



Norfish Dataset 22

Shetland Cod Fishery

1520–1796

Supporting Documentation

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*Het Eyland Hitland met zyn onderhoorige Eylanden Wort by de Engelsche Shetland genaamt.*¹ (Van Keulen 1728)

¹ Translation: The Island “Hitland” and its subject islands is named Shetland by the English. Chart of Shetland by Van Keulen (Chart 30) in 1728

Summary

Dataset Title:	Shetland Cod Fishery 1520-1796
Norfish Case Study:	Shetland Cod Fishery 1520-1796
Large Marine Ecosystem:	22: North Sea
Subject:	Catches, Shetland, cod, North Sea, 1520-1796
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Sources and Chronology

Shetland is an archipelago situated off the north east coast of Scotland. Early modern fisheries are believed to have been conducted nearshore while the discovery of offshore banks in the eighteenth century led to an expansion of the fishery. Ling (*Molva molva*) dominated the Shetland fishery with cod (*Gadus morhua*) playing a significant but lesser role.

1520 to 1741

The Danish Sound Toll Tables of the 17th and 18th centuries record that cod and herring catches were exported to the Baltic. Shetland's primary trade relation was with Bergen, but most ships went in ballast from Shetland to buy wood products, including boats (Smith, 1984, p. 34).

The period 1520 to 1546 provides no statistical data that can be reported. The first available data in 1547 is in the form of transport (export) vessel numbers to Hamburg and Bremen. This data is available until 1647. The period 1648 to 1741 has been interpolated to create a simple direct line between the two available dates. No other fisheries in the region appear to have a particular indication of providing some level of trend that may be followed.

The German cities of Hamburg and Bremen had an extensive trade with the North Atlantic islands in the fifteenth and sixteenth centuries. The merchants set up trading booths by the shore and exchanged goods, primarily grain, for ling and cod, prepared and assessed by different dried and salted qualities. The merchants of Hamburg were organised in a fraternity and the evidence of members and lists have enabled a reconstruction of annual number of ships (Baasch, 1889, 1894; Ehrenberg, 1899). The evidence has recently been reviewed by Grassel (2017).

The Hamburg series commences in 1533 when the Danish Civil War likely impacted shipping. The figures are probably complete by 1544 and continue for the Faroes until 1593, for Iceland until 1623, and for Shetland until 1642. The evidence shows a marked decline of shipping during the Nordic Seven Year War in the 1560s. In the 1580s trade built up and Iceland was regularly visited by 15-20 Hamburg ships in a year. An abrupt but not complete decline of shipping to the Faroes and Iceland in 1602 followed the Danish King's decision to award exclusive trade rights to Danish denizens. Shetland continued the Hamburg link. Unfortunately, we do not have similar documentation of the Bremen trade. We know that in 1585 14 ships from Hamburg and 8 ships from Bremen, Lübeck, and Danzig reached Iceland (Ehrenberg, 1899, p. 19). On the other hand, Bremen merchants seem to have dominated the Shetland trade. By the mid-sixteenth century Bremen sent five ships per year while

Hamburg only sent one or two. We do not know if this ratio continued but it seems likely that Hamburg will have diverted more shipping to Shetland when access to Iceland and the Faroes became limited after 1601.

We use this evidence, imperfect as it is, to estimate total exports from the North Atlantic islands to the German cities. We assume that Bremen sent two times the number of ships from Hamburg to Shetland. For Shetland, Baasch (1894) provides the lastage of 18 vessels, showing an average of 34 lasts or 163 t of liveweight fish. We assume that 80% of the cargo was fish, half air-dried, half salted and barrelled, and use a conversion rate of cargo to live weight of 1:5 (the historical conversion rate in Iceland of dried cod to live weight was 1:7.7 while the conversion rate of salted cod was 1:3.5 (J. Jónsson, 1994).

Ling and cod were a staple of the Shetlander diet and domestic consumption was an important factor in determining the overall volumes of cod caught. Population figures were obtained from the GB Historical GIS – A Vision of Britain through Time (University of Portsmouth, n.d.) and domestic consumption was calculated based on an assumed per capita per annum value of 120 Kg of cod. The derived figure was obtained from Jonsson's (1988) calculations that indicate a typical Icelandic consumption of 650 to 700 grams of fish per day in 1770; this amounts to about 240 Kg per annum. The Shetland diet may reasonably be considered as ranging between the very large Icelandic (240Kg per capita per annum) intake and the average Norwegian intake of 50 Kg per capita per annum; a figure of 120 Kg was adopted. We estimate a value of 120 kg p/c annually for Shetland as the standard fish consumption rate, equalling 2.6 times that of the domestic consumption of the Faroes.

Population figures indicate that in 1742 there were 15,000 people in Shetland (GB Historical GIS). No demographic data prior to 1742 was available. Prior to 1742, we therefore calculated domestic consumption at a rate of 2.6 times that of the domestic consumption of the Faroes (Holm et al 2021).

1742 to 1796

The Customs Records reported by Goodlad (1971, p.122) provide a series of export data from 1742 to 1796. These data incorporate exports to the Baltic (Hamburg), to the Mediterranean (Barcelona), to Ireland (Dublin), and an aggregated value for "Other" ports.

Goodlad's (Ibid.) export figures are provided in hundredweight measure (cwt) which has been converted into metric tonnes (1 cwt = 0.0508023 metric tonnes).

Furthermore, all export figures are assumed to be of salt-dried cod that had to be converted into liveweight values based on Jonsson's (1994) conversion values.

These records do not account for cod being transported to Scotland and England. To derive the values for UK cod exports for Shetland, the work of Smith provides a multiplication factor of six times the amount of all other exports. This value was added to the overall total. As Smith states: "The only exact figures are for the year 1st May 1808 until 1st May 1809, when 19,107 cwt. were exported coastwise, and 3,159 cwt. abroad. In general, it appears that the home market consumption was about six times that of the foreign markets. During this period the Irish market became 'quite overstocked', and after the union with Great Britain and Ireland in 1801 the encouragement to trade was further lessened by the fact that this ceased to be a foreign market eligible for the 3/- bounty per cwt. dry fish."

(Smith 1984, p.131)

The technological advances over time that influenced the fishery were considered. The introduction of methodical processing impacted to a large extent:

"In the 1730s, the prospects were further enhanced by developments in fish processing. In Shetland as in Norway, a new curing method was adopted for fish such as cod and ling. Split fresh from the sea, pressed, lightly salted and hard dried, these earned an international reputation for quality."

(Irvine and Morrison 1987, p.43)

Similarly, the introduction of new types of vessels would have added to the efficiency of the fishers in landing and processing cod.

"Gifford's 1743 order to Bergen included eight 6-oared boats (Bruce 1931). It would certainly be wrong to imagine that 6-oared boats had not been used in Shetland waters long before then, in one role or another, but it is from this time onwards that their use for fishing far offshore becomes very apparent. "

(Ibid., p.48)

Despite the innovations and developments in fishing gear and methods deployed, there is evidence to suggest that technology creep provided little impact for the period under consideration.

"...in 1772 a Mr Cobb visited Shetland and demonstrated a simple and inexpensive method by which catches could be improved markedly when long-lining. Long-lining rather than trawling was the Shetlanders' characteristic method for catching bottom-

living fish [...] such as ling, tusk and cod (in order of usual importance). It had been employed there from at least 1570.² The lines were made up in handy lengths of 50 fathoms (300 feet, ca91 m) called baukts. These were joined and paid out onto the seabed. Until around 1733, it is likely that only 40 baukts were used per boat, but as craft got bigger and the fishing moved farther offshore in the late 18th and through the 19th century, this increased until as much as 7 miles (ca 11 km) of line with 1,200 hooks might be set by a single sixareen. The hooks were each attached to a trace about 4 feet long (1.2m) called a tourn, these being spaced at five fathom (ca 9.101) intervals along the lines. Cobb's innovation was to add small floats to the toums, so that the hooks were held clear of the bottom, and he 'proved that three fish were caught by his mode for one in the common way'.³ The efficacy of this method has since been confirmed by Swedish fishermen ⁴. Yet Fea (1775)⁵ tells us that as soon as Cobb left the islands the men returned to their old ways. They had no incentive to increase productivity if an increase in through-put merely meant more work for them, and more profit for the lairds without any real advantage to their own families."

Overall, the results obtained from the combined export, domestic consumption and UK receipt are in line with expected values indicted by 19th century activity:

"The new fishery- and truck-systems were at their height in the early years of the nineteenth century when 400-500 boats were in use and about 3,000 men employed in them."

(Goodlad 1971, p.112)

By a conservative estimate of just one metric tonne catch per fisher per annum, total catches of around 30,000 metric tonnes in total are indicated. This marries nicely with the peak values

² Irvine and Morrison cite Balfour (1859) as their source: Balfour, D. 1859. The Oppressions of the 16th century in the Islands of Orkney and Shetland. Edinburgh.

³ Irvine and Morrison cite Edmonston (1809, p362) as their source: Edmonston, A. 1809. A View of the Ancient and Present State of the Zetland Islands. Edinburgh.

⁴ Irvine and Morrison cite Goodlad (1971) as their source: see bibliography.

⁵ Irvine and Morrison cite Fay (1971) as their source: Fea, J. 1775. State of Orkney and Shetland. Edinburgh.

derived for 1787 and 1795 when Spanish imports were at their height, leading to the conclusion that the provided dataset values are reasonably corroborated.

For the period 1755 to 1756, and the year 1759 there is a gap in the export figures. Similarly, there is a gap in recorded figures between 1769 and 1782. This may be due to the loss of documents over time, or a failure to record the data. The values for this period have been assumed based on a simple interpolation between the last given and next given points.

Conversion Factors

Goodlad's (1971) export figures are provided in hundredweight measure (cwt) which has been converted into metric tonnes.

- 1 cwt = 0.0508023 metric tonnes

Catch weight values are provided in metric tonnes as reported above. However, Jónsson (1994) provides conversions for determining typical liveweight values from salted, dried and barrelled cod:

- Dried cod (Iceland) to liveweight = 1:1.77
- Salted cod to liveweight = 1:3.5
- Wetfish (half dried and half salted in barrels) to liveweight = 1:5
- 1 last = 1.2 t (metric tonnes)

Other Processes

The marine species information that informs the dataset is obtained from the World Register of Marine Species (WoRMS 2020) which validates common species names, scientific names and sources.

The metadata system underpinning the dataset is based on Darwin Core (OBIS 2017; 2020) which provides static formulations of all data fields as outlined in the Data Fields section of this document.

Data Fields

Darwin Core Field Name	Description
occurrenceID	A globally unique “per record” identifier based upon the concatenated institutionCode, collectionCode, catlogNumber and ID fields (TCD_Norfish_SheHolNicCod_1)
type	Description of data series type. (Dataset)
modified	Most recent date the data was modified; ISO 8601 metric date/time standards apply. (2021-08-06)
license	Data licensing conditions that apply. (http://creativecommons.org/licenses/by/4.0/legalcode)
bibliographicCitation	Author citation for the dataset. (Holm, P and Nicholls, J. 2021. Norfish: Shetland Cod Fishery 1520-1796. Dublin: TCD.)
references	Denotes the link where more detailed information about the dataset is held. (http://www.vliz.be/imis?module=project&proid=5064)
institutionCode	Identifies the institution which owns the data - Trinity College Dublin. (TCD)
collectionCode	Code of the project or research group. (Norfish)
datasetName	Name of the dataset. (Shetland Cod Fishery 1520-1796)
basisOfRecord	Specifies the nature of the observed or researched specimens or data. (HumanObservation)
dataGeneralizations	Source data that informs the provenance of the data. (Sources: Goodlad, C.A. 1971. Shetland Fishing Saga. Shetland: The Shetland Times. P.122. (from: Custom House Records).

catalogNumber	Identifier of the data within the institution and project – “She” refers to Shetland, “Hol” refers to Holm, “Nic” refers to Nicholls, “Cod” refers to cod. (SheHolNicCod)
occurrenceRemarks	Comments about the occurrence record. (NA)
recordedBy	Researchers who recorded the data. (Poul Holm John Nicholls)
organismQuantity	Quantity of fish represented in the record shown in Kg live weight. (8161419)
organismQuantityType	organismQuantity unit of measurement. (biomass in kilograms (kg))
occurrenceStatus	Stipulates the physical presence or absence of animals relating to the record. (present)
eventDate	Actual date and time at which an occurrence was recorded. ISO 8601 metric date/time standards apply. (1520)
year	Year taken from the eventDate field. (1520)
locationID	Marine Region unique identifier. (http://marineregions.org/mrgid/3260)
locality	Local name for the overall location or region. (Shetland Islands)
locationAccordingTo	MRGID location identifier based on the marineregions.org/mrgid system. (MRGID)
locationRemarks	Description of location identifier. (NOAA described Large Marine Ecosystem)
decimalLatitude	Latitude shown in decimal notation based on the WGS 84 (EPSG:4326) geodetic datum standard. (60.19175)

decimalLongitude	Latitude shown in decimal notation based on the WGS 84 (EPSG:4326) geodetic datum standard. (-2.1185)
coordinateUncertaintyInMeters	The smallest circle (radius) in metres from the ground zero point depicted by the decimalLatitude and decimalLongitude fields. In this instance, "85269" depicts a radius of c. 85 Km.
georeferenceRemarks	Remarks indicating the geographic area identified – Large Marine Ecosystems are used. (22: North Sea)
scientificNameID	The WoRMS LSID associated with the scientificName, based on the Marine Species database. (urn:lsid:marinespecies.org:taxname:126436)
scientificName	Scientific name of the animal based upon the vernacularName. (Gadus morhua)
kingdom	Together with taxonRank assists in determining broader animal characteristics for darwinCore search engines. (Animalia)
taxonRank	Together with kingdom assists in determining broader animal characteristics for darwinCore search engines. (species)
scientificNameAuthorship	Based on the scientificNameID field and discoverable through the WoRMS database. (Linnaeus, 1758)
vernacularName	Literal common name applied to the animal involved. In this case, all values are Gronge – the Shetland common name for cod
identificationRemarks	Details that assist in identifying the animal. (Common name for cod is gronge; also known as grodningar, brismek, cusk, groinin, ber-kodlin, sjukkolo, staragoit, stukki or by the English name: cod)
conversion	Conversion factor applied to derive catchMT.

	(1 cwt = 0.0508023 MT; ratio saltfish to liveweight = 1:3.85; ration saltfish in barrels to liveweight = 1:3.0; domestic consumption = 120 kg per capita per annum)
numberOfVesselsHamburg	Number of Vessels deployed in the export trade with Hamburg. (1)
numberOfVesselsBremen	Number of Vessels deployed in the export trade with Bremen – estimated as twice the number from Hamburg (2)
cargoHamburgBremen	Calculated cargo of “wet” fish which comprised 80% of the cargo; converted from lasts to tonnes. (102)
wetFishWeightConverted	Weight in tonnes of “wet” fish (typically half dried and half barrelled) converted to fresh liveweight fish equivalent. (408)
exportsHamburg	Exports of dried salted cod to Hamburg in metric tonnes. (370)
exportsBarcelona	Exports of dried salted cod to Barcelona in metric tonnes. (220)
exportsDublin	Exports of dried salted cod to Barcelona in metric tonnes. (139)
exportsOther	Exports of dried salted cod to other ports in metric tonnes. (139)
totalSaltDriedMT	Total of exported salt dried cod in metric tonnes. (354)
liveWeightMT	Converted totalSaltDriedMT value into liveweight cod in metric tonnes - 1:3.85

	(1423)
unitedKingdomMarket	Value of the United Kingdom market based on six times the combined value of exports to all other markets. (8540)
population	Annual population of Shetland. (15000)
domesticConsumption	Domestic consumption equates to 2.6 times that of the Faroes in 1742. Calculated annual domestic consumption of liveweight cod based on 120 Kg per capita consumption value. (1800)
catchMT	Derived metric tonnes value based on the calculated fields as shown in the conversion field, or as shown in the codes field.
trafficLight	Traffic Light coding system denotes level of certainty, and/or level of accuracy that can be described for each record; see Appendix 1 for details.
codes	Explanation codes that highlight the process for each record; see Appendix 2 for details.

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Appendix 1

Traffic Light System

Traffic Light	Explanation
green	Given values with minimal conversion
amber	Calculated values based on given vessel numbers
red	Calculated values based on Capacity Trended values derived from Icelandic cod fishery values

Appendix 2

Codes

Codes	Explanation
a	Values assumed as a static extrapolation based on the 1742 given value
b	Given values based on export figures intended for various destinations including the UK, and domestic consumption added
c	Interpolated values based on last given and next given figures
d	Calculated values based on numbers of vessels