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UK TAC sustainability risk analysis (FRD039/C8505)

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Executive Summary

Policy question: What are the sustainability risks to quota species under the current management system? Specifically, with a focus on mixed fisheries, is there evidence of fishing beyond agreed total allowable catch (TAC) shares by UK fleets in recent years, are some TACs at a higher risk of being fished beyond allowed catch shares?

An increase in fishing quotas, in some cases by more than 50%, was applied to account for the implementation of the landing obligation (LO). In the absence of catch monitoring, this may have led to an unmeasured increase in fishing mortality. Cefas previously reported that there was no detectable reduction in discard rates for English vessels following the implementation of the LO. Therefore, there is a risk that discards may be contributing to fishing mortality above the agreed TACs.

Two analyses were completed for TACs in each region, Celtic Sea, North Sea, West of Scotland and Irish Sea, to identify those TACs most at risk of fishing beyond the agreed UK TAC shares. One provides a proxy for risk and is calculated for the period prior to the full implementation of the LO (2014-18), the other estimated the absolute catches relative to UK TAC share once fisheries were fully subject to the LO (2019-20/21). The different approaches indicated several of the same species and TACs as being at highest risk. Therefore, while there is some uncertainty in the discard data, and so in the absolute estimates of over- and under-fishing of the quotas, there is confidence in the relative risk ranking for the different TACs.

For the Celtic Sea, the TACs for cod (COD/7XAD34), haddock (HAD/7X7A34), whiting (WHG/7X7A-C) and plaice (PLE/7HKJ) had the highest risk of catches exceeding agreed UK TAC shares during the assessed period.

For the North Sea, the TACs for whiting (WHG/2AC4.), cod (COD/2A3AX4), saithe (POK/2C3A4), and hake (HKE/2AC4-C) had the highest risk of catches exceeding agreed levels.

For the West of Scotland region, the TACs for cod (COD/5BE6A), whiting (WHG/56-14) and haddock (HAD/5BC6A.) had the highest risk of catches exceeding agreed levels.

For the Irish Sea, the TACs for cod (COD/07A.) and whiting (WHG/07A.) had the highest risk of catches exceeding agreed levels.

The risks identified here relate only to the catches when compared with the agreed TACs, and not to the levels at which TACs are set relative to scientific advice. Across all regions, four cod and whiting TACs, and two haddock TACs had the highest risk that catches have been above agreed UK TAC shares, indicating that these species could be prioritised for enhancements in catch accounting to mitigate the risk of fishing beyond agreed levels.

1. Introduction

Policy question: What are the sustainability risks to quota species under the current management system? Specifically, with a focus on mixed fisheries, is there evidence of fishing beyond total allowable catch (TAC) shares by UK fleets in recent years, are some TACs at a higher risk of being fished beyond allowed catch shares?

An increase in fishing quotas, in some cases by more than 50%, was applied to account for the implementation of the landing obligation (LO). In the absence of catch monitoring, this may have led to an unmeasured increase in fishing mortality. Cefas previously reported that there was no detectable reduction in discard rates for English vessels following the implementation of the LO (Ribeiro Santos et al., 2021¹). Therefore, there is a risk that discards may be contributing to fishing mortality above the allowable catch shares.

Here we assess the relative and absolute sustainability risk from UK vessels catching quota species in excess of agreed levels in the Celtic Sea, North Sea, Irish sea and West of Scotland regions.

2. Methodology

A full list of TACs was compiled. To assess total levels of catch against quotas, the assessment included only TACs for which there are both reported landings and discards by UK vessels. The analysis assumed that landed fish were reported against the correct TAC. A list of TACs for which there was not both UK landings and discard data is given in Annex 1.

Due to having no direct access to observer programme data for UK administrations other than England and Wales, two approaches were applied. For those UK fisheries predominantly in English and Welsh waters (Celtic Sea), the Cefas observer data were used directly to estimate discards (2014-2021). These data are generated by scientific observers recording catches during routine commercial fishing operations. For other UK fisheries (in the North Sea, Irish Sea and West of Scotland regions), published STECF FDI data were used. These data are derived from the independent UK observer programmes, submitted by England and Wales, Northern Ireland and Scotland. These data are processed and published by the EU Commission. The final year for which the UK

¹ Ana Ribeiro Santos, Marta Soeffker, Jonathan Ball, Marieke Desender, Tom Catchpole (2021). English catch and discard patterns during the phased implementation of the Landing Obligation - Assessing the response to the landing obligation between 2015 and 2019. A Cefas Report from the ASSIST II Project for Defra, May 2021, pp75.

submitted data to STECF was for 2020, and the data extracted from the FDI database were for the period 2014-20.

Details of the data and processing used for the two approaches are given in Annex 2. From fishing trips observed by scientists, a percentage of the catch discarded was calculated and applied to the total reported landings from all fishing trips to estimate the total quantity of discards. The final product was UK total landings and estimated discards by year by TAC.

2.1. Rules for filling gaps in discard data

A metier is a group of fishing operations catching a specific group of species, using a specific gear, during a period of the year, such as a quarter of a year, and/or within a specific area, such as a combination of ICES sub divisions. In this analysis, an example of a metier-quarter-TAC combination would be catches of haddock from ICES sub divisions 7.b-k, taken by beam trawlers operating in Q1 2018. For some metier-quarter-TAC combinations, due to the level of observer coverage, no discard estimates were available from the Cefas observer programme or the STECF FDI database.

Rules were developed to systematically fill the gaps with the most relevant estimates. Discard rates were filled using the estimate from the nearest quarter for which there was data, with the previous quarter prioritised. The percentage of filling in the datasets across all TACs by year is given in Annex 3 which shows that the level of filling was higher for the STECF FDI data (68-80%) than the Cefas observer (27-70%) due to thresholds applied for sample sizes for the FDI, and filling was higher for the period when observer programmes were disrupted by Covid-19 (2020-21).

For some metier-quarter-TAC combinations, observer sampled trips generated 100% discard rates, i.e., all catches of a species were discarded. In instances where there were fleet landings associated with a 100% discard rate, to enable a calculation of total catch, the next nearest quarterly discard rate estimate within the same year was used. In a few cases, where no discard estimate was available, a nominal discard rate of 99% was applied to the reported landings.

2.2. Catch vs quota analyses

In each region, two analyses were applied to the final estimates of UK landings and discards by TAC to account for the implementation of the LO, whereby total catch was aligned with quotas for all TACs only from 2019.

2.2.1. Analysis 1 - prior to full implementation of the landing obligation

For the period 2014-18, for each TAC, the overall discard rates for all UK vessels were correlated with quota uptake - landings as a percentage of available quota (at the end of the year). This was the period before the full implementation of the LO, when landings quotas were issued, or partial catch quotas from 2016. TACs which demonstrated high uptake of quota, from landings only, combined with a high discard rate, were identified as those at highest risk of being fished beyond agreed levels.

2.2.2. Analysis 2 - post full implementation of the landing obligation

For the period 2019-20 (and 2021 for Celtic Sea region), for each TAC, the total catch (landings + discards) was compared with the UK TAC share. After the full implementation of the LO, full catch quotas were allocated (not only landings), therefore it is possible to directly compare the estimated catch with the available quota and quantify the under and over-shoot of quotas. Catches were compared with the end of year UK TAC shares, to account for international within-year quota swaps. We assessed separately the 2020-21 discard data to explore the effect of the disruption to the observer programmes due to Covid-19.

2.3. Ranking of risk by TAC

For analysis 1, TACs with a high discard rate combined with a high (landings) quota uptake indicated a higher risk. For the period 2014-18, it cannot be determined whether overall catches exceeded agreed levels of fishing mortality. However, we have developed a simple proxy for risk by multiplying discard rate (given as proportion of discards relative to the catch) by the percentage uptake for each TAC in each year. When summed across all years and then ranked, this provided a proxy for sustainability risk for the different TACs.

For 2019-21 in analysis 2, the risk of catches exceeding quota is given by the ‘% Catch in comparison to quota’ in Table 1, whereby the higher the percentage, the higher the risk. For 2020-21, the disruption to the Cefas programme meant there is less confidence in the discard estimates. We therefore explored 2019 in isolation and in combination with the other two years.

2.4. Other considerations

2.4.1. Comparison of approaches for Celtic Sea region

For the Celtic Sea region, a comparative analysis was performed to assess the consistency between using the Cefas observer data directly and using the same data once

processed and published in the STECF FDI database. If the outputs were consistent, that provided more confidence that using the STECF FDI data to provide observer data from Scottish and Northern Irish fisheries was appropriate. We present a short summary of the outputs.

2.4.2. Skate and rays

Skates and ray TACs are allocated to a group of species, and while speciated landings and discards are available for the Celtic Sea, no discard data were available for the other regions in the FDI. Moreover, most skates and ray TACs are allocated as landings only TACs, therefore catches exceeding the TAC would not constitute fishing beyond agreed levels. Therefore only when landings exceeded the TAC would it indicate a sustainability risk for the stock (see next point). For these reasons, skates and rays were excluded from these analyses.

2.4.3. TACs with no discard information

For TACs with no discard data, or no discard information from the main target fisheries, it was not possible to compare total catch with UK TAC shares. However, for each region, we have identified stocks for which uptake of the UK TAC share was >90% in any one year between 2019-21. While we cannot quantify the level of risk for these TACs, we can infer that with relatively low levels of discarding, the total UK catch could have exceeded the UK TAC share. We have provided a list of these potentially higher risk TACs, but these are not included in the final rankings.

3. Results

3.1. Presentation of results

Results are presented for each region separately for analysis 1 and 2, then an overall ranking using both analyses is given for each region.

3.1.1. Analysis 1 - Quota uptake vs discard rate for 2014 to 2018

For each region, overall discard rates, shown as discards as a proportion of catch, for the UK fleet, are plotted against the quota uptake, given as a percentage. The quota uptake is based on the landings as a percentage of the end of year allocation. The quota mostly represents a landings quota, but some are partial catch quotas in later years where adjustments were made to account for phasing in of the landing obligation. TACs in the top right quadrant are the most at risk of catches exceeding the agreed quotas due to the high

quota uptake and high proportion discarded. TACs located in the bottom left quadrant are less at risk as the quota uptake and proportion discarded are both low.

3.1.2. Analysis 2 - UK TAC share vs UK catch for 2019-20/21

For each region, tables present the TACs ranked by the risk that UK catches exceeded UK quota shares in 2019, with an estimate of the % catch relative to UK quota share. The equivalent tables for 2020, and 2021 for Celtic Sea, are given in Annex 4.

3.1.3. Ranking of risk by TAC and region

For analysis 1, TACs with a high discard rate combined with a high (landings) quota uptake indicate a higher risk. For the period 2014-18, it cannot be determined whether overall catches exceeded agreed levels of fishing mortality. However, we have developed a simple proxy for sustainability risk by multiplying discard rate (given as proportion of discards relative to the catch) by the percentage uptake for each TAC in each year. When summed across all years and then ranked by highest value first, this provides a proxy for sustainability risk for the group of TACs in each region.

For analysis 2, for 2019-20 (and 2021 in the Celtic Sea), the risk of catches exceeding quota is given by the ‘% Catch in comparison to quota’ in Table 1, whereby the higher the percentage, the higher the risk. This is transposed to a numerical ranked risk.

A sum of the ranking from analyses 1 and 2 are presented as an overall ranking of risk. For 2020-21, the disruption to the observer programmes from COVID meant there is less confidence in the discard estimates. To explore the effect of this, we present an overall ranking that includes only 2019 data from analysis 2, and one that also includes 2020 and 2021 (Celtic Sea only).

3.2. Celtic Sea

3.2.1. Analysis 1 - Quota uptake vs discard rate for 2014 to 2018

In Figure 1, TACs in the top right quadrant are the most at risk of catches exceeding the agreed quotas due to the high quota uptake and high proportion discarded. Celtic Sea haddock (HAD/7X7A34) from 2014 to 2018, plaice 7fg (PLE/7FG.) in 2014 and 2016 and plaice 7hjk (PLE/7HJK) in 2015 and 2018 were at most risk of catches exceeding the agreed levels (Figure 1).

3.2.2. Analysis 2 - UK TAC share vs UK catch for 2019

When accounting for discards, the total catch was estimated to be higher than the available UK TAC share for Celtic Sea cod (COD/7XAD34), Celtic Sea haddock

(HAD/7X7A34) and Sole 7fg (SOL/7FG.) with an estimated overshoot of the quota of 48%, 4.8% and 1.6% respectively (Table 1). Catches were lowest, relative to quota for Cod 7d (COD/07D.) and Plaice 7fg (PLE/7FG.), with an estimated undershoot of 89% and 82% respectively in 2019. The equivalent outputs from 2020 and 2021 are given in Annex 4.8.1.

Table 1. Quota and catch comparison for 2019 Celtic Sea TACs

TAC	Quota (t)	Estimated catch as % quota	% Estimated catch overshoot/undershoot
COD/7XAD34	118.54	147.80%	47.80%
HAD/7X7A34	910.46	104.80%	4.80%
SOL/7FG.	209.91	101.60%	1.60%
SOL/07E.	979.78	96.30%	-3.70%
NEP/07.	7716.73	90.90%	-9.10%
ANF/07.	6837.98	88.80%	-11.20%
WHG/7X7A-C.	1372.26	83.40%	-16.60%
PLE/7DE.	3244.21	76.20%	-23.80%
SOL/7HJK.	68.25	70.60%	-29.40%
SOL/07D.	380.14	66.90%	-33.10%
LEZ/07.	3698.83	64.10%	-35.90%
PLE/7HJK.	16.79	54.50%	-45.50%
HKE/571214	11693.69	44.00%	-56.00%
POL/07.	2308.66	42.10%	-57.90%
PLE/7FG.	363.14	17.60%	-82.40%
COD/07D.	177.59	11.40%	-88.60%

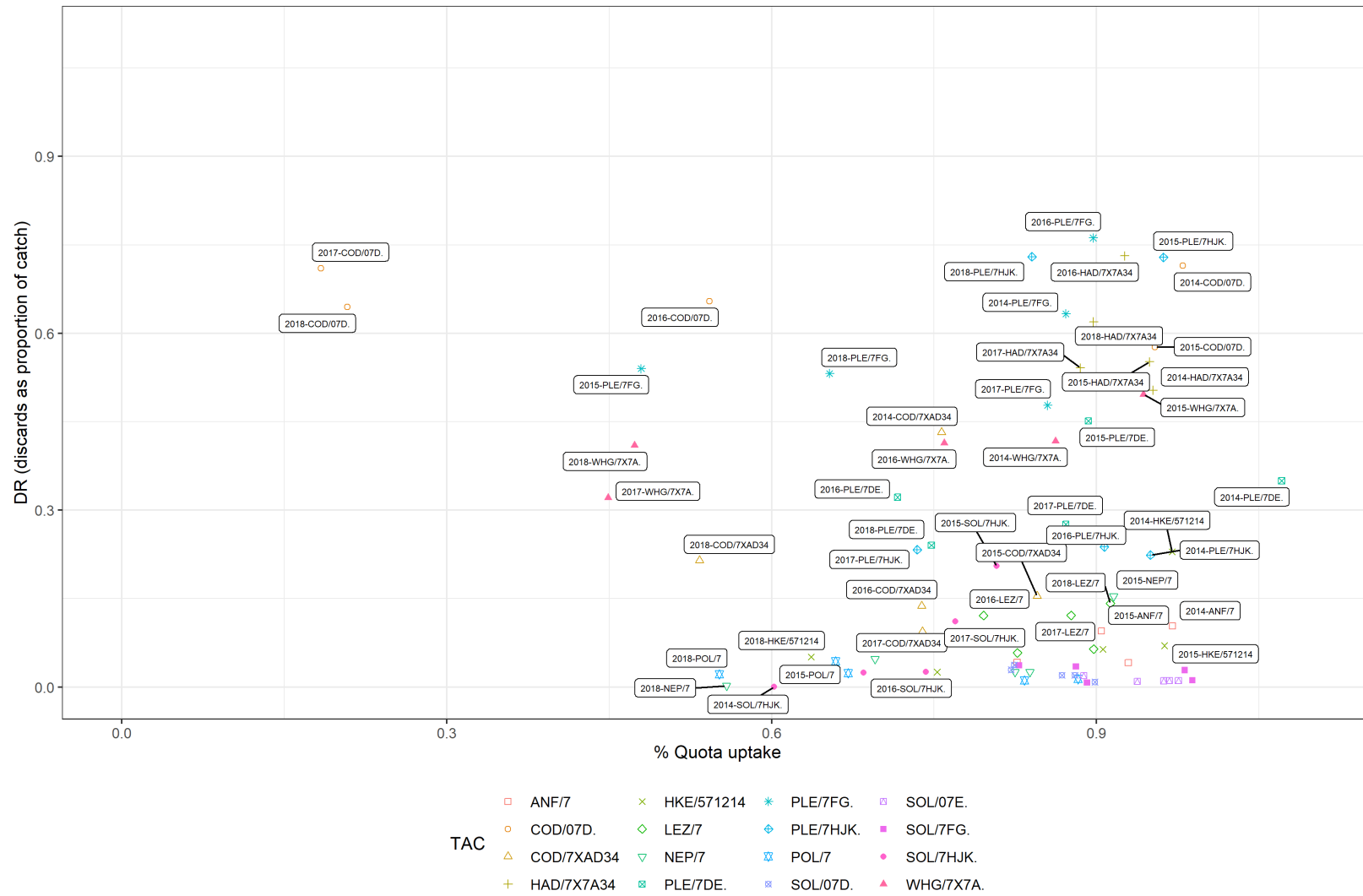


Figure 1. A scatter plot of the percentage of quota uptake (landings only) plotted against the discard rate (given as a proportion of the total catch) for each TAC for the period 2014-18 in Celtic Sea region

3.2.3. Ranking of risk by TAC

From the rankings in Table 2, the TACs for Celtic Sea cod (COD/7XAD34) and haddock (HAD/7X7A34), feature in the top 4 highest risk TACs in all the approaches used to rank risk, and Celtic Sea whiting (WHG/7X7A-C) in the top 5 in three of the four approaches. These TACs are considered the most at risk from being fished above the agreed limits during the assessed period.

Table 2. Celtic Sea: risk high to low (1-16). TACs with '*' indicate where catch calculated to exceed available TAC in at least 1 year. Column "2019" is ranked by the % catch uptake. Column "2014-2018" is ranked by a proxy for risk (proportion quota uptake x proportion discarded). Column "overall rank (excl. 20_21)" sum of ranked values excluding 2020/21 data. Column "overall rank (incl. 20_21)" sum of ranked values including 2020 and 2021 data.

Risk rank	2019	2014-2018 (proxy)	overall rank (excl. 20_21)	overall rank (incl. 20_21)
1	COD/7XAD34*	HAD/7X7A34	HAD/7X7A34*	COD/7XAD34*
2	HAD/7X7A34*	PLE/7FG.	COD/7XAD34*	WHG/7X7A-C.
3	SOL/7FG*	PLE/7HJK.	WHG/7X7A-C.	PLE/7FG*
4	SOL/07E.	COD/07D.	PLE/7DE.	HAD/7X7A34*
5	NEP/07.	WHG/7X7A-C.	PLE/7HJK.	SOL/7FG*
6	ANF/07.	PLE/7DE.	SOL/7FG*	NEP/07.
7	WHG/7X7A-C.	COD/7XAD34	ANF/07.	ANF/07.
8	PLE/7DE.	LEZ/07.	PLE/7FG*	SOL/07E.
9	SOL/7HJK.	HKE/571214	NEP/07.	PLE/7DE.
10	SOL/07D.	ANF/07.	LEZ/07.	PLE/7HJK.
11	LEZ/07.	SOL/7HJK.	SOL/07E.	SOL/7HJK.
12	PLE/7HJK.	NEP/07.	SOL/7HJK.	LEZ/07.

Risk rank	2019	2014-2018 (proxy)	overall rank (excl. 20_21)	overall rank (incl. 20_21)
13	HKE/571214	SOL/7FG.	COD/07D.	SOL/07D.
14	POL/07.	SOL/07D.	HKE/571214	COD/07D.
15	PLE/7FG*	POL/07.	SOL/07D.	HKE/571214
16	COD/07D.	SOL/07E.	POL/07.	POL/07.

3.2.4. Celtic Sea comparison between direct use of Cefas observer programme with data extracted from STECF FDI

When using the STECF FDI data, Celtic Sea haddock (HAD/7X7A34) and plaice 7hjk (PLE/7HJK), feature in the top 2 highest risk TACs in all the approaches, and Celtic Sea cod (COD/7XAD34) in the top 3 in 3 of the approaches.

Therefore both data sets indicate that Celtic Sea haddock (HAD/7X7A34) and cod (COD/7XAD34) are high risk. The FDI analysis also identifies plaice 7hjk (PLE/7HJK) and the observer data when used directly, identifies Celtic Sea whiting (WHG/7X7A-C.). When taking a precautionary approach, we consider that both these stocks should be viewed as higher risk. The differences between the outputs are due to sample number thresholds being applied to the STECF FDI, which means not all the observer data is included. This means that while data accepted may be more representative, a higher level of filling is required for the STECF FDI. The results are sufficiently consistent to support the use of the STECF FDI where there is no direct access to UK administrations observer data.

3.3. North Sea

3.3.1. Analysis 1 - Quota uptake vs discard rate for 2014 to 2018

Figure 2 shows that North Sea whiting (WHG/2AC4.) and North Sea Saithe (POK/2C3A4) from 2014 to 2018, North Sea cod (COD/2A3AX4) and North Sea hake (HKE/2AC4-C) from 2014 to 2016 are in the top right quadrant and therefore were at most risk of catches exceeding agreed levels.

3.3.2. Analysis 2 - UK TAC share vs UK catch for 2019

Table 3 shows the North Sea TACs ranked by the risk that UK catches exceeded UK quota shares in 2019. When accounting for discards, the total catch was estimated to be higher than the available UK quota for North Sea whiting (WHG/2AC4.), North Sea saithe

(POK/2C3A4), North Sea cod (COD/2A3AX4), North Sea hake (HKE/2AC4-C), North Sea haddock (HAD/2AC4), North Sea ling (LIN/04-C), North Sea tusk (USK/4EI.), and North Sea Nephrops (NEP/2AC4-C). Catches were lowest relative to quota for North Sea anglerfish (ANF/2AC4-C) and plaice (PLE/2A3AX4) with an estimated undershoot of 47% and 51% respectively in 2019.

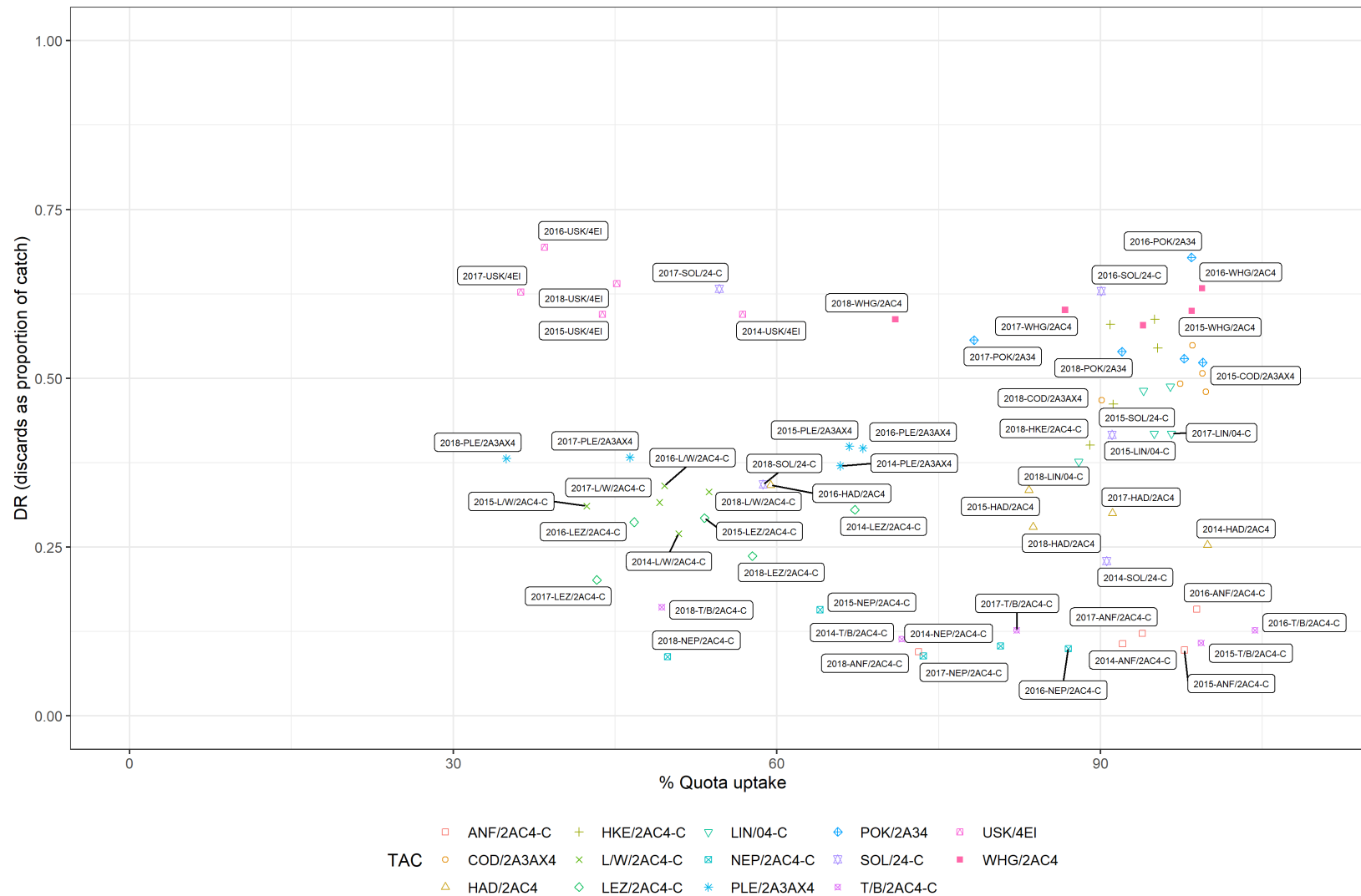


Figure 2. A scatter plot of the percentage of quota uptake (landings only) plotted against the discard rate (given as a proportion of the total catch) for each TAC for the period 2014-18 in North Sea region.

Table 3. Quota and catch comparison for 2019 North Sea TACs.

TAC	Quota (t)	Estimated catch as % quota	% Estimated catch overshoot/undershoot
WHG/2AC4.	13053.8	207.07	107.07
COD/2A3AX4	17628.1	162.27	62.27
POK/2C3A4	12795.9	159.17	59.17
HKE/2AC4-C	5827.4	132.33	32.33
HAD/2AC4	23652.9	128.56	28.56
LIN/04-C	3222.6	125.99	25.99
USK/4EI.	113.3	106.36	6.36
NEP/2AC4-C	20533.5	100.09	0.09
SOL/24-C	672.5	67.74	-32.26
LEZ/2AC4-C	2696.9	62.26	-37.74
T/B/2AC4-C	924.3	61.30	-38.70
L/W/2AC4-C	4992.2	54.76	-45.24
ANF/2AC4-C	17787.7	53.16	-46.84
PLE/2A3AX4	25054.4	48.92	-51.08

3.3.3. Ranking of risk by TAC

The TACs for North Sea whiting (WHG/2AC4.), North Sea cod (COD/2A3AX4), North Sea saithe (POK/2C3A4), feature in the top 3 highest risk TACs in all the approaches used to rank risk (Table 4). North Sea hake (HKE/2AC4-C) ranks as the fourth highest risk in all approaches. These four TACs are considered the most at risk TACs during the assessed period.

Table 4. North Sea: risk high to low (1-14). TACs with “*” indicate where catch exceeded available TAC in at least 1 year. “Column “2019” is ranked by the % catch uptake. Column “2014-2018” is ranked by a proxy for risk (proportion quota uptake x proportion discarded). Column “overall rank (excl. 20)” sum of ranked values excluding 2020 data. Column “overall rank (incl. 20)” sum of ranked values including 2020 data. ** Nephrops TACs are landings only, so a total catch that is higher than the TAC is not an indicator that agreed catch levels were exceeded.

Risk rank	2019	2014-2018 (proxy)	overall rank (excl. 20)	overall rank (incl. 20)
1	WHG/2AC4*	WHG/2AC4.	WHG/2AC4.*	WHG/2AC4.*
2	COD/2A3AX4*	POK/2C3A4	POK/2C3A4*	COD/2A3AX4*
3	POK/2C3A4*	COD/2A3AX4	COD/2A3AX4*	POK/2C3A4*
4	HKE/2AC4-C*	HKE/2AC4-C	HKE/2AC4-C*	HKE/2AC4-C*
5	HAD/2AC4*	LIN/04-C	LIN/04-C*	LIN/04-C*
6	LIN/04-C*	SOL/24-C	HAD/2AC4*	HAD/2AC4*
7	USK/4EI.*	USK/4EI	USK/4EI*	USK/4EI*
8	NEP/2AC4-C**	HAD/2AC4	SOL/24-C	SOL/24-C
9	SOL/24-C	PLE/2A3AX4	LEZ/2AC4-C	LEZ/2AC4-C
10	LEZ/2AC4-C	L/W/2AC4-C	L/W/2AC4-C	ANF/2AC4-C
11	T/B/2AC4-C	LEZ/2AC4-C	NEP/2AC4-C*	T/B/2AC4-C
12	L/W/2AC4-C	ANF/2AC4-C	PLE/2A3AX4	NEP/2AC4-C*
13	ANF/2AC4-C	T/B/2AC4-C	T/B/2AC4-C	L/W/2AC4-C
14	PLE/2A3AX4	NEP/2AC4-C	ANF/2AC4-C	PLE/2A3AX4

3.4. West of Scotland

3.4.1. Analysis 1 - Quota uptake vs discard rate for 2014 to 2018

Figure 3 shows that West of Scotland whiting (WHG/56-14) from 2015 to 2018 and West of Scotland cod (COD/5BE6A) from 2014 to 2018 are in the top right quadrant and therefore were the most at risk of catches exceeding the agreed levels. The uptake for West of Scotland cod was revised to 100% as there is no quota allocation in this period due to zero TAC advice but there are reported landings. During this period, by-catches of cod could be landed (if cod catches were less than 1.5 % of the live weight of the total catch retained on board per fishing trip). From 2019, a bycatch TAC was allocated.

3.4.2. Analysis 2 - UK TAC share vs UK catch for 2019

When accounting for discards, the total catch was estimated to be higher than the available UK quota for West of Scotland haddock (HAD/5BC6A.), cod (COD/5BE6A), anglerfish (ANF/56-14) and whiting (WHG/56-14), with an estimated overshoot of 42%, 40%, 4% and 2% respectively in 2019 (Table 5). West of Scotland pollack (POL/56-14) and sole (SOL/56-14) had an estimated undershoot of 81% and 74%. It was noted that no discards were recorded for West of Scotland *Nephrops*.

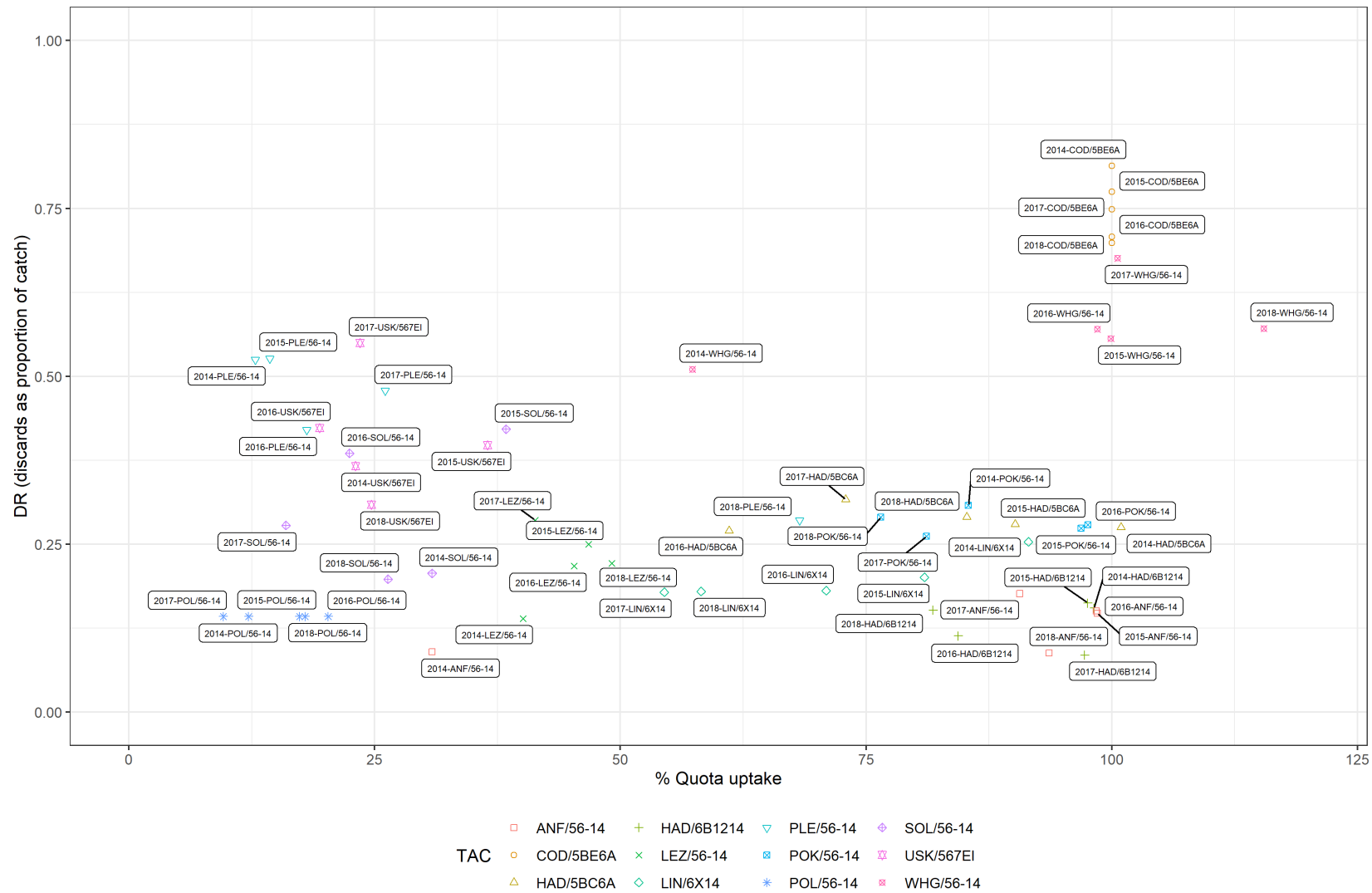


Figure 3. A scatter plot of the percentage of quota uptake (landings only) plotted against the discard rate (given as a proportion of the total catch) for each TAC for the period 2014-18 in West of Scotland region.

Table 5. Quota and catch comparison for 2019 West of Scotland TACs.

TAC	Quota (t)	Estimated catch as % quota	% Estimated catch overshoot/undershoot
HAD/5BC6A.	2909.2	141.85	41.85
COD/5BE6A	1300.2	139.42	39.42
ANF/56-14	3693.1	104.25	4.25
WHG/56-14	680.1	101.83	1.83
POK/56-14	3983.6	94.61	-5.39
LIN/6X14	4685.4	82.45	-17.55
HAD/6B1214	8862.4	80.81	-19.19
PLE/56-14	431.1	76.61	-23.39
LEZ/56-14	1973.0	71.04	-28.96
USK/567EI	376.9	30.25	-69.75
SOL/56-14	12.2	26.40	-73.60
POL/56-14	160.9	19.30	-80.70

3.4.3. Ranking of risk by TAC

The TACs for West of Scotland cod (COD/5BE6A) features in the top 2 highest risk TACs in all the approaches used to rank risk. West of Scotland whiting (WHG/56-14) and haddock (HAD/5BC6A.) feature in the top 3 highest risk TACs for 3 of the approaches (Table 6). West of Scotland cod (COD/5BE6A), whiting (WHG/56-14) and haddock (HAD/5BC6A.) are considered the most at risk TACs during the assessed period.

Table 6. West of Scotland: risk high to low (1-12). TACs with “*” indicate where catch calculated to exceed available TAC in at least 1 year. “Column “2019” is ranked by the % catch uptake. Column “2014-2018” is ranked by a proxy for risk (proportion quota uptake x proportion discarded). Column “overall rank (excl. 20)” sum of ranked values excluding 2020 data. Column “overall rank (incl. 20)” sum of ranked values including 2020 data.

Risk rank	2019	2014-2018 (proxy)	overall rank (excl. 20)	overall rank (incl. 20)
1	HAD/5BC6A.*	WHG/56-14	COD/5BE6A*	COD/5BE6A*
2	COD/5BE6A*	COD/5BE6A	WHG/56-14*	WHG/56-14*
3	ANF/56-14*	POK/56-14	HAD/5BC6A.*	HAD/5BC6A.*
4	WHG/56-14*	HAD/5BC6A.	POK/56-14	POK/56-14
5	POK/56-14	LIN/6X14	ANF/56-14*	ANF/56-14*
6	LIN/6X14	HAD/6B1214	LIN/6X14	LIN/6X14
7	HAD/6B1214	ANF/56-14	HAD/6B1214	HAD/6B1214
8	PLE/56-14	PLE/56-14	PLE/56-14	LEZ/56-14
9	LEZ/56-14	USK/567EI	USK/567EI	PLE/56-14
10	USK/567EI	LEZ/56-14	LEZ/56-14	USK/567EI
11	SOL/56-14	SOL/56-14	SOL/56-14	POL/56-14
12	POL/56-14	POL/56-14	POL/56-14	SOL/56-14

3.5. Irish Sea

3.5.1. Analysis 1 - Quota uptake vs discard rate for 2014 to 2018

Figure 4 shows that Irish Sea whiting (WHG/07A.) in 2014 and 2018 is in the top right quadrant and therefore was most at risk of being fished above the agreed levels. The discard levels remain high for the other years, but the uptake was lower (<50%). Irish Sea cod (COD/07A.) and haddock (HAD/07A.) have a high uptake but low levels of discarding (<50%) according to the UK FDI data.

3.5.2. Analysis 2 - UK TAC share vs UK catch for 2019

Table 7 shows the Irish Sea TACs ranked by the risk that UK catches exceeded UK quota shares in 2019. When accounting for discards, the total catch was estimated to be higher than the available UK quota for sole 7a (SOL/07A.) with an estimated overshoot of 0.12%. Plaice 7a (PLE/07A.) had an undershoot of 91%. We note that discards rates for Irish Sea whiting (WHG/07A.) are high and landings are low, which introduces more uncertainty in the catch estimate.

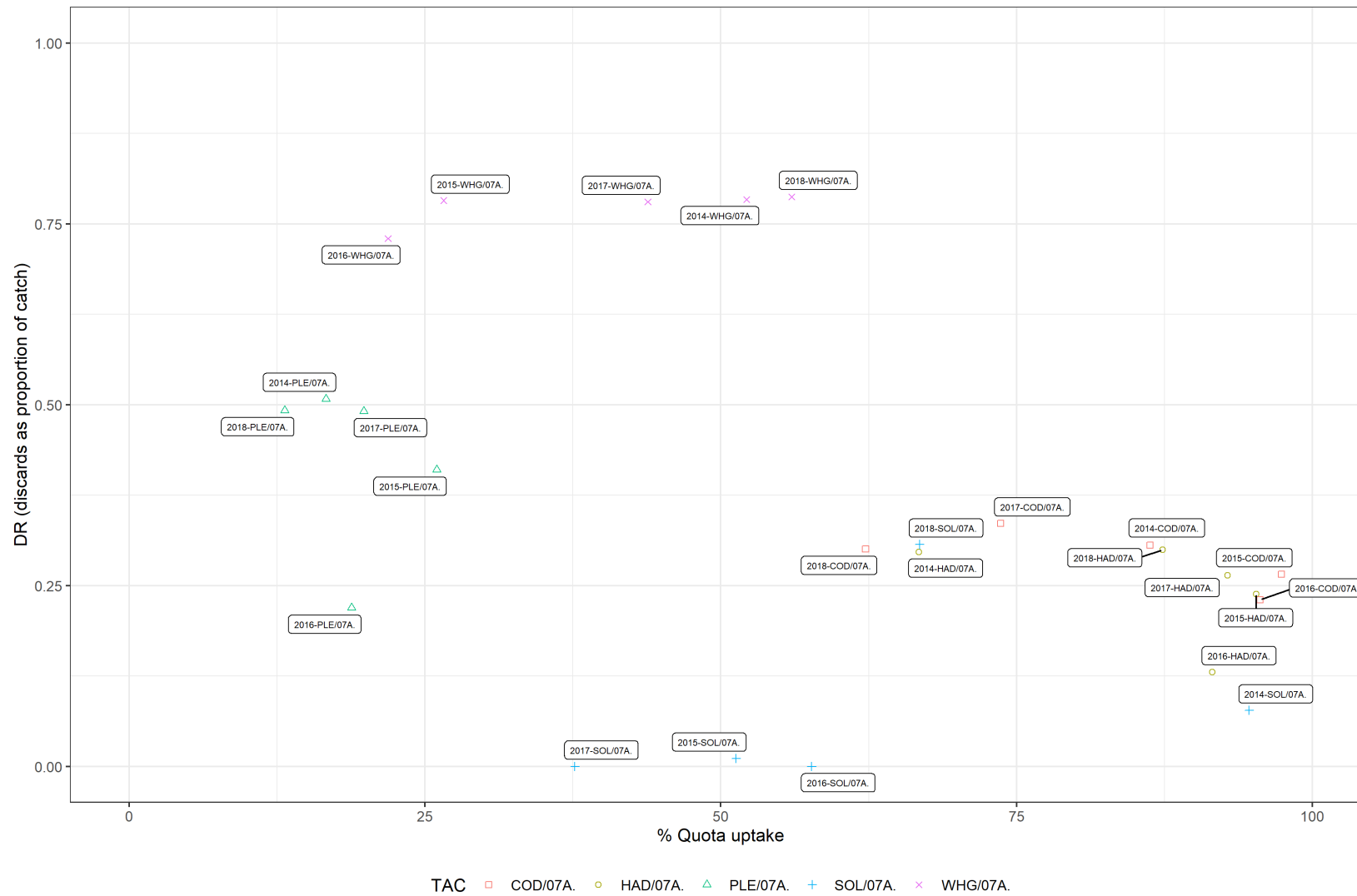


Figure 4. A scatter plot of the percentage of quota uptake (landings only) plotted against the discard rate (given as a proportion of the total catch) for each TAC for the period 2014-18 in the Irish Sea region.

Table 7. Quota and catch comparison for 2019 Irish Sea TACs

TAC	Quota (t)	Estimated catch as % quota	% Estimated catch overshoot/undershoot
SOL/07A.	18.3	100.31	0.31
COD/07A.	253.5397	97.14	-2.86
HAD/07A.	1970.927	87.34	-12.66
WHG/07A.	485.368	53.65	-46.35
PLE/07A.	1391.906	8.49	-91.51

3.5.3. Ranking of risk by TAC

The TACs for Irish Sea cod (COD/07A.) and whiting (WHG/07A.) feature in the top 2 highest risk TACs in 3 of the approaches used to rank risk (Table 8). These are considered the most at risk TACs during the assessed period.

Table 8. Irish Sea: risk high to low (1-5). TACs with “*” indicate where catch calculated to exceed available TAC in at least 1 year. “Column “2019” is ranked by the % catch uptake. Column “2014-2018” is ranked by a proxy for risk (proportion quota uptake x proportion discarded). Column “overall rank (excl. 20)” sum of ranked values excluding 2020 data. Column “overall rank (incl. 20)” sum of ranked values including 2020 data.

Risk rank	2019	2014-2018 (proxy)	overall rank (excl. 20)	overall rank (incl. 20)
1	SOL/07A.*	WHG/07A.	COD/07A.*	COD/07A.*
2	COD/07A.*	COD/07A.	WHG/07A.	WHG/07A.
3	HAD/07A.	HAD/07A.	HAD/07A.	SOL/07A.*
4	WHG/07A.	PLE/07A.	SOL/07A.*	HAD/07A.
5	PLE/07A.	SOL/07A.	PLE/07A.	PLE/07A.

3.6. Potential higher risk TACs with no discard data

For TACs with no discard data, or no discard information from the main target fisheries, we can infer that, with a >90% uptake of the UK TAC share, even with relatively low levels of discarding, the total UK catch could have exceeded the UK TAC share. These TACs are listed in Table 9. All the TACs are fished predominantly in pelagic fisheries, which are not sampled by observer programmes on the notion that discarding is low, based on the available knowledge of the fishery.

Table 9. TACs for which the uptake is over 90% in at least one year (2019-2021).

TAC	TAC
HER/4AB.	HER/07A/MM
JAX/4BC7D	HER/4C7D
MAC/2A34.	ARU/567.
MAC/2CX14-	SAN/2
WHB/1X14	SAN/2A3A4
HER/1/2	SAN/4
SAN/3	

4. Summary

Two analyses were completed for TACs in each region, Celtic Sea, North Sea, West of Scotland and Irish Sea, to identify those TACs most at risk of catches exceeding the agreed UK TAC shares. One provided a proxy for risk and is calculated for the period prior to the full implementation of the LO (2014-18), the other estimated the absolute catches relative to UK TAC share once fisheries were fully subject to the LO (2019-20/21). These two analyses were used to rank TACs by risk and an approach to integrate the two analyses is presented.

There are different methods to raise and process the discard data, and the level of data filling, where no data are available, introduces uncertainties in the absolute catch estimates. The different approaches and data sources indicated many of the same TACs as being those at highest risk. Therefore, there is more confidence in the relative risk ranking than in the absolute estimates of exceeding and undershooting of the quotas.

For the Celtic Sea, the TACs for cod (COD/7XAD34), haddock (HAD/7X7A34), whiting (WHG/7X7A-C) and plaice (PLE/HKJ) had the highest risk of catches exceeding agreed levels during the assessed period.

For the North Sea, the TACs for whiting (WHG/2AC4.), cod (COD/2A3AX4), saithe (POK/2C3A4), and hake (HKE/2AC4-C) had the highest risk of catches exceeding agreed levels.

For the West of Scotland region, the TACs for cod (COD/5BE6A), whiting (WHG/56-14) and haddock (HAD/5BC6A.) had the highest risk of catches exceeding agreed levels.

For the Irish Sea, the TACs for cod (COD/07A.) and whiting (WHG/07A.) had the highest risk of catches exceeding agreed levels.

The risks identified here relate only to UK catches when compared with the agreed UK TAC shares, and not to the levels at which TACs are set relative to scientific advice. Across all regions, four cod and whiting TACs, and two haddock TACs had the highest risk of catches exceeding agreed levels, indicating that these species could be prioritised for enhancements in catch accounting to mitigate the risk of fishing beyond agreed levels.

5. Annex 1 - List of TACs

Table 10. List of TACs included in the analysis.

Code	Description	Area
ANF/2AC4-C	North Sea anglerfish	Division 2a, area 4
ANF/561214	West of Scotland Anglerfish	Division 5b, 6a, 6b, 14b and area 12
ANF/07.	Anglerfish VII	Area 7
B/L/05B-F.	Ling, Blue Ling Vb Faroes	Division 5b
C/H/05B-F.	Cod Haddock Vb Faroes	Division 5b
COD/*5BC6A	West of Scotland Cod (VIb)	Division 5b, 6a
COD/07A.	Irish Sea Cod	Division 7a
COD/07D.	Cod VIId	Division 7d
COD/2A3AX4	North Sea cod (exc IV Norway)	Area 4
COD/561214	West of Scotland Cod (exc Vb, VIa)	Division 5b, 6b, 14b and area 12
COD/5B6A-C	West of Scotland Cod (Vb, VIa)	Division 5b, 6a
COD/7X7A34	Cod VIIb-k	Division 7b-k, 8a-e,9ab, subarea 34.1.1 and 27.7.1
COD/7XAD34	Cod VIIb-k (exc d)	Division 7bc-ek
D/F/2AC4-C	North Sea Dabs & Flounder	Division 2a, area 4
HAD/*07A.	Irish Sea Haddock	Division 7a
HAD/07A.	Irish Sea Haddock	Division 7a
HAD/2AC4.	North Sea haddock (exc IV Norway)	Area 4
HAD/552064	Haddock VII (exc VIIa)	Division 7b-k, 8a-e,9ab, subarea 34.1.1 and 27.7.1
HAD/5BC6A.	West of Scotland Haddock VIa, Vb (EC)	Division 5b, 6a
HAD/6B1214	West of Scotland Haddock VIb,XII,XIV	Area 12, division 14b, 6b
HAD/7X7A34	Haddock VIIb-k	Area 1, Division 7b-k, 8a-e, 9ab, subarea 34.1.1

Code	Description	Area
HER/*4AN.	North Sea Herring (IVa Norway)	Division 4a-b
HER/*4BN.	North Sea Herring (IVb Norway)	Division 4b
HER/04A.	North Sea Herring (IVa exc IVa Norway)	Division 4a
HER/04B.	North Sea Herring (IVb exc IVb Norway)	Division 4b
HER/07A/MM	Herring VIIa Manx, Mourne	Division 7a
HER/5B6ANB	West of Scotland Herring	Division 5b, 6a,6b
HER/7EF.	Herring VIIef	Division 7ef
HKE/2AC4-C	North Sea Hake	Division 2a, area 4
HKE/571214	West of Scotland Hake incl VII	Division 5b, 6a, 6b, 14b, area 7 and area 12
JAX/2AC4-C	North Sea Horse Mackerel	Division 2a, area 4
JAX/4BC7D	North Sea Horse Mackerel (from 2010)	Division 4bc, 7d
JAX/578/14	West Coast Horse Mackerel & VII	Area 12, 7, Division 14b, 5b, 6a-b, 8ae
L/W/2AC4-C	North Sea Lemon Sole & Witch	Division 2a, area 4
LEZ/2AC4-C	North Sea Megrin	Division 2a, area 4
LEZ/561214	West of Scotland Megrin	Division 5b, 6a, 6b, 14b and area 12
LEZ/07.	Megrin VII	Area 7
LIN/04-C.	North Sea Ling	Area 4
LIN/05EI.	Ling (V)	Area 5
LIN/6X14.	Western Ling	Area 1, 12, 7, division 14b, 6ab, 8a-e,9ab
MAC/*04A-C	Mackerel IVa (flex box)	Division 2a, 4a
MAC/*3A4BC	North Sea Mackerel (IIIa, IVbc)	Division 3a, 4bc
MAC/2A34.	North Sea Mackerel (exc IIIa, IVbc)	Division 2a, 3b-d, 4a
MAC/2CX14-	Western Mackerel	Division 5b, 6a, 6b, 14b, 2a, 8abde, and area 7 ,12

Code	Description	Area
NEP/2AC4-C	North Sea Nephrops	Division 2a, area 4
NEP/07.	Nephrops VII	Area 7
NOP/2A3A4.	North Sea Norway Pout	Division 2a, 3a area 4
PLE/*04N-	North Sea Plaice (IV Norway)	Division 4a and b
PLE/07A.	Irish Sea Plaice	Division 7a
PLE/2A3AX4	North Sea Plaice (exc IV Norway)	Division 2a, area 4
PLE/561214	West of Scotland Plaice	Division 5b, 6a, 6b, 14b and area 12
PLE/7DE.	Plaice VIIde	Division 7de
PLE/7FG.	Plaice VIIfg	Division 7fg
PLE/7HJK.	Plaice VIIhjk	Division 7hjk
POK/05B-F.	Saithe Vb Faroes	Division 5b
POK/2C3A4.	North Sea Saithe	Division 2a, area 3 and 4
POK/552064	Saithe VII	Division 7b-k, 8a-e,9ab, subarea 34.1.1 and 27.7.1
POK/561214	West of Scotland Saithe	Division 5b, 6a, 6b, 14b and area 12
POL/561214	West of Scotland Pollack	Division 5b, 6a, 6b, 14b and area 12
POL/07.	Pollack VII	Area 7
SOL/07A.	Irish Sea Sole	Division 7a
SOL/07D.	Sole VIIId	Division 7d
SOL/07E.	Sole VIIe	Division 7e
SOL/24	North Sea Sole	Division 2a, area 4
SOL/561214	West of Scotland Sole	Division 5b, 6a, 6b, 14b and area 12
SOL/7FG.	Sole VIIfg	Division 7fg
SOL/7HJK.	Sole VIIhjk	Division 7hjk

Code	Description	Area
T/B/2AC4-C	North Sea Turbot & Brill	Division 2a, area 4
USK/4EI.	Tusk (IV)	Area 4
USK/567EI.	Tusk (V,VI,VII)	Division 5b, area 6,7
WHB/1X14	Northern Blue Whiting	Area 1, 12, 2, 3, 4, 6, 7, Division 5b, 8a-e
WHB/2AC4-C	North Sea Blue Whiting	Division 2a, area 4
WHB/2X12-F	Blue Whiting Faroes	Division 2a, 4a, 5ab, 6a
WHG/07A.	Irish Sea Whiting	Division 7a
WHG/2AC4.	North Sea whiting (exc IV Norway)	Area 4
WHG/561214	West of Scotland Whiting	Division 5b, 6a, 6b, 14b and area 12
WHG/7X7A-C.	Celtic Sea Whiting	Division 7b-k

Table 11. List of TACs not included in the analysis, for which there was not both UK landings and discard data. Skates and rays have combined species TACs, and reporting of skates and ray landings has been speciated only in more recent years. Moreover, skates and rays TACs are for landings-only, therefore all discards could be in excess of TACs. For these reasons, skates and rays were excluded from these analyses.

Code	Description	Code	Description
ALF/3X14-	Alfonsino North East Atlantic	POK/1/2INT	Saithe I, II
ANE/552126	Anchovy IX,X(EC)	POK/1N2AB.	Saithe I,II Norway
ANE/8	Anchovy VIII	POL/08C.	Pollack VIIIc
ANF/*8ABDE	Anglerfish VIIIabde	POL/552126	Pollack IX,X(EC)
ANF/8C3411	Anglerfish VIIIc,IX,X	POL/8ABDE.	Pollack VIIIabde
ARU/1/2.	Greater Silver Smelt (I,II)	POR/1-14CI	Porbeagle 1X14
ARU/3/4.	North Sea Greater Silver Smelt	PRA/03A.	Northern Prawn IIIa
ARU/4AB-N.	Other Species IV ex EC Norway	PRA/2AC4-C	North Sea Northern Prawn
ARU/567	Greater Silver Smelt (V,VI,VII)	PRA/N3L.	Northern Prawn NAFO 3 L
BFT/AE045W	Blue Fin Tuna North Atlantic	PRA/N3M.	Northern Prawn NAFO 3 M
BLI/24-	North Sea Blue Ling	RED/05A-IS	Redfish Va Iceland
BLI/245-	Blue Ling (II,IV,V)	RED/05B-F.	Redfish Vb Faroes
BLI/5B67-	Western Blue Ling (Vb,VI,VII)	RED/1N2AB.	Redfish I,II Norway
BOR/678-.	Boarfish VI,VII,VIII	RED/51214S	Redfish V,XII,XIV

Code	Description	Code	Description
BSF/1234-	Black Scabbards (I,II,III,IV)	RED/N1G14D	Redfish V,XIV Greenland
BSF/56712-	Black Scabbards (V,VI,VII,XII)	RED/N3M.	Redfish NAFO 3 M
BSF/8910-	Black Scabbards IX, X	RHG/8X14-	Roundnose Grenadier (VIII,IX,,X,,XII,,XIV)
CAP/02B.	Capelin IIb	RJB/2AC4-C	North Sea Skates/Rays (Common Skate)
CAP/514GRN	Capelin V, XIV Greenland	RJC/07D.	Skates & Rays VIId (Thornback Ray)
COD/1/2B.	Cod IIb Spitzbergen	RJC/2AC4-C	NS Skates/Rays (Thornback Ray)
COD/1N2AB.	Cod I,II Norway	RJC/67AKXD	Skates & Rays 6&7 ex 7d (Thornback)
COD/N01514	Cod V,XIV Greenland	RJC/8910-C	Skates & Rays 8&9 (Thornback Ray)
COD/N2J3KL	Cod NAFO 2J 3KL	RJE/07D.	Skates & Rays VIId (Smalleyed Ray)
COD/N3M.	Cod NAFO 3M	RJE/67AKXD	Skates & Rays 6&7 ex 7d (Small-eyed Ray)
DGS/15X14	West Coast Dogfish	RJF/67AKXD	Skates & Rays 6&7 ex 7d (Shagreen Ray)
DGS/2AC4-C	North Sea Dogfish (Spur)	RJH/07D.	Skates & Rays VIId (Blonde Ray)

Code	Description	Code	Description
DWS/12-	Deep Sea Sharks XII	RJH/2AC4-C	North Sea Skates/Rays (Blonde Ray)
DWS/56789-	Deep Sea Sharks V,VI,VII,VIII,IX	RJH/67AKXD	Skates & Rays 6&7 ex 7d (Blonde Ray)
FLX/05B-F.	Flat Vb ex EC Faroes	RJH/8910-C	Skates & Rays 8&9 (Blonde Ray)
GFB/1012-	Forkbeards X,XII	RJI/67AKXD	Skates & Rays 6&7 ex 7d (Sandy Ray)
GFB/1234-	Forkbeards I,II,III,IV	RJM/07D.	Skates & Rays VIId (Spotted Ray)
GFB/567-	Forkbeards V,VI,VII	RJM/2AC4-C	NS Skates/Rays (Spotted Ray)
GHL/1/2INT	Greenland Halibut I, II International	RJM/67AKXD	Skates & Rays 6&7 ex 7d (Spotted Ray)
GHL/1N2AB.	Greenland Halibut I,II Norway	RJN/07D.	Skates & Rays VIId (Cuckoo Ray)
GHL/2A-C46	Greenland Halibut IIa(EC),IV,VI	RJN/2AC4-C	NS Skates/Rays (Cuckoo Ray)
GHL/514GRN	Greenland Halibut V,XIV Greenland	RJN/67AKXD	Skates & Rays 6&7 ex 7d (Cuckoo Ray)
GHL/N01GRN	Greenland Halibut NAFO 1 Greenland	RJN/8910-C	Skates & Rays 8&9 (Cuckoo Ray)
GHL/N3LMNO	Greenland Halibut NAFO 3LMNO	RJR/07D.	Skates & Rays VIId (Starry Ray)

Code	Description	Code	Description
HAD/1N2AB.	Haddock I,II Norway	RJR/2AC4-C	NS Skates/Rays (Starry Ray)
HAD/3A/BCD	Haddock IIIa-d	RJU/07D.	Skates & Rays VIId (Undulate Ray)
HAL/514GRN	Halibut V,XIV Greenland	RJU/67AKXD	Skates & Rays 6&7 ex 7d (Undulate Ray)
HAL/N01GRN	Halibut NAFO 1 Greenland	RJU/7DE.	Undulate Ray 7de
HER/*2AJMN	Atlanto Scandian Herring (Nor)	RJU/8910-C	Skates & Rays 8&9 (Undulate Ray)
HER/03A.	Herring IIIa	RNG/1245A-	Roundnose Grenadier (I,II,IV,Va)
HER/1/2.	Atlanto Scandian Herring (exc Norway)	RNG/5B67-	Roundnose Grenadier (Vb,VI,VII)
HER/4AB.	North Sea Herring (exc IV Norway)	SAN/04-N.	Sandeel IV Norway
HER/4CXB7D	Herring IVc,VIId	SAN/2A3A4.	North Sea Sandeels
HER/6AS7BC	Herring VIa,VIIbc	SBR/10-	Red Seabream (X)
HER/7G-K.	Herring VIIg-k	SBR/678-	Red Seabream (VI,VII,VIII)
HKE/*8ABDE	Hake VIIIabde	SOL/3A/BCD	Sole IIIa-d
HKE/3A/BCD	Hake IIIa-d	SOL/7BC.	Sole VIIbc
HKE/8C3411	Hake VIIIc,IXa,X(EC)	SPR/03A.	Sprat IIIa
JAX/8C9.	Horse Mackerel VIIIc,IX	SPR/2AC4-C	North Sea Sprat

Code	Description	Code	Description
JAX/X34PRT	Horse Mackerel X	SPR/7DE.	Sprat VIIde
LEZ/8ABDE.	Megrim VIIIabde	SRX/07D.	Skates & Rays VIId
LEZ/8C3411	Meg VIIIc,IX,X(EC)	SRX/2AC4-C	North Sea Skates/Rays
LIN/1/2.	Ling (I,II)	SRX/67AKXD	Skates & Rays 6&7 ex 7d
LIN/3	Ling (III)	SRX/8910-C	Skates & Rays 8&9
MAC/05B-F.	Mackerel Vb Faroes	USK/1214EI	Tusk (I,II,XIV)
MAC/8C3411	Mackerel VIIIc,IX,,X(EC)	WHB/8C3411	Blue Whiting VIIIc,IX,X(EC)
NEP/08C.	Nephrops VIIIc	WHG/03A.	Whiting IIIa
NEP/3A/BCD	Nephrops III(EC)	WHG/552126	Whiting IX,X(EC)
NEP/552126	Nephrops IX,X(EC)	WHG/8	Whiting VIII
NEP/5BC6.	West Coast Nephrops		
NEP/8ABDE.	Nephrops VIIIabde		
ORY/06C-	Orange Roughy (VI)		
ORY/07C-	Orange Roughy (VII)		
ORY/1CX14C	Orange Roughy I to XIV ex. VI,VII		
PLE/552095	Plaice XIII,IX,X(EC)		
PLE/7BC.	Plaice VIIbc		

6. Annex 2 - Data sources and processing

6.1. Celtic Sea region using Cefas observer data

- Landing and discard estimates by ICES subdivision, metier and quarter, 2014-21 were extracted from the Cefas observer programme. ICES subdivisions were then linked to TAC areas for each species.
- Official reported landings by sector (Producer Organizations (PO) and non-sector), year, quarter, metier and TAC, were generated from the IFish database.
- Published MMO fishing vessel lists were used to assign every fish landing event to each sector or non-sector, based on the registered fishing vessel number (RssNo).
- Published MMO tables were used to generate landings only quota uptake by year, sector and TAC.
- For the years 2014-2021, estimates of discard rate from the observer programme by TAC, quarter and metier, were applied to landings data for all UK vessels from each Producer Organization and the non-sector to estimate total catch.

6.2. North Sea, West of Scotland and Irish Sea regions using STECF FDI data

- All UK landings and discards from all metiers and for all species were extracted from the published STECF FDI database, i.e. for England and Wales, Scotland, Northern Ireland, Jersey, Guernsey, Isle of Mann.
- Landings reported as 'FDF' in the STECF FDI were from the UK Fully Documented Fishery scheme, for which it was assumed that the discard rate was zero.
- Published MMO tables were used to generate landings only quota uptake by year, sector and TAC.
- STECF FDI landings and discards were used to generate an overall discard rate for each year and TAC. This was applied to the reported MMO summary annual landings data to estimate total UK catches by TAC.

7. Annex 3 - Percentage of discard rate filling for data sets

Table 12. Percentage filling for each dataset by year.

Year	Observer program	FDI data
2014	0.27	0.71
2015	0.30	0.71
2016	0.27	0.69
2017	0.27	0.70
2018	0.25	0.70
2019	0.25	0.68
2020	0.70	0.80
2021	0.55	NA

8. Annex 4 - UK TAC share vs UK catch for 2020 (and 2021 for Celtic Sea)

8.1. Celtic Sea

Table 13. Quota and catch comparison for 2020 and 2021 Celtic Sea TACs.

TAC	Quota (t)	Estimated catch as % quota	% Estimated catch overshoot/undershoot
2020			
PLE/7FG.	476.214	279.99%	179.99%
COD/7XAD34	47.435	208.55%	108.55%
WHG/7X7A-C.	878.526	96.92%	-3.08%
SOL/07E.	1044.977	94.41%	-5.59%
HAD/7X7A34	1106.046	88.61%	-11.39%
ANF/07.	7099.798	87.35%	-12.65%
NEP/07.	6250.848	85.16%	-14.84%
SOL/7FG.	369.822	81.41%	-18.59%
PLE/7HJK.	9	78.07%	-21.93%
LEZ/07.	3079.384	68.74%	-31.26%
PLE/7DE.	2988.921	65.65%	-34.35%
SOL/7HJK.	79.425	64.39%	-35.61%
SOL/07D.	449.014	44.95%	-55.05%

TAC	Quota (t)	Estimated catch as % quota	% Estimated catch overshoot/undershoot
POL/07.	2283.867	42.42%	-57.58%
HKE/571214	9284.019	37.62%	-62.38%
COD/07D.	96.759	21.91%	-78.09%
2021			
PLE/7FG.	433.57	301.39%	201.39%
COD/7XAD34	78.72	148.88%	48.88%
WHG/7X7A-C.	1049.83	94.90%	-5.10%
SOL/7FG.	441.01	92.60%	-7.40%
NEP/07.	7536.13	90.64%	-9.36%
SOL/7HJK.	54.87	88.81%	-11.19%
SOL/07E.	1295.48	82.81%	-17.19%
ANF/07.	8672.86	76.28%	-23.72%
PLE/7DE.	3323.94	73.76%	-26.24%
PLE/7HJK.	10.97	70.84%	-29.16%
LEZ/07.	3784.57	65.59%	-34.41%
POL/07.	2264.29	56.11%	-43.89%
SOL/07D.	558.77	42.07%	-57.93%

TAC	Quota (t)	Estimated catch as % quota	% Estimated catch overshoot/undershoot
HAD/7X7A34	2276.10	41.35%	-58.65%
HKE/571214	9187.09	38.15%	-61.85%
COD/07D.	79.17	13.60%	-86.40%

8.2. North Sea

Table 14. Quota and catch comparison for 2020 North Sea TACs.

TAC	Quota (t)	Estimated catch as % quota	% Estimated catch overshoot/undershoot
WHG/2AC4.	12501.19	212.62	112.62
COD/2A3AX4	9191.62	180.80	80.80
POK/2C3A4	9812.21	154.70	54.70
HKE/2AC4-C	4023.09	135.92	35.92
HAD/2AC4	24855.43	124.74	24.74
USK/4EI	113.30	124.33	24.33
LIN/04-C	3503.25	109.71	9.71
LEZ/2AC4-C	2995.69	76.02	-23.98
ANF/2AC4-C	13228.84	75.99	-24.01
T/B/2AC4-C	748.43	71.17	-28.83
SOL/24-C	1128.25	62.84	-37.16
NEP/2AC4-C	20106.37	60.50	-39.50
L/W/2AC4-C	4551.62	44.18	-55.82
PLE/2A3AX4	25856.02	35.89	-64.11

8.3. West of Scotland

Table 15. Quota and catch comparison for 2020 West of Scotland TACs.

TAC	Quota (t)	Estimated catch as % quota	% Estimated catch overshoot/undershoot
COD/5BE6A	741.2	156.75	56.75
WHG/56-14	585.9	124.17	24.17
ANF/56-14	2931.9	99.28	-0.72
HAD/5BC6A.	3199.0	90.81	-9.19
POK/56-14	3983.0	88.87	-11.13
LEZ/56-14	1948.3	64.46	-35.54
LIN/6X14	4546.9	61.47	-38.53
HAD/6B1214	9056.2	52.82	-47.18
POL/56-14	103.0	36.39	-63.61
USK/567EI	377.7	31.67	-68.33
PLE/56-14	430.6	30.52	-69.48
SOL/56-14	11.8	15.50	-84.50

8.4. Irish Sea

Table 16. Quota and catch comparison for 2020 Irish Sea TACs.

TAC	Quota (t)	Estimated catch as % quota	% Estimated catch overshoot/undershoot
COD/07A.	116.556	103.85	3.85
SOL/07A.	91	74.86	-25.14
WHG/07A.	279	61.39	-38.61
HAD/07A.	1709.101	46.29	-53.71
PLE/07A.	1287.191	11.07	-88.93



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