NorFish
An Environmental History of the North Atlantic
- 1400-1700 -

Norfish Dataset 17

Iceland Cod Landings

1520–1871

Supporting Documentation

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A fisherman's hut in Reykjavík in 1835 with fish hung outside for drying. Wind-dried fish remains popular in Iceland. (Gaimard 1835)

Iceland Cod Landings 1520 – 1871

Summary

Dataset Title:	Iceland Cod Landings 1520 – 1871
Norfish Case Study:	Iceland
Large Marine Ecosystem:	59: Iceland Shelf and Sea
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Contents

Objectives

The Icelandic Fisheries were highly productive and drew attention from both domestic and various foreign markets. While the gear deployed and the methods used for fishing did not vary significantly during the early modern period, there were several influences on the industry that impacted either negatively or positively. For instance, human intervention in the standard fishing practices, such as acts of war, market pressures, etc. led to variability in the total catches that were made on an annual basis. Natural influences were an issue as well; fish migration and stock levels, weather/climate conditions, etc. played their part in the types of inconsistencies that pervaded the era.

Actual data (typically, archival source materials) reporting fish stocks, catch volumes and fishing efforts are rare or often not available at all. Where recorded data are available, these need to be carefully considered for accuracy and reliability; similarly, sources need to be verified and an assessment is required to determine the nature of the data (e.g. quantitative or qualitative, actual recorded or estimated, etc.).

With these caveats in mind, and considering the overall nature of the Icelandic fishery, this dataset seeks to provide a largely derived series of fish landings (catch) that reflect the overall effort of the Icelandic Fishery. Wherever possible, available data are used to inform the output and these data points are carefully annotated.

Sources

Total landings have been calculated based on a combination of export tonnages and domestic consumption, derived from various source materials and population census data.

Jonsson (1994) provides a listing of cod exports from Iceland for the period 1624 to 1871. These figures have many large gaps and in their standalone state do not provide clarity around the status of cod exports. Jonsson's figures include calculated values for conversions for dried cod (stockfish) and salted cod (saltfish).

Applying Jonsson's (1994) figures to determine domestic consumption required an understanding of the demographics of Iceland. Two primary sources were employed: Karlsson (2000) and Statistics Iceland (2020). **Appendix 1: Demographic values** provides an outline of the actual population values obtained. Missing values were extrapolated to obtain an overall annual value basis for the Icelandic population from 1544 to 1871.

Ehrenberg (1899) provides a data series of the numbers of Hamburg Hanseatic trader vessels landing at Icelandic ports and exporting goods. The primary export was fish, in particular, cod. This series commences in 1533 and continues until 1623, nearly a century of Hanseatic trade being depicted.

In line with Ehrenberg (1899), Grassel (2016) highlighted the difference in typical Hamburg trade vessels and their relative burthen weights. This data is important in determining an overall assessment of the ratio of exports relating specifically to the Hamburg Hanseatics.

Also important is the assessment by Smith (1984) who relates comparative exports of the Shetland market. He cites Jolly (1709) who reports figures of 8 or 9 vessels carrying 8,800 cwt (492.8 metric tonnes), and 10 to 12 vessels carrying 800 lasts of fish. These figures are helpful in determining a reasonable understanding of the mass of actual exports from Iceland where similar vessels were deployed.

Conversion rates

Conversion factors are applied to gain a uniform “wet” or fresh, ungutted fish weight that is used throughout this dataset. Jonsson (1994) applies the following conversion rates:

stockfish to fresh fish ratio	= **1:7.7**
saltfish to fresh fish ratio	= **1:3.85**
wet fish (half stockfish, half barrelled cod)	= **1:5**

Original figures used by Jonsson had to be converted from their various weights and measurements to the universal metric tonne measurement. The following figures were applied:

1 skippund (skp) = 160 Kg = 0.16 tonnes
1 barrel = 128 Kg = 0.128 tonnes
1 barrel = 0.8 skp = 0.128 tonnes

Further analysis revealed that G Jonsson (1998) calculated a daily per capita value in 1770 of 30% of calorific intake to be fish; this was based on observed diets. These values led to

the assessment that 650g to 700g of fish per capita per day was consumed by the Icelandic population.

This equates to a domestic consumption of **237.25 Kg to 255.5 Kg per capita per annum**.

Hamburg vessels carried a maximum of 100 lasts in total capacity, with most being smaller. It is reasonable to assume that a typical average **burthen weight of 50 lasts** was deployed for the trade with Iceland (Ehrenberg 1899).

This "last" measure in late medieval and early modern times varied in value depending on the region, specific period and socio-economic situation. The Dutch value of 1 last to 1.96 tonnes reflects an accurate figure for the 17th and 18th centuries, but lower values were in play earlier; typically, these ranged from 1 last to 1.2 tonnes and 1.25 tonnes.

For the purposes of calculating the variable landing values, average vessel capacity is assumed to be 50 lasts, with **1 last equating to 1.25 tonnes**.

Process

Determining values prior to 1624

Ehrenberg (1899)'s data provides a listing of the number of vessels that traded annually with Iceland from the Hanseatic port of Hamburg and covers the period 1533 to 1623, but only values from 1544 are deemed to be reliable. These figures form the basis of calculated values prior to 1624. Prior to 1544, data are poor or there are no data available. The period 1520-1543 was derived from the extended series of values from (extrapolation) assuming the value from 1544. Prior to 1544 Ehrenberg's values are erratic and/or are not available; this may be due to inaccurate recording, a period of instability, or both. This is borne out by the observation that the *Schifferbücher* (ships' listings) indicate that "early years" were underreported (Grassel 2016:23) so only figures from 1544 are regarded as robust. From 1544, the series is continuous and documents the annual influx of Hanseatic Hamburg vessels determined to ply a trade with Iceland.

Grassel (2016, 23) indicates that the vessels employed in the Hanseatic Icelandic export market never exceeded a cargo of more than 100 lasts (approx. 125 tonnes). The largest vessels sailed with a compliment of between 40 and 60 people, of whom 10 to 15 were merchants, and 10 to 20 were crew; servants made up the remainder. Smaller vessels carried around 20 people of whom about 10 would have been crew.

The Northern Seven Year War of 1563 to 1570 saw a power struggle between Denmark and Sweden. Despite a large loss of life and massive negative economic impacts for both sides, the outcome was that very little changed territorially speaking. In terms of the Icelandic trade, the impact of this war is clearly visible.

The 1601 decision by the Danish King to ban trade with the Hanseatic League did not completely end the trade. In fact, a far reduced and patchy level of trade did continue at the behest of the Danish King; Hamburg vessels were occasionally employed to ferry fish with the blessing of the Danish crown. General export continued albeit at a relatively reduced rate; roughly a third of trade was impacted.

By 1624, the Hamburg trade, and indeed the Hanseatic trade with Iceland as a whole, ceased completely as the League shrank and reduced its influence over the North Atlantic trade arena.

For the purposes of calculating the variable landing values, average Hamburg Hanseatic vessel capacity is assumed to be 50 lasts, making the average vessel capacity about 60 tonnes. This is corroborated by Smith (1984:19) who argues that the typical burthen per vessel for the Shetland trade was 1,100 cwt (56 tonnes). A typical vessel would therefore transport 60 tonnes of processed fish which, for the purposes of transport and saleability at the destination, was “wet fish” half dried and half barrelled with a conversion factor of 1:5 to obtain the live weight of cod (i.e.: typically 300 tonnes per vessel).

These figures provide a reasonable estimate that reflects the proportion of the Hamburg trade which was about two thirds of the overall export market for Iceland. The rest would have been made up from trade with other major ports of the Hanseatic League and with Denmark (the controlling power). To some lesser extent, other Scandinavian countries, Scotland, England, the Netherlands, Flanders and possibly countries even further afield would have been engaged.

Determining values from 1624 to 1871

Jonsson (1994) presents export figures derived from the records of the Danish monopoly company. The quality of Jonsson’s figures is regarded as high and represent a viable basis for calculating overall cod exports for Iceland. Jonsson also provides domestic consumption figures which provide an insight into the dietary patterns of Iceland during the period. The same conversion factor as used for export values was applied.

Applying Jonsson’s figures to determine domestic consumption required an understanding of the demographics of Iceland. Two primary sources were employed:

Karlsson (2000) and Statistics Iceland (2020). **Appendix 1: Demographic values** provides an outline of the actual population values obtained. Missing values were extrapolated to obtain an overall annual value basis for the Icelandic population from 1544 to 1871.

Jonsson (1994) assumed that 63% of all catches by Icelanders were consumed domestically (which he based on the average rates for 1764-1773). This assumption rests on the hypothesis that domestic consumption was as elastic as the export trade. We consider this assumption unrealistic as domestic per capita consumption would have been relatively constant except for periods of catch failure. We have therefore calculated domestic consumption based on the figure provided by G Jonsson (1998) for observed consumption in the 1770s and assumed a constant per capita consumption in previous centuries.

The process for calculating the resultant missing fields for domestic consumption then entailed an analysis of the trended values of the population deviation for gap periods; the resulting figures were used as a trend to determine an accurate estimated figure to fill each gap. This yielded clear results, highlighting a sudden population decrease from 1703 with partial recovery by 1707, but continuing a downward trend. Also, the period 1785 to 1789 reflects a sharper decline in population than would be otherwise predicted by using a direct extrapolation.

The records of Hamburg Hanseatic League seafarers who visited Iceland shows a pattern of sustained activity from as early as 1533, which provides insights into the levels of landings from this date (Ehrenberg 1899).

Hansa traders typically delivered and exchanged goods with Iceland for mutual gain; fish was certainly one of the primary exports taken to Hamburg and other Hanseatic ports. Through various ebbs and flows in the fortunes of this trade, Very fruitful periods of activity occurred around the mid-16th century, and again into the early 17th century. Conflicts like the Nordic Seven Years War (1564 to 1571), as may be expected, had a major impact on trade which is clearly visible in the data. Similarly, the decline of Hanseatic engagement is apparent following the Icelandic ban on foreign trade that was imposed by the Danish Realm from 1602 onwards.

Despite a minor recovery that saw Hanseatic vessels plying their trade again during the second decade of the 17th century, in 1624 all meaningful trade ceased, and the Hansa were no longer a viable factor in the Icelandic export zone. In comparison, trade with the Faroe Islands roughly followed the Icelandic trend and also peaked for two periods during the mid and late 16th century, albeit at a much smaller scale (Ehrenberg 1899).

Further comparison may be drawn to the Shetland trade which roughly mimicked the Icelandic Hansa trade, but continued unabated through the banning period from 1602; Shetland trade proceeded unhindered into the 1640s and reflects the overall decline of the Hanseatic League's sphere of influence in the North Atlantic region after 1640.

Importantly, the figures available for Hanseatic trade are limited to the numbers of vessels that landed at Icelandic ports from Hamburg. Various other Hanseatic ports may reasonably be assumed to have engaged in the lucrative Icelandic trade which is reflected in the boom periods described earlier. Also, these vessels engaged in trade that encompassed far more than the export of Icelandic fish; goods and produce of various guises were exported alongside the primarily cod-based trade. The vessels employed by the Hansa in the Icelandic trade were smaller than 100 lasts berthen (weight/volume) and typically they were far smaller. Ehrenberg (1899, 23) posits that the largest vessels carried between 40 and 60 people, including a complement of up to 15 merchants, up to 30 crew and a crew of 10-20 seamen. The smaller vessels would typically carry about 20 people, half of whom were crew.

Taking into account the fact that various other Hansa ports would have simultaneously plied their trade with Iceland, arguably along the same trends as Hamburg, it is clear that a thriving commercial enterprise was underway throughout the period until 1624. However, the numbers of vessels from Hamburg provide an accurate trend that can be followed for the period with a reasonable assumption that post-1624 export values can be adopted to determine an average. A figure of 9,000 metric tonnes, a low estimate that considers the possible effect of technology creep and avoids over-estimation, has been adopted. This enables a trend line to be established that demarcates the assumed export and derived domestic consumption values. Essentially, the resultant figure was added to the projected domestic consumption to provide an overall value for landed fresh fish.

Other Processes

The Capacity Trend Method was used to calculate values for years where no data was available. This process entails a trending process where a trend of annual data is applied between available points in order to determine a series that reflects general trends rather than a simple straight line (Nicholls, Allaire, Holm 2020).

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_IceHolm_1)
type	Description of data series type. (Dataset)
modified	Most recent date the data was modified; ISO 8601 metric date/time standards apply. (2021-01-19)
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. 2020. Norfish: Iceland Cod Landings 1520-1871. 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. (Iceland Cod Landings 1520-1871)
basisOfRecord	Specifies the nature of the observed or researched specimens or data. (Human Observation)
dataGeneralizations	Source data that informs the provenance of the data. (Source: Ehrenberg 1899)

catalogNumber	Identifier of the data within the institution and project – "Ice" refers to Iceland, "Hol" refers to Holm, "Cod" refers to Cod. (IceHolCod)
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. (8285162)
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	Location identifier. (http://marineregions.org/mrgid/8535)
locality	Overall location or region. (Icelandic coast and shelf)
locationAccordingTo	MRGID identifier based on the marineregions.org/mrgid system. (MRGID)
locationRemarks	Stipulation of the system deployed for locationAccordingTo field. (Sea around Iceland)
decimalLatitude	Latitude shown in decimal notation based on the WGS 84 (EPSG:4326) geodetic datum standard. (66.57046)

decimalLongitude	Latitude shown in decimal notation based on the WGS 84 (EPSG:4326) geodetic datum standard. (-15.5671)
coordinateUncertaintyInMeters	The smallest circle (radius) in metres from the ground zero point depicted by the decimalLattitude and decimalLongitude fields. In this instance, “530259” depicts a radius of 530.239 Km.
georeferenceRemarks	Location information – NOAA LME system used. (59: Iceland Shelf and Sea)
scientificNameID	The WoRMS LSID associated with the scientficName, based on the Marine Species database. (urn:lsid:marinespecies.org:taxname:126436)
scientificName	Scientific name of the animal based upon the commonName. (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 “þorski” – the Icelandic common name for dry Cod.
identificationRemarks	Explanatory notes to inform the data. (Local Icelandic name for Atlantic Cod used)
conversion	For export and domestic consumption, conversion rates are taken from Jonsson (1994). (1 skippund (skp) = 160 kg; 1 barrel = 128 kg = 0.8 skp; fresh to stockfish 1:7.7; fresh to saltfish 1:3.85; 1 vessel

	= 60 t; wet fish (half dried, half barrelled) ratio to fresh liveweight fish = 1:5)
catchMT	Derived metric tonnes value based on the calculated fields as shown in the conversion field. (20000)
noOfVessels	Number of vessels engaged in the fishery. (17)
vesselTonnage	Tonnage (burthen) of loaded vessels based on 60 t load per vessel in tonnes. Typically, wet fish (half dried and half barrelled) (1020)
exportMT	Total export values in metric tonnes per annum of fresh ungutted cod based on calculated fields as shown in the *conversion* field and extracted from Jonsson (5100).
domesticConsumptionMT	Total domestic consumption values in metric tonnes per annum of fresh ungutted cod based on calculated fields as shown in the *conversion* field and extracted from Jonsson (1994); rates of domestic consumption per capita calculated at 650-700 g fish per capita daily.[1] (8104)
estimatedLandedTonnesMT	Aggregated value of exportMT and domesticConsumptionMT in metric tonnes; the value is either based fully on source data or extrapolated from values in the series. (22717)
population	Population of Iceland based on statistical values and census data; census data[2] are recorded for specific

[1] J. Jonsson (1994) assumes that 63% of all catches are consumed domestically based on average 1764-1773; G. Jonsson (1998) calculates daily per capita value in 1770 to be 30% of daily calorific intake based on observed diets, equating to 650-700 g of fish per capita daily; This equates to between 237.25 Kg and 255.5 Kg per annum.

[2] Landshagir (Statistical yearbook of Iceland) provides listings as per Appendix 1.

	dates as per Appendix 1, and several further figures are provided based on source materials[3]. (33078)
catchMT	Derived metric tonnes value based on the calculated fields as shown in the conversion field. (2000)
trafficLight	Traffic Light coding system denotes level of certainty, and/or level of accuracy that can be described for each record; see Appendix 2 for details.
codes	Explanation codes that highlight the process for each record; see Appendix 3 for details.

[3] Karlsson (2000) 177-8 provides further specific population figures also outlined in Appendix 1.

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Appendix 1

Demographic values (Karlsson 2000, pp.177-8)

Year	Population	Source
1703	50400	Statistical yearbook of Iceland (Landshagir)
1762	44800	Statistical yearbook of Iceland (Landshagir)
1769	46200	Statistical yearbook of Iceland (Landshagir)
1785	40600	Statistical yearbook of Iceland (Landshagir)
1790	46000	Statistical yearbook of Iceland (Landshagir)
1801	47200	Statistical yearbook of Iceland (Landshagir)
1810	49000	Statistical yearbook of Iceland (Landshagir)
1815	50000	Statistical yearbook of Iceland (Landshagir)
1822	52000	Statistical yearbook of Iceland (Landshagir)
1830	54000	Statistical yearbook of Iceland (Landshagir)
1835	56000	Statistical yearbook of Iceland (Landshagir)
1840	57100	Statistical yearbook of Iceland (Landshagir)
1845	58600	Statistical yearbook of Iceland (Landshagir)
1850	59200	Statistical yearbook of Iceland (Landshagir)
1855	64600	Statistical yearbook of Iceland (Landshagir)
1860	67000	Statistical yearbook of Iceland (Landshagir)
1864	68000	Statistical yearbook of Iceland (Landshagir)
1870	69800	Statistical yearbook of Iceland (Landshagir)
1685	55000	Karlsson 2000, 177-8
1707	37000	Karlsson 2000, 177-8
1751	49000	Karlsson 2000, 177-8
1758	43000	Karlsson 2000, 177-8
1783	50121	Karlsson 2000, 177-8

Appendix 2

Traffic Light System

Traffic Light	Explanation
green	Export values, domestic consumption values and estimated landed tonnes ungutted (in tonnes) are extracted from archival and source materials; population figures may be calculated in some instances
amber	Export values, domestic consumption values and estimated landed tonnes ungutted (in tonnes) are are calculated; population figures are exracted from archival and source materials
red	Export values, domestic consumption values, estimated landed tonnes ungutted (in tonnes) and population figures are calculated

Appendix 3

Codes

Codes	Explanation
a	Demographic values calculated based on given values for specific years
b	Export values, domestic consumption values and estimated landed tonnes ungutted (in tonnes) are calcuated and based on recalulated source values from Jonsson 1994; domestic consumption is inelastic and should be calculated as a per capita addition to exports (PH)
c	Export values, domestic consumption values, estimated landed tonnes ungutted (in tonnes) and population figures are extracted from archival and source materials
d	Export values calculated based on trend of noOfVessels field (as supplied by Ehrenberg 1899)
e	Domestic Consumption values calculated based on population trend
f	Trended values based on assumed 1520 value of 20000 metric tonnes