

BRIEFING NOTE

September 2019

North Sea Cod

– Some Key Facts



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Introduction

In light of the recent ICES advice that the total allowable catch of North Sea cod be cut by 70% in 2020, the Shetland Fisherman's Association wishes to draw attention to some key facts about the state of the North Sea cod stock:

- **The abundance of cod has naturally varied greatly in the North Sea.**
- **The overall abundance of fish in the North Sea has increased substantially.**
- **Even with recent declines cod are still extremely abundant in the North Sea.**
- **There is no single right size for the North Sea cod stock.**
- **The North Sea cod stock is very resilient.**
- **The distribution of cod within the North Sea has changed.**

The SFA believes that these facts should dispel some of the myths surrounding the North Sea cod stock and that account should be taken of them when agreeing the fishing opportunities for 2020 and when formulating longer-term fisheries management policy.

Cod has Varied Greatly in Abundance - Naturally

During the 1960s the abundance of cod in the North Sea increased dramatically. There were also large increases in the abundances of other species of 'gadoid' fish, including haddock, saithe and whiting, and this period is known as the 'gadoid outburst'. The immediate cause of the gadoid outburst was very high levels of recruitment (the entry of new young fish to the stocks) in some years. Although this is believed to have been due to favourable environmental conditions the exact causes remain unclear.

For cod, the gadoid outburst lasted until the mid-1980s and it has been suggested that the decline in the stock size during the 1980s should be regarded as a return to normal levels.

After the end of the gadoid outburst the size of the cod stock continued to decline, probably due to high levels of fishing pressure, but increased again from the mid-2000s after fishing pressure was reduced.

The average size of the North Sea cod stock since the end of the gadoid outburst has been 87,000 tonnes, compared to 184,000 tonnes during the outburst.

The large size of the North Sea cod stock in the 1960s and 1970s was the result of unusual conditions and does not reflect the 'normal' size of the stock. It is unrealistic to expect that management measures can return the cod stock to these sizes, unless the conditions that caused the gadoid outburst recur.

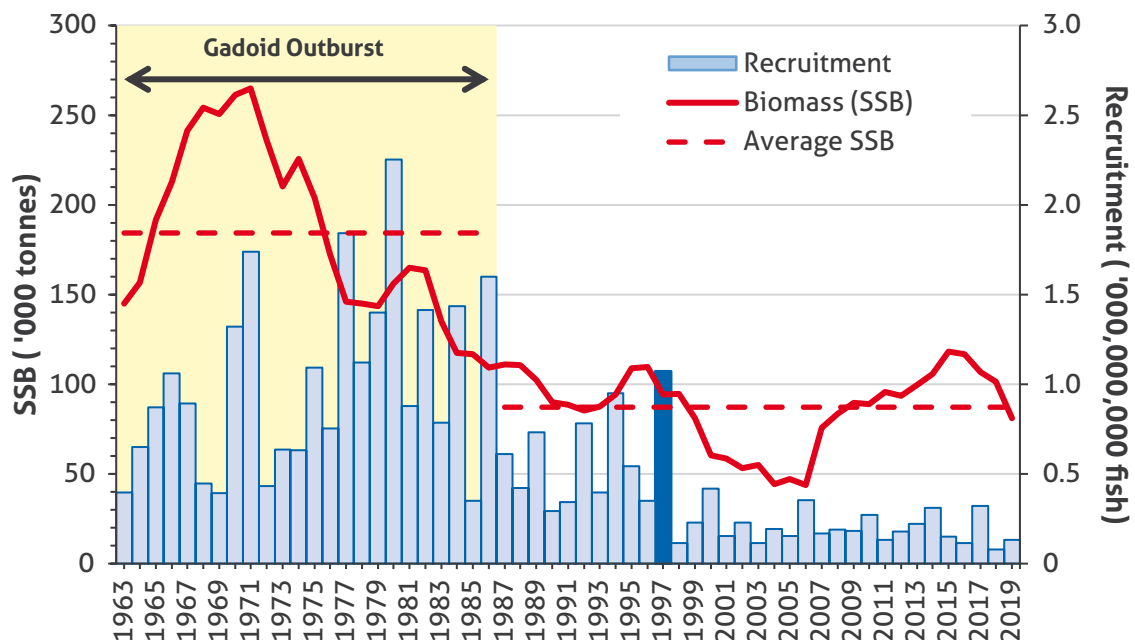
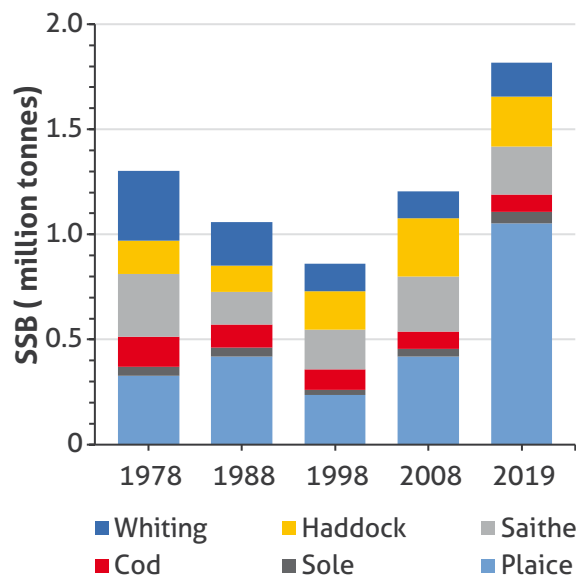
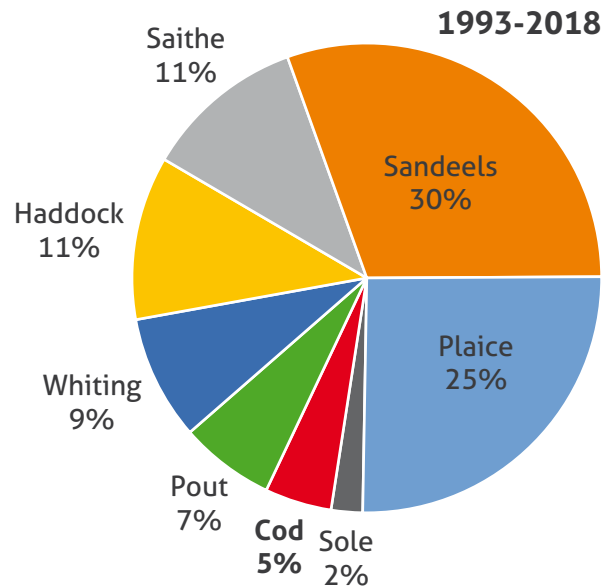


Figure 1 The estimated spawning stock biomass (SSB; line – left axis) and recruitment (bars – right axis) of North Sea cod from 1963 to the present. The average SSBs during and after the gadoid outburst are shown. (ICES data.)

There Are More Fish in the North Sea Now Than There Have Been for Decades

Cod is only one of many species of fish in the North Sea and accounts for only a relatively small proportion of the total population of exploited fish. Of eight species whose abundances are known over the last 25 years, cod accounted for only 5% on average.



Each stock of fish in the North Sea has varied in abundance over the years: some have become more abundant, other less. While the size of the cod stock decreased slightly over the last two decades, the combined size of six principal stocks more than doubled.

In fact, five of the six stocks increased in size; most notably plaice, which more than quadrupled in size, and common sole which more than doubled. The stocks of whiting, haddock and saithe also increased by 20% or more.

All fish stocks vary in abundance over time. Although cod may have declined in abundance in the North Sea since the highs of the gadoid outburst, the abundances of other species have increased substantially. The overall abundance of six principal species has more than doubled in the last 20 years. Cod is just one of many commercially important fish species in the North Sea and changes in its abundance do not reflect the overall state of North Sea fish stocks.

There are More Than 180 Million North Sea Cod

There are estimated to have been more than 180 million cod in the North Sea in 2018.

That is three times the human population of the UK, and three times more than the most abundant British land animal (the field vole).

There are 4½ times more cod in the North Sea than there are mice in the UK, 25 times more cod than rats, and 600 times more cod than red squirrels.

That does not count cod in the English Channel, or the Irish Sea, or other areas around the UK. Nor does it include cod in other areas further afield, from the coast of America to Greenland, Iceland, the Baltic, the Norwegian Sea and the Arctic Ocean.

North Sea cod is one of the most abundant animals in the UK. To suggest that cod is 'threatened' or 'endangered' or in any way at risk of 'extinction' is risible. The management of fisheries for cod or other fish species is not a 'conservation' issue.

SPECIES	NUMBER
Cod (North Sea)	180,000,000

UK POPULATIONS

Humans	65,000,000
Field Voles	60,000,000
Field Mice	40,000,000
Rabbits	36,000,000
Sheep (farmed)	34,000,000
Cats (pets)	11,000,000
Cattle (farmed)	10,000,000
Dogs (pets)	9,000,000
Brown Rats	7,000,000
Grey Squirrels	2,700,000
Red Deer	350,000
Red Squirrels	290,000
Grey Seals	120,000
Common Seals	55,000
Otters	11,000
Wildcats	200

GLOBAL POPULATIONS

Elephants (African)	440,000
Humpback Whales	80,000
Blue Whales	8,500
Tigers	3,500
Pandas	1,800

There is no Single Right Size for the Cod Stock

The current approach to the management of the North Sea cod stock (and other fish stocks) is based on fixed targets (reference points) which are in turn based on historic levels of abundance and recruitment. This represents a statist, nostalgic and interventionist approach to fisheries management based, essentially, on a belief that *'things were better in the past'*. This approach assumes that there is a single 'right' size for the cod stock (and implicitly that the current size of the stock is 'wrong'), that we can manipulate the abundance of cod, and that it is appropriate to do so in an attempt to recapture some past level of abundance.

Whether or not things were 'better' in the past they were certainly different. The large abundances of cod seen in the North Sea in the past occurred under different environmental conditions and with different abundances of other fish stocks. Given these different conditions it cannot be assumed that we can *'turn the clock back'* to return to past levels of cod abundance, even if it is appropriate for us to attempt to manipulate nature in this way.

Fisheries management should not assume that there is a single 'right' size for the North Sea cod stock, or that the current size is 'wrong', or that we can and should attempt to control nature in order to 'turn the clock back'.

The Cod Stock is Very Resilient

During the 1980s and 1990s North Sea fish stocks were subject to very high levels of fishing pressure, partly as a result of the expansion of fishing effort under the Common Fisheries Policy. Over a 20 year period from the early 1980s the fishing mortality (F) for North Sea cod averaged about 1.0 (indicating that about two-thirds of the stock was being caught each year).

Despite being subject to this sustained very high level of fishing pressure over an extended period the cod stock did not collapse. Although it did decline in size the rate of decline was relatively small (5% per year, on average) and at least some of that decline can be attributed to the end of the gadoid outburst.

When the fishing pressure was reduced in the 2000s the cod stock rapidly rebounded – doubling in size within 10 years.

The North Sea cod stock is resilient: It did not collapse under very high levels of fishing pressure in the past so it is very unlikely that it will collapse now when fishing pressure is much lower. Although high fishing pressure may reduce the size of the cod stock, the evidence shows that it will recover when fishing pressure is reduced.

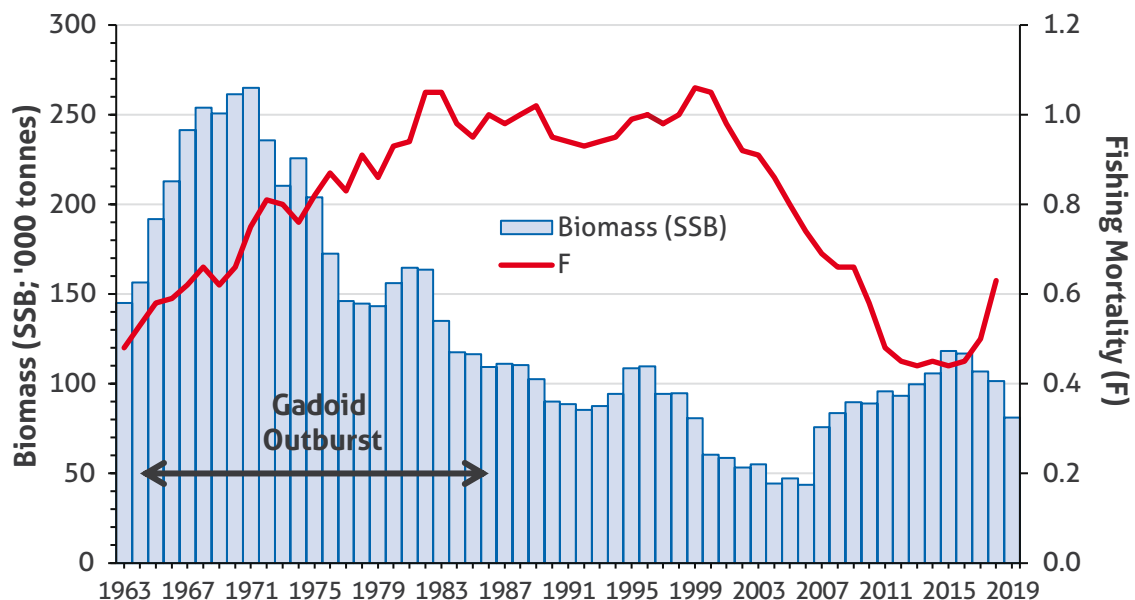


Figure 2 The estimated spawning stock biomass (SSB; bars – left axis) and the fishing mortality (F; line – right axis) of North Sea cod from 1963 to the present. (ICES data.)

The Distribution of Cod Has Changed

During the 1960s and 1970s cod were distributed throughout the North Sea: Slightly more than half of the cod caught during the International Bottom Trawl Survey (Q1) were caught south of a line extending east from the Firth of Forth (56° N).

After about 1980 the distribution of cod in the North Sea appeared to start shifting north, with an increasing proportion of the cod caught during the survey in the northern North Sea. By the early 2000s about three-quarters of all the cod caught in the survey were taken in the northern North Sea (north of 56° N). This trend appears to have accelerated after the late 2000s with up to 90% of the cod being caught in the northern North Sea.

The very high abundances of cod seen during the gadoid outburst occurred at a time when cod was distributed throughout the entire North Sea. Since then cod has become increasingly concentrated in the northern North Sea.

Given that cod is concentrated in a smaller area of the North Sea than it was in the past it seems unrealistic to expect that it can return to the abundances seen in the past, when it was more widely distributed throughout the North Sea.

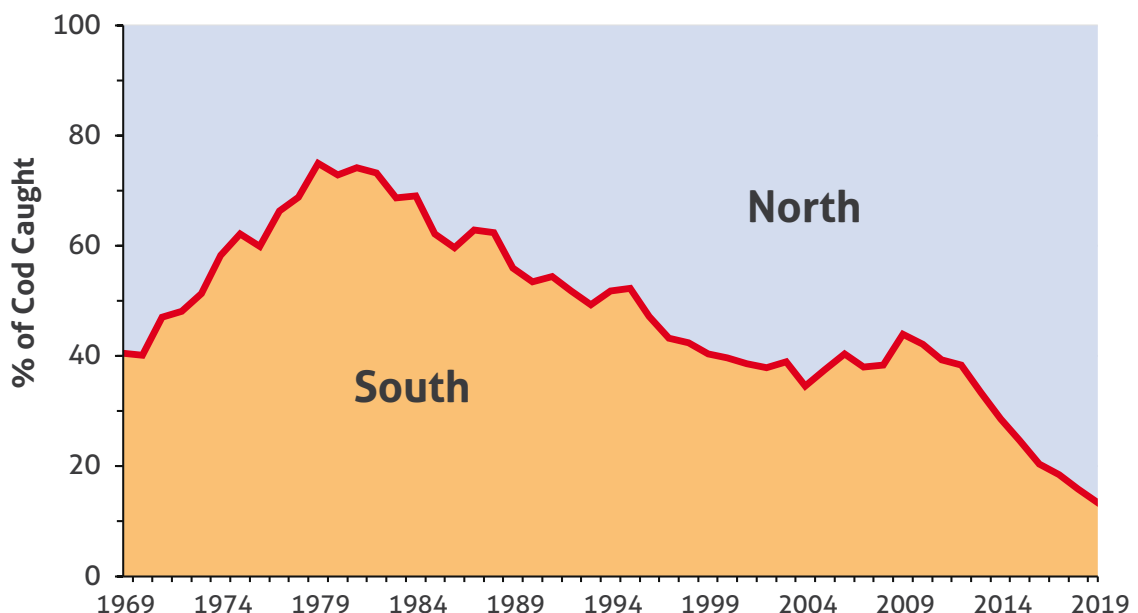


Figure 3 The division of the North Sea cod stock between the Northern and Southern North Sea: Rolling five-year average of the proportions of the cod caught in the annual Q1 IBTS survey in the northern and southern North Sea (north and south of 56° N latitude). (Analysis of ICES data.)

Appendix

Why Are the Reference Points for Cod So High?

Assessments of the state of fish stocks are made in relation to defined 'reference points' (essentially target stock sizes). The current biomass reference points for North Sea cod are:

- **B_{lim}** (minimum 'safe' biomass)
= 107,000 tonnes.
- **B_{pa}** (minimum biomass associated with precautionary approach)
= 150,000 tonnes.
- **MSY B_{trigger}** (minimum biomass compatible with MSY exploitation)
= 150,000 tonnes.

Thus the cod stock should be larger than 150,000 tonnes if exploitation is to be compatible with the current MSY (maximum sustainable yield) or precautionary approaches to management.

But the cod stock was only ever above this size during the gadoid outburst which ended more than 30 years ago. Since then it has rarely even exceeded B_{lim}, supposedly the minimum 'safe' biomass.

Reference points are not inherent natural biological features of fish stocks but are usually defined rather arbitrarily on the basis of historic abundances and levels of recruitment. For North Sea cod, B_{lim} is defined as *"the spawning stock biomass associated with the last-above average recruitment."* That is the SSB in 1996 (which was about 107,000 tonnes) given that 1997 was the last year of above average recruitment. B_{pa} is simply a multiple of B_{lim} (B_{lim} × 1.4) and MSY B_{trigger} is taken as being equal to B_{pa}.

The 'average' recruitment used to define B_{lim} is taken over the whole period since 1963 although this includes the unusually high levels of recruitment seen during the gadoid outburst. These inflate the long-term average and effectively result in biomass reference points that reflect the historic state of the stock and historic environmental conditions.

Unrealistically high reference points trap the cod fishery in a state of chronic 'crisis' leading to the frequent imposition of severely restrictive management measures with little realistic prospect of attaining the target stock sizes.

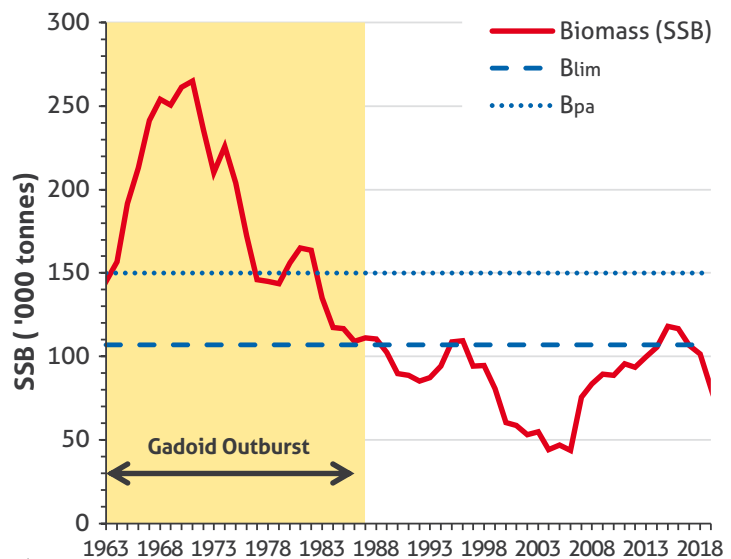


Figure 4 The estimated spawning stock biomass of North Sea cod from 1963 to 2019 showing the reference points B_{lim} and B_{pa}. (ICES data.)