

Falkland
Islands
Fisheries
Department



Vessel Units

Allowable Effort

Allowable Catch

2025

Summary and Recommendations

© Crown Copyright 2024

No part of this publication may be reproduced without prior permission from the Falkland Islands Government Fisheries Department.

For citation purposes this publication should be referenced as follows:

FIFD. 2024. Vessel Units, Allowable Effort, and Allowable Catch 2025. Summary and Recommendations. Fisheries Department, Directorate of Natural Resources, Falkland Islands Government.

Contents

1. FOREWORD AND SUMMARY	3
2. <i>DORYTEUTHIS GAHI (LOLIGO) – FALKLAND CALAMARI.....</i>	5
<i>Andreas Winter</i>	
2.1. MANAGEMENT AND STOCK TRENDS.....	5
2.2. VESSEL UNITS AND Q-VALUES.	5
2.3. REFERENCES.....	7
3. FINFISH.....	8
<i>Andreas Winter / Jorge E. Ramos / Andrea Clausen / Matt Jenkins</i>	
3.1. INTRODUCTION	8
3.2. VESSEL UNITS AND FISHING TIME.....	8
3.3. REFERENCES	11
4. <i>DISSOSTICHUS ELEGINOIDES – PATAGONIAN TOOTHFISH</i>	13
<i>Frane Skeljo</i>	
4.1. INTRODUCTION	13
4.2. STOCK ASSESSMENT	14
4.3. MANAGEMENT ADVICE	15
4.4. REFERENCES	15
5. RAJIFORMES – SKATES	16
<i>Andreas Winter</i>	
5.1. MANAGEMENT AND STOCK TRENDS.....	16
5.2. ALLOWABLE EFFORT AND CATCH	17
5.3. REFERENCES	18
6. QUICK REFERENCE GUIDE TO VUM/GT CATEGORY	19
6.1. FALKLAND CALAMARI FISHERY (C).....	19
6.2. FINFISH FISHERY (A, G, W)	19
6.3. TOOTHFISH LONGLINE FISHERY (L).....	20
6.4. SKATE FISHERY (F).....	20
6.5. RESTRICTED FINFISH PELAGIC FISHERY (S).....	20

1. Foreword and summary

The 2025 Licensing Advice document (Vessel Units, Allowable Effort, and Allowable Catch) summarizes licensing advice for all regulated fisheries in Falkland Islands Conservation Zones for 2025 apart from the B-licenced *Illex* fishery. Current licencing advices are based on data through the end of 2023 for finfish, toothfish and skates, and through the end of first season 2024 for calamari. Summary tables of the licencing advice are presented at the end of the report.

Stock assessments, committee papers, and survey data that inform the licencing advice standards are published as separate reports and are available on the Falkland Islands Fisheries Department website: <https://www.falklands.gov.fk/fisheries/> (publications).

Falkland calamari *Doryteuthis (Loligo) gahi* was fished for the full 1st season 2024, obtaining the fifth-highest catch and CPUE of 1st seasons since 2004. Four of the last five 1st seasons have each totalled over 45,000 tonnes *D. gahi* catch. Accordingly, allowable effort is set with the premise of full seasons in 2025, and Vessel Units were calculated as the average of the past three years: 27.01. However, with the two most recent 2nd seasons closed respectively early (2023) and not even opened (2024) for conservation, continued cautious monitoring of the *D. gahi* stock is indicated.

Finfish licence (A, G, W) allocations have, since 2022, been based on a protocol adjusting TAE by target proportion, TAC proportion, and stock abundance factors. These adjustment factors were developed largely in response to the high rates of non-allocated hake (*Merluccius* spp.) bycatch taken under G and W licences. With hake bycatches having decreased (effectively in response to these measures), that protocol has become increasingly restrictive on A licence despite A licence not evidently fishing worse than before, either in terms of taking allocated catch or avoiding non-allocated bycatch. The proposal was therefore presented to ‘freeze’ A, G and W licence allocations for 2025 at the same level as the year before, pending re-evaluation of the TAE protocol. This proposal was accepted by the fishing industry and therefore A, G and W licence Total Allowable Effort will be the same in 2025 as in 2024.

Patagonian toothfish (*Dissostichus eleginoides*) catch in the target longline fishery obtained 1,064.8 tonnes in 2023, while toothfish bycatches in calamari (4.7 tonnes) and finfish trawls (88.5 tonnes) increased in 2023 from the year before for the first time since their peaks in 2017 and 2016. The current assessment estimates a spawning stock biomass (SSB) of 12,728 tonnes toothfish and a SSB_{2023}/SSB_0 ratio of 0.491 – both higher than last year’s estimates and above the upper target reference point of 0.45. However, SSB/SSB_0 projections under the current TAC still showed a decrease below 0.45 within ten years, and a TAC increase could therefore not be proposed in accordance with the Harvest Control Rules. The TAC for 2025 is maintained at 1040 tonnes.

Skate (Rajiformes) total catch in 2023 of 1,786 tonnes was the highest since 2018. Skate target fishing (F licence) has not been resumed since 2020. Given the hiatus in skate target fishing, and the change in regulatory trawl mesh size since the last skate target fishery, the previously implemented Vessel Unit protocol for F licence was discontinued again for 2025. Instead, the same recommendation as last year was applied by default: that a skate TAC of 500 tonnes may be allocated, on condition of use of the new regulatory trawl mesh, an approved fishing plan, and continuance of the exclusion zone to skate target fishing south of 51°S latitude.

Southern blue whiting (*Micromesistius australis*) commercial catches in Falkland Islands waters were the lowest on record in 2023, at 15.2 tonnes. Of this total, 6.0 tonnes were reported under A licence, 8.4 tonnes under W licence, 0.6 tonnes under C licence, and 0.2 tonnes under X licence. A pelagic fishing trip by one vessel targeting southern blue whiting, jointly under S and E licences, had been proposed for 2023 but was subsequently cancelled for logistic reasons. Accordingly, the statutory S licence TAC of 2,000 metric tonnes is rolled forward again for 2025, but may be augmented if an approved joint commercial-exploratory fishery is reprised this year or next year.

We are grateful to the scientific observers of the FIFD for data collection and to data management staff for processing catch reports from fishing vessels. We also thank our local and overseas-partner fishing companies for their cooperation in providing timely and informative fisheries data.

2. *Doryteuthis gahi* (*Loligo*) – Falkland calamari

2.1. Management and stock trends

The targeted fishery for Falkland calamari (*Doryteuthis gahi* – colloquially *Loligo*) is managed through two levels of control: 1) season schedule and 2) total biomass to a minimum escapement threshold per season. Season schedules are currently set as: 1st season (C licence), 64/65 days opening from late February; 2nd season (X licence), 64 days from late July. Since 2013 a flexible option also allows vessels to start and end either season as much as 6 days later, including compensatory days for deferred fishing days in-season. In either 1st or 2nd season the minimum escapement threshold is set at 10,000 tonnes biomass (Barton 2002, Arkhipkin et al. 2008). If in-season depletion models project that calamari biomass will fall below 10,000 tonnes, the fishery may be suspended or stopped before the scheduled end date of the season. With the use of these controls, actual Vessel Units (VU) play a nominal role in determining the effort allocation to the Falkland calamari fishery. As long as no significant decline in stock biomass is anticipated, all licenced vessels can expect to fish for the duration of the season (except vessels restricted to fixed proportions of the season based on their replacement categories; see below). Vessel allocations are calculated from 1st seasons, given the schedule for publishing licencing advice. Four of the last five 1st seasons were among the five highest for catch and CPUE since at least 2004, when catch management was assumed by the FIFD (Skeljo and Winter 2024). Concurrently abundant biomasses are reflected in zero to low risks of season-end escapement failure (Table 2.1).

Table 2.1. Catches, estimated biomass, escapement risks, and VU allocations of Falkland calamari 1st seasons 2019-2023.

Year	1 st season calamari catch (t)	1 st season calamari biomass (t) ^a	Risk of <10,000 t escapement	Total VU allocation
2020	29,116	52,941	0.001	
2021	59,587	145,482	0.000	
2022	56,417	242,913	0.000	27.01
2023	52,704	160,375	0.000	
2024	47,588	138,471	0.000	

a: Biomass estimate at the end of the pre-season survey, plus in-season immigration.

2.2. Vessel units and q-values.

As in previous years (e.g., Section 2 in FIFD 2023), the total VU allocation for 2024 was set as the average of the preceding three years (Table 2.1). Given that this procedure has been followed for a number of years, the total VU allocation at this point is essentially a fixed value of 27.01.

Total VU allocation was partitioned among licenced vessels in proportion to the GT category-averaged catchability coefficients (q values). Catchability coefficients represent the efficiency of a vessel at fishing (Arreguín-Sánchez 1996), and are calculated as catch per unit effort per available biomass. To smooth variations within seasons, catchability coefficients were averaged over the most recent three years 2022 to 2024 (Table 2.2). Since 2016 catchability coefficients have been calculated only on unsubstituted vessels, i.e. excluding vessels that had been entered as short-term substitutes for logistic or mechanical reasons. Substitute vessels

may be less experienced in the fishery and therefore have lower catch efficiency independently of their GT category.

Table 2.2. Parameters for average q-value calculations. Trends were visualized for the five years 2020 - 2024; q averages were calculated for the most recent three years 2022 – 2024.

Parameter	GT Cat	Year					3-year average
		2020	2021	2022	2023	2024	
Biomass		52,941	145,482	242,913	160,375	138,471	
Catch (t)	4	6674.6	15946.3	15864.5	14653.7	12936.4	
	5	8988.6	15570.2	14902.5	14461.9	9585.1	
	6	9307.3	19196.3	17752.6	16632.9	18881.4	
	7	4145.6	8450.5	7561.0	6464.9	5986.7	
Fishing days	4	251	283	299	307	295	
	5	322	217	242	184	183	
	6	318	273	307	351	371	
	7	121	110	115	115	115	
CPUE (t day ⁻¹)	4	26.6	56.3	53.1	47.7	43.9	
	5	27.9	71.8	61.6	57.6	52.4	
	6	29.3	70.3	57.8	58.4	50.9	
	7	34.3	76.8	65.7	56.2	52.1	
Catchability (q)	4	5.02e-4	3.87e-4	2.18e-4	2.98e-4	3.17e-4	2.78e-4
	5	5.27e-4	4.93e-4	2.54e-4	3.59e-4	3.78e-4	3.30e-4
	6	5.53e-4	4.83e-4	2.38e-4	3.64e-4	3.68e-4	3.23e-4
	7	6.47e-4	5.28e-4	2.71e-4	3.51e-4	3.76e-4	3.32e-4

Table 2.3. VU allocations per vessel.

Vessel Callsign	GT category	GT avg. q	VU allocation
ZDLC1	4	2.78e-4	1.53
ZDLC4	4	2.78e-4	1.53
ZDLD4	5	3.30e-4	1.82
ZDLE1	6	3.23e-4	1.78
ZDLF2 ^a	6	3.14e-4	^a 1.73
ZDLM3 ^b	4	2.55e-4	^b 1.41
ZDLO1	6	3.23e-4	1.78
ZDLP1	5	3.30e-4	1.82
ZDLR1	6	3.23e-4	1.78
ZDLS3	5	3.30e-4	1.82
ZDLT1	4	2.78e-4	1.53
ZDLU1	6	3.23e-4	1.78
ZDLW3	4	2.78e-4	1.53
ZDLY ^c	7	2.86e-4	^c 1.57
ZDLZ	7	3.32e-4	1.83
ZDLZ1	6	3.23e-4	1.78
			27.01

^a Refit to category 6 from category 5, restricted to 97% of the season.

^b Replacing a category 3 vessel, restricted to 92% of the season.

^c Three-way replacement between category 5 and 7 vessels, restricted to 86% of the season.

One category 5 vessel was refit to category 6, and is restricted to 97% of the season to offset its higher fishing capacity. One category 4 vessel has been licenced to replace a category 3 vessel since 2019 (FIFD 2019), and is restricted to 92% of the season to offset its higher fishing capacity. One category 7 vessel had part of its allocation transferred to a newer category 5 vessel, and the allocation restriction was calculated at 86% (Table 2.3). By agreement in the Fisheries Advisory Committee (Winter and Ross 2022a, b), allocation restrictions for inter-category vessel replacements are kept to fixed percentages going forward.

Note that same as last year (FIFD 2023), the 3-year average has now obtained higher catchability q , and therefore VU allocation, for smaller category 5 vessels than category 6 vessels (Table 2.2, Table 2.3). The coefficient of variation (standard deviation / mean) among GT category VUs (here, cf. Table 2.33, $cv(1.53, 1.82, 1.78, 1.83) = 0.0814$) has decreased each of the last five years, indicating that GT categories have been getting progressively less differentiated in their catch power.

2.3. References.

- Arkhipkin, A.I., Middleton, D.A.J., Barton, J. 2008. Management and conservation of a short-lived fishery resource: *Loligo gahi* around the Falkland Islands. American Fisheries Society Symposium 49:1243-1252.
- Arreguín-Sánchez, F. 1996. Catchability: a key parameter for fish stock assessment. Reviews in Fish Biology and Fisheries 6:221-242.
- Barton, J. 2002. Fisheries and fisheries management in Falkland Islands Conservation Zones. Aquatic Conservation: Marine and Freshwater Ecosystems 12:127-135.
- FIFD. 2019. Vessel Units, Allowable Effort, and Allowable Catch 2020. Part I. Summary and recommendations. Fisheries Dept., Directorate of Natural Resources, Falkland Islands Government, 21 p.
- FIFD. 2023. Vessel Units, Allowable Effort, and Allowable Catch 2024. Summary and Recommendations. Fisheries Dept., Directorate of Natural Resources, Falkland Islands Government, 19 p.
- Skeljo, F., Winter, A. 2024. 2024 1st Season Stock Assessment of Falkland calamari (*Doryteuthis gahi*). Technical Document, Falkland Islands Fisheries Department. 34 p.
- Winter, A., Ross, S. 2022a. VU options for permanent vessel replacement in the Falkland Islands calamari (*Doryteuthis gahi*) fishery. Fisheries Advisory Committee paper, June 2022, 3 p.
- Winter, A., Ross, S. 2022b. VU options for permanent vessel replacement in the Falkland Islands calamari (*Doryteuthis gahi*) fishery. Fisheries Advisory Committee paper, September 2022, 3 p.

3. Finfish

3.1. Introduction

Finfish trawl catch in the Falkland Islands is allocated by three licences: A (unrestricted finfish), G (*Illex* squid and restricted finfish), and W (restricted finfish). Specialized fisheries for toothfish, skates and surimi are separately allocated by L, F and S licences. In 2023, catch of major commercial species by A, G and W licences totalled 69353.5 tonnes (Table 3.1, from Winter and Ramos 2024).

Table 3.1. Catches in 2023 of commercial species targeted by finfish licences. Licence A/G means the vessel declared an A-licence fishing day with G licence reserved.

Species	Catch by Licence (tonnes)				Total
	A	A/G	G	W	
Common hake	55789.1	86.7	4070.8	192.6	60139.1
Southern hake	9.6	0.0	0.4	26.1	36.1
<i>Illex</i> squid	201.9	11.2	2076.7	68.9	2358.7
Southern blue whiting	6.0	0.0	0.0	8.4	14.4
Hoki	567.5	0.0	198.5	2648.6	3414.7
Red cod	803.0	0.6	97.4	165.7	1066.6
Kingclip	1071.1	0.8	289.8	75.7	1437.4
Rock cod	612.9	0.4	228.4	44.9	886.6
	59061.1	99.6	6962.0	3230.9	69353.5

Finfish licence allocations for 2022 – 2024 were set by Total Allowable Effort (TAE) adjusted with target proportion, TAC proportion, and since last year; stock abundance factors (FIFD 2021, 2022, 2023). The same allocation algorithms as before were initially calculated for 2025 (Winter and Ramos 2024). However, it was found that the TAC proportion factor has become increasingly contra-indicative for A licence as this factor decreases not because A licence is fishing worse, but because G and W licences are fishing better at avoiding non-allocated hake bycatches (Winter et al. 2024). It was therefore proposed to the fishing industry (Fisheries Advisory Committee, June 2024) that instead of implementing the calculated finfish allocations for 2025 (Winter and Ramos 2024), to either switch the 2025 finfish allocations to a different baseline, or to ‘freeze’ the 2025 finfish allocations at the same level as 2024 pending a more comprehensive revision of the finfish allocation protocol (Winter et al. 2024). The fishing industry opted for having 2025 finfish allocations ‘frozen’ (personal communications to FIFD management since June 2024).

Accordingly, finfish Vessel Units (VU) are set the same for 2025 as they are for 2024 (FI Gazette 2024).

3.2. Vessel Units and Fishing Time

Vessel Units (VU), originally a calculation of catchability \times biomass \times effort, represent a metric of the fishing effort expected to yield a standard level of catch of the target species. VUs are then used to apportion the total effort allocation into fishing time. A, G and W-licence VUs were reiterated from 2024 to 2025 (Table 3.2).

Table 3.2. Vessel Units comparing 2021 to 2025.

Licence	2021 VU	2022 VU	2023 VU	2024 VU	2025 VU
A	12.20	22.39	23.93	22.83	22.83
G	12.77	7.34	11.26	10.14	10.14
W	14.27	4.01	3.60	6.07	6.07

VUs are translated to fishing time (vessel-days or vessel-months) by the vessel-units per month (VUMs), which are a function of catchability and available fish biomass. In the current TAE/TAC formulation VUMs are considered practically constant, as finfish catchability is assumed to not fundamentally change, and available fish biomass is calculated in relation to the allowed catch (Winter and Ramos 2023, 2024). Differences in fishing time allocated for years since 2021 are therefore directly proportional to VU differences from 2021 (Table 3.2):

Table 3.3. Fishing effort VUM and allocated fishing time in vessel-months by GT category, for A licence, 2016 to 2025.

GT category	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Fishing effort VUM										
3	0.45	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46
4	0.45	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46
5	0.45	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46
6	0.45	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46
7				0.46	0.46	0.46	0.46	0.46	0.46	0.46
Fishing time vessel-months										
3	26.5	26.6	26.6	26.6	26.6	26.6	48.7	52.0	49.6	49.6
4	26.5	26.6	26.6	26.6	26.6	26.6	48.7	52.0	49.6	49.6
5	26.5	26.6	26.6	26.6	26.6	26.6	48.7	52.0	49.6	49.6
6	26.5	26.6	26.6	26.6	26.6	26.6	48.7	52.0	49.6	49.6
7				26.6	26.6	26.6	48.7	52.0	49.6	49.6

Table 3.4. Fishing effort VUM and allocated fishing time in vessel-months by GT category, for G licence, 2016 to 2025.

GT category	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Fishing effort VUM										
3	0.40	0.40	0.40	0.38	0.38	0.38	0.38	0.38	0.38	0.38
4	0.68	0.68	0.68	0.73	0.73	0.73	0.73	0.73	0.73	0.73
5	0.96	0.96	0.96	1.07	1.07	1.07	1.07	1.07	1.07	1.07
6	1.25	1.25	1.25	1.42	1.42	1.42	1.42	1.42	1.42	1.42
7				1.76	1.76	1.76	1.76	1.76	1.76	1.76
Fishing time vessel-months										
3	49.7	44.8	38.1	40.0	35.2	33.4	19.3	29.6	26.7	26.7
4	29.3	26.3	22.4	21.0	18.5	17.5	10.1	15.4	13.9	13.9
5	20.7	18.7	15.9	14.3	12.6	11.9	6.9	10.5	9.5	9.5
6	16.1	14.5	12.3	10.8	9.5	9.0	5.2	7.9	7.1	7.1
7				8.7	7.7	7.3	4.2	6.4	5.8	5.8

Table 3.5. Fishing effort VUM and allocated fishing time in vessel-months by GT category, for W licence, 2016 to 2025.

GT category	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Fishing effort VUM										
3	0.31	0.31	0.31	0.40	0.40	0.40	0.40	0.40	0.40	0.40
4	0.49	0.49	0.49	0.56	0.56	0.56	0.56	0.56	0.56	0.56
5	0.66	0.66	0.66	0.72	0.72	0.72	0.72	0.72	0.72	0.72
6	0.84	0.84	0.84	0.88	0.88	0.88	0.88	0.88	0.88	0.88
7				1.03	1.03	1.03	1.03	1.03	1.03	1.03
Fishing time vessel-months										
3	71.0	64.0	54.4	42.5	37.4	35.5	10.0	9.0	15.2	15.2
4	45.7	41.2	35.0	30.5	26.9	25.4	7.2	6.4	10.8	10.8
5	33.7	30.3	25.8	23.8	21.0	19.9	5.6	5.0	8.4	8.4
6	26.7	24.0	20.4	19.5	17.2	16.3	4.6	4.1	6.9	6.9
7				16.5	14.5	13.8	3.9	3.5	5.9	5.9

Note that GT categories are equalized for A licence, as previous analyses (FIFD 2018) showed no statistically significant correlation between GT and VU of individual vessels under A licence. Also note that VUM and vessel-months per category are alternate (not additive) total outcomes, for example, the W-licence fishery could be taken entirely by Category 3 vessels fishing a total of 15.2 vessel-months or by Category 4 vessels fishing a total of 10.8 vessel-months or by Category 5 vessels fishing a total of 8.4 vessel months, etc.; or any fractional combination of these categories.

For summary purposes (H. Guille, Njord Consulting Ltd, pers. comm.), a nominal total of allocated fishing days has also been calculated for each licence, defined as the vessel-days equivalent to the vessel-months ($\times 30.5$), average-weighted by the number of fishing days per GT category actually carried out in the preceding year 2023 (Tables 3.6, 3.7, 3.8). Note that in this case the nominal totals do differ from the year before (FIFD 2023), as realized numbers of fishing days per GT category were not the same in 2023 as in 2022.

Table 3.6. A licence summary of vessel days and fishing days. V-months / v-days are equivalent to Table 3.3.

GT category	2025		2023
	v-months	v-days	fishing days
3	49.6	1513.8	516
4	49.6	1513.8	494
5	49.6	1513.8	549
6	49.6	1513.8	0
7	49.6	1513.8	0

Table 3.7. G licence summary of vessel days and fishing days. V-months / v-days are equivalent to Table 3.4.

GT category	2025		2023
	v-months	v-days	fishing days
3	26.7	814.1	75
4	13.9	423.8	158
5	9.5	289.1	107
6	7.1	217.9	0
7	5.8	175.8	0

Table 3.8. W licence summary of vessel days and fishing days. V-months / v-days are equivalent to Table 3.5.

GT category	2024		2022
	v-months	v-days	fishing days
3	15.2	462.5	17
4	10.8	330.3	73
5	8.4	256.9	24
6	6.9	210.2	0
7	5.9	179.6	0

$$\begin{aligned} \text{Summary A days} &= \\ & \frac{(1513.8 \times 516) + (1513.8 \times 494) + (1513.8 \times 549) + (1513.8 \times 0) + (1513.8 \times 0)}{(516 + 494 + 549 + 0 + 0)} \\ &= 1513.8 \end{aligned}$$

$$\begin{aligned} \text{Summary G days} &= \\ & \frac{(814.1 \times 75) + (423.8 \times 158) + (289.1 \times 107) + (217.9 \times 0) + (175.8 \times 0)}{(75 + 158 + 107 + 0 + 0)} \\ &= 467.5 \end{aligned}$$

$$\begin{aligned} \text{Summary W days} &= \\ & \frac{(462.5 \times 17) + (330.3 \times 73) + (256.9 \times 24) + (210.2 \times 0) + (179.6 \times 0)}{(17 + 73 + 24 + 0 + 0)} \\ &= 334.6 \end{aligned}$$

3.3. References

- Falkland Islands Fisheries Department (FIFD). 2018. Vessel Units, Allowable Effort, and Allowable Catch 2019. Summary and recommendations. Fisheries Dept., Directorate of Natural Resources, Falkland Islands Government, 21 p.
- Falkland Islands Fisheries Department (FIFD). 2021. Vessel Units, Allowable Effort, and Allowable Catch 2022. Summary and recommendations. Fisheries Dept., Directorate of Natural Resources, Falkland Islands Government, 19 p.
- Falkland Islands Fisheries Department (FIFD). 2022. Vessel Units, Allowable Effort, and Allowable Catch 2023. Summary and recommendations. Fisheries Dept., Directorate of Natural Resources, Falkland Islands Government, 18 p.
- Falkland Islands Fisheries Department (FIFD). 2023. Vessel Units, Allowable Effort, and Allowable Catch 2024. Summary and recommendations. Fisheries Dept., Directorate of Natural Resources, Falkland Islands Government, 19 p.

Falkland Islands Gazette (2024). Volume 133, No. 15. Notices No. 68, 69, 70.

Winter, A., Ramos, J.E. 2023. Finfish licencing advice 2024. Fisheries Advisory Committee paper, June 2023, 16 p.

Winter, A., Ramos, J.E. 2024. Finfish licencing advice 2025. I. Calculations. Fisheries Advisory Committee paper, June 2024, 20 p.

Winter, A., Clausen, A.P., Jenkins, M. 2024. Finfish licencing advice 2025 II. Management options. Fisheries Advisory Committee paper, June 2024, 5 p.

4. *Dissostichus eleginoides* – Patagonian toothfish

4.1. Introduction

The targeted longline fishery (L licence) for Patagonian toothfish (*Dissostichus eleginoides*) is managed through total allowable catch (TAC). In addition to target longlines, notable quantities of toothfish are taken as bycatch in finfish and calamari trawl fisheries. In the finfish fishery, toothfish are a commercially valuable bycatch; in the calamari fishery, toothfish are typically discarded due to the small size of the specimens.

Toothfish stock assessment is conducted using an integrated model implemented in CASAL software (Bull et al. 2012). The model integrates the catch, effort, and tag recapture data reported by fisheries, with toothfish age, length and maturity data collected by observers during commercial trips and research surveys. Toothfish tag-release and tag-recapture data had been introduced into the model for the first time in the 2023 assessment (Skeljo et al. 2023); tag-recapture data were used as an index of absolute abundance, thus reducing model reliance on the commercial CPUE data. The main observations used to inform the model are catch-at-age data for Spanish-system longline, umbrella-system longline, finfish trawl and calamari trawl fisheries, catch-at-age data for groundfish survey and calamari pre-season survey, CPUE data for Spanish- and umbrella-system longline, and tag-recapture data for the umbrella-system longline. CPUE is standardized across several covariates (individual vessel, month, soak time, depth, fishing area and number of hooks per umbrella).

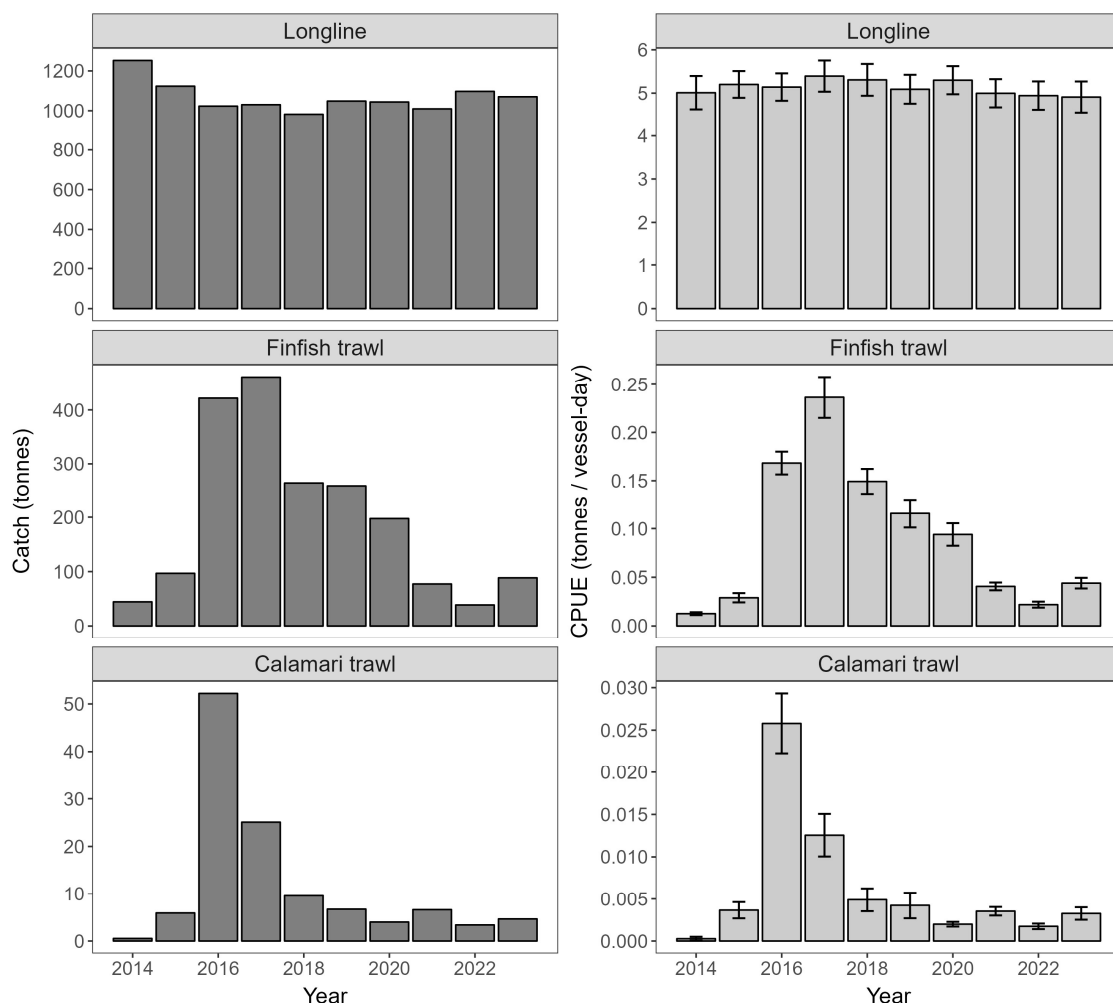


Figure 4.1 [previous page]. Time series of toothfish catches (left) and observed CPUE (right) for longline, finfish trawl and calamari trawl fisheries. Error bars are 95% confidence intervals of the mean observed CPUE.

In 2023, a total of 1,165.8 tonnes of toothfish was caught in the FCZ, with 1064.8 tonnes (91.3%) taken by the target longline fishery, 88.5 tonnes (7.6%) by finfish trawl and 4.7 tonnes (0.4%) by the calamari trawl fishery (Figure 4.1). A further 7.8 tonnes (0.7%) was caught during research surveys. The combined toothfish bycatch in finfish and calamari trawl fisheries increased compared to the previous year for the first time since 2016.

4.2. Stock assessment

Model estimates (with 95% credible intervals) of initial spawning stock biomass (SSB_0), current spawning stock biomass (SSB_{2023}) and current spawning stock biomass relative to SSB_0 (SSB_{2023}/SSB_0) are given in Table 4.1. The current estimates of SSB_0 , $SSB_{current}$ and $SSB_{current}/SSB_0$ were higher than in the 2023 assessment by 5.8%, 10.3% and 4.9%, respectively. As there were no major changes to the model structure or model assumptions from the previous year, the change in estimates was largely due to data updates through 2023; further analysis showed that the higher estimates were driven primarily by tag-recapture data in 2023, while the CPUE and catch-at-age data for 2023 had comparatively little effect on changing model estimates from the year before.

Since the inclusion of tag-recapture data into the model in the 2023 assessment, the 95% credible intervals have been noticeably narrower and only slightly asymmetrical compared to earlier years; likely due to tag-recapture data being highly informative on the SSB_0 . Deterministic MSY (maximum constant annual catch that can be sustained under the assumption of constant average recruitment) was estimated at 1,699 t, in-between the 2023 and 2022 estimates (1,653 and 1,728 t, respectively).

Table 4.1. Model estimates (with 95% credible intervals) of SSB_0 , SSB_{2023} and SSB_{2023}/SSB_0 . From Skeljo and Winter (2024).

SSB_0	SSB_{2023}	SSB_{2023}/SSB_0
25,942 (23,912 - 28,935)	12,728 (10,815 - 15,878)	0.491 (0.449 - 0.551)

Projections from the current and previous assessments showed a similar trend, except the current assessment projected SSB/SSB_0 to drop from the *expansion range* to the *target range* three years later, in 2029 instead of 2026. This change can be explained by the higher estimate of $SSB_{current}/SSB_0$ in the current model. The model estimate was the starting point for the projections, and everything else being the same, it would take projected SSB/SSB_0 longer to drop below 0.45 when starting from a higher $SSB_{current}/SSB_0$ value. The projected drop in SSB/SSB_0 is a response to a series of weak recruitments estimated by the model (below-average YCS in 2018-2020) and supported by an independent analysis (Lee et al. 2021).

Given the influence of recent recruitment strengths on model projections, close monitoring of juvenile toothfish abundance during research surveys needs to be emphasized. Protection of high recruitment age-0 cohorts while on the shelf via spatiotemporal management of the calamari trawl fishery has been proposed (Skeljo 2023), and a protocol established in early 2024.

4.3. Management advice

Management advice is based on the harvest control rules (HCR) established for the Falkland Islands toothfish longline fishery (Farrugia and Winter 2018). The estimated SSB_{2023}/SSB_0 ratio of 0.491 was above *the upper target reference point* (0.45), i.e. in the *expansion range*; projections from the current model indicated that SSB/SSB_0 ratio will drop and remain in the *target range* during 2029-2045. The year 2023 was the fourth consecutive year with $SSB_{current}/SSB_0$ estimated to be in the *expansion range*; however, since SSB/SSB_0 projections under the current TAC showed a decrease below 0.45 within ten years, no alteration of TAC was anticipated by HCR at this point.

The recommendation is to maintain toothfish annual TAC in the longline fishery at its current level of 1,040 tonnes.

4.4. References

- Bull, B., Francis, R.I.C.C., Dunn, A., McKenzie, A., Gilbert, D.J., Smith, M.H., Bian, R., Fu, D. 2012. CASAL (C++ algorithmic stock assessment laboratory): CASAL User Manual v2.30-2012/03/21. NIWA Technical Report 135, 275 p.
- Lee, B., Arkhipkin, A., Randhawa, H. 2021. Environmental drivers of Patagonian toothfish (*Dissostichus eleginoides*) spatial-temporal patterns during an ontogenetic migration on the Patagonian Shelf. *Estuarine, Coastal and Shelf Science* 259, 107473.
- Farrugia, T.J., Winter, A. 2018. 2017 Stock Assessment Report for Patagonian toothfish, Fisheries Report SA-2017-TOO. Fisheries Department, Directorate of Natural Resources, Falkland Islands Government, 35 p.
- Skeljo F. 2023. Patagonian toothfish (*Dissostichus eleginoides*) bycatch in the calamari trawl fishery (2012 - 2021). Fisheries Report BY-2023-TOO. Fisheries Department, Directorate of Natural Resources, Falkland Islands Government, 50 p.
- Skeljo, F., Lee, B., Winter, A. 2023. Stock assessment of Patagonian toothfish (*Dissostichus eleginoides*) in the Falkland Islands to 2022. Fisheries Report SA-2022-TOO. Fisheries Department, Directorate of Natural Resources, Falkland Islands Government, 48 p.
- Skeljo, F., Winter, A. 2024. Stock assessment of Patagonian toothfish (*Dissostichus eleginoides*) in the Falkland Islands to 2023. Fisheries Report SA-2023-TOO. Fisheries Department, Directorate of Natural Resources, Falkland Islands Government, 46 p.

5. Rajiformes – Skates

5.1. Management and stock trends

Skate (Rajiformes) are since 1994 licenced separately from other groundfish trawl fisheries in the Falkland Islands (F licence). The skate fishery has been regulated by total allowable effort (TAE) of licenced vessels. A large proportion of skate catch is routinely taken in finfish trawls, while skate-licenced vessels may take large amounts of groundfish other than skate.

Total catch of skate in 2023 was the highest since 2018, and non-target skate catch was the highest since 2017 (Figure 5.1). 2023 was also the third year on record with a complete absence of skate catch under target (F) licence, which had been decreasing continually since 2014 (Figure 5.1). Therefore, a new catch / effort-based stock assessment was again not calculated in 2024. Most skate in 2023 was caught under finfish (A, G and W) licences, but representing no more than low single-digit percentages of the total commercial catches of these licences (Table 5.1). The most recent stock assessment (Winter 2018) showed stable trends of the skate stock, while reviews of the skate assemblage (Arkhipkin et al. 2012, Winter et al. 2015) noted high population abundance, species diversity, and habitat structure. In contrast, an analysis of skate surveys indicated that since 2013 (the latest year examined by Winter et al. 2015) skate biomass in Falkland Islands waters may have decreased by 45% to 70% overall, with most individual species showing declines (Winter 2022, Winter and Arkhipkin 2023).

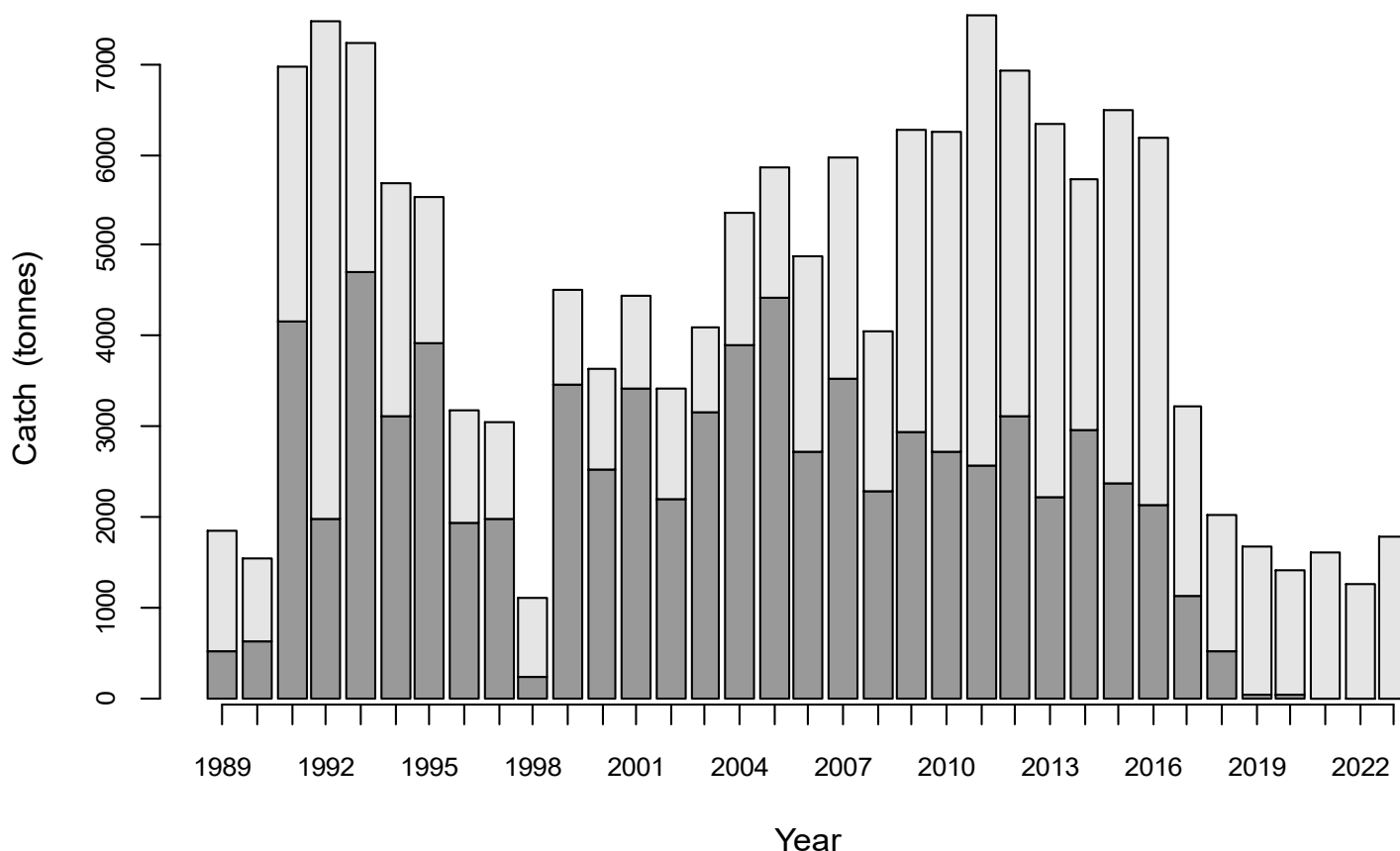


Figure 5.1. Target-licence catches (dark) and all catches (light grey) of skates, 1989 to 2023.

Table 5.1. Skate catch by fishing licence in 2023, and percentage that skate represented of each licence’s total commercial catch. Licence type A/G means the vessel declared an A-licence fishing day with G licence reserved. Percentages of commercial catch exclude jig fishing (B and O licences), as jig fishing never catches skate.

Licence	Tonnes	% of commercial species catch
A	1443.1	2.4
A/G	0.5	0.5
B*	0.0	–
C	8.3	< 0.1
E	5.1	0.3
G	189.5	2.6
L	46.9	4.0
O*	8.4	0.2
W	77.7	2.3
X	6.5	< 0.1
Total	1786.0	1.2

* Excluding jig fishing.

5.2. Allowable effort and catch

The general aim of Licencing Advice is to maintain fisheries at sustainable catch levels while mitigating year-to-year fluctuations in allocated effort. Vessel Units (VU) are therefore calculated over three-year rolling averages (FIFD 2023). However, the speculative use of F licence in recent years has made the VU protocol impractical. Before ceasing completely in 2021, 59 fishing days under F licence were recorded in 2020, of which only 2 reported >50% skate in the catch and only 12 reported even >10% skate in the catch. The year before, in 2019, a total of 27 fishing days were recorded under F licence, of which 9 reported >50% skate in the catch and 13 reported >10% skate in the catch. Furthermore, a regulatory minimum codend mesh size of 400 mm for skate target trawling, established in 2021 (Arkhipkin et al. 2021) (and thus never used commercially) would prevent any straightforward catch-per-unit-effort comparison with previous years.

The skate survey analysis recommended that with as much as 70% reduction of biomass, a precautionary limit on catch should be 30% of the most recent calculated MSY, which after deduction of bycatch, would leave approximately 500 tonnes TAC for F licence (Winter 2022). As no skate target fishing is being taken in 2023, and no more recent stock assessment data are available, the 500 tonne TAC is continued for next year. Fishing this 500 tonne TAC should require use of the regulatory 400 mm mesh trawl codend, and should continue to be excluded from south of 51°S latitude, established as a skate conservation area since 1996 (Agnew et al. 1999).

As noted above, setting a corresponding fishing days allocation is impeded by the lack of comparability with previous skate trawl effort using smaller mesh. For 2023, a nominal maximum effort allocation of 114 days was set based on previous years (FIFD 2022). For 2024 and now 2025, the 114-day effort allocation is continued by default, but in practice, any resumption of F licence skate target fishing in 2025 will require an approved fishing plan.

5.3. References

- Agnew, D.J., Nolan, C.P., Pompert, J. 1999. Management of the Falkland Islands skate and ray fishery. In: Case studies of the Management of Elasmobranch Fisheries (R. Shotton, ed.), FAO, Rome, pp. 268-284.
- Arkhipkin, A., Brickle, P., Laptikhovsky, V., Pompert, J., Winter, A. 2012. Skate assemblage on the eastern Patagonian Shelf and Slope: structure, diversity and abundance. *Journal of Fish Biology* 80:1704-1726.
- Arkhipkin, A., Skeljo, F., Wallace, J., Derbyshire, C., Goyot, L., Trevizan, T., Winter, A. 2021. Industry-collaborative mesh trials to reduce bycatch in the Falkland Islands skate trawl fishery (Southwest Atlantic). *ICES Journal of Marine Science* 80: 578–590.
- FIFD. 2022. Vessel Units, Allowable Effort, and Allowable Catch 2022. Summary and recommendations. Fisheries Dept., Directorate of Natural Resources, Falkland Islands Government, 18 p.
- FIFD. 2023. Vessel Units, Allowable Effort, and Allowable Catch 2024. Summary and Recommendations. Fisheries Dept., Directorate of Natural Resources, Falkland Islands Government, 19 p.
- Winter, A. 2018. Stock assessment – skates (Rajidae). Technical Report, Falkland Islands Fisheries Department. 14 p.
- Winter, A. 2022. Survey estimation of skate biomass. Fisheries Advisory Committee paper, September 2022, 15 p.
- Winter, A., Arkhipkin, A. 2023. Opportunistic survey analyses reveal a recent decline of skate (Rajiformes) biomass in Falkland Islands waters. *Fishes* 8, 24.
- Winter, A., Pompert, J., Arkhipkin, A., Brewin, P. 2015. Interannual variability in the skate assemblage on the South Patagonian shelf and slope. *Journal of Fish Biology* 87: 1449-1468.

6. Quick reference guide to VUM/GT Categories

6.1. Falkland calamari fishery (C)

VU = 27.01 – allows for a standard fleet of 16 vessels.

6.2. Finfish fishery (A, G, W)

VU allocations for 2021 to 2024.

Licence	2021 VU	2022 VU	2023 VU	2024 VU	2025 VU
A	12.20	22.39	23.93	22.83	22.83
G	12.77	7.34	11.26	10.14	10.14
W	14.27	4.01	3.60	6.07	6.07

A licence. Fishing effort VUM and fishing time vessel-months.

GT category	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Fishing effort VUM										
3	0.45	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46
4	0.45	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46
5	0.45	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46
6	0.45	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46
7				0.46	0.46	0.46	0.46	0.46	0.46	0.46
Fishing time vessel-months										
3	26.5	26.6	26.6	26.6	26.6	26.6	48.7	52.0	49.6	49.6
4	26.5	26.6	26.6	26.6	26.6	26.6	48.7	52.0	49.6	49.6
5	26.5	26.6	26.6	26.6	26.6	26.6	48.7	52.0	49.6	49.6
6	26.5	26.6	26.6	26.6	26.6	26.6	48.7	52.0	49.6	49.6
7				26.6	26.6	26.6	48.7	52.0	49.6	49.6

G licence. Fishing effort VUM and fishing time vessel-months.

GT category	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Fishing effort VUM										
3	0.40	0.40	0.40	0.38	0.38	0.38	0.38	0.38	0.38	0.38
4	0.68	0.68	0.68	0.73	0.73	0.73	0.73	0.73	0.73	0.73
5	0.96	0.96	0.96	1.07	1.07	1.07	1.07	1.07	1.07	1.07
6	1.25	1.25	1.25	1.42	1.42	1.42	1.42	1.42	1.42	1.42
7				1.76	1.76	1.76	1.76	1.76	1.76	1.76
Fishing time vessel-months										
3	49.7	44.8	38.1	40.0	35.2	33.4	19.3	29.6	26.7	26.7
4	29.3	26.3	22.4	21.0	18.5	17.5	10.1	15.4	13.9	13.9
5	20.7	18.7	15.9	14.3	12.6	11.9	6.9	10.5	9.5	9.5
6	16.1	14.5	12.3	10.8	9.5	9.0	5.2	7.9	7.1	7.1
7				8.7	7.7	7.3	4.2	6.4	5.8	5.8

W licence. Fishing effort VUM and fishing time vessel-months.

GT category	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Fishing effort VUM										
3	0.31	0.31	0.31	0.40	0.40	0.40	0.40	0.40	0.40	0.40
4	0.49	0.49	0.49	0.56	0.56	0.56	0.56	0.56	0.56	0.56
5	0.66	0.66	0.66	0.72	0.72	0.72	0.72	0.72	0.72	0.72
6	0.84	0.84	0.84	0.88	0.88	0.88	0.88	0.88	0.88	0.88
7				1.03	1.03	1.03	1.03	1.03	1.03	1.03
Fishing time vessel-months										
3	71.0	64.0	54.4	42.5	37.4	35.5	10.0	9.0	15.2	15.2
4	45.7	41.2	35.0	30.5	26.9	25.4	7.2	6.4	10.8	10.8
5	33.7	30.3	25.8	23.8	21.0	19.9	5.6	5.0	8.4	8.4
6	26.7	24.0	20.4	19.5	17.2	16.3	4.6	4.1	6.9	6.9
7				16.5	14.5	13.8	3.9	3.5	5.9	5.9

6.3. Toothfish longline fishery (L)

TAC – 1,040 tonnes.

6.4. Skate fishery (F)

TAC – 500 tonnes, maximum 114 vessel-days pursuant to an approved fishing plan.

6.5. Restricted finfish – Pelagic fishery (S)

TAC for southern blue whiting – 2,000 tonnes plus FIFD-approved exploratory fishing.