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*Marine Planning, Policy and Advice Section - Fisheries Data Analysis*

# Discarding by Shetland's Whitefish Vessels: Data from the SFA's Discards Tally Books

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July 2014





**Title:** *Discarding by Shetland's Whitefish Vessels:  
Data from the SFA's Discards Tally Books*  
Final Report

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# Summary

Discard tally sheets were used by the Shetland Fishermen's Association to collect information from a sample of Shetland's whitefish vessels on the nature and magnitude of their discards. Eight vessels completed tally sheets over varying periods between June 2013 and July 2014. Completed sheets covered 422 days of fishing and 1,513 tows, during which about 46,000 boxes of fish of more than 24 different species were caught.

Overall, 41% of the recorded catch was discarded. Discards of at least 16 different species were recorded, but hake, cod and saithe accounted for the vast majority of the fish discarded (86%).

Discard rates varied widely between individual species. Of the main species caught hake had the highest discard rate (90%), followed by cod (49%) and saithe (43%). Other commercially important species, such as whiting, haddock, monks and most flatfish had relatively low discard rates (below 5%) and a few species were never discarded. A number of non-target bycatch species also had very high discard rates, although they were caught in relatively small quantities.

There was no clear evidence of any seasonal patterns in discards of the main species, except perhaps a decline in cod discarding towards the end of the year. There was some evidence of differences between seine netters and trawlers in the discard rates of some species (such as saithe and plaice), but discard rates for some other species (such as hake and haddock) were consistent across all fishing gear types.

Discards were recorded from virtually all catches (98%), although the frequency of discarding varied between species. Hake was the most frequently discarded of the main species caught (98% of catches), followed by cod (76%) and saithe (72%).

# Introduction

Following the agreement to introduce a discards ban ('landings obligation') under the revised Common Fisheries Policy, the Shetland Fishermen's Association (SFA) wished to collect information about the nature and scale of discarding by whitefish vessels in the waters around Shetland. The Association wanted this information to help inform the development of management measures intended to implement the discards ban, and in particular to ensure that such management measures were appropriate, proportionate, and would not damage the viability of local fishing vessels.

To this end a tally sheet scheme was developed by the Association and the NAFC Marine Centre to collect information from fishermen about what they were discarding during their normal fishing operations. The primary objective of the scheme was to collect basic information about discarding practices from a representative sample of fishing vessels in Shetland's whitefish fleet. The scheme was intended to provide a general overview of the nature, magnitude and frequency of discarding from whitefish vessels fishing in the waters around Shetland, (The scheme did not attempt to investigate more detailed aspects of discarding, such as the detailed reasons for discarding, the influences of differences in individual quota holdings, market conditions, etc.)

# Methods

A tally sheet design was developed by the NAFC Marine Centre in collaboration with the Shetland Fishermen's Association (SFA), and with input from some fishing skippers. The agreed tally sheet design (see Appendix) represented a compromise between the desire to collect as much information as possible, without placing an unreasonable burden on the fishermen who had to complete them.

Books of tally sheets were then issued by the SFA to the skippers of selected local whitefish fishing vessels chosen by the SFA to provide a representative sample of Shetland's whitefish fleet. The fishermen were asked to use these tally sheets to record the quantities of each species that were retained and discarded from each tow that they made, together with basic information about the tow (date time and location).

The tally sheets were issued to fishing vessels at the beginning of June 2013 and the scheme was intended to run for one year.

Completed tally sheets were returned to the NAFC Marine Centre for collation and analysis. The data from the sheets were entered into a computer spreadsheet and relevant parameters calculated.



## Results

Eight fishing vessels participated in the tally book scheme; two seine netters, three single trawlers and three twin trawlers. These vessels returned a total of 199 tally sheets between June 2013 and July 2014, covering 422 days of fishing and 1,513 tows. All recorded fishing activity took place in the waters around Shetland.

Generally, about three or four vessels completed tally sheets each month (Figure 1), although returns by individual vessels were somewhat irregular (Figure 2). Short gaps in returns primarily represent periods when vessels were not fishing (for example due to restrictions on fishing effort). The longer gap in early 2014 reflects a period of exceptionally poor weather early in the year when few local vessels were fishing, and a subsequent tendency to neglect the tally sheets. A push was made in the spring to remind fishermen to complete the tally sheets, resulting in further returns before the scheme was wound up in July 2014.

Overall, four vessels (one seine netter, one single trawler and two twin trawlers) accounted for about three-quarters (76%) of the sheets returned (and 80% of the recorded tows).

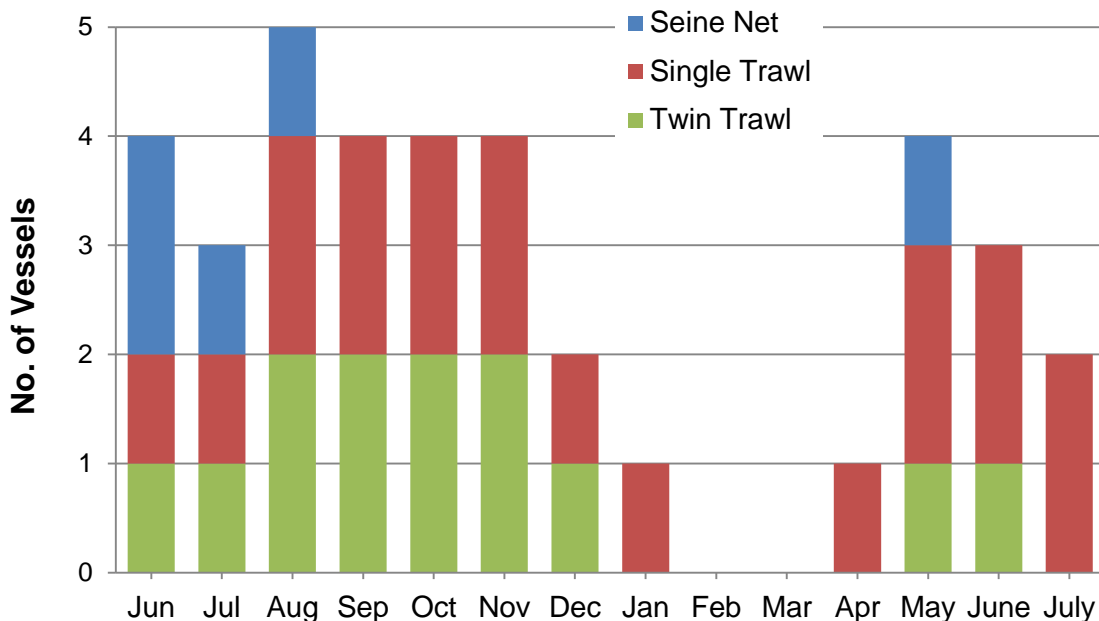


Figure 1 The numbers of fishing vessels in each gear category that returned tally sheets during each month (see Figure 2 for more details).

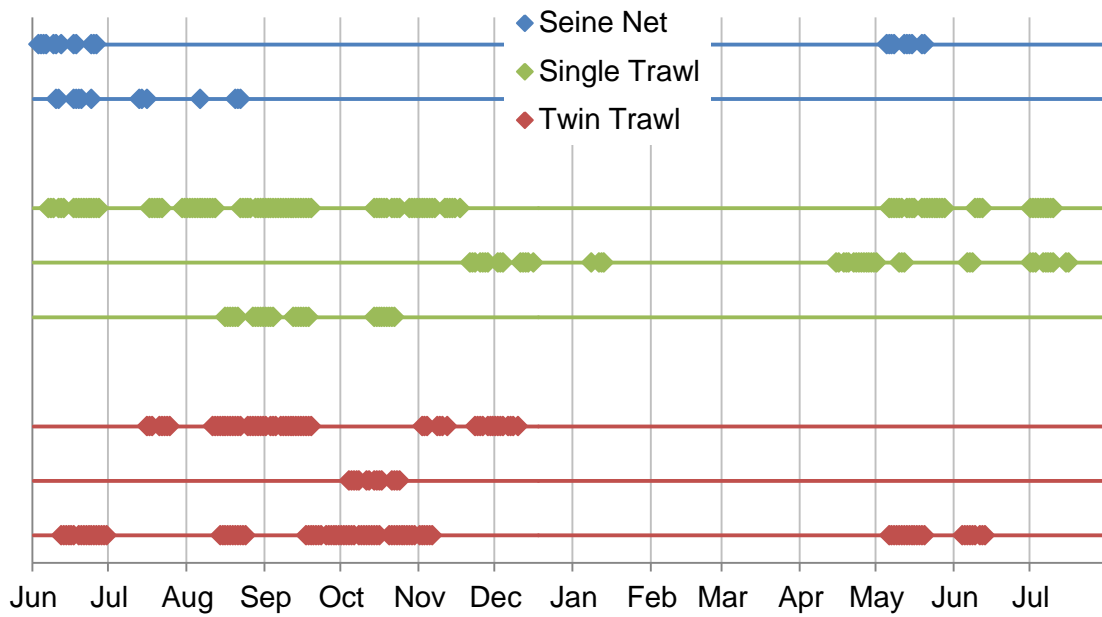


Figure 2 Representation of the time periods over which individual vessels returned tally sheets. Each horizontal row represents one vessel; each symbol represents a day for which that vessel completed a tally sheet.

## Characteristics of Catches

The tally sheets recorded catches of just over 46,000 boxes<sup>1</sup> of fish, of more than 24 different species (Figure 3, Table 1). The catches were dominated by cod, which accounted for one-quarter (25%) of the total, followed by haddock (19%), saithe (17%) and hake (14%). Together these four species accounted for three-quarters (75%) of the catch.

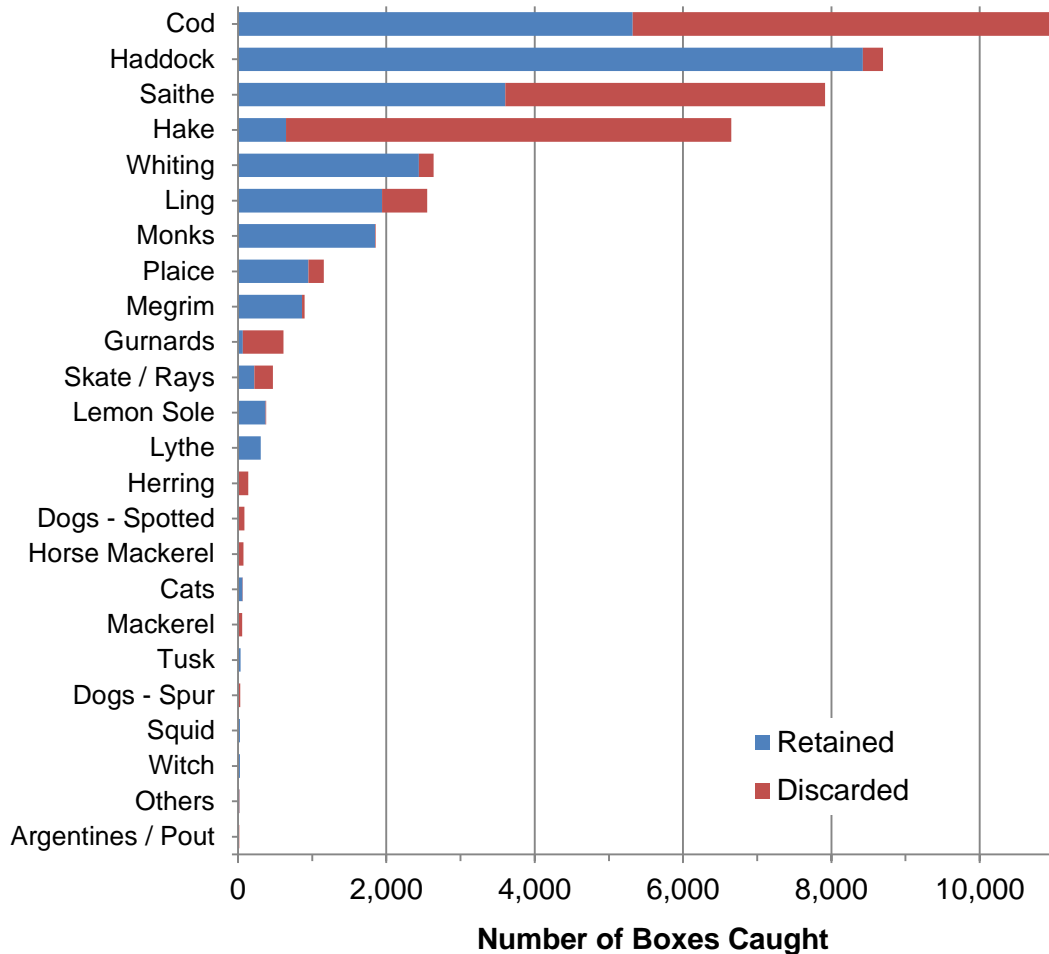


Figure 3 The total quantities of each species caught<sup>1</sup>, as recorded on the tally sheets. For each species the quantities retained and discarded are also shown. There was some catch of all the species shown (for values see Table 1).

<sup>1</sup> Most respondents recorded their catches and discards as numbers of boxes. For vessels in Shetland's whitefish fleet box weights are generally 30 kg for hake and flatfish, and 45 kg for other species.

Table 1 The total quantities of each species recorded on the tally sheets as caught and discarded. The quantities discarded are shown as percentages of the total quantity discarded and of the total quantity caught. (Species are ranked in decreasing order of total quantity discarded. Box weights are 30 kg for hake and flatfish and 45 kg for other species.)

Rank	Species	Catch		Discards		
		Quantity (boxes)	% of total caught	Quantity (boxes)	as % of total discarded	as % of total caught
1	Hake	6,651	14%	6,001	32%	13%
2	Cod	11,314	25%	5,993	32%	13%
3	Saithe	7,913	17%	4,311	23%	9%
4	Ling	2,550	6%	606	3%	1%
5	Gurnards	615	1%	551	3%	1%
6	Haddock	8,697	19%	275	1%	1%
7	Skate / Rays	473	1%	253	1%	1%
8	Plaice	1,157	3%	208	1%	0%
9	Whiting	2,635	6%	198	1%	0%
10	Herring	138	0%	135	1%	0%
11	Dogs - Spotted	84	0%	84	0%	0%
12	Horse Mackerel	76	0%	76	0%	0%
13	Mackerel	55	0%	55	0%	0%
14	Megrim	896	2%	33	0%	0%
15	Dogs - Spur	32	0%	32	0%	0%
16	Argentines / Pout	18	0%	20	0%	0%
17	Lemon Sole	382	1%	12	0%	0%
18	Monks	1,854	4%	7	0%	0%
19	Others*	19	0%	2	0%	0%
20	Cats	62	0%	1	0%	0%
21	Lythe	308	1%	0	0%	0%
22	Squid	27	0%	0	0%	0%
23	Tusk	35	0%	0	0%	0%
24	Witch	25	0%	0	0%	0%
<b>TOTAL</b>		<b>46,020</b>		<b>18,852</b>		<b>41%</b>

\* 'Others' included halibut, turbot and conger eels.

## Quantities of Discards

Overall, of the catches recorded on the tally sheets, two-fifths (41%) were discarded. Discards of at least 16 different species were recorded (Figure 3, Figure 4, Table 1). The only species for which no discards were recorded were lythe (pollack), tusk, witch and squid (squid is included under 'others').

The vast majority of the fish discarded were of three species: cod, hake and saithe. These three species together accounted for 86% of all the fish discarded, and those discards for about one-third (35%) of the total recorded catch. On their own, cod and hake each accounted for about one-third (32%) of the fish discarded (Figure 4, Table 1).

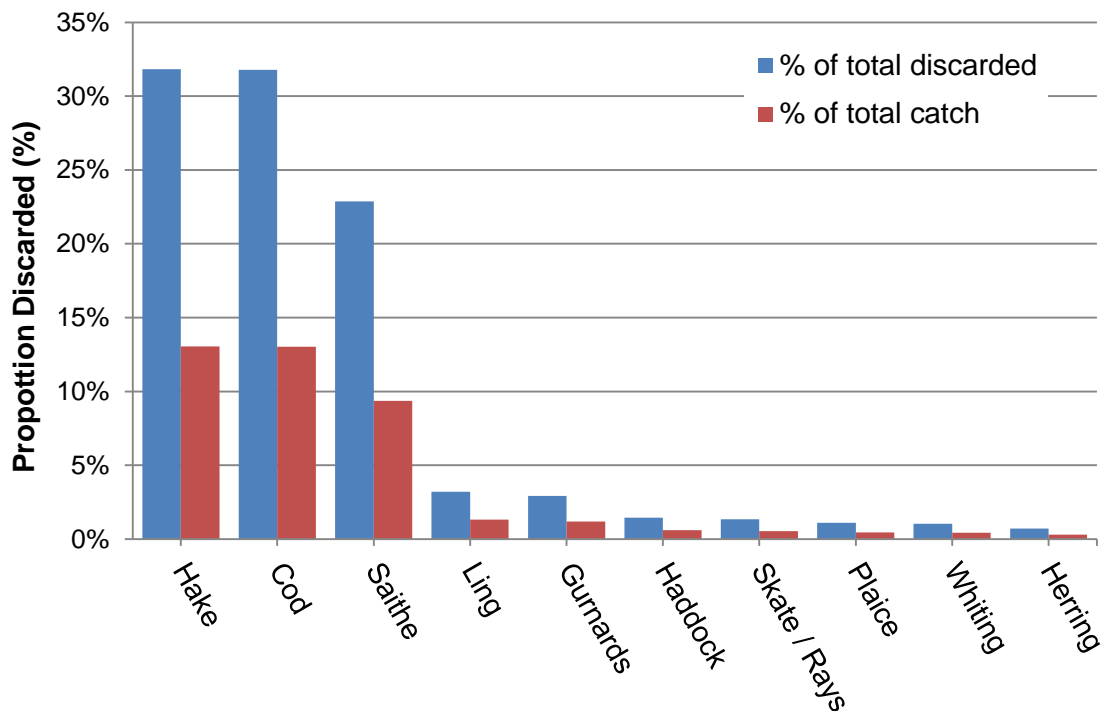


Figure 4 The quantities of the principal species discarded, as percentages of the total quantity discarded and of the total quantity caught. (For values see Table 1).

## Discard Rates<sup>1</sup>

The discard rates of individual species – the proportion of the quantity caught that was discarded – varied widely (Figure 5). Of the main species caught, hake had the highest discard rate (90%), followed by cod (49%), saithe (43%) and skates and rays (40%). Other commercially important species, such as whiting, haddock, monks and most flatfish had relatively low discard rates (below 5%), and a few species (such as lythe, squid, tusk and witch) were never discarded.

A number of non-target species, including argentinies / pout, dogfish, horse mackerel, mackerel, herring and gurnards also had very high discard rates (100% in many cases), although they were caught in relatively small quantities (less than 1% of the total catch; see Table 1). In most cases the whitefish vessels had no quota for these species or there is no market for them.

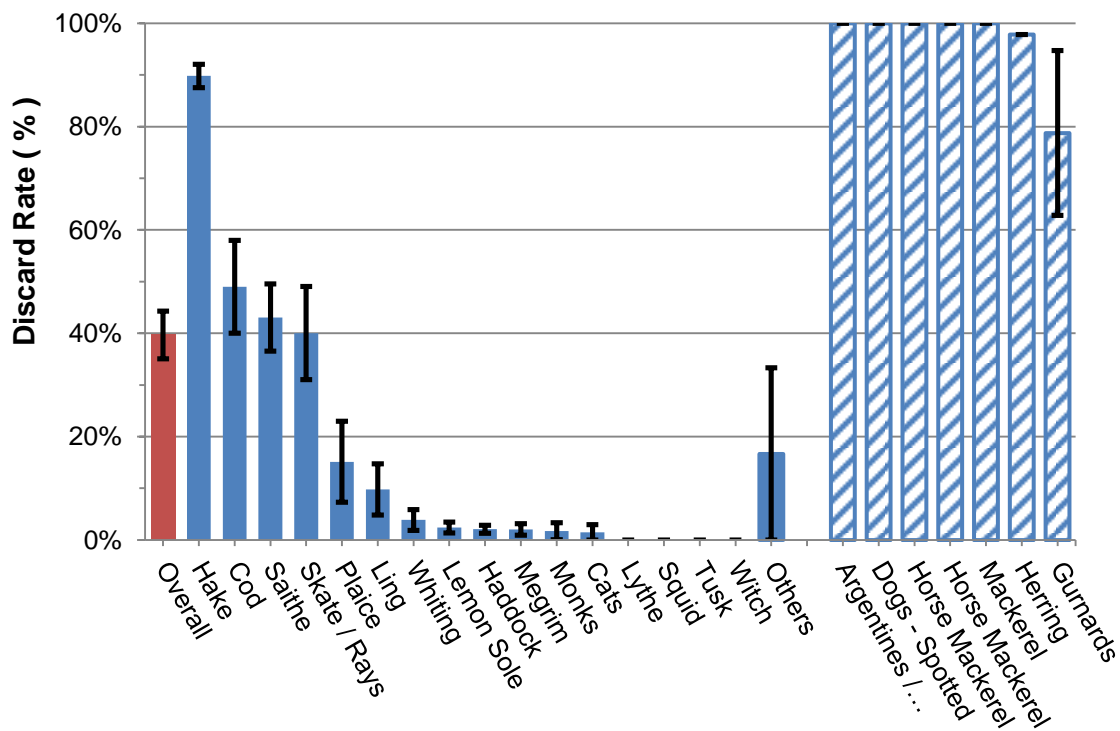


Figure 5 Average discard rates for individual species (all vessels): the proportion of the quantity caught of each species that was discarded. Error bars show the standard errors of the means. Non-target species are grouped separately at the right (hatched bars).

<sup>1</sup> The 'Discard Rate' is the proportion (percentage) of the total catch that is discarded.

## **Seasonal Variations in Discard Rates**

The average monthly discard rates for the three species with the highest discard rates – hake, cod and saithe – are shown in Figure 6. The discard rates for both hake and saithe remained relatively constant over the period covered by the available data.

The cod discard rate remained relatively constant over most of the time period, but declined markedly towards the end of the year (November / December). This might reflect a reduction in cod discarding due to an increase in the availability of cod quota towards the end of the year (or a relaxation of limits to its availability).

However, as with other apparent changes over time, this apparent reduction might rather reflect differences in the fishing practices of the individual vessels that returned tally sheets at different times.

When discard rates were calculated separately for the four fishing vessels that accounted for the majority of the tally sheet returns the results were broadly similar (Figure 7).

Discarding by Shetland's Whitefish Vessels

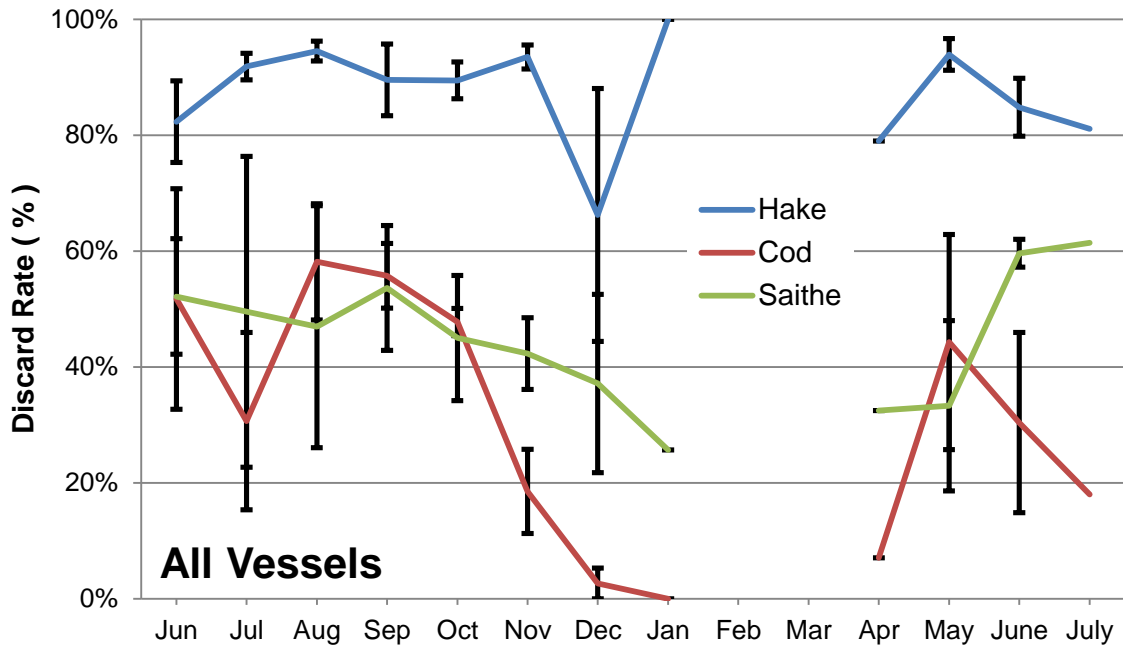


Figure 6 The average monthly discard rates for cod, hake and saithe (all vessels): the proportion of the quantity caught of each species that was discarded. Error bars show the standard errors of the means.

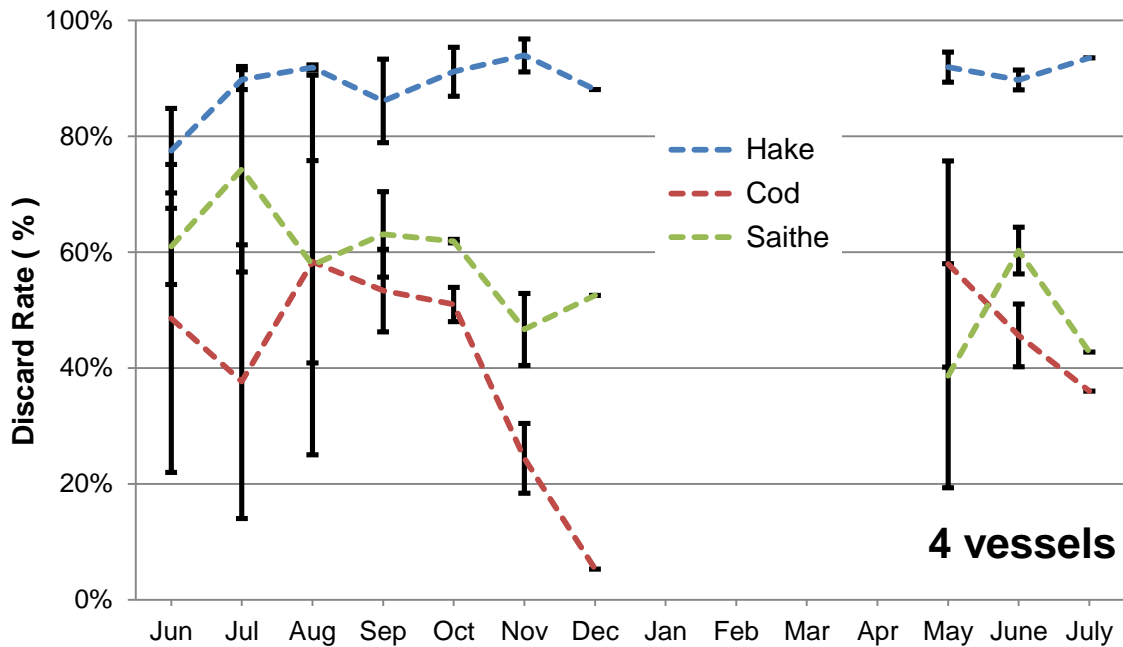


Figure 7 The average monthly discard rates for cod, hake and saithe (for the four vessels that returned most tally sheets): the proportion of the quantity caught of each species that was discarded. Error bars show the standard errors of the means.



## Differences in Discard Rates Between Gears

Figure 8 compares the average discard rates of selected species between different types of fishing gear (seine net and single and twin trawls). For some species – such as hake and haddock – the discard rate appears to have been fairly consistent between gear types. For other species, however, there are indications of differences in discard rates, especially between the seine net and the trawls. For example, the average discard rate for saithe was markedly lower with the seine net, while those for plaice and skates and rays were higher. The average discard rate of cod was markedly lower with the single trawl than with either the seine net or the twin trawl.

To some extent these may reflect differences in the spatial distribution of individual species in relation to the grounds fished with the different fishing gears, or in the catchability of different species by those gears. Saithe are probably less common, and plaice and skate and rays more common, on seine net grounds, for example.

However, apparent difference may differences in the fishing practices of the individual vessels that returned tally sheets at different times, and/or in their access to quota..

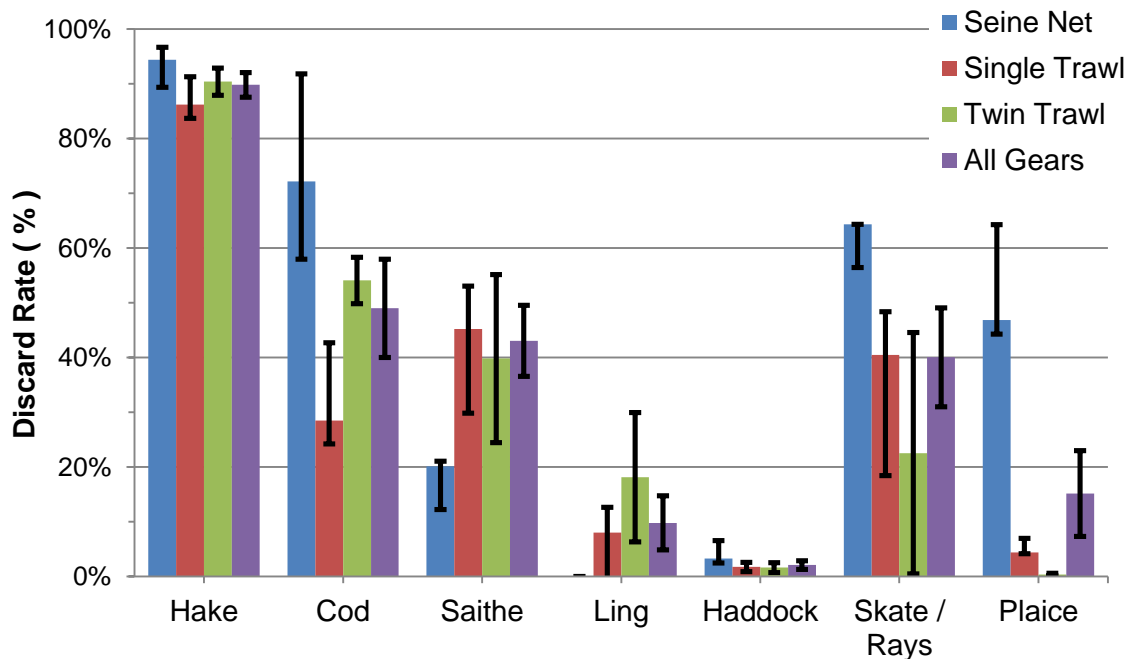


Figure 8 The average discard rates of selected species with different types of fishing gear and for all gears combined: the proportion of the quantity caught of each species that was discarded. Error bars show the standard errors of the means.

## Frequency of Discards

Overall, discards were recorded from virtually all catches (98%). The frequency of discarding varied for individual species; of the main species caught, hake was almost always discarded (98% of catches), while cod (76%) and saithe (72%) were also discarded from more than half of all catches. In contrast, species such as lemon sole, monks and catfish were rarely discarded, while lythe, tusk and witch never were.

A number of non-target species, including dogfish, horse mackerel, mackerel and gurnards were also always, or nearly always, discarded, although most were caught in relatively small quantities (see Table 1). In most cases the whitefish vessels had no quota for these species or there was no market demand.

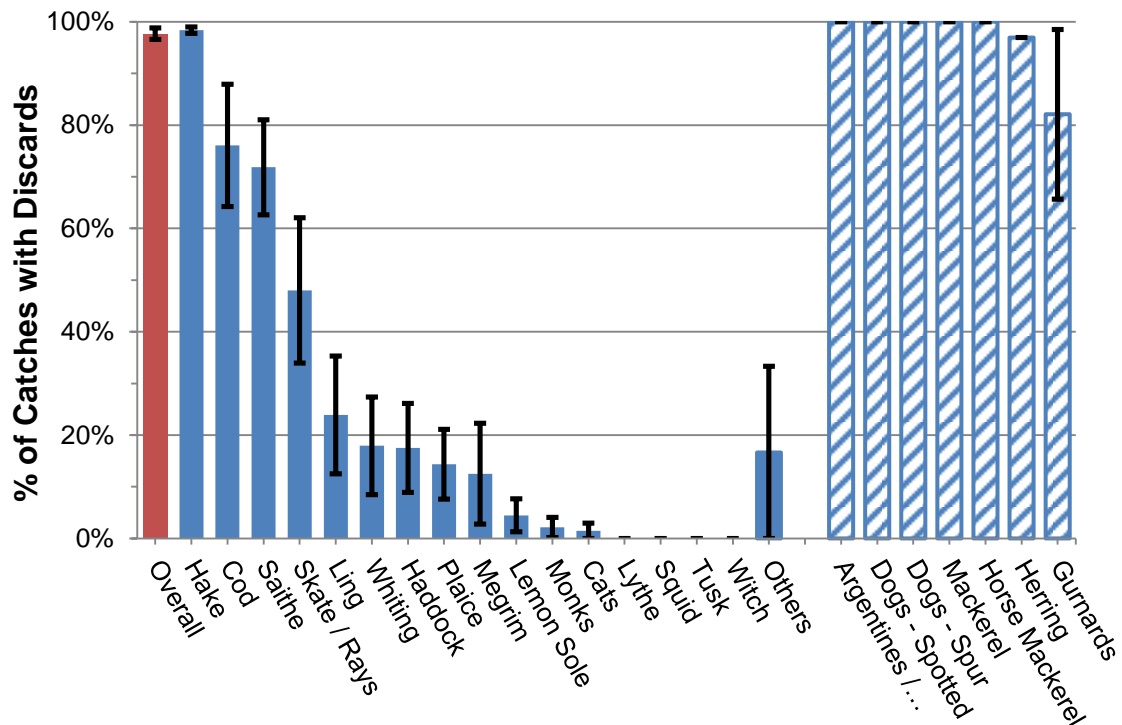


Figure 9 The frequency of discarding of individual species (all gears): for each species the average percentage of catches in which the species was caught from which at least some was discarded. Error bars show the standard errors of the means. Non-target, bycatch species are grouped separately at the right (hatched bars).

## Discussion

The Shetland Fishermen's Association's discards tally book scheme has provided basic quantitative data on the nature and scale of discarding by a sample of vessels in Shetland's whitefish fleet. Despite the limitations of the scheme (such as small sample size and the irregularity of returns) the data collected provide a broad overview of the magnitude and nature of discarding by these vessels. It would be reasonable to assume that other whitefish fishing vessels fishing in the waters around Shetland would exhibit similar discarding practices.

A couple of broad conclusions can be drawn from these data:

Firstly, discarding was extremely common; some discarding was recorded from almost all catches. The frequency of discarding varied widely between species, but most of the commercial species caught were discarded at some time (albeit at a low level in some cases).

Secondly, the quantities of fish being discarded were substantial. Overall, some 40% of all the fish caught were discarded, although again the discard rate varied widely between species.

The discards were dominated by three species: hake, cod and saithe. This reflects both the quantities of these species being caught, but also their relatively high discard rates. More than nine-tenths of all the hake caught (90%) were discarded, as were about half of the cod (49%) and almost as much of the saithe (43%). This is in line with general impressions and anecdotal information of where the biggest challenges lie in implementing a discards ban.

A number of other species, of limited or no commercial importance to whitefish vessels, including several pelagic species (such as herring and mackerel), dogfish and gurnards, also had very high discard rates, although most were caught in relatively small quantities.

Information on the reasons why fish were discarded was not systematically recorded through the tally book scheme. However, what information was provided, together with anecdotal information, indicates that the primary reason for discarding for species such as hake and cod was lack of quota. For other commercial species, including saithe, market conditions were probably also an important factor; generally lack of demand (poor prices) for smaller sizes of fish. Other causes for discarding included lack of market demand (gurnards, spotted dogs) and prohibitions on landings (spur-dogs, common skate, undersized fish of all species).

These results could help inform the development of management measures to implement the discards ban without having a disproportionate effect on whitefish fishing vessels.

# Appendix

Examples of the tally sheets and associated instructions issued to fishermen.

# *Discard Tally Sheets*

- ◆ These tally sheets are intended to collect information on how much fish are being discarded around Shetland.
- ◆ The Association needs this information to help it negotiate with the Scottish Government to try and find a workable way of implementing a 'discard ban'.
- ◆ For each haul (or as many hauls as possible) please estimate as accurately as you can the quantities of each species that you retain and the quantities that you discard (for example, as the number of boxes or baskets of each).
- ◆ **It is important that the information collected is as accurate as possible:** Please do not exaggerate or minimise the quantities that you discard.
- ◆ **If you cannot record the discards** from some hauls you should still enter those hauls on the tally sheet but note that the discards were not recorded.
- ◆ **If there are no discards** from some hauls you should still enter those hauls on the tally sheet and record the discards as 0 (zero).
- ◆ Please ensure that you do not only record discards when there are a lot of them, and ignore hauls where there are few or no discards.
- ◆ The Association will keep the information from these sheets confidential. Only anonymous and averaged results will be released to the Government.
- ◆ If you have any questions please contact Simon Collins (01595 693197) or Leslie Tait (07786 656398).

# Discard Tally Sheet

Boat Name:

Skipper:

Gear:

Please fill in one column for each haul.

For each haul record the total quantities of each species kept and discarded.

Use the same unit for both (for example, baskets or boxes)

If there are no discards please enter a zero in the Disc' column.

If discards are not recorded please enter 'NR' in the Disc' column.

Date:														
Time:														
Area:														
	Kept	Disc'	Kept	Disc'	Kept	Disc'	Kept	Disc'	Kept	Disc'	Kept	Disc'	Kept	Disc'
Units:														
Cod														
Haddock														
Hake														
Lemon Sole														
Ling														
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