Canada	10

Table S25. Country shifts (Flag to ISH) for sampled Asian fishing vessels. Top 10 ISH countries are shaded in grey.

ISH continent and country	No. vessels	% of total shifts
Asia	66	64.7
South Korea	19	18.6
Turkey	13	12.7
Japan	8	7.8
Hong Kong SAR China	5	4.9
Cambodia	5	4.9
Taiwan	4	3.9
United Arab Emirates	4	3.9
Thailand	2	2.0
Philippines	2	2.0
China	1	1.0
Saudi Arabia	1	1.0
Malaysia	1	1.0
Iran	1	1.0
Americas	11	10.8
Belize	7	6.9
Panama	1	1.0
Honduras	1	1.0
Argentina	1	1.0
British Virgin Islands	1	1.0
Europe	10	9.8
Russia	6	5.9
Spain	2	2.0
Ireland	1	1.0
Norway	1	1.0
Oceania	9	8.8
Vanuatu	5	4.9
Australia	1	1.0
New Zealand	1	1.0
Kiribati	1	1.0
Micronesia (Federated States of)	1	1.0
Africa	6	5.9
Liberia	2	2.0
Namibia	1	1.0
Mozambique	1	1.0
Guinea	1	1.0
Angola	1	1.0
Total	102	100

Table S26. Ownership of Georgian, Chinese, and South Korean vessels by foreign ISHs (country). Georgia, China, and South Korea are the top three Asian flag countries for which shifts were observed between the Flag and the ISH level.

Flag country	ISH country	No. vessels	% country shifts at ISH level (of corresponding flag country total)
Georgia	Turkey	13	54.2
	Cambodia	3	12.5
	Taiwan	3	12.5
	Thailand	2	8.3
	Ireland	1	4.2
	Liberia	1	4.2
	Mozambique	1	4.2
China	Hong Kong	5	38.5
	Japan	3	23.1
	Belize	2	15.4
	Vanuatu	1	7.7
	Cambodia	1	7.7
	Guinea	1	7.7
South Korea	Saudi Arabia	1	11.1
	Philippines	1	11.1
	Angola	1	11.1
	Argentina	1	11.1
	Russia	1	11.1
	Honduras	1	11.1
	Spain	1	11.1
	Japan	1	11.1
	Panama	1	11.1

Table S27. Increase (+) and decrease (-) in the number of vessels between analysis at the ISH vs. the GUO level for all owner countries of Asian LSF vessels. The delta (Δ) indicates the absolute difference in vessel counts (+ or -) between the two levels, along with the corresponding percentage change.

Continent	Owner country	Vessels owned by ISHs	Vessels owned by GUOs	Δ (no. vessels)	Δ (%)
Asia	China	329	334	5	+2
	South Korea	266	268	2	+1
	Indonesia	169	167	-2	-1
	Japan	165	166	1	+1
	Taiwan	86	87	1	+1
	Philippines	73	73	0	0
	Turkey	55	55	0	0
	India	42	42	0	0

Continent	Owner country	Vessels owned by ISHs	Vessels owned by GUOs	Δ (no. vessels)	Δ (%)
	Georgia	24	23	-1	-4
	Iran	21	21	0	0
	Thailand	14	14	0	0
	Vietnam	12	12	0	0
	Saudi Arabia	9	1	-8	-89
	Azerbaijan	7	7	0	0
	United Arab Emirates	6	6	0	0
	Hong Kong SAR China	5	1	-4	-80
	Oman	5	5	0	0
	Cambodia	5	5	0	0
	North Korea	5	14	9	+18
	Kazakhstan	4	4	0	0
	Myanmar (Burma)	4	4	0	0
	Malaysia	4	4	0	0
	Kuwait	3	3	0	0
	Turkmenistan	3	1	-2	-67
	Cyprus	3	3	0	0
	Israel	2	2	0	0
	Qatar	2	2	0	0
	Maldives	2	2	0	0
	Sri Lanka	1	1	0	0
	Yemen	1	1	0	0
	Mongolia	1	1	0	0
Americas	Belize	7	4	-3	-43
	Panama	1	0	-1	-100
	Honduras	1	1	0	0
	Argentina	1	0	-1	-100
	British Virgin Islands	1	1	0	0
Europe	Russia	6	8	2	+33
	Spain	2	3	1	+50
	Ireland	1	1	0	0
	Norway	1	0	-1	-100
	United Kingdom	0	1	1	NA
Oceania	Vanuatu	5	5	0	0
	Australia	1	3	2	+20
	New Zealand	1	1	0	0
	Kiribati	1	1	0	0

Continent	Owner country	Vessels owned by ISHs	Vessels owned by GUOs	Δ (no. vessels)	Δ (%)
	Micronesia (Federated States of)	1	1	0	0
Africa	Liberia	2	2	0	0
	Namibia	1	1	0	0
	Mozambique	1	1	0	0
	Guinea	1	1	0	0
	Angola	1	0	-1	-100

Table S28. Country shifts (Flag to GUO) for sampled Asian fishing vessels. Top 10 GUO countries are shaded in grey.

GUO continent and country	No. vessels	% of total shifts
Asia	66	63.5
South Korea	17	17.7
Turkey	13	13.5
Japan	9	9.4
Taiwan	5	5.2
Cambodia	5	5.2
United Arab Emirates	4	4.2
Thailand	2	2.1
Philippines	2	2.1
Iran	1	1.0
China	1	1.0
Hong Kong SAR China	1	1.0
Malaysia	1	1.0
Europe	13	13.5
Russia	8	8.3
Spain	3	3.1
United Kingdom	1	1.0
Ireland	1	1.0
Oceania	11	11.5
Vanuatu	5	5.2
Australia	3	3.1
New Zealand	1	1.0
Kiribati	1	1.0
Micronesia (Federated States of)	1	1.0
Americas	6	6.3
Belize	4	4.2
Honduras	1	1.0
British Virgin Islands	1	1.0

GUO continent and country	No. vessels	% of total shifts
Africa	5	5.2
Liberia	2	2.1
Guinea	1	1.0
Namibia	1	1.0
Mozambique	1	1.0
Total	96	100

Table S29. Ownership of Georgian, Chinese, and Indonesian vessels by foreign GUOs (country). Georgia, China, and Indonesia are the top three Asian flag countries for which shifts were observed between the Flag and the GUO level.

Flag country	GUO country	No. vessels	% country shifts at GUO level (of corresponding flag country total)
Georgia	Turkey	13	52.0
	Taiwan	4	16.0
	Cambodia	3	12.0
	Thailand	2	8.0
	Ireland	1	4.0
	Liberia	1	4.0
	Mozambique	1	4.0
China	Japan	3	37.5
	Vanuatu	1	12.5
	Hong Kong	1	12.5
	Cambodia	1	12.5
	Belize	1	12.5
	Guinea	1	12.5
Indonesia	South Korea	3	50.0
	Australia	3	50.0

Table S30. Largest GUO companies (≥ 10 vessels) owning Asian LSF vessels (Orbis data). Only sampled Asian-flagged vessels are included—any vessels owned by these companies but flagged to non-Asian countries are excluded.

GUO name	GUO country	ISH name	ISH country	Vessel flag	No. Vessels
Pingtang Marine Enterprise, Ltd. (n=77)	China	Fujian Pingtang County Ocean Fishery Group Company Limited	China	China	77
China National Agricultural Development Group Company Limited (n=47)	China	Cnfc Overseas Fishery (Yantai) Company Limited	China	China	10
		Zhanjiang Marine Fisheries Company	China	China	4
		China National Fisheries Yantai Marine Fisheries Corporation	China	China	3
		Shandong Ocean Fisheries Corporation	China	China	3
		Zhoushan Marine Fisheries Company	China	China	3

GUO name	GUO country	ISH name	ISH country	Vessel flag	No. Vessels
		Zhoushan No. 2 Ocean Fishing Shipping Company	China	China	3
		Zhoushan Ocean Going Fishery Shipping Company	China	China	3
		Zhouyang Fishery Company Limited	China	China	2
		Dalian Marine Fisheries Corporation	China	China	2
		Dandong Changxing Shellfish Cultivation Company Limited	China	China	2
		Shanghai Marine Fisheries Company	China	China	2
		Zhoushan Putuo Fishery (Group) Shipping Company Limited	China	China	2
		Dalian Hong Da Steamer Company	China	China	1
		Xiamen Fishing Company	China	China	1
		Dalian Haiyang Island Frozen Aquatic Product Transport Company	China	China	1
		Yantai Municipal Deep-Sea Fishery Development Corporation	China	China	1
		Dalian Zhangzi Island Fishery Group Company	China	China	1
		Ningbo Marine Fishery Company	China	China	1
		China Kingdom Shipping Limited	Hong Kong SAR China	China	1
		Qinhuangdao General Ocean Fishery Company	China	China	1
Government Of China (n=43)	China	Cnfc Overseas Fisheries Co.,Ltd	China	China	15
		China Aquatic Products Co., Ltd.	China	China	14
		Shanghai Dier Deep Sea Fisheries Co., Ltd.	China	China	5
		Yantai Beijing Deep-Ocean Fishery Company	China	China	3
		Shanghai Deep Sea Fisheries Co.,Ltd	China	China	3
		China Yantai Marine Fisheries Corporation	China	China	2
		Zhongyu Global Seafood Corp.	China	China	1
Fujian Yihai Investment Co., Ltd. (n=41)	China	Fuzhou Honglong Ocean Fishing Co., Ltd.	China	China	41
Sajo Industries Co.,Ltd. (n=35)	South Korea	Sajo Industries Co.,Ltd.	South Korea	South Korea	28
		Sajo Cold Storage Company Limited	South Korea	South Korea	4
		Sajo Seafood Company Limited	South Korea	South Korea	2
		Tong Young Industries Company Limited	South Korea	South Korea	1
RBL Fishing Corporation (n=30)	Philippines	RBL Fishing Corporation	Philippines	Philippines	30
Dalian Longtai Chuangye Investment Co., Ltd. (n=30)	China	Dalian Oceanic Fishing Tuna Fishing Co., Ltd.	China	China	30
Dongwon Industries Co.,Ltd. (n=21)	South Korea	Dongwon Industries Co.,Ltd.	South Korea	South Korea	21
P.T. Mina Kartika (n=13)	Indonesia	P.T. Mina Kartika	Indonesia	Indonesia	13
Korea North Govt (n=13)	North Korea	Korea Namsan Shipping Company	South Korea	North Korea	3
		Korea Kangsong General Trading Corporation	North Korea	North Korea	1
		Korea Taedonggang Shipping Company	South Korea	North Korea	1

GUO name	GUO country	ISH name	ISH country	Vessel flag	No. Vessels
		Korea Hakbong Trading Company	South Korea	North Korea	1
		Korea Nampo Roksan Company	South Korea	North Korea	1
		Lyukdae Fishery Station	South Korea	North Korea	1
		Pongsu Shipping Company Limited	North Korea	North Korea	1
		South Hamgyong Province Marine Products Export Branch	South Korea	North Korea	1
		Wonsan Fishery Station	South Korea	North Korea	1
		Korea Rungrado Shipping Company	North Korea	North Korea	1
		Korea Surim Trading Company	North Korea	North Korea	1
Trans Pacific Journey Fishing Corp. (n=12)	Philippines	Trans Pacific Journey Fishing Corp.	Philippines	Philippines	12
Pt. Dwi Bina Utama (n=12)	Indonesia	Pt. Dwi Bina Utama	Indonesia	Indonesia	12
Government Of India (n=11)	India	Government Of India	India	India	9
	India	Ministry Of Agriculture & Irrigation - Department Of Agriculture	India	India	1
	India	Government Of The Republic Of India (Central Institute Of Fishing Technology - Cochin)	India	India	1
Government Of Vietnam (n=11)	Vietnam	Halong Fishery Complex Enterprise (Xi Nghiep Lien Hiep Thuy San Ha Long)	Vietnam	Vietnam	9
	Vietnam	Victory Fishing Corporation	Vietnam	Vietnam	1
	Vietnam	Soc Trang Shipping	Vietnam	Vietnam	1
Pt West Irian Fishing Industry (n=11)	Indonesia	Pt West Irian Fishing Industry	Indonesia	Indonesia	11
P.T. Alfa Kurnia Fish Enterprise (n=10)	Indonesia	P.T. Alfa Kurnia Fish Enterprise	Indonesia	Indonesia	10
Republic Of Indonesia (n=10)	Indonesia	Pann, Pt (Persero)	Indonesia	Indonesia	9
	Indonesia	Republic Of Indonesia	Indonesia	Indonesia	1
Dongwon Fisheries Co.,Ltd. (n=10)	South Korea	Dongwon Fisheries Co.,Ltd.	South Korea	South Korea	10

Table S31. Country shifts (Flag to ISH) for sampled African fishing vessels. Top 10 ISH countries are shaded in grey

ISH continent and country	No. vessels	% of total shifts
Africa	31	15.7
Namibia	10	5.1
Seychelles	3	1.5
South Africa	3	1.5
Liberia	3	1.5
Mozambique	3	1.5
Ghana	2	1.0
Morocco	2	1.0

ISH continent and country	No. vessels	% of total shifts
Côte d'Ivoire	2	1.0
Tanzania	1	0.5
Mauritania	1	0.5
Senegal	1	0.5
Americas	29	14.7
Panama	11	5.6
Belize	6	3.0
Canada	3	1.5
St. Vincent & Grenadines	2	1.0
Cayman Islands	2	1.0
Uruguay	2	1.0
United States	1	0.5
Curaçao	1	0.5
Ecuador	1	0.5
Asia	36	18.3
China	12	6.1
Bahrain	10	5.1
Singapore	4	2.0
Taiwan	3	1.5
South Korea	2	1.0
Philippines	2	1.0
India	1	0.5
Thailand	1	0.5
Malaysia	1	0.5
Europe	93	47.2
Spain	43	21.8
Norway	8	4.1
Malta	8	4.1
Italy	6	3.0
Portugal	6	3.0
France	4	2.0
Germany	3	1.5
United Kingdom	3	1.5
Sweden	2	1.0
Russia	2	1.0
Netherlands	2	1.0
Estonia	1	0.5
Iceland	1	0.5
Greece	1	0.5
Latvia	1	0.5
Poland	1	0.5
Lithuania	1	0.5

ISH continent and country	No. vessels	% of total shifts
Oceania	8	4.1
Marshall Islands	2	1.0
Australia	2	1.0
New Zealand	2	1.0
Tuvalu	1	0.5
Papua New Guinea	1	0.5
Total	197	100

Table S32. Ownership of vessels flagged to Morocco, Guinea Bissau, and Mozambique by foreign ISHs (country). These countries are the top three African flag countries for which shifts were observed between the Flag and the ISH level.

Flag country	ISH country	No. vessels	% country shifts at ISH level (of corresponding flag country total)
Morocco	Bahrain	10	47.6
	Spain	3	14.3
	Portugal	2	9.5
	China	2	9.5
	Iceland	1	4.8
	Panama	1	4.8
	Sweden	1	4.8
	Norway	1	4.8
Guinea Bissau	Seychelles	3	15.8
	Spain	3	15.8
	Panama	3	15.8
	Germany	1	5.3
	Russia	1	5.3
	Latvia	1	5.3
	Malta	1	5.3
	Senegal	1	5.3
	Mauritania	1	5.3
	Singapore	1	5.3
	Belize	1	5.3
	Lithuania	1	5.3
	Poland	1	5.3
Mozambique	China	10	52.6
	Spain	5	26.3
	Portugal	3	15.8
	Italy	1	5.3

Table S33. Increase (+) and decrease (-) in the number of vessels between analysis at the ISH vs. the GUO level for all owner countries of African LSF vessels. The delta (Δ) indicates the absolute difference in vessel counts (+ or -) between the two levels, along with the corresponding percentage change.

Continent	Country	Vessels owned by ISHs	Vessels owned by GUOs	Δ (no. vessels)	Δ (%)
Africa	Morocco	249	235	-14	-6
	Namibia	95	85	-10	-11
	South Africa	77	78	1	+1
	Senegal	52	39	-13	-25
	Ghana	51	47	-4	-8
	Mauritania	39	30	-9	-23
	Mozambique	28	7	-21	-75
	Angola	21	9	-12	-57
	Côte d'Ivoire	16	16	0	0
	Tunisia	13	11	-2	-15
	Seychelles	12	9	-3	-25
	Guinea	11	11	0	0
	Nigeria	10	10	0	0
	Algeria	9	9	0	0
	Kenya	8	9	1	+13
	Gabon	7	4	-3	-43
	Madagascar	7	3	-4	-57
	Cameroon	7	4	-3	-43
	Libya	6	6	0	0
	Guinea-Bissau	5	4	-1	-20
	Somalia	4	0	-4	-100
	Egypt	4	4	0	0
	Eritrea	4	4	0	0
	Tanzania	4	6	2	+50
	São Tomé & Príncipe	3	3	0	0
	Equatorial Guinea	3	3	0	0
	Liberia	3	1	-2	-67
	Congo - Kinshasa	3	3	0	0
	Mauritius	2	2	0	0
	Togo	1	2	1	+100
	Sierra Leone	1	1	0	0
	Gambia	1	1	0	0
Europe	Spain	43	126	83	+193
	Norway	8	5	-3	-38
	Malta	8	7	-1	-13
	Italy	6	8	2	+33
	Portugal	6	6	0	0

Continent	Country	Vessels owned by ISHs	Vessels owned by GUOs	Δ (no. vessels)	Δ (%)
	France	5	4	-1	-20
	Germany	3	3	0	0
	United Kingdom	3	7	4	+133
	Sweden	2	3	1	+50
	Russia	2	2	0	0
	Netherlands	2	2	0	0
	Estonia	1	1	0	0
	Iceland	1	1	0	0
	Greece	1	1	0	0
	Latvia	1	2	1	+100
	Poland	1	1	0	0
	Lithuania	1	2	1	+100
	Switzerland	0	1	1	NA
Asia	China	12	12	0	0
	Bahrain	10	10	0	0
	Singapore	4	4	0	0
	Taiwan	3	3	0	0
	South Korea	2	7	5	+250
	Philippines	2	2	0	0
	India	1	1	0	0
	Thailand	1	4	3	+300
	Malaysia	1	1	0	0
	United Arab Emirates	0	4	4	NA
	Oman	0	4	4	NA
	Japan	0	2	2	NA
	Lebanon	0	1	1	NA
Americas	Panama	11	6	-5	-45
	Belize	6	4	-2	-33
	Canada	3	3	0	0
	St. Vincent & Grenadines	2	2	0	0
	Cayman Islands	2	2	0	0
	Uruguay	2	2	0	0
	United States	1	1	0	0
	Curaçao	1	0	-1	-100
	Ecuador	1	1	0	0
Oceania	Marshall Islands	2	2	0	0
	Australia	2	1	-1	-50
	New Zealand	2	5	3	+150
	Tuvalu	1	0	-1	-100
	Papua New Guinea	1	1	0	0

Table S34. Country shifts (Flag to GUO) for sampled African fishing vessels. The top 10 GUO countries associated with mismatches are shaded in grey.

GUO continent and country	No. vessels	% of total shifts
Europe	181	61.6
Spain	126	42.9
Italy	8	2.7
United Kingdom	7	2.4
Malta	7	2.4
Portugal	6	2.0
Norway	5	1.7
Germany	3	1.0
France	3	1.0
Sweden	3	1.0
Russia	2	0.7
Lithuania	2	0.7
Netherlands	2	0.7
Latvia	2	0.7
Switzerland	1	0.3
Estonia	1	0.3
Iceland	1	0.3
Greece	1	0.3
Poland	1	0.3
Asia	55	18.7
China	12	4.1
Bahrain	10	3.4
South Korea	7	2.4
Thailand	4	1.4
United Arab Emirates	4	1.4
Oman	4	1.4
Singapore	4	1.4
Taiwan	3	1.0
Japan	2	0.7
Philippines	2	0.7
Lebanon	1	0.3
India	1	0.3
Malaysia	1	0.3
Africa	28	9.5
Namibia	9	3.1
South Africa	8	2.7
Tanzania	3	1.0
Ghana	2	0.7

GUO continent and country	No. vessels	% of total shifts
Côte d'Ivoire	2	0.7
Senegal	1	0.3
Liberia	1	0.3
Morocco	1	0.3
Mozambique	1	0.3
Americas	21	7.1
Panama	6	2.0
Belize	4	1.4
Canada	3	1.0
Uruguay	2	0.7
St. Vincent & Grenadines	2	0.7
Cayman Islands	2	0.7
United States	1	0.3
Ecuador	1	0.3
Oceania	9	3.1
New Zealand	5	1.7
Marshall Islands	2	0.7
Papua New Guinea	1	0.3
Australia	1	0.3
Total	294	100

Table S35. Ownership of vessels flagged to Mozambique, Morocco, and Namibia by foreign GUOs (country). These countries are the top three African flag countries for which shifts were observed between the Flag and the GUO level.

Flag country	GUO country	No. vessels	% country shifts at GUO level (of corresponding flag country total)
Mozambique	Spain	24	63.2
	China	10	26.3
	Portugal	3	7.9
	Italy	1	2.6
Morocco	Spain	15	44.1
	Bahrain	10	29.4
	China	2	5.9
	Portugal	2	5.9
	Sweden	1	2.9
	Iceland	1	2.9
	United Arab Emirates	1	2.9
	Lithuania	1	2.9
	Norway	1	2.9
Namibia	Spain	17	60.7

South Africa	6	21.4
Belize	1	3.6
Canada	1	3.6
United Kingdom	1	3.6
Australia	1	3.6
South Korea	1	3.6

Table S36. Largest GUO companies (≥ 10 vessels) owning African LSF vessels (Orbis data). Only sampled African-flagged vessels are included—any vessels owned by these companies but flagged to non-African countries are excluded. (*) Company in liquidation according to third sources.

GUO name	GUO country	ISH name	ISH country	Vessel flag	No. Ves.
Omnium Nord Africain Group Of Companies (n=34)	Morocco	Omnium Marocaine De Peche (Ste)	Morocco	Morocco	34
Brimstone Investment Corporation Limited (n=23)	South Africa	Sea Harvest Corporation (Pty) Ltd	South Africa	South Africa	23
Abanca Corporacion Bancaria SA (n=22)	Spain	Sociedade De Pesca De Mariscos Lda (Pescamar)	Mozamb.	Mozamb. Angola	19
		Novapesca Trading SL	Spain	Namibia	2
Ste De Peche Marona (n=20)	Morocco	Ste De Peche Marona	Morocco	Morocco	20
Mac Fishery (n=13)	Morocco	Mac Fishery	Morocco	Morocco	13
Bertrand Peche Export (n=13)	Côte d'Ivoire	Bertrand Peche Export	Côte d'Ivoire	Côte d'Ivoire	13
Societe De Navigation Darmement Et Peche (Sonarp) (n=12)	Morocco	Societe De Navigation Darmement Et Peche (Sonarp)	Morocco	Morocco	12
Government Of China (n=12)	China	China Aquatic Products Co., Ltd.	China	Mozamb.	10
		Shanghai Dier Deep Sea Fisheries Co., Ltd.	China	Morocco	2
		Astipeche Tanger	Morocco	Morocco	3
Astipesca S.L. (n=11) ^(*)	Spain	Himapeche S.A.	Mauritania	Mauritania	3
		Equapeche S.A.R.L.	Gabon	Gabon	3
		Khalid Fisheries	Morocco	Morocco	1
		Astipesca S.L.	Spain	Guinea-Bissau	1
Groupe Gema Unimar Sonama S.A. (n=11)	Morocco	Societe Des Peches Du Sud Latlas	Morocco	Morocco	11
Tunacor Group Limited (n=10)	Namibia	Karibib Fisheries Private Limited	Namibia	Namibia	6
	Namibia	Tunacor Fisheries Limited	Namibia	Namibia	4
Skeleton Coast Trawling Proprietary Limited (n=10)	Namibia	Skeleton Coast Trawling Proprietary Limited	Namibia	Namibia	5
	Namibia	Lalandii Holdings (Proprietary) Limited	Namibia	Namibia	4
	Namibia	Omuhuka Trawling Proprietary Limited	Namibia	Namibia	1
Al Amine Securities Company (n=10)	Bahrain	Al Amine Securities Company	Bahrain	Morocco	10

Societe De Peche Et Darmement Senegalais (Sopasen S.A.) (n=10)	Senegal	Societe De Peche Et Darmement Senegalais (Sopasen S.A.)	Senegal	Senegal	10
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Table S37. Country shifts (Flag to ISH) for sampled Oceanian fishing vessels. The top 10 ISH countries associated with mismatches are shaded in grey.

ISH continent and country	No. vessels	% of total shifts
Asia	22	38.6
South Korea	6	10.5
Taiwan	4	7.0
Hong Kong SAR China	4	7.0
Philippines	3	5.3
Japan	2	3.5
Singapore	1	1.8
Iran	1	1.8
India	1	1.8
Oceania	12	21.1
Vanuatu	3	5.3
Kiribati	3	5.3
New Zealand	2	3.5
Papua New Guinea	1	1.8
Fiji	1	1.8
Australia	1	1.8
Marshall Islands	1	1.8
Americas	11	19.3
United States	4	7.0
Belize	2	3.5
Ecuador	2	3.5
Mexico	1	1.8
British Virgin Islands	1	1.8
Panama	1	1.8
Europe	7	12.3
Denmark	1	1.8
Spain	1	1.8
Norway	1	1.8
Iceland	1	1.8
United Kingdom	1	1.8
Ireland	1	1.8
Netherlands	1	1.8
Africa	5	8.8
South Africa	3	5.3
Mauritius	1	1.8
Seychelles	1	1.8

Total	57	100
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Table S38. Ownership of vessels flagged to the Cook Islands, Vanuatu, and Tuvalu by foreign ISHs (country). These countries are the top three Oceanian flag countries for which shifts were observed between the Flag and the ISH level.

Flag country	ISH country	No. vessels	% country shifts at ISH level (of corresponding flag country total)
Cook Islands	Ecuador	2	14.3
	South Africa	2	14.3
	Kiribati	2	14.3
	Vanuatu	1	7.1
	South Korea	1	7.1
	Denmark	1	7.1
	Iceland	1	7.1
	United States	1	7.1
	Belize	1	7.1
	Fiji	1	7.1
	Mexico	1	7.1
Vanuatu	Taiwan	3	23.1
	Japan	2	15.4
	Panama	1	7.7
	United States	1	7.7
	Kiribati	1	7.7
	South Africa	1	7.7
	Spain	1	7.7
	Netherlands	1	7.7
	Ireland	1	7.7
	New Zealand	1	7.7
Tuvalu	South Korea	3	50.0
	Philippines	1	16.7
	Belize	1	16.7
	Marshall Islands	1	16.7

Table S39. Increase (+) and decrease (-) in the number of vessels between analysis at the ISH vs. the GUO level for all owner countries of Oceanian LSF vessels. The delta (Δ) indicates the absolute difference in vessel counts (+ or -) between the two levels, along with the corresponding percentage change.

Continent	Country	Vessels owned by ISHs	Vessels owned by GUOs	Δ (no. vessels)	Δ (%)
Oceania	Australia	63	63	0	0
	New Zealand	45	43	-2	-4
	Vanuatu	40	36	-4	-10

Continent	Country	Vessels owned by ISHs	Vessels owned by GUOs	Δ (no. vessels)	Δ (%)
	Kiribati	12	7	-5	-42
	Micronesia (Fed. St. of)	8	6	-2	-25
	Nauru	7	7	0	0
	Marshall Islands	5	5	0	0
	Fiji	3	3	0	0
	Papua New Guinea	3	2	-1	-33
	Solomon Islands	3	0	-3	-100
	Tuvalu	2	2	0	0
Asia	South Korea	6	15	9	+150
	Taiwan	4	4	0	0
	Hong Kong SAR China	4	4	0	0
	Philippines	3	3	0	0
	Japan	2	5	3	+150
	Singapore	1	1	0	0
	Iran	1	1	0	0
	India	1	1	0	0
Americas	United States	4	4	0	0
	Belize	2	2	0	0
	Ecuador	2	1	-1	-50
	Mexico	1	1	0	0
	British Virgin Islands	1	0	-1	-100
	Panama	1	1	0	0
Europe	Denmark	1	1	0	0
	Spain	1	1	0	0
	Norway	1	1	0	0
	Iceland	1	1	0	0
	United Kingdom	1	0	-1	-100
	Ireland	1	1	0	0
	Netherlands	1	4	3	+300
	Italy	0	3	3	NA
	Ukraine	0	2	2	NA
Africa	South Africa	3	3	0	0
	Mauritius	1	1	0	0
	Seychelles	1	1	0	0

Table S40. Country shifts (Flag to GUO) for sampled Oceanian fishing vessels. The top 10 GUO countries associated with mismatches are shaded in grey.

GUO continent and country	No. vessels	% of total shifts
Asia	34	46.6
South Korea	15	20.5

GUO continent and country	No. vessels	% of total shifts
Japan	5	6.8
Hong Kong SAR China	4	5.5
Taiwan	4	5.5
Philippines	3	4.1
Singapore	1	1.4
Iran	1	1.4
India	1	1.4
Europe	14	19.2
Netherlands	4	5.5
Italy	3	4.1
Ukraine	2	2.7
Norway	1	1.4
Spain	1	1.4
Denmark	1	1.4
Ireland	1	1.4
Iceland	1	1.4
Oceania	11	15.1
Kiribati	3	4.1
New Zealand	2	2.7
Vanuatu	2	2.7
Papua New Guinea	1	1.4
Fiji	1	1.4
Australia	1	1.4
Marshall Islands	1	1.4
Americas	9	12.3
United States	4	5.5
Belize	2	2.7
Panama	1	1.4
Ecuador	1	1.4
Mexico	1	1.4
Africa	5	6.8
South Africa	3	4.1
Mauritius	1	1.4
Seychelles	1	1.4
Total	73	100

Table S41. Ownership of vessels flagged to Vanuatu, the Cook Islands, and Kiribati by foreign GUOs (country). These countries are the top three Oceanian flag countries for which shifts were observed between the Flag and the GUO level.

Flag country	GUO country	No. vessels	% country shifts at GUO level (of corresponding flag country total)
Vanuatu	Netherlands	4	25.0
	Taiwan	3	18.8
	Japan	2	12.5
	South Africa	1	6.3
	Panama	1	6.3
	Spain	1	6.3
	Kiribati	1	6.3
	United States	1	6.3
	Ireland	1	6.3
	New Zealand	1	6.3
Cook Islands	South Africa	2	15.4
	Kiribati	2	15.4
	United States	1	7.7
	Denmark	1	7.7
	Ecuador	1	7.7
	Fiji	1	7.7
	South Korea	1	7.7
	Iceland	1	7.7
	Vanuatu	1	7.7
	Belize	1	7.7
	Mexico	1	7.7
Kiribati	South Korea	5	71.4
	Taiwan	1	14.3
	Hong Kong	1	14.3

Table S42. Ten largest GUO companies owning Oceanian LSF vessels (Orbis data). Only sampled Oceanian-flagged vessels are included—any vessels owned by these companies but flagged to non-Oceanian countries are excluded.

GUO name	GUO country	ISH name	ISH country	Vessel flag	No. Vessels
A. Raptis & Sons Proprietary Limited	Australia	A. Raptis & Sons Proprietary Limited	Australia	Australia	5
		Raptis Investments Proprietary Limited	Australia	Australia	2
		Exitus Proprietary Limited	Australia	Australia	1
Sanford Limited	New Zealand	Sanford Limited	New Zealand	New Zealand	8

GUO name	GUO country	ISH name	ISH country	Vessel flag	No. Vessels
Talleys Group Limited	New Zealand	Talleys Group Limited	New Zealand	New Zealand	5
		Greenshell (Glm9) Limited	New Zealand	New Zealand	1
Austral Fisheries Pty Ltd	Australia	Austral Fisheries Pty Ltd	Australia	Australia	6
		Independent Fisheries Limited	New Zealand	New Zealand	2
Kura Limited	New Zealand	Sealord Vessel Management Limited	New Zealand	New Zealand	2
		United Fame Investments (Cook Islands) Limited	New Zealand	Cook Islands (New Zealand)	1
				Nauru	1
Dongwon Industries Co.,Ltd.	South Korea	Dongwon Industries Co.,Ltd.	South Korea	Papua New Guinea	1
				Tuvalu	2
Full Ocean Fishery Company Limited	Vanuatu	Full Ocean Fishery Company Limited	Vanuatu	Vanuatu	4
		Van Laar Maritime B.V.	Netherlands	Vanuatu	1
Stichting Administratiekantoor Van Laar Ijmuiden Beheer	Netherlands	Octopus Marine Shipping B.V.	Vanuatu	Vanuatu	1
		Jan Van Gent Limited	Vanuatu	Vanuatu	1
		Linda C Shipping Limited	Vanuatu	Vanuatu	1
National Fisheries Corporation Incorporated	Micronesia (Federated States of)	Caroline Fisheries Corporation Incorporated	Micronesia (Federated States of)	Micronesia (Federated States of)	4
Sajo Industries Co.,Ltd.	South Korea	Kiribati & Sajo Fisheries Company Limited	Kiribati	Kiribati	4
		Mg Kailis Proprietary Limited	Australia	Australia	3
Mg Kailis Group	Australia	Mg Kailis Gulf Fisheries Proprietary Limited	Australia	Australia	1

Table S43. Locus of shifts for the top 10 GUO countries in the global sample. The table represents the distribution of country shifts by flag continent, highlighting where the mismatches occur – at the ISH level, the GUO level, or both. For instance, Spanish GUOs collectively own 250 foreign-flagged vessels, mostly in Africa and the Americas. Only 31.2% of the foreign vessels collectively owned by Spanish GUOs were already owned by Spanish companies at the ISH level – the rest is owned through the corporate ownership of foreign subsidiaries.

Country	Flag continent	Flag-to-GUO mismatches	Owned by companies in (country) at the ISH and GUO level	%	Owned by companies (in country) at the GUO level only	%
All countries	Americas	404	252	62.4	152	37.6
	Africa	294	168	57.1	126	42.9
	Europe	231	162	70.1	69	29.9
	Asia	96	81	84.4	15	15.6
	Oceania	73	53	72.6	20	27.4
	Total	1,098	716	65.2	382	34.8
Spain	Africa	126	42	33.3	84	66.7

Country	Flag continent	Flag-to-GUO mismatches	Owned by companies in (country) at the ISH and GUO level	%	Owned by companies (in country) at the GUO level only	%
	Americas	98	25	25.5	73	74.5
	Europe	22	8	36.4	14	63.6
	Asia	3	2	66.7	1	33.3
	Oceania	1	1	100.0	0	0.0
	Total	250	78	31.2	172	68.8
South Korea	Americas	28	15	53.6	13	46.4
	Asia	17	10	58.8	7	41.2
	Oceania	15	6	40.0	9	60.0
	Europe	5	5	100.0	0	0.0
	Africa	7	2	28.6	5	71.4
	Total	72	38	52.8	34	47.2
U.S.	Americas	28	19	67.9	9	32.1
	Oceania	4	4	100.0	0	0.0
	Africa	1	1	100.0	0	0.0
	Europe	15	1	6.7	14	93.3
	Total	48	25	52.1	23	47.9
Netherlands	Europe	32	17	53.1	15	46.9
	Americas	5	4	80.0	1	20.0
	Africa	2	2	100.0	0	0.0
	Oceania	4	1	25.0	3	75.0
	Total	43	24	55.8	19	44.2
Taiwan	Americas	29	25	86.2	4	13.8
	Oceania	4	4	100.0	0	0.0
	Asia	5	4	80.0	1	20.0
	Africa	3	3	100.0	0	0.0
	Total	41	36	87.8	5	12.2
Japan	Asia	9	8	88.9	1	11.1
	Europe	7	7	100.0	0	0.0
	Americas	10	3	30.0	7	70.0
	Oceania	5	2	40.0	3	60.0
	Africa	2	0	0.0	2	100.0
	Total	33	20	60.6	13	39.4
UK	Europe	16	10	62.5	6	37.5
	Americas	8	8	100.0	0	0.0
	Africa	7	2	28.6	5	71.4
	Asia	1	0	0.0	1	100.0
	Total	32	20	62.5	12	37.5
Norway	Europe	16	12	75.0	4	25.0
	Americas	10	9	90.0	1	10.0

Country	Flag continent	Flag-to-GUO mismatches	Owned by companies in (country) at the ISH and GUO level	%	Owned by companies (in country) at the GUO level only	%
	Africa	5	5	100.0	0	0.0
	Oceania	1	1	100.0	0	0.0
	Total	32	27	84.4	5	15.6
Russia	Europe	8	8	100.0	0	0.0
	Americas	6	6	100.0	0	0.0
	Asia	8	6	75.0	2	25.0
	Africa	2	2	100.0	0	0.0
	Total	24	22	91.7	2	8.3
France	Africa	3	3	100.0	0	0.0
	Europe	2	2	100.0	0	0.0
	Total	5	5	100.0	0	0.0

