



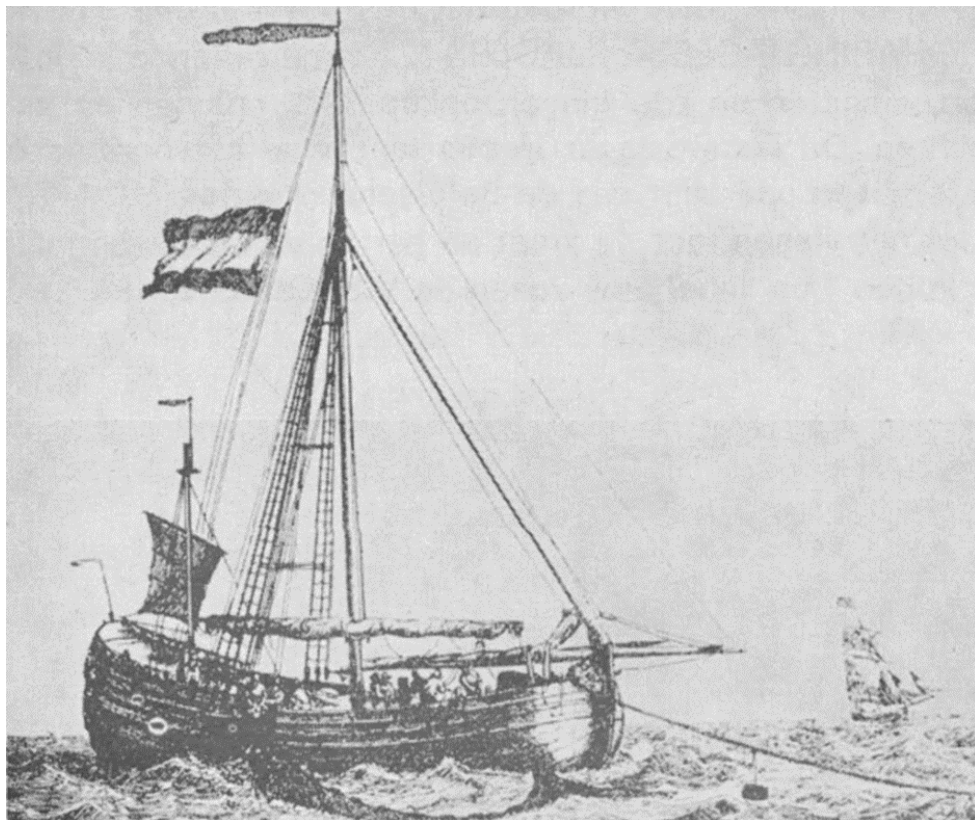
Norfish Dataset 01

Flemish Herring Fisheries

1386–1790

Supporting Documentation

John Nicholls



A herring ship (haringbuis) deploying a large herring net as typically utilised in the herring fleet of the 15th century; in the distance a herring hunter vessel is seen.

(Desnerck 1974)



Flemish Herring Fishery

1386–1790

Summary

Dataset Title:	Flemish Herring Fishery 1368-1790
Norfish Case Study:	Flemish Herring Fishery 1368-1790
Large Marine Ecosystem:	22. North Sea
Subject:	Catches, Oostende, herring, Flanders, 1386-1790
Author:	John Nicholls Norfish Project Centre for Environmental Humanities Trinity College Dublin
Data Provider:	John Nicholls Norfish Project Centre for Environmental History Trinity College Dublin
Data Editors:	John Nicholls Norfish Project Centre for Environmental History Trinity College Dublin
Extent:	410 records
Keywords:	North Sea herring catches; Norfish; fishing effort; Oostende; effort; landings; CPUE

Citations:

- a. **The dataset:** please cite as follows Nicholls, J. 2020. Norfish: Flemish Herring Fishery 1368-1790. Dublin: TCD
- b. **Supporting documentation:** please cite as follows Nicholls, J. 2020. Norfish Supporting Documentation: Flemish Herring Fishery 1368-1790. Dublin: TCD

Contents

Summary	2
Contents	3
Context	4
Sources	4
Chronology	6
Location	12
Measurements and Conversions.....	13
Process.....	14
Other Processes	16
Conclusions	17
Data Fields	18
Acknowledgements.....	23
Bibliography.....	24
Appendix 1.....	26
Appendix 2.....	26



Figure 1: Cover page introducing accounts of the Count of Flanders, containing the accounts of the Officials and Notaries of Brugge and the Freemen of Brugge between 1416 and 1417. Oostende was subservient to and acted as a port for Brugge.

(Belgian State Archive ARA I001/13689)

Context

From medieval times and into the early modern period, the port of Oostende (Ostend) was a primary fishing port on the Flemish coast, second only to Nieuwport (Nieuwpoort) in Flanders. The Flemish coastal fisheries produced an industry that was highly developed and influential, reaching markets of the Hanseatic League along the Baltic coast, England and the Mediterranean. This “Golden Age” of Flemish Fisheries Oostende’s fishing effort was interrupted by natural effects such as the silting of its harbour, and numerous human affects such as warfare and political interference. However, due to ingenuity and fortitude of its fishermen, and the application of revolutionary modern techniques for treating caught fish, the industry developed apace. The 15th and 16th Centuries are regarded as the “Bloom period” of the Flemish herring fisheries (Hovart, 1985; Lescrauwaet, 2013).

The Oostende fishery, and by extension the Flemish fisheries were highly focused on herring catches and processing, but by the early 17th century the industry had completely collapsed. The herring fisheries saw little recovery until the 19th century and the emerging Flemish cod fishery usurped the once mighty “kaakharing”¹ trade which was the pride and lifeblood of Flanders as a fishing nation.

This dataset engages Oostende’s herring trade during the 15th and 16th centuries and highlights the rise of the herring fishery and its rapid collapse. Where possible, comparisons are made with other Flemish ports with a view to understanding the overall scale and complexity of the industry.

Sources

Edward Vlietinck’s self/family publications in Oostende are the basis of the data that was used in this dataset. Writing in the 19th century, he was limited to local archives and materials found at the ports he physically visited which makes his achievements all the more pertinent. The bulk of the information that has been extracted from his work emanates from his book (1897): “*Het oude Oostende en zijne driejarige belegering (1601-1604): opkomst bloei en ondergang met de beroerten der XVIe eeuw*” and is found both in tables and in inline text throughout the volume. His earlier work (1889): “*Eene bladzijde uit de geschiedenis der Stad Nieupoort, Nieupoort & zijne visscherij in de XVIe eeuw*”, contains only sparse

¹ “Kaakharing” was effectively gutted and de-gilled herring which was specifically treated to ensure longevity and saleability at the fish markets of Europe.

data relating to herring catches, but it does provide valuable sources of corroborative information as noted in the general text of this Supporting Documentation. (Vlietinck, 1889, 1897)

Corroborative data and confirmation of the original sources was sought at the State Archives of Belgium in Brussels (*Het Rijksarchief in België*, or Algemeen Rijksarchief - ARA). Detailed information on searching the archives is provided online in Dutch and French (Lindeman, 2019). Of interest were the Accounts of the Counts of Flanders and other accounting documents pertaining to herring fisheries in Oostende and other Flemish ports which Vlietinck references in his works. In particular, the archives yielded the following relevant bundles of documents (approximately 50 items per bundle):

Archive Ref. ²	Bundle Title
I 001-13689	Rekening van de baluw van Brugge en het Brugse Vrije jaere 1416-1417
I 001-13893	Rekening van de baluw van Damme 1418
I 001-14283	Rekening van de baluw van Nieuwpoort 1413-1415
I 001-27797	Rekening van de dicaige van de stede van Oostende 1522
I 001-27799	Rekening van de dicaige van de stede van Oostende 1560-1561

Table 1: Archive references

The work of Roger Degryse is vital to this dataset insofar as it clarifies and corroborates much of the primary data obtained from Edward Vlietinck's efforts. Degryse also provides various data for ports other than Oostende, including Nieuwpoort, Duinkerke (Dunkirk) and Biervliet amongst others. These extra ports help to identify patterns over periods where data may be missing or scarce for Oostende and also assist in building an impression of the overall scale of the Flemish Fishery. While several volumes of Degryse's work are relevant to this dataset, actual extracted data was obtained from his book (1966): "*De crisis in het haringbedrijf te Oostende en te Damme van 1437 tot 1441*" (Degryse, 1966).

A further invaluable source of data has been the archived documents, notes and materials of Roger Degryse which are held at the VLIZ archives in Oostende. These materials include a multitude of unpublished and previously non-referenced notes by the author which were

² Original reference system: Algemeen Rijksarchief (ARA): I 001 - indicating the collection reference, followed by the Rekenkamer nummer (Unique archive reference number)

intended for future publications or used in developing ideas for works that he managed to publish during his lifetime. Some of these items are in the process of being digitised by VLIZ and may become available in the public domain in future. However, the source information used here has never been published before. The massively helpful staff at the VLIZ library ensured that the materials were made available. Specific materials used for this dataset include:

- Haringkaken, kaakharing voor en na 1400, Raversijde-Nieuwpoort enz; VLIZ, Fonds Degryse 5
- Oostende: vismijnharing in tonnen, copinghe, kaakharing; ARA, "acquits de Lille", nr. 520 I-II 1541 en 1543; VLIZ, Fonds Degryse 1
- Dikaigerekening, kaakharing; ARA, Rekenkamer nr. 27799; VLIZ, Fonds Degryse 1

Chronology

Early mentions of Oostende date back to at least 814 CE when Gobrecht van Steenberg gifted the town to the Abbey of St Bertinus at St Omaar (Saint-Omer) (Vroome, 1957), and again in 1267 when Oostende was elevated to City status and received the appropriate rights that accompanied this status, including establishing its own market buildings and receiving a coat of arms (Degryse, 1944). Around 1284 Oostende was even minting its own coinage as a sign of prosperity and influence (Vroome, 1957).

Various primary factors impacted the Oostende herring fishery, such as Regulation, Infrastructure, Natural Disasters, Trade, Technology and Warfare. These will be briefly explored thematically.

Regulation

Due to the perceived great success of the fishing effort in Flanders, a decree was issued in May 1270 limiting the overall number of herrings salted per day during the herring catch season to 25,000. This highlights the level of importance of the industry, and awareness of lawmakers concerning environmental and economic effects. This is emphasised by the imposition of a ban on the use of intensive fishing techniques, such as barrier-nets, in a bid to prevent over-fishing by Philip the Fair in 1289, which became an Ordinance in 1291 (Roberts, 2007). This Ordinance was renewed in 1326 and net mesh sizes were further regulated for Flemish vessels by Charles IV (Nationaal Visserijmuseum, 2018).

In 1450, a “Weerd” or mediator between merchants and fishermen was first mentioned; this role meant that fish were accounted for and trade was documented at the quayside and/or harbour market. This occurrence explains the appearance of the “weerdgeld” duties imposed on fish, providing an accurate tally of landings (Nationaal Visserijmuseum, 2018).

In 1455, Brugge (Bruges) issued the regulation that fish may not be kept in the water for longer than a period of two tides in nets set by fishermen, thus ensuring the freshness of caught fish from Oostende for their market. In an attempt to control behaviour and practice, the “Brugse Vrije”, or elders of Brugge, called a compulsory meeting of fishermen from Oostende, Blankenberge, Wenduine, Heist and other Flemish ports under their control on 2 October 1455. The fishermen were urged to be more disciplined (Boterberge, 2010).

On 19 December 1457 a new tax was imposed on herring at the end of the fishing season to pay for the introduction of kitted out defence vessels to protect the fishing fleet against pirates and other dangers. On 4 December 1458 Oostende met this new obligation to cover the cost of escort “Vreytschepen” convoy vessels (Boterberge, 2010).

In a move following the destruction of Oostende in 1489 by the Austrians and their followers, in what became known as “The Privilege of Nieuwpoort”, Oostende was obliged to first sell their fish in Nieuwpoort before approaching any other markets (Vlietinck, 1889).

A ban on trawling that “*rooted up and swept away the seaweeds which served to shelter the fish*” was imposed along the Flemish coast in 1499, highlighting a level of conservation awareness of the natural world (Roberts, 2007). As a further example, on 20 April 1510 the Board of Flanders issued a new ordinance which required net meshes to be at least 10 cm wide; a 3-year exile awaited any who offended (Boterberge, 2010). Again, on 5 May 1531, the Board banned fishing with seine nets typically drawn by two horses along near shore and beach stretches in an effort to prevent the destruction of fish spawning grounds (Ibid.). Reinforcing the earlier ban on seines, Emperor Charles V prohibited the use under any circumstances regardless of mesh sizes or mode of operation on 19 March 1539. The decree recognised the destructive nature of beam trawling in fish fry (Ibid.). In 1536 Flemish fishermen were forbidden to sail between 24 June and 25 July in an attempt to mitigate the destruction of the fisheries (Hovart, 1985).

By 1545 the prohibition on seines was retained, but beach fishing with net meshes exceeding 12.5 cm was permitted, showing a relaxing of the earlier strict regulation (Boterberge, 2010).

Infrastructure

In 1284 the dredging of a shipping canal from Oostende to Brugge facilitated larger vessels, speedier transport links and boosted trade to inland markets. Still a small city, Oostende was effectively a protectorate of Brugge at this time (Vroome, 1957).

The Oostende/Brugge canal, having become silted up and virtually unusable by 1443 was re-dredged and widened significantly. In 1445 the harbour was significantly expanded to accommodate the new canal traffic. Vitally, the new harbour and expanded canal afforded the town its first direct link with the sea leading to far greater potential growth. Work was completed on the harbour in 1446. Oostende began a new construction of its harbour in 1483 in a bid to improve and enlarge to meet the growing herring trade (ibid.).

Natural Disasters

A devastating flood in 1334 overran Oostende and destroyed much of its infrastructure, including its church. Plans were formulated to relocate the church and focus on sea defences. Another severe flood badly damaged the town on 22 January 1394, leading to many inhabitants leaving for safer inland locations, and the rebuilding of the Town Hall further inland. Following a visit from the Duke of Burgundy, in 1432 the town was permitted to sound alarms on ships and the church bells to warn inhabitants of future flooding (Vroome, 1957).

Trade and Statistics

In 1305, 113 Flemish vessels delivered herring to Scarborough which shows the scale of the Flemish trade abroad in the early days of the industry (Boterberge, 2010). In 1427, processed “kaakharing” saturated Hanseatic markets (Degryse, 1966).

In 1467, Oostende landings of herring are reported as 18,000 wooden casks (typically used for storing herring and weighing about 1 metric tonne per cask, and in 1468 annual herring landings at Oostende reach their 15th century maximum at 29 million pieces (single filleted herring) (Hovart, 1985).

By way of describing the level of processing, in 1474 in Nieuwpoort, 48 vessels landed salted/treated herring, and 22 landed fresh herring, totalling 8,144 tons (1,140 metric tonnes). The fishing effort in Oostende increased steadily between 1450 and 1475 from 28 to 64 “busses” (large fishing vessels) in a clear indication of the growth in the industry (Nationaal Visserijmuseum, 2018).

From 1475 the Flemish “doggervaert” or Dogger Bank voyages saw the introduction of the cod fishery industry on a large scale, almost certainly having an impact on the herring fishery (Hovart, 1985).

In general terms, the whole Flemish herring fishery fleet comprised about 150 large herring vessels (buizen) with a crew of around 3,000 men; this amounted to landings of about 50,000 tons (7,000 metric tonnes) in 1480 (Nationaal Visserijmuseum, 2018). By 1483, the Flemish and neighbouring Zealand and Holland fleets produce a total of between 11,000 and 12,000 lasts of gutted (processed) herring, amounting to between 13,200 and 14,400 barrels, and equivalent weight in metric tonnes (Degryse, 1966).

Despite an approaching century of decay in the herring and cod fisheries industry during the 1500s (Hovart, 1985), a revived Oostende (along with Nieuwpoort and Duinkerke) develops a large fishery monopoly in the herring and cod fishery and trade by 1500 (Boterberge, 2010).

Oostende herring gained a reputation for quality. In 1534 Charles the V imported herring specifically from Oostende (Vlietinck, 1897).

In 1547 the combined Flemish fleet engaged only 200 vessels which may be attributed to the prohibition of sailing before 1 September in 1547 and 1548 by Charles V. This effectively blocked fishermen from accessing fish stocks during the height of the season (Hovart, 1985).

By 1567, the combined fleets of Flanders, Zeeland and Holland and Friesland amounted to about 700 vessels, a mere 100 of these herring boats and ships were from Flanders (Boterberge, 2010).

Religious riots in 1576 were the harbinger of the end to the fishery of Nieuwpoort, Oostende’s greatest rival. Nieuwpoort was ceded to the Netherlands in 1578 causing the collapse of its fisheries. Oostende and the entire Flemish fisheries were in turmoil in the period leading up to 1600 when Nieuwpoort resumed fishing activities (Beun, Dumon, Lelièvre, & Moeyaert, 2006; Stadsbestuur Nieuwpoort, 1985).

The commencement of the 17th century saw increased interest in Icelandic cod fisheries from Oostende, Nieuwpoort and Duinkerke, but this was to be premature as Oostende was sieged from 1601 to 1604 and taken by invading Spanish armies. The era of the Flemish herring fisheries was finished (Pieters, Verhaeghe, Gevaert, Mees, & Seys, 2003).

Technology

According to Vroome (1957), in 1400 the discovery of the “haringkaken” (gibbing) process whereby gills and intestines were removed from herring to preserve them longer was accredited to two fishers from Biervliet: Gillis Beukels and Jakob Kien. However, this version of events has been contested and debunked in the revelation of the “False Legend of Willem Beukels of Biervliet” (Unger 1997); earlier processes, very similar to that of the Flemish “haringkaking” were used to treat and process fish by Scandanavian fishers. Nevertheless, it cannot be gainsaid that the use of this process provided the Flemish fishers with a great advantage on an industrial scale. With this technology the herring fishery expanded and reached ever further markets. In 1402 the fishermen of Oostende (as well as Nieuwpoort and Sluis) were first permitted to carry out the “haringkaken” process at sea (perhaps giving us our first fish processing factory ships), but they had to deposit fish at Biervliet who held the monopoly on the process (Beun et al., 2006). The scale of the Flemish fishery is seen in the fact that in 1426 a total of 4,254.5 tonnes of “kaakharing” was processed in Biervliet (Degryse, 1966). By the 15th century herring buizen (busses) and hoekers (hookers) were first used in the Flemish fisheries; these sailing vessels were technologically advanced in their era and influenced the productivity of the industry (Hovart, 1985). Vessels equipped with weapons that sailed in convoy for the safety of the herring fleet were termed “Vreytschepen” (Boterberge, 2010).

Warfare

The burgers and fishermen of Oostende were no strangers to conflict. The fishing fleet and the city were subject to attacks from armies of other countries and also by pirates during the turbulent period before the 17th century. In 1297 an English fleet attacked and sank 45 fishing vessels from Blankenberge, a smaller nearby port to the north of Oostende, resulting in the loss of 365 fishermen, including 35 notaries (Boterberge, 2010).

Clearly the active and successful fisheries of Flanders were of a size and stature that warranted large scale, organised attacks and Oostende was no exception. In 1382 war broke out between Brugge and Gent; Oostende was plundered by Gent’s allies, the English (Vroome, 1957).

The extent of threats from piracy and plundering were massive in the 15th century; protected convoys were commonplace, such as the herring fleet convoy from Duinkerke (Dunkirk) to the North Sea in 1438. In 1441 some convoy ships, known as “Vreytschepen”,

from Oostende, Duinkerke and Nieuwpoort were equipped with weapons to act as defence vessels. By 1457, costs were recovered through new taxes (Boterberge, 2010).

After a period of relative prosperity and growth under Austrian control, the city of Oostende was destroyed (plundered and burned) by Austrian and Nieuwpoort troops loyal to Archduke Maximilian I of Hapsburg in 1489 following a Flemish revolt. By 1492 the revolt was crushed, and rebuilding began in earnest (Vlietinck, 1897; Vroome, 1957).

The 16th and 17th centuries were regarded as an era of decay of the fisheries in Flanders largely due to conflicts and political intrigue. By the end of the 15th century, typical vessels armed themselves against piracy; protective convoy vessels were provided based on a 25 shilling tax on each last of fish caught (20 Shillings to the Flemish pound) (Hovart, 1985). Decline in fortunes of the entire Flemish fisheries from 1570 onwards was at least partly down to the sea and coastal areas being unsafe due to piracy, robbers and brigands (Boterberge, 2010).

In 1583 Oostende was under siege by the Spanish forces of Alexander Farnèse, Duke of Parma, who was establishing a beachhead for the Spanish Armada's proposed invasion of England. Oostende withstood the attack and the Spanish withdrew, however, the decade and the following decade were fraught with instability and fishing was badly affected. A renewed attack by the Spanish commencing in July 1601 effectively halted all Oostende fishing involvement. The siege lasted until September 1604 when Oostende surrendered (Vroome, 1957).

The final nail in the coffin of the Flemish herring fishery was realised. In the words of Roger Degryse:

“The fall of Oostende in 1604 meant the death of the Flemish ‘gibbing’ (kaak) industry... Is it therefore any surprise that after 1600 the herring fishery in Holland reached a level that no other nation has ever equalled since?”³ (Degryse, 1944)

³ Translated from the original Dutch: “De val van Oostende in 1604 betekende den dood van de Vlaamsche kaakindustrie... Moet het ons dan verwonderen dat in Holland na 1600 de haringvisserij een peil bereikte, dat sedertdien door geen enkele andere natie meer geevenaard werd.”

Location

The port of Oostende is situated on the Belgian coast between the ports of Zeebrugge to the north east and Nieuwpoort to the south west. The fishing grounds most frequented by Oostende vessels were shared by other Flemish ports and centred primarily on an area that is bounded by the coastal extent of Flanders (incorporating the modern Belgian coast and reaching as far south as Gravelines in northern France). However, fishing efforts were often extended into the North Sea and into the English Channel. Contact was occasionally made with French, English and Dutch vessels who fished these waters as well. The Large Marine Ecosystem of the North Sea is recorded in terms of generalised location, but the focus was essentially the southern aspect of this LME.



Figure 2: 1609 map of Flanders (Quad, 2019)

Measurements and Conversions

Wherever possible, metric measurements have been provided alongside the original values and units shown in the sources. There are some instances where measures may be variable over time, for example, the value of a “last” or “load” varied over time:

Up to c. 1500: 1 last = 12 tons = 1.2 / 1.68 metric tonnes⁴

Post c. 1500: 1 last = 18 tons = 1.8 / 2.52 metric tonnes⁵

The following values and conversion rates have been applied to the dataset to enable a uniform and stable series:

Original	Conv.	Conversion	Description	Source
last	ton	1 last = 12 tons (< c.1528)	Last ~ Ship's load; Flemish ton	(Vlietinck, 1897, p73)
last	ton	1 last = 18 tons (> c.1528)	Last ~ Ship's load; Flemish ton	(Vlietinck, 1897, p73)
ton	tonne	1 ton = 0.1 tonnes	Flemish ton Metric tonne	(Vlietinck, 1897, p73)
last	tonne	1 last = 1.8 tonnes	Last ~ Ship's load Metric tonne	(Vlietinck, 1897, p73)
but	ton	1 but = ¼ ton	But ~ barrel Flemish ton	(Vandewalle, 1984)
ton	tonne	1 ton = 0.14 tonnes	Flemish ton Metric tonne	(Vandewalle, 1984)
pint	litre	1 pint = 0.58 l	Pint of liquid Metric litre	(Vandewalle, 1984)
pond	Kg	1 pound = 0.463 Kg	Flemish pound weight Metric Kilogram	(Vandewalle, 1984)
barrel	herring	1 barrel = 800 pieces	Barrel salted herring Individual organism	(Verlinden & Craeybeckx, 1959, p731-7)

⁴ Vlietinck equates 1 ton to 0.1 metric tonnes; Vandewalle equates 1 ton to 0.14 metric tonnes

⁵ Ibid.

herring	silver	1 herring = 1 g	Individual organism Metric gram silver	(Van der Wee, 1975, p413-447)
barrel	litre	1 barrel = 100.9 l	Barrel salted herring Metric litre	(Waterman, 2019)
pond	groten	1 £ = 240 g.	Flemish pounds Flemish groats	(Spufford, 1963)
pond	schilling	1 £ = 20 s.	Flemish pounds Flemish schillings	(Spufford, 1963)
pond	pond parisis	1 £ = 12 £ parisis	Flemish pounds Paris pounds	(Verheyden, 2019)
pond	pond brabant	1 £ = 1.5 £ brabant	Flemish pounds Brabant pounds	(Verheyden, 2019)

Table 2: values and conversion rates

Currency valuations are based on market prices for Antwerpen and Malines (Antwerp and Gent), the two nearest major markets to the Flemish coastline. The valuation of 1 individual fish at 1 gram of silver is applied (Van der Wee, 1975), but the mass of an individual fish is taken as 1 Kg rather than the suggested 1.05 Kg (Ibid.) as outlined in the “Herring species information” section of this document.

The “pond” is synonymous for a measurement of weight (1 pond = 0.463 Kg) and of currency (1 pond [£] = 20 schilling [s.]).

It is important to consider that in the process of calculating and converting currency values, the use of “Vlaams pond groten” and “pond groten parisis” in the sources represent Flemish pounds and Paris pounds respectively. The Flemish pound was worth twelve Paris pounds, a factor that features in enabling otherwise irreconcilable differences experienced in attempting to enumerate the dataset’s currency values.

The actual marketable value of herring, based on the GPIHG silver to currency ratio dataset, had to be converted into Flemish pounds in order to provide a constant index to be applied across the dataset (Global Price and Income History Group, 2005).

Process

1368-1599

Derived from data extracted primarily from the works of Edward Vlietinck and Roger Degryse, a data series based initially on harbour taxes and duties was established. Further data points

were added from research carried out at the Algemeen Rijksarchief (General Royal Archive of Belgium). Each of these data points is clearly cited in the dataset. These data are provided as literal monetary values collected at the port from vessels off-loading their catch.

Based on these specified data points, a further data series of price indexed values relating to market values of herring is provided to establish a median between the tax and duty values provided (Van der Wee, 1975, p413-447).

Where possible, any values provided from the archives and/or sources as listed that add any other perspectives (e.g. actual landed weights, numbers of vessels, etc.) are included. These values are cited in the dataset as well.

In order to determine landing weights in metric tonnes, a series of calculations was carried out. Similarly, numbers of vessels, referred to as “effort” were calculated, as well as Catch per Unit of Effort (CPUE).

Full calculation formulae are provided within the dataset adjacent to the calculated values to highlight the process and output voracity. Descriptions of each formula are contained in the “Data Fields” section of this document. As highlighted before, the valuation of Flemish pounds compared with Paris pounds enables the reconciliation of otherwise conflicting values.

To assist in determining archival and related sourced data entries, the Traffic Light system is deployed. Green indicates that verified sources have been supplied that underpin the values given. Amber indicates that at least some verified source materials have been used, but these are reliant on a level of calculation to populate the series. Red indicates that data shown are indicative based on calculations derived from market price trends only.

Vitally, the Oostende figures were used to inform the overall Flemish fishery figures. This was attained by recognising that the Oostende fishery was roughly equal in scale to the Nieuwpoort fishery to the south. Several other minor Flemish fisheries were also active, but these are deemed to be small in comparison. In total, these other ports would have landed roughly an equal measure to that of either Oostende or Nieuwpoort. Therefore, the total Flemish fishery equates to the Oostende landing values multiplied by three.

1600-1790

The extended data series between 1600 and 1790 shows a much-depleted fishery that only began to recover to some extent in the 18th century. The siege of Oostende (1601-1604) highlights the end of the hitherto prosperous Flemish industry. From 1605 to 1783, values

are based on the Dutch Herring Fishery figures with the Capacity Trend Method (Nicholls et al. 2020) applied.

A single 1784 value of 1200 metric tonnes is for the entire Flemish fishery, not just Oostende, therefore has not had a factor applied.

Other Processes

The World Register of Marine Species (WoRMS) indicates that the classification of the typical herring caught in the Flemish herring fishery, known by the common name of “Haring” is “*Clupea harengus*, Linnaeus, 1758: AphiaID 126417 - (urn:lsid:marinespecies.org:taxname:126417)”. (WoRMS, 2019)

The Fishbase database of fish species provides detailed information about the species physiology including that herring reach a maximum weight of 1.1 Kg. However, North Sea herring present dimensions of between 3.8 cm and 39.8 cm in length, and adults of the species are found in the range of 18 cm to 45 cm with a common length of 30 cm. This length equates to a mass of 0.212 Kg (FishBase, 2019, <https://www.fishbase.in/summary/24>). For the purpose of this dataset a typical weight is deemed to be 0.10 Kg to accommodate smaller (juvenile) fish that may have been caught, as well as any variance in weight where the gibbing (kaak) process may have already been initiated (loss of head and gills).



Figure 3: Clupea harengus - picture by Bernd Ueberschär (FishBase, 2019)

Where relevant, 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.

Conclusions

The Trends determined through a combination of sourced archival materials and calculation show an industry that was buffeted by many external factors leading to highly variable outputs, and finally, to the overall collapse of the fishery by 1604 (outside of the remit of this dataset). Nevertheless, the Oostende fishery provides a deep insight into the fortunes of the overall Flemish fisheries and sets a baseline for determining future generalisations about this important precursor to the North Sea herring fisheries of the Dutch in the 17th and 18th centuries.

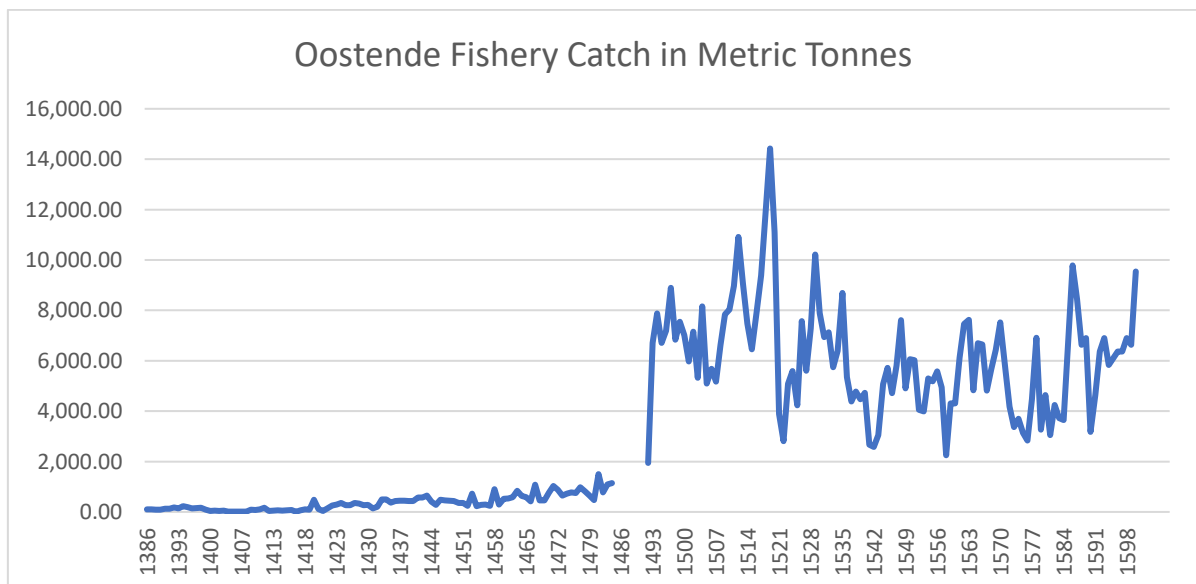


Figure 4: : Oostende Fishery Catch in Metric Tonnes 1368-1599

Figure 4 highlights the trend of general, steady growth in the industry until 1484 where there is a large gap until 1492. During this period the city was at war and was besieged from 1481

until 1484 leading to zero fishing effort. No records for this period appear to be available. Markedly, there is a boom immediately following 1484 which is probably due to a combination of new governance and technological innovation, including superior fish curing processes and the expansion of the harbour.

The fluctuations in fortunes of the fishery are clear with massive peaks and troughs corresponding largely with the human activities, especially wars, that drove the local economy. Despite a reasonable trend of continued prosperity until 1600, the fishery collapsed completely in 1604 and only recovered to any extent at least a century later.

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_FleNicHer_1)
type	Description of data series type. (Dataset)
modified	Most recent date the data was modified; ISO 8601 metric date/time standards apply. (2021-01-31)
license	Data licensing conditions that apply. (http://creativecommons.org/licenses/by/4.0/legalcode)
bibliographicCitation	Author citation for the dataset. (Nicholls, J. 2020. Norfish Flemish Herring Fishery 1386-1790. Norfish Dataset. 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.



Flemish Herring Fishery

1386–1790

	(Norfish)
datasetName	Name of the dataset. (Flemish Herring Fishery 1368-1790)
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: Van der Wee, H (1975). Prijzen en lonen als ontwikkelingsvariabelen, Een vergelijken onderzoek tussen Engeland en de Zuidelijke Nederlanden, 1400-1700, in Album offert à Charles Verlinden à l'occasion de ses trente ans de Professorat, Gent, Belgium. (pp. 413-447))
catalogNumber	Identifier of the data within the institution and project – “Fle” refers to Flemish, “Nic” refers to Nicholls, “Her” refers to Herring. (FleNicHer)
recordedBy	Researcher who recorded the data. (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/2469)



Flemish Herring Fishery

1386–1790

locality	Overall location or region. (Belgian coast and North Sea)
locationAccordingTo	MRGID identifier based on the marineregions.org/mrgid system. (MRGID)
locationRemarks	Stipulation of the system deployed for locationAccordingTo field. (Flemish coast, North Sea)
decimalLatitude	Latitude shown in decimal notation based on the WGS 84 (EPSG:4326) geodetic datum standard. (4.22835)
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 decimalLatitude and decimalLongitude fields. In this instance, “125928” depicts a radius of 125.928 Km.
georeferenceRemarks	Location information – NOAA LME system used. (22: North Sea)
scientificNameID	The WoRMS LSID associated with the scientificName, based on the Marine Species database. (urn:lsid:marinespecies.org:taxname:126417)
scientificName	Scientific name of the animal based upon the commonName. (Clupiae Harengis)
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 “haring” – the Flemish common name for herring.
identificationRemarks	Explanatory notes to inform the data. (The Flemish name for herring is haring.)
effort	Effort value based on the number of vessels deployed. (18)
effortUnit	Unit of effort is indicated. (haringBuizen)
gramsSilverPerGroat	Value of Silver per Groat given in grammes. (0.65)
groatsPerBarrel	Value of a barrel of herring in groats. (134.00)
groatsPerFish	Cost of a herring in groats. (0.17)
currencyValueInPounds	Currency value of the catch in pounds (ponden). (12)
conversionCurrencyValue InPounds	Conversion equation to calculate the value in pounds (noOfIndividuals * groatsPerFish / 240)
currencyUnit	Unit of currency when given. (Flemish pounds, schillings, groats)
noOfIndividuals	Number of individual herring caught. (912000)
conversionNoOfIndividuals	Conversion of individual herring to barrels. (weightBarrel * 800)
NoOfVessels	Number of vessels engaged in the fishery. (12)
conversionNoOfVessels	Conversion to calculate the number of vessels based on weightMT. (weightMT / 32.18)
weightBarrel	Given weight in barrels where available.

	(1140)
conversionWeightBarrel	Conversion of weight in Lasts into weight in barrels. (weightLast * 12)
weightLast	Given weight in Lasts where available. (95.00)
conversionWeightLast	Conversion of weight in metric tonnes to calculate weight in Lasts. (weightMT / lastPerMT)
weightMT	Weight in metric tonnes for the port of Oostende. (96)
conversionWeightMT	Conversion weight in metric tonnes. (trend based on groatsPerBarrel)
weightTon	Weight in tons - not metric. (492)
conversionWeightTon	Conversion from metric tonnes into tons. (weightMT * 2.52)
lastPerMT	Number of Lasts per metric tonne. (12)
conversionLastPerMT	Conversion of Lasts into Metric tonnes. (1 Last = 12 tons)
taxRate	Given tax rate in percentage where available. (1%)
taxType	Given type of tax imposed – either sales tax or herring excise. (sales tax-remittance/eerdgeld-pondgeld; herring excise duty/haringaccijn)
sourceData	Specific reference for related given data values. (Vlietinck, E (1897). Het Oude Oostende en zijne Driejarige Belegering (1601-1604), Jos Vlietinck, Oostende, Belgium (pp 72-77).)
CPUE	Catch per Unit of effort calculated from effort and catchMT shows the relative effort exerted in comparison with other years. (32.18)

notes	Any relevant information that informs the data.
catchMT	Total annual fishery value in metric tonnes for the whole Flemish fishery calculated as three times the overall Oostende weightMT to incorporate other ports. (1076)
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.

Acknowledgements

The staff at VLIZ provided courteous and reliable assistance by enabling access to materials and sharing helpful information. In particular, Leen Vandepitte and Joana Beja in their data management roles, and Ann-Katrien Lescrauwaet (Lescrauwaet, 2013) in her role as historian were very helpful. Fons Verheyde, librarian, historian and archivist at the VLIZ Library (Library of the Flanders Marine Institute in Oostende) deserves special thanks for his excellent assistance in providing relevant digitised documents and making original archived materials available for research.

The staff at the Algemeen RijksArchief (ARA) in Brussels are thanked for their assistance in granting access to the relevant archived documents pertinent to this study.

This work would not have been possible without the incredible work undertaken by two unsung heroes of medieval Flemish history: Edward Vlietinck and Roger Degryse. While Vlietinck was highly productive in the latter part of the 19th century and produced some of the most graphic and accurate information ever compiled, he had to publish his own work through a family connection in Oostende. Arguably, he never received the level of credit his work truly deserves, and to this end, he is acknowledged fully. Similarly, Roger Degryse, despite several detailed, accurate and highly insightful publications which made him a *once in a generation* historian of Flemish fisheries, has never received the accolades that his work probably deserves. He was not affiliated with any specific academic body in Belgium apart from an association with the University of Ghent, but he was very highly regarded by many institutes and universities around the world. Sadly, Degryse passed away on 7 November 2006. This work reflects much of his efforts in realising a complete history of the medieval Flemish fisheries.

Bibliography

- Beun, J., Dumon, J., Lelièvre, W., & Moeyaert, D. 2006. De Nieuwpoortse visserij. Nieuwpoort: VVV Nieuwpoort.
- Boterberge, R. 2010. Geschiedenis van het Blankenbergse visserijbedrijf. Blankenberge: Stadsbestuur Blankenberge.
- Degryse, R. 1944. Vlaanderens haringbedrijf in de Middeleeuwen. In De Seizoenen (Vol. 49). Antwerpen: De Nederlandsche Boekhandel.
- Degryse, R. 1966. De crisis in het haringbedrijf te Oostende en te Damme van 1437 tot 1441. Brugge: Société d'Emulation.
- Desnerck, R. 1974. Vlaamse visserij en vissersvaartuigen: Deel 1 De havens. Oostduinkerke: Gaston Desnerck.
- FishBase. 2019. FishBase - Search. Retrieved from www.fishbase.org
- Global Price and Income History Group. (2005). Prices and wages in Belgium, 1366-1603. Retrieved from: <http://iisg.nl/hpw/data.php#europe>
- Hovart, P. 1985. Zeevisserijbeheer in vroegere eeuwen: een analyse van normatieve bronnen. In Mededelingen van het Rijksstation voor Zeevisserij. Oostende: Rijksstation voor Zeevisserij.
- Lescrauwaet, A.-K. 2011. Belgian Fisheries: Ten Decades, Seven Seas, Forty Species: Historical time-series to reconstruct landings, catches, fleet and fishing areas from 1900. Ghent: Ghent University (UGent).
- Lindeman, M. 2019. Het Rijksarchief in België: Zoeken naar archieven. Retrieved from <https://search.arch.be/en/zoeken-naar-archieven>
- Nationaal Visserijmuseum. 2018. Achter de schermen. Retrieved from <https://www.navigomuseum.be/nl/achter-de-schermen-1>
- Nicholls, John., Allaire, Bernard & Poul Holm. 2021. The Capacity Trend Method: A new approach for enumerating the Newfoundland cod fisheries (1675–1790). Historical Methods: A Journal of Quantitative and Interdisciplinary History. DOI: 10.1080/01615440.2020.1853643
- OBIS Ocean Biogeographic Information System of UNESCO. 2017. Manual: DarwinCore. [Online] Available at: <http://www.iobis.org/manual/darwincore/> [Accessed 29 05 2020].
- Pieters, M., Verhaeghe, F., Gevaert, G., Mees, J., & Seys, J. (2003). Colloquium Visserij, handel en piraterij: vissers en vissersnederzettingen in en rond het

Noordzeegebied in de Middeleeuwen en later. 21-23 November 2003. Museum Walraversijde, Oostende, Belgium. Oostende: Vlaams Instituut voor de Zee (VLIZ).

- Quad, M. 2019. 1609 Map of the County of Flanders. Retrieved from https://en.wikipedia.org/wiki/Flanders#/media/File:Quad_Flandria.jpg
- Roberts, C. 2007. The unnatural history of the sea. Washington D.C.: Island Press.
- Spufford, P. 1963. Coinage and currency. In E. Postan & E. Rich (Eds.), Cambridge economic history of Europe. Cambridge: Cambridge University Press.
- Stadsbestuur Nieuwpoort. 1985. Haven en visserij Nieuwpoort. Nieuwpoort: Stadsbestuur Nieuwpoort.
- Van der Wee, H. 1975. Prijzen en lonen als ontwikkelingsvariabelen, Een vergelijken onderzoek tussen Engeland en de Zuidelijke Nederlanden, 1400-1700. Gent.
- Vandewalle, P. 1984. Oude maten, gewichten en muntstelsels in Vlaanderen, Brabant en Limburg. Gent: Belgisch centrum voor landelijke geschiedenis.
- Verheyden, V. 2019. Numismatiek. [Online] <https://familiegeschiedenis.be/hulpwetenschappen/numismatiek> [Retrieved 19 January 2019]
- Verlinden, C., & Craeybeckx, J. 1959. Documents pour l'histoire des prix et des salaires en Flandres et en Brabant. Brussels.
- Vlietinck, E. 1889. 1489-1889: Eene bladzijde uit de geschiedenis der Stad Nieupoort, Nieupoort & zijne visscherij in de XVe eeuw; Het beleg van 20-28 juni 1489; De dankprocessie van Sint Jan. Oostende: J. Vlietinck, Boek en Muziekhandelaar.
- Vlietinck, E. 1897. Het oude Oostende en zijne driejarige belegering (1601-1604): opkomst, bloei en ondergang met de beroerten der XVIe eeuw. Oostende: J. Vlietinck, Boek en Muziekhandelaar.
- Unger, R.W., 1978. The Netherlands herring fishery in the late Middle Ages: the false legend of Willem Beukels of Biervliet. Viator: Medieval and Renaissance Studies 9, 335–356.
- Vroome, E. 1957. De evolutie van de Oostendse vissershaven: een duizendjarige reuzenstrijd. Oostende: Emile Vroome.
- Waterman, J. 2019. Measures, Stowage Rates and Yields of Fishery Products. Retrieved from <http://www.fao.org/3/x5898e/x5898e00.htm#Contents>

- WoRMS. World Register of Marine Species – taxa. 2020. <http://www.marinespecies.org/aphia.php?p=taxdetails&id=126436>. Oostende, Belgium [Accessed: 29 May 2020].

Appendix 1

Traffic Light System

Traffic Light	Explanation
green	Given values from reliable sources with minimal calculations and/or conversions required
amber	Calculated values based one or more variables from given values
red	Calculated and/or trended values based on extrapolated data

Appendix 2

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 calculated and based on recalculated 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