

## ESTIMATE OF THE CAPACITY OF LARGE-SCALE PURSE SEINERS FISHING FOR TROPICAL TUNAS IN THE ATLANTIC OCEAN IN 2022

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### SUMMARY

*This document estimates the 2022 fishing capacity of large-scale purse seiners targeting tropical tunas in the Atlantic, using a combination of data sources that include the ICCAT Vessel Record. It is estimated that at least 67 (and possibly 72) purse seiners were operating in this region as of the first half of 2022. This compares to 74 (80) vessels estimated in 2021 using similar methodology. The combined Fish Hold Volume (FHV) of the 72 vessels is 99,326 m<sup>3</sup>, which is equivalent to about 77,363 t of carrying capacity. We also estimate that there are at least 11 vessels operating in support of these purse seiners.*

### RÉSUMÉ

*Le présent document estime la capacité de pêche de 2022 des grands senneurs ciblant les thonidés tropicaux dans l'Atlantique, en utilisant une combinaison de sources de données dont le registre des navires de l'ICCAT. On estime qu'au moins 67, voire 72 senneurs, opéraient dans cette région au cours du premier semestre 2022. Ce chiffre est à comparer aux 74 (80) navires estimés en 2021 selon une méthodologie similaire. Le volume combiné des cales à poisson (FHV) des 72 navires est de 99.326 m<sup>3</sup>, ce qui équivaut à environ 77.363 t de capacité de transport. Nous estimons également qu'il y a au moins 11 navires opérant en soutien de ces senneurs.*

### RESUMEN

*Este documento estima la capacidad pesquera de 2022 de los grandes cerqueros que se dirigen a los túnidos tropicales en el Atlántico utilizando una combinación de fuentes de datos que entre las que se incluye el Registro ICCAT de buques. Se estima que en la primera mitad de 2022 operaron en esta región al menos 67 (y posiblemente 72) cerqueros. Esto es comparable con los 74 (80) buques estimados en 2021 utilizando una metodología similar. El volumen combinado de bodegas de pescado (FHV) de los 72 buques es de 99.326 m<sup>3</sup>, lo que equivale a unas 77.363 t de capacidad de transporte. Hemos estimado también que existen al menos 11 buques que operan en como buques de apoyo de estos cerqueros.*

### KEYWORDS

*Capacity, Fish Hold Volume, Purse seine vessels, Tropical tunas, Atlantic Ocean*

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## 1. Introduction

Paragraph 66b of the *Recommendation By ICCAT Replacing Recommendation 19-02 Replacing Recommendation 16-01 On A Multi-Annual Conservation and Management Programme for Tropical Tunas* (Rec. 2119-012) states:

*"The ICCAT Secretariat shall work with the SCRS in preparing an estimate of capacity in the Convention area, to include at least all the fishing units that are large-scale or operate outside the EEZ of the CPC they are registered in. All CPCs shall cooperate with this work, providing estimates of the number of fishing units fishing for tuna and tuna-like species under their flag, and the species or species groups each fishing unit targets (e.g. tropical tunas, temperate tunas, swordfish, other billfish, small tunas, sharks, etc.); this work shall be presented to the next meeting of the SCRS in 2020 and forwarded to the Commission for consideration;"*

Restrepo et al. (2020) and Restrepo et al. (2021) presented estimates of capacity for purse seine vessels fishing in the Atlantic in 2020 and 2021 in order to contribute to the Commission's request. This document is an update of that estimate for 2022. The methodology is repeated below for the reader's convenience.

## 2. Methods

### 2.1 Definitions

There are many ways of defining and measuring fishing capacity. For stock assessment purposes, it is useful to calculate fishing power or vessel efficiency, since not all vessels have the same fishing power due to factors such as size, age of the vessel, skipper skills, technological equipment onboard or on FADs, use of support vessels, etc. (ISSF, 2012). But this is difficult to do without having access to detailed vessel characteristics information as well as to set-by-set catch and effort information, which are not publicly available.

More simplistically, capacity can be measured in numbers of vessels and their dimension. Here we use Fish Hold Volume (FHV), which is the volume of the well space in which the tuna are stored during a fishing trip. Other dimensions such as the vessel's Gross Tonnage (GT) or the Gross Registered Tonnage (GRT) are also used, but these include spaces on the vessel that are not used to store fish, so we prefer FHV instead. Another measure that is also used is Fish Carrying Capacity (FCC) which is often measured as the maximum tons of fish that the vessel can carry during a trip. FCC and FHV are linearly related, but FCC is available less frequently, so we use FHV.

In this paper, large-scale purse seiners (LSPS) are those that have an FHV of 335 m<sup>3</sup> or greater. This is the threshold used by ISSF and the one used by Justel-Rubio and Recio (2022).

### 2.2 Estimation of FHV

The methodology used to estimate FHV is explained in detail in Justel-Rubio and Recio (2022) and here we provide a basic summary. All of the available information on individual vessels is updated annually using information from the tuna RFMO Vessel Records and from the IHS Sea-Web database in order to obtain as many details as possible about vessel dimensions (Length Overall -LOA-, Length Between Perpendiculars -LBP-, Registered Length -RGL-, GT, GRT, FCC and FHV). Vessel dimensions reported to ISSF as part of the application process to be listed on the [ProActive Vessel Register](#) (PVR, see below) are also used when available, as they often include FHV values and are audited by a third party. Then, using a set of relationships between the different vessel dimensions for purse seiners (detailed in Appendix 2 of Justel-Rubio and Recio, 2022), a hierarchical approach is used to infer the value of FHV if it is not already available.

### 2.3 Determining if a vessel is active in the Atlantic

The tuna RFMO Records of authorized vessels often contain vessels that are authorized in several RFMOs at the same time. We used Justel-Rubio and Recio (2022) estimation of LSPS authorized in ICCAT (106 vessels) as a starting point, but we have removed those LSPS that have not authorization to fish tropical tunas in ICCAT (8 purse seiners) and added one vessel that was inactive at that time but is now back in ICCAT's active list as of August 2022. That initial list of 99 LSPS vessels authorized in ICCAT is larger than that of the ICCAT Vessel Record (79 vessels) as of August 2022. There are several reasons for this, the most important one being that several vessels flagged to Venezuela had their authorization to fish for tropical tuna expire at the end of May and have now been removed from ICCAT's active list. We kept these vessels in the initial list, as they were potentially active in the Atlantic during the first half of 2022.

We also used two other sources of information to infer if vessels were operating in other areas:

- The ISSF PVR: This record is intended to enable tuna vessel owners to identify themselves as active participants in meaningful sustainability efforts complying with ISSF Conservation Measures, such as implementing specific best practices (e.g., 100% human or electronic observer coverage, use of non-entangling FADs). Its coverage is less than that of the tuna RFMOs combined (about 76% of the RFMO-listed large-scale purse seine vessels are on the PVR). On the other hand, the PVR contains fields such as the vessel owner's declaration of the RFMO Convention Area in which the vessel is fishing, plus vessel dimensions, and this information is audited annually by a third party.
- Data on Automatic Identification System (AIS). AIS is a system of position transmissions required by the International Maritime Organization (IMO) for vessels exceeding a certain size and sailing through international waters. AIS data are not always transmitted, as the systems can be turned off, but the presence of the systems can be detected from terrestrial stations at a certain distance (i.e. when near a port). AIS data are publicly-available in a [Global Fishing Watch portal](#) or via simple internet searches using the vessel name (e.g., [marinetraffic.com](#)).

As in previous years, we followed a stepwise approach to determine which large-scale purse seine vessels were likely fishing in the Atlantic:

1. Start with the vessels in the Justel-Rubio and Recio (2022) that indicate they target tropical tunas, are large-scale and are possibly operating in the Atlantic Ocean.
2. Eliminate those vessels that AIS information indicates that they have been operating in another Ocean (we focused on the period January to August 2022; in many cases there was no continuous information and we relied on recent sightings such as from port visits).
3. When AIS information was not available for a vessel, we eliminated that vessel only if the PVR indicated that it was not operating in the Atlantic. Note, however, that the operators of some vessels on the PVR do not always inform ISSF of changes in RFMO area of operation while others are unresponsive to questions such as verifying their region of operation. In these cases where AIS data was unavailable and the PVR information could not be audited, the vessels were noted as uncertain regarding region of operation.

#### ***2.4 Number of support vessels***

Some fleets have vessels that operate in support of purse seiners (called "support vessels" in Rec. 21-01). Our intention was to also calculate the number of these that are active in the Atlantic. However, it was not possible to do this for various reasons. As a result, we limited the exercise to comparing the list of support vessels on the PVR and the ICCAT Record.

### **3. Results**

Our starting point contained 99 large-scale (according to ISSF's definition) purse seiners potentially authorized to fish for tropical tunas in ICCAT (**Table 1**). After the culling process described in the previous section, we ended up with 72 vessels (**Table 2**).

Of the 72 vessels in **Table 2**, we are uncertain that five of them operate in the Atlantic, because either the PVR or the AIS information, or both, are unable to indicate that the vessels were active in the Atlantic in recent times.

As a result, our estimate of the number of active LSPS vessels in the Atlantic in 2022 ranges from 67 to 72. This is similar to our estimated capacity for 2020, but lower than our estimate for 2021 (**Table 3**). From PVR audits and the analysis in this paper, we know that at least three vessels have moved or are moving to other RFMOs. Furthermore, vessels estimated to operate in 2021 flagged to Brazil, Cape Verde and Liberia do not appear to be active in 2022.

The combined FHV for the 72 vessels in **Table 1** is 99,326 m<sup>3</sup> (93,267 m<sup>3</sup> for the 67 vessels that we are more certain have been active in the Atlantic in 2022).

The FHV for the 72 vessels translates into 77,363 t of Fish Carrying Capacity using the relationships in Justel-Rubio and Recio (2022). In 2020, purse seiners caught 323,143 t of tropical tunas in the Atlantic (Task1NC data distributed at the May 2022 Skipjack Stock Assessment meeting). Therefore, if the 72 vessels made fishing trips that completely filled their wells, they would need to make an average of 4.2 trips per vessel in a year. Large-scale purse seiners may make 5-8 trips per year and this suggests that the current capacity is higher than needed for today's catch, i.e., there is overcapacity.

**Table 4** shows the list of support vessels that are on the ISSF PVR in 2022 and whether or not they are also on the ICCAT Record. Of the 13 vessels on the PVR, 11 are on the ICCAT Active Record. However, we note that their vessel type classification varies in the ICCAT Record (support vessel, auxiliary vessel, purse seiner), which makes the analysis difficult.

#### 4. Discussion

Our estimate of 72 large scale purse seine vessels targeting tropical tunas in 2022, and even the 67 lower range estimate, is lower than our estimate for 2021 (Restrepo et al., 2021) and similar to our estimate for 2020 (Restrepo et al. 2020). There are year-to-year fluctuations, partly explained because ICCAT has no capacity limits for these vessels and they generally can move between RFMOs where they are authorized. Our study indicates that at least three vessels moved out of the ICCAT area during the last year. Variations in the number of vessels between years can also be due to lax vessel registration practices by CPCs. Furthermore, some purse seiners appear to be inactive for long periods of time perhaps waiting to be sold or scrapped, but they still appear on the ICCAT record and can be recognized by terrestrial AIS antennae in ports. Nevertheless, these are the best estimates we could come up with. We invite National Scientists to review the information in Table 2 so that it can be improved if necessary.

One important aspect for the SCRS and Secretariat to consider is that our estimates are intended to measure active capacity. In a way, all of the vessels on the ICCAT Record authorized to fish for tropical tunas could be considered as potential capacity. The RFMOs have not jointly decided on a way to manage movement of active capacity from one Convention Area to another, which, in our opinion, makes it more difficult to manage capacity regionally and globally.

We identified 11 support vessels that are on both the ISSF PVR and the ICCAT Record (**Table 4**). But the number of support vessels operating in the Atlantic could be higher as ICCAT has no specific list for support vessels in the tropical tuna fishery.

We note that paragraph 23 of Rec. [21-01] required CPCs to report their support vessels and the purse seiners that they worked with by January 31, 2020. The same paragraph also instructed the Secretariat to prepare a report to the Commission, but we are not aware of such report, perhaps because the information is being treated as confidential (pers. comm, ICCAT Secretariat) and is not being shared with observer organizations such as ISSF or shared publicly. We encourage the Secretariat to estimate the number of active support vessels.

## References

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**Table 1.** Initial list of purse seine vessels used in these analyses for 2022. PVR RFMO and AIS RFMO indicate the region where the vessel operates according to the ISSF PVR or to publicly available AIS information. PVR RFMO in parenthesis indicates that the vessel operator has not responded to third-party audits, or that they reported the vessel is not currently active, thus the information is uncertain. The penultimate column indicates whether we considered that the vessel is or could be active in the ICCAT Convention Area during January-August 2022. The last column are notes based on PVR audits or internet searches.

FLAG	NAME	ICCAT REG	PVR RFMO	AIS RFMO	ICCAT?	Notes
BLZ	ATLANTIC GLORY	AT000BLZ00036	ICCAT	ICCAT	Yes	
BLZ	ATLANTIC PRINCE	AT000BLZ00037	ICCAT	ICCAT	Yes	
BLZ	BAO LUCKY	AT000BLZ00055	ICCAT	ICCAT	Yes	
BLZ	BAO WIN	AT000BLZ00056	(ICCAT)	ICCAT	Yes	
BLZ	DICHA UNO	AT000BLZ00076	ICCAT	ICCAT	Yes	
BLZ	HARMONIA 1	AT000BLZ00057	ICCAT	ICCAT	Yes	
BLZ	JC GLORIA	AT000BLZ00081	ICCAT	ICCAT	Yes	
BLZ	PLAYA DE AZKORRI	AT000BLZ00063	ICCAT	ICCAT	Yes	
BLZ	TXORI BERRI	AT000BLZ00049	ICCAT	IOTC	No	Moved to IOTC
CUW	ALBACORA NUEVE	AT000CUW00016	(ICCAT)	IATTC	No	Probably inactive
CUW	EGALABUR	AT000CUW00029	ICCAT	ICCAT	Yes	
CUW	GALERNA	AT000CUW00015	(WCPFC)	IATTC	No	Moving to WCPFC?
CUW	GURIA	AT000CUW00022	ICCAT	ICCAT	Yes	
EU-ESP	ALBACAN	ATEU0ESP00011	IOTC	IOTC	No	
EU-ESP	ALBACORA QUINCE	ATEU0ESP01168	ICCAT	ICCAT	Yes	
EU-ESP	ALBACORA UNO	ATEU0ESP03586	IOTC	IOTC	No	
EU-ESP	ALBONIGA	ATEU0ESP00016	ICCAT	ICCAT	Yes	
EU-ESP	DONIENE	ATEU0ESP00096	IOTC	IOTC	No	
EU-ESP	EGALUZE	ATEU0ESP00099	ICCAT	ICCAT	Yes	
EU-ESP	ELAI ALAI	ATEU0ESP00100	IOTC	IOTC	No	
EU-ESP	ITSAS TXORI	ATEU0ESP03585	IOTC	IOTC	No	
EU-ESP	KURTZIO	ATEU0ESP00171	ICCAT	ICCAT	Yes	
EU-ESP	MAR DE SERGIO	ATEU0ESP00195	ICCAT	ICCAT	Yes	
EU-ESP	MONTEMAIOR	ATEU0ESP00021	ICCAT	ICCAT	Yes	
EU-ESP	MONTERAIOLA	ATEU0ESP03995	ICCAT	ICCAT	Yes	
EU-ESP	PLAYA DE BAKIO	ATEU0ESP00321	ICCAT, WCPFC	ICCAT	Yes	
EU-ESP	PLAYA DE NOJA	ATEU0ESP00106	ICCAT, WCPFC	ICCAT	Yes	
EU-ESP	PLAYA DE RIS	ATEU0ESP03774	IOTC	IOTC	No	Moved to IOTC
EU-ESP	ZUBEROA	ATEU0ESP00425	ICCAT	ICCAT	Yes	
EU-FRA	CAP BOJADOR	ATEU0FRA00012	ICCAT	ICCAT	Yes	
EU-FRA	GEVRED	ATEU0FRA05449	ICCAT, IOTC	ICCAT	Yes	
EU-FRA	GUEOTEC	ATEU0FRA00031	ICCAT	ICCAT	Yes	
EU-FRA	GUERIDEN	ATEU0FRA00032	ICCAT	ICCAT	Yes	
EU-FRA	PENDRUC	ATEU0FRA05450	ICCAT	ICCAT	Yes	
EU-FRA	STERENN	ATEU0FRA00066	ICCAT	ICCAT	Yes	
EU-FRA	VIA ALIZE	ATEU0FRA18106	ICCAT	ICCAT	Yes	
EU-FRA	VIA AVENIR	ATEU0FRA00072	ICCAT	ICCAT	Yes	
EU-FRA	VIA EUROS	ATEU0FRA00073	ICCAT	ICCAT	Yes	
EU-FRA	VIA MISTRAL	ATEU0FRA00075	ICCAT	ICCAT	Yes	
GHA	AFKO FOODS 805	AT000GHA00009	ICCAT	NA	Yes	
GHA	AFRICA STAR	AT000GHA00063	ICCAT	ICCAT	Yes	
GHA	AGNES 1	AT000GHA00010	ICCAT	ICCAT	Yes	
GHA	ATLANTIC PRINCESS	AT000GHA00057	ICCAT	ICCAT	Yes	
GHA	ATLANTIC QUEEN	AT000GHA00067	ICCAT	ICCAT	Yes	
GHA	IRIS-J	AT000GHA00056	ICCAT	ICCAT	Yes	
GHA	IRIS-QUEEN	AT000GHA00072	ICCAT	ICCAT	Yes	
GHA	LONG TAI 1	AT000GHA00068	ICCAT	ICCAT	Yes	
GHA	LONG TAI 2	AT000GHA00069	ICCAT	ICCAT	Yes	
GHA	PANOFI COMMANDER	AT000GHA00073	ICCAT	ICCAT	Yes	
GHA	PANOFI DISCOVERER	AT000GHA00060	ICCAT	ICCAT	Yes	
GHA	PANOFI FORE-RUNNER	AT000GHA00061	ICCAT	ICCAT	Yes	
GHA	PANOFI GRACE	AT000LBR00042	ICCAT	ICCAT	Yes	
GHA	PANOFI MASTER	AT000GHA00031	ICCAT	ICCAT	Yes	
GHA	PANOFI PATH FINDER	AT000GHA00062	ICCAT	ICCAT	Yes	
GHA	PANOFI QUEEN	AT000LBR00043	ICCAT	ICCAT	Yes	
GHA	YOUNG BOK	AT000GHA00054	(ICCAT)	NA	Yes	Probably inactive
GTM	SANT YAGO TRES	AT000GTM00003	ICCAT	ICCAT	Yes	
GTM	SANT YAGO UNO	AT000GTM00001	ICCAT	ICCAT	Yes	
MAR	ALESHKA	AT000MAR04755	ICCAT	ICCAT	Yes	
MAR	AZROU 1	AT000MAR00081	NA	ICCAT	Yes	
MAR	LOUDINI	AT000MAR04753	NA	NA	Yes	Could not verify
MAR	MEDIOUNA	AT000MAR01418	NA	ICCAT	Yes	
PAN	ALBACORA CARIBE	AT000PAN00024	ICCAT	ICCAT	Yes	
PAN	CAPE CORAL	AT000PAN00195	ICCAT	ICCAT	Yes	
PAN	GALERNA LAU	AT000PAN00251	ICCAT	ICCAT	Yes	
PAN	SIDNEY SOFIA	AT000PAN00226	NA	ICCAT	Yes	
PAN	SYDNEY SOFIA 101	AT000PAN00297	NA	NA	Yes	Could not verify
PAN	SYDNEY SOFIA 111	AT000PAN00296	NA	NA	Yes	Could not verify
SEN	GRANADA	AT000SEN00021	ICCAT	ICCAT	Yes	
SEN	ORIENTAL KIM	AT000SEN00032	ICCAT	ICCAT	Yes	
SEN	PONT SAINT LOUIS	AT000SEN00018	ICCAT	ICCAT	Yes	
SEN	SEA DEFENDER	AT000SEN00033	ICCAT	ICCAT	Yes	

FLAG	NAME	ICCAT REG	PVR RFMO	AIS RFMO	ICCAT?	Notes
SEN	SOLEVANT	AT000SEN00020	ICCAT	ICCAT	Yes	
SEN	WESTERN KIM	AT000SEN00022	ICCAT	ICCAT	Yes	
SEN	XIXILI	AT000SEN00025	ICCAT	ICCAT	Yes	
SLV	MONTECELO	AT000SLV00005	ICCAT	ICCAT	Yes	
SLV	MONTEFRISA NUEVE	AT000SLV00004	ICCAT	ICCAT	Yes	
SLV	MONTELAPE	AT000SLV00002	ICCAT	ICCAT	Yes	
VEN	ALETA AZUL	AT000VEN00075	IATTC	IATTC	No	
VEN	AMAZONAS	AT000VEN00003	(ICCAT, IATTC)	ICCAT	Yes	Probably inactive
VEN	CANAIMA	AT000VEN00008	IATTC	IATTC	No	
VEN	CARIBE TUNA	AT000VEN00068	IATTC	IATTC	No	
VEN	CARMELA	AT000VEN00010	IATTC	IATTC	No	
VEN	CAYO CRASQUI	AT000VEN00164	IATTC	NA	No	
VEN	CAYO NORONKY	AT000VEN00165	IATTC	IATTC	No	
VEN	CAYUDE	AT000VEN00012	IATTC	NA	No	
VEN	CURIMAGUA	AT000VEN00009	IATTC	IATTC	No	
VEN	DON FRANCESCO	AT000VEN00064	(IATTC)	IATTC	No	Probably inactive
VEN	FALCON	AT000VEN00027	IATTC	IATTC	No	
VEN	GRAN ROQUE	AT000VEN00151	ICCAT, IATTC	IATTC	No	
VEN	GUAYACAN	AT000VEN00031	(ICCAT)	NA	No	Probably inactive
VEN	LAS AVES	AT000VEN00157	NA	NA	No	Vessel scrapped
VEN	LOS ROQUES	AT000VEN00040	IATTC	IATTC	No	
VEN	ORINOCO II	AT000VEN00046	IATTC	IATTC	No	
VEN	ROCINANTE	AT000VEN00051	(ICCAT)	ICCAT	Yes	
VEN	TAURUS 1	AT000VEN00058	IATTC	IATTC	No	
VEN	TAURUS TUNA	AT000VEN00057	ICCAT, IATTC	IATTC	No	
VEN	TUNAPUY	AT000VEN00061	ICCAT	NA	Yes	
VEN	VENTUARI	AT000VEN00062	IATTC	IATTC	No	

**Table 2.** Estimate of large-scale purse seine vessels fishing for tropical tunas in the Atlantic Ocean in 2022. FLAG: Current vessel flag; NAME: Current vessel name. ICCAT Reg: Registration number in the ICCAT Record of Vessels; IMO#: Unique vessel identifier; Built: Year the vessel was built; LOA: Length overall (m); FHV: Fish Hold Volume (m<sup>3</sup>); IN 2021?: Yes if the vessel was also identified in SCRS/2021/153. Vessel names highlighted in grey are less certain to be operating in the Atlantic.

FLAG	NAME	ICCAT REG	IMO#	BUILT	LOA	FHV	IN 2021?	Notes
BLZ	ATLANTIC GLORY	AT000BLZ00036	8919403	1991	80	1100	Y	
BLZ	ATLANTIC PRINCE	AT000BLZ00037	8919415	1991	80	1100	Y	
BLZ	BAO LUCKY	AT000BLZ00055	7809273	1979	54	653	Y	
BLZ	BAO WIN	AT000BLZ00056	7360320	1974	51	650	Y	
BLZ	DICHA UNO	AT000BLZ00076	8029026	1981	55	783	Y	
BLZ	HARMONIA 1	AT000BLZ00057	7360318	1974	51	650	Y	
BLZ	JC GLORIA	AT000BLZ00081	8988818	1984	65	1225	Y	
BLZ	PLAYA DE AZKORRI	AT000BLZ00063	9476111	2009	87	1700	Y	
CUW	EGALABUR	AT000CUW00029	9710995	2014	91	2200	Y	
CUW	GURIA	AT000CUW00022	9758351	2015	82	1708	Y	
EU-ESP	ALBACORA QUINCE	ATEU0ESP01168	8206296	1983	86	1300	Y	
EU-ESP	ALBONIGA	ATEU0ESP00016	8613267	1988	55	745	Y	
EU-ESP	EGALUZE	ATEU0ESP00099	8109620	1983	52	732	Y	
EU-ESP	KURTZIO	ATEU0ESP00171	7385461	1975	56	872	Y	
EU-ESP	MAR DE SERGIO	ATEU0ESP00195	8212075	1984	84	2049	Y	
EU-ESP	MONTEMAIOR	ATEU0ESP00021	7817323	1979	72	1582	Y	
EU-ESP	MONTERAIOLA	ATEU0ESP03995	9882009	2021	77	1529	Y	
EU-ESP	PLAYA DE BAKIO	ATEU0ESP00321	9010345	1991	76	1850	Y	
EU-ESP	PLAYA DE NOJA	ATEU0ESP00106	8806955	1988	77	1850	Y	
EU-ESP	ZUBEROA	ATEU0ESP00425	8906456	1991	77	1881	Y	
EU-FRA	CAP BOJADOR	ATEU0FRA00012	8908026	1990	61	1050	Y	
EU-FRA	GEVRED	ATEU0FRA05449	9741097	2016	77	1490	Y	
EU-FRA	GUEOTEC	ATEU0FRA00031	8912986	1991	82	1800	Y	
EU-FRA	GUERIDEN	ATEU0FRA00032	8912998	1991	82	1800	Y	
EU-FRA	PENDRUC	ATEU0FRA05450	9741102	2016	77	1400	Y	
EU-FRA	STERENN	ATEU0FRA00066	9225548	2001	67	1200	Y	
EU-FRA	VIA ALIZE	ATEU0FRA18106	9877365	2021	67	1200	Y	
EU-FRA	VIA AVENIR	ATEU0FRA00072	8812186	1990	78	1650	Y	
EU-FRA	VIA EUROS	ATEU0FRA00073	9017862	1991	78	1650	Y	
EU-FRA	VIA MISTRAL	ATEU0FRA00075	9017850	1991	78	1650	Y	
GHA	AFKO FOODS 805	AT000GHA00009	8017786	1981	56	1026	Y	
GHA	AFRICA STAR	AT000GHA00063	8010386	1981	71	1090	Y	
GHA	AGNES 1	AT000GHA00010	7437202	1974	60	508	Y	
GHA	ATLANTIC PRINCESS	AT000GHA00057	8124412	1982	55	800	Y	
GHA	ATLANTIC QUEEN	AT000GHA00067	9223227	2000	73	1092	Y	
GHA	IRIS-J	AT000GHA00056	8214310	1983	55	600	Y	
GHA	IRIS-QUEEN	AT000GHA00072	8210493	1982	62	1076	Y	
GHA	LONG TAI 1	AT000GHA00068	8748660	1989	57	1330	Y	
GHA	LONG TAI 2	AT000GHA00069	8748555	1990	66	1385	Y	
GHA	PANOFI COMMANDER	AT000GHA00073	9097379	2007	72	1488	Y	
GHA	PANOFI DISCOVERER	AT000GHA00060	9565352	2009	71	3200	Y	
GHA	PANOFI FORE-RUNNER	AT000GHA00061	9568859	2009	71	3000	Y	
GHA	PANOFI GRACE	AT000LBR00042	9517276	2008	69	1538	Y	
GHA	PANOFI MASTER	AT000GHA00031	8976815	1988	65	1163	Y	
GHA	PANOFI PATH FINDER	AT000GHA00062	9568861	2009	71	3200	Y	
GHA	PANOFI QUEEN	AT000LBR00043	9097329	2007	69	1538	Y	
GHA	YOUNG BOK	AT000GHA00054	7042497	1971	56	1699	Y	Probably inactive
GTM	SANT YAGO TRES	AT000GTM00003	8919427	1991	80	1851	Y	
GTM	SANT YAGO UNO	AT000GTM00001	8919439	1991	80	1851	Y	
MAR	ALESHKA	AT000MAR04755	8415897	1984	57	458	Y	
MAR	AZROU 1	AT000MAR00081	9098646	2003	38	418	Y	
MAR	LOUDINI	AT000MAR04753	NA	NA	36	376	Y	Could not verify
MAR	MEDIOUNA	AT000MAR01418	8984939	1998	50	702	Y	
PAN	ALBACORA CARIBE	AT000PAN00024	8716825	1990	67	1800	Y	
PAN	CAPE CORAL	AT000PAN00195	9699050	2014	71	1700	Y	
PAN	GALERNA LAU	AT000PAN00251	9861495	2020	83	1909	Y	
PAN	SIDNEY SOFIA	AT000PAN00226	9857030	2019	50	704	Y	
PAN	SYDNEY SOFIA 101	AT000PAN00297	9895991	2020	72	1450	Y	Could not verify
PAN	SYDNEY SOFIA 111	AT000PAN00296	9895989	2020	72	1450	Y	Could not verify
SEN	GRANADA	AT000SEN00021	8102907	1981	68	1190	Y	
SEN	ORIENTAL KIM	AT000SEN00032	7827495	1982	68	1274	Y	
SEN	PONT SAINT LOUIS	AT000SEN00018	8222422	1984	77	1889	Y	
SEN	SEA DEFENDER	AT000SEN00033	8996190	2003	72	1488	Y	
SEN	SOLEVANT	AT000SEN00020	8104204	1982	55	600	Y	
SEN	WESTERN KIM	AT000SEN00022	8003242	1981	68	1724	Y	
SEN	XIXILI	AT000SEN00025	7413828	1979	79	2272	Y	
SLV	MONTECELO	AT000SLV00005	7409152	1980	77	1900	Y	
SLV	MONTEFRISA NUEVE	AT000SLV00004	7409176	1983	77	1358	Y	
SLV	MONTELAPE	AT000SLV00002	8021775	1981	69	1559	Y	
VEN	AMAZONAS	AT000VEN00003	7121138	1972	65	1084	N	Probably inactive
VEN	ROCINANTE	AT000VEN00051	7369675	1984	52	770	Y	
VEN	TUNAPUY	AT000VEN00061	7383748	1989	52	769	Y	



**Table 3.** Comparison of the SCRS estimation of large-scale purse seiners operating in the Atlantic Ocean in 2018 (from Table 2 of the 2019 Skipjack Executive Summary), our 2020 estimates (minimum and maximum), our 2021 estimates (min-max) and this paper's estimates (min-max) of the number of large-scale purse seine vessels that fish for tropical tunas in the Atlantic Ocean in 2019, 2020, 2021 and 2022.

<b>FLAG</b>	<b>SCRS 2019</b>	<b>SCRS/2020/ 123</b>	<b>SCRS/2021/ 153</b>	<b>This paper</b>
BLZ	2	8-8	8-8	8-8
BRA	0	0-1	0-1	0
CPV	1	1-1	1-1	0
CUW	5	4-4	4-4	2-2
EU.ESP	10	10-10	11-11	10-10
EU.FRA	10	9-9	10-10	10-10
GHA	15	16-16	16-17	16-17
GTM	2	2-2	2-2	2
LBR	0	2-2	2-2	0
MAR	0	1-1	3-4	3-4
PAN	2	3-6	5-6	4-6
SEN	7	7-7	7-7	7-7
SLV	4	4-4	3-3	3-3
VEN	0	1-1	2-4	2-3
<b>Total</b>	<b>58</b>	<b>68-72</b>	<b>74-80</b>	<b>67-72</b>

**Table 4.** Support vessels that are listed on the PVR in 2022. ICCAT TYPE indicates whether a vessel is on the ICCAT Record of vessels and how it has been classified. The last column indicates if the vessel was in Restrepo et al. (2021).

<b>FLAG</b>	<b>NAME</b>	<b>IMO#</b>	<b>PVR RFMO</b>	<b>ICCAT TYPE</b>	<b>In 2021</b>
CPV	ARTIKE	9808120	ICCAT	AUXILIARY	Y
CUW	HAIZEA BAT	9717943	ICCAT	SUPPORT	Y
CUW	PATUDO	9276092	ICCAT	SUPPORT	Y
EU-ESP	ALAKRANTXU	9156929	ICCAT, IOTC	PURSE SEINE	Y
EU-ESP	GARBOLA	9747560	ICCAT	SUPPORT	Y
EU-ESP	HAIZEA HIRU	9717955	ICCAT	SUPPORT	Y
EU-ESP	ZAHARA DOS*	9292333	(ICCAT)		Y
EU-ESP	ZAHARA UNO*	9292321	(ICCAT)		Y
PAN	CABO DE PALOS	7363700	(ICCAT)	SUPPORT	Y
PAN	IRENE	8304749	ICCAT	SUPPORT	Y
PAN	MONTEALBA	8829452	ICCAT	AUXILIARY	Y
PAN	ZAHARA TRES	9292735	(ICCAT)	SUPPORT	Y
SLV	GOLFO DE FONSECA	8829440	ICCAT	AUXILIARY	Y

\* Vessel is listed on the ICCAT inactive vessel list, and waiting to be scrapped according to PVR information.