Fish bones: small remains, enormous potential: A synthesis of fish consumption in the northern Low Countries (450-1800 CE)

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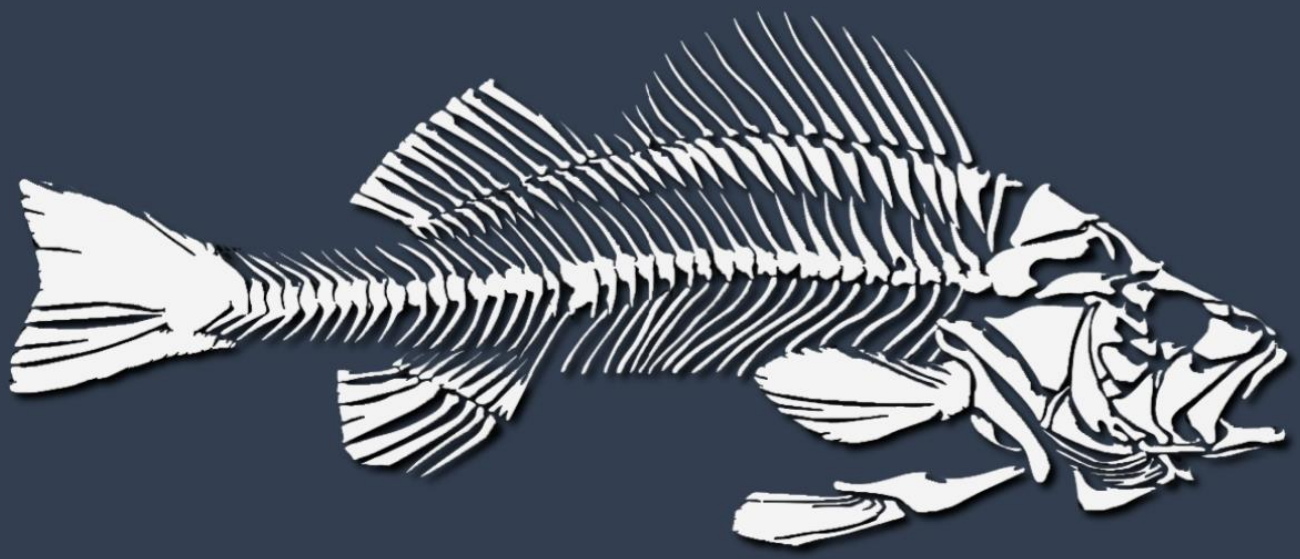
FISH BONES

SMALL REMAINS | ENORMOUS POTENTIAL



A SYNTHESIS OF FISH CONSUMPTION IN THE NORTHERN LOW COUNTRIES (450-1800 CE)

CHRIS MUYSSON

Die dit vis boock sullen sien of lesen

Sij sullent die somighe berispen en seggen behoort al anders te weesen

Ic hebt geschreven en gemaekt na mijn simpel verstant

Meest van onse visschen die wij hebben in Hollant

Die onse vissgers dagelijk vangende zijn

En gegeten worden tot alle termijn

Adriaen Coenen van Scheveningen, 1577

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CHAPTER 1: INTRODUCTION

In 1577, Adriaen Coenen, a fish merchant in Scheveningen, began compiling an extraordinary collection of richly illustrated manuscripts known as the *Visboock* (Figure 1.1). These manuscripts combined empirical knowledge with first-hand experience, drawing on local fishermen's expertise and Coenen's own encounters with marine life. His work continues to hold significance today, providing a unique window into the marine world of the sixteenth century and capturing the curiosity and wonder that typified early scientific exploration. Coenen's contributions are particularly noteworthy because the Dutch dominated the western European herring catch and trade during his life, with a significant portion of the population involved in the fishing industry (Martin, 2009, p. 77).

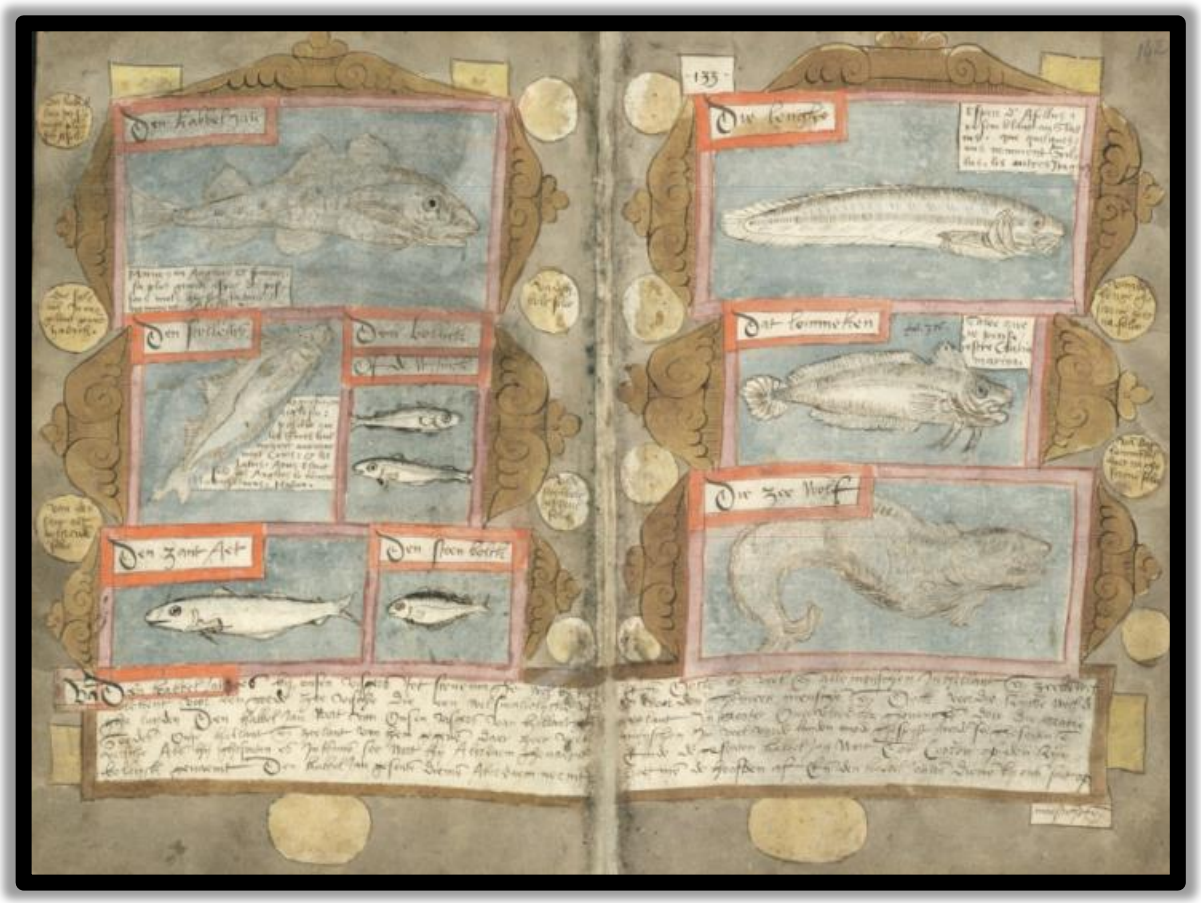


Figure 1.1: Marine fishes as depicted in Adriaen Coenen's 'Visboock' (1577-1579), folio 133. Collected from the KB catalogue (Koninklijke Bibliotheek).

Coenen characterized herring as the king of all fish and the great golden mountain of Holland (Egmond, 2005, p. 78). The profitability of both herring and cod fishing was incredibly significant, to the extent that recent research has coined the term 'North Atlantic Fish Revolution' to describe this particular period (Holm *et al.,* 2022, p. 103). The industry developed exponentially between approximately 1500 and 1700, characterized by a transatlantic shift of momentous economic, cultural, and political consequence. However, herring fishing was not a recent development when Coenen wrote his book of fishes in the late sixteenth century. The preservation technique known as *haringkaken* or gibbing, which allowed herring to be stored longer at sea, had already been in use for over two centuries. Moreover, the *haringbuis*, a specialized vessel designed to catch and hold herring in high seas, emerged during the course of the fifteenth century. The beginning of the booming business that was called the marine fishing industry can therefore be placed well before Coenen and his *Visboock.*

Our understanding of marine fish catch, trade, and consumption in the northern Low Countries, known as the Netherlands, today, prior to the sixteenth century remains limited. In contrast, in England, the concept of a 'fish event horizon', originally introduced by Barrett et al. (2004b, p. 2417), highlights the emergence of extensive marine fish consumption. Archaeological findings of fish remains in England suggest a significant increase in marine fishing around 1000 CE, which unfolded in two stages: a transition from inland freshwater fish to coastal fishing, followed by a subsequent shift from coastal to marine fishing (Sicking & Abreu-Ferreira, 2009, p. 7). Several factors have been put forward to explain this fish event horizon, including urbanization, Christian fasting regulations, population growth, depletion of inland fish stocks, and the concurrent Medieval Warm Period, which brought about changes in the populations of cod and herring in the North Sea (Barrett *et al.*, 2004b, p. 2420).

In his comprehensive examination of medieval sea-fishing in Europe, James H. Barrett extensively discusses the Low Countries, focusing on data primarily sourced from Belgium, often referred to as the 'southern Low Countries' (Barrett, 2016, pp. 253-264). During the high Middle Ages (1050-1350), there was a notable expansion of sea fishing and marine fish trade in the southern Low Countries. However, rather than a sudden occurrence of a fish event horizon, the relative significance of marine fish consumption compared to freshwater fish

gradually increased from the eleventh to the fourteenth centuries (Van Neer and Ervynck, 2016, p. 167; Barrett, 2016, p. 259). This observation is primarily based on the analysis of sieved fish remains from inland towns located in the Scheldt River basin. These urban centers, which relied on urban markets for their fish supply, are considered more representative of the fish trade compared to rural or elite areas (Van Neer and Ervynck, 2016, p. 163).

In the Netherlands, or the 'northern Low Countries', there are no clear signs of a fish event horizon in the early medieval period (425-1050). A recent analysis of fish remains from nineteen Dutch archaeological sites reveals that while marine species consumption slightly increased in coastal areas during this period, this trend was not observed in inland regions (Muysson, 2021, p. 46). Freshwater fish constituted the majority of fish consumption throughout the entire early medieval period, with marine species only accounting for a small portion. However, the fact that marine species were consumed, even in modest quantities in inland regions, suggests an existing demand for and exchange of marine fish throughout the northern Low Countries.

A comprehensive synthesis of fish consumption in the northern Low Countries during the later medieval period is still lacking. However, a recently compiled dataset called Dutch Fish Bones (DFB-dataset) presents a valuable opportunity to investigate and analyse historical fish consumption patterns in this region. The availability of the dataset offers a unique opportunity to delve into the concept of a fish event horizon and gain insights into the trends in fish consumption. Initially established as part of the North Sea Synthesis project, the DFB-dataset forms a component of the larger 4-OCEANS project[1], which is funded by the European Research Council. The dataset comprises an extensive collection of fish remains (Figure 1.2), recovered from various archaeological sites across the Netherlands, and presents a valuable resource for investigating and analysing historical fish consumption patterns. The 4-OCEANS project seeks to examine marine event horizons over the past two millennia on a global scale, aiming to identify the periods and locations in which sudden surges in marine consumption and rapid extractions of marine fish occurred.

[1] https://cordis.europa.eu/project/id/951649

In 2018, Inge van der Jagt (*Rijksdient voor het Cultureel Erfgoed*, or RCE) compiled the dataset for the Netherlands, covering the period from 450 to 2000 CE. For the Roman era, spanning from 0 to 450 CE, Monica Dütting contributed the data. The information was gathered through a comprehensive database of archaeozoological remains from archaeological sites, known as BoneInfo. By initiative of the RCE this database was consistently updated with new findings until 2015. Supplementary data was collected through meticulous desk-based research.

To further enhance the Dutch Fish Bones dataset, this thesis incorporates additional data not included in the original collection, sourced from supplementary desk-based research and through personal correspondence with archaeozoological specialists. Consequently, the combined efforts of Inge van der Jagt, Monica Dutting, and the author have culminated in a dataset encompassing 152 sites and 514 assemblages (Appendix 1). This enriched dataset provides an unparalleled opportunity for a more in-depth diachronic exploration of fish consumption trends and patterns throughout the assemblages.

Figure 1.2: An example of fish bones from an archaeological site, unidentified fish bone assemblage from: Nieuwegein-het Klooster, picture by Roosje de Leeuwe (RAAP).

However, when analysing such a dataset, researchers may encounter specific issues. For example: substantial inter- and intra-site variation in fish spectra could present challenges for studying and explaining individual assemblages (Wouters *et al.*, 2021, p. 1). In Flanders, in the southern Low Countries, a decline in freshwater fish consumption is evident during the late Middle Ages, though it was not a universal trend for all cities in Flanders. For instance, in the thirteenth century, Ghent residents relied on freshwater fish for only 10% of their fish diet, while in contemporary Aalst, freshwater fish consumption accounted for as much as 75% of marine fish consumption (Van Neer & Ervynck, 2016, p. 164). Diachronic comparisons of unique sites within a country could therefore benefit from a more generalized perspective. Averaging data from numerous assemblages along a diachronic line, while disregarding observable variation, might be the only way to identify general trends (Wouters *et al.*, 2021, p. 8). This approach has been applied to archaeologically recovered fish data from York and London, proving useful in providing a more generalized trend of fish consumption in England (Harland *et al.*, 2016; Orton *et al.*, 2014, 2016, 2017).

thus, this study aims to explore and elucidate fish consumption patterns in the northern Low Countries along a general diachronic line. By utilizing the Dutch Fish Bones dataset, alongside historical research, this research will address a range of questions regarding fish consumption. These include diachronic trends in marine, freshwater, and migratory fish consumption, as well as the potential identification of a marine fish event horizon specifically for the northern Low Countries. By examining the development of fish consumption over time and the varying trends between urban and rural areas, this study will not only build upon Coenen's pioneering work but also contribute to a more inclusive understanding of the fish consumption and the extended socio-economic dynamics of the northern Low Countries

1.1 RESEARCH QUESTIONS

The objective of this study is to provide a general overview of fish consumption in the northern Low Countries during the medieval and early modern periods (450-1800). This dataset will be analysed comprehensively to answer the following research questions:

Main question:

- How did fish consumption develop in the northern Low Countries during the medieval and early modern periods (450-1800) and what factors can account for the diachronic trends observed?

Sub questions:

- What diachronic trends in the consumption of marine, freshwater, and migratory fish can be identified by analysing fish bone data from archaeological contexts?
    - What impact do factors such as data quality, collection methods, context, and individual sites/assemblages with irregular high number of fish remains, have on the observed diachronic trends?
    - To what extent do diachronic trends differ between urban and rural areas?
    - To what extent do diachronic trends vary regionally between coastal and inland provinces?
    - Can a sudden increase in marine fish consumption be observed, and is it possible to establish a marine fish event horizon for the northern Low Countries, in comparison to the significant expansion of marine fishing around 1000 CE in England?
- What diachronic patterns in the consumption of various fish species or families can be identified by analysing fish bone data from archaeological contexts?
    - Which species and families can be considered primary consumption fishes within marine, freshwater, and migratory fish groups?
    - To what degree do the primary consumption fishes differ between urban and rural areas?
    - To what degree do the primary consumption fishes vary regionally between coastal and inland provinces?
    - Is a sudden increase in marine fish consumption corroborated by a shift in the primary consumption fishes?

1.2 READING GUIDE

Chapter 2 explores the various fish species found in the northern Low Countries, including freshwater, marine, and migratory fish, and discusses their ecology and distribution. It also examines zonation, which refers to the division of aquatic environments into distinct zones based on factors such as water temperature, depth, and salinity.

Chapter 3 provides a historical background of the region, including the changes in its geography and demographics during the early and late medieval period. It also discusses the role of fish in society, including its significance in religious practices and as a status symbol, as well as the development of fishing techniques during this period.

Chapter 4 delves into the materials and methods used in the study, providing an in-depth look at the DFB-dataset, data quality, and data alteration, as well as the various considerations that were taken into account during the analysis and the methods that were considered and used for the analysis.

Chapter 5 presents the results of the study, including the diachronic trends in fish consumption between 450 and 1800, the primary consumption fishes during this period, and the factors that possibly influenced these trends, such as collection method, data quality, and high NISP accumulations. It also examines the differences in fish consumption between rural and urban areas, as well as coastal and inland provinces.

Chapter 6 provides a summary of the study's findings and delves into a comprehensive discussion of the diverse factors that influenced fish consumption during the medieval and early modern periods. These factors include geographical and climatological changes, demographic shifts, urbanization, religious practices, and advancements in fishing techniques.

Chapter 7 summarizes the study's conclusions regarding fish consumption patterns in the northern Low Countries from 450 to 1800. It answers the main research question and sub-questions, drawing from the analysis of the DFB-dataset and historical research. The chapter also provides recommendations for future research.

CHAPTER 2: FISH SPECIES AND ECOLOGY

2.1 INTRODUCTION

To fully comprehend the historical consumption of fish, it is crucial to gain an understanding of the fish species that were accessible to the people of the northern Low Countries. The first section serves as an introduction to the biology and the historical description by Coenen (if available) of fishes, exploring the background of marine, freshwater, and migratory fish groups. This background sheds light on the most common fish remains from various archaeological contexts as derived from the DFB-dataset, discussing a variety of fish species that were found in archaeological contexts dated between the years 450 and 1800 CE. This section focuses on the fish species that account for over 100 fish remains in the DFB-dataset (Table 5.5), representing the majority of fish remains addressed in the results. It is important to note that although certain fish species or families may not be individually addressed in the rest of the study, they still contribute to the overall composition of the recovered fish remains and play a role in shaping the results. In the second section of this chapter, the habitat of these fish will be examined within a zonation framework. This discussion will then transition into the third and concluding section of the chapter, where the prediction of fish species distribution will be explored.

2.1.1 FRESHWATER FISHES

Coenen devotes relatively little attention to river and freshwater fishing compared to his focus on sea fishing. However, he does provide some descriptions of specific freshwater fish. Coenen portrays the tench as highly pleasing to rich and lavish people during their festive banquets (f. 201). He also highlights the carp as a popular delicacy and a 'principal fish of the inland waters well known in Holland'. The carp was consumed by wealthy and opulent individuals during their feasts" (f. 199). And the roach, was also considered tasty and had the added advantage of serving as excellent bait for catching cod (f. 202).

2.1.1.1 FRESHWATER EELS (ANGUILLIDAE)

The most commonly found freshwater fish in the archaeological contexts of the DFB-database is the European eel (*Anguilla Anguilla*: Figure 2.1.1a). This species is known for its distinctive appearance and its life cycle, which involves a long and complex migration from freshwater habitats to the Sargasso Sea in the Atlantic Ocean. European eels are adaptable to a range of environmental conditions, and they are able to tolerate varying levels of salinity and water temperature. In freshwater habitats, they can be found in both still and running water, although they prefer environments with plenty of vegetation and a soft muddy or sandy bottom (Van Emmerik & de Nie, 2006, p. 111). The European eel is scientifically classified as a catadromous migratory fish. Adult specimens, however, are never caught in the sea, they are therefore considered a freshwater fish in terms of fish consumption. (Beerenhout, 2016, p. 517).

2.1.1.2 CYPRINIDS (CYPRINIDAE)

The cyprinids are the second biggest family of freshwater fishes in the DFB-dataset. They are a family of freshwater fishes that is widely distributed throughout Europe. Cyprinids are highly adaptable and can be found in a range of habitats, including lakes, rivers, streams, and ponds. They are typically small to medium in size, and they feed on a variety of food sources, including invertebrates and vegetation, and sometimes even smaller fish. Cyprinids are unique in that they lack a stomach and have toothless jaws, but they can effectively chew their food through the use of pharyngeal teeth that are located in the last gill bow. Common cyprinid species found in the northern Low Countries include: common bream (*Abramis brama*; figure 2.1.1g), white bream (*Blicca bjoerkna*; Figure 2.1.1m), Eurasian carp (*Cyprinus carpio*; Figure 2.1.1d), common roach (*Rutilus rutilus*; Figure 2.1.1i), common rudd (*Scardinius erythrophthalmus*; Figure 2.1.1f), tench (*Tinca tinca*; Figure 2.1.1k), and common barbel (*Barbus barbus*; Figure 2.1.1j).

The common bream is a fish that reaches a length of about 70 centimetres. Within archaeological contexts juvenile common bream are often confused with white bream, which grow to a maximum length of around 40 centimetres. While there are some morphological differences that allow for the distinction between the two species, hybridization between the two makes this difficult (Van Emmerik & de Nie, 2006, p. 92). As common bream mature, they develop a beautiful bronze colouring

Figure 2.1.1: Freshwater fishes: (a) Welsh catfish, (b) European eel, (c) Northern pike, (d) Eurasian carp, (e) ruffe, (f) common rudd, (g) common bream, (h) three-spined stickleback, (i) common roach, (j) common barbel, (k) tench, (l) European perch, (m) white bream, images after goodfish.nl.

easily distinguishing itself from the white bream, which remain silver coloured. Both species of bream spend the majority of their lives in shoals, often alongside each other, with only very old individuals of common bream living solitarily. Common breams have a protrusible mouth that they use to forage along the bottom, feeding on small insects and other benthic animals (Van Emmerik & de Nie, 2006, p. 93). White breams lack this protrusible mouth and instead directly snap up larger larvae and snails from the bottom (Van Emmerik & de Nie, 2006, p. 156).

The Eurasian carp is a non-native fish in the waters of the Low Countries and is traditionally a species from the Caspian Sea that can reach up to a meter in length. The earliest archaeological recordings of carp in the northern Low Countries date back from the eleventh century onwards (Buitenhuis and Brinkhuizen 2003, p. 43). The first recorded evidence of carp in historical sources dates back to the 12th century (Quak, 2014, p. 35). The fish is believed to have been introduced through the monastic community and maintained in fishponds, but there are indications that carp naturally found its way to the waters of the Rhine-Meuse delta as early as the tenth or eleventh century (Beerenhout, 2017, p. 2; Quak, 2014, p. 34). Carp are mainly found in standing waters such as lakes and canals but can also be found in larger rivers. They search for insects, molluscs, and small crustaceans in shallow waters near the shore and use their protrusible mouth to dig around in the bottom. The carp can survive well in turbid water because they primarily rely on smell and taste to locate their food (Van Emmerik & de Nie, 2006, p. 146).

The common roach and common rudd both occur in shoals. They are typically found near the banks but can also be found in deeper parts of open water. Common roach and rudd reach a length of approximately 40-45 centimetres and feed on water plants, algae, molluscs, insects, and small fish larvae that reside in the boundary between vegetation and open water (Van Emmerik & de Nie, 2006, p. 190).

The tench reaches a length of approximately 60 centimetres and inhabits small bodies of water with rich underwater vegetation, such as the waters of a polder and ponds. Tench often live solitarily or in small groups and primarily feed in the evening. They mainly feed on plankton, small insects, and molluscs, but also

consume water plants. Tench are known to hibernate in the winter by hiding in the mud. Another unique characteristic of this fish is its thick skin mucus, which contains certain proteins that can kill harmful bacteria. Due to this quality, the fish is also commonly known as the 'doctor fish' (Van Emmerik & de Nie, 2006, p. 231).

The common barbel is recognizable by its slender body and whisker-like barbels and can reach a length of approximately 70 centimetres. This fish prefers slow to medium flowing water and searches the bottom for insects, molluscs, small crustaceans, and fish, with plants also being part of its diet. During winter, the fish form large schools and seek deeper water to hibernate (Van Emmerik & de Nie, 2006, p. 85).

2.1.1.3 PIKES (ESOCIDAE)

The northern pike (*Esox Lucius*: Figure 2.1.1c), is a predatory fish that can reach a length of 1.5 meters. Pike can be found in nearly all freshwater bodies, although it can also be found in brackish water, they are also able to withstand relatively low water temperatures. The pike is a fish that primarily hunts by sight. In an environment where the water is too murky, it will disappear despite an abundant food supply. Specimens are never caught in large quantities. This is because the pike is a predator and therefore the population remains relatively limited (Van Emmerik & de Nie, 2006, p. 202).

2.1.1.4 PERCHES (PERCIDAE)

The perches are represented by two species in the DFB-dataset. European perch (*Perca fluviatilis*; Figure 2.1.1l) and ruffe (*Gymnocephalus cernua*: Figure 2.1.1e). The European Perch is an opportunistic species that inhabits a range of aquatic environments, including both still and flowing waters, as well as brackish estuaries. They are diurnal predators that prefer clear waters. European Perch can grow to be over 50 centimetres in length and can be distinguished from the Ruffe by the fact that the fins of the latter species are joined. Ruffe, which are also hunters, grow to about 20 centimetres in length and thrive in nutrient-rich still waters with soft bottoms and no aquatic vegetation. This species is well-adapted to murky and dark environments (Van Emmerik & de Nie, 2006, p. 63/172).

2.1.1.5 OTHER FRESHWATER FISHES

Other species that commonly found the assemblages of the dataset are the Wels catfish (*Silurus glanis*; Figure 2.1.1a), and the three-spined stickleback, (*Gasterosteus aculeatus*; Figure 2.1.1h). These species are both the largest and the smallest fishes on this list, with catfish reaching up to five meters in length and the stickleback typically measuring some five centimetres in length. The three spined stickleback (Gasterosteidae) is found in various water habitats, including fresh, brackish, or salt water, and prefers slow-flowing bodies with emergent vegetation (Van Emmerik & de Nie, 2006, p. 97).

The Welsh catfish (Siluridae) is a nocturnal solitary fish that hide in vegetation or mud during the day and emerge in twilight to hunt their prey. Catfish, therefore, prefer vegetation rich murky waters with plenty of hiding spots (Van Emmerik & de Nie, 2006, p. 115). The catfish was previously considered an invasive species in the Low Countries, that was introduced in medieval times. But archaeological evidence confirms that catfish has been indigenous in the region since prehistory (Beerenhout, 2009, 2; Wheeler and Jones, 2009, 166).

2.1.2 MARINE FISHES

Coenen treats herring as an esteemed fish. In the sixteenth century, herring was a highly important food source in the coastal provinces. The abundance of herring fishing was made possible by significant innovations in maritime technology. Many of the large herring ships were based in the cities of Holland and brought the salted herring ashore in barrels. Due to its plentiful supply, herring also served as a vital food source for the less wealthy. According to Coenen, fresh herring is much tastier than salted herring, but only the coastal inhabitants know this (f. 26). Dutch herring fishermen typically set sail around Pentecost and remained at sea for up to eight weeks. Usually, they made two to four trips during a season, with the herring season ending in November. In autumn, the so-called *slabharing* was caught near the coast, and fishermen would only stay away for one night. This herring was often dried to make *bokking* (Egmond, 2005, p. 79-81). *Panharing* was caught in the Zuiderzee, with a short season from late December to March. This herring species was primarily used as bait.

During Coenen's time, cod was abundantly caught and consumed. The fishing season for cod started in October and lasted until Easter (Egmond, 2005, p. 85). Cod was consumed both fresh and salted, and it was called *aberdaam* in Holland and *bollik* or *bolk* in Cologne. The fishermen who targeted cod were referred to as 'doggers' and the lines used for catching cod were baited. *Panharing*, shrimp, or shad were used as bait. Interestingly, if the fishermen switched from using shad to *panharing*, there were instances where the cod no longer found it appetizing. Coenen remarks: 'the cod blows away the bait as if to say, this does not please me' (f.141-142).

Coenen extensively covers righteye flounder in his *Visboock*. Fresh flounder and plaice were primarily consumed in the cities of Holland and the coastal regions, while dried fish was primarily traded to the hinterland through Deventer (f. 135-136). He describes flounder as 'a good fish suitable for all common people in these regions' (f. 135-136). The flounder catch originated from numerous ports in Holland and Zeeland and dried flounder was traded to the German hinterland. In the areas of Kleve and Gulik, flounder was particularly traded, as Coenen believed that people had difficulty distinguishing between plaice and flounder (Egmond, 2005, p. 83). Flounder was possibly less popular than plaice in the Low Countries, due to its muddy flavour (Beerenhout, 2015, p. 21). Fishermen who targeted plaice would typically embark in February, when the haddock catch diminished. The annual plaice catch exhibited considerable variation. According to Coenen, an abundance of dabs indicated a forthcoming poor plaice year. By March, plaice would gradually approach the coast, sometimes in such immense quantities that the three-month intensive fishing season only scarcely impacted their numbers (f. 138-139).

2.1.2.1 HERRINGS (CLUPEIDAE)

The Atlantic herring (*Clupea harengus*; Figure 2.1.2i), is widely consumed in the northern Low Countries and is recognized as a globally abundant fish species. These fish are found in large shoals, sometimes numbering in the millions, and occupy the upper water layers to a depth of approximately 200 meters. Herring typically reaches a length of approximately 45 centimetres and can attain a maximum lifespan of 22 years. Herring primarily feeds on animal plankton, clams, and fish spawn. They exhibit a high degree of adaptability to low salt levels and

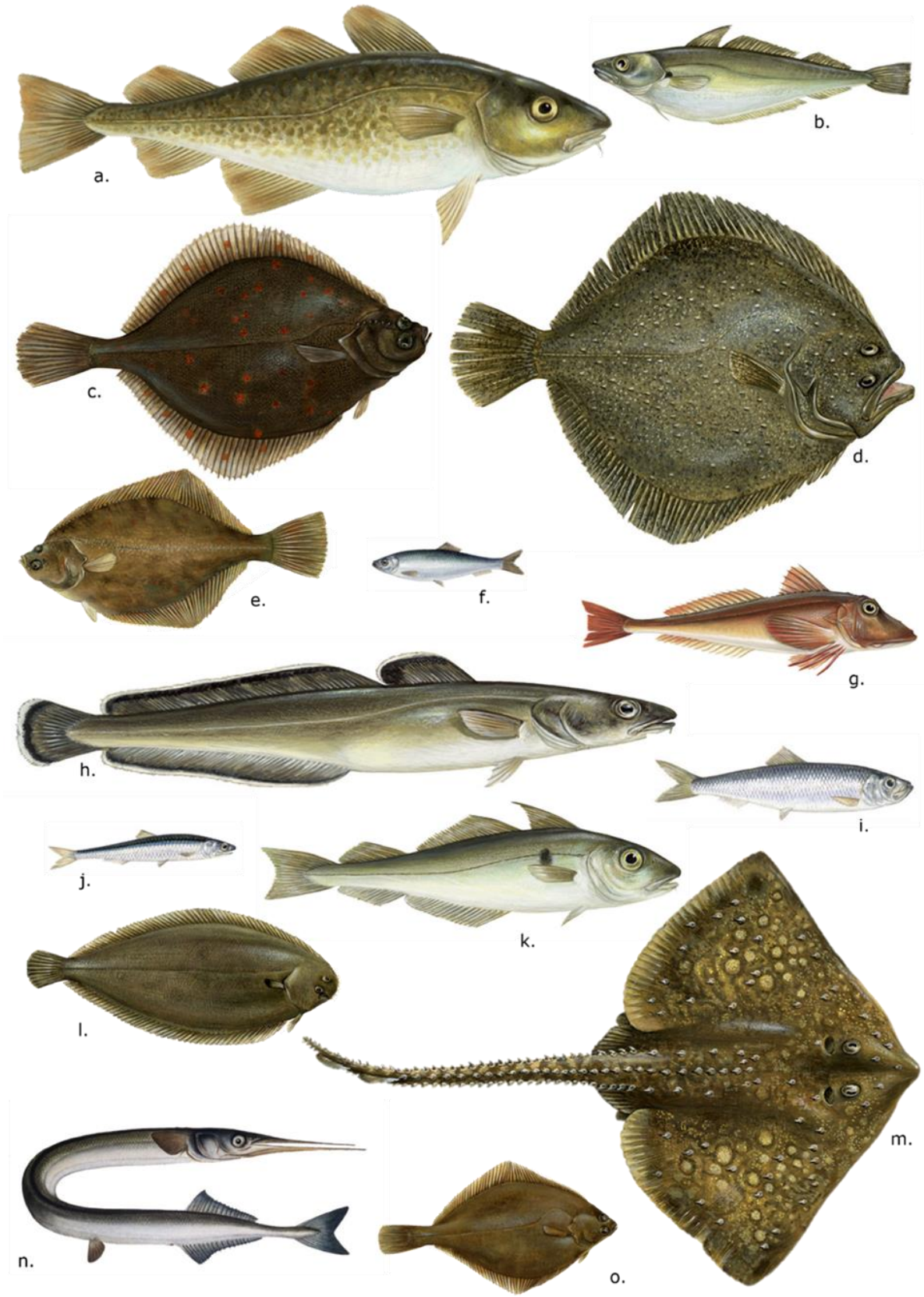


Figure 2.1.2: Marine fishes: (a) Atlantic cod, (b) whiting, (c) European plaice, (d) turbot, (e) European flounder, (f) European sprat, (g) tub gurnard, (h) common ling, (i) Atlantic herring, (j) European anchovy, (k) haddock, (l) common sole, (m) thornback ray, (n) garfish, (o) common dab, images after goodfish.nl.

have the ability to flourish in brackish water environments (Brevé, 2007, p. 5).

Another variety of herring, the European sprat (*Sprattus sprattus*; Figure 2.1.2f), is less commonly found in archaeological context. It generally measures around ten centimetres in length. As a shoaling fish, the European sprat inhabits depths up to 150 meters. This species exhibits migration patterns, moving between its winter-feeding grounds and summer breeding grounds, and engages in vertical migrations, ascending to near the surface at night to feed (Helmus *et al.*, 2004, p. 201). The European sprat can be differentiated from herring by its serrated keel in front of the anal fin, as well as the positioning of its belly fin relative to its dorsal fin.

2.1.2.2 CODFISHES (GADIDAE)

Codfishes are characterized by the presence of three dorsal fins on the back and two anal fins on the bottom. Many species within this group possess barbels on their chins, which are used to locate food while foraging on the sea floor. As carnivores, gadids primarily consume smaller fish and crustaceans as part of their diet. They exhibit high reproductive rates, with the ability to produce several million eggs per spawning event. This high level of productivity contributes to the abundant population numbers of these fish (Muus, 1964, p. 96). Three species that are most commonly found in the DFB-database include the Atlantic cod (*Gadus morhua*; Figure 2.1.2a), which is the most frequently caught species, the haddock (*Melanogrammus aeglefinus*; Figure 2.1.2k), and the whiting *(Merlangius merlangus*; Figure 2.1.2b).

These members of the cod family primarily reside near the coast, but they can also be found in open sea. The whiting remains close to the coast throughout its life, while cod and haddock tend to reside further out towards open sea. (Muus, 1964, p. 98). The Atlantic cod can reach lengths up to 150 centimetres, haddock, and whiting reach an average length of respectively 50 and 35 centimetres. But the largest species in the Gadidae family is the common ling, *Molva molva* (Figure 2.1.2h). The Common Ling is a species capable of reaching a maximum length of 200 centimetres. This primarily solitary species is typically found inhabiting the rocky crevices, sunken wrecks, and other structures located in deep waters. However, it is not uncommon to observe individuals freely swimming in deep open

waters. In contrast, Atlantic cod, haddock, and whiting are known to exhibit shoaling behaviour and are generally found in large, size-structured groups.

2.1.2.3 RIGHTEYE FLOUNDERS (PLEURONECTIDAE)

The Pleuronectidae or commonly referred to as righteye flounders, are an order of demersal fish that live on or near the seabed, often partially burrowed beneath the sand. Righteye flounder are well adapted to living on the seafloor and are perfectly camouflaged to blend in with their surroundings. Many species of righteye flounder primarily feed on invertebrates living on the seafloor, such as bristle worms and crustaceans. In their early developmental stages, righteye flounder start out as morphological 'normal' fishes, but after six weeks, their eyes migrate to one side and their body is strongly flattened vertically (Muus, 1966, p. 172).

In archaeological contexts three species of righteye flounder are frequently found: European plaice (*Pleuronectes platessa*; Figure 2.1.2c), European flounder (*Platichthys flesus;* Figure 2.1.2e), and the common dab (*Limanda limanda*; Figure 2.1.2o). The most commonly found righteye flounder in archaeological contexts is the European plaice, which is distinguished by its orange spots. It is followed in numbers by the European flounder. Although this fish occasionally migrates far up rivers in the summer, it spawns in saltwater and is actually a catadromous migratory fish instead of a marine fish. However, both the plaice and flounder spawn simultaneously and in the same area, which makes it difficult to differentiate between the two species archaeologically as hybrids are often found (Muus, 1966, p. 188). The plaice grows to a larger size than the flounder, reaching up to 90 and 60 centimetres respectively. Length is therefore used to differentiate between the two species archaeologically (Beerenhout, 2016, p. 491). The dab is the smallest of the three righteye flounder and can reach a maximum length of 40 centimetres, although most individuals do not exceed 20 centimetres in length.

2.1.2.4 OTHER MARINE FISHES

Other marine fishes that are often encountered in assemblages in the dataset are: common sole (*Solea solea*; Figure 2.1.2l), turbot (*Scophthalmus maximus;* Figure 2.1.2d), thornback ray (*Raja clavata*; Figure 2.1.2m), tub gurnard (*Chelidonichthys* lucerne; Figure 2.1.2g), European anchovy (*Engraulis* encrasicolus; Figure 2.1.2j) and the garfish (*Belone belone;* Figure 2.1.2n).

The common sole (Soleidae) and turbot (Scophthalmidae) are two distinct species of righteye flounder belonging to separate families. However, they share several morphological and behavioural similarities with other righteye flounders belonging to the Pleuronectidae family. The turbot, on average, reaches a relatively large size, with a maximum recorded length of one meter (Muus, 1966, p. 174). Meanwhile, the common sole can attain a maximum length of 70 centimetres. A fish that can be compared to the righteye flounder in terms of behaviour is the thornback ray (Rajidae), which is also a demersal predatory fish. These rays usually lie on the seafloor, waiting for passing prey, and are nearly invisible due to their camouflage. Thornback rays are cartilaginous fish, which limits the number of remains that are found archaeologically. They can reach a size of over one meter in length and are characterized by numerous thorny spines covering their back and tail.

The tub gurnard (Triglidae) is another demersal fish that typically grows to a length of 30 centimetres. These fish forage on the seafloor, searching for small fish and crustaceans, and use their pectoral fins as 'legs' to walk. In addition, pelagic behaviour, where the fish swim around in open water, is also commonly observed (Helmus *et al.*, 2004, p. 201). Gurnards are known to produce characteristic low, rumbling sounds by contracting their swim bladder.

The European anchovy (Engraulidae) is an important species that supports many predator populations in marine ecosystems. Anchovy is a pelagic fish that is commonly found in large shoals near the coast, although it is also able to thrive in brackish waters. The anchovy primarily feeds on plankton, molluscs, and small crustaceans and normally reaches a length of fourteen centimetres (Muus, 1966, p. 70).

The garfish (Belonidae) is a pelagic shoaling fish that typically resides near the surface of the water. Its notable feature are its green-coloured bones. As a diurnal predator, it hunts for small fish and crustaceans by sight during the day. It has a long, slender body, distinctive long jaws, and can reach a length of up to 90 cm. The species is typically found along the coast of the Low Countries during the spawning season between April and May. However, the flesh of the garfish is

relatively dry and therefore most sought after in the fall when it is at its fattest, requiring the fish to be caught further offshore (Muus, 1966, p. 88).

2.1.3 MIGRATORY FISHES

Regarding migratory fishes, Coenen states the following about the salmon: if a fisherman once caught some salmon, it was considered almost as good as a fattened pig, and it was valued equally as a sturgeon (f. 43-44). Salmon was primarily caught by sea fishermen, and the winter salmon was caught off the coast in January. The summer salmon was caught from June onwards until autumn. Both fishing seasons benefited from strong southwest winds. Salmon nets were highly valuable because they needed to be stronger than those used for plaice, haddock, or cod. The most desirable salmon was found in the rivers, where they became exceptionally fat and delicious (Egmond, 2005, p. 89). Significant amounts of salmon were caught, particularly in Kampen and Deventer. In Den Briel and Maassluis, barriers were placed in the water to guide the salmon towards traps, while heavy drifting nets were used in the Maas River near Rotterdam. Subsequently, salmon was traded from these cities to areas with high demand.

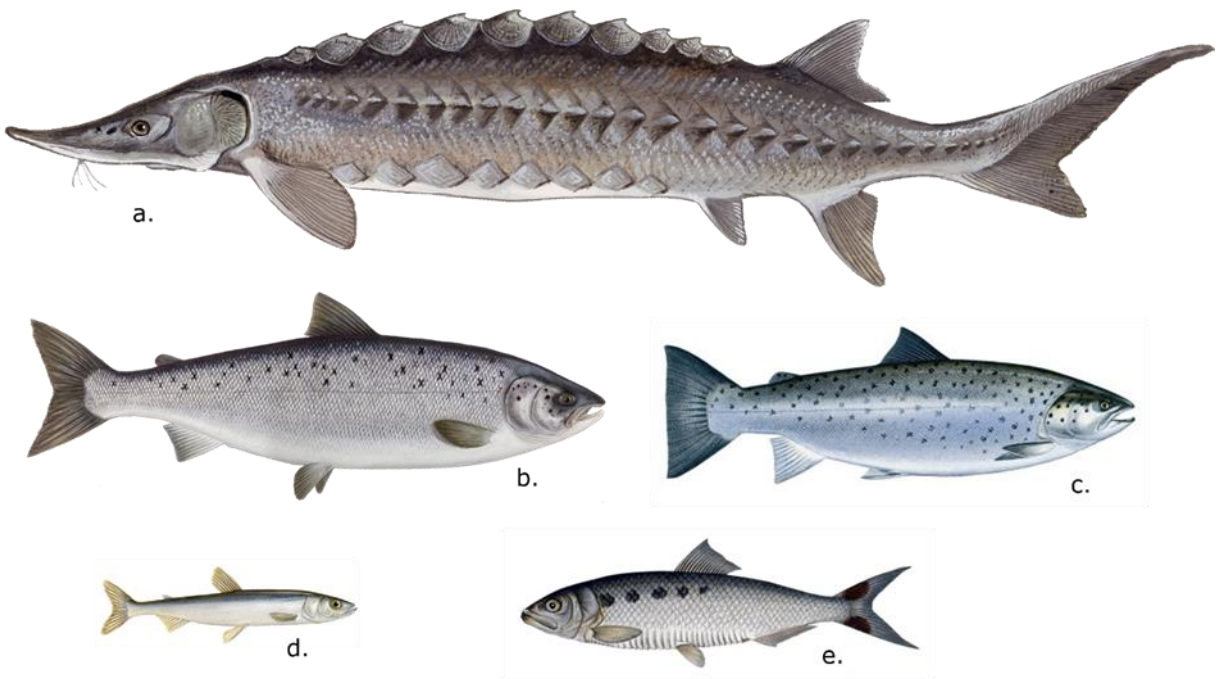


Figure 2.1.3: Migratory fishes: (a) Atlantic sturgeon, (b) Atlantic salmon, (c) brown trout, (d) European smelt, (e) twait shad, images after goodfish.nl.

2.1.3.1 STURGEONS (ACIPENSERIDAE)

The European sturgeon (*Acipenser sturio*; Figure 2.1.3a) is one of the largest anadromous migratory fish in Europe and can grow up to more than two meters in length in the wild, with exceptional cases reaching over six meters. Adult sturgeons living in the sea feed on bottom-dwelling fish, in addition to crustaceans, worms, and molluscs such as snails and bivalves. From April to May, the sturgeons ascend the rivers to spawn, during this process, some individuals migrate far upstream, while others remain closer to the sea. Caviar is a well-known by-product obtained from mature female sturgeons (Muus, 1966, p. 62).

The European sturgeon can be easily distinguished from other fish by the five rows of bony plates on its body and the absence of scales on its skin. However, compared to some other sturgeon species, it can be difficult to recognize. The Atlantic sturgeon (*Acipenser oxyrinchus*) can only be differentiated from the European sturgeon through DNA analysis. Hybridization can also occur, in which different sturgeon species mate and intermediate characteristics arise. In such cases, it can be challenging to determine the species of the animal archaeologically (Thieren *et al.*, 2016, p. 1958).

2.1.3.2 RIVER HERRINGS (CLUPEIDAE)

The twait shad (*Alosa fallax*; Figure 2.1.3e) is an anadromous fish belonging to the herring family and can grow up to sixty centimetres in length. It closely resembles the allis shad (*Alosa alosa*) and can also hybridize with it (Coscia *et al.*, 210, p. 1137). Due to the spots on their flanks and their size, they are also known as the 'dotted giant herring.' Another common name for them is the 'May fish' because they are caught in the tidal zone of large rivers during the spring. These fish mainly inhabit feeding grounds in the sea and migrate to their spawning grounds upriver between April and June (Muus, 1966, p. 72).

2.1.3.2 SMELTS (OSMERIDAE)

The Europea smelt (*Osmerus eperlanus;* Figure 2.1.3d) is an anadromous fish that typically grows to a length of around 20 centimetres. This fish is commonly referred to as the 'cucumber fish' due to the cucumber-like scent it emits (Van Emmerik & de Nie, 2006, p. 211). The smelt is found in both freshwater and saltwater and forms large pelagic shoals. During the spawning season, which occurs in April and

May, the smelt migrates up rivers in shoals. Given that the smelt requires similar environmental conditions as other anadromous species, it serves as a useful indicator of suitable conditions for species such as salmon, shad, and sea trout. The smelt is utilized in a variety of ways, including as bait in fishing, livestock feed, in the production of liver oil, and as a consumption fish (Muus, 1966, p. 80).

2.1.3.4 SALMONIDS (SALMONIDAE)

The Salmonidae family, or salmonids, is archaeologically represented by a number of anadromous migratory fish species including the Atlantic salmon (*Salmo salar*; Figure 2.1.3b), and the brown trout (*Salmo trutta*; Figure 2.1.3c). Salmonids are predatory fish and typically feed on crustaceans and smaller fish.

The Atlantic salmon is a fish that can reach a length of about 1.5 meters. They are known to roam the enormous distance between north America and Europe while at sea. Adult salmon migrate to the coast in May with significant built-up fat reserves. From June to November, they migrate up large rivers to spawn, during which they do not eat and rely on the fat reserves accumulated. Males undergo typical morphological changes during this time, including the development of the characteristic hooked lower jaw. After spawning, a large proportion of the salmon die from malnutrition, while some return to the sea after hibernating in deep fresh waters (Muus, 1966, p. 74-76; Van Emmerik & de Nie, 2006, p. 58).

The brown trout can be hard to distinguish from the salmon morphologically. It has a slightly plumper body shape and a higher tail base. These fish typically reach a length of approximately one meter. Although the spawning behaviour of brown trout is similar to that of salmon, they undertake less extensive migrations at sea and remain in coastal waters. They also feed themselves in fresh waters during spawning. In fact, some trout species, such as the river trout (*Salmo trutta fario*), permanently reside in their freshwater habitats (Muus, 1966, p. 78).

2.2 ZONATION

The longitudinal zonation patterns of fish species in large rivers and seas were first classified in the 19th century. A rough overview on the ecology and dominant fish species, in both the fresh and brackish waters of the rivers and streams and the salt waters of the seas, in and near the northern Low Countries, will be presented here. The overview of freshwater species is based on the studies of Aarts and Nienhuis (2003, p. 157) and Van Neer and Ervynck (1993, p. 33), while the zonation of sea waters is partly based on the research of Wheeler and Jones (2009, p. 36). The rivers and natural waters of the northern Low Countries are divided into five zones, named after the dominant species in each zone: the trout, grayling, barbel, bream, and smelt zones. The adjacent North Sea is divided into three zones: the littoral zone, inshore zone, and the offshore zone. Particular emphasis will be placed on the *Aelmere/Zuyderzee*, a significant inland lake that underwent a transformation from a freshwater lake to an inner sea during the medieval period.

The classical zonation of rivers is based on natural rivers and is, nowadays, severely affected by anthropogenic alterations such as dams and sluices. It is therefore important to acknowledge the historical impact of water management in the northern Low Countries on the occurrence of fish species. All fish species in the barbel and bream zone, for example, are nowadays intertwined and alike (Aarts & Nienhuis 2003, p. 161). Additionally, the fish species associated with the presented zonation are based on adult stationary fishes and are therefore not absolute. The spawning and nursery behaviours of all fishes that cause movement out of the described zonation must also be considered. Furthermore, large fully-grown fishes move and feed differently than small juvenile fishes from the same species and can therefore be caught in different zones.

2.2.1 FRESHWATER ZONATION

Both the trout and grayling zones are characterized by clear, cold, and fast flowing waters. The streams are narrow and shallow, and the subsoil consists of gravel, sand and sometimes silt. The streams of the grayling zone are deeper and wider than the trout zone. In the northern Low Countries only the river Geul in Limburg contains these zones. The barbel zone consists of wide, deep, and often clear waters flowing through a landscape of sloping hills. The water is higher in nutrients

than the trout and grayling zones and the bottom consists of gravel. In the northern Low Countries only the upper part of the river Meuse belongs to this zone. Other typical fishes in this zone are the common chub and the burbot, or freshwater cod.

The bream zone comprises of slow flowing or stagnant waters and is characteristic for the low-land rivers of the northern Low Countries and the isolated waterbodies in the floodplains. The water can both be clear or slightly murky and is moderately rich in nutrients. The fish communities in these waters are historically very rich in species. The many artificial channels, ponds and lakes can be assigned to this zone as well, although the particular fish species living here, have specific preferences in water type. Perch and roach prefer low nutrient, clear waters with less vegetation. The common rudd and pike thrive in clear and moderately nutrient-rich waters with lots of vegetation, such as ditches and ponds. Bream, the most abundant species in this zone, prefers murky waters with less vegetation, for example, channels and lakes (Zoetemeyer & Lucas, 2007, p. 38)

The smelt zone can be found in the brackish waters of the river delta and can be divided into two zones: the ruffe or upper brackish water zone, and the flounder or lower brackish water zone. The ruffe zone is a very nutrient high but dynamic part of the river, where the water alternates in salinity. Migratory fishes that are adapted to these kinds of circumstances therefore thrive in this zone. The flounder zone can be found in the estuaries and is characterized by deep channels and sand banks that are affected by the tide of the sea. Anadromous migratory fish such as the smelt and twaite shad both have their spawning grounds in this zone.

2.2.2 SEA ZONATION

The littoral zone is characterized by changing water levels between high and low tides. This area is above water level at low tide and submerged during high tide, but it also includes continuously submerged parts of the coast at wading depth. The coastal area of the northern Low Countries and parts of the Wadden sea can both be considered as a littoral zone. Righteye flounders such as plaice, and codfishes such as whiting, typically reside in this area.

The inshore zone comprises of the shallow waters beyond the littoral zone. Inshore fishes in the North and Wadden Sea include codfishes, such as haddock and cod, righteye flounders such as turbot and common dab, but also small sharks (Triakidae) and skates (Rajidae) can be caught in these waters. A distinct type of herring can also be caught in the inshore waters, these are smaller and lower in fat than herring caught in deeper waters (Brevé, 2007, p. 30). The offshore zone includes the deeper waters of the North Sea and beyond. Typical fishes of this zone are large shoals of herrings and pilchards (Clupeidae), common ling and Atlantic halibut.

2.2.3 THE AELMERE/ZUYDERZEE

Before the late medieval period the *Aelmere*, formerly described as the *Flevomeer* was a large freshwater lake in the central part of the northern Low Countries. The ecology and corresponding fish species of this lake would likely adhere to the freshwater zonation, making them comparable to the bream and smelt zones. There is no exact moment the freshwater lake turned into a habitat for sea fishes as it was most likely an ongoing process from the twelfth century onwards (Schaap, 1982, p. 8; Vos, 2018, p. 74). The inner sea that formed after the twelfth century was called the *Zuyderzee*.

The first historical reports of saltwater fishes in the Zuyderzee are discussed by Ypma. The *Zuyderzeeharing* or *panharing,* is first mentioned in the second half of the twelfth century by the abbey of Werden in the Rurh area who collected herring as levy, this herring was caught at the southern bank of the *Zuyderzee* basin (Ypma, 1962, p. 15). In the same period the export of herring is already visible from cities near the *Zuyderrzee* to the cities of Cologne and Koblenz and merchants from Utrecht and Deventer paid their levies in herring and eel. It is important to note that the most important catch of the *Zuyderzee* fisheries in later centuries remained herring, but also eel, anchovies, flounder and smelt. Salmon and sturgeon were certainly caught in these waters as well (Beerenhout 2011a, p. 63-64). According to these sources, the category of fishes that can be caught in this inner sea can be assigned to the salt waters of the littoral and inshore zones (with an absence of codfishes), and to the brackish waters of the smelt zone.

2.3 PREDICTING FISH SPECIES DISTRIBUTION

The ecology of Dutch waters and the fish species they contain offer insights into the probable distribution of fish species in different contexts within the DFB database. Various fish species serve as indicators of fishing locations and methods. For example, carp and tench thrive in man-made fishing ponds, while eels rely on migration patterns for capture. Predatory pike are not commonly caught in large quantities, unlike the more common perch due to their smaller size and wider range.

The distribution of migrating fish, such as salmon and smelt, is also significant. As their habitat range expands with the creation of the Zuyderzee, it is expected that their catch will correspondingly increase. Human interventions, such as dams and sluices, can disrupt zones and negatively impact migratory fish like eels. The impact of such interventions on fish populations is complex, affecting movement, water quality, and breeding patterns. This highlights the intricate relationship between human activities, the aquatic environment, and the distribution of fish species. Sea fish species also exhibit distribution patterns. Coastal regions with limited fishing tend to have more common littoral and inshore species like righteye flounders. Herring, which form large schools in offshore zones, are caught in significant quantities but require more time and energy to capture. The intensity of fishing practices is particularly important for species like herring and cod. In archaeological contexts, the presence of herring, cod, and righteye flounder does not necessarily indicate deep-sea fishing. These fish can be caught both from the coast and offshore, so it is crucial to assess their numbers to determine their significance. A small number of fish remains may indicate local catch, while a higher quantity suggests offshore fishing.

In summary, the ecology and zonation of waters in the northern Low Countries provide a foundation for understanding and predicting the distribution of fish species. The significance of their catch is determined by the number of fish and the fishing practices employed. The next chapter will delve into the historical context that influenced the catch and trade of the described fishes.

CHAPTER 3: HISTORICAL BACKGROUND

In this chapter, the surface of the rich and complex historical background of the northern Low Countries is highlighted, focusing, at first, on the interplay between geography and demography that has shaped the region over the centuries. The unique landscape of the northern Low Countries, characterized by peat marshes, river deltas, and coastal areas, has undergone significant changes due to both human intervention and natural processes. These geographical transformations, in turn, have influenced the demographic shifts and the development of settlements, from the Roman era to the emergence of modern towns and cities. Moreover, the role of fish in society is examined, exploring how fish has been intertwined with the culture and traditions of the northern Low Countries. This part highlights the significance of fish in Christianity and the fish as a status symbol in the region. Additionally, the technological developments in fishing techniques that have transformed the industry over time are discussed. This part provides an overview of the evolution of fishing methods, from traditional techniques to early modern innovations.

3.1 GEOGRAPHICAL CHANGES

Around 100 CE, the coastal areas of the northern Low Countries were primarily composed of peat marshes located in a river delta (Figure 3.1.1). Prior to the arrival of the Romans, the inhabitants of these regions had already begun to drain the peaty areas through the use of trenches and canals. This drainage process caused the peat to subside gradually, making it easier for sea water to flood the hinterland. The trenches and canals that were constructed served as pathways for the sea to enter the area, ultimately leading to an event in the year 270 in which large parts of Zeeland were flooded, causing significant damage to the landscape, and rendering it uninhabitable (Vos, 2018, p. 64). Similar flooding also occurred in the regions of Noord-Holland, Friesland, and Groningen, resulting in the formation of salt marshes and mudflats.

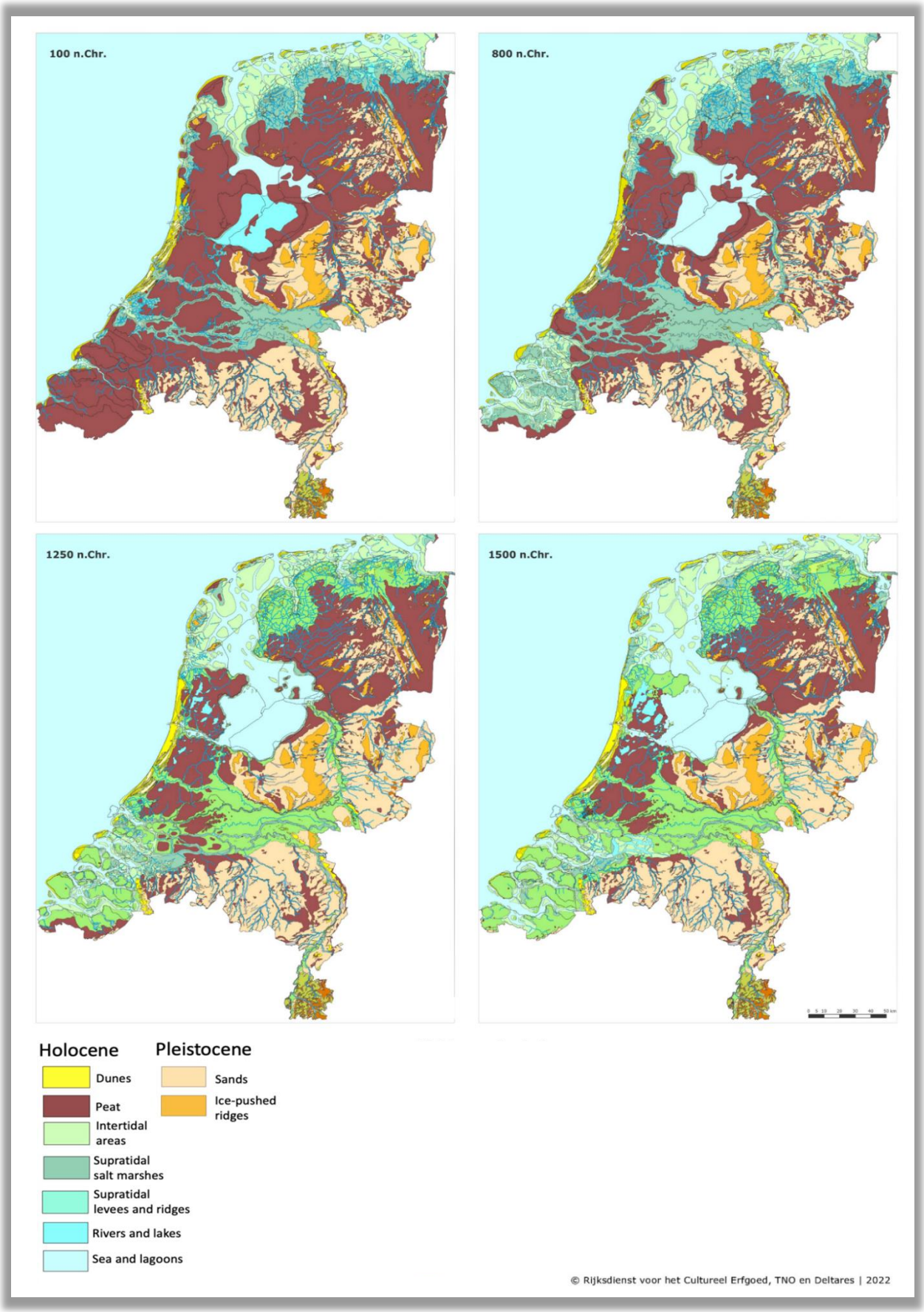


Figure 3.1.1: Paleogeographic maps of the Netherlands (100-1500 CE), image after Rijksdienst voor het Cultureel Erfgoed, TNO and Delatares 2022).

The interaction between tidal processes and an increased flow of sediment from the rivers led to the deposition of clay within the salt marshes, resulting in the partial habitability of the Meuse estuary and former salt marshes and mudflats in the regions of Groningen and Friesland after 250, as the higher elevations in these areas were considered suitable for habitation. Over time, an increasing number of salt marshes became suitable for habitation, and by the year 800, people began to settle in these areas. The population expansion and growing demand for food production in the Low Countries during the tenth century onwards led to an expansion of agriculture. To make way for farmlands, the peat marshes in the region were systematically drained once again. As the process of drainage progressed, it gradually came under the control of local authorities, resulting in the implementation of an organized allotment system.

However, the reclamation of peat marshes had unintended consequences. The landscape subsided as a result of the drainage, leaving it vulnerable to flooding, which happened frequently in the first millennium CE (Jansma, 2020, p. 18). The period between 1000-1200 saw a large-scale embankment of the rivers and coastal areas to protect the areas to flooding. To protect the land from incoming water, dikes and dams were constructed. This practice expanded throughout the entire Low Countries during the twelfth and thirteenth century with large-scale construction works being undertaken to manage the water from both the large rivers and the sea, including the damming of the Rhine in the central Netherlands near Wijk bij Duurstede in 1122 (Jansma, 2020, p. 17). While these structures helped to keep the water at bay, the former peat marshes continued to be susceptible to flooding due to their low-lying nature. Additionally, the embankment of certain areas had a harmful effect on the process of sedimentation. For example, the *Middelzee*, a large estuary in Frisia, quickly clogged up after dikes were constructed to control the water flow (Vos, 2018, p. 66).

In the inland regions of the northern Low Countries, several rivers underwent significant changes in their course by 800. One notable example of this is the formation of the IJssel river, which flowed directly into the *Aelmere*, a large lake located in the central region of the northern Low Countries. The *Aelmere* was surrounded by peat marshes and, due to a process called *waterwolf*, the lake's size was significantly expanded by eroding its soft peat shores (Vos, 2018, p. 70). The occurrence of large floods, such as the All-Saints' flood in 1170, further contributed

to the salinification of the lake through the expansion of tidal inlets. Over time, the increasing salinity of the lake and the open connection to the sea led to it being referred to as the *Zuyderzee* (Figure 3.1.2), or 'southern sea', during the twelfth and thirteenth century (Schaap, 1982, p. 8; Vos, 2018, p. 74).

Figure 3.1.2: The Zuyderzee as depicted in Adriaen Coenen's 'Visboock' (1577-1579), folio 194. Collected from the KB catalogue (Koninklijke Bibliotheek).

Between 1250 and 1500 the river delta and coastal area was almost completely surrounded by dikes. Water channels and pound locks redirected the excess water. When the hinterland subsided to a point where it was no longer possible to redirect the water trough ditches and canals, different types of mills were used to drain the water. This caused the landscape behind the dikes to drop further and further. During storms or an increased waterflow from the rivers, the embankments endured high water levels almost to a point where they almost overflowed. Great floods such as the Saint-Elizabeth's flood in 1421 and the Saint-Felix's flood in 1530 caused dike breaches and consequently, submerged significant portions of the landscape (Vos, 2018, p. 78).

3.2 DEMOGRAPHIC CHANGES

The northern Low Countries came under Roman influence in the first century CE. This period saw an increase in population and a vast expansion of settlements. The first major cities in the Low Countries were Noviomagnus and Forum Hadriani, but the majority of the population still lived and worked in rural areas (Vos, 2018, p. 67). The growing complexity and size of the population led to a more extensive and diverse supply and demand of produce. To meet this demand and support the growing population, the Romans invested heavily in infrastructure, including the construction of roads, harbours, and canals. Additionally, they created dikes and dams to control the large amounts of water that characterized the landscape of the Meuse and Rhine River delta. However, in the third century, the Roman influence in the region began to decline. The high population growth and settlement expansion that had been seen in the preceding years gradually collapsed in the following two centuries. Some regions were completely abandoned, and urban areas diminished significantly (Vos, 2018, p. 71). The decline of Roman influence also had a significant impact on the economy and society of the region. The infrastructure and systems that had been built by the Romans fell into disrepair, and trade and agriculture were greatly affected. The decline of Roman influence also led to a shift in power dynamics and the rise of new political entities in the region.

The fifth and sixth centuries saw a resurgence in the establishment of settlements in the region and in the latter half of the eighth century, pre-urban areas like Deventer, Maastricht, Nijmegen, and Utrecht started to develop (Vos, 2018, p. 71). Among the pre-urban regions, the town of Dorestad (Figure 3.2.1) stood out as one of the foremost settlements during this era. Dorestad gained prominence as a vital trade hub in North-West Europe, playing a fundamental role in the exchange of various goods, including raw materials, commodities, and food. This included not only local freshwater fish but also imported sea fish (Vos, 2018, p. 71). The settlement was situated between two important rivers, the Rhine and Lek. These waterways connected the region from Scandinavia and the British Isles to the German Rhine valley, which led to a wealth of trade commodities travelling through the northern Low Countries (Vos, 2018, p. 71).

Figure 3.2.1: the town of Dorestad, image by Jean-Claude Golvin, collected from jeanclaudegolvin.com.

During the early medieval period several significant socio-political transformations occurred in the northern Low Countries. Christianity gradually assumed a central role in the population, with the church and ruling elites working to divide and organize the landscape to suit their needs. As a result, the rise of town centers and the establishment of extensive agricultural hubs centered around main courts became evident. In the eleventh century, the nobility began granting city rights, contributing to the growth and development of urban areas (Van Oosten *et al.*, 2021, p. 146). However, the majority of rural areas were still characterized by small hamlets and isolated farms that were constantly moving around in the landscape (Vos, 2018, p. 75).

This began to change in the thirteenth century, as villages started to appear under local control and the number of towns increased rapidly. These settlements were generally centered around a church and people began to settle in one place. Alongside the main rivers, urban centres such as Deventer, Tiel, and Medemblik developed into commercial towns in the twelfth century (Vos, 2018, p. 75). In addition, major towns in coastal and inland areas, such as Haarlem, 's Hertogenbosch, and Dordrecht formed in the thirteenth century, as well as settlements that were created around important dams, such as Amsterdam and Rotterdam. This period also saw the local nobility ordering the construction of numerous castles to ensure their hold on the counties. The development of these settlements and the growth of urbanization not only transformed the landscape

but also had a significant impact on the economic and social structure of the northern Low Countries (Vos, 2018, p. 75). One key aspect of the increased urbanization and coherent market development was the rise of the *Hanzesteden*, a network of trading cities in the Baltic and North Sea regions. These cities, which included major urban centres in the northern Low Countries such as Deventer, Zwolle, and Nijmegen, facilitated the exchange of goods, including fish, between different regions as early as the first half of the fourteenth century (Weststrate, 2000, p. 27).

The creation of towns and villages, as well as the growth of commercial centres and urban areas, had a significant impact on trade and business. During the fourteenth and fifteenth centuries, urbanization accelerated, leading to a higher demand for food and raw materials. As a result, trade expanded, and goods started to be sourced from farther away places (Van Oosten *et al.*, 2021, p. 146). The towns' independent administration and self-governance allowed them to keep growing steadily. And by the beginning of the fifteenth century the greater part of the population lived and worked in urban areas and the vast majority of the present towns and villages already existed (Clark, 2013, p. 555; Clark, 2009, p. 35).

The period from 1500 to 1800, known as the Early Modern period, witnessed significant changes in the northern Low Countries. Exploration and the establishment of global trade networks contributed to the region's prosperity and development. The Eighty Years' War (1568-1648) led to the independence of the Dutch Republic from the Spanish Empire. During the 17th century, the Dutch Republic emerged as a major economic and maritime power. The Dutch East India Company (VOC) and the West India Company (WIC), chartered by the Dutch Republic, established extensive trade networks worldwide, leading to tremendous economic growth in the region (Israel, 1995, p. 45).

However, subsequent conflicts with England and France had significant impacts on the economy and society of the region (Israel, 1995, p. 67). Following *Rampjaar* (Disaster Year*)* 1672, the subsequent Franco-Dutch War, and the French occupation, the region experienced a period of economic decline and rising political instability. Additionally, several floods with dike breaches further aggravated the hardships faced by the Dutch in the late seventeenth century (Figure 3.2.2). Throughout the 18th century, the region faced additional economic challenges due to wars with Great Britain and France, resulting in a financial crisis. These

circumstances had a lasting impact, and by 1815, the economy had undergone a process of deindustrialization and deurbanization, leaving the region with significant economic struggles and a diminished industrial and urban presence (De Vries and Van der Woude, 1997, p. 686).

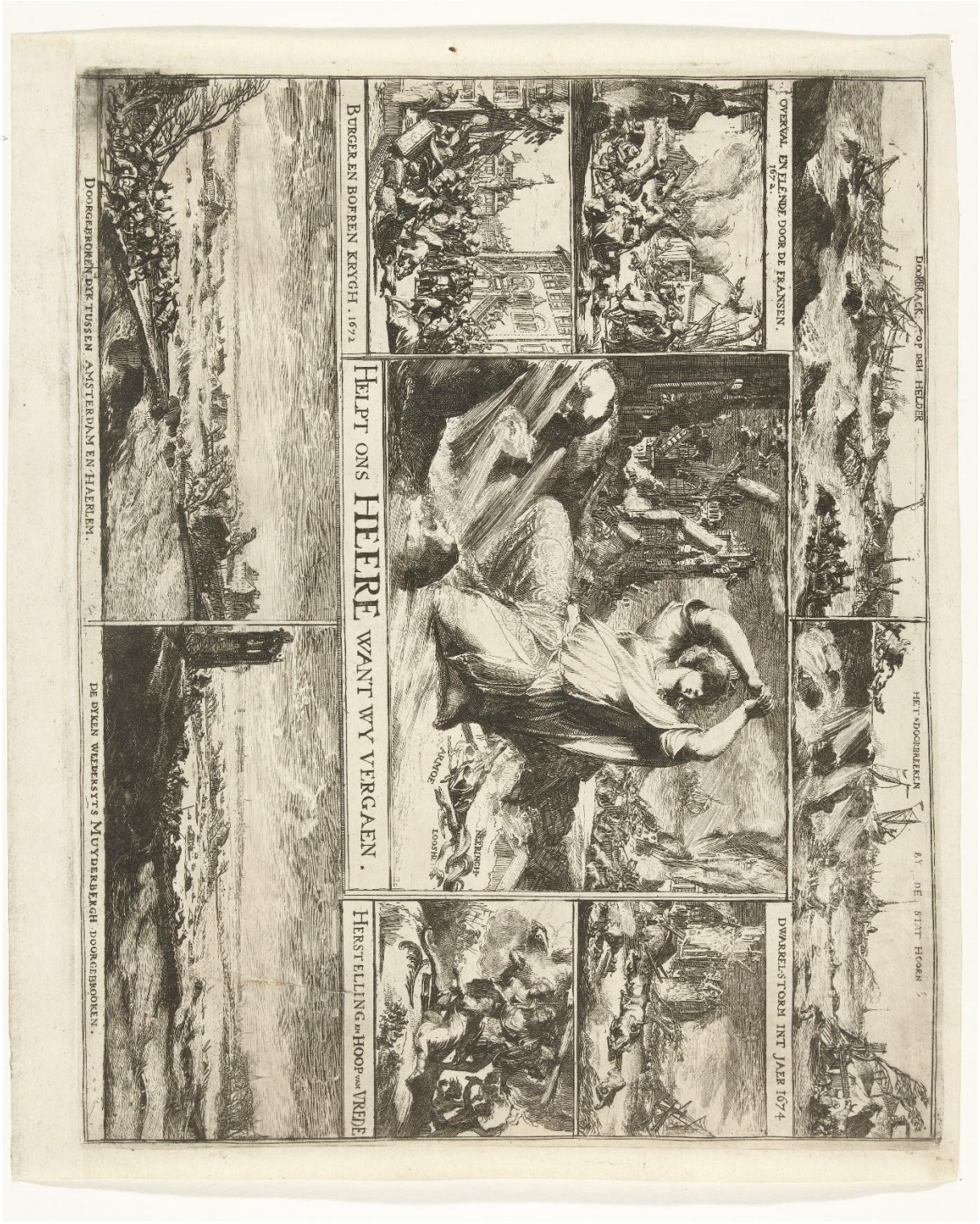


Figure 3.2.2: 'Help us, Lord, for we are perishing' The struggles and disasters in the seventeenth century Dutch Republic, image by Romeyn de Hooghe (1675), collected from Rijksmuseum Amsterdam.

3.3 THE ROLE OF FISH IN SOCIETY

3.3.1 CHRISTIANITY

In the early Christian tradition of the medieval Low Countries, simplicity was highly valued and an important aspect of religious life. This was reflected in the requirement for 140 days of fasting each year, during which only specific types of food, such as fish and shellfish, were permitted to be consumed (Hoffmann, 2001, p. 141). Meat from warm-blooded animals, for instance beef, pork, and poultry, was seen as a symbol of wealth and abundance and was therefore prohibited during fasting periods. From the seventh century onwards, the Latin Church allowed the consumption of fish as a substitute for meat, leading to consistent weekly and substantial seasonal fish consumption among those who could afford it (Hoffmann, 2001, p. 141).

Fish played a significant role in the Christian fasting tradition, embodying two key symbolic meanings. Firstly, the depiction of Jesus as a fisherman in the Bible and his ability to 'catch' his followers in some stories, associated fish with spiritual significance. Secondly, the consumption of fish, being cold-blooded and having less fat than meat from warm-blooded animals, was seen as a symbol of reflection and self-restraint (Cremers, 2014, p. 37). This symbolic significance made fish a crucial part of the fasting tradition, serving as a means of cultivating spiritual and moral discipline through dietary practices. Due to the many fasting days in the Christian calendar, fish became a significant source of protein in the Middle Ages (Cremers, 2014, p. 37). The emphasis on fish in the fasting tradition was not just about nourishment, but also about symbolism and the pursuit of spiritual and moral ideals. -

3.3.2 FISH AS A STATUS SYMBOL

In the study of social history, food and its consumption often serve as a marker of status and wealth. Fish was no exception, with the availability, rarity, preparation, location, and age and size of the fish all playing a role in determining its perceived value and prestige. Obtaining fishing rights was a matter of prestige, and local lords would grant these rights to people they considered important. Later, these rights could be purchased by anyone (Kerklaan, 2012, p. 14). Fresh fish was not always easily accessible, so fishponds were built to cultivate prestigious species such as carp. The fishponds were regarded as a status symbol as well, due to vast

amount of work and care that went into their construction and maintenance (Currie, 1990, p. 42; Cremers, 2014, p. 37). In high-status households, large cyprinids and pike were considered prestigious fish (Figure 3.3.1), which could be cultivated in these managed fishponds. Additionally, wild sturgeon and exceptional large fishes such as cod and salmon, were also regarded as an indicator of wealth and social standing (Maccarinelli, 2021, p. 15; Van Dam 2003, p. 486-488). The rarity of certain fish species would also impact their prestige, with artificial scarcity sometimes being created by the nobility to claim the rights to certain fish in an area (Kerklaan, 2012, p. 14).

Freshwater and saltwater fish availability varied depending on the location. Fresh fish, which could be supplied alive, was highly valued and more expensive compared to preserved fish (Kerklaan, 2012, p. 13). During spring, freshly caught fish was abundant, while preserved fish such as salted herring and dried eel were consumed more frequently after June (Van Dam, 2003, p. 479). Haddock and cod were esteemed sea fish species known for their taste and quality. Haddock, in particular, was accessible to the common people and transported in significant quantities to inland cities. Sole was considered a luxury fish, while plaice was commonly consumed by the general population (Unger, 1916, p. 143; Egmond, 1997, p. 113). Food preparation methods also reflected social status. Dishes with challenging bone structures, like cyprinids, were served as side dishes to impress guests. Preserved sea fish, such as smoked herring, was affordable for the poor, while the rich could afford fresh sea fish. Inland areas faced greater difficulty in obtaining fresh sea fish (Kerklaan, 2012, p. 16). The age at which fish were slaughtered served as an indicator of social status. Fish growth rates and the slaughter age influenced their quality and taste. The size and butchering technique of fish were also significant factors. Elaborate party dishes often featured large, prestigious fish (Van Dam, 2003, p. 488).

The following general rules applied to the status of a fish: fresh fish was preferred over salted fish, larger fish were favoured over smaller fish, and rare fish species were deemed superior to more common ones (Weststrate, 2009, p. 14). The nobility and wealthy urban citizens undoubtedly consumed a wide variety of both fresh and preserved fish species. However, when they sought to make an impression or demonstrate their status, they opted for fish with greater prestige.

Figure 3.3.1: Still Life with fish, a candle, artichokes, crab and prawns, painting by Clara Peeters 1611, collected from Museo Nacional del Prado.

Figure 3.3.2: Still life of marine caught fish and shellfish on a table, by Isaac van Duynen (1628-1680), collected from Colonia-Art.

3.4 DEVELOPMENT IN FISHING TECHNIQUES

It is difficult to determine the development of fishing techniques prior to the widespread professional fishing industry. Historical sources focused on fishing techniques are scarce for the Low Countries, but it is possible to study these practices using archaeological evidence and the prior development of modern fishing techniques. During the early medieval period, two different forms of fishing were traditionally used: passive and active fishing methods (Muysson, 2021, p. 34). Active fishing methods include fishing with a spear or fork, hook and line fishing, and a fishing net. Passive fishing methods refer to techniques that involve setting a 'trap' for fish, which can be retrieved at a later time. Although it is probable that traditional fishing techniques were still widely employed during these periods, The later medieval and early modern periods experienced a notable upsurge in innovation and technological advancements in the realm of fishing techniques.

Figure 3.4.1: ''catching salmon with fishing spears'' image from Adriaen Coenen's 'Visboock' (1577-1579) folio 33. Collected from the KB catalogue (Koninklijke Bibliotheek).

Examples of traditional methods of actively catching fish are fishing spears, which were used to catch fish in shallow waters, with or without the help of a fishing weir. And another classic method involves fishing with a hook that is connected to a line and contains a form of bait to lure the fish. This method could be used from the shore, the coastline, or from a boat. A later development of this technique is longline fishing, where a series of several hundreds or thousands hooks containing bait are connected to a vessel. An example of this technique is the *beug*, which is used to catch codfishes (Van de Voort, 1975, p. 12).

Figure 3.4.2: 'using a cross net' image from Adriaen Coenen's 'Visboock' (1577-1579) folio 195. Collected from the KB catalogue (Koninklijke Bibliotheek).

The eel trap, or *aalkobbe*, a bell-shaped basket made of reeds, is the most commonly used passive fishing gear and has been employed since ancient times to catch eels (Asaert *et al.,* 1976, p. 289). Another fishing gear that shares similarities in both shape and function with the eel trap is the fyke, which is a funnel-shaped basket woven with twigs used to catch fish. Fish weirs are constructed from branches or nets that guide fish into the fyke from which they cannot escape. Fish weirs were also used to keep fish captive, allowing them to be caught using a scoop net or fishing spear during low tide (Asaert *et al.,* 1976, p. 289). And finally, the standing net, or *staand want*, is a long net that is deployed in the water. The net is equipped with floats at the top, allowing it to act as a sieve

in the river, with fish becoming entangled in the mesh as they try to swim through it.

More complex forms of active fishing use the construction of a net. The *zeeg* is a net that was used both on the coastal and inland waters, it is a simple oblong net that is pulled together in a bow to catch fish. The cross net was used to scoop up small schools of fish and the throwing net was cast with weights to catch fish. Around the year 1000, the floating net, or *vleet*, became a widespread active fishing method in coastal fishing, enabling the capture of pelagic fish such as herring. Prior to this time, it is likely that only trawl nets were used along the coast to catch demersal fishes living near the seabed (Figure 3.4.3), such as plaice and flounder (Van Neer and Ervynck, 2007, p. 4).

1Figure 3.4.3: 'fishing near the coast with nets and spears, image from Adriaen Coenen's 'Visboock' (1577-1579) folio 32. Collected from the KB catalogue (Koninklijke Bibliotheek).

3.4.1 'DE KLEINE VISCHERIJ'

An important development in the history of fishing is the emergence of specialized fishing vessels during the late medieval period. The first records of a dedicated fishing vessel date back to 1339, referred to as *waterschepen*. These vessels were designed to catch and transport live fish in a compartment within the ship (Vlierman, 2006, p. 154). In the early Middle Ages, evidence of transporting live fish was also found in Dorestad between 675-850 in the form of woven baskets. These baskets have been interpreted as fish containers used to transport fresh fish

to markets (Beerenhout, 2012, p. 547). It is reasonable to speculate that waterschepen (water boats) were used prior to their earliest documented references in history. Centuries of development within the marine fishing industry have resulted in a wide variety of fishing vessels and techniques. During the early modern period, the marine fishing industry underwent further specialization, leading to the emergence of two distinct sectors: the *Groote* and *Kleine Vischerij* or 'lesser' and 'greater' marine fishing sector.

The lesser marine fishing sector encompassed coastal and inshore fishing. Line fishing was used to catch fish species such as codfish and halibut (Figure 3.4.1.1). The process of deploying the lines and baiting the hooks, often numbering in the thousands, required a larger crew and vessel. This demand led to the creation of a specialized vessel named the *hoeker* (Asaert *et al.,* 1976, p. 289). Another type of ship was focused on catching righteye flounder and demersal fish using a trawl net or a standing net, such as the *pinck* or the later *bomschuit* which dates back to the 16th century (Egmond, 1997, p. 112). These ships were designed with a flat bottom, enabling them to navigate close to the coastline without the risk of running aground. Moreover, they had the advantage of being able to set sail directly from the coast without relying on large ports.

Figure 3.4.1.1: line fishing of cod and halibut and coastal fishing with nets in the North Sea near the coast, image from Adriaen Coenen's 'Visboock' (1577-1579) folio 130. Collected from the KB catalogue (Koninklijke Bibliotheek).

Due to the necessity for longer preservation, fish had to reach the urban market in a form that allowed for extended storage. This was presumably achieved using salted herring and dried plaice. But also, cod, a large, tasty fish, became an iconic preserved fish in medieval times, either salted or air dried as stockfish. Prior to consumption, the stockfish needed to be pounded with a hammer. This action broke down the tough fibres of the fish and left marks on the remaining bone

material (Ervynck and Van Neer, 2015, p. 31). After hammering, the stockfish was soaked in fresh water for one or more nights, with regular water changes. Finally, it was boiled and served as a meal. During the Late Middle Ages, a significant number of stockfish originated from Norway (Nedkvitne, 2016, p. 54). Massive quantities of cod were caught from the fishing villages of Northern Norway. These catches were then dried on racks during the early spring, exposed to the cold sun and salty wind. The Hanseatic League held exclusive trading rights for this lucrative business, which thrived from the late Middle Ages onward (Ervynck and Van Neer, 2015, p. 29). This trade was conducted by two distinct merchant groups: those from Amsterdam and the merchants from Hanseatic cities such as Kampen and Deventer in the Overijssel region. In fact, Deventer served as a staple market for stockfish in the 15th century (Wubs-Mrozewicz, 2008, p. 177-182).

3.4.2 'DE GROOTE VISCHERIJ'

Additionally, the greater marine fishing sector was dedicated to the catch and trade of herring. Specialized herring boats utilized floating nets and were already mentioned as early as 1326. (Asaert *et al.,* 1976, p. 289). The larger *haringbuizen* were developed from the 15th century onwards and were fully specialized in catching and preserving herring on board (Egmond, 1997, p. 111).

Figure 3.4.1.2: Catching herring by the vleet in the North Sea, image from Adriaen Coenen's 'Visboock' (1577-1579) folio 19. Collected from the KB catalogue (Koninklijke Bibliotheek).

The fish were captured using a massive drift net called, the floating net, or *vleet*, these nets, spanning over a kilometre in length, formed a curtain-like structure in the sea (Dorleijn, 2002, p. 271). The fishing boats would remain stationary, eagerly awaiting the moment when a school of herring would swim into the placed net (Figure 3.4.1.2) The large and deep *haringbuizen* were not suitable for departing from the beach, so they only set sail from cities with deep seaports. Consequently, the number of towns that fished for herring was restricted. Herring fishing was seasonal and governed by the initial herring law known as the *'Placaet ende Ordonnantie op het Stuk van de Haringvaert'* in 1519. This law remained in effect until 1857 and primarily regulated the start of the herring fishing season on the 24th of June (this however fluctuated) and provided regulations on the handling of the fish and the quality standards that herring barrels had to meet for transportation (Dorleijn, 2002, p. 271). The herring season extended until December or January. The herring boats sailed in convoys, and fishermen would spend 6 to 8 weeks away from home, embarking on 2 to 3 trips per season.

During the later part of the medieval period, an important innovation in herring preservation emerged known as *haringkaken*, or gibbing. Initially, this technique was a monopoly by the Hanseatic League, which acquired gutted herring from Scandinavian fishermen and sold it in the Low Countries (Lauwerier and Laarman, 2006, p. 151). The preservation method involved removing the herring's gills and a portion of its entrails while still at sea, the pancreas was left intact as it added to the fish's flavour (Ervynck and Van Neer, 2015, p. 28). Subsequently, the gutted herring was salted and transported ashore for further distribution. The process of *haringkaken* resulted in an extended preservation period for the fish, making it more profitable for fishermen because they could extend their time at sea. The origin and start date of this technique is still unknown. At present, it is widely accepted that this technique was probably assimilated from the Scandinavians. It is believed that the technique originated in Denmark during the twelfth century and was subsequently introduced and perfected in the Low Countries at a later time (Lauwerier and Laarman, 2006, p. 159; Ervynck and Van Neer, 2015, p. 28; Muus, 1966, p. 210).

CHAPTER 4: MATERIAL AND METHODS

The following chapter provides an overview of the material and the methods that served as the foundation for this research. This chapter is divided into two parts. In the first part, the quality and selection of the data are discussed in detail. The material chapter aims to offer a clear and thorough understanding of the Dutch Fish Bones (DFB) dataset, along with the measures taken to ensure its quality and reliability. It emphasizes the significance of considering different factors, such as the overall quality of the data, necessary modifications to facilitate the analysis, and important considerations for analysing the dataset. The second part of the chapter focuses on the statistical methods used to analyse the data. The discussion starts with an overview of the various statistical methods that were considered for this study. The reasoning behind choosing a particular method is then explained, along with the extent to which it was applied.

4.1 MATERIAL

4.1.1 DATASET: DUTCH FISH BONES (DFB)

The chronology of fish consumption in the Low Countries is analysed through a large dataset of fish bones. The dataset: Dutch Fish Bones (DFB), was given its name by the author and contains data of the distinctive assemblages as described in table 4.1.1. This dataset includes the NISP (Number of Identified SPecimens) of fish species and families found through archaeological research of Dutch sites that date between 0-2000 CE and with a minimal of 30 fish bones.

The dataset encompasses various information related to the archaeological site. It includes details such as the assemblage's name, possible linked assemblages, site name, and site code for identification and association purposes. Geographic context is provided with settlement/province/country and coordinates. Source information consists of the publication year, short/full reference, and analyst name. Dating is represented by start date/end date and start period/end period, establishing temporal frameworks. Contextual details describe the site type, such as rural settlement, town, castle, monastery, and provide insights into the site's nature. The dataset also specifies whether the site is rural or urban. Context type information, such as barrel, cess pit, ditch, waste layer, is included to characterize the specific archaeological contexts within the site. The recovery method is

documented, distinguishing between hand-collected/sieved approaches, along with relevant comments. Additionally, a yes/no is mentioned for the availability of additional data such as skeletal element mentioned/measurement/fish size, sediment volumes, associated mammal/bird NISP, and stable isotopes/aDNA analysis indicating if supplementary data for further research is present. Data quality is evaluated with a colour code (green, red, or amber) and accompanied by further comments. Finally, the total number of identified/unidentified specimens and NISP of specific fish species/families are recorded, providing information on the fish assemblage present at the site.

Table 4.1.1: Data collection parameters of the Dutch Fish Bones dataset.

Site	**Location**	**Source**	**Dating**	**Context**	**Recovery method**	**Availability of data**	**Data quality**	**Fish**
Assemblage name	Settlement /province/country	GeoRef source	Start date/ End date	Site type	Hand-collected/sieved	Skeletal element/ measurement/ fish size	Green, red, or amber	Total number of identified/unidentified specimens (excluding fish scales)
Linked assemblages	Coordinates	Publication year	Start period/ end period	Rural/urban	Minimum/ maximum sieve mesh	Sediment volumes	Comments on data quality	NISP of fish species/families (excluding fish scales)
Site name		Short/full reference		Context type	Comments on recovery method	Associated mammal/bird NISP		
Site code		Analyst name				Stable isotopes/aDNA analysis		
General comments								

4.1.2 DATA QUALITY

When collecting data from archaeological reports, we must keep in mind that the data on fish bones originates from a multitude of distinctive research methods. These methods include various approaches on recovery, quantification, and qualification of faunal material. Within every archaeozoological research-method there are several issues that could affect the quality of the collected data. These issues are discussed to bring forth biases that can ultimately impact the results of this study.

4.1.2.1 RECOVERY METHODS

In the field of archaeozoology, the recovery of faunal remains from sediment is a crucial first step in research. Two methods of recovery are commonly applied in excavations: hand collection and sediment sieving, or a combination of both. When dealing with the skeletal elements of fish, it is important to consider the relative size of the bones in relation to the chosen method of collection. An exclusively hand-collected assemblage will have a significant underrepresentation of smaller fish species. If any fish remains are present at all, merely large elements from large fishes will make up the assemblage. Hand-collection of fish remains is considered to be of little significance when creating a representative assemblage of fishes from an archaeological context (Van der Jagt & Laarman, 2021, p. 386).

The extent to which the assemblage represents the consumed fish is determined by the amount of sieving that took place and the mesh size of the sieve. If whole features or samples of sediment are sieved, the abundance of skeletal elements of fish will increase. The sieve mesh size is a crucial factor in determining the type of analysis that can be performed on the sieved residue. Archaeologists are well aware that the size of the mesh used during an excavation can greatly affect the faunal data obtained. The effects of mesh size on the data can be significant, and errors in the results of analyses may occur if larger mesh screens are employed (Cannon, 1999, p. 213). This is because larger mesh sizes can lead to differential recovery of faunal remains, resulting in an incomplete or skewed representation of the faunal assemblage present at the site. For example, up to 90% of fish remains may be lost if a sieve mesh of ¼ inch (6,3mm) is used for sample sieving (Gordon, 1993, p. 458; James, 1997, p. 385). This highlights the importance of carefully considering the mesh size used during excavations in order to ensure that the faunal data obtained is as accurate and representative as possible.

Furthermore, it is important to consider the relative number of species from each sieve mesh and sample size. Studies have shown that the number of fish tax increases when using a smaller sieve mesh, such as 2mm, as opposed to a 4mm sieve mesh (Van der Jagt & Laarman, 2021, p. 379). The field guide of Dutch archaeology emphasizes the significance of using a minimal sieve mesh size of 2mm for fish analysis (Carmiggelt & Schulten, 2002, p. 37), further confirming the importance of a minimum mesh size.

Another challenge in constructing a picture of historical fish consumption is the incomplete nature of the available data. Only a small portion of all archaeological sites have been excavated, and even within these sites, fish remains may not always receive the attention they deserve. This is due, in part, to the relative scarcity of fish remains compared to other faunal remains, as well as the knowledge required to identify and analyse fish bones. Moreover, the sampling of fish remains can be expensive, and it is not always incorporated into excavation plans.

4.1.2.2 THAPONOMY

The preservation of skeletal remains plays a crucial role in determining the quality of data obtained from them, both before and after excavation. Taphonomic processes can significantly degrade bones, sometimes leading to their complete disappearance. It is also important to acknowledge the varying preservation of ichthyological remains, specifically the bones of different fish species. One such problem created by the variable preservation rate is the underrepresentation of certain fish species. For example, the fatty vertebrae of salmon tend to have poor preservation in soil (Van Neer & Ervynck 1993, p. 14). Additionally, herring is often underrepresented in assemblages because its delicate, tiny bones may not be as easily preserved or recovered as those of larger, sturdier fish species like cod and perch (Wheeler & Jones, 2009, p. 63). These larger species, with their more durable bones, are more likely to be overrepresented in the archaeological record. Taphonomy and preservation are therefore crucial factors in the recovery and interpretation of fish remains. Many fish species have fragile bones prone to decay and fragmentation, making them less likely to be found in the archaeological record. The underrepresentation of herring and possible overrepresentation of species with sturdier bones can result in a distorted understanding of actual consumption patterns, as the significance of various fish species in the diet may be inaccurately assessed.

Differential preservation of fish remains significantly impacts the available archaeological record. Moreover, fish bones are more likely to be preserved in waterlogged or oxygen-poor conditions, which may lead to an overrepresentation of fish remains from such environments, potentially skewing the data towards species with more durable bones or sites with better preservation conditions. Soil factors, like acidity and moisture levels, also greatly influence bone preservation

(Spriggs, 2014, p. 202). In some instances, the absence of particular fish remains could be due to poor preservation rather than a genuine lack of consumption or historical dietary importance. For example, cartilaginous fish such as rays, sharks, and sturgeons don't have a bony structure, resulting in a lower preservation rate compared to bony fish species (Ervynck, 2012, p. 484). Consequently, the data that we have is only a small sample of what was once a much larger and more diverse assemblage of fish remains, and our conclusions based on this data must be tempered by the recognition of these limitations.

The condition of skeletal elements can affect the analysis conducted by a fish specialist even after they are excavated from the ground. If the preservation is not sufficient, it becomes more difficult to identify the specific elements, leading to a larger category of unidentified fish (Rebolledo et al., 2021, p. 1; Colley, 1990, p. 217). However, it is important to acknowledge that the success of analysing poorly preserved remains depends on the expertise and experience of the specialist involved.

4.1.2.3 CONTEXT

It is important to carefully consider the potential impact of contextual certainty and chronological specificity on the quality of data. The excavation reports should provide clear information about the origin of materials from distinct contexts and their corresponding dating. A comprehensive analysis of numerous fish bones retrieved from well-defined, closed contexts with precise dating yields higher-quality data compared to a small collection of fish bones from contexts with a broad range of time periods.

Moreover, the type of context and its relevance to the research objectives have a substantial impact on data quality. It is not always guaranteed that a context provides clear and direct data on consumption patterns. For instance, a context might represent a location where fish were butchered, resulting in the preservation of skeletal remains that primarily consist of discarded or leftover parts. Alternatively, it could be a natural accumulation of fish in, for example, a ditch that eventually became clogged up. Failure to properly document and report these details can potentially introduce biases and distort consumption data.

Another context that can introduce bias when studying fish consumption patterns is the presence of a sunken fishing vessel with its catch or traded goods. Since

these materials do not originate from a terrestrial consumption context, they do not provide insights into consumption patterns or the relative abundance of specific fish types or families. Instead, such contexts merely contribute to an increased count of NISP for specific traded taxa or fish families, which can influence the overall data for that particular time period.

Additionally, the proportion of 'high status' contexts, such as monasteries, castles, or palaces, can potentially skew the results. When examining fish consumption patterns, it is crucial to assess the representativeness of these contexts in relation to the general population. The customs and practices of elite groups may significantly differ from those of the broader population, thereby affecting the validity and generalizability of the findings.

4.1.2.4 FISH SPECIALIST AND ACTUALITY OF DATA

Fish specialists are responsible for the identification, quantification, and analysis of skeletal remains from archaeological excavations. The quality of the resultant data may be affected by the specialist's experience, skill, and research objectives. To accurately identify fish remains, specialists rely on reference collections; the size and precision of these collections significantly impact data quality. A small reference collection may lead to the identification of a limited variety of species within an assemblage. Moreover, the experience of the specialist is a critical factor; a seasoned specialist with over 40 years of experience may identify different fish species within the same assemblage compared to a novice student.

The research goals of the specialist also play a significant role in the quality of data. A specialist focusing on the analysis of migratory species, for instance, may be more attentive to the identification of specific taxa, while another specialist with different research objectives may prioritize other aspects of the assemblage. This underscores the importance of aligning the specialist's research goals with the overall objectives of the project to ensure accurate and relevant results.

Furthermore, assemblages containing fish remains can be reinterpreted years after the initial excavation, with different specialists potentially arriving at varying conclusions. A recent example includes the re-examination of the fish bone assemblage from Huis ter Kleef, in which swordfish (*Xiphias gladius*) and Atlantic bluefin tuna (*Thunnus thynnus*) were identified, both unique findings for the Netherlands (Van Neer & Wouters, 2022, p. 237-264). This highlights the

importance of data actuality in archaeological research. Another illustration of the impact of data actuality is the recent discovery of *Acipenser oxyrinchus* in archaeological assemblages from the Netherlands. Prior to this discovery, sturgeon remains were automatically attributed to *Acipenser sturio*. However, recent DNA analyses of older material revealed this to be a false assumption, affecting all previous studies on *Acipenser sturio* (Thieren *et al.*, 2016, p. 1958).

4.1.2.5 SKELETAL ELEMENTS

The incorporation of various skeletal elements into the analysis of fish remains is a crucial aspect of a specialist's research. If a researcher solely relies on vertebral elements, a significant portion of the available skeletal remains may be neglected, potentially leading to the omission of a diverse range of taxa within the assemblage. Additionally, the treatment of fish scales during quantification warrants consideration, as some specialists include scales in their analysis, while others do not.

Fish scales offer valuable insights to specialists, allowing for identification at the family and species levels, as well as providing seasonality data (Casteel, 1974, p. 567). However, their inclusion in the quantification method known as Number of Identified Specimens (NISP) can potentially skew results. This is exemplified by the well-preserved and easily distinguishable perch scales, which may contribute to a higher NISP count for perch compared to a smaller count of cod remains. To illustrate, suppose there are seven cod remains comprising only bones, representing four individuals, while 99 perch scales and one bone are attributed to a single individual. Consequently, incorporating scales in NISP counts can introduce bias when comparing species within an assemblage, particularly if the minimum number of individuals is not considered. To address overrepresentation biases, scales are frequently excluded from NISP counts. Nonetheless, the inconsistent application of this exclusion in ichthyoarchaeological research, along with unclear quantification descriptions in archaeological reports, can unintentionally influence results when scales are included in the analysis.

4.1.2.6 QUANTIFICATION

The analysis of fish remains necessitates the quantification of species frequency, which is typically achieved through the examination of the Number of Identified Specimens (NISP) or the Minimum Number of Individuals (MNI). Both methods are

employed in Dutch archaeology and have distinct advantages and limitations. In this study solely NISP is used for the following reasons: NISP represents a raw count of each identifiable element, offering a straightforward representation of taxa within an assemblage. However, this method has several drawbacks, such as the potential overestimation of species frequency for those with numerous bones or large bones prone to significant fragmentation (Rizzetto & Albarella, 2017, p. 764). Additionally, NISP can be influenced by differential preservation of elements, and the skeletal remains of a single animal may overestimate the frequency of that species within the assemblage (Lyman, 2008, p. 29).

To address the biases inherent in the NISP method, researchers may employ the MNI method. MNI quantification for each taxon is determined by counting unique skeletal elements within an animal. By focusing on individuals rather than the number of elements, MNI can circumvent biases arising from differences in skeletal complexity between taxa and the recovery methods utilized, as it does not consider the size of skeletal elements (Lyman, 2008, p. 764). However, MNI is not without its own limitations, such as the potential overrepresentation of rare species within an assemblage. Furthermore, MNI relies on the presence of complete animals at a site and fails to account for the manner in which animals were consumed or processed within a specific context, which may result in partial skeletons or scattered skeletal elements. Due to the strict identification criteria for MNI and the difficulty in identifying some body parts, MNI is likely to have more bias than NISP in highly fragmented assemblages, making it a less representative descriptor of relative element frequencies. (Marshall and Pilgram, 1993, p. 267)

4.1.2.6 FAIR DATA PRINCIPLE

The quality of data presented in a study is invariably influenced by the level of detail provided by the authors in their report. The FAIR Guiding Principles are a set of guidelines aimed at improving the Findability, Accessibility, Interoperability, and Reusability of research data (Wilkinson *et al.* 2016, p. 4). It is essential that authors thoroughly describe the recovery methods employed, the preservation status of the remains, and the specific context from which the remains were obtained to ensure reusability. Ambiguity surrounding these aspects can result in a decline in data quality due to the introduction of uncertainties.

To maintain transparency and minimize biases, it is crucial for authors to address several key aspects. Firstly, the omission of specific details regarding the employed excavation techniques can introduce biases in the collected data. For instance, the use of different methods, such as hand collection and sieving, can yield varied outcomes. Moreover, the failure to adequately document the contextual information of the samples can result in biases. Additionally mixing fish remains from different time periods without proper differentiation, can obscure the understanding of temporal changes in fish consumption patterns. Furthermore, transparency in the quantification methods employed by fish specialists is of utmost importance. It is essential for a specialist to explicitly specify the skeletal elements utilized in the analysis, as the inclusion of scales or solely vertebrae can introduce additional uncertainties and potential biases.

To avoid unnecessary biases and ensure the data is FAIR it is imperative that archaeological reports maintain complete transparency, detailing all aspects of the research process. Reports that uphold the FAIR principles are the most usable for this study, as they provide a solid foundation for reproducibility and further analysis. In contrast, reports that do not adhere to the FAIR principles are less reliable, as they may lack the necessary information for proper evaluation and utilization. By prioritizing FAIRness in archaeological reporting, researchers can enhance the integrity and trustworthiness of their findings, encouraging a transparent research environment.

4.1.3 DATA ADJUSTMENTS

4.1.3.1 NOMENCLATURE AND FISH SCALES

Within the taxonomical classification system, ongoing research continually advances our understanding of species. As a result, new findings and scientific insights may lead to the reclassification of a species, resulting in a divergence from its previous classification. This can be attributed to advancements in DNA analysis and other methodologies that yield new insights into the family or genus to which a species belongs. Consequently, this leads to a change in the species' nomenclature. However, it is important to note that the presence of both ‘old’ and ‘new’ names in archaeological reports does not necessarily have a negative impact on data quality.

In the process of data collection for this study, species names are updated to reflect the latest taxonomic findings. As it is essential to utilize consistent and up-to-date nomenclature for this research. The most recent taxonomic data has been sourced from the *Nederlands Soortenregister* provided by the Naturalis Biodiversity Center. Notable examples of renaming encountered during the dataset creation include the white bream (*Blicca bjoerkna*), previously known and named as *Abramis bjoerkna*, and the common rudd (*Scardinius erythrophthalmus*), which was frequently referred to by the Latin name *Rutilus erythrophthalmus* in archaeological reports.

For reasons discussed in section 4.1.2.5, fish scales are not quantified in the dataset and are excluded from the total NISP. If fish specialists specifically mentioned scales in their analysis, adjusted NISP counts were entered into the table and noted in the comment section. When remains from a single taxon exclusively comprised scales, this was represented as a 'P' in the dataset, with 'P' denoting 'present.' During the analysis, 'P' was converted to an NISP of '1.'

4.1.3.2 REDIRECTING CLASSIFICATIONS

Following the data collection process, several changes were made to enable effective data analysis. These primarily concerned adjustments in the classification of fish species by fish specialists. A frequent challenge in this context was the broad categorization of species. Due to the similar appearance of certain species, archaeozoologists may occasionally struggle to identify them accurately. As a result, a subset of potential species is chosen, within which the fish remains are likely to belong. For example, in some instances a specimen was attributed to multiple species, such as the plaice/flounder/dab (*Pleuronectes platessa/Platichthys flesus/Limanda limanda*).

In these cases, classifications were reassigned to the corresponding family of the fish species. A Microsoft Access list was created to automatically convert fish names into alternatives (Appendix 5). If a specimen could potentially belong to multiple species, the species was automatically designated at the family level. For instance, plaice/flounder/dab is placed in the Pleuronectidae family. Another example is the common roach/common rudd (*Rutilus rutilus/Scardinius erythrophthalmus),* this was assigned to the Cyprinidae family. In another example, a description involving Cyprinidae/European perch (*Perca fluviatilis)*

where the fish species and family are unrelated, the classification was assigned to a 'not applicable' category. Furthermore, uncertainties in species classification mentioned by fish specialists were converted to a more secure classification at the family or genus level. For example, if a specialist used a question mark next to the species name or a 'cf.', denoting 'most likely species,' these classifications were uniformly assigned to their broader family level.

4.1.3.3 FISH GROUP CATEGORIZATION

To investigate consumption patterns of marine and freshwater fish, all discernible species within the dataset are categorized into fish groups. This classification relies on fish species data available from BoneInfo, with fish being assigned to three distinct groups: marine, freshwater, and migratory fish (Appendix 6). The marine category encompasses fish species that breed and inhabit the salt waters of seas and oceans. However, there is one exception within the righteye flounder family, Pleuronectidae. The European flounder (*Platichthys flesus*) is a catadromous migratory fish that primarily dwells in freshwater, but also resides and breeds in salt and brackish water (Muus, 1966, p.188). The flounder has been classified as a marine fish for three reasons. Firstly, the catch origin is generally uncertain, as it can be found in salt, brackish, or freshwater. Secondly, it is challenging to distinguish between the two most common righteye flounder species, the European flounder, and the marine plaice (*Pleuronectes platessa*), due to their anatomical similarities (Beerenhout, 2016, p. 518; Wouters et al, 2007, p. 43/51). Finally, the proportion of flounder within the Pleuronectidae family in the archaeological record remains unknown. Subsequent sources describe the flounder as generally 'low status' due to its muddy flavour, suggesting a general preference for plaice (Beerenhout, 2015, p. 21).

The second fish group comprises freshwater fish, which breed and live in the freshwater environments of streams, lakes, and rivers. Catadromous migratory fish, with the exception of the flounder, are also included in the freshwater category. Catadromous fish inhabit freshwater and migrate to the sea for breeding. Species within this category, such as the European eel (*Anguilla anguilla*), are primarily considered *standvissen* meaning they can be caught in freshwater year-round, resulting in their classification as freshwater fish.

The final category consists of migratory fish. This group includes anadromous migratory fish that inhabit the ocean and migrate to freshwater for breeding. Due to their breeding behaviour, these fish can be caught in both sea and freshwater environments, such as streams and rivers, leading to their classification as migratory fish.

4.1.4 DATA ANALYSIS CONSIDERATIONS

4.1.4.1 DATE RANGE

In this analysis of fish consumption patterns, the focus is on assemblages with a NISP falling within the medieval and early modern periods (450-1800 CE), thus providing a comprehensive overview of trends and patterns beyond the medieval era. The assemblages that were analysed were characterised by end dates occurring after 450 CE and start dates falling between 0 and 1800 CE. This is necessary because an assemblage with a start date before 450 CE and an end date after that year, includes a certain quantity of fish NISP within the established timeline, as discussed in section 4.2.4. Employing this methodology ensures a coherent chronological framework without distorting the beginning and end points. Consequently, 46 assemblages from 17 sites were excluded from the analysis as they did not adhere to the designated date range (see Appendix 3).

4.1.4.2 RECOVERY METHOD

The use of different recovery methods in archaeological excavations can impact the completeness of a species list, as explored in section 4.1.2.1. This raises an important discussion about applying various recovery methods in archaeological research, but it doesn't affect the evaluation of fish taxa from the dataset. In order to keep the dataset as large as possible, it was decided not to exclude data based on the recovery method used. The thoroughness of the species list from sites that only used hand collection or coarse sieving can be debated, potentially leading to bias in the results. This concern is addressed separately in section 5.2.1. Within this section, the results are presented based on a subset analysis that focuses on assemblages that underwent minimal fine sieving (mesh size of less than 4mm). As part of this analysis, a total of 168 assemblages that were initially coarse sieved or collected by hand only were excluded from the dataset (Appendix 2).

4.1.4.3 VARIATION IN DATA QUALITY

The dataset was compiled with careful consideration given to the quality of the collected data. This assessment of data quality was based on a color-coded system utilized in the DFB-dataset (Appendix 4). The codes 'green', 'amber', and 'red' were respectively assigned to sufficient, adequate, and insufficient data quality. The quality of the data was influenced by several factors, as outlined in section 4.1.2. Examples of these factors include the analysis being conducted by a student rather than a specialist, unknown collection and sieving methods, and limited reference collections.

Assemblages with no comments concerning data quality were assigned a 'green' mark, signifying a higher level of confidence. A total of 288 assemblages received this 'green' mark, indicating sufficient data quality. In cases where only one negative comment was made regarding data quality, the 'amber' mark was assigned. This categorization applied to 109 assemblages, indicating an adequate level of confidence in the data. And finally, a 'red' mark was assigned to data quality when two or more negative aspects were identified by the dataset analyst. In total, 136 assemblages received this 'red' mark, indicating potential issues with data quality.

To ensure the consistency of results from data spanning a lengthy period, it was decided to incorporate all levels of data quality, despite the biases that may arise. This approach was deemed less significant than using a smaller dataset for the results. The impact of data quality is addressed separately in section 5.2.2 of the results.

4.1.5 THE SELECTED DATASET

The selected dataset employed in the analysis spans the period between 450 and 1800, comprising 462 distinct assemblages derived from 130 sites, as detailed in Appendix 1. A key aspect of the dataset is the differentiation between rural and urban contexts, which is instrumental in addressing the research questions concerning this subject in section 5.3. The classification of a site as either rural or urban is based on the author's description in the original archaeological report.

Furthermore, the dataset is categorized according to the province and its proximity to the sea. Coastal provinces include Zeeland, Noord-Holland, Zuid-Holland, Groningen, and Friesland, while inland provinces encompass Drenthe, Gelderland,

Utrecht, Flevoland, Noord-Brabant, Overijssel, and Limburg. This distinction is explored further in section 5.4.

Figure 4.1.5 highlights the location of each of the 130 sites employed in the analysis, indicating whether they are categorized as urban or rural and situated within a coastal or inland province.

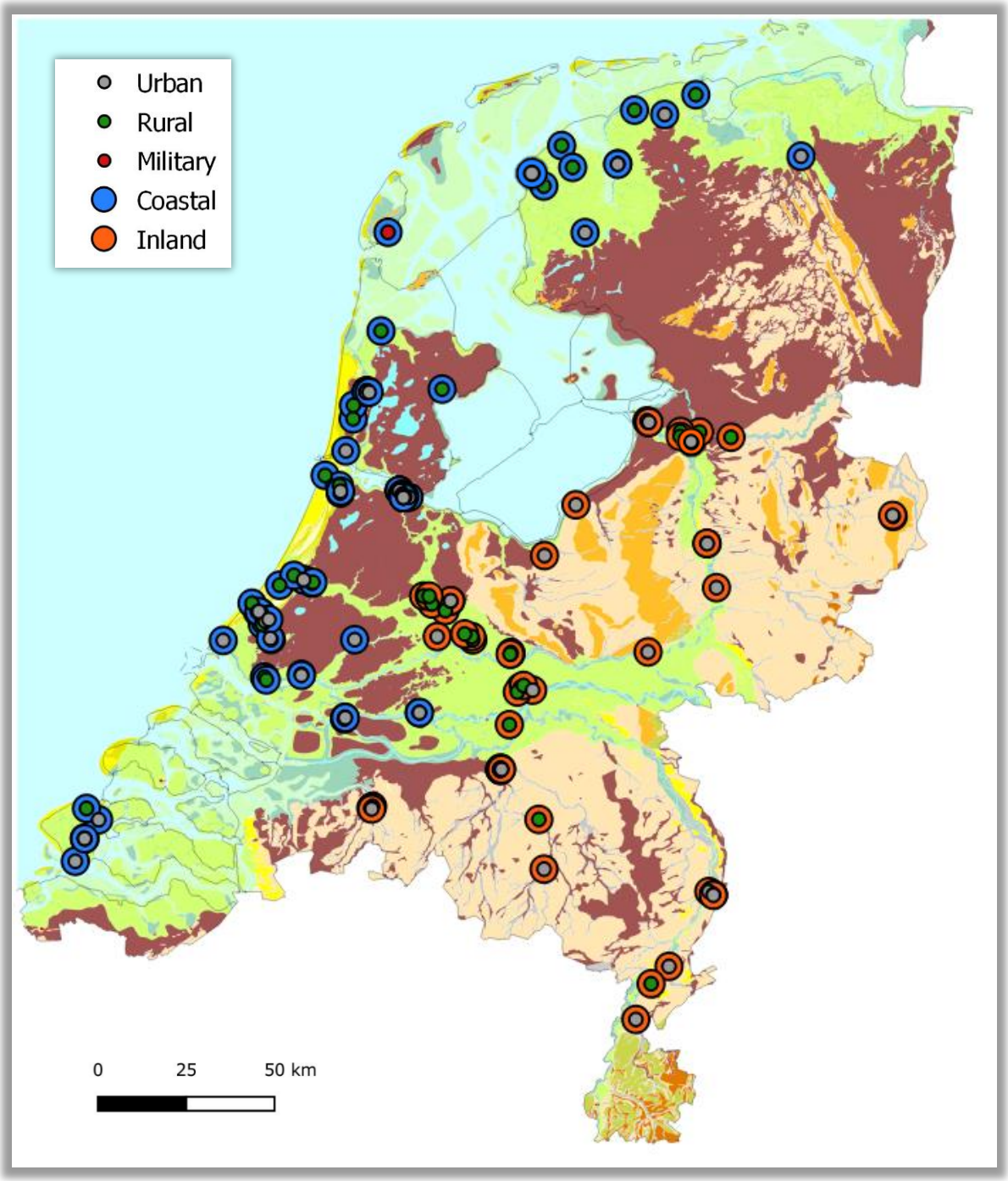


Figure 4.1.5: Distribution of analysed sites, indicating rural or urban contexts and coastal or inland locations on the 1250 CE paleogeographic map, image by author after Rijksdienst voor het Cultureel Erfgoed, TNO and Delatares 2022.

4.2 METHODS

In this section, the challenges, and limitations in determining the chronology of meta-analyses and the potential solutions that can be employed to overcome these challenges will be examined. One of the key methods to be discussed is aoristic analysis, which divides data into chronological bins for a detailed examination of chronological patterns. Another approach that will be considered is the use of a Monte Carlo simulation model. This model is a powerful tool for simulating complex systems and estimating the likelihood of different chronologies within a given dataset, complementing the aoristic method. However, its limitations for this study will be acknowledged and the decision to exclude the Monte Carlo simulation model will be discussed. Finally, we will discuss the process of applying aoristic analysis to the DFB-dataset.

4.2.1. CHALLENGES IN DETERMINING CHRONOLOGY OF META-ANALYSES

Central to a meta-analysis is the chronology of a dataset. While dealing with a large dataset one can encounter the problem of variable dated materials in each independent study. The most common problem in meta-analysis is dealing with this overlapping and contemporaneous dating of archaeological material (Orton *et al.,* 2017, p. 3). It is almost not possible to create a fluent timeline with this data, therefore, the formation of chronological categories or 'bins' in which the data from each independent study is placed is required.

One approach to addressing the problem of variable-dated materials in meta-analysis is the grouping of these materials into chronological categories based on a midpoint date range. For instance, a study may use 100-year bins as chronological categories, such as 800-899, 900-999, 1000-1099. In this example, three dated entities, 870-890, 940-1070 and 800-1200, would result in midpoint dates of 880, 1005, and 1000, respectively, and would be placed in the corresponding category. However, a limitation of this approach is that it can lead to discrepancies in the timeline. For example, while two of the three entities are dated within the 900-999 range, their midpoint falls outside of this category, resulting in a timeline gap. To mitigate this issue, one solution could be to use smaller bins, such as 50 years. However, this approach still disregards a large portion of the true dating of the entity and may not be entirely accurate. For

example, the midpoint of 800-1200 is 1000, which alternatively places it in the 1000-1049 category, overlooking the other 350 years to which the entity is dated. This highlights the need for a nuanced and thoughtful approach to the organization of chronologies in meta-analysis, as well as the potential limitations of using chronological categories or 'bins' as a method of managing variable-dated materials.

An alternative approach to organizing chronologies in meta-analysis is the use of natural breakpoints that can be defined archaeologically and historically to create chronological categories. As Orton *et al.* (2017) note, such breakpoints can include various destruction horizons that are known for a specific location. An example of a breakpoint mentioned by Orton *et al.* is the Boudiccan destruction horizon (60/61 CE) in London. This destruction event can be identified archaeologically and serves as a natural breakpoint in the chronology. However, a significant drawback of the breakpoint-method is the potential redistribution of well-dated entities that overlap these natural breakpoints. This can give the impression that 'change' occurs around these breakpoints, while in reality, the entities in question may have overlapped in time.

4.2.2 AORISTIC ANALYSIS

A common and frequently used solution to the challenges posed by the chronology distribution in meta-analysis is the use of a uniformly distributed dataset along a diachronic timeline. This approach involves dividing the data equally into narrow chronological bins using a method known as aoristic analysis (Ratcliffe, 2000, p.669; Johnson, 2004, p. 448; Crema, 2012, p. 447; Palmisano 2017, p. 59; Orton *et al.*, 2017, p. 3). This method calculates the probability of each individual data entity falling into a specific bin category. Aoristic analysis can be used to estimate the likelihood of contemporaneousness of a large dataset of archaeological sites or assemblages. The aoristic sum is then the estimate of the total number of data entities falling into a specific bin category. These bin categories can contain any time period necessary for the specific research goals, such as 25, 50 or 100 years.

The aoristic analysis is a method that involves dividing each assemblage over a specific date range to create a uniform timeline. The main principle of this method is to stack separate assemblages in specific date ranges. To illustrate this method, consider three dated entities: 1125-1150, 1090-1200 and 1054-1176 in bin-

categories of 25-year (table 4.2). Each assemblage is assigned a probability mass for each 25-year bin. For example, assemblage 1 falls neatly into the 1125-1150 bin category and therefore has a probability mass of 1, indicating that there is a 100% chance that the assemblage's NISP fits into this specific time period. Assemblage 2 is dated in one partial bin and four complete bins. The assemblage's NISP is distributed evenly over these bins, and a certain percentage makes up each bin. The probability mass of 1 is divided over a range of 110 years, meaning each year has a probability mass of 0.00909. The partial bin of ten years therefore has a probability mass of 0.0909, indicating that 9.09% of the assemblage's NISP (402) falls into this category (36.6%). The other four 25-year bins have a probability mass of 0.227, and therefore each entail 22.7% of the total assemblage's NISP (91.4%). Assemblage 3 is calculated in the same way, the range of 122 puts the probability mass of each year at 0.0082. The percentage of the total NISP for each bin category is again calculated by the number of years that fall within the total assemblage. This ultimately results in a probability distribution across the timeline, weighing each assemblage accordingly in the aoristic sum. This method allows for a more accurate representation of the chronological distribution of the assemblages in the meta-analysis, considering the probability of contemporaneousness of each assemblage.

Table 4.2: Example of an aoristic analysis.

Entity	Start date	End date	Range	Mid	Fish bones NISP
Assemblage 1	1125	1150	25	1137	38
Assemblage 2	1090	1200	110	1145	402
Assemblage 3	1054	1176	122	1115	2300

25-year Bin	1050-1075 (NISP)	1075-1100 (NISP)	1100-1125 (NISP)	1125-1150 (NISP)	1150-1175 (NISP)	1175-1200 (NISP)
Assemblage 1	0	0	0	38	0	0
Assemblage 2	0	36.6	91.4	91.4	91.4	91.4
Assemblage 3	395.9	471.3	471.3	471.3	471.3	18.9
Total	395.9	507.9	562.7	600.7	562.7	110.2

4.2.3 LIMITATIONS OF THE AORISTIC ANALYSIS

The biggest advantage of the aoristic analysis is that it addresses the problem of overlap in chronology of specific assemblages. However, there are also major disadvantages to this method. The aoristic sum, which is a measure of event frequency, alone does not provide a complete understanding of the event being

studied. It is important to consider other measures such as context and historical data in conjunction with the aoristic sum to fully understand the complexity and nuances of the events (Johnson, 2004, p. 449). The aoristic analysis looks at the data in isolation and may not consider the broader context in which the data accumulated. This can make it difficult to understand and interpret the causes or consequences of the outcome on a timeline.

Another disadvantage of the aoristic method is that it assumes an even distribution of data across the timeline (Johnson, 2004, p. 449). However, in reality, there may be no reason to assume such a distribution. For example, considering an assemblage of fish bones that is dated between 1000 and 1200. In order to comprehend the significance of this dating, it is crucial to consider the context in which the data was accumulated. If these fish bones accumulated consistently across these two hundred years and therefore represent duration, the aoristic analysis can describe the gradual build-up of the assemblage. However, if the fish bones represent a single event, there is a significant margin of error in the uniformly distributed remains, making it uncertain if the analysis accurately represents the assemblage on the timeline.

The GIGO principle, 'Garbage In, Garbage Out', is particularly relevant to concerns about the reliability of dating in meta-analyses. For example, if the dating of a dataset with a 1000-1200 timeframe has a standard deviation of 50 years, the input data is already probabilistic. As Crema (2012, p. 449) notes in his paper on modelling temporal uncertainty, when the input data is probabilistic, the output data should also be probabilistic. Therefore, the accuracy of the aoristic sum may be compromised by the input data, potentially obscuring alternative models by only revealing one possible outcome.

4.2.4. THE MONTE CARLO SIMULATION MODEL

To deal with the problem of uncertainty, Crema (2012, p. 450). suggests a calculation of probability for each specific assemblage and each time bin together. This calculation is called a Monte Carlo simulation model. This is a type of model that uses random sampling to simulate the behaviour of a system or process. The model represents a simulation technique which replicates a process not once, but hundreds of times, each time with a different set of rules. The result of this model provides a range of possible dynamic conclusions instead of one rigid outcome.

The simulation essentially works in the same way as the aoristic analysis. The archaeological entities are again uniformly distributed on a timeline between the desired categories, but instead of calculating the aoristic sum a random date is drawn from each assemblage's time range. This represents a combination of true dates that deals with the amount of uncertainty that signifies the assemblage (Orton *et al.,* 2017, p. 5). This simulation model is then run a number of times to create a dynamic timeline of possible outcomes. The advantage of this approach is that the results can be compared to null models (Crema, 2012, p. 454). These null models can be created by designing a set of assemblages that are based on conservative assumptions, for example a model of uniform frequency distribution (Orton *et al.* 2017, p. 5).

However, it is important to note that the accuracy of a Monte Carlo simulation depends on the quality of the input data and the number of iterations. A large number of iterations will increase the accuracy of the simulation but also increase the computational time and cost. Furthermore, Monte Carlo simulations can become very complex, especially when modelling systems with many uncertain inputs. This can make it difficult to understand or interpret the results of the simulation. Monte Carlo simulations can model uncertainty, but it is often difficult to estimate the amount of uncertainty in the input data, therefore it may lead to an underestimation or overestimation of the uncertainty in the results.

4.2.4 APPLICATION OF THE AORISTIC ANALYSIS ON THE DFB-DATASET

Considering the limitations of this thesis in terms of time and resources, it was deemed appropriate to limit the analysis of the DFB-dataset to an aoristic analysis without an additional Monte Carlo simulation. This approach was chosen because it provides a useful model of uniform frequency distribution that will serve as a valuable resource for future research. Additionally, the studies by Orton *et al.* (2014; 2016) provide an example of similar approaches with comparable data, where the focus was primarily on the aoristic sum without the inclusion of a Monte Carlo simulation. However, it is important to note that, like a Monte Carlo simulation model, the conclusions drawn from this research should be considered as one of many possible outcomes, rather than being definitive. The presence of uncertainty within each assemblage should also be considered while interpreting the results. Additionally, it is important to consider the potential limitations and

biases of the aoristic analysis method and to approach the results with a critical and nuanced perspective.

The selected samples of the DFB-dataset will be analysed in 25-year bin categories. When expressing years in the results, it is crucial to use appropriate terminology. For instance, when referring to the year 1200, it is associated with a 25-year interval that extends prior to that year. Therefore, the correct temporal span for the year 1200 would be 1175-1200. The bin width utilized in aoristic analysis is not fixed and can be adjusted to align with specific research goals. The resolution of 25 years was chosen as it allows for the observation of patterns and trends discernible within a human lifetime. Longer time periods, such as 50 years, may generalize trends over multiple human lifetimes and generations, resulting in a loss of precision. Moreover, the selection of the 25-year bin width considers computational feasibility. Smaller bins could complicate trends and make them harder to discern, while a 25-year bin width strikes a balance between temporal resolution and granularity. A temporal resolution of 25 years provides sufficient detail to identify specific events and their corresponding periods. It enables the study of events that may not be visible when examining broader trends or patterns. This time frame is commonly employed in historical research by both historians and archaeologists, representing the available chronology (Steinmann & Weissova, 2021, p. 295). Furthermore, the 25-year bin width achieves a balance between granularity and ease of data collection. Finally, the choice of a 25-year bin width facilitates a more detailed analysis of the temporal dynamics of the dataset, enabling a comprehensive exploration of the emerging patterns and trends.

The aoristic analysis will be conducted in an Excel sheet with a formula that automatically redirects the amount of NISP across the bin-categories of 25 years (Appendix 7). This Excel formula, created by Ivo Poldervaart, uses a combination of mathematical operations and logical tests to calculate a value based on the input provided in certain cells. The formula uses a series of nested IF statements to check the relationship between the start date, end date, and chronological categories. Depending on the results of these checks, it will subtract different values from each other to calculate the result. Finally, the formula multiplies the result obtained from the logical tests by the number of fish bones. This final result represents the value that is obtained by evaluating the formula using the input provided in the cells, following the procedure described in section 4.2.2.

The analysis yields a timeline presenting the number of NISP for each bin category. These results are further categorized for comparison purposes, such as contrasting fish groups (freshwater, marine, and migratory fish) or fish families (e.g., Gadidae, Pleuronectidae, Clupeidae). Within each comparison, the percentage of each category in relation to the total will be calculated and depicted on a diachronic timeline. This approach enables the identification of evolving patterns in fish consumption. Emphasizing the comparison of percentages rather than the absolute number of fish bones within a bin category offers a more accurate assessment of historical periods with fluctuating amounts of fish bones found in archaeological contexts. Moreover, it balances sudden increases in the number of fish bones across all categories, making it easier to compare different historical periods.

CHAPTER 5: RESULTS

The aoristic analysis of the DFB dataset has resulted in a wide range of graphs. These graphs are organized into different themes to present the findings systematically. They illustrate either the comparison of fish groups, such as marine, freshwater, and migratory fish, or the evaluation of primary consumption fishes within each group over time along a diachronic line. First, the findings of the analysis of the entire DFB dataset are presented as main diachronic trends. Next, the factors that impact these trends, including data quality, collection methods, high NISP sites and contexts, and high-status contexts, are discussed and evaluated. Following this, the results of subset analyses of the DFB dataset are presented to show diachronic trends in both rural and urban areas, as well as coastal and inland provinces. These findings are compared to the major diachronic trends. Lastly, the primary consumption fishes within each fish group are presented and discussed, and diachronic trends are compared to the results of the subset analyses from rural and urban areas, as well as coastal and inland provinces.

5.1 GENERAL DIACHRONIC TRENDS

Figure 5.1.1 depicts a line graph presenting the percentage of each fish group (marine, freshwater, and migratory fish) within 25-year intervals, in comparison to the total NISP. This graph serves as a proxy for fish consumption patterns. Likewise, Figure 5.1.2 exhibits the total NISP for each fish group per 25-year interval.

Figure 5.1.1 offers valuable insights into the changing trends in fish consumption from 450 to 1800 CE, complemented by the total NISP data displayed in Figure 5.1.2. Between 450 and 650, there is a moderate preference for marine fish consumption. However, a notable shift occurs after 650, with an increased portion freshwater fish consumption and a gradual decline in marine fish consumption. This trend continues until 1175 when a sudden change takes place. The portion of marine fish within the overall fish diet experiences a rapid increase, supported by the rising total NISP of marine fishes between 1200 and 1300, while there is a decline in freshwater fish consumption during this period. By 1225, marine fish consumption becomes the most popular choice. Interestingly, around 1300, there

is a significant change in the pattern. Freshwater fish consumption experiences a sharp increase, leading to a nearly equal balance between marine and freshwater fish consumption at around 50%. This shift is supported by the data shown in Figure 5.1.2, where the total number of marine fish decreases while the total number of freshwater fish increases. Despite this temporary event, marine fish consumption remains dominant throughout the graph until 1800. This aligns with the notable increases in the total number of marine fish between 1400 and 1650, as shown in Figure 5.1.2. However, after 1650, there is a significant decline in the number of fish across all categories. While this suggests a decreasing trend in fish consumption during this period, this is quickly followed by a rising consumption of marine fishes in 1750.

In contrast, the consumption of migratory fish remains relatively insignificant compared to the other fish groups, both in terms of percentage and total NISP. The only notable trend in migratory fish consumption is a small sudden upturn around 1300.

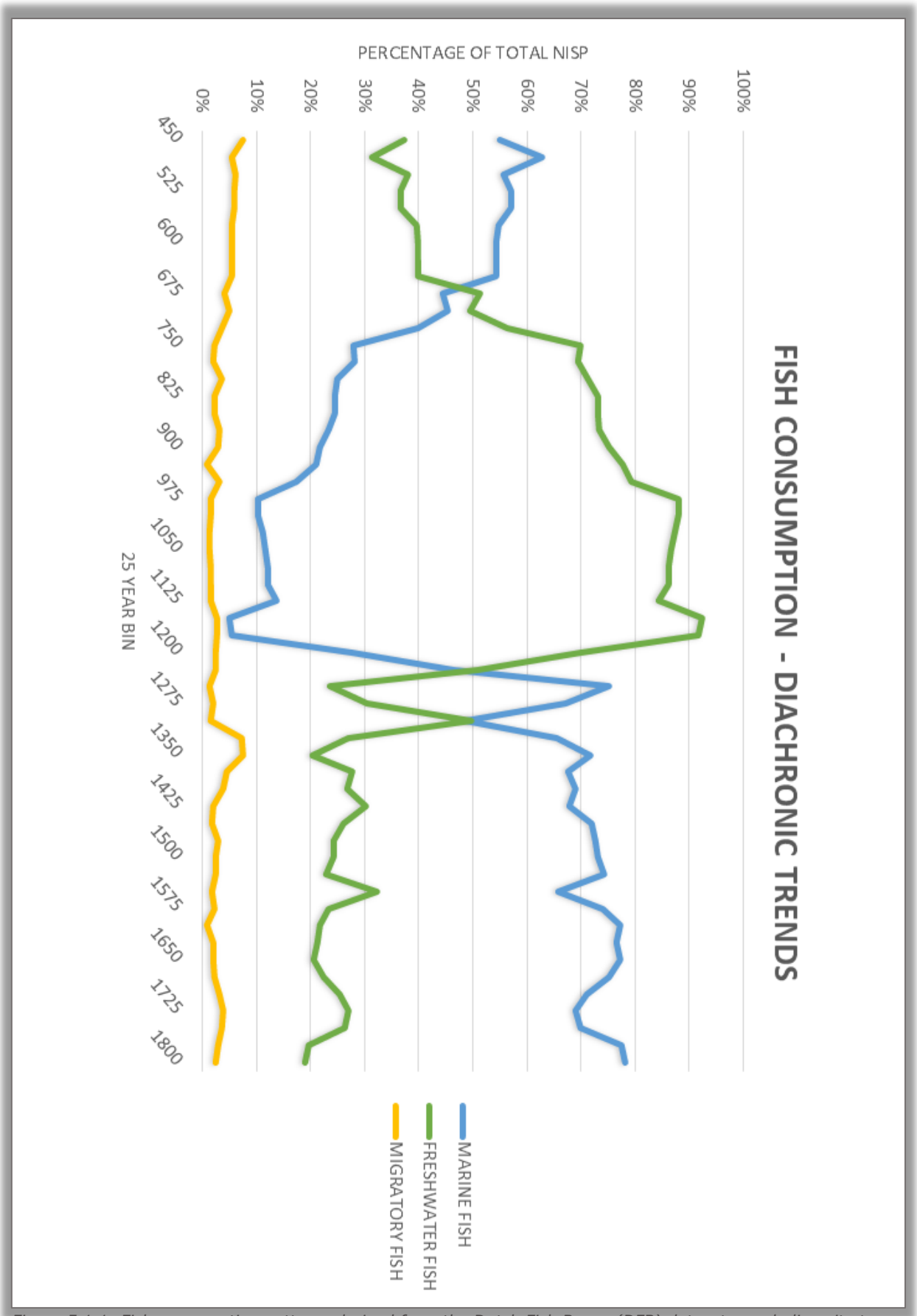


Figure 5.1.1: Fish consumption patterns derived from the Dutch Fish Bones (DFB) dataset - excluding site type: ship with trade context (450-1800 range = 462 assemblages/130 sites).

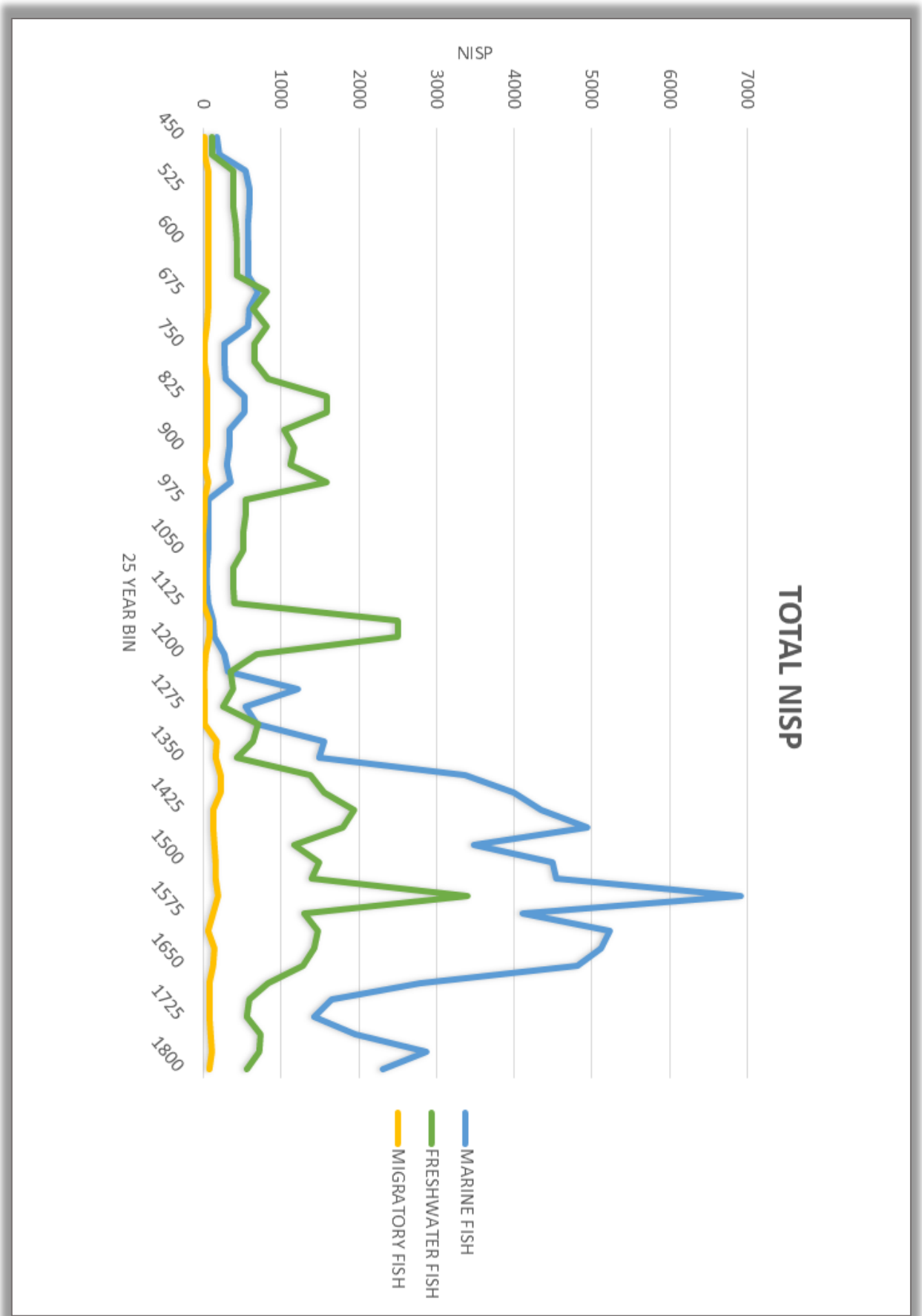


Figure 5.1.2: Total NISP derived from the DFB-dataset - excluding site type: ship with trade context (450-1800 range = 462 assemblages/130 sites).

5.2 INFLUENCES ON DIACHRONIC TRENDS

As previously discussed in section 4.1, collection method, data quality, and specific contexts, such as ships, churches, monasteries, palaces, and castles, can have a significant impact on the results obtained from the analysis of the dataset. Furthermore, high NISP assemblages may also affect the outcomes. Several graphs were created using subsets of the DFB-dataset. These additional subset analyses aimed to determine the degree to which the diachronic trends were influenced by these factors. This approach aimed to increase the robustness and reliability of the findings by considering possible sources of variation in the dataset.

5.2.1 INFLUENCE OF COLLECTION METHOD

The analysis specifically examined a subset of fine sieved assemblages (with a sieve mesh of less than 4mm), intentionally excluding 168 assemblages that were course-sieved or collected by hand (Figure 5.2.1). The results of this subset analysis revealed that excluding these specific collection methods did not result in any notable changes or deviations from the main diachronic trends. Thus, it can be concluded that the choice of collection method, in this instance, did not have a significant impact on the overall diachronic trends observed in the analysis.

5.2.2 INFLUENCE OF DATA QUALITY

To assess the impact of data quality on the results, a subset analysis was conducted specifically focusing on green- and amber-data-quality assemblages (Figure 5.2.2). This subset excluded 114 assemblages categorized as red-data-quality. Within this subset, an interesting variation from the main diachronic trends was observed between 1000 and 1150. There was a sudden increase in marine fish consumption accompanied by a decline in freshwater fish consumption. This subset analysis emphasizes the significance of considering the timing of changes in fish consumption patterns, as the observed rise in marine fish consumption during 1000-1150 may have served as a precursor to the more significant increase observed around 1200. Importantly, this observation does not alter the overall diachronic trends, indicating that excluding the red data from the results does not significantly impact the outcomes of this study.

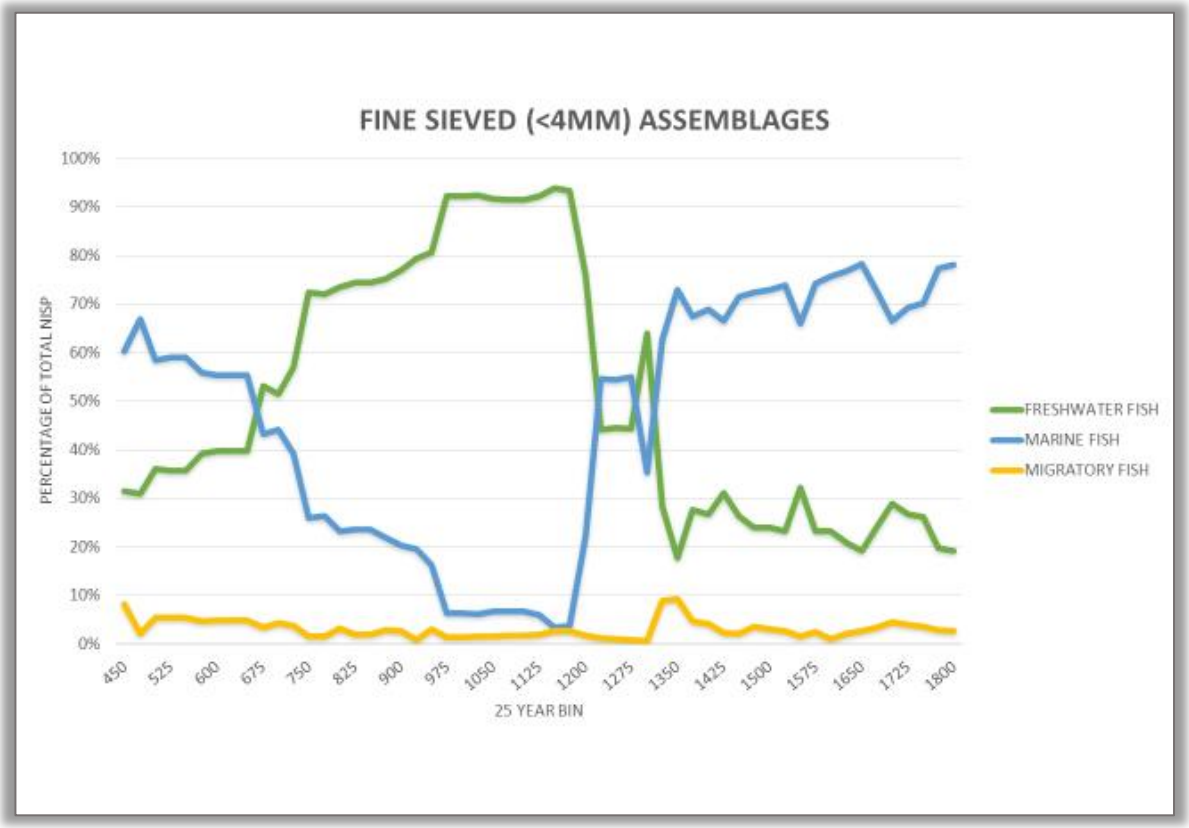


Figure 5.2.1: DFB-subset of recovery method ''minimal fine sieve mesh'': 0,25mm, 0,5mm, 0,6mm, 1mm, 2mm, 2,5mm, 4mm. Subset size of 297 assemblages.

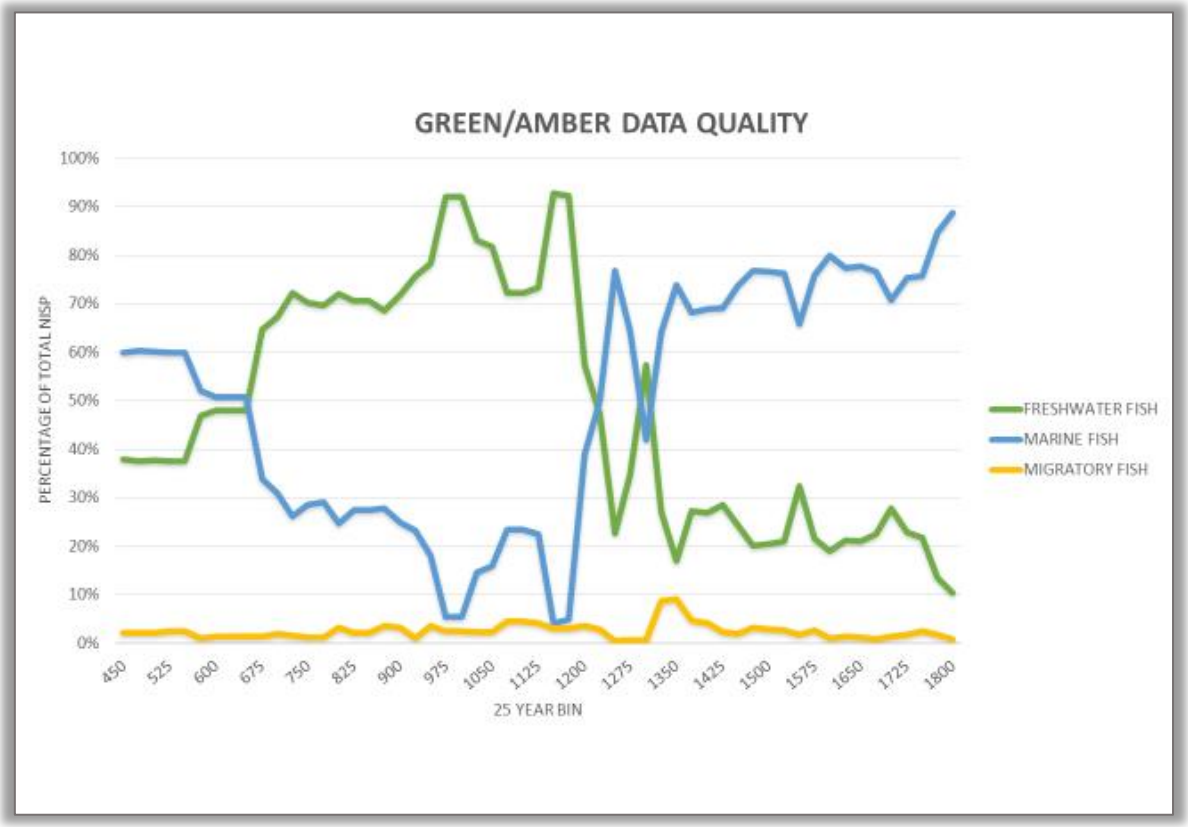


Figure 5.2.2: DFB-subset of data quality: green and amber/yellow. Subset size of 350 assemblages.

5.2.3 INFLUENCE OF HIGH NISP SITES

Assemblages from the settlements of Oegstgeest, Deventer, Zutphen, Hoorn, Leiderdorp, Haarlem, and Wijnaldum (discussed in section 4.1.2.3), were identified as notable high NISP accumulations. This is due to both the extensive scope of the research and the recovery methods employed, as fully sieved contexts yield more fish remains. These assemblages could potentially influence the results independently. It is crucial to consider the potential impact of high NISP accumulations on the analysis outcomes, as they may distort the representation of fish consumption patterns over time.

To evaluate the influence of high NISP accumulations on the results, a subset analysis excluding these settlements was conducted. The subset graph (Figure 5.2.3) revealed no significant changes in the primary diachronic trends, even when these high NISP assemblages and ship contexts were absent. It is noteworthy that the sudden increase in marine fish consumption is more evenly distributed between 900 and 1250, while migratory fish consumption is particularly prominent in the years preceding 750.

Assemblages that significantly affected the results are from Hoorn-Winston bioscoop. During the archaeological investigation of this site, a dung heap dating back to the period between 1280 and 1310 was meticulously sifted using mesh sizes of 1 and 0.25mm (Beerenhout, 2006, p. 2). This rigorous sieving process yielded a significant number of fish remains within a relatively short-dated timeframe, in a period where limited data is available. Remarkably, these findings accounted for more than half of the total Number of Identified Specimens (NISP) for this specific period. As a result, this particular site assumes a disproportionately influential role in the overall NISP analysis of the surrounding period around 1300. The NISP accumulations of this site accounted for single event of declining marine fish consumption and the increase in freshwater species consumption around 1300 visible in 5.1.1. Consequently, this settlement was identified as a statistical deviation from the more general trends of rising marine fish consumption.

Another site that impacted the results is Zutphen-Stadhuis. A layer of waste dating back to 1125-1175 was meticulously sieved through 1mm and 2mm meshes (Beerenhout, 2011b, p.2). This analysis yielded approximately 4346 fish remains, predominantly consisting of freshwater fish, within the 1125-1150 and 1150-1175

bin categories (Figure 5.1.2). In contrast, all other assemblages combined only accounted for 1487 fish remains. During this period, there is evidence of already significant freshwater fish consumption, but the contribution from Zutphen-Stadhuis stands out as disproportionately large. The specific sites of Hoorn-Winston bioscoop and Zutphen-Stadhuis emphasize the importance of averaging data from various assemblages as the only way to identify general trends, while sometimes neglecting the observable variations that exist (as discussed in chapter 1).

This subset analysis highlights that while the exclusion of sites with high NISP accumulations may impact specific aspects of the results, the overall trends remain consistent. However, one notable change is the earlier emergence and gradual increase of marine fish consumption between the period 900-1300. Additionally, the decline in freshwater consumption begins earlier without the influence of the Zutphen-Stadhuis assemblages. By excluding the high NISP sites, the graph exhibits a smoother and more coherent pattern, without abrupt spikes or overwhelming amounts of data that deviate from the overall trends. This approach allows for a clearer and more generalized representation of the data, providing a better understanding of the overarching picture. This subset analysis emphasizes the robustness of the general trends and underscores the importance of considering specific contexts with high NISP when interpreting the diachronic patterns in fish consumption.

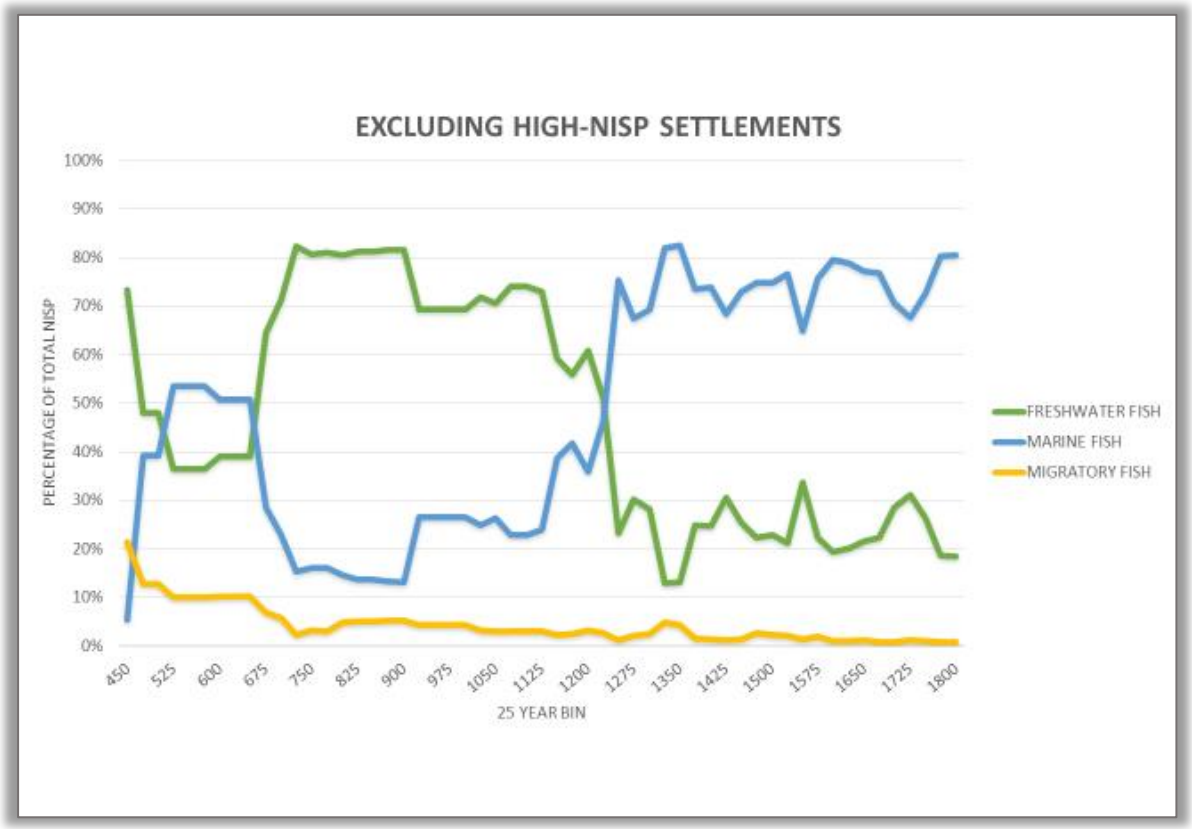


Figure 5.2.3: DFB-subset excluding settlement: Deventer, Hoorn, Leiderdorp, Oegstgeest, Wijnaldum, Zutphen, and Haarlem. Subset size of 360 assemblages.

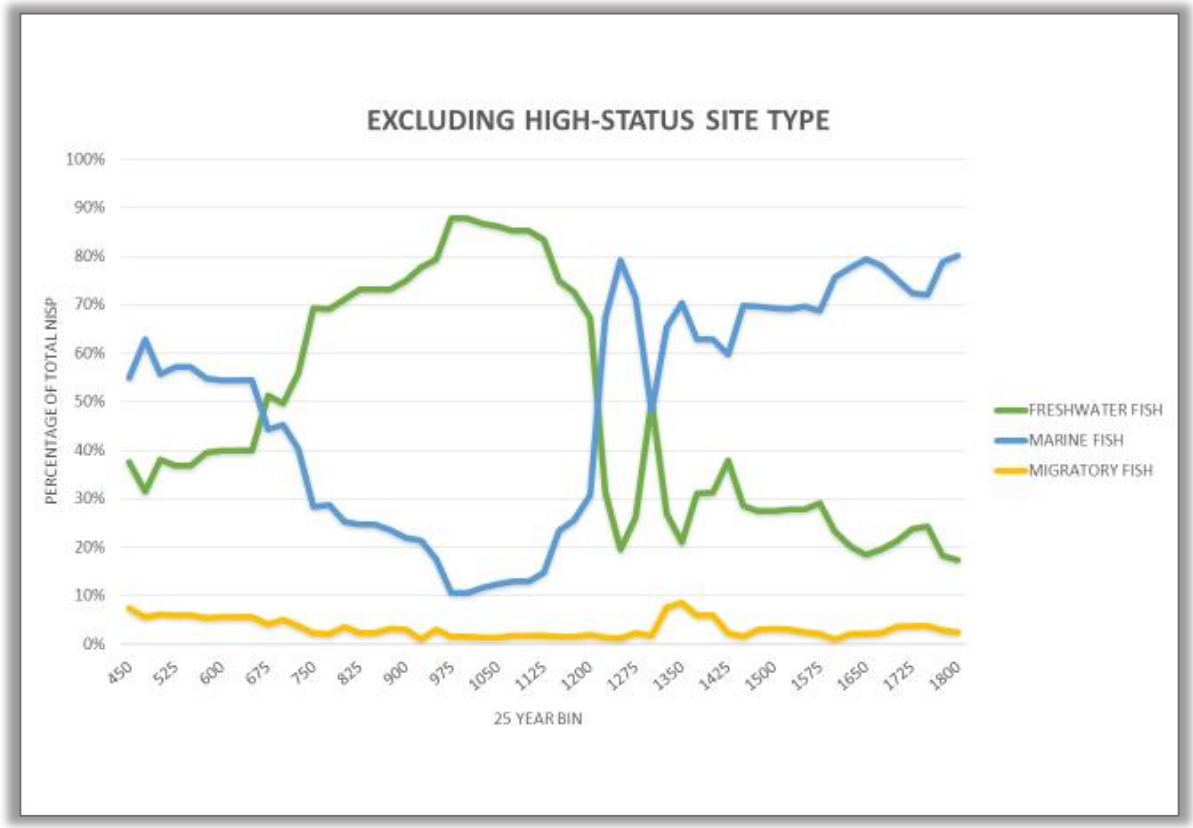


Figure 5.2.4: DFB-subset excluding site type: Monastery, church, palace, and castle. Subset size of 355 assemblages.

5.2.4 INFLUENCE OF HIGH-STATUS SITES

As discussed in section 4.1.2.3, another contextual factor that can potentially influence the analysis results is the presence of high-status assemblages, such as those found in monasteries, palaces, and castles. To assess the impact of this context on the results, a subset analysis of the DFB dataset was performed, excluding 107 assemblages from these specific types of sites (Figure 5.2.4). The findings of this analysis did not identify any significant deviations from the general diachronic trends. However, there was evidence suggesting an earlier emergence and a gradual increase in marine fish consumption between the period of 975-1250, in contrast to the general trend of rising marine fish consumption observed from 1175 onwards. This suggests that even when these high-status assemblages are excluded, the diachronic trends remain relatively consistent. While the presence of high-status assemblages has some influence on certain aspects of the results, it does not significantly alter the overall trends.

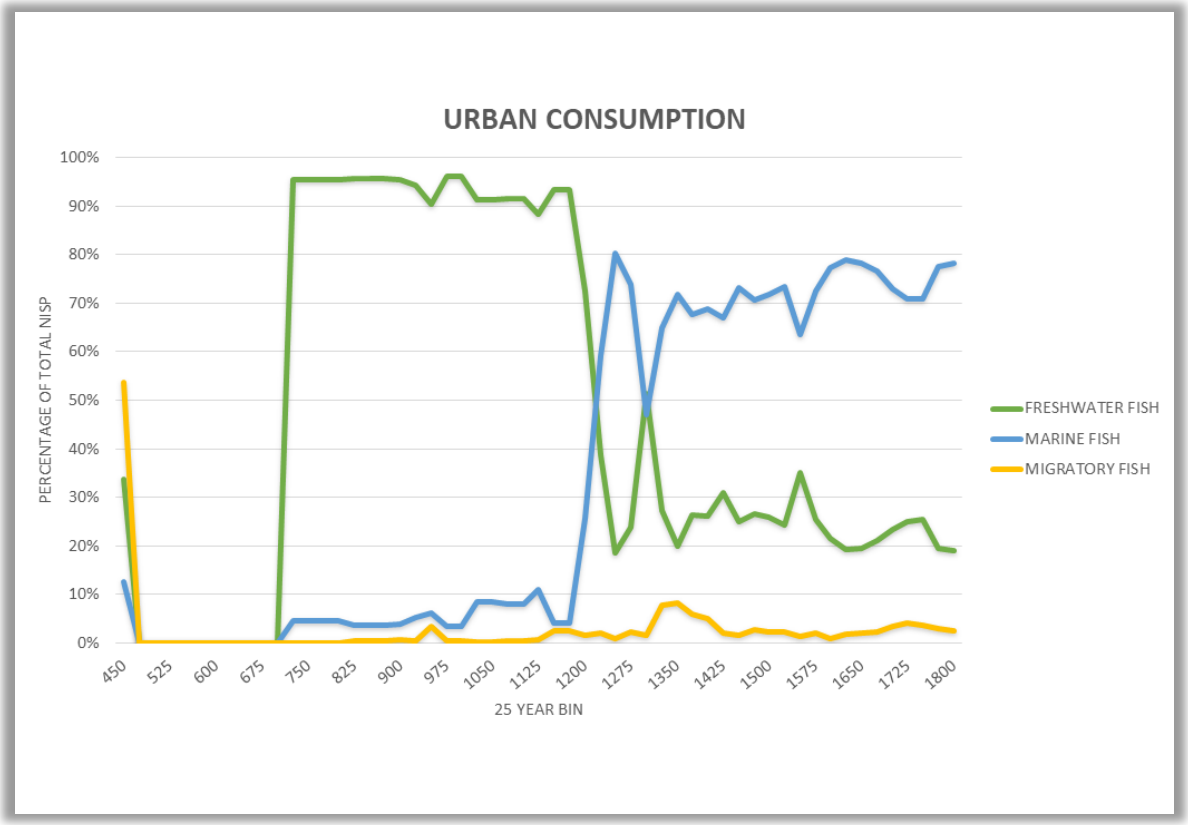
5.3 URBAN/RURAL CONSUMPTION OF FISH GROUPS

To determine the differences in diachronic trends between rural and urban areas, two DFB-dataset subset analyses were conducted. One subset consisted of 312 'urban' assemblages and the other subset comprised of 174 assemblages from rural areas. During the creation of the dataset, the original archaeological reports were examined to determine whether the context of fish remains was associated with an urban or rural setting. It was observed that contexts described as urban only started to appear in the archaeological record from 725 onwards. Before this time period, with the exception of the Roman period ending in 450, urban areas were not documented in the archaeological reports. This is evident from the gap between 475 and 725 in Figure 5.3.1, indicating the absence of references to urban contexts during that interval. After this gap, the main diachronic trends, as depicted in Figure 5.1.1, re-emerge. This includes the sudden onset of marine fish consumption around 1200, accompanied by a concurrent decline in freshwater fish consumption. Additionally, there is a minor increase in the consumption of migratory fishes between 1300 and 1400. These patterns align with the previously identified trends.

The analysis of rural areas (Figure 5.3.2) initially appears to exhibit the reappearance of the main diachronic trends. However, there are slight variations

when compared to Figure 5.1.1. These variations can be attributed to specific sites that heavily influence the trends observed. In particular, a significant increase in marine fish consumption is evident around 925-950 in rural areas, primarily driven by a single site called Wijnaldum-Tjitsma. This site exhibits a high total NISP of marine fishes, surpassing the numbers of other assemblages. Sixteen assemblages collectively contribute to a total of 102 marine fish bones, whereas the single assemblage from Wijnaldum alone accounts for 408 NISP of marine fishes during that period. Similarly, the peak in freshwater fish consumption around 1625-1650 can be attributed to a single assemblage from the castle of Haarzuilens-Kasteel De Haar, which was located in a rural area at the time but can be considered a 'high-status' context, as discussed in the previous section. However, this peak may also be part of a broader trend visible in Figure 5.1.2, where marine fish NISP declines entirely between 1650 and 1750. It is important to consider the representativeness of both locations, Wijnaldum and Haarzuilens in relation to the entire northern Low Countries, as their influence on the overall trends could be called into question. The dominant marine fish consumption in rural areas between 450 and 650 aligns with the general diachronic trend, as does the subsequent increase in freshwater fish consumption. However, a significant deviation occurs in rural areas with the rise of marine fish consumption around 1300, which contrasts with the rapid increase observed around 1200 in urban areas. Furthermore, the small increase in migratory fish consumption between 1300 and 1400 is not evident in rural areas, suggesting a trend unique to urban contexts.

The comparison between urban and rural areas highlights distinctive trends that are specific to each context. Notably, the sudden increase in marine fish consumption occurred much later in rural areas, with a time lag of over a hundred years compared to urban areas. This indicates that urban areas stand out by experiencing an earlier rise in marine fish consumption compared to the rest of the northern Low Countries. A similar pattern can be observed in the case of the increase in migratory fish consumption, which is also unique to urban areas.



3Figure 5.3.1: DFB-subset of urban assemblages. Selected by type: urban. Subset size of 301 assemblages.

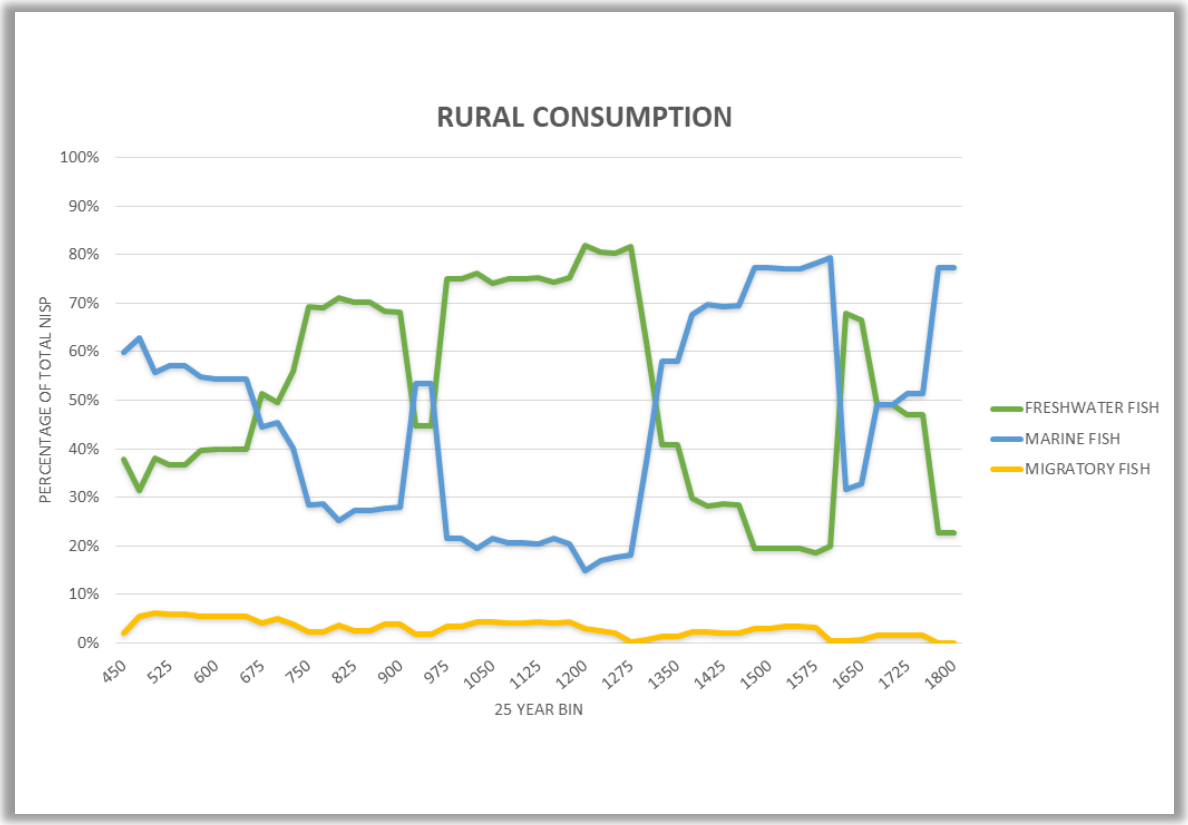


Figure 5.3.2: DFB-subset of rural assemblages. Selected by type: rural. Subset size of 152 assemblages.

5.4 COASTAL/INLAND CONSUMPTION OF FISH GROUPS

In order to investigate the differences in diachronic trends between coastal and inland provinces. Two subsets of the DFB-dataset were examined. The first subset included 300 assemblages from coastal provinces and the second subset consisted of 213 assemblages from inland provinces.

The analysis of assemblages from coastal provinces yielded a graph (Figure 5.4.1) that initially did not exhibit the same overall trends as Figure 5.1.1. Marine fish consumption was found to be the predominant choice throughout the entire timeline. However, there were three notable periods that deviated from this general trend. Around 850 and 1000, there was a temporary and rapid increase in freshwater fish consumption. These increases were identified in assemblages from the settlement of Leiderdorp, where freshwater fish was consumed in higher quantities than marine fish during those specific periods. Similarly, there was a significant rise in freshwater consumption around 1300, which could be attributed to the single settlement of Hoorn, as discussed in section 5.2.3. Despite these deviations, the analysis indicates that marine fish consumption remained significant in coastal provinces throughout the medieval and early modern periods. Upon closer examination of the graph, it can be observed that, in line with Figure 5.1.1, there is a presence of freshwater fish consumption, albeit in lower quantities, particularly before 1000. Marine fish, however, remained the more consumed choice. After 1000, there is a noticeable divergence between the lines representing freshwater and marine fish consumption in the graph, which aligns with the general diachronic trends depicted in Figure 5.1.1. However, it is interesting to note that the consumption of marine and freshwater fishes starts to drift further apart as early as 1000, almost two hundred years before the overall trend of increasing marine fish consumption observed around 1200. This indicates that the shift towards greater marine fish consumption in coastal provinces occurred earlier compared to the broader trend observed in the dataset. And finally, the absence of an increase in migratory fish consumption around 1300 suggests that this particular trend did not appear in the coastal provinces.

The analysis of assemblages from inland provinces revealed a graph (Figure 5.4.2) that exhibited significant divergence from the general diachronic trends. In contrast to the general trend observed in Figure 5.1.1, freshwater fish consumption

was nearly exclusive between 450 and 1175 in the inland provinces, whereas there was increased marine fish consumption in the earlier period between 450 and 650. After 1200, marine fish consumption gradually increased and became the dominant choice by 1325. This differs from the more sudden increase seen in the general trend. Interestingly, the rapid rise in marine fish consumption observed in the inland provinces was less pronounced and occurred at a more gradual pace compared to the general trend. However, the increase in migratory fish consumption around 1300 is prominently visible in this subset analysis. In contrast to coastal provinces, the impact of the decline in overall fish consumption after 1650, as depicted in Figure 5.1.2, is clearly evident in Figure 5.4.2 as well. The lines representing marine fish and freshwater fish consumption move closer together towards the end of the timeline.

The comparison between coastal and inland provinces highlights distinct trends that differentiate them from the general patterns observed in Figures 5.1.1 and 5.1.2. In coastal provinces, marine fish consumption remains consistently high throughout the entire timeline, with a notable increase after 1000. In contrast, in inland provinces, the rise in marine fish consumption in the twelfth and thirteenth centuries is evident but occurs more gradually and is less pronounced compared to the general trend. The increase in migratory fish consumption is specific to inland provinces, indicating that this trend originated from urban areas within those regions, as discussed in section 5.3. Furthermore, the decline in overall fish consumption after 1650 is primarily visible in inland provinces, suggesting that the decline in consumption had a greater impact on the dietary distribution in the inland regions when compared to coastal provinces.

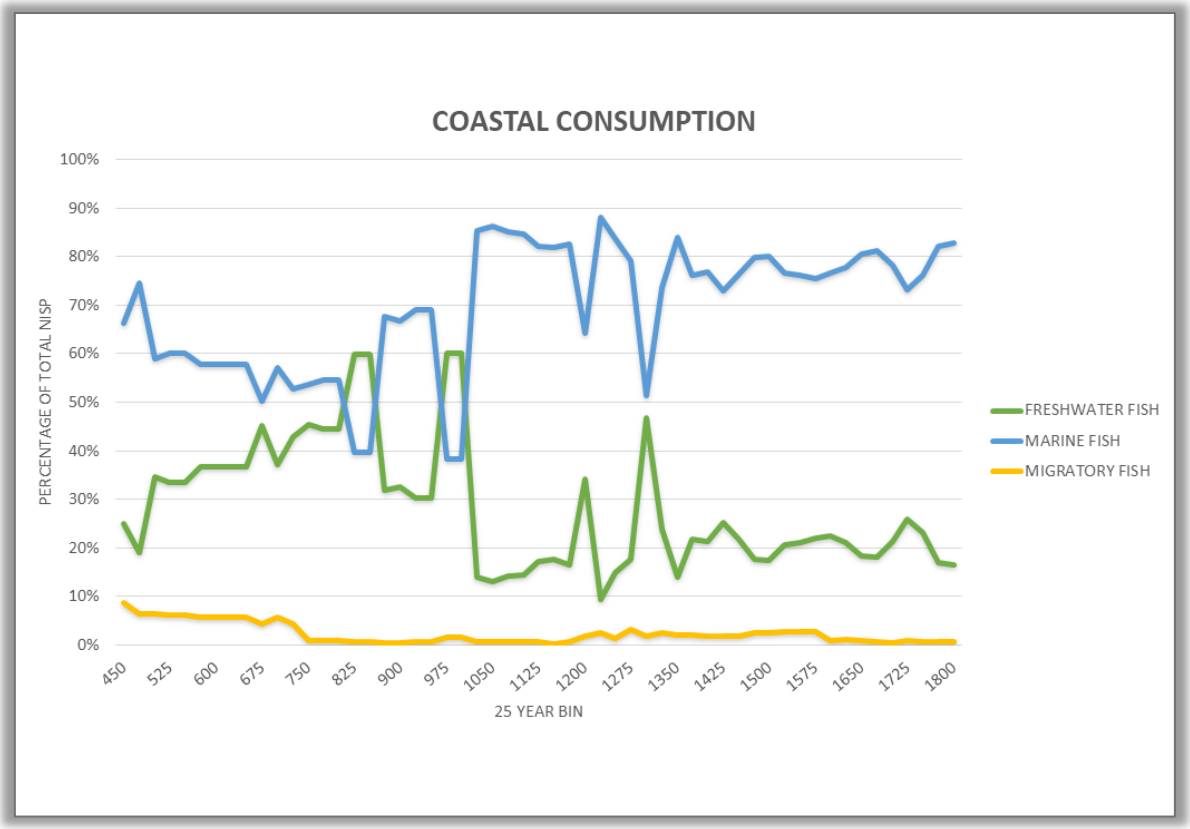


Figure 5.4.1: DFB-subset of coastal province assemblages. Selected by province: Friesland, Groningen, Noord-Holland, Zeeland, and Zuid-Holland. Subset size of 266 assemblages.

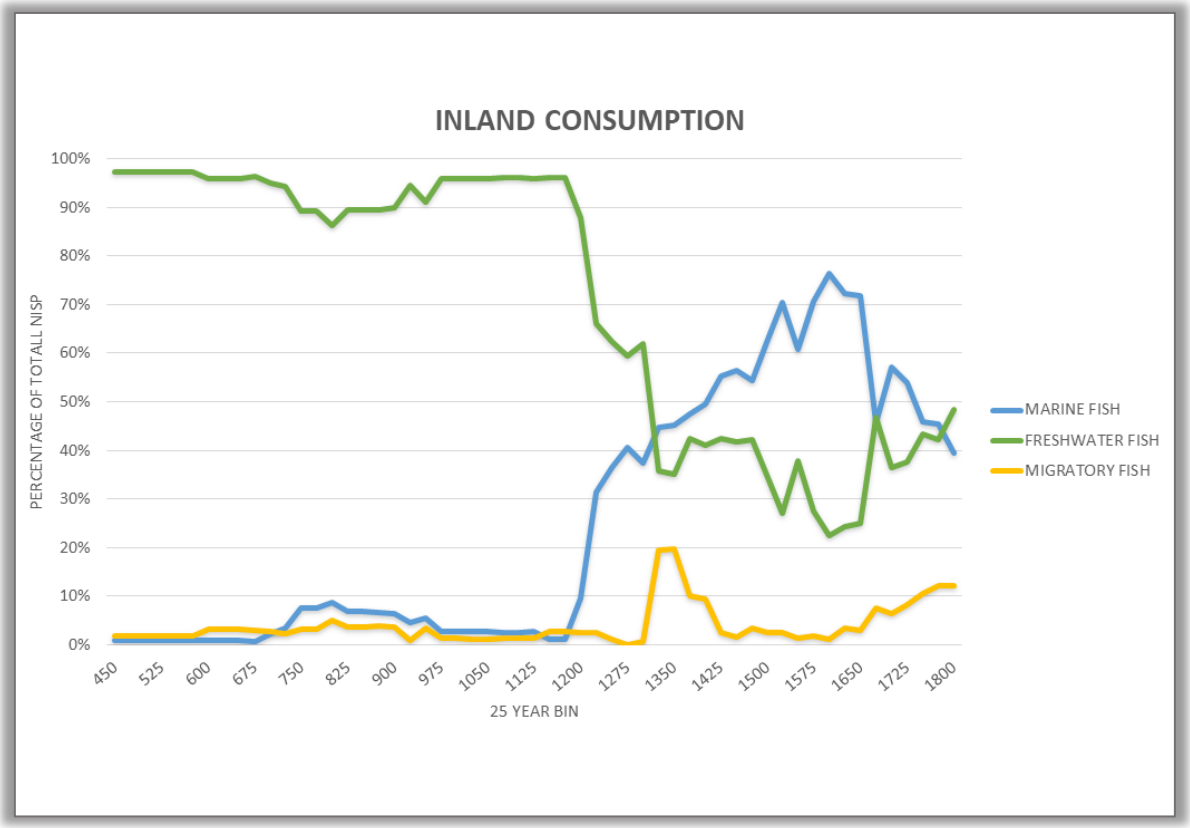


Figure 5.4.2: DFB-subset of inland province assemblages. Selected by province: Flevoland, Gelderland, Limburg, Noord-Brabant, Overijssel, and Utrecht. Subsete size of 196 assemblages.

5.5 PRIMARY CONSUMPTION FISHES

To determine the primary consumption fishes in the DFB-dataset, a detailed examination of the assemblages was conducted, analysing individual fish species and families comprising the total NISP. Tables 5.5.1, 5.5.2 and 5.5.3 provide an overview of the fish and fish families present in 468 assemblages between 450-1800.

It was observed that not all fish species and families were consumed with the same frequency. The fish families that contributed more than ten percent to the total NISP within their respective groups (marine, freshwater, and migratory fishes) were identified as primary consumption fishes. These include the marine families of herrings (Clupeidae), codfishes (Gadidae), and righteye flounders (Pleuronectidae). In the freshwater group, cyprinids (Cyprinidae), freshwater eels (Anguillidae), and perches (Percidae). And within the migratory fishes, sturgeons (Acipenseridae), smelts (Osmeridae), and salmonids (Salmonidae).

It is important to note that while these primary consumption fishes were the most significant contributors to the overall fish diet, other 'secondary' consumption fishes were also consumed, albeit in smaller quantities. These secondary consumption fishes, although not as prominent, still played a role in the diet of the people of the northern Low Countries. However, by examining the fish families that constitute the predominant portion of the dataset in each group, we can gain valuable insights into the general diachronic trends of fish consumption, without overwhelming the analysis with an abundance of intricate details about secondary consumption fishes.

Table 5.5.1: Marine fishes in the DFB-dataset (450-1800).

Fish group	Family	Latin species name	English species name	Family NISP	Family % of total	Species NISP	Species % of Family	Species % of total
Marine fishes								
	Ammodytidae		**Sandlances**	**2**	**0,0%**			
		Ammodytes tobianus	Lesser sand eel			1	50,0%	0,0%
		Indet.	Sand lances			1	50,0%	0,0%
	Belonidae		**Needlefishes**	**96**	**0,1%**			
		Belone belone	Garfish			96	100,0%	0,1%
	Bothidae		**Lefteye flounders**	**325**	**0,3%**			
		Scophthalmus maximus	Turbot			233	71,7%	0,2%
		Scophthalmus rhombus	Brill			16	4,9%	0,0%
		Indet.	Lefteye flounders			76	23,4%	0,1%
	Carangidae		**Carangids**	**18**	**0,0%**			
		Trachurus trachurus	Atlantic horse mackerel			18	100,0%	0,0%
	Clupeidae		**Herrings**	**44225**	**34,7%**			
		Clupea harengus	Atlantic herring			43910	93,1%	34,5%
		Sardina pilchardus	European pilchard			6	0,0%	0,0%
		Sprattus sprattus	European sprat			162	0,3%	0,1%
		Indet.	Herrings			147	0,3%	0,1%
	Congridae		**Conger Eels**	**6**	**0,0%**			
		Conger conger	European conger			6	100,0%	0,0%
	Cottidae		**Sculpins**	**12**	**0,0%**			
		Myoxocephalus scorpius	Shorthorn sculpin			12	100,0%	0,0%
	Dasyatidae		**Whiptail stingrays**	**2**	**0,0%**			
		Dasyatis pastinaca	Common stingray			2	100,0%	0,0%
	Engraulidae		**Anchovies**	**2929**	**2,3%**			
		Engraulis encrasicolus	European anchovy			2929	100,0%	2,3%
	Gadidae		**Codfishes**	**39981**	**31,4%**			
		Ciliata mustela	Fivebeard rockling			6	0,0%	0,0%
		Gadus morhua	Atlantic cod			13340	33,4%	10,5%
		Melanogrammus aeglefinus	Haddock			10360	25,9%	8,1%
		Merlangius merlangus	Whiting			3697	9,2%	2,9%
		Molva molva	Common Ling			146	0,4%	0,1%
		Molva	Lings			6	0,0%	0,0%
		Pollachius virens	Saithe			2	0,0%	0,0%
		Trisopterus minutus	Poor cod			2	0,0%	0,0%
		Indet.	Codfishes			12422	31,1%	9,8%
	Lophiidae		**Anglerfishes**	**3**	**0,0%**			
		Lophiidae	Goosefishes			3	100,0%	0,0%
	Lotidae		**Rocklings**	**28**	**0,0%**			
		Brosme brosme	Cusk			28	100,0%	0,0%
	Merlucciidae		**Merluccid hakes**	**3**	**0,0%**			
		Merluccius merluccius	European hake			3	100,0%	0,0%
	Moronidae		**Temperate basses**	**11**	**0,0%**			
		Dicentrarchus labrax	European bass			11	100,0%	0,0%
	Mugilidae		**Mullets**	**419**	**0,3%**			
		Chelon	Mullets			1	0,2%	0,0%
		Chelon labrosus	Thicklip grey mullet			52	12,4%	0,0%
		Liza ramada	Thinlip mullet			82	19,6%	0,1%
		Indet.	Mullets			284	67,8%	0,2%
	Mullidae		**Goatfishes**	**1**	**0,0%**			
		Mullus surmuletus	Striped red mullet			1	100,0%	0,0%
	Pleuronectidae		**Righteye flounders**	**37351**	**29,3%**			

	Hippoglossus hippoglossus	Atlantic halibut			43	0,1%	0,0%
	Limanda limanda	Common dab			125	0,3%	0,1%
	Platichthys flesus	European flounder			1137	3,0%	0,9%
	Pleuronectes platessa	European plaice			3442	9,2%	2,7%
	Indet.	Righteye flounders			32604	87,3%	25,6%
Rajidae		**Skates**	**824**	**0,6%**			
	Raja batis	Common skate			20	2,4%	0,0%
	Raja clavata	Thornback ray			750	91,0%	0,6%
	Raja montagui	Spotted ray			16	1,9%	0,0%
	Raja	Skates			14	1,7%	0,0%
	Indet.	Skates and rays			24	2,9%	0,0%
Sciaenidae		**Drums or croakers**	**6**	**0,0%**			
	Argyrosomus regius	Meagre			6	100,0%	0,0%
Scombridae		**Tunas and mackerels**	**35**	**0,0%**			
	Scomber japonicus	Chub mackerel			1	2,9%	0,0%
	Scomber scombrus	Atlantic mackerel			28	80,0%	0,0%
	Thunnus thynnus	Atlantic bluefin tuna			6	17,1%	0,0%
Scyliorhinidae		**Catsharks**	**1**	**0,0%**			
	Scyliorhinus canicula	Small-spotted catshark			1	100,0%	0,0%
Soleidae		**True soles**	**534**	**0,4%**			
	Solea solea	Common sole			528	98,9%	0,4%
	Indet.	Soles			6	1,1%	0,0%
Sparidae		**Sea breams and porgies**	**2**	**0,0%**			
	Pagellus bogaraveo	Blackspot seabream			2	100,0%	0,0%
Squalidae		**Dogfishes**	**32**	**0,0%**			
	Squalidae	Dogfishes			15	46,9%	0,0%
	Squalus acanthias	Spiny dogfish			17	53,1%	0,0%
Squatinidae		**Angel sharks**	**6**	**0,0%**			
	Squatina squatina	Angelshark			6	100,0%	0,0%
Trachinidae		**Weeverfish**	**6**				
	Trachinus draco	Greater weever			6	100,0%	0,0%
Triakidae		**Houndshark**	**6**				
	Galeorhinus galeus	School shark			2	33,3%	0,0%
	Mustelus mustelus	Common smooth-hound			4	66,7%	0,0%
Triglidae		**Sea robins**	**398**	**0,3%**			
	Chelidonichthys cuculus	Red gurnard			5	1,3%	0,0%
	Chelidonichthys lucerna	Tub gurnard			135	33,9%	0,1%
	Chelidonichthys	Smallscaled gurnards			2	0,5%	0,0%
	Eutrigla gurnardus	Grey gurnard			68	17,1%	0,1%
	Trigla lyra	Piper gurnard			1	0,3%	0,0%
	Indet.	Gurnards			187	47,0%	0,1%
Xiphiidae		**Swordfish**	**1**	**0,0%**			
	Xiphias gladius	Swordfish			1	100,0%	0,0%
Zoarcidae		**Eelpouts**	**3**	**0,0%**			
	Zoarces viviparus	Viviparous eelpout			3	100,0%	0,0%
Indet.			**86**	**0,1%**			
	Chondrichthyes	Cartilaginous fishes			17	19,8%	0,0%
	Elasmobranchii	Sharks, rays, skates and sawfishes			6	7,0%	0,0%
	Rajiformes	Flattened cartilaginous fishes			63	73,3%	0,0%
Total			**127352**	**100,0%**	**127352**		**100,0%**

Table 5.5.2: Freshwater fishes in the DFB-dataset (450-1800).

Fish group	Family	Latin species name	English species name	Family NISP	Family % of total	Species NISP	Species % of Family	Species % of total
Freshwater fishes								
	Anguillidae		**Freshwater eels**	**21667**	**35,5%**			
		Anguilla anguilla	European eel			21667	100,0%	35,5%
	Cottidae		**Sculpins**	**1**	**0,0%**			
		Cottidae	Sculpins			1	100,0%	0,0%
	Cyprinidae		**Cyprinids**	**21938**	**35,9%**			
		Abramis brama	Common bream			3366	15,3%	5,5%
		Alburnus alburnus	Common bleak			17	0,1%	0,0%
		Barbus barbus	Common barbel			130	0,6%	0,2%
		Blicca bjoerkna	White bream			312	1,4%	0,5%
		Carassius carassius	Crucian carp			24	0,1%	0,0%
		Chondrostoma nasus	Common nase			9	0,0%	0,0%
		Cyprinus carpio	Eurasian carp			668	3,0%	1,1%
		Gobio gobio	Gudgeon			1	0,0%	0,0%
		Leuciscus idus	Ide			77	0,4%	0,1%
		Leuciscus leuciscus	Common dace			15	0,1%	0,0%
		Leuciscus	Eurasian daces			1	0,0%	0,0%
		Rutilus rutilus	Common roach			645	2,9%	1,1%
		Scardinius erythrophthalmus	Common rudd			183	0,8%	0,3%
		Squalius cephalus	Common chub			21	0,1%	0,0%
		Tinca tinca	Tench			148	0,7%	0,2%
		Indet.	Cyprinids			16321	74,4%	26,7%
	Esocidae		**Pikes**	**4771**	**7,8%**			
		Esox lucius	Northern pike			4771	100,0%	7,8%
	Gadidae		**Codfishes**	**16**	**0,0%**			
		Lota lota	Burbot			16	100,0%	0,0%
	Gasterosteidae		**Sticklebacks**	**1496**	**2,5%**			
		Gasterosteus	Sticklebacks			1356	90,6%	2,2%
		Gasterosteus aculeatus	Three-spined stickleback			81	5,4%	0,1%
		Indet.	Sticklebacks			59	3,9%	0,1%
	Nemacheilidae		**Stone loaches**	**1**	**0,0%**			
		Barbatula barbatula	Stone loach			1	100,0%	0,0%
	Percidae		**Perches**	**7818**	**12,8%**			
		Gymnocephalus cernua	Ruffe			456	5,8%	0,7%
		Perca fluviatilis	European perch			6998	89,5%	11,5%
		Indet.	Perches			364	4,7%	0,6%
	Salmonidae		**Salmonids**	**2**	**0,0%**			
		Salmo trutta fario	River trout			2	100,0%	0,0%
	Siluridae		**Catfishes**	**468**	**0,8%**			
		Silurus glanis	Wels catfish			468	100,0%	0,8%
	Indet.			**2847**	**4,7%**			
		Indet.	Freshwater fishes			2847	100,0%	4,7%
	Total			**61025**	**100,0%**	**61025**		**100,0%**

Table 5.5.3: Migratory fishes in the DFB-dataset (450-1800).

Fish group	Family	Latin species name	English species name	Family NISP	Family % of total	Species NISP	Species % of Family	Species % of total
Migratory fishes								
	Acipenseridae		**Sturgeons**	**787**	**16,2%**			
		Acipenser oxyrinchus	Atlantic sturgeon			22	2,8%	0,5%
		Acipenser sturio	European sturgeon			748	95,0%	15,4%
		Acipenser	Sturgeons			17	2,2%	0,4%
	Clupeidae		**Herrings**	**443**	**9,1%**			
		Alosa alosa	Allis shad			92	20,8%	1,9%
		Alosa fallax	Twait shad			187	42,2%	3,9%
		Alosa	River herrings			164	37,0%	3,4%
	Osmeridae		**Smelts**	**2499**	**51,5%**			
		Osmerus eperlanus	European smelt			2499	100,0%	51,5%
	Salmonidae		**Salmonids**	**1122**	**23,1%**			
		Coregonus lavaretus	Lavaret			25	2,2%	0,5%
		Coregonus oxyrinchus	Houting			177	15,8%	3,6%
		Coregonus	Whitefishes			99	8,8%	2,0%
		Salmo salar	Atlantic salmon			369	32,9%	7,6%
		Salmo trutta	Brown trout			46	4,1%	0,9%
		Salmo	Salmons and trouts			279	24,9%	5,8%
		Indet.	Salmonids			127	11,3%	2,6%
	Total			**4851**	**100,0%**	**4851**		**100,0%**

5.6 DIACHRONIC TRENDS OF PRIMARY CONSUMPTION FISHES

To analyse the diachronic trends within each fish group, a 100% stacked column chart (Figure 5.6.1) was created to display the primary consumption fish families of each group. This chart complements Figure 5.1.1 by visually illustrating the composition of each fish group as presented in that figure. Specifically, Figure 5.6 demonstrates the relative distribution of freshwater fishes, including perches, cyprinids, and freshwater eels; marine fishes, comprising codfishes, herrings, and righteye flounders; and migratory fishes, consisting of smelts, salmonids, and sturgeons. Figures 5.6.2, 5.6.3, and 5.6.4 provide additional data regarding the total NISP for each fish group, categorized in 25-year bins on stacked column charts, which complement Figure 5.6.1.

The distribution patterns, shown in Figure 5.6.1, demonstrate that herring and righteye flounders dominated marine fish consumption during the period between 450 and 650, while codfishes contributed to a lesser extent. Freshwater eels and cyprinids were also consumed, albeit in lesser quantities. Migratory fishes,

including sturgeon and salmonids, made a modest contribution to the diet during this timeframe. In the subsequent centuries, marine fish consumption declined while freshwater fish consumption rose steadily. Freshwater eels, cyprinids and perches emerged as a more prominent consumption fish after 650, while the consumption of herring and righteye flounders decreased. This rising trend in the proportion of the diet consisting of freshwater fishes was influenced by a significant decline in the consumption of marine and migratory fish (as shown in Figures 5.6.3 and 5.6.4). However, it is worth noting that the total numbers of freshwater fish NISP also displayed a downward trend up until 1300, although to a lesser extent (Figure 5.6.2). The substantial increase in the consumption of cyprinids and freshwater eels during in the twelfth century can be attributed to the single high-NISP site of Zutphen-Stadhuis. However, it is worth noting that this particular site has been discussed in section 5.2.3 and its influence on the timeline can be disregarded to form a more generalized image of that period.

Between 1000 and 1200, there was a resurgence in the consumption of codfishes after a decline spanning several centuries. Initially, codfish consumption constituted a relatively smaller portion of marine fish consumption but showed a growing trend, particularly after the year 1000. Following 1200, the consumption of codfishes, as well as the righteye flounders, experienced a substantial increase, consistently rising in quantity well into the seventeenth century. The period between 1200-1375 is characterized by a significant decline in freshwater eels. While there was a subsequent rise in the total numbers of freshwater fish in the fourteenth and fifteenth centuries, it did not constitute a larger portion of the overall diet compared to the increasing consumption of marine fish.

Starting from the early fourteenth century and intensifying around 1375, herring consumption significantly gains importance within the marine fish group, although consumption of cod and righteye flounder continued to dominate. Interestingly, there was also a notable shift in the significance of migratory smelts during this period. After a prolonged period of relatively limited consumption, the importance of smelts experienced a sudden surge in the fourteenth century. While the total NISP of herring and smelts decreased in the fifteenth century, their overall significance remained relatively stable until the end of the timeline, with occasional fluctuations in their share of the total fish consumption.

The total NISP of all primary consumption fishes reveals a downwards trend during the seventeenth and eighteenth centuries. However, when examining Figure 5.6.1, no significant changes to the portion of fish families in the diet can be observed over the same time period.

In summary, the analysis of primary consumption fishes reveals distinct trends that supplement the trends discussed in section 5.1. From 450 to 650, there was a higher emphasis on marine consumption, particularly herring and righteye flounders. In the period of 650-950, freshwater consumption, especially of eels and cyprinids, became prominent. The subsequent period from 950 to 1200 experienced a decline in overall fish consumption, affecting marine and migratory fish consumption, and freshwater fish in lesser extent. Between 1000 and 1200, however, there was a slight increase in the consumption of codfishes, this trend extended exponentially, accompanied by a rise in righteye flounder consumption, that extends into the seventeenth century. The period between 1200-1375 is characterized by a significant decline in freshwater eels and around 1375, herring consumption surged, along with a notable increase in smelt consumption. During the seventeenth and eighteenth centuries, the total NISP of all primary consumption fishes displayed a downward trend, while no significant changes were observed in the portion of fish families in the diet.

In order to examine regional differences between coastal and inland provinces, as well as variations between rural and urban areas, further analysis was conducted on marine and freshwater fishes' subsets. However, due to an insufficient amount of data on migratory fishes, as evidenced by the low percentages of the migratory fish group in Figure 5.6.1, the total NISP of this group did not provide enough information for a detailed subset examination. The NISP quantities per 25-year bin fell below the threshold of 30, which was discussed in section 4.1.1 as a minimal requirement for the data collection parameters. As a result, no subset analysis of migratory fishes regarding rural and urban areas, as well as coastal and inland provinces, will be discussed.

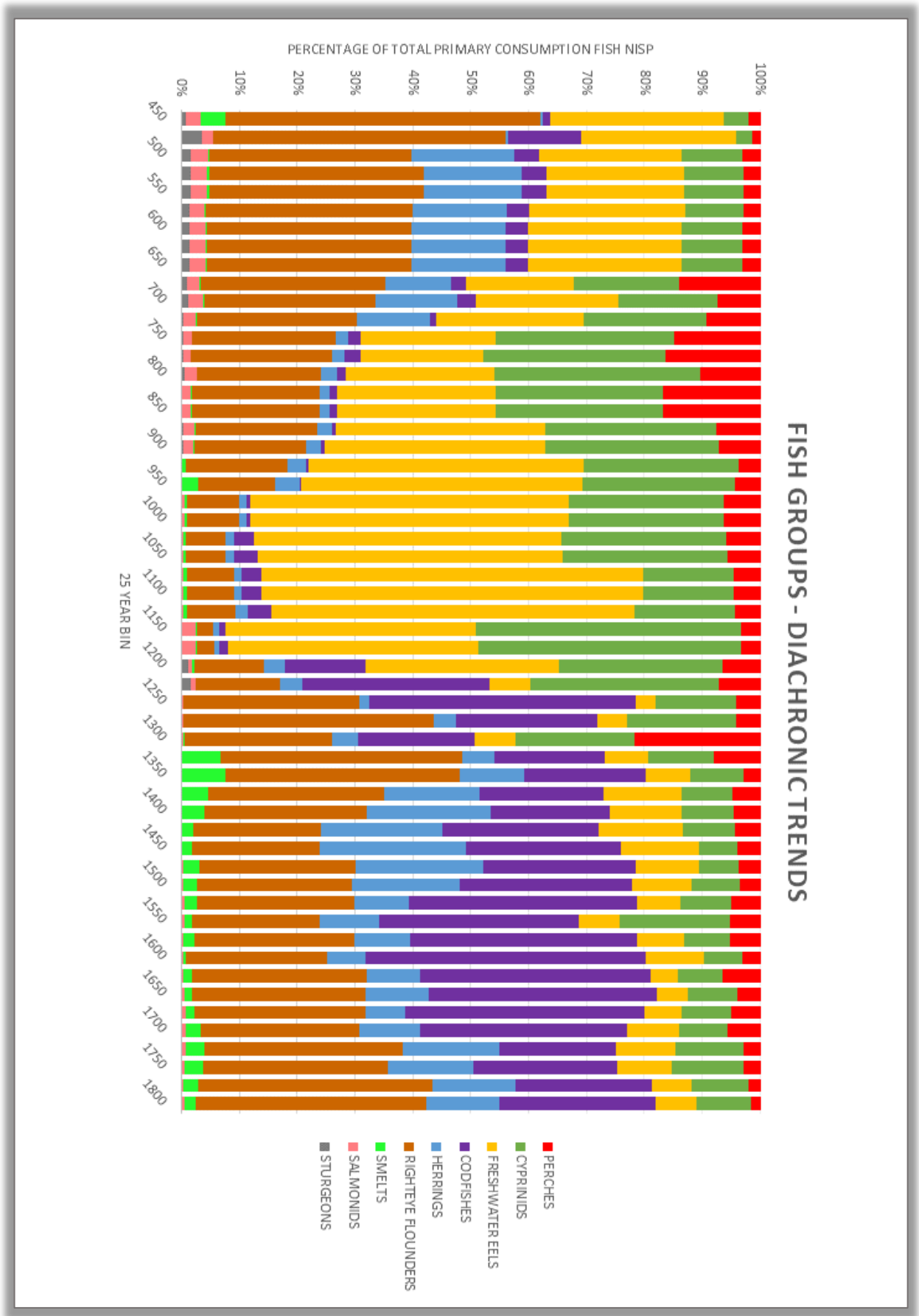


Figure 5.6.1: Diachronic trends of primary consumption fishes within fish groups, derived the DFB-dataset - excluding site type: ship with trade context (450-1800 range = 462 assemblages/130 sites).

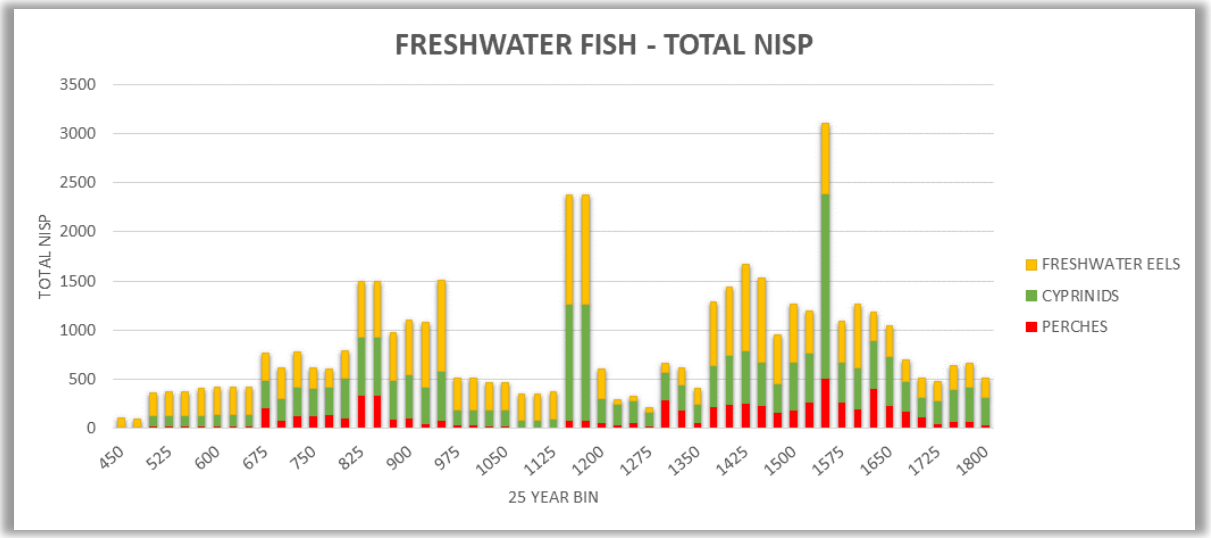


Figure 5.6.2: Total NISP of primary freshwater consumption fishes

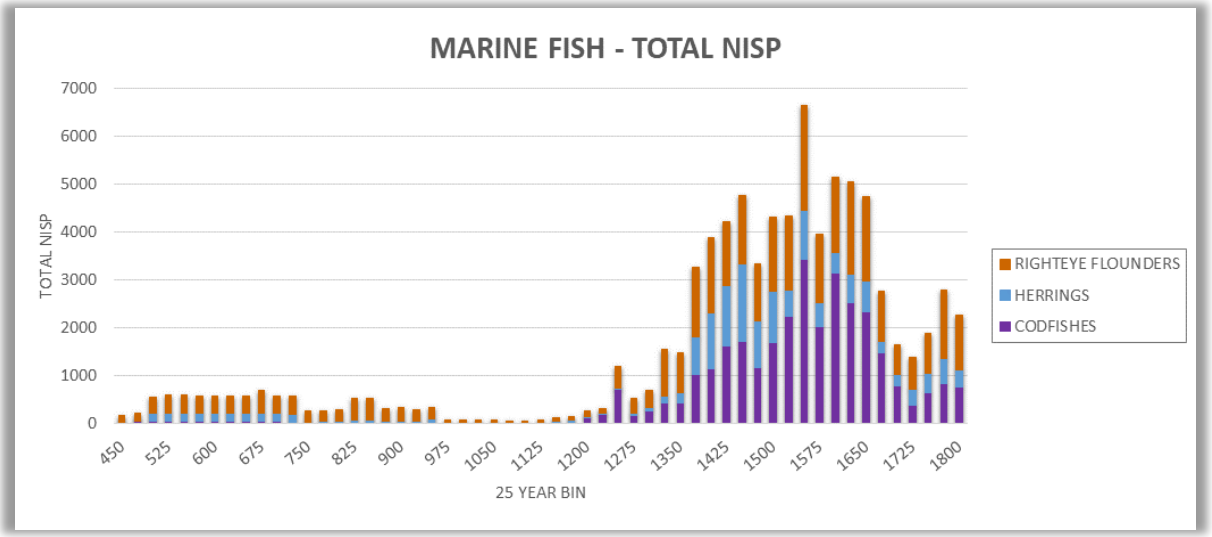


Figure 5.6.3: Total NISP of primary marine consumption fishes

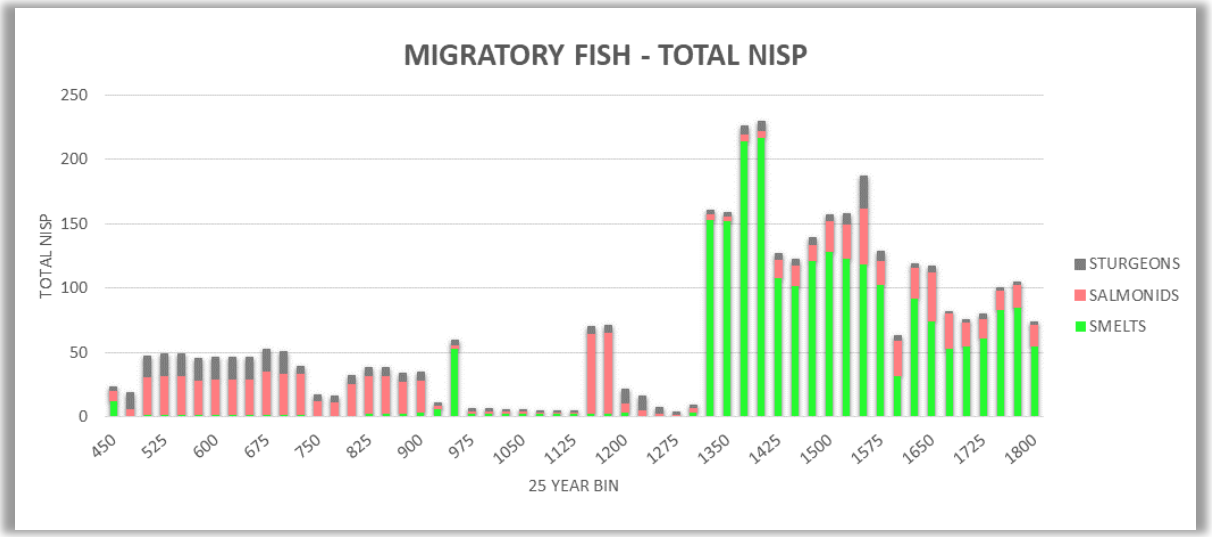


Figure 5.6.4: Total NISP of primary migratory consumption fishes

5.7 URBAN/RURAL CONSUMPTION OF PRIMARY CONSUMPTION FISHES

Two 100% stacked column charts are used to analyse the changing trends in primary consumption fishes between urban and rural areas. These charts are accompanied by a corresponding total NISP chart. In urban areas (Figure 5.7.1), the overall trends are similar to those observed in Figure 5.6.1. The only notable difference is the relatively low presence of righteye flounders in the centuries before 1200, and the higher numbers of herring and perch in the eighth century. As we progress into the 13th century, there is a significant increase in the consumption of cod and righteye flounders, followed by herring in the fourteenth and fifteenth centuries.

The proportion of righteye flounder, but also cyprinid and perch consumption in rural areas (as shown in Figure 5.7.2) generally appears much higher compared to urban areas. Rural consumption of righteye flounders and herring is relatively high during the period 450-750, while Cyprinids constitute the largest part of the diet from 750-900. The significant rise in marine consumption in rural areas occurs after 1275, which is 100 years later than in urban areas, as previously discussed in section 5.3. This increase follows a period of relatively low NISP for all fish families between 975-1375 (as shown in Figure 5.7.4). During this period, Cyprinids are briefly consumed in larger quantities, which is visible in Figure 5.7.2. The shift in the diet towards marine fishes begins with righteye flounders in the thirteenth century, and it is only in the late fourteenth century that the proportion and total NISP of cod, herring, and righteye flounders significantly increase compared to freshwater fishes, although herring makes up a larger part of the diet in urban areas when compared to rural areas. A rise in numbers contemporary to marine fishes is observed in the total NISP of freshwater eels, but the increase in marine fishes is relatively so substantial that it is not visible on the stacked chart. The consumption of all fishes decreases significantly when considering the total NISP in the seventeenth and eighteenth centuries. Consequently, the proportion of marine fishes in the diet decreases, and there is a nearly equal consumption of freshwater fishes compared to marine fish consumption. The disparity in the decline of consumption between urban and rural areas during that period becomes evident when comparing Figure 5.7.3 with 5.7.4. The decline in consumption is

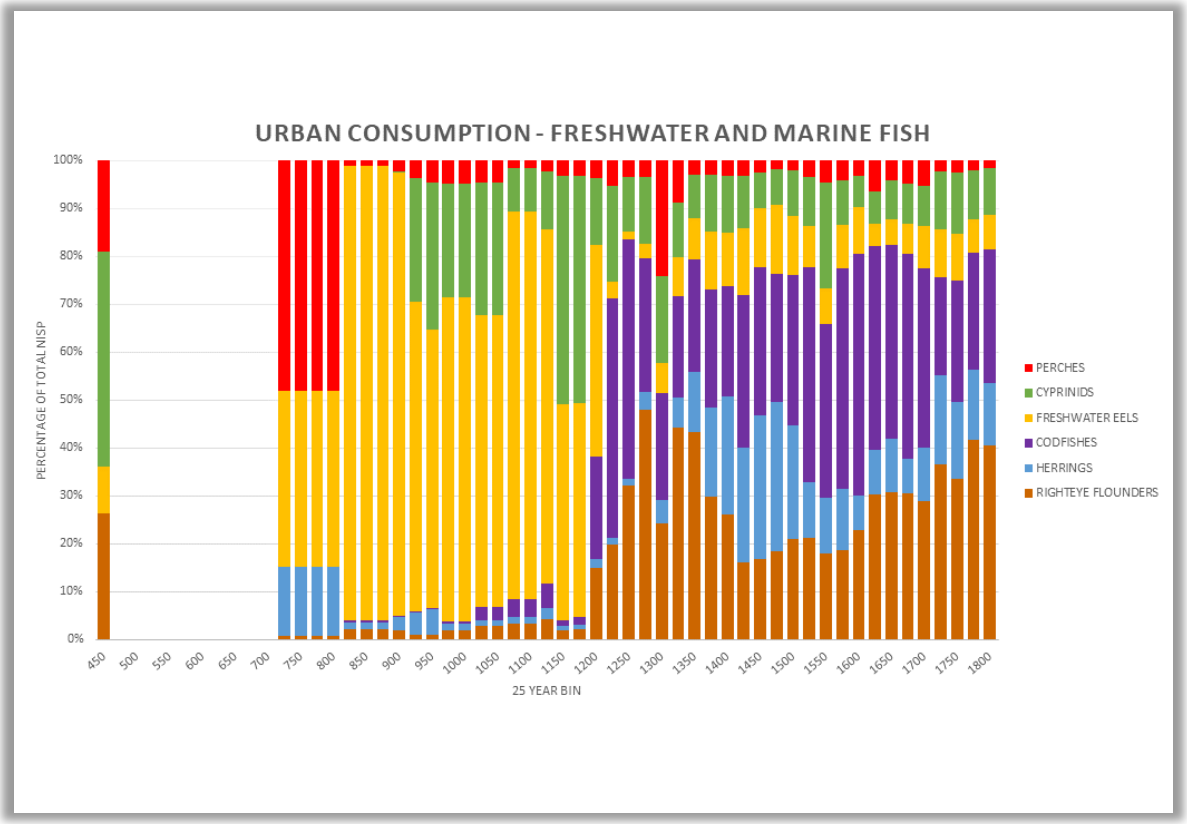


Figure 5.7.1: diachronic trends of urban consumption of primary feshwater and marine fishes. Selected by type: urban. Subset size of 301 assemblages.

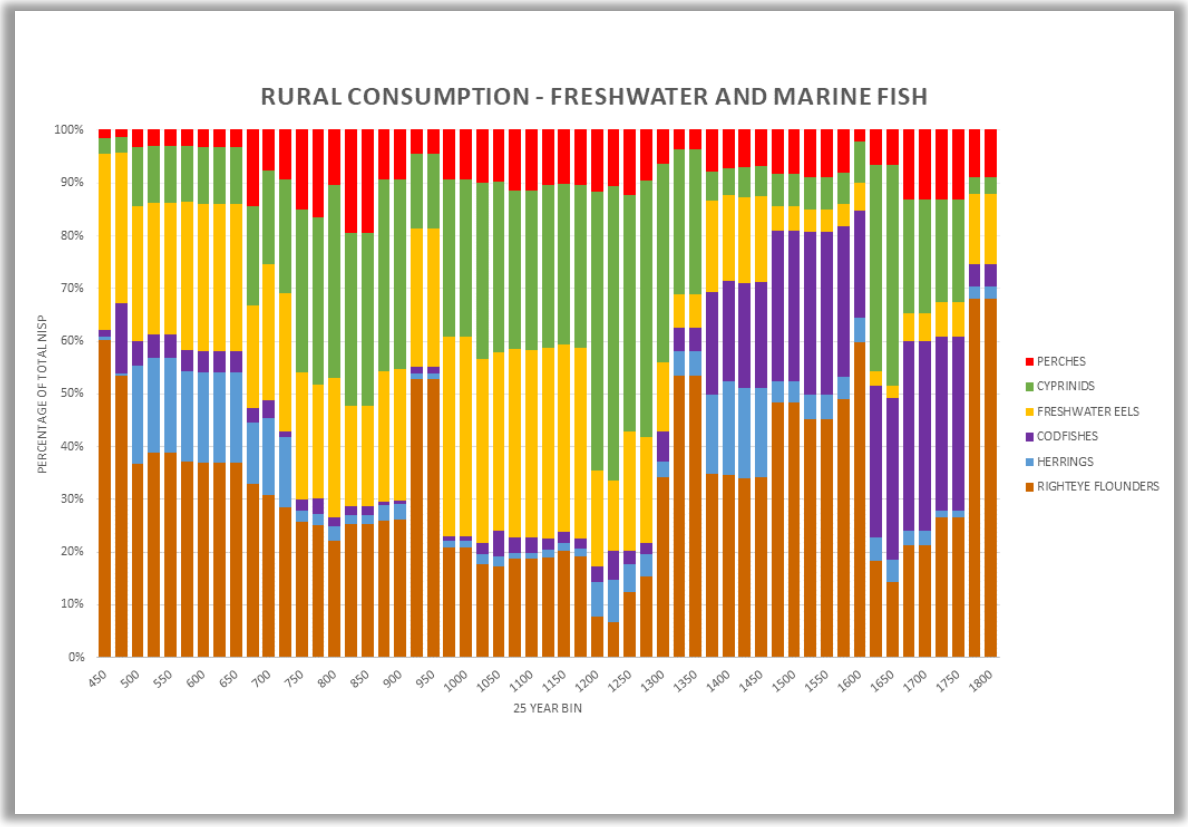


Figure 5.7.2: diachronic trends of rural consumption of primary feshwater and marine fishes. Selected by type: rural. Subset size of 152 assemblages.

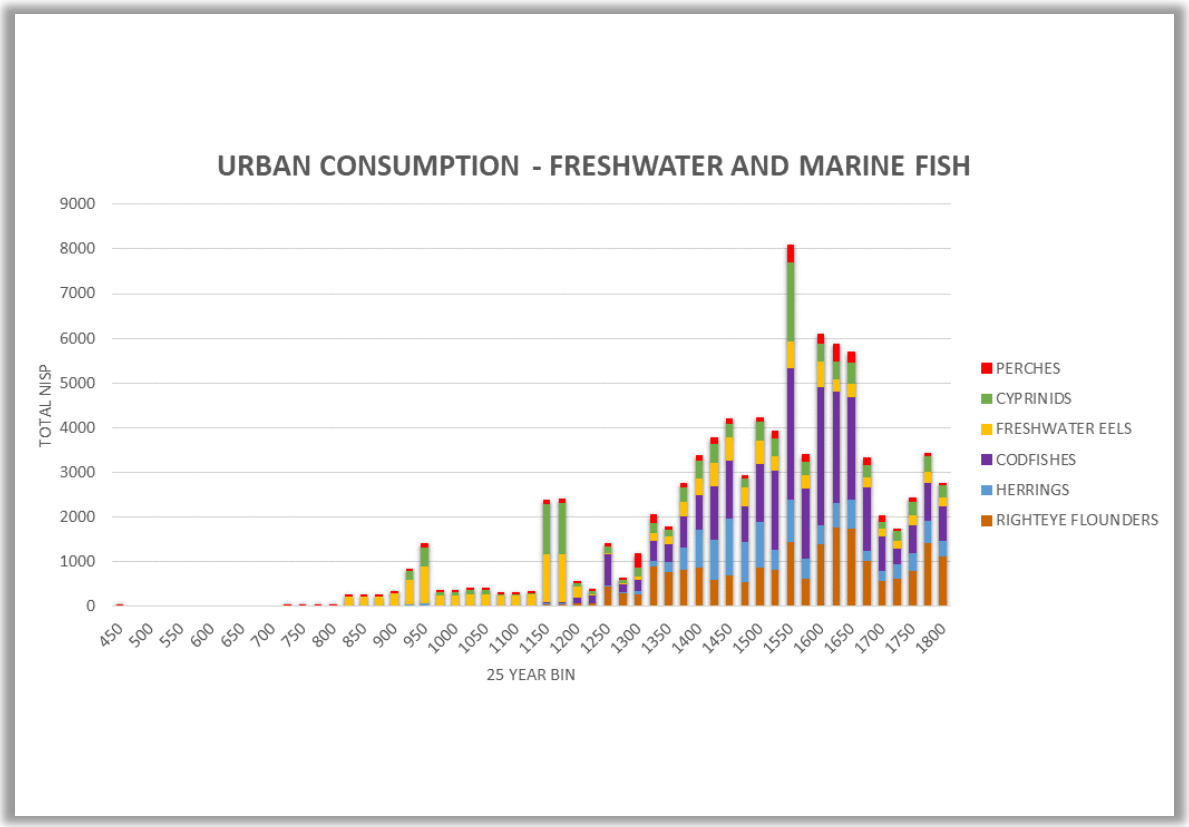


Figure 5.7.3: Total NISP of primary marine and freshwater consumption fishes in urban areas

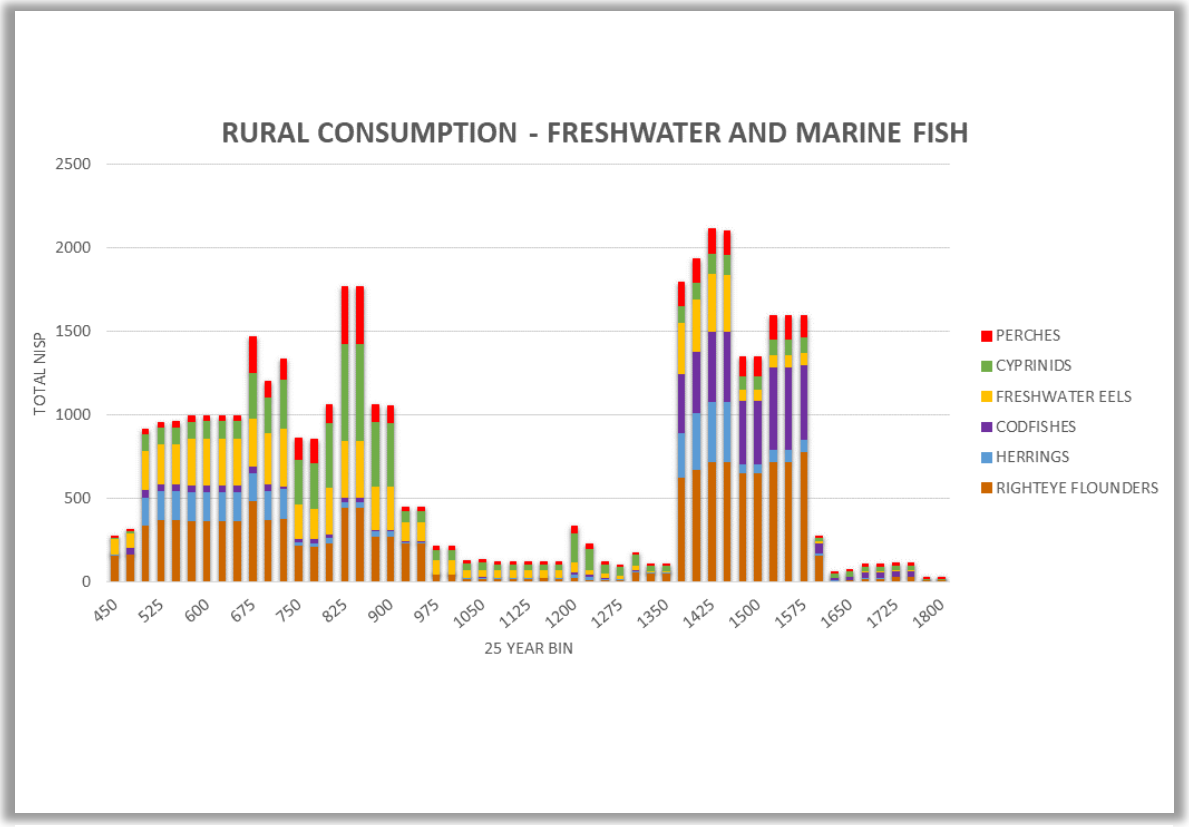


Figure 5.7.4: Total NISP of primary marine and freshwater consumption fishes in rural areas

less pronounced and recovers more quickly in urban areas compared to rural areas.

The main findings of the comparison between urban and rural consumption highlight distinct consumption patterns in rural areas compared to urban areas. Especially, righteye flounders as well as cyprinids and perches, play a more significant role in the overall diet of rural areas. A more specific difference is that the transition towards a diet centered around marine fishes occurred at a later period in rural areas compared to urban areas, respectively 1300 and 1200 CE. It began with the consumption of righteye flounders and subsequently saw a notable increase in the proportion and total NISP of cod, righteye flounders, and eventually herring in the late fourteenth century. However, herring consumption was more prominent in urban areas than in rural areas. Furthermore, a significant difference emerges in the decline of overall fish consumption. In rural consumption data, the decline begins earlier, around 1600, and is less pronounced compared to urban consumption data, which even experiences a rise in total consumption numbers again in the eighteenth century.

5.8 COASTAL/INLAND CONSUMPTION OF PRIMARY CONSUMPTION FISHES

The changing trends in primary consumption fishes between coastal and inland provinces are analysed using two 100% stacked column charts, accompanied by a corresponding total NISP chart. In coastal areas (Figure 5.8.1), it is observed that a significant portion of the diet consists of marine fish, while freshwater fishes remain relatively less abundant, as discussed in section 5.4. Among the marine fishes, righteye flounders occupy a predominant share throughout the entire timeline.

During the period between 500-750, a notable feature in coastal consumption is the relatively high consumption of herring in the diet. However, it should be noted that freshwater eels also play a significant role in the diet during this period and continue to do so in the subsequent centuries. In the tenth century, the NISP of all primary consumption fishes decreases (Figure 5.8.3), but the proportion of righteye flounders remains relatively stable. However, from the eleventh century onwards, codfish starts gaining importance, accompanied by a rise in NISP until the late seventeenth century. This increase is accompanied by a sharp rise in the

NISP of righteye flounders, as depicted in Figure 5.8.3. The proportion of righteye flounders, however, experiences a slight decline due to the growing numbers of marine families and a growing significance of freshwater fishes. Herring consumption numbers begin to rise in the fourteenth century. Eventually, the consumption of all fishes declines in the first half of the eighteenth century, but is followed by a rapid increase again in the second half of the eighteenth century.

When comparing the data on inland consumption to coastal consumption, a clear contrast in the consumption of marine fishes becomes evident. Inland fish consumption before 1200 primarily consists of freshwater eels, cyprinids, and to a lesser extent, perches, which make up over 90 percent of the diet (Figure 5.8.2). As discussed in section 5.4, the following increase in marine fishes is much more prominent in coastal areas. In inland regions, the consumption of marine fishes begins in the eighth century, characterized by the consumption of herring, righteye flounders, and to a lesser extent, codfishes. The consumption of marine fishes in inland regions gradually declines in the following centuries. However, after 1200, there is a sudden and exponential rise in marine fish consumption, starting with codfishes and righteye flounders, followed by herring in the late fourteenth century. When examining the total NISP of freshwater fishes (Figure 5.8.4), it can be observed that their consumption never reaches the same levels as seen before 1000, except for a single exception around 1550. Similar to previous patterns, the total NISP of all fishes decreases in the late seventeenth century and but gradually declines towards the end of the timeline instead of increasing again as visible in coastal areas.

The key finding of these results is that inland consumption does not exhibit the high marine consumption of the period between 450 and 650, indicating this was a trend that is unique to coastal provinces. There is also a distinct difference in the distribution of righteye flounders between coastal and inland consumption. Coastal areas demonstrate a higher consumption of righteye flounders compared to inland provinces even surpassing the generally high consumption of freshwater fishes in the period between 650-950. Another difference is the inland absence of a rise in codfishes in the period between 1000-1200, this is only visible in coastal consumption data. Additionally, there is a general difference in the overall proportion of freshwater eels, which is less significant in coastal consumption compared to inland consumption.

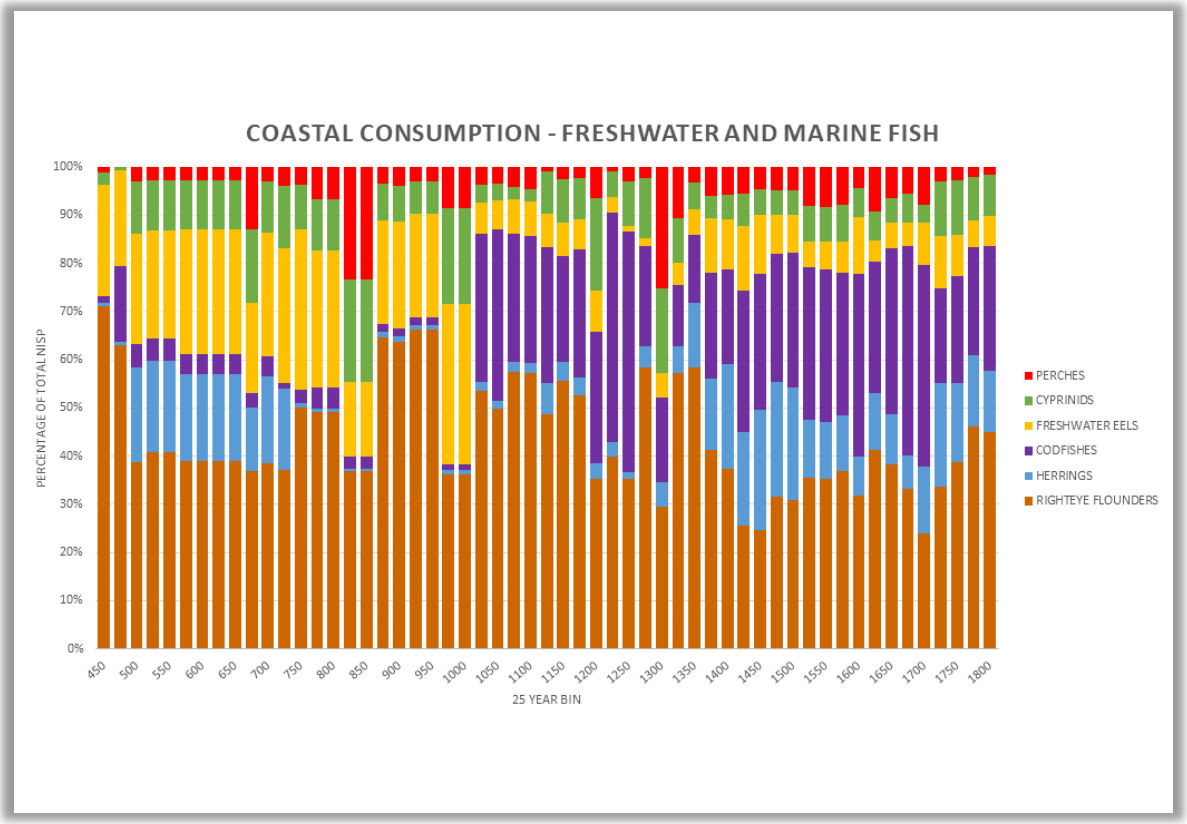


Figure 5.8.1: diachronic trends of coastal consumption of primary feshwater and marine fishes. Selected by province: Friesland, Groningen, Noord-Holland, Zeeland, and Zuid-Holland. Subset size of 266 assemblages

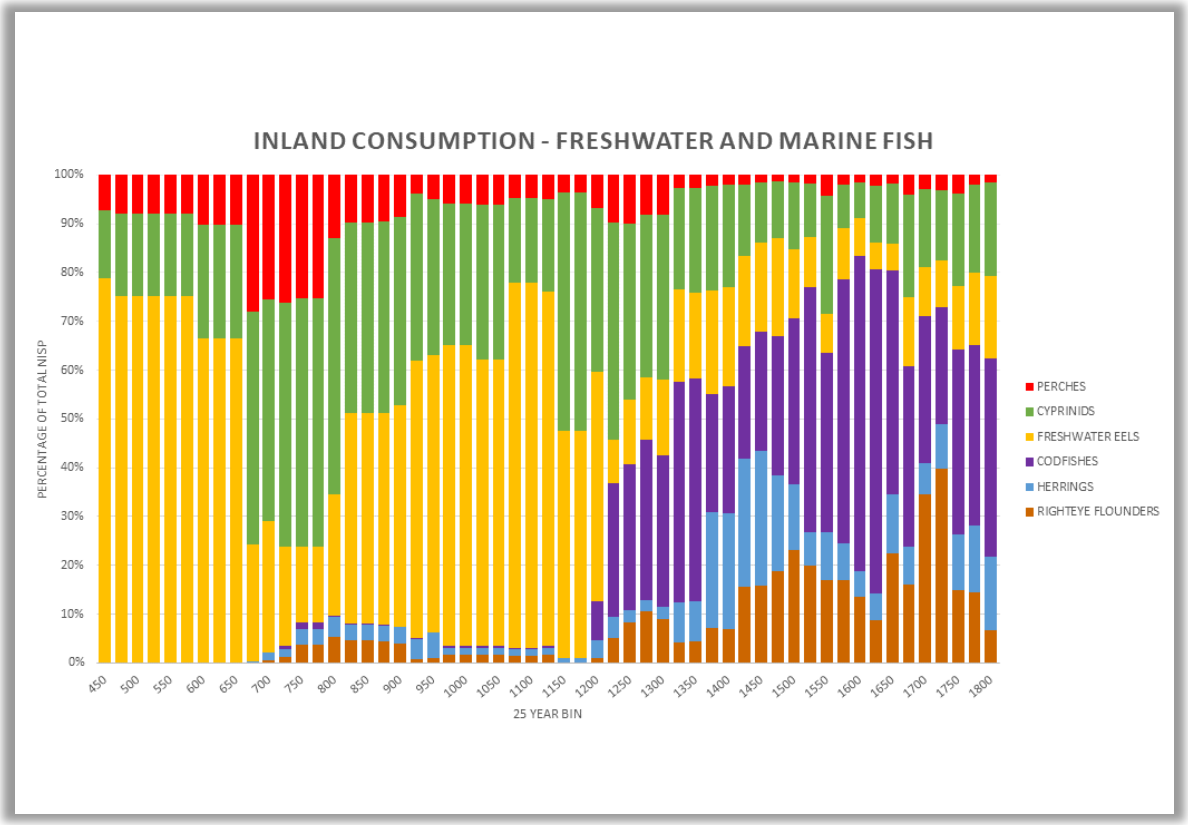


Figure 5.8.2: diachronic trends of inland consumption of primary feshwater and marine fishes. Selected by province: Flevoland, Gelderland, Limburg, Noord-Brabant, Overijssel, and Utrecht. Subset size of 196 assemblages

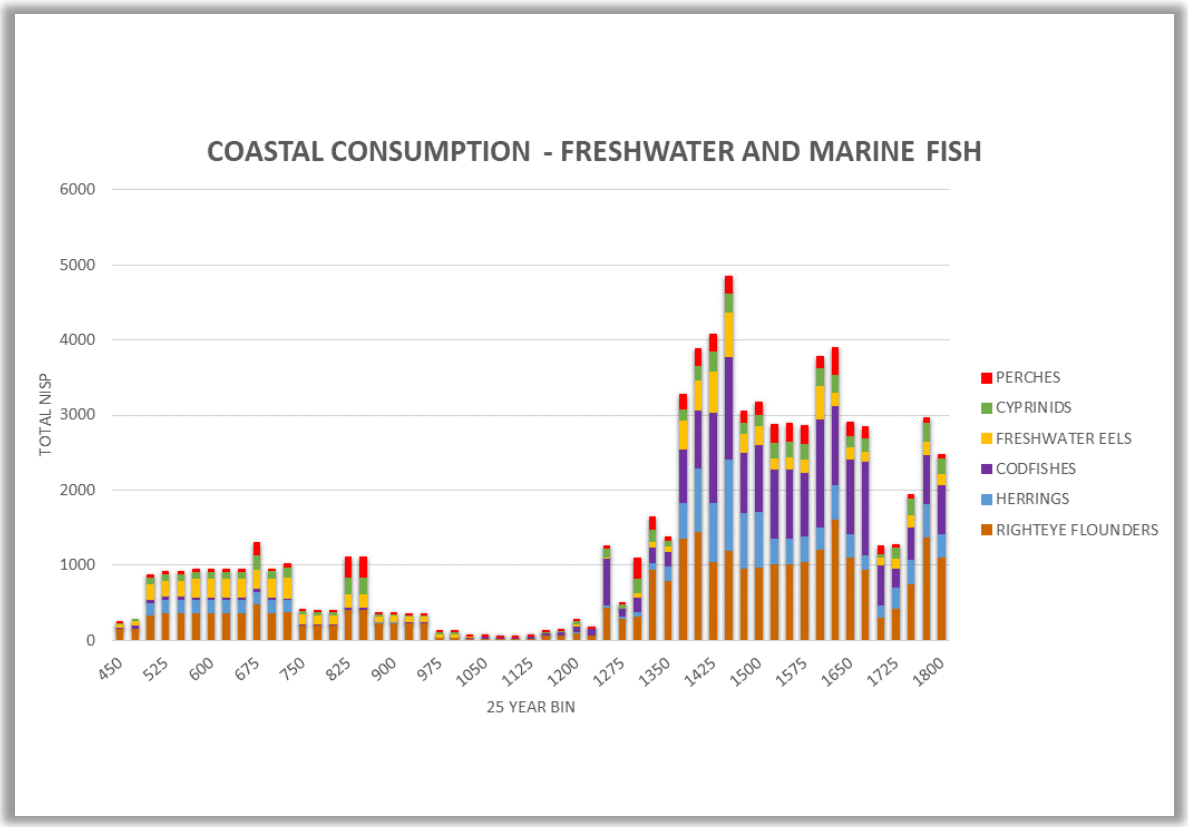


Figure 5.8.3: Total NISP of primary marine and freshwater consumption fishes in coastal provinces.

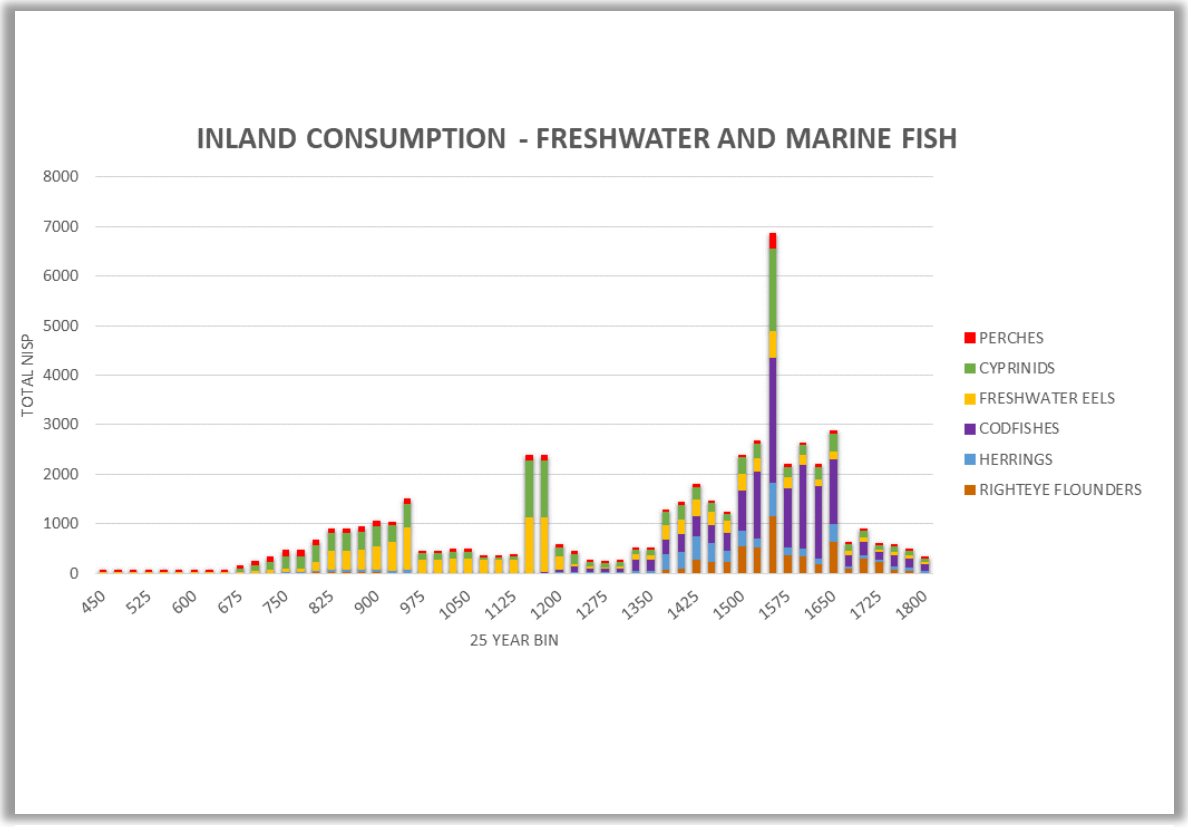


Figure 5.8.4: Total NISP of primary marine and freshwater consumption fishes in inland provinces.

5.9 SUMMARY OF THE RESULTS

During the period between 450 and 650, a notable preference for marine fishes, particularly herring and righteye flounders existed. Additionally, there was a small portion of migratory fishes, specifically sturgeons and salmonids, in the overall fish consumption during this period. However, apart from this specific timeframe, migratory fish consumption remained relatively insignificant compared to other fish groups throughout the entire timeline. From the second half of the seventh century onwards, there was a notable shift towards increased consumption of freshwater fish. Over the subsequent centuries, marine fish consumption declined while freshwater fish consumption steadily rose. Freshwater eels, cyprinids, and perches emerged as more prominent consumption fishes after 650, while the consumption of herring and righteye flounders decreased.

The period between 950 and 1200 witnessed an overall decline in fish consumption, affecting marine and migratory fish consumption, with a lesser impact on freshwater fish. This led to a rising trend in the proportion of the diet consisting of freshwater fishes. Between 1000 and 1200, however, there was a small resurgence in the consumption of codfishes after a decline spanning several centuries. Initially, codfish consumption constituted a relatively smaller portion of marine fish consumption but showed a growing trend. In the thirteenth century, both the consumption of codfishes and righteye flounders experienced substantial increases, persistently rising in quantity until the seventeenth century. However, the consumption of freshwater fishes, especially freshwater eels, declined significantly during the thirteenth and fourteenth centuries. Although there was a subsequent rise again in the total numbers of freshwater fish in the late fourteenth century, it did not constitute a larger portion of the overall diet compared to the increasing consumption of marine fish.

From the early fourteenth century, herring began to regain importance within the marine fish group, although consumption of cod and righteye flounder continued to dominate consumption patterns, herring consumption intensified after 1375. Additionally, the consumption of migratory smelt increased as well in this period. The total NISP of all primary consumption fishes showed a downward trend during the seventeenth and eighteenth centuries, with no significant changes observed in the portion of fish families in the diet over the same time period.

5.9.1 COMPARISONS

The main findings of the comparison between urban, rural, and coastal/inland consumption highlight distinct consumption patterns across all the assemblages. Between 450 and 650, rural and coastal areas demonstrate a higher consumption of marine fish, specifically righteye flounder and herring. Inland consumption, however, does not exhibit the same high marine consumption observed during this period, indicating that this trend was unique to rural areas within coastal provinces. Rural areas exhibit a significant reliance on righteye flounders, as well as cyprinids and perches, in their overall diet. Coastal provinces maintain a consistent reliance on righteye flounders throughout the entire timeline, even during the period of 650-950 when other assemblages show a higher portion of freshwater fish consumption. This period holds significance for marine fish consumption in inland regions as well. Although the consumption of marine fish in inland areas remains relatively low, there is evidence of a gradual increase during this period. While the quantities consumed may be small compared to coastal areas, it still marks a notable shift towards incorporating marine fish into the diet of inland regions. The coastal regions stand out in their sustained consumption of righteye flounders, and a lesser proportion of freshwater eels compared to inland consumption.

During 1000 to 1200, there is a notable increase in codfish consumption, particularly in urban and rural coastal regions. Inland consumption of codfish remains relatively insignificant during this period. A unique trend in rural areas is the delayed increase in marine fish consumption, with a time lag of over a hundred years compared to urban areas. Initially, this transition involves the consumption of righteye flounders, and it is not until the late fourteenth century that there is a significant rise in the consumption of cod and herring, which is seen much earlier in urban consumption data. The increase in herring consumption in rural areas during this period is also less pronounced than in urban areas. This suggests that urban areas experienced an earlier rise in marine fish consumption with different primary consumption fishes compared to the rest of the northern Low Countries.

Furthermore, the decline in overall fish consumption after 1650 is primarily visible in rural areas in inland provinces, indicating that the decline had a greater impact on the dietary distribution in rural and inland regions compared to urban coastal areas.

CHAPTER 6: DISCUSSION

The aoristic analysis of the DFB-database has revealed several interesting diachronic trends in fish consumption patterns. In accordance with the research questions and goals of this study, we will focus on discussing some of the most significant trends that have emerged. This discussion aims to examine the multitude of factors contributing to these observed trends, encompassing geographical and climatological changes, demographic shifts, technological advancements in fishing techniques, market developments, and religious and culinary influences. The trends will be discussed based on the time periods in which they emerged.

6.1 LOCAL CATCH AND TASTING TRADE: 450-650

Between 450 and 650, there is a notable absence of marine fish consumption in inland areas. This absence is also observed in the majority of archaeological excavations conducted in settlements across Belgium, France, and the Netherlands (Barrett, 2016, p. 251). It suggests that the local economy in these regions primarily relied on locally produced food, as evidenced by the abundance of freshwater fish found at inland sites. In contrast, coastal areas did show evidence of marine fish consumption, specifically of righteye flounder and herring. These fish species could be caught along the shores, with herring shoals arriving in autumn before the coast. Coenen referred to this type of herring as *slabharing* (Egmond, 2005, p. 79-81). Righteye flounders and codfishes, which are found near the coast, could also be caught in small quantities from the beach or in small fishing vessels using hook and line fishing techniques (Muysson, 2021, p. 34-35). It is reasonable to assume that people living near water were familiar with their environment and relied on it as a source of food. Fish were easily accessible in the waters, especially during times when meat was likely to be expensive and scarce.

From 650 to 950, there was a continued preference for freshwater fish consumption, with eels, cyprinids, and perches being the preferred species. However, coastal regions still heavily relied on marine righteye flounder. During this period, there was a gradual emergence of marine fish consumption in small quantities in inland regions, indicating a growing demand for marine fish. This changing pattern occurred during the 'long eighth century' and represented a

small-scale emergence of marine fish consumption in medieval England, France, and Belgium, which had previously been difficult to detect (Barret, 2016, p. 251-252). This emerging demand for marine fish can be directly linked to the commercial trade hub of Dorestad in the northern Low Countries. Herring, codfish, and righteye flounder were consumed in this town. However, after 875, the trade hub ceased to exist due to Viking raids and the rivers becoming clogged with sedimentation (Vos, 2018, p. 71). Consequently, the proportion of marine fish within the assemblages decreased, although in the following centuries it still remained present in small quantities.

6.2 SHIFTING CATCH AND STOCKING COD: 950-1200

During the period from 950 to 1200, there was a general decline in the consumption of marine and migratory fishes, and freshwater fishes to a lesser extent. One possible factor that contributed to this trend was the Medieval Warm Period, which occurred from the tenth to twelfth centuries. This period of increased temperatures in the northern Low Countries resulted in changes in fish populations as species adapted to the shifting environmental conditions. The warmer waters had an impact on the distribution and abundance of certain fish species, particularly those sensitive to temperature fluctuations. It is believed that the Medieval Warm Period may have led to a northward expansion of some marine fish species (Hoffmann, 2005, p. 22).

The warmer waters in the North Sea negatively affected the reproduction of herring and cod specifically, while their populations notably increased further north, around Iceland and the Barents Sea (Barrett *et al*., 2004a, p. 629; Barrett *et al*., 2004b, p. 2420). This shift in the habitat of specific fish species influenced fishing practices in the region and may have prompted fishermen to adopt innovative techniques or rely on trade to obtain the desired fish species. However, the climatological argument does not explain why the numbers of righteye flounder also diminished in the coastal regions. Additionally, in contrast with the northern Low Countries, Scandinavia maintained a continuous practice of marine fishing, particularly targeting cod and herring, throughout the entire early medieval period (Barrett, 2016, p. 253). And other regions such as England and Scotland experienced a significant increase in marine fish consumption during this period, with herring and cod replacing eel as the primary consumption fish around the turn

of the millennium. This phenomenon has been labelled as a 'fish event horizon' (Barrett *et al*., 2004b, p. 2417; Barrett, 2016, p. 253). These two notions raise the possibility that the increased consumption of marine fish in England and Scotland during the fish event horizon may have been influenced by the presence of Scandinavians and their impact on the local population during the Viking age. As migrants might have contributed to the diffusion of sea fishing traditions and consumption customs (Barrett, 2016, p. 265). The reason behind the decline in fish consumption in the northern Low Countries, however, remains unclear at present.

Conversely, between 1000 and 1200, there is also a small increase in the consumption of codfish, particularly in urban and rural areas of coastal regions. However, inland consumption of codfish remains relatively insignificant during this period and only experiences a significant rise from the thirteenth century onwards. The initial gradual rise in codfish consumption in the northern Low Countries is also evident in the southern Low Countries, specifically Flanders (Van Neer & Ervynck, 2016, p. 165). Research conducted on assemblages in England and Flanders using isotopic analysis has provided insights into this trend. The analysis of bones from the ninth to twelfth centuries indicates that most codfishes originated from the southern North Sea. However, by the thirteenth to fourteenth centuries, there was a shift towards long-distance transportation of codfish from Arctic Norway to meet the growing demand (Van Neer & Ervynck, 2016, p. 166; Barrett *et al.*, 2011, p. 1516). It is reasonable to assume that assemblages from the northern Low Countries would show a similar pattern when isotopes of codfishes are analysed. The significant increase in codfish consumption around 1200 could be (partly) linked to the intensification of the Norwegian long-distance trade of dried cod, known as stockfish, from 1100 onwards (Nedkvitne, 2016, p. 52).

6.3 A FISH EVENT HORIZON: 1200-1375

During the twelfth and continuing into the thirteenth century, the northern Low Countries experienced a notable intensification of urbanization and significant population growth (Vos, 2018, p. 75). As the population expanded, there was an increased demand for a diverse and stable supply of food sources. In urban areas, the increase in marine fish consumption that can be labelled as a gradual fish event horizon, began around 1200, coinciding with the rapid urbanization process during

the twelfth and thirteenth centuries. In urban contexts within coastal regions, the consumption of codfish has been increasing, accompanied by a smaller portion of righteye flounders and herring. While codfish and herring are consumed in larger quantities within urban areas located inland, the consumption of righteye flounders remains minimal during this period. In contrast, rural areas experienced a delayed rise in marine fish consumption, starting around 1300. Initially and almost exclusively, righteye flounders were consumed amongst the marine fishes, followed by the consumption of codfish and herring in the following centuries. This delay can be attributed to the influence of urbanization on rural communities. Rural populations may have initially been less exposed to the changing dietary trends and the increased availability of marine fish. As the urbanization process continued and the influence of urban centres extended into the countryside, the demand for marine fish in rural areas eventually caught up, leading to the observed rise in consumption starting in the late thirteenth century. The delayed rise could be partially attributed to the migration of people from rural areas to the cities. As individuals sought improved opportunities and resources in urban centres, the rural population may have experienced a decline (Mayer, 2019, p. 992). This demographic shift would have affected the demand for marine fish in rural areas, resulting in a more gradual increase in consumption over time as rural communities adapted to the changing availability and preferences for marine fish.

The rapid urbanization process led to the development of new urban centres, which became crucial hubs for the distribution and consumption of fish. The urban population required a consistent supply of various food products, with fish becoming an essential component of their diet, satisfying both nutritional and religious needs. The influence of Christianity on fish consumption can be primarily attributed to the religious practice of abstaining from meat on approximately 140 days throughout the year (Hoffmann, 2001, p. 141). These dietary restrictions led to an increased demand for fish as a protein source during these periods, driving the consumption of various fish species in both urban and rural areas.

The development of markets played a significant role in shaping fish consumption patterns. As urban centres expanded, there was a growing demand for fish, which led to the establishment of local fish markets. These markets served as venues for trading various types of fish, including freshwater, marine, and migratory species. Consequently, city dwellers gained access to a wider range of fish varieties

compared to before. The growth of fish markets in urban areas also facilitated the consumption of marine fish species that were previously less accessible to people living inland. A crucial factor in this urbanization process and coherent market development was the emergence of trade hubs known as *Hanzesteden*. The formation of the *Zuyderzee,* from the twelfth century onwards, may have facilitated these trade hubs by opening an open and easily accessible waterway between urban areas on the river, such as Deventer, Maastricht, Nijmegen, and Utrecht, and the North Sea (Schaap, 1982, p. 8; Vos, 2018, p. 74). This development opened important trade routes, connecting the inland provinces to the North Sea, facilitating the exchange of goods, including stockfish. These trading centres facilitated the exchange of goods between different regions as early as the first half of the fourteenth century (Weststrate, 2000, p. 27). Consequently, fishes that were traded from the Scandinavians, such as cod, or fish caught in the North Sea such as herring, became increasingly available in inland regions. The widespread availability of marine fish contributed to the observed increase in marine fish consumption, particularly in urban areas. During the thirteenth century, the prices of dried cod were generally low, allowing merchants to acquire a large quantity of stockfish in exchange for their traded goods (Nedkvitne, 2016, p. 53). This could have attributed to the high rise of codfish consumption in inland and urban contexts.

This shift in aquatic habitat not only affected the distribution and availability of fish species in the region but also impacted local fishing practices. The *Zuyderzee* became a source of marine fish such as herring, anchovies, flounder, and the migratory fish, smelt. The rise in smelt consumption, that is seen in the results around 1300 can also be linked to the growing popularity of fish as a food source, particularly among the common people. Smelts were affordable and accessible all year round (Van 't Hoog & de Leeuw, 2008, p. 39). The versatility of smelts, their various uses across industries including their use as bait, livestock fodder and the production of liver oil, combined with their affordability likely contributed to the marked increase in smelt consumption during this period. The rapid growth in smelt consumption can be seen as a reflection of the broader trend of rising fish consumption, fuelled by urbanization and population growth in the northern Low Countries.

Between 1200 and 1375, not all fish species experienced exponential growth. Freshwater species, such as the European eel, declined in numbers during this period. The human interventions aimed at controlling the landscape, may have had an impact on the historical distribution of migratory and freshwater fish species in the region. Such as the construction of dams and sluices to prevent floods during the period between 1250 and 1500 (Vos, 2018, p. 78). Anthropogenic alterations to aquatic environments disrupted the classical zonation of rivers and led to the disruption of traditional migration routes within fish populations. Juvenile European eels are known to suffer from disturbances in rivers, resulting in a severe limitation of their dispersal capabilities (Klein Breteler, 2005, p. 68). This could have led to the significant decline in freshwater eels between 1200 and 1375 visible in the results, while marine fishes replace eels as primary consumption fishes.

6.4 THE GOLDEN MOUNTAIN: 1375-1650

After the initial increase in marine fish consumption during the thirteenth and fourteenth centuries, there was a substantial expansion that occurred in the late fourteenth century and extended into the seventeenth century. While the consumption of cod and righteye flounders started this trend, there was also a considerable rise in herring consumption during this period. The rise in herring consumption becomes increasingly evident from the late fourteenth century onwards, emphasizing the significance that Coenen attributed to this fish, 'the great golden mountain' in his *Visboock*. Fish became a valuable resource during this time, with fishing activities in Europe yielding substantial profits. Historians refer to this period as the second phase of fisheries commercialization, just after the initial fish event horizon (Gardiner, 2016, p. 88). A third phase emerges during the sixteenth and first half of the seventeenth century, as the consumption of marine fish reaches its peak, as visible in the results.

Technological advancements in fishing techniques and equipment played a crucial role in driving these changes in fish consumption patterns in the northern Low Countries during the fourteenth and fifteenth centuries. The growing demand for fish, driven by demographic shifts and urbanization, prompted the fishing industry to innovate and develop new methods and technologies to enhance the efficiency of fish capture and preservation. These advancements, in turn, influenced the availability and abundance of fish species for consumption.

During the fourteenth and fifteenth centuries, the herring fisheries in Scania experienced rapid expansion, leading to the export of thousands of tons of herring in barrels. The value of barrelled herring, as well as stockfish, also witnessed an increase during this period (Barrett, 2016, p. 265). This eventually led the trade of stockfish to be initiated from the cities of Holland and the Hanseatic League (Wubs-Mrozewicz, 2009, p. 195). Additionally, the dominance of Scania in international trade was eventually overtaken by the Dutch, who caught herring from the North Sea and utilized the *haringkaken* technique for curing onboard their ships. This practice is believed to have expanded in the late fourteenth or early fifteenth centuries (Unger, 1978, p. 335). The Dutch managed to surpass the Scanian herring industry by incorporating technological innovations in their seafaring vessels (Holm, 2016, p. 17). The Dutch herring industry continued to expand well into the sixteenth century, resulting in a shift from Scanian to Dutch barrelled herring in European shipping routes (Holm, 2016, p. 17).

Although the significant expansion in herring trade does not necessarily imply that the fish was consumed in larger quantities, as a considerable amount was likely exported to other regions, it does indicate a significant increase in the availability of herring in the market. This enhanced availability could have served as an incentive for buyers to consume more of these fish. Culinary preferences, next to the dynamics of supply and demand, are likely to have played a partial role in influencing the observed patterns of not only herring, but the general fish consumption. This is indicated by historical cookbooks from the sixteenth century, such as the notable boecxken van cokeryen (1514). This book describes detailed recipes featuring a variety of fish, including pike, carp, salmon, eel, smelt, plaice, cod, red gurnard, haddock, and herring (Sieben & van der Molen-Willebrands, 1994, p. 11). The emergence of new recipes and cooking methods likely contributed to a growing recognition of various fish species, with certain types being deemed more desirable and commanding higher prices due to their prestige (Van Dam, 2003, p. 495-496). Consequently, this motivated fishermen and merchants to actively pursue and trade in these valuable species, resulting in shifts in the fish species available in the markets and subsequently influencing consumption patterns among the wider population. For example, herring, eel, and cod were highly valued in the northern Low Countries, and their consumption was not only driven by their availability but also by their culinary appeal.

During the late fourteenth and fifteenth centuries, there was a recovery in the numbers of consumed freshwater eels, as well as increased consumption of cyprinids and perch. While there was an increase in the total numbers of freshwater fish, it is important to note that they did not constitute a substantial portion of the overall diet when compared to the growing consumption of marine fish. Despite the rise in freshwater fish numbers, the consumption of marine fish remained dominant in the overall diet of the population. The increasing presence of freshwater fish suggests a rise in the population of individuals who consume such fish. The limited availability of freshwater habitats in comparison to the vast open sea, where marine fish are primarily caught, makes the establishment of large-scale freshwater fisheries however, unlikely.

6.5 CATCHING AND RELEASING: 1650-1800

The period from 1650 to 1800 in the northern Low Countries witnessed significant changes, including a sharp decline in fish consumption. This decline in overall fish consumption began earlier, around 1600, in rural and inland areas. This is reflected as well by the demand for salted herring in the Dutch market in the 17th and 18th centuries, which also experienced a decline. Starting around 1640, the proportion of domestically consumed herring relative to the total herring production in the Netherlands decreased. This decline coincided with a significant reduction in the overall volume of herring production during that period (Poulsen, 2008, p. 99).

The overall decline in fish consumption during this period can be attributed to several factors. Firstly, the conflicts with England and France in the seventeenth century had significant impacts on the economy and society of the region (Israel, 1995, p. 67). These conflicts disrupted fishing activities, affecting the availability and accessibility of fish (Dorleijn, 2002, p. 269). The Franco-Dutch War resulted in economic decline and rising political instability. Subsequent wars with Great Britain and France in the 18th century added to the economic difficulties, leading to a financial crisis (Israel, 1995, p. 67). This situation, coupled with the invasion and occupation by the French, further contributed to the challenges faced by the region, as France implemented a complete ban on the importation of traded herring Both in 1689 and 1751 (Poulsen, 2008, p. 102). These external factors, combined with the process of deindustrialization and deurbanization that had occurred by 1815 had lasting impacts on the region's economy and society (De

Vries and Van der Woude, 1997, p. 686). The decline in fish consumption reflected the broader economic struggles faced by the northern Low Countries during this period. But despite the overall decline, urban and coastal regions showed a more resilient fish consumption trend, with a small resurgence in total consumption numbers during the eighteenth century. This could be attributed to factors such as proximity to fishing grounds, better access to fish markets, and the potential influence of trade networks in sustaining fish consumption levels. Additionally, it is worth noting that the dominance of marine species in the fish diet persists across all regions, representing the majority of fish consumption. Throughout the centuries following the fish event horizon, this pattern has remained consistent and continues to be relevant in modern times.

CHAPTER 7: CONCLUSION

In conclusion, this study has provided a comprehensive overview of fish consumption in the northern Low Countries during medieval and early modern periods (450-1800), drawing on results from the Dutch Fish Bones dataset analysis and historical research. The research questions of this thesis will be addressed in this concluding summary, revolving around the central theme: How did fish consumption develop in the northern Low Countries during the medieval and early modern periods (450-1800), how do these trends differ between urban, rural, inland, and coastal contexts, what factors can account for the diachronic trends observed and can a fish event horizon for the northern Low countries be established?

The question whether these general trends are impacted by data quality, collection methods, context, and individual sites/assemblages with an irregular high number of fish remains, can be answered: no, not in a significant or conclusive way. Significant accumulations of NISP have had an impact on a brief timeframe, occasionally deviating from the overall pattern. However, if we overlook these noticeable statistical deviations, it may be the only approach to identify general trends across the diachronic timeline.

Before delving into diachronic trends, it is essential to address the question of which species and families can be classified as primary consumption fish within the marine, freshwater, and migratory fish groups. In the marine fish category, notable families include herrings, codfishes, and righteye flounders. Within the freshwater group, primary species consist of cyprinids, freshwater eels, and perches. Lastly, migratory fishes comprise of sturgeons, smelts, and salmonids, although their numbers in the results are comparatively lower, making them less significant than the freshwater and marine categories.

7.1 THE DEVELOPMENT OF FISH CONSUMPTION 450-1800

Between the years 450 and 650, both the inland and coastal regions of the northern Low Countries displayed a preference for locally sourced fish. In the inland areas, freshwater eels, cyprinids, and perches were the primary choices, while coastal consumption mainly consisted of demersal righteye flounders and small amounts of herring, which were easily caught along the shores. Moving

forward to the period between 650 and 950, the coastal region continued to heavily rely on righteye flounders, and there was a consistent preference for freshwater fish in the inland regions. However, there was a gradual emergence of marine fish consumption in small quantities during the 'long eighth century,' likely influenced by trade and commercial hubs such as Dorestad. This initial increase in marine fish consumption can also be observed in neighbouring countries.

Between the years 950 and 1200, the consumption of marine, migratory, and to a lesser extent, freshwater fish declined in the northern Low Countries. This decline can potentially be attributed to the Medieval Warm Period and changes in fish populations. The warmer waters had a negative impact on the reproduction of herring and cod, leading to an increase in their populations further north. In contrast, regions such as England, Scotland, and Scandinavia experienced an increase in marine fish consumption. However, in the northern Low Countries, both urban and rural coastal areas saw a gradual rise in codfish consumption, albeit a small one. This slight increase in codfish consumption during the period from 1000 to 1200 may be linked to the growing trade of Norwegian stockfish, as indicated by evidence from isotopic research in Flanders and England.

During the twelfth and thirteenth centuries, the northern Low Countries experienced urbanization and population growth, which resulted in an increased demand for fish. Urban areas witnessed a gradual shift in fish consumption patterns between 1200 and 1375, with a rise in the consumption of codfish followed by righteye flounder and herring. In contrast, rural areas exhibited a delayed increase in fish consumption, beginning around 1300. Initially, this transition involved the consumption of righteye flounders, and it was only in the late fourteenth century that a significant rise in cod and righteye flounder consumption occurred. The rural population may have been initially less exposed to changing dietary trends and the increased availability of marine fish.

The development of markets and trade hubs played a crucial role in making marine fish more accessible in inland regions. The rapid growth in smelt consumption during the fourteenth century reflects the broader trend of rising fish consumption, fuelled by urbanization and population growth in the northern Low Countries. The consumption of fish was further encouraged by dietary restrictions imposed by Christian fasting regulations, as well as the emergence of urban markets and Hanseatic trade hubs. The formation of the Zuyderzee, starting from the twelfth

century, likely facilitated these trade hubs by providing an open and easily accessible waterway to the North Sea. Additionally, the construction of dams and human interventions may have disrupted the distribution of migratory and freshwater fish species, leading to a significant decline in freshwater eels between 1200 and 1375.

During the late fourteenth and fifteenth centuries, fish consumption in the northern Low Countries underwent significant expansion which extended well into the seventeenth century. Herring, cod, and righteye flounders were consumed in larger quantities, driven by technological advancements in fishing techniques and equipment and the growing demand for fish. While the consumption of cod and righteye flounders initially started this trend, there was also a substantial increase in herring consumption during this period. This marked the second phase of fisheries commercialization, following the initial fish event horizon. The herring industry of the northern Low Countries experienced rapid growth, with Dutch vessels becoming dominant in the European trade. Although the consumption of freshwater fish also increased during this period, marine fish remained dominant in the overall diet. The preferences of consumers and the availability of fish in the market played a significant role in shaping consumption patterns as a third phase emerged during the sixteenth and first half of the seventeenth century, characterized by an unprecedented rise in the consumption of marine fish.

Between 1650 and 1800, fish consumption in the northern Low Countries experienced a significant decline, beginning somewhat earlier in around 1600 in rural and inland areas. This decline can be attributed to various factors, including conflicts with England and France, which disrupted fishing activities, as well as economic difficulties and political instability. The French occupation and ban on imported herring further impacted the region's fish consumption. However, urban, and coastal regions showed a slight resurgence in fish consumption during the eighteenth century, potentially due to their proximity to fishing grounds, better market access, and trade networks. The overall decline in fish consumption reflected the broader economic struggles faced by the northern Low Countries during this period.

7.2 RECOMMENDATIONS FOR FURTHER RESEARCH

This study has successfully provided valuable insights into fish consumption patterns in the northern Low Countries during the early and late medieval period. However, to gain a more comprehensive understanding of fish consumption and its role in medieval society, several areas deserve further exploration. The following recommendations for future research are proposed:

1. *Enriching the DFB-dataset: although it is already substantial, incorporating new and reinterpreted data could unveil previously hidden patterns in fish consumption, enriching our understanding of the topic and possibly leading to fascinating new insights.*
2. *Additional meta-analyses: the dataset could also greatly benefit from incorporating research methods that were beyond the scope of this thesis, such as the Monte Carlo Simulation Model. Utilizing this approach could potentially enhance the accuracy and reliability of the findings that are presented in this thesis.*
3. *Isotopic analyses: By examining the origins of fish in certain locations through isotopic research, new insights may be gained. It is essential to determine whether marine fish, as a bulk commodity, originated from local sources or came from international waters, such as those near Norway or the Baltic region. Especially for codfishes in the period 1000-1200. Additionally, it would be interesting to investigate if there is a shift in time when these sources change, revealing potential fluctuations in trade and supply networks.*
4. *Addressing knowledge gaps: Between 950 and 1200, there was a notable decrease in the consumption of marine, migratory, and to a lesser extent, freshwater fish in the northern Low Countries. Nevertheless, the factors that contributed to this decline in fish consumption remain unclear at present and would greatly benefit from further research and investigation.*

Lastly, let us emphasize the importance of sampling archaeological fish contexts. Fish research holds immense value, serving as a proxy for diet, trade and market development, urbanization, and sociocultural developments. By taking the time and resources to sample and analyse fish remains, we can contribute to a richer understanding of the past and the role of fish in historical societies. The potential discoveries awaiting in these small remains are truly enormous!

ABSTRACT

Drawing on research findings of a fish event horizon in England and extensive work on historical fish consumption in Belgium, this study aims to answer the question: How did fish consumption develop in the northern Low Countries during the early and late medieval period (450-1500). This research is conducted using the Dutch Fish Bones (DFB) dataset, which includes the Number of Identified Specimens (NISP) of fish species and families from archaeological sites between 0-2000 CE. The DFB-dataset is subjected to aoristic analysis in 25-year bin categories to create a diachronic timeline. Despite potential biases and limitations, coherent with the presence of uncertainty within each assemblage and the underrepresentation of certain fish species due to differential preservation and the collection methods employed in archaeological excavations, the study offers valuable insights into regional fish consumption dynamics.

During the period from 450 to 650, both inland and coastal regions displayed a preference for locally sourced fish. Freshwater eels, cyprinids, and perches were the primary choices inland, while coastal consumption mainly consisted of demersal righteye flounders and small amounts of herring. From 650 to 950, the coastal region continued to heavily rely on righteye flounders, while freshwater fish remained popular inland. However, there was a gradual emergence of marine fish consumption during the "long eighth century," likely influenced by trade and commercial hubs. Between 950 and 1200, the consumption of marine, migratory, and freshwater fish declined in the northern Low Countries, potentially due to the Medieval Warm Period and changes in fish populations. Despite this decline, there was a slight increase in codfish consumption, which may be linked to the growing trade of Norwegian stockfish. Urban areas witnessed a shift towards marine consumption between 1200 and 1375 in a period that can be called a gradual 'fish event horizon', rural areas, in contrast, exhibited a delayed increase in marine fish consumption almost a century after urban consumption surged. The development of markets and trade hubs played a crucial role in making marine fish more accessible in inland regions. The rapid growth in smelt consumption during the fourteenth century reflects the broader trend of rising fish consumption, fuelled by urbanization, population growth, and dietary restrictions. The formation of the Zuyderzee facilitated trade of the Hanseatic cities by providing an open waterway to the North Sea. However, human interventions disrupted the distribution of fish species, leading to a decline in freshwater eels. During the late fourteenth to seventeenth centuries, fish consumption experienced significant expansion phases. Herring, cod, and righteye flounders were consumed in larger quantities, driven by technological advancements in fishing techniques and equipment. The herring industry of the northern Low Countries grew rapidly, with Dutch vessels dominating European trade. Between 1650 and 1800, overall fish consumption declined due to conflicts, economic difficulties, and political instability. However, throughout the centuries following the fish event horizon, the pattern of high marine fish consumption has remained steadfast and continues to be relevant in modern times.

These findings illuminate historical fish consumption patterns in the region and provide a foundation for future research, including enriching the dataset, calling for additional meta-analyses and isotopic research, and addressing knowledge gaps, such as the significant decrease in overall fish consumption in the period 950-1200.

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APPENDIX 1: SITES AND ASSEMBLAGES OF THE DFB-DATASET (0-2000)

Id	Site name	Settlement	Assemblage/sub-assemblage/complex specification	County/ Province/ State etc	Short reference(s)	Dataset contact	Used in analysis:
1	A2-sportpark Strijland	Vleuten-De Meern	A2-sportpark Strijland Vleuten-De Meern Merovingian period	Utrecht	Beerenhout 2009	Inge van der Jagt	450-1800, rural, inland
2	A2-sportpark Strijland	Vleuten-De Meern	A2-sportpark Strijland Vleuten-De Meern late Merovingian - early Carolingian	Utrecht	Beerenhout 2009	Inge van der Jagt	450-1800, rural, inland
3	A2-sportpark Strijland	Vleuten-De Meern	A2-sportpark Strijland Vleuten-De Meern Carolingian	Utrecht	Beerenhout 2009	Inge van der Jagt	450-1800, rural, inland
4	Aalmarkt	Leiden	Aalmarkt Leiden Fase 2 Hand-collected	Zuid-Holland	Beerenhout & Rijkelijkhuizen 2009	Chris Muysson	450-1800, rural, coastal
5	Aalmarkt	Leiden	Aalmarkt Leiden Fase 5 Hand-collected and sieved (1mm)	Zuid-Holland	Beerenhout & Rijkelijkhuizen 2009	Chris Muysson	450-1800, rural, coastal
6	Aalmarkt	Leiden	Aalmarkt Leiden Fase 7 Hand-collected	Zuid-Holland	Beerenhout & Rijkelijkhuizen 2009	Chris Muysson	450-1800, rural, coastal
7	Aalmarkt	Leiden	Aalmarkt Leiden Fase 9 Sieve (0.5mm)	Zuid-Holland	Beerenhout & Rijkelijkhuizen 2009	Chris Muysson	450-1800, urban, coastal
8	Aalmarkt	Leiden	Aalmarkt Leiden Fase 9 Sieve (5mm)	Zuid-Holland	Beerenhout & Rijkelijkhuizen 2009	Chris Muysson	450-1800, urban, coastal
9	Aalmarkt	Leiden	Aalmarkt Leiden Fase 9 Hand-collected	Zuid-Holland	Beerenhout & Rijkelijkhuizen 2009	Chris Muysson	450-1800, urban, coastal
10	Aalmarkt	Leiden	Aalmarkt Leiden Fase 10 Sieve (0.5mm)	Zuid-Holland	Beerenhout & Rijkelijkhuizen 2009	Chris Muysson	450-1800, urban, coastal
11	Aalmarkt	Leiden	Aalmarkt Leiden Fase 10 Hand-collected	Zuid-Holland	Beerenhout & Rijkelijkhuizen 2009	Chris Muysson	450-1800, urban, coastal
12	Aalmarkt	Leiden	Aalmarkt Leiden Fase 11 Sieve (5mm)	Zuid-Holland	Beerenhout & Rijkelijkhuizen 2009	Chris Muysson	450-1800, urban, coastal
13	Aalmarkt	Leiden	Aalmarkt Leiden Fase 11 Hand-collected	Zuid-Holland	Beerenhout & Rijkelijkhuizen 2009	Chris Muysson	450-1800, urban, coastal
14	Aalmarkt	Leiden	Aalmarkt Leiden Fase 13 Sieve (5mm)	Zuid-Holland	Beerenhout & Rijkelijkhuizen 2009	Chris Muysson	450-1800, urban, coastal
15	Aalmarkt	Leiden	Aalmarkt Leiden Fase 13 Hand-collected	Zuid-Holland	Beerenhout & Rijkelijkhuizen 2009	Chris Muysson	450-1800, urban, coastal
16	Aalmarkt	Leiden	Aalmarkt Leiden Fase 14 Sieve (0.5mm)	Zuid-Holland	Beerenhout & Rijkelijkhuizen 2009	Chris Muysson	450-1800, urban, coastal
17	Aalmarkt	Leiden	Aalmarkt Leiden Fase 14 Hand-collected	Zuid-Holland	Beerenhout & Rijkelijkhuizen 2009	Chris Muysson	450-1800, urban, coastal

18	Aalmarkt	Leiden	Aalmarkt Leiden Fase 17 Sieve (0.5mm)	Zuid-Holland	Beerenhout & Rijkelijkhuizen 2009	Chris Muysson	450-1800, urban, coastal
19	Aalmarkt	Leiden	Aalmarkt Leiden Fase 17 Hand-collected	Zuid-Holland	Beerenhout & Rijkelijkhuizen 2009	Chris Muysson	450-1800, urban, coastal
20	Abdijplein	Middelburg	Abdijplein Middelburg	Zeeland	Brinkhuizen 2006	Inge van der Jagt	450-1800, urban, coastal
21	Abdijplein	Middelburg	Abdijpein Middelburg complex 1	Zeeland	Beerenhout 2005	Chris Muysson	450-1800, urban, coastal
22	Abdijplein	Middelburg	Abdijpein Middelburg complex 2	Zeeland	Beerenhout 2005	Chris Muysson	450-1800, urban, coastal
23	Achlumer terp	Achlum	Achlumer terp Sieve 5mm MP	Friesland	Hullegie & Prummel 2015	Chris Muysson	450-1800, rural, coastal
24	Achlumer terp	Achlum	Achlumer terp Sieve 5mm KP	Friesland	Hullegie & Prummel 2015	Chris Muysson	450-1800, rural, coastal
25	Achlumer terp	Achlum	Achlumer terp Sieve 5mm LMA	Friesland	Hullegie & Prummel 2015	Chris Muysson	450-1800, rural, coastal
26	Achlumer terp	Achlum	Achlumer terp Sieve 5mm LMB	Friesland	Hullegie & Prummel 2015	Chris Muysson	450-1800, rural, coastal
27	Achlumer terp	Achlum	Achlumer terp Sieve 2mm MP	Friesland	Hullegie & Prummel 2015	Chris Muysson	450-1800, rural, coastal
28	Achlumer terp	Achlum	Achlumer terp Sieve 2mm KP	Friesland	Hullegie & Prummel 2015	Chris Muysson	450-1800, rural, coastal
29	Achlumer terp	Achlum	Achlumer terp Sieve 2mm K/O	Friesland	Hullegie & Prummel 2015	Chris Muysson	450-1800, rural, coastal
30	Achlumer terp	Achlum	Achlumer terp Sieve 2mm LMA	Friesland	Hullegie & Prummel 2015	Chris Muysson	450-1800, rural, coastal
31	Achlumer terp	Achlum	Achlumer terp Sieve 2mm LMB	Friesland	Hullegie & Prummel 2015	Chris Muysson	450-1800, rural, coastal
32	Achter Blokker	Kampen	Achter Blokker Kampen	Overijssel	Laarman 1990	Inge van der Jagt	450-1800, urban, inland
33	Achter de broeren	Zwolle	Achter de broeren Zwolle	Overijssel	Grimm 2006	Inge van der Jagt	450-1800, urban, inland
34	Achterom	Den Haag	Achterom Den Haag phase 0	Zuid-Holland	Nieweg 2007	Inge van der Jagt	450-1800, urban, coastal
35	Achterom	Den Haag	Achterom Den Haag phase 1	Zuid-Holland	Nieweg 2007	Inge van der Jagt	450-1800, urban, coastal
36	Achterom	Den Haag	Achterom Den Haag phase 3	Zuid-Holland	Nieweg 2007	Inge van der Jagt	450-1800, urban, coastal
37	Agnietenkloost er	's-Gravenh age	Agnietenklooster Den Haag 032	Zuid-Holland	Esser, Van Dijk & Verhagen 1999	Inge van der Jagt	450-1800, urban, coastal

38	Agnietenkloost er	's-Gravenh age	Agnietenklooster Den Haag 077	Zuid-Holland	Esser, Van Dijk & Verhagen 2000	Inge van der Jagt	450-1800, urban, coastal
39	Agnietenkloost er	's-Gravenh age	Agnietenklooster Den Haag 216	Zuid-Holland	Esser, Van Dijk & Verhagen 2001	Inge van der Jagt	450-1800, urban, coastal
40	Agnietenkloost er	's-Gravenh age	Agnietenklooster Den Haag 301 V301	Zuid-Holland	Esser, Van Dijk & Verhagen 2002	Inge van der Jagt	450-1800, urban, coastal
41	Agnietenkloost er	's-Gravenh age	Agnietenklooster Den Haag 301 V308	Zuid-Holland	Esser, Van Dijk & Verhagen 2003	Inge van der Jagt	450-1800, urban, coastal
42	Anjum-terpsterweg	Anjum	Anjum Terpsterweg Sieve (5mm) early medieval	Friesland	Prummel 2022	Chris Muysso n	450-1800, rural, coastal
43	Anjum-terpsterweg	Anjum	Anjum Terpsterweg Hand-collected early medieval	Friesland	Prummel 2022	Chris Muysso n	450-1800, rural, coastal
44	Anjum-terpsterweg	Anjum	Anjum Terpsterweg Sieve (5mm) late medieval	Friesland	Prummel 2022	Chris Muysso n	450-1800, rural, coastal
45	Anjum-terpsterweg	Anjum	Anjum Sieve Terpsterweg Hand-collected late medieval	Friesland	Prummel 2022	Chris Muysso n	450-1800, rural, coastal
46	Assendelver Polder -site F	Assendelf t, Zaanstad	Assendelver Polder -site F	Noord-Holland	Laarman 1983	Monica Dütting	Not used (outside 450-1800 range)
47	Berghuijskazer ne	Middelbu rg	Berghuijskazerne Middelburg phase 1	Zeeland	Esser et al. 2005	Inge van der Jagt	450-1800, rural, coastal
48	Berghuijskazer ne	Middelbu rg	Berghuijskazerne Middelburg phase 2	Zeeland	Esser et al. 2005	Inge van der Jagt	450-1800, urban, coastal
49	Berghuijskazer ne	Middelbu rg	Berghuijskazerne Middelburg phase 3	Zeeland	Esser et al. 2005	Inge van der Jagt	450-1800, urban, coastal
50	Berghuijskazer ne	Middelbu rg	Berghuijskazerne Middelburg phase 4 Hand	Zeeland	Esser et al. 2005	Inge van der Jagt	450-1800, urban, coastal
51	Berghuijskazer ne	Middelbu rg	Berghuijskazerne Middelburg phase 4 Sieve	Zeeland	Esser et al. 2005	Inge van der Jagt	450-1800, urban, coastal
52	Berghuijskazer ne	Middelbu rg	Berghuijskazerne Middelburg phase 5 Hand	Zeeland	Esser et al. 2005	Inge van der Jagt	450-1800, urban, coastal
53	Berghuijskazer ne	Middelbu rg	Berghuijskazerne Middelburg phase 5 Sieve	Zeeland	Esser et al. 2005	Inge van der Jagt	450-1800, urban, coastal
54	Berghuijskazer ne	Middelbu rg	Berghuijskazerne Middelburg phase 6 Hand	Zeeland	Esser et al. 2005	Inge van der Jagt	450-1800, urban, coastal
55	Berghuijskazer ne	Middelbu rg	Berghuijskazerne Middelburg phase 6 Sieve	Zeeland	Esser et al. 2005	Inge van der Jagt	450-1800, urban, coastal
56	Berghuijskazer ne	Middelbu rg	Berghuijskazerne Middelburg phase 7	Zeeland	Esser et al. 2005	Inge van der Jagt	Not used (outside 450-1800 range)

57	Bergstraat-west	Venlo	Bergstraat-west Venlo S20	Limburg	Kootker, Beerenhout & Rijkelijkhuizen 2015	Inge van der Jagt	Not used (outside 450-1800 range)
58	Bergstraat-west	Venlo	Bergstraat-west Venlo S21	Limburg	Kootker, Beerenhout & Rijkelijkhuizen 2015	Inge van der Jagt	Not used (outside 450-1800 range)
59	Bethlehemstraat - Voogdijstraat	Roermond	Bethlehemstraat - Voogdijstraat Roermond BP01/AFKL02	Limburg	Grimm 2009	Inge van der Jagt	450-1800, urban, inland
60	Bethlehemstraat - Voogdijstraat	Roermond	Bethlehemstraat - Voogdijstraat Roermond BP05	Limburg	Grimm 2009	Inge van der Jagt	450-1800, urban, inland
61	Bethlehemstraat - Voogdijstraat	Roermond	Bethlehemstraat - Voogdijstraat Roermond AFKL03	Limburg	Grimm 2009	Inge van der Jagt	450-1800, urban, inland
62	Bethlehemstraat - Voogdijstraat	Roermond	Bethlehemstraat - Voogdijstraat Roermond KL064	Limburg	Grimm 2009	Inge van der Jagt	450-1800, urban, inland
63	Bethlehemstraat - Voogdijstraat	Roermond	Bethlehemstraat - Voogdijstraat Roermond KL033	Limburg	Grimm 2009	Inge van der Jagt	450-1800, urban, inland
64	Bierstraat	Den Haag	Bierstraat Den Haag southern ditch	Zuid-Holland	Esser & Beerenhout 2007	Inge van der Jagt	450-1800, urban, coastal
65	Bierstraat	Den Haag	Bierstraat Den Haag northern ditch	Zuid-Holland	Esser & Beerenhout 2007	Inge van der Jagt	450-1800, urban, coastal
66	Bierstraat	Den Haag	Bierstraat Den Haag well	Zuid-Holland	Esser & Beerenhout 2007	Inge van der Jagt	450-1800, urban, coastal
67	Bierstraat	Den Haag	Bierstraat Den Haag cess pit S34	Zuid-Holland	Esser & Beerenhout 2007	Inge van der Jagt	450-1800, urban, coastal
68	Bierstraat	Den Haag	Bierstraat Den Haag cess pit S404	Zuid-Holland	Esser & Beerenhout 2007	Inge van der Jagt	450-1800, urban, coastal
69	Boerenmouw	's-Hertogenbosch	Boerenmouw 's-Hertogenbosch DBBM F8 Hand	Noord-Brabant	Esser 1997	Inge van der Jagt	450-1800, urban, inland
70	Boerenmouw	's-Hertogenbosch	Boerenmouw 's-Hertogenbosch DBBM F8 Sieve	Noord-Brabant	Esser 1997	Inge van der Jagt	450-1800, urban, inland
71	Boerenmouw	's-Hertogenbosch	Boerenmouw 's-Hertogenbosch DBBM F86/87 Hand	Noord-Brabant	Esser 1997	Inge van der Jagt	450-1800, urban, inland

72	Boerenmouw	's-Hertogenbosch	Boerenmouw 's-Hertogenbosch DBBM F86/87 Sieve	Noord-Brabant	Esser 1997	Inge van der Jagt	450-1800, urban, inland
73	Bolwerk	Gouda	Bolwerk Gouda phase 1	Zuid-Holland	Esser et al. 2010	Inge van der Jagt	450-1800, urban, coastal
74	Bolwerk	Gouda	Bolwerk Gouda phase 2	Zuid-Holland	Esser et al. 2010	Inge van der Jagt	450-1800, urban, coastal
75	Bolwerk	Gouda	Bolwerk Gouda phase 3	Zuid-Holland	Esser et al. 2010	Inge van der Jagt	450-1800, urban, coastal
76	Bolwerk	Gouda	Bolwerk Gouda phase 4	Zuid-Holland	Esser et al. 2010	Inge van der Jagt	450-1800, urban, coastal
77	Bolwerk	Gouda	Bolwerk Gouda phase 5	Zuid-Holland	Esser et al. 2010	Inge van der Jagt	450-1800, urban, coastal
78	Breestraat/Peperstraat	Beverwijk	Breestraat/Peperstraat Beverwijk cess pit 2	Noord-Holland	De Vries 2006	Inge van der Jagt	450-1800, urban, coastal
79	Breestraat/Peperstraat	Beverwijk	Breestraat/Peperstraat Beverwijk early period	Noord-Holland	De Vries 2006	Inge van der Jagt	450-1800, urban, coastal
80	Breestraat/Peperstraat	Beverwijk	Breestraat/Peperstraat Beverwijk later period	Noord-Holland	De Vries 2006	Inge van der Jagt	450-1800, urban, coastal
81	Breestraat/Peperstraat	Beverwijk	Breestraat/Peperstraat Beverwijk sample M181	Noord-Holland	Beerenhout et al. 2006	Inge van der Jagt	450-1800, urban, coastal
82	Breestraat/Peperstraat	Beverwijk	Breestraat/Peperstraat Beverwijk sample M84	Noord-Holland	Beerenhout et al. 2006	Inge van der Jagt	450-1800, urban, coastal
83	Breestraat/Peperstraat	Beverwijk	Breestraat/Peperstraat Beverwijk sample M169	Noord-Holland	Beerenhout et al. 2006	Inge van der Jagt	450-1800, urban, coastal
84	Breestraat/Peperstraat	Beverwijk	Breestraat/Peperstraat Beverwijk sample M170	Noord-Holland	Beerenhout et al. 2006	Inge van der Jagt	450-1800, urban, coastal
85	Bruggestraat 8-10	Harderwijk	Bruggestraat 8-10 Harderwijk 1mm 1300-1350 AD	Gelderland	Beerenhout 2010	Inge van der Jagt	450-1800, urban, inland
86	Bruggestraat 8-10	Harderwijk	Bruggestraat 8-10 Harderwijk 1mm 1550-1600 AD	Gelderland	Beerenhout 2010	Inge van der Jagt	450-1800, urban, inland
87	Bruggestraat 8-10	Harderwijk	Bruggestraat 8-10 Harderwijk 4mm 13th century	Gelderland	Beerenhout 2010	Inge van der Jagt	450-1800, urban, inland
88	Bruggestraat 8-10	Harderwijk	Bruggestraat 8-10 Harderwijk 4mm 14th century	Gelderland	Beerenhout 2010	Inge van der Jagt	450-1800, urban, inland
89	Bruggestraat 8-10	Harderwijk	Bruggestraat 8-10 Harderwijk 4mm 15th century	Gelderland	Beerenhout 2010	Inge van der Jagt	450-1800, urban, inland
90	Bruggestraat 8-10	Harderwijk	Bruggestraat 8-10 Harderwijk 4mm 16th century	Gelderland	Beerenhout 2010	Inge van der Jagt	450-1800, urban, inland
91	Bruggestraat 8-10	Harderwijk	Bruggestraat 8-10 Harderwijk 4mm 17th century	Gelderland	Beerenhout 2010	Inge van der Jagt	450-1800,

							urban, inland
92	Buiten IJ, wrak VAL7	Amsterdam	Buiten IJ, wrak VAL7 Amsterdam	Noord-Holland	Beerenhout 2010	Chris Muysson	not used (ship context)
93	Burseplein	Deventer	Burseplein Deventer 9-12th century	Overijssel	IJzereef & Laarman 1986	Inge van der Jagt	450-1800, urban, inland
94	Burseplein	Deventer	Burseplein Deventer 13-14th century	Overijssel	IJzereef & Laarman 1986	Inge van der Jagt	450-1800, urban, inland
95	Burseplein	Deventer	Burseplein Deventer 15-16th century	Overijssel	IJzereef & Laarman 1986	Inge van der Jagt	450-1800, urban, inland
96	Burseplein	Deventer	Burseplein Deventer 17-18th century	Overijssel	IJzereef & Laarman 1986	Inge van der Jagt	450-1800, urban, inland
97	Burseplein	Deventer	Burseplein Deventer 19-20th century	Overijssel	IJzereef & Laarman 1986	Inge van der Jagt	450-1800, urban, inland
98	Canadaplein	Alkmaar	Canadaplein Alkmaar	Noord-Holland	Zeiler et al. 2013	Inge van der Jagt	450-1800, urban, coastal
99	Canadaplein	Alkmaar	Canadaplein Alkmaar BP4	Noord-Holland	Van Haaster, Zeiler & Brinkhuizen 2012	Inge van der Jagt	450-1800, urban, coastal
100	City Building (Binnenrotte)	Rotterdam	City Building Rotterdam Hand	Zuid-Holland	Esser 2004	Inge van der Jagt	450-1800, rural, coastal
101	City Building (Binnenrotte)	Rotterdam	City Building Rotterdam Sieve	Zuid-Holland	Esser 2004	Inge van der Jagt	450-1800, rural, coastal
102	De Beyerd	Breda	De Beyerd Breda waste pit 1	Noord-Brabant	Esser & Beerenhout 2007	Inge van der Jagt	450-1800, urban, inland
103	De Beyerd	Breda	De Beyerd Breda waste pit 2	Noord-Brabant	Esser & Beerenhout 2007	Inge van der Jagt	450-1800, urban, inland
104	De Dorpen	Schagen	De Dorpen Schagen	Noord-Holland	Prummel 1989	Inge van der Jagt	450-1800, rural, coastal
105	De Krocht	Limmen	De Krocht Limmen V3572	Noord-Holland	Beerenhout 2006	Chris Muysson	450-1800, rural, coastal
106	De Krocht	Limmen	De Krocht Limmen V3466	Noord-Holland	Beerenhout 2006	Chris Muysson	450-1800, rural, coastal
107	De Krocht	Limmen	De Krocht Limmen M452	Noord-Holland	Beerenhout 2006	Chris Muysson	450-1800, rural, coastal
108	De Krocht	Limmen	De Krocht Limmen V340	Noord-Holland	Beerenhout 2006	Chris Muysson	450-1800, rural, coastal
109	De Krocht	Limmen	De Krocht Limmen V345	Noord-Holland	Beerenhout 2006	Chris Muysson	450-1800, rural, coastal

110	De Krocht	Limmen	De Krocht Limmen V5796	Noord-Holland	Beerenhout 2006	Chris Muysson	450-1800, rural, coastal
111	De Krocht	Limmen	De Krocht Limmen V3545	Noord-Holland	Beerenhout 2006	Chris Muysson	450-1800, rural, coastal
112	De Krocht	Limmen	De Krocht Limmen V5796 (1)	Noord-Holland	Beerenhout 2006	Chris Muysson	450-1800, rural, coastal
113	De Schans	Oude Schild	De Schans Oude Schild Hand	Noord-Holland	Zeiler 1996	Inge van der Jagt	not used (ship context)
114	De Schans	Oude Schild	De Schans Oude Schild Sieve	Noord-Holland	Zeiler 1996	Inge van der Jagt	not used (ship context)
115	De Vrieswijk	Heiloo	De Vrieswijk Heiloo	Noord-Holland	Haaster et al. 1998	Inge van der Jagt	450-1800, rural, coastal
116	Den Haag-Scheveningseweg	Den Haag	Den Haag-Scheveningseweg laag I	Zuid-Holland	Carmiggelt, Laarman & Waasdorp 1998	Monica Dütting	Not used (outside 450-1800 range)
117	Den Haag-Scheveningseweg	Den Haag	Den Haag-Scheveningseweg laag I (2)	Zuid-Holland	Carmiggelt, Laarman & Waasdorp 1998	Monica Dütting	Not used (outside 450-1800 range)
118	d'Engelsche Boomgaert	Vlaardingen	d'Engelsche Boomgaert Vlaardingen	Zuid-Holland	Paalman et al. 2002	Inge van der Jagt	450-1800, rural, coastal
119	Elfhuizen	Dordrecht	Elfhuizen Dordrecht phase V S506	Zuid-Holland	Van Dijk & Beerenhout 2008	Inge van der Jagt	450-1800, urban, coastal
120	Elfhuizen	Dordrecht	Elfhuizen Dordrecht phase II S878	Zuid-Holland	Van Dijk & Beerenhout 2008	Inge van der Jagt	450-1800, urban, coastal
121	Elfhuizen	Dordrecht	Elfhuizen Dordrecht phase IV S390	Zuid-Holland	Van Dijk & Beerenhout 2008	Inge van der Jagt	450-1800, urban, coastal
122	Elfhuizen	Dordrecht	Elfhuizen Dordrecht phase IV S486	Zuid-Holland	Van Dijk & Beerenhout 2008	Inge van der Jagt	450-1800, urban, coastal
123	Elisabeth Bloemenkampklooster	s-Hertogenbosch	Elisabeth Bloemenkampklooster 's-Hertogenbosch	Noord-Brabant	De Jong 2000	Inge van der Jagt	450-1800, urban, inland
124	Firdgum-terp	Firdgum	Firdgum Terp Sieve (2mm) early medieval	Friesland	Prummel 2022	Chris Muysson	450-1800, rural, coastal
125	Firdgum-terp	Firdgum	Firdgum Terp Sieve (5mm) early medieval	Friesland	Prummel 2022	Chris Muysson	450-1800, rural, coastal
126	Firdgum-terp	Firdgum	Firdgum Terp Hand-collected early medieval	Friesland	Prummel 2022	Chris Muysson	450-1800, rural, coastal
127	Firdgum-terp	Firdgum	Firdgum Terp Sieve (2mm) late medieval	Friesland	Prummel 2022	Chris Muysson	450-1800, rural, coastal
128	Firdgum-terp	Firdgum	Firdgum Terp Sieve (5mm) late medieval	Friesland	Prummel 2022	Chris Muysson	450-1800, rural, coastal

129	Firdgum-terp	Firdgum	Firdgum Terp Hand-collected late medieval	Friesland	Prummel 2022	Chris Muysson	450-1800, rural, coastal
130	Forum Hadriani	Voorburg, Leidschendam-Voorburg	Forum Hadriani-vm Effathaterrein	Zuid-Holland	De Vries & Zeiler 2009	Monica Dütting	Not used (outside 450-1800 range)
131	Forum Hadriani	Voorburg, Leidschendam-Voorburg	Forum Hadriani-vm Effathaterrein (2)	Zuid-Holland	De Vries & Zeiler 2009	Monica Dütting	Not used (outside 450-1800 range)
132	Forum Hadriani	Voorburg, Leidschendam-Voorburg	Forum Hadriani-vm Effathaterrein (3)	Zuid-Holland	De Vries & Zeiler 2009	Monica Dütting	Not used (outside 450-1800 range)
133	Ganzenmarkt	Oldenzaal	Ganzenmarkt Oldenzaal	Overijssel	De Vries 2006	Inge van der Jagt	450-1800, urban, inland
134	Gat in de Markt 01.101	Vlaardingen	Gat in de Markt Vlaardingen period 2	Zuid-Holland	Buitenhuis et al. 2006	Inge van der Jagt	450-1800, rural, coastal
135	Gat in de Markt 01.101	Vlaardingen	Gat in de Markt Vlaardingen period 3 Sieve	Zuid-Holland	Buitenhuis et al. 2006	Inge van der Jagt	not used (ship context)
136	Gat in de Markt 01.101	Vlaardingen	Gat in de Markt Vlaardingen period 3 Hand	Zuid-Holland	Buitenhuis et al. 2006	Inge van der Jagt	not used (ship context)
137	Gat in de Markt 01.101	Vlaardingen	Gat in de Markt Vlaardingen period 4 Sieve	Zuid-Holland	Buitenhuis et al. 2006	Inge van der Jagt	450-1800, rural, coastal
138	Gat in de Markt 01.101	Vlaardingen	Gat in de Markt Vlaardingen period 4 Hand	Zuid-Holland	Buitenhuis et al. 2006	Inge van der Jagt	450-1800, rural, coastal
139	Gat in de Markt 01.101	Vlaardingen	Gat in de Markt Vlaardingen period 5 Sieve	Zuid-Holland	Buitenhuis et al. 2006	Inge van der Jagt	450-1800, urban, coastal
140	Gat in de Markt 01.101	Vlaardingen	Gat in de Markt Vlaardingen period 5 Hand	Zuid-Holland	Buitenhuis et al. 2006	Inge van der Jagt	450-1800, urban, coastal
141	Gedempte Kattendiep	Groningen	Gedempte Kattendiep Groningen	Groningen	Brinkhuizen 1988	Inge van der Jagt	450-1800, urban, coastal
142	Gedempte Nieuwesloot 29-31	Alkmaar	Gedempte Nieuwesloot 29-31 Alkmaar	Noord-Holland	Van Haaster, Zeiler & Brinkhuizen 2012	Inge van der Jagt	450-1800, urban, coastal
143	Gerner Marke	Dalfsen	Gerner Marke Dalfsen	Overijssel	Brinkhuizen 2006	Chris Muysson	450-1800, rural, inland
144	Groene Linde	Rossum	Groene Linde Rossum	Gelderland	Beerenhout 2006	Chris Muysson	450-1800, rural, inland
145	Groot Olmen	Bloemendaal	Groot Olmen Bloemendaal site 3	Noord-Holland	De Vries 2011	Inge van der Jagt	450-1800, rural, coastal

146	Groot Olmen	Bloemendaal	Groot Olmen Bloemendaal site 8	Noord-Holland	De Vries 2011	Inge van der Jagt	450-1800, rural, coastal
147	Groot Olmen	Bloemendaal	Groot Olmen Bloemendaal site 5	Noord-Holland	De Vries 2011	Inge van der Jagt	450-1800, rural, coastal
148	Groot Olmen	Bloemendaal	Groot Olmen Bloemendaal site 14	Noord-Holland	De Vries 2011	Inge van der Jagt	450-1800, rural, coastal
149	Grote Markt	Dordrecht	Grote markt Dordrecht V64	Zuid-Holland	Beerenhout 2008	Chris Muysson	450-1800, urban, coastal
150	Grote Markt	Dordrecht	Grote Markt Dordrecht V93	Zuid-Holland	Beerenhout 2008	Chris Muysson	450-1800, urban, coastal
151	Haarlemmerplein 18	Amsterdam	Haarlemmerplein 18 Amsterdam	Noord-Holland	Médard 2006	Inge van der Jagt	450-1800, urban, coastal
152	Haarlemmerplein 20	Amsterdam	Haarlemmerplein 20 Amsterdam	Noord-Holland	Vorst 2002	Inge van der Jagt	450-1800, urban, coastal
153	Haarlemmerplein 22	Amsterdam	Haarlemmerplein 22 Amsterdam	Noord-Holland	Vorst 2002	Inge van der Jagt	450-1800, urban, coastal
154	Haarlemmerplein 24	Amsterdam	Haarlemmerplein 24 Amsterdam	Noord-Holland	Peters 2001	Inge van der Jagt	450-1800, urban, coastal
155	Haarlemmerplein 28	Amsterdam	Haarlemmerplein 28 Amsterdam	Noord-Holland	Zuyderwyk 2004	Inge van der Jagt	450-1800, urban, coastal
156	Havezate De Kranenburg	Zwolle	Havezate De Kranenburg Zwolle	Overijssel	Grimm 2006	Inge van der Jagt	450-1800, rural, inland
157	Havezate Werkeren	Zwolle	Havezate Werkeren Zwolle 8.1.3	Overijssel	Grimm 2006	Inge van der Jagt	450-1800, rural, inland
158	Havezate Werkeren	Zwolle	Havezate Werkeren Zwolle 6.1.3 en 8.1.42	Overijssel	Grimm 2006	Inge van der Jagt	450-1800, rural, inland
159	Helenius de Cockschool	Kampen	Helenius de Cockschool Kampen	Overijssel	Laarman 1990	Inge van der Jagt	450-1800, urban, inland
160	Het Regthuys	Wassenaar	Het Regthuys Wassenaar	Zuid-Holland	Grimm 2011	Inge van der Jagt	450-1800, rural, coastal
161	Hofstraat	IJsselstein	Hofstraat IJsselstein	Utrecht	Brinkhuizen 2002	Chris Muysson	450-1800, urban, inland
162	Hoogdijk terrein 89	Houten	Hoogdijk terrein 89, Houten	Utrecht	Beerenhout 2001	Chris Muysson	450-1800, rural, inland
163	Hoogeland Zuidweg	Naaldwijk	Hoogeland Zuidweg Naaldwijk Roman period phase 6	Zuid-Holland	Van Dijk et al. 2015	Inge van der Jagt	Not used (outside 450-1800 range)
164	Hoogeland Zuidweg	Naaldwijk	Hoogeland Zuidweg Naaldwijk Roman period remaining	Zuid-Holland	Van Dijk et al. 2015	Inge van der Jagt	Not used (outside 450-1800 range)
165	Hoogeland Zuidweg	Naaldwijk	Hoogeland Zuidweg Naaldwijk Merovingian period	Zuid-Holland	Van Dijk et al. 2015	Inge van der Jagt	450-1800,

							rural, coastal
166	Hoogeland Zuidweg	Naaldwijk	Hoogeland Zuidweg Naaldwijk Carolingian period	Zuid-Holland	Van Dijk et al. 2015	Inge van der Jagt	450-1800, rural, coastal
167	Hoogeland Zuidweg	Naaldwijk	Hoogeland Zuidweg Naaldwijk Ottonian-Late medieval	Zuid-Holland	Van Dijk et al. 2015	Inge van der Jagt	450-1800, rural, coastal
168	Hoogstraat III / Dorestad	Wijk bij Duurstede	Hoogstraat III Dorestad 10mm	Utrecht	Prummel 1983	Inge van der Jagt	450-1800, rural, inland
169	Hoogstraat III / Dorestad	Wijk bij Duurstede	Hoogstraat III Dorestad 4mm	Utrecht	Prummel 1983	Inge van der Jagt	450-1800, rural, inland
170	Hoogstraat I / Dorestad	Wijk bij Duurstede	Hoogstraat I Dorestad 10mm	Utrecht	Prummel 1983	Inge van der Jagt	450-1800, rural, inland
171	Hoogstraat I / Dorestad	Wijk bij Duurstede	Hoogstraat I Dorestad 4mm	Utrecht	Prummel 1983	Inge van der Jagt	450-1800, rural, inland
172	Hoogstraat I / Dorestad	Wijk bij Duurstede	Hoogstraat I Dorestad Hand	Utrecht	Prummel 1983	Inge van der Jagt	450-1800, rural, inland
173	Huis Malburg	Kerk-Avezaath	Huis Malburg Kerk-Avezaath Ottonian period	Gelderland	Esser 2000	Inge van der Jagt	450-1800, rural, inland
174	Huis Malburg	Kerk-Avezaath	Huis Malburg Kerk-Avezaath High Middle Ages	Gelderland	Esser 2000	Inge van der Jagt	450-1800, rural, inland
175	Huis Malburg	Kerk-Avezaath	Huis Malburg Kerk-Avezaath Late Middle Ages	Gelderland	Esser 2000	Inge van der Jagt	450-1800, rural, inland
176	Huis Malburg	Kerk-Avezaath	Huis Malburg Kerk-Avezaath Post Middle Ages	Gelderland	Esser 2000	Inge van der Jagt	450-1800, rural, inland
177	Huis te Vleuten	Vleuten	Huis te Vleuten	Utrecht	Van Dijk et al. 2005	Inge van der Jagt	450-1800, rural, inland
178	Huis ter Kleef	Haarlem	Huis ter Kleef hand collected AH	Noord-Holland	Van Neer & Wouters 2022	Inge van der Jagt	450-1800, rural, coastal
179	Huis ter Kleef	Haarlem	Huis ter Kleef 4mm AH	Noord-Holland	Van Neer & Wouters 2022	Inge van der Jagt	450-1800, rural, coastal
180	Huis ter Kleef	Haarlem	Huis ter Kleef hand collected AK	Noord-Holland	Van Neer & Wouters 2022	Inge van der Jagt	450-1800, rural, coastal
181	Huis ter Kleef	Haarlem	Huis ter Kleef 4mm AK	Noord-Holland	Van Neer & Wouters 2022	Inge van der Jagt	450-1800, rural, coastal
182	Huis ter Kleef	Haarlem	Huis ter Kleef 2mm AK	Noord-Holland	Van Neer & Wouters 2022	Inge van der Jagt	450-1800, rural, coastal
183	Huis ter Kleef	Haarlem	Huis ter Kleef hand collected XX	Noord-Holland	Van Neer & Wouters 2022	Inge van der Jagt	450-1800, rural, coastal
184	Huis ter Kleef	Haarlem	Huis ter Kleef 4mm XX	Noord-Holland	Van Neer & Wouters 2022	Inge van der Jagt	450-1800,

							rural, coastal
185	Huis ter Kleef	Haarlem	Huis ter Kleef hand collected LL	Noord-Holland	Van Neer & Wouters 2022	Inge van der Jagt	450-1800, rural, coastal
186	Huis ter Kleef	Haarlem	Huis ter Kleef 4mm LL	Noord-Holland	Van Neer & Wouters 2022	Inge van der Jagt	450-1800, rural, coastal
187	Huis ter Kleef	Haarlem	Huis ter Kleef 4mm SS	Noord-Holland	Van Neer & Wouters 2022	Inge van der Jagt	450-1800, rural, coastal
188	Huis ter Kleef	Haarlem	Huis ter Kleef hand collected WW	Noord-Holland	Van Neer & Wouters 2022	Inge van der Jagt	450-1800, rural, coastal
189	Huis ter Kleef	Haarlem	Huis ter Kleef 4mm WW	Noord-Holland	Van Neer & Wouters 2022	Inge van der Jagt	450-1800, rural, coastal
190	Huis ter Kleef	Haarlem	Huis ter Kleef hand collected IV	Noord-Holland	Van Neer & Wouters 2022	Inge van der Jagt	450-1800, rural, coastal
191	Huis ter Kleef	Haarlem	Huis ter Kleef 4mm IV	Noord-Holland	Van Neer & Wouters 2022	Inge van der Jagt	450-1800, rural, coastal
192	Huis ter Kleef	Haarlem	Huis ter Kleef hand collected III	Noord-Holland	Van Neer & Wouters 2022	Inge van der Jagt	450-1800, rural, coastal
193	Huis ter Kleef	Haarlem	Huis ter Kleef 4mm III	Noord-Holland	Van Neer & Wouters 2022	Inge van der Jagt	450-1800, rural, coastal
194	Huis ter Kleef	Haarlem	Huis ter Kleef 2mm III	Noord-Holland	Van Neer & Wouters 2022	Inge van der Jagt	450-1800, rural, coastal
195	Huis ter Kleef	Haarlem	Huis ter Kleef hand collected II	Noord-Holland	Van Neer & Wouters 2022	Inge van der Jagt	450-1800, rural, coastal
196	Huis ter Kleef	Haarlem	Huis ter Kleef 4mm II	Noord-Holland	Van Neer & Wouters 2022	Inge van der Jagt	450-1800, rural, coastal
197	Huis ter Kleef	Haarlem	Huis ter Kleef 2mm II	Noord-Holland	Van Neer & Wouters 2022	Inge van der Jagt	450-1800, rural, coastal
198	Huis ter Kleef	Haarlem	Huis ter Kleef hand collected I	Noord-Holland	Van Neer & Wouters 2022	Inge van der Jagt	450-1800, rural, coastal
199	Huis ter Kleef	Haarlem	Huis ter Kleef 4mm I	Noord-Holland	Van Neer & Wouters 2022	Inge van der Jagt	450-1800, rural, coastal
200	Huis ter Kleef	Haarlem	Huis ter Kleef 2mm I	Noord-Holland	Van Neer & Wouters 2022	Inge van der Jagt	450-1800, rural, coastal
201	Huys te Werve	Rijswijk	Huys ter Werve Rijswijk layer 3	Zuid-Holland	Kootker & Beerenhout 2011	Inge van der Jagt	450-1800, rural, coastal
202	Huys te Werve	Rijswijk	Huys ter Werve Rijswijk layer 4	Zuid-Holland	Kootker & Beerenhout 2011	Inge van der Jagt	450-1800, rural, coastal
203	Huys te Werve	Rijswijk	Huys ter Werve Rijswijk layer 5	Zuid-Holland	Kootker & Beerenhout 2011	Inge van der Jagt	450-1800, rural, coastal

204	Huys te Werve	Rijswijk	Huys ter Werve Rijswijk layer 1 t/m 5 mix	Zuid-Holland	Kootker & Beerenhout 2011	Inge van der Jagt	450-1800, rural, coastal
205	In den Struys'	Veere	In den Struys' Veere	Zeeland	IJzereef & Laarman 1986	Inge van der Jagt	450-1800, urban, coastal
206	Jansstraat 46/Gerechtsgebouw	Haarlem	Jansstraat 46/Gerechtsgebouw Haarlem	Noord-Holland	Seeman 1984	Inge van der Jagt	450-1800, urban, coastal
207	Johan van Oldenbarneveltlaan 91-95	Den Haag	Johan van Oldenbarneveltlaan Den Haag	Zuid-Holland	Magendans & Waasdorp 1989	Inge van der Jagt	450-1800, rural, coastal
208	Kastanjelaan	Leiderdorp	Kastanjelaan Leiderdorp V148	Zuid-Holland	Kerklaan 2014	Inge van der Jagt	450-1800, rural, coastal
209	Kastanjelaan	Leiderdorp	Kastanjelaan Leiderdorp V189	Zuid-Holland	Kerklaan 2014	Inge van der Jagt	450-1800, rural, coastal
210	Kastanjelaan	Leiderdorp	Kastanjelaan Leiderdorp V220	Zuid-Holland	Kerklaan 2014	Inge van der Jagt	450-1800, rural, coastal
211	Kastanjelaan	Leiderdorp	Kastanjelaan Leiderdorp Hand	Zuid-Holland	Kerklaan 2014	Inge van der Jagt	450-1800, rural, coastal
212	Kasteel De Haar	Haarzuilens	Kasteel De Haar Haarzuilens	Utrecht	Zeiler & Brinkhuizen 2013	Inge van der Jagt	450-1800, rural, inland
213	Kasteel van Breda	Breda	Kasteel van Breda chute layer 1010	Noord-Brabant	De Jong, Carmiggelt & Van den Eynde, 1997	Inge van der Jagt	450-1800, urban, inland
214	Kasteel van Breda	Breda	Kasteel van Breda chute excl. layer 1010	Noord-Brabant	Nagels, Kerklaan & Van Kaam 2014	Inge van der Jagt	450-1800, urban, inland
215	Kasteel van Breda	Breda	Kasteel van Breda well 153	Noord-Brabant	Nagels, Kerklaan & Van Kaam 2014	Inge van der Jagt	450-1800, urban, inland
216	Kasteel van Eindhoven	Eindhoven	Kasteel van Eindhoven 20.15	Noord-Brabant	De Jong 1992	Inge van der Jagt	450-1800, urban, inland
217	Kasteel van Eindhoven	Eindhoven	Kasteel van Eindhoven 18.1	Noord-Brabant	De Jong 1992	Inge van der Jagt	450-1800, urban, inland
218	Kasteel van Eindhoven	Eindhoven	Kasteel van Eindhoven 19.1	Noord-Brabant	De Jong 1992	Inge van der Jagt	450-1800, urban, inland
219	Kasteel van Eindhoven	Eindhoven	Kasteel van Eindhoven 20.1	Noord-Brabant	De Jong 1992	Inge van der Jagt	450-1800, urban, inland
220	Kasteel Voorst	Zwolle	Kasteel Voorst Zwolle	Overijssel	IJzereef 1983	Inge van der Jagt	450-1800, rural, inland
221	Kavel M11	Biddinghuizen	Kavel M11 Biddinghuizen	Flevoland	Lauwerier & Laarman 2006	Inge van der Jagt	not used (ship context)
222	Kazerneplein	Gorinchem	Kazerneplein Gorinchem	Zuid-Holland	De Jong 1998	Inge van der Jagt	450-1800, urban, coastal

223	Keizershof	s-Hertogenbosch	Keizershof 's-Hertogenbosch Period A	Noord-Brabant	Esser & Kerklaan 2017	Inge van der Jagt	450-1800, urban, inland
224	Keizershof	s-Hertogenbosch	Keizershof 's-Hertogenbosch Period B	Noord-Brabant	Esser & Kerklaan 2017	Inge van der Jagt	450-1800, urban, inland
225	Keizershof	s-Hertogenbosch	Keizershof 's-Hertogenbosch Period C	Noord-Brabant	Esser & Kerklaan 2017	Inge van der Jagt	450-1800, urban, inland
226	Keizershof	s-Hertogenbosch	Keizershof 's-Hertogenbosch Period D	Noord-Brabant	Esser & Kerklaan 2017	Inge van der Jagt	450-1800, urban, inland
227	Keizershof	s-Hertogenbosch	Keizershof 's-Hertogenbosch Period E	Noord-Brabant	Esser & Kerklaan 2017	Inge van der Jagt	450-1800, urban, inland
228	Kerklaan	Rijswijk	Kerklaan Rijswijk	Zuid-Holland	Paalman, Esser & Beerenhout 2003	Inge van der Jagt	450-1800, urban, coastal
229	Kerkstraat	Sint-Oedenrode	Kerkstraat Sint-Oedenrode phase 2	Noord-Brabant	Esser et al. 2014	Inge van der Jagt	450-1800, rural, inland
230	Kerkstraat	Sint-Oedenrode	Kerkstraat Sint-Oedenrode phase 3	Noord-Brabant	Esser et al. 2014	Inge van der Jagt	450-1800, rural, inland
231	Kesteren-De Woerd	Neder-Betuwe	Kesteren-De Woerd fase a	Gelderland	Zeiler 2001	Monica Dütting	Not used (outside 450-1800 range)
232	Kesteren-De Woerd	Neder-Betuwe	Kesteren-De Woerd fase b	Gelderland	Zeiler 2001	Monica Dütting	Not used (outside 450-1800 range)
233	Kesteren-De Woerd	Neder-Betuwe	Kesteren-De Woerd fase c	Gelderland	Zeiler 2001	Monica Dütting	Not used (outside 450-1800 range)
234	Kesteren-De Woerd	Neder-Betuwe	Kesteren-De Woerd fase d	Gelderland	Zeiler 2001	Monica Dütting	Not used (outside 450-1800 range)
235	Kesteren-De Woerd	Neder-Betuwe	Kesteren-De Woerd fase c-e	Gelderland	Zeiler 2001	Monica Dütting	Not used (outside 450-1800 range)
236	Klokkenveld	Utrecht	Klokkenveld Utrecht BP1 Hand	Utrecht	Van Dijk & Kerklaan 2016	Inge van der Jagt	450-1800, urban, inland
237	Klokkenveld	Utrecht	Klokkenveld Utrecht BP1 Sieve 4mm	Utrecht	Van Dijk & Kerklaan 2016	Inge van der Jagt	450-1800, urban, inland
238	Klokkenveld	Utrecht	Klokkenveld Utrecht BP1 Sieve 2mm	Utrecht	Van Dijk & Kerklaan 2016	Inge van der Jagt	450-1800, urban, inland
239	Klokkenveld	Utrecht	Klokkenveld Utrecht BP2 Hand	Utrecht	Van Dijk & Kerklaan 2016	Inge van der Jagt	450-1800, urban, inland
240	Klokkenveld	Utrecht	Klokkenveld Utrecht BP2 Sieve 4mm	Utrecht	Van Dijk & Kerklaan 2016	Inge van der Jagt	450-1800, urban, inland
241	Klokkenveld	Utrecht	Klokkenveld Utrecht BP2 Sieve 2mm	Utrecht	Van Dijk & Kerklaan 2016	Inge van der Jagt	450-1800,

							urban, inland
242	Klokkenveld	Utrecht	Klokkenveld Utrecht BP3	Utrecht	Van Dijk & Kerklaan 2016	Inge van der Jagt	450-1800, urban, inland
243	Klokkenveld	Utrecht	Klokkenveld Utrecht BP4	Utrecht	Van Dijk & Kerklaan 2016	Inge van der Jagt	450-1800, urban, inland
244	Kloosterstraat 3-5	Nijkerk	Kloosterstraat 3-5 Nijkerk	Gelderland	Kerklaan 2020	Chris Muysson	450-1800, urban, inland
245	Kokpanden	Kampen	Kokpanden Kampen	Overijssel	Laarman 1990	Inge van der Jagt	450-1800, urban, inland
246	Koningsstraat	Dokkum	Konigsstraat Dokkum (V224)	Friesland	van Haaster et al. 2003	Chris Muysson	450-1800, urban, coastal
247	Koningsstraat	Dokkum	Konigsstraat Dokkum (V219)	Friesland	van Haaster et al. 2003	Chris Muysson	450-1800, urban, coastal
248	Koningstraat 18	Arnhem	Koningstraat 18 Arnhem Hand	Gelderland	Zeiler, Brinkhuizen & Kuijper 2011	Inge van der Jagt	450-1800, urban, inland
249	Koningstraat 18	Arnhem	Koningstraat 18 Arnhem Sieve	Gelderland	Zeiler, Brinkhuizen & Kuijper 2011	Inge van der Jagt	450-1800, urban, inland
250	Koornmarkt	Tiel	Koornmarkt Tiel Hand	Gelderland	Klein Hofmeijer 1998	Inge van der Jagt	450-1800, urban, inland
251	Koornmarkt	Tiel	Koornmarkt Tiel Sieve	Gelderland	Klein Hofmeijer 1998	Inge van der Jagt	450-1800, urban, inland
252	Korte Begijnestraat	Haarlem	Korte Begijnestraat Haarlem cess pit (cellar)	Noord-Holland	Van Dijk, Esser, Verhagen, 1998	Inge van der Jagt	450-1800, urban, coastal
253	Korte Begijnestraat	Haarlem	Korte Begijnestraat Haarlem cess pit 1 layer E Hand	Noord-Holland	Van Dijk, Esser, Verhagen, 1998	Inge van der Jagt	450-1800, urban, coastal
254	Korte Begijnestraat	Haarlem	Korte Begijnestraat Haarlem cess pit 1 layer E Sieve analysed	Noord-Holland	Van Dijk, Esser, Verhagen, 1998	Inge van der Jagt	450-1800, urban, coastal
255	Korte Begijnestraat	Haarlem	Korte Begijnestraat Haarlem cess pit 1 layer E Sieve scan	Noord-Holland	Van Dijk, Esser, Verhagen, 1998	Inge van der Jagt	450-1800, urban, coastal
256	Korte Begijnestraat	Haarlem	Korte Begijnestraat Haarlem cess pit 1 layer B	Noord-Holland	Van Dijk, Esser, Verhagen, 1998	Inge van der Jagt	450-1800, urban, coastal
257	Korte Begijnestraat	Haarlem	Korte Begijnestraat Haarlem cess pit 2-layer C Hand	Noord-Holland	Van Dijk, Esser, Verhagen, 1998	Inge van der Jagt	450-1800, urban, coastal
258	Korte Begijnestraat	Haarlem	Korte Begijnestraat Haarlem cess pit 2-layer C Sieve analysed	Noord-Holland	Van Dijk, Esser, Verhagen, 1998	Inge van der Jagt	450-1800, urban, coastal

259	Korte Begijnestraat	Haarlem	Korte Begijnestraat Haarlem cess pit 2-layer C Sieve scanned	Noord-Holland	Van Dijk, Esser, Verhagen, 1998	Inge van der Jagt	450-1800, urban, coastal
260	Korte Begijnestraat	Haarlem	Korte Begijnestraat Haarlem cess pit 2 chute	Noord-Holland	Van Dijk, Esser, Verhagen, 1998	Inge van der Jagt	450-1800, urban, coastal
261	Korte Houtstraat 28	Amsterdam	Korte Houtstraat 28 Amsterdam	Noord-Holland	Bakker 2014	Inge van der Jagt	450-1800, urban, coastal
262	Krijtstraat	Gorinchem	Krijtstraat Gorinchem 14th-early 15th century Hand	Zuid-Holland	Zeiler & Brinkhuizen 2005	Inge van der Jagt	450-1800, urban, coastal
263	Krijtstraat	Gorinchem	Krijtstraat Gorinchem 14th-early 15th century Sieve	Zuid-Holland	Zeiler & Brinkhuizen 2005	Inge van der Jagt	450-1800, urban, coastal
264	Krijtstraat	Gorinchem	Krijtstraat Gorinchem 16th-early 17th century	Zuid-Holland	Zeiler & Brinkhuizen 2005	Inge van der Jagt	450-1800, urban, coastal
265	Krijtstraat	Gorinchem	Krijtstraat Gorinchem late 16th-17th century Sieve 2,5 mm	Zuid-Holland	Zeiler & Brinkhuizen 2005	Inge van der Jagt	450-1800, urban, coastal
266	Krijtstraat	Gorinchem	Krijtstraat Gorinchem late 16th-17th century Sieve 0,5 mm	Zuid-Holland	Zeiler & Brinkhuizen 2005	Inge van der Jagt	450-1800, urban, coastal
267	Laat 233-237	Alkmaar	Laat 233-237 Alkmaar	Noord-Holland	Van Haaster, Zeiler & Brinkhuizen 2012	Inge van der Jagt	450-1800, urban, coastal
268	Lange Houtstraat 6	Amsterdam	Lange Houtstraat 6 Amsterdam 2mm	Noord-Holland	Bakker 2014	Inge van der Jagt	450-1800, urban, coastal
269	Lange Houtstraat 6	Amsterdam	Lange Houtstraat 6 Amsterdam 0,5-1mm	Noord-Holland	Bakker 2014	Inge van der Jagt	450-1800, urban, coastal
270	Langestraat 115/117	Alkmaar	Langestraat 115/117 Alkmaar cess pit 11B	Noord-Holland	Esser, Van Dijk, Luijten 1997	Inge van der Jagt	450-1800, urban, coastal
271	Langestraat 115/117	Alkmaar	Langestraat 115/117 Alkmaar cess pit 12A	Noord-Holland	Esser, Van Dijk, Luijten 1997	Inge van der Jagt	450-1800, urban, coastal
272	Langestraat 115/117	Alkmaar	Langestraat 115/117 Alkmaar cess pit 13B	Noord-Holland	Esser, Van Dijk, Luijten 1997	Inge van der Jagt	450-1800, urban, coastal
273	Langestraat 115/117	Alkmaar	Langestraat 115/117 Alkmaar cess pit 13C	Noord-Holland	Esser, Van Dijk, Luijten 1997	Inge van der Jagt	450-1800, urban, coastal
274	Langestraat 3-5	Alkmaar	Langestraat 3-5 Alkmaar BP5 Hand	Noord-Holland	Van Haaster, Zeiler & Brinkhuizen 2012	Inge van der Jagt	450-1800, urban, coastal
275	Langestraat 3-5	Alkmaar	Langestraat 3-5 Alkmaar BP5 Sieve	Noord-Holland	Van Haaster, Zeiler & Brinkhuizen 2012	Inge van der Jagt	450-1800, urban, coastal
276	Langestraat 3-5	Alkmaar	Langestraat 3-5 Alkmaar BP2	Noord-Holland	Van Haaster, Zeiler &	Inge van der Jagt	450-1800, urban, coastal

					Brinkhuizen 2012		
277	Loerik terrein 9	Houten	Loerik terrein 9, Houten	Utrecht	Brinkhuizen 2003	Chris Muysson	450-1800, rural, inland
278	LR 31 - Zandweg Wachttoren	Utrecht	LR31-Wachttoren fase 1a	Utrecht	Esser, Beerenhout & Kuijper 2007	Monica Dütting	Not used (outside 450-1800 range)
279	LR 31 - Zandweg Wachttoren	Utrecht	LR31-Wachttoren fase 1b 50-62	Utrecht	Esser, Beerenhout & Kuijper 2007	Monica Dütting	Not used (outside 450-1800 range)
280	LR 31 - Zandweg Wachttoren	Utrecht	LR31-Wachttoren fase 1a/b 40-62	Utrecht	Esser, Beerenhout & Kuijper 2007	Monica Dütting	Not used (outside 450-1800 range)
281	LR 31 - Zandweg Wachttoren	Utrecht	LR31-Wachttoren fase 2 c. 61-80/90	Utrecht	Esser, Beerenhout & Kuijper 2007	Monica Dütting	Not used (outside 450-1800 range)
282	LR 31 - Zandweg Wachttoren	Utrecht	LR31-Wachttoren fase 1/2 c. 40-80/90	Utrecht	Esser, Beerenhout & Kuijper 2007	Monica Dütting	Not used (outside 450-1800 range)
283	LZ1	Flevoland	LZ1 Flevoland	Flevoland	Zeiler & Brinkhuizen 1992	Inge van der Jagt	not used (ship context)
284	Maasboulevard	Venlo	Maasboulevard Venlo 13th-14th century	Limburg	Esser, Beerenhout & Rijkelijkhuizen 2009	Inge van der Jagt	450-1800, urban, inland
285	Maasboulevard	Venlo	Maasboulevard Venlo 15th-16th century	Limburg	Esser, Beerenhout & Rijkelijkhuizen 2009	Inge van der Jagt	450-1800, urban, inland
286	Maasboulevard	Venlo	Maasboulevard Venlo 16th-17th century	Limburg	Esser, Beerenhout & Rijkelijkhuizen 2009	Inge van der Jagt	450-1800, urban, inland
287	Maasboulevard	Venlo	Maasboulevard Venlo 16th-17th century cesspit 63	Limburg	Esser, Beerenhout & Rijkelijkhuizen 2009	Inge van der Jagt	450-1800, urban, inland
288	Maasboulevard	Venlo	Maasboulevard Venlo 17th-18th century	Limburg	Esser, Beerenhout & Rijkelijkhuizen 2009	Inge van der Jagt	450-1800, urban, inland
289	Maaskade-zuid	Venlo	Maaskade-zuid Venlo BP1	Limburg	Kootker, Beerenhout & Rijkelijkhuizen 2015	Inge van der Jagt	450-1800, urban, inland
290	Maaskade-zuid	Venlo	Maaskade-zuid Venlo BP2	Limburg	Kootker, Beerenhout & Rijkelijkhuizen 2015	Inge van der Jagt	450-1800, urban, inland
291	Maaskade-zuid	Venlo	Maaskade-zuid Venlo BP3	Limburg	Kootker, Beerenhout & Rijkelijkhuizen 2015	Inge van der Jagt	450-1800, urban, inland

292	Maaskade-zuid	Venlo	Maaskade-zuid Venlo BP4	Limburg	Kootker, Beerenhout & Rijkelijkhuizen 2015	Inge van der Jagt	450-1800, urban, inland
293	Maaskade-zuid	Venlo	Maaskade-zuid Venlo BP5	Limburg	Kootker, Beerenhout & Rijkelijkhuizen 2015	Inge van der Jagt	450-1800, urban, inland
294	Marktenroute/Vismarkt	Leiden	Marktenroute/Vismarkt Leiden	Zuid-Holland	Van Wijngaarden-Bakker 1980	Inge van der Jagt	450-1800, urban, coastal
295	Marktveld	Valkenburg (Z-H), Katwijk	Valkenburg-Marktveld geul	Zuid-Holland	Gehasse 1997	Monica Dütting	Not used (outside 450-1800 range)
296	Marktveld	Valkenburg (Z-H), Katwijk	Valkenburg-Marktveld geul (2)	Zuid-Holland	Gehasse 1997	Monica Dütting	Not used (outside 450-1800 range)
297	Marktveld	Valkenburg (Z-H), Katwijk	Valkenburg-Marktveld geul (3)	Zuid-Holland	Gehasse 1997	Monica Dütting	Not used (outside 450-1800 range)
298	Marktveld	Valkenburg (Z-H), Katwijk	Valkenburg-Marktveld geul (4)	Zuid-Holland	Gehasse 1997	Monica Dütting	Not used (outside 450-1800 range)
299	Marktveld	Valkenburg (Z-H), Katwijk	Valkenburg-Marktveld geul (5)	Zuid-Holland	Gehasse 1997	Monica Dütting	Not used (outside 450-1800 range)
300	Marnixlaan	Utrecht	Marnixlaan Utrecht Hand	Utrecht	Zeiler et al. 2011	Inge van der Jagt	450-1800, urban, inland
301	Marnixlaan	Utrecht	Marnixlaan Utrecht BP124 Sieve 4mm	Utrecht	Zeiler et al. 2011	Inge van der Jagt	450-1800, urban, inland
302	Marnixlaan	Utrecht	Marnixlaan Utrecht BP124 Sieve 2mm	Utrecht	Zeiler et al. 2011	Inge van der Jagt	450-1800, urban, inland
303	Marnixlaan	Utrecht	Marnixlaan Utrecht BP124 Sieve 1mm	Utrecht	Zeiler et al. 2011	Inge van der Jagt	450-1800, urban, inland
304	Marnixlaan	Utrecht	Marnixlaan Utrecht BP218 Sieve 4mm	Utrecht	Zeiler et al. 2011	Inge van der Jagt	450-1800, urban, inland
305	Marnixlaan	Utrecht	Marnixlaan Utrecht BP218 Sieve 2mm	Utrecht	Zeiler et al. 2011	Inge van der Jagt	450-1800, urban, inland
306	Martiniplein	Sneek	Martiniplein Sneek 12th-14th century	Friesland	Brinkhuizen 2008	Chris Muysson	450-1800, urban, coastal
307	Martiniplein	Sneek	Martiniplein Sneek 15th century	Friesland	Brinkhuizen 2008	Chris Muysson	450-1800, urban, coastal
308	Martiniplein	Sneek	Martiniplein Sneek 16th century	Friesland	Brinkhuizen 2008	Chris Muysson	450-1800, urban, coastal
309	Martiniplein	Sneek	Martiniplein Sneek 16th-17th century	Friesland	Brinkhuizen 2008	Chris Muysson	450-1800, urban, coastal
310	Martiniplein	Sneek	Martiniplein Sneek 17th century	Friesland	Brinkhuizen 2008	Chris Muysson	450-1800, urban, coastal

311	Martiniplein	Sneek	Martiniplein Sneek 18th-19th century	Friesland	Brinkhuizen 2008	Chris Muysson	450-1800, urban, coastal
312	Meeuwenweg	Kampen	Meeuwenweg Kampen	Overijssel	Laarman 1990	Inge van der Jagt	450-1800, urban, inland
313	Middelhof	Alkmaar	Middelhof Alkmaar find number 400	Noord-Holland	Zeiler et al. 2013	Inge van der Jagt	450-1800, urban, coastal
314	Middelhof	Alkmaar	Middelhof Alkmaar find number 402 Sieve	Noord-Holland	Zeiler et al. 2013	Inge van der Jagt	450-1800, urban, coastal
315	Middelhof	Alkmaar	Middelhof Alkmaar find number 402 Hand	Noord-Holland	Zeiler et al. 2013	Inge van der Jagt	450-1800, urban, coastal
316	Middelhof	Alkmaar	Middelhof Alkmaar find number 412	Noord-Holland	Zeiler et al. 2013	Inge van der Jagt	450-1800, urban, coastal
317	Middelhof	Alkmaar	Middelhof Alkmaar find number 414	Noord-Holland	Zeiler et al. 2013	Inge van der Jagt	450-1800, urban, coastal
318	Middelhof	Alkmaar	Middelhof Alkmaar find number 415	Noord-Holland	Zeiler et al. 2013	Inge van der Jagt	450-1800, urban, coastal
319	Minderbroeders klooster	s-Hertogen bosch	Minderbroedersklooster 's-Hertogenbosch period ducal court	Noord-Brabant	Kerklaan 2016	Inge van der Jagt	450-1800, urban, inland
320	Minderbroeders klooster	s-Hertogen bosch	Minderbroedersklooster 's-Hertogenbosch period monastery pit 1	Noord-Brabant	Kerklaan 2016	Inge van der Jagt	450-1800, urban, inland
321	Minderbroeders klooster	s-Hertogen bosch	Minderbroedersklooster 's-Hertogenbosch period monastery pit 2 14d	Noord-Brabant	Kerklaan 2016	Inge van der Jagt	450-1800, urban, inland
322	Minderbroeders klooster	s-Hertogen bosch	Minderbroedersklooster 's-Hertogenbosch period monastery pit 2 15a	Noord-Brabant	Kerklaan 2016	Inge van der Jagt	450-1800, urban, inland
323	Minderbroeders klooster	s-Hertogen bosch	Minderbroedersklooster 's-Hertogenbosch period monastery pit 2 15	Noord-Brabant	Kerklaan 2016	Inge van der Jagt	450-1800, urban, inland
324	Minderbroeders klooster	s-Hertogen bosch	Minderbroedersklooster 's-Hertogenbosch period inn	Noord-Brabant	Kerklaan 2016	Inge van der Jagt	450-1800, urban, inland
325	Molenstraat/Oude Vest	Breda	Molenstraat/Oude Vest Breda Hand	Noord-Brabant	Van der Lee 1992	Inge van der Jagt	450-1800, urban, inland
326	Molenstraat/Oude Vest	Breda	Molenstraat/Oude Vest Breda Sieve	Noord-Brabant	Van der Lee 1992	Inge van der Jagt	450-1800, urban, inland
327	Muggenborch	Kapel-Avezaath	Muggenborch Kapel-Avezaath S3.40	Gelderland	Beerenhout 2011	Chris Muysson	450-1800, rural, inland
328	Muggenborch	Kapel-Avezaath	Muggenborch Kapel-Avezaath S1.96	Gelderland	Beerenhout 2011	Chris Muysson	450-1800, rural, inland

329	Muggenborch	Kapel-Avezaath	Muggenborch Kapel-Avezaath S1.48	Gelderland	Beerenhout 2011	Chris Muysson	450-1800, rural, inland
330	Muggenborch	Kapel-Avezaath	Muggenborch Kapel-Avezaath S2.2	Gelderland	Beerenhout 2011	Chris Muysson	450-1800, rural, inland
331	Museumkwartier	s-Hertogenbosch	Museumkwartier 's-Hertogenbosch F1147	Noord-Brabant	Kootker, Esser & Kerklaan 2016	Inge van der Jagt	450-1800, urban, inland
332	Museumkwartier	s-Hertogenbosch	Museumkwartier 's-Hertogenbosch F1403	Noord-Brabant	Kootker, Esser & Kerklaan 2016	Inge van der Jagt	450-1800, urban, inland
333	Museumkwartier	s-Hertogenbosch	Museumkwartier 's-Hertogenbosch F1408	Noord-Brabant	Kootker, Esser & Kerklaan 2016	Inge van der Jagt	450-1800, urban, inland
334	Museumkwartier	s-Hertogenbosch	Museumkwartier 's-Hertogenbosch F1495	Noord-Brabant	Kootker, Esser & Kerklaan 2016	Inge van der Jagt	450-1800, urban, inland
335	Museumkwartier	s-Hertogenbosch	Museumkwartier 's-Hertogenbosch F753 layer 7 Hand	Noord-Brabant	Esser & Kerklaan 2014	Inge van der Jagt	450-1800, urban, inland
336	Museumkwartier	s-Hertogenbosch	Museumkwartier 's-Hertogenbosch F753 layer 7 Sieve	Noord-Brabant	Esser & Kerklaan 2014	Inge van der Jagt	450-1800, urban, inland
337	Museumkwartier	s-Hertogenbosch	Museumkwartier 's-Hertogenbosch F538 layer 3 Hand	Noord-Brabant	Esser & Kerklaan 2014	Inge van der Jagt	450-1800, urban, inland
338	Museumkwartier	s-Hertogenbosch	Museumkwartier 's-Hertogenbosch F1114	Noord-Brabant	Van Saane 2017	Inge van der Jagt	450-1800, urban, inland
339	Museumkwartier	s-Hertogenbosch	Museumkwartier 's-Hertogenbosch F538 layer 3 Sieve	Noord-Brabant	Esser & Kerklaan 2014	Inge van der Jagt	450-1800, urban, inland
340	Museumkwartier	s-Hertogenbosch	Museumkwartier 's-Hertogenbosch F538 layer 2 Hand	Noord-Brabant	Esser & Kerklaan 2014	Inge van der Jagt	450-1800, urban, inland
341	Museumkwartier	s-Hertogenbosch	Museumkwartier 's-Hertogenbosch F538 layer 2 Sieve	Noord-Brabant	Esser & Kerklaan 2014	Inge van der Jagt	450-1800, urban, inland
342	Museumkwartier	s-Hertogenbosch	Museumkwartier 's-Hertogenbosch F887 layer 3 Hand	Noord-Brabant	Esser & Kerklaan 2014	Inge van der Jagt	450-1800, urban, inland
343	Museumkwartier	s-Hertogenbosch	Museumkwartier 's-Hertogenbosch F887 layer 3 Sieve	Noord-Brabant	Esser & Kerklaan 2014	Inge van der Jagt	450-1800, urban, inland
344	Museumkwartier	s-Hertogenbosch	Museumkwartier 's-Hertogenbosch F922 layer 8 Hand	Noord-Brabant	Esser & Kerklaan 2014	Inge van der Jagt	450-1800, urban, inland

345	Museumkwartier	s-Hertogenbosch	Museumkwartier 's-Hertogenbosch F922 layer 8 Sieve	Noord-Brabant	Esser & Kerklaan 2014	Inge van der Jagt	450-1800, urban, inland
346	Museumkwartier	s-Hertogenbosch	Museumkwartier 's-Hertogenbosch F922 layer 6 Hand	Noord-Brabant	Esser & Kerklaan 2014	Inge van der Jagt	450-1800, urban, inland
347	Museumkwartier	s-Hertogenbosch	Museumkwartier 's-Hertogenbosch F922 layer 6 Sieve	Noord-Brabant	Esser & Kerklaan 2014	Inge van der Jagt	450-1800, urban, inland
348	Nieuw Rhijngeest-zuid	Oegstgeest	Nieuw Rhijngeest-zuid 2009/2010 Oegstgeest Hand/5mm	Zuid-Holland	Kerklaan 2013	Inge van der Jagt	450-1800, rural, coastal
349	Nieuw Rhijngeest-zuid	Oegstgeest	Nieuw Rhijngeest-zuid 2009/2010 Oegstgeest 1mm/2mm	Zuid-Holland	Kerklaan 2013	Inge van der Jagt	450-1800, rural, coastal
350	Nieuw Rhijngeest-zuid	Oegstgeest	Nieuw Rhijngeest-zuid 2014 Oegstgeest Hand	Zuid-Holland	Van der Jagt & Laarman 2018	Inge van der Jagt	450-1800, rural, coastal
351	Nieuw Rhijngeest-zuid	Oegstgeest	Nieuw Rhijngeest-zuid 2014 Oegstgeest 1mm	Zuid-Holland	Van der Jagt & Laarman 2018	Inge van der Jagt	450-1800, rural, coastal
352	Nieuw Rhijngeest-zuid	Oegstgeest	Nieuw Rhijngeest-zuid 2014 Oegstgeest 2mm	Zuid-Holland	Van der Jagt & Laarman 2018	Inge van der Jagt	450-1800, rural, coastal
353	Nieuw Rhijngeest-zuid	Oegstgeest	Nieuw Rhijngeest-zuid 2014 Oegstgeest 4mm	Zuid-Holland	Van der Jagt & Laarman 2018	Inge van der Jagt	450-1800, rural, coastal
354	Nieuwendijk 1979	Amsterdam	Nieuwendijk 1979 Amsterdam	Noord-Holland	Bakker 2012	Inge van der Jagt	450-1800, urban, coastal
355	Ockenburgh	Den Haag	Den Haag-Ockenburgh II	Zuid-Holland	Waasdorp& van Zoolingen 2015	Monica Dütting	Not used (outside 450-1800 range)
356	Ockenburgh	Den Haag	Den Haag-Ockenburgh II (2)	Zuid-Holland	Waasdorp& van Zoolingen 2015	Monica Dütting	Not used (outside 450-1800 range)
357	Ockenburgh	Den Haag	Den Haag-Ockenburgh II (3)	Zuid-Holland	Waasdorp& van Zoolingen 2015	Monica Dütting	Not used (outside 450-1800 range)
358	Oostenburgermiddenstraat	Amsterdam	Oostenburgermiddenstraat Amsterdam	Noord-Holland	Ijzereef & Laarman 1986	Inge van der Jagt	450-1800, urban, coastal
359	Oosterbeintum-terp	Oosterbeintum	Oosterbeintum Terp Sieve (2mm) early medieval	Friesland	Prummel 2022	Chris Muysson	450-1800, rural, coastal
360	Oosterbeintum-terp	Oosterbeintum	Oosterbeintum Terp Sieve (5mm) early medieval	Friesland	Prummel 2022	Chris Muysson	450-1800, rural, coastal
361	Oosterbeintum-terp	Oosterbeintum	Oosterbeintum Terp Hand-collected early medieval	Friesland	Prummel 2022	Chris Muysson	450-1800, rural, coastal

362	Oude en nieuwe Gasthuis	Delft	Oude en nieuwe Gasthuis Delft 15th century	Zuid-Holland	Esser 1992	Inge van der Jagt	450-1800, urban, coastal
363	Oude en nieuwe Gasthuis	Delft	Oude en nieuwe Gasthuis Delft 17th century	Zuid-Holland	Esser 1992	Inge van der Jagt	450-1800, urban, coastal
364	Oudebuurtseweg- site 21.23	Schipluiden, den Haag	Schipluiden-Oudebuurtseweg site 21.23	Zuid-Holland	Groot 1997	Monica Dütting	Not used (outside 450-1800 range)
365	Oudezijds Voorburgwal 107	Amsterdam	Oudezijds Voorburgwal 107 Amsterdam	Noord-Holland	Médard 2006	Inge van der Jagt	450-1800, urban, coastal
366	Paardenmarkt	Alkmaar	Paardenmarkt Alkmaar S-574	Noord-Holland	Beerenhout 2011	Chris Muysson	450-1800, urban, coastal
367	Paardenmarkt	Alkmaar	Paardenmarkt Alkmaar S-397	Noord-Holland	Beerenhout 2011	Chris Muysson	450-1800, urban, coastal
368	Passewaaijsche Hogeweg	Tiel	Tiel-Passewaaijsche Hogeweg	Gelderland	Groot 2008	Monica Dütting	Not used (outside 450-1800 range)
369	Passewaaijsche Hogeweg	Tiel	Tiel-Passewaaijsche Hogeweg (2)	Gelderland	Groot 2008	Monica Dütting	Not used (outside 450-1800 range)
370	Passewaaijsche Hogeweg	Tiel	Tiel-Passewaaijsche Hogeweg (3)	Gelderland	Groot 2008	Monica Dütting	Not used (outside 450-1800 range)
371	Peperstraat	Venlo	Peperstraat Venlo	Limburg	De Jong 1997	Inge van der Jagt	450-1800, urban, inland
372	Plantage	Leiderdorp	Plantage Leiderdorp Merovingian	Zuid-Holland	Beerenhout 2016	Inge van der Jagt	450-1800, rural, coastal
373	Plantage	Leiderdorp	Plantage Leiderdorp Late Merovingian-Carolingian	Zuid-Holland	Beerenhout 2016	Inge van der Jagt	450-1800, rural, coastal
374	Plantage	Leiderdorp	Plantage Leiderdorp Early Carolingian-Carolingian	Zuid-Holland	Beerenhout 2016	Inge van der Jagt	450-1800, rural, coastal
375	Plantage	Leiderdorp	Plantage Leiderdorp Carolingian	Zuid-Holland	Beerenhout 2016	Inge van der Jagt	450-1800, rural, coastal
376	Postelstraat	's-Hertogenbosch	Postelstraat 's-Hertogenbosch	Noord-Brabant	Verhagen 1988	Inge van der Jagt	450-1800, urban, inland
377	Regulierenklooster	s-Gravenzande	Regulierenklooster 's-Gravenzanden pit 60	Zuid-Holland	Esser & Paalman 2001	Inge van der Jagt	450-1800, urban, coastal
378	Regulierenklooster	s-Gravenzande	Regulierenklooster 's-Gravenzande pit 161	Zuid-Holland	Esser & Paalman 2001	Inge van der Jagt	450-1800, urban, coastal
379	Rijksweg 9	Zweins	Rijksweg 9 Zweins	Friesland	Van Maanen & Vaandrager 1988	Inge van der Jagt	450-1800, rural, coastal

380	Ritsevoort 32	Alkmaar	Ritsevoort 32 Alkmaar	Noord-Holland	Van Haaster, Zeiler & Brinkhuizen 2012	Inge van der Jagt	450-1800, urban, coastal
381	Salvatorplein	Susteren	Salvatorplein Susteren 8th/10th century	Limburg	Beerenhout 2021	Chris Muysson	450-1800, urban, inland
382	Salvatorplein	Susteren	Salvatorplein Susteren 8th/13th century	Limburg	Beerenhout 2021	Chris Muysson	450-1800, urban, inland
383	Salvatorplein	Susteren	Salvatorplein Susteren 11th/13th century	Limburg	Beerenhout 2021	Chris Muysson	450-1800, urban, inland
384	Salvatorplein	Susteren	Salvatorplein Susteren 14th/15th century	Limburg	Beerenhout 2021	Chris Muysson	450-1800, urban, inland
385	Salvatorplein	Susteren	Salvatorplein Susteren 16th/17th century	Limburg	Beerenhout 2021	Chris Muysson	450-1800, urban, inland
386	Salvatorplein	Susteren	Salvatorplein Susteren 13th/17th century	Limburg	Beerenhout 2021	Chris Muysson	450-1800, urban, inland
387	Scheldekwartier (Dokkershaven Zuid)	Vlissingen	Scheldekwartier Vlissingen period 2	Zeeland	Van Dijk et al. 2010	Inge van der Jagt	450-1800, urban, coastal
388	Scheldekwartier (Dokkershaven Zuid)	Vlissingen	Scheldekwartier Vlissingen period 3	Zeeland	Van Dijk et al. 2010	Inge van der Jagt	450-1800, urban, coastal
389	Scheldekwartier (Dokkershaven Zuid)	Vlissingen	Scheldekwartier Vlissingen period 4	Zeeland	Van Dijk et al. 2010	Inge van der Jagt	450-1800, urban, coastal
390	Scheurrak SO1	Waddenzee	Scheurrak SO1 Waddenzee barrell 1	Noord-Holland	Brinkhuizen 1994	Inge van der Jagt	not used (ship context)
391	Scheurrak SO1	Waddenzee	Scheurrak SO1 Waddenzee barrell 2	Noord-Holland	Brinkhuizen 1994	Inge van der Jagt	not used (ship context)
392	Sint Janskerkhof	s-Hertogenbosch	Sint Janskerkhof 's-Hertogenbosch phase 1	Noord-Brabant	Van Haaster 1997	Inge van der Jagt	450-1800, urban, inland
393	Sint Janskerkhof	s-Hertogenbosch	Sint Janskerkhof 's-Hertogenbosch phase 2	Noord-Brabant	Van Haaster 1997	Inge van der Jagt	450-1800, urban, inland
394	Sint Janskerkhof	s-Hertogenbosch	Sint Janskerkhof 's-Hertogenbosch phase 3	Noord-Brabant	Van Haaster 1997	Inge van der Jagt	450-1800, urban, inland
395	Sint Janskerkhof	s-Hertogenbosch	Sint Janskerkhof 's-Hertogenbosch phase 4	Noord-Brabant	Van Haaster 1997	Inge van der Jagt	450-1800, urban, inland

396	Sint-Hieronymusdal	Delft	Sint-Hieronymusdal Delft	Zuid-Holland	Esser & Beerenhout 2002	Inge van der Jagt	450-1800, urban, coastal
397	Speelmansstraat	Leeuwarden	Speelmansstraat Leeuwarden	Friesland	Brinkhuizen 1983	Inge van der Jagt	450-1800, urban, coastal
398	St. Agnesklooster	Oldenzaal	St. Agnesklooster Oldenzaal	Overijssel	Laarman 1999	Inge van der Jagt	450-1800, urban, inland
399	St. Jacobsstraat	Leeuwarden	St. Jacobsstraat Leeuwarden	Friesland	Brinkhuizen 1983	Inge van der Jagt	450-1800, urban, coastal
400	St. Nicolaasgasthuis	Den Haag	St. Nicolaasgasthuis Den Haag - 14th century pits	Zuid-Holland	Esser, Kuijper & Brinkhuizen 2003	Inge van der Jagt	450-1800, urban, coastal
401	St. Nicolaasgasthuis	Den Haag	St. Nicolaasgasthuis Den Haag - Infirmary	Zuid-Holland	Esser, Kuijper & Brinkhuizen 2004	Inge van der Jagt	450-1800, urban, coastal
402	stadhuis	Zutphen	Stadhuis Zutphen	Gelderland	Beerenhout & Kerklaan 2011	Inge van der Jagt	450-1800, urban, inland
403	Stadhuiskwartier	Deventer	Stadhuiskwartier Deventer 321	Overijssel	Beerenhout 2015	Inge van der Jagt	450-1800, rural, inland
404	Stadhuiskwartier	Deventer	Stadhuiskwartier Deventer 315	Overijssel	Beerenhout 2015	Inge van der Jagt	450-1800, urban, inland
405	Stadhuiskwartier	Deventer	Stadhuiskwartier Deventer 330	Overijssel	Beerenhout 2015	Inge van der Jagt	450-1800, urban, inland
406	Stadhuiskwartier	Deventer	Stadhuiskwartier Deventer 299	Overijssel	Beerenhout 2015	Inge van der Jagt	450-1800, urban, inland
407	Stadhuiskwartier	Deventer	Stadhuiskwartier Deventer 296	Overijssel	Beerenhout 2015	Inge van der Jagt	450-1800, urban, inland
408	Stadhuiskwartier	Deventer	Stadhuiskwartier Deventer 263	Overijssel	Beerenhout 2015	Inge van der Jagt	450-1800, urban, inland
409	Stadhuiskwartier	Deventer	Stadhuiskwartier Deventer 326	Overijssel	Beerenhout 2015	Inge van der Jagt	450-1800, urban, inland
410	Stadhuiskwartier	Deventer	Stadhuiskwartier Deventer 269 Sieve unknown (botanical)	Overijssel	Beerenhout 2015	Inge van der Jagt	450-1800, urban, inland
411	Stadhuiskwartier	Deventer	Stadhuiskwartier Deventer 269 Sieve 2mm	Overijssel	Beerenhout 2015	Inge van der Jagt	450-1800, urban, inland
412	Stadhuiskwartier	Deventer	Stadhuiskwartier Deventer 258 Sieve unknown (botanical)	Overijssel	Beerenhout 2015	Inge van der Jagt	450-1800, urban, inland
413	Stadhuiskwartier	Deventer	Stadhuiskwartier Deventer 258 Sieve 4mm (botanical)	Overijssel	Beerenhout 2015	Inge van der Jagt	450-1800, urban, inland
414	Stadhuiskwartier	Deventer	Stadhuiskwartier Deventer 258 Sieve 2mm	Overijssel	Beerenhout 2015	Inge van der Jagt	450-1800,

							urban, inland
415	Stadhuiskwartier	Deventer	Stadhuiskwartier Deventer 258 Sieve 2mm (botanical)	Overijssel	Beerenhout 2015	Inge van der Jagt	450-1800, urban, inland
416	Stadhuiskwartier	Deventer	Stadhuiskwartier Deventer 304 Sieve unknown (botanical)	Overijssel	Beerenhout 2015	Inge van der Jagt	450-1800, urban, inland
417	Stadhuiskwartier	Deventer	Stadhuiskwartier Deventer 304 Sieve 1mm	Overijssel	Beerenhout 2015	Inge van der Jagt	450-1800, urban, inland
418	Stadhuiskwartier	Deventer	Stadhuiskwartier Deventer 284 Sieve unknown (botanical)	Overijssel	Beerenhout 2015	Inge van der Jagt	450-1800, urban, inland
419	Stadhuiskwartier	Deventer	Stadhuiskwartier Deventer 284 Sieve 4mm (botanical)	Overijssel	Beerenhout 2015	Inge van der Jagt	450-1800, urban, inland
420	Stadhuiskwartier	Deventer	Stadhuiskwartier Deventer 284 Sieve 2mm	Overijssel	Beerenhout 2015	Inge van der Jagt	450-1800, urban, inland
421	Stadhuiskwartier	Deventer	Stadhuiskwartier Deventer 284 Sieve 2mm (botanical)	Overijssel	Beerenhout 2015	Inge van der Jagt	450-1800, urban, inland
422	Stadhuiskwartier	Deventer	Stadhuiskwartier Deventer 325	Overijssel	Beerenhout 2015	Inge van der Jagt	450-1800, urban, inland
423	Stadhuiskwartier	Deventer	Stadhuiskwartier Deventer 280 Sieve 4mm (botanical)	Overijssel	Beerenhout 2015	Inge van der Jagt	450-1800, urban, inland
424	Stadhuiskwartier	Deventer	Stadhuiskwartier Deventer 280 Sieve 2mm	Overijssel	Beerenhout 2015	Inge van der Jagt	450-1800, urban, inland
425	Stadhuiskwartier	Deventer	Stadhuiskwartier Deventer 280 Sieve 2mm (botanical)	Overijssel	Beerenhout 2015	Inge van der Jagt	450-1800, urban, inland
426	Stadhuiskwartier	Deventer	Stadhuiskwartier Deventer 288	Overijssel	Beerenhout 2015	Inge van der Jagt	450-1800, urban, inland
427	Stadhuiskwartier	Deventer	Stadhuiskwartier Deventer 298 Sieve 2mm	Overijssel	Beerenhout 2015	Inge van der Jagt	450-1800, urban, inland
428	Stadhuiskwartier	Deventer	Stadhuiskwartier Deventer 298 Sieve 2mm (botanical)	Overijssel	Beerenhout 2015	Inge van der Jagt	450-1800, urban, inland
429	Stadhuiskwartier	Deventer	Stadhuiskwartier Deventer 298 Sieve 4mm (botanical)	Overijssel	Beerenhout 2015	Inge van der Jagt	450-1800, urban, inland
430	Stadhuiskwartier	Deventer	Stadhuiskwartier Deventer 316 Sieve 4mm (botanical)	Overijssel	Beerenhout 2015	Inge van der Jagt	450-1800, urban, inland
431	Stadhuiskwartier	Deventer	Stadhuiskwartier Deventer 316 Sieve 2mm	Overijssel	Beerenhout 2015	Inge van der Jagt	450-1800, urban, inland
432	Stadhuiskwartier	Deventer	Stadhuiskwartier Deventer 316 Sieve 2mm (botanical)	Overijssel	Beerenhout 2015	Inge van der Jagt	450-1800, urban, inland
433	Stadhuiskwartier	Deventer	Stadhuiskwartier Deventer 336	Overijssel	Beerenhout 2015	Inge van der Jagt	450-1800, urban, inland

434	Steenakker	Maasbracht, Maasgouw	Villa Maasbracht-Steenakker	Limburg	Kooistra & Laarman 1996	Monica Dütting	450-1800, rural, inland
435	Steenakker	Maasbracht, Maasgouw	Villa Maasbracht-Steenakker (2)	Limburg	Kooistra & Laarman 1996	Monica Dütting	450-1800, rural, inland
436	Steenakker	Maasbracht, Maasgouw	Villa Maasbracht-Steenakker (3)	Limburg	Kooistra & Laarman 1996	Monica Dütting	450-1800, rural, inland
437	Steenakker	Maasbracht, Maasgouw	Villa Maasbracht-Steenakker (4)	Limburg	Kooistra & Laarman 1996	Monica Dütting	450-1800, rural, inland
438	Steenakker	Maasbracht, Maasgouw	Villa Maasbracht-Steenakker (5)	Limburg	Esser, Laarman & Rijkelijkhuizen 2017	Monica Dütting	450-1800, rural, inland
439	Steenakker	Maasbracht, Maasgouw	Villa Maasbracht-Steenakker (6)	Limburg	Esser, Laarman & Rijkelijkhuizen 2017	Monica Dütting	450-1800, rural, inland
440	Steenakker	Maasbracht, Maasgouw	Villa Maasbracht-Steenakker (7)	Limburg	Esser, Laarman & Rijkelijkhuizen 2017	Monica Dütting	450-1800, rural, inland
441	Stenen Kamer/Linge	Buren/Tiel	Stenen Kamer/Linge Carolingian period	Gelderland	Esser & Van Dijk 2001	Inge van der Jagt	450-1800, rural, inland
442	Stenen Kamer/Linge	Buren/Tiel	Stenen Kamer/Linge Ottonian period	Gelderland	Esser & Van Dijk 2001	Inge van der Jagt	450-1800, rural, inland
443	Stenen Kamer/Linge	Buren/Tiel	Stenen Kamer/Linge High Middle Ages	Gelderland	Esser & Van Dijk 2001	Inge van der Jagt	450-1800, rural, inland
444	Stenen Kamer/Linge	Buren/Tiel	Stenen Kamer/Linge Late Middle ages	Gelderland	Esser & Van Dijk 2001	Inge van der Jagt	450-1800, rural, inland
445	Stenen Kamer/Linge	Buren/Tiel	Stenen Kamer/Linge Late Middle Ages-recent years	Gelderland	Esser & Van Dijk 2001	Inge van der Jagt	450-1800, rural, inland
446	t Klooster	Vrouwenpolder	kloostercomplex Vrouwenpolder Hand	Zeeland	Zeiler 1995	Inge van der Jagt	450-1800, rural, coastal
447	t Klooster	Vrouwenpolder	kloostercomplex Vrouwenpolder Sieve	Zeeland	Zeiler 1995	Inge van der Jagt	450-1800, rural, coastal
448	t Vliegend Hart	Noordzee	t Vliegend Hart Noordzee	Noordzee	Brinkhuizen 1992	Inge van der Jagt	not used (ship context)
449	Themaat	Utrecht	Themaat Utrecht V57	Utrecht	Beerenhout 2007	Chris Muysson	450-1800, rural, inland
450	Themaat	Utrecht	Themaat Utrecht V304	Utrecht	Beerenhout 2007	Chris Muysson	450-1800, rural, inland
451	Themaat	Utrecht	Themaat Utrecht V418	Utrecht	Beerenhout 2007	Chris Muysson	450-1800, rural, inland
452	Themaat	Utrecht	Themaat Utrecht B304 2mm	Utrecht	Beerenhout 2007	Chris Muysson	450-1800, rural, inland

453	Themaat	Utrecht	Themaat Utrecht B304 1mm	Utrecht	Beerenhout 2007	Chris Muysson	450-1800, rural, inland
454	Tiellandtweg	Houten	Tiellandtweg Houten Roman period	Utrecht	Laarman 1996	Inge van der Jagt	450-1800, rural, inland
455	Tiellandtweg	Houten	Tiellandtweg Houten Early Middle Ages	Utrecht	Laarman 1996	Inge van der Jagt	450-1800, rural, inland
456	Tjitsma-Foarryp	Wijnaldum	Tjitsma Foarryp Wijnaldum Roman period	Friesland	Prummel, Esser & Zeiler 2013	Inge van der Jagt	Not used (outside 450-1800 range)
457	Tjitsma-Foarryp	Wijnaldum	Tjitsma Foarryp Wijnaldum Migration period	Friesland	Prummel, Esser & Zeiler 2013	Inge van der Jagt	450-1800, rural, coastal
458	Tjitsma-Foarryp	Wijnaldum	Tjitsma Foarryp Wijnaldum Merovingian period	Friesland	Prummel, Esser & Zeiler 2013	Inge van der Jagt	450-1800, rural, coastal
459	Tjitsma-Foarryp	Wijnaldum	Tjitsma Foarryp Wijnaldum Carolingian period	Friesland	Prummel, Esser & Zeiler 2013	Inge van der Jagt	450-1800, rural, coastal
460	Tjitsma-Foarryp	Wijnaldum	Tjitsma Foarryp Wijnaldum Ottonian period	Friesland	Prummel, Esser & Zeiler 2013	Inge van der Jagt	450-1800, rural, coastal
461	Valkenburgerstraat 130-146	Amsterdam	Valkenburgerstraat 130-146 Amsterdam S82 Sieve	Noord-Holland	Bakker 2014	Inge van der Jagt	450-1800, urban, coastal
462	Valkenburgerstraat 130-146	Amsterdam	Valkenburgerstraat 130-146 Amsterdam S82 Hand	Noord-Holland	Cavallo 2016	Inge van der Jagt	450-1800, urban, coastal
463	Valkenburgerstraat 130-146	Amsterdam	Valkenburgerstraat 130-146 Amsterdam S83	Noord-Holland	Bakker 2014	Inge van der Jagt	450-1800, urban, coastal
464	Van de Perrehuis	Middelburg	Van de Perrehuis Middelburg Find number 3-2-23	Zeeland	De Vries 1998	Inge van der Jagt	450-1800, urban, coastal
465	Van de Perrehuis	Middelburg	Van de Perrehuis Middelburg Find number 3-1-2	Zeeland	De Vries 1998	Inge van der Jagt	450-1800, urban, coastal
466	Van de Perrehuis	Middelburg	Van de Perrehuis Middelburg Cesspit 2	Zeeland	De Vries 1998	Inge van der Jagt	450-1800, urban, coastal
467	Veilingterrein	Wijk bij Duurstede	Veilingterrein Wijk bij Duurstede phase 1	Utrecht	Esser, Beerenhout & Rijkelijkhuizen 2012	Inge van der Jagt	450-1800, rural, inland
468	Veilingterrein	Wijk bij Duurstede	Veilingterrein Wijk bij Duurstede phase 1/2	Utrecht	Esser, Beerenhout & Rijkelijkhuizen 2012	Inge van der Jagt	450-1800, rural, inland
469	Veilingterrein	Wijk bij Duurstede	Veilingterrein Wijk bij Duurstede phase 2	Utrecht	Esser, Beerenhout & Rijkelijkhuizen 2012	Inge van der Jagt	450-1800, rural, inland
470	Velsen 2	Velsen	Velsen-2	Noord-Holland	Brinkhuizen 1989	Monica Dütting	Not used (outside 450-1800 range)

471	Velsen-1	Velsen	Velsen-1 Roman harbour Romeinse laag	Noord-Holland	Beerenhout &Dütting 1987	Monica Dütting	Not used (outside 450-1800 range)
472	Velsen-1	Velsen	Velsen-1 Roman harbour Baggerlaag	Noord-Holland	Beerenhout &Dütting 1987	Monica Dütting	Not used (outside 450-1800 range)
473	Velsen-1	Velsen	Velsen-1 Roman harbour Paalgaten	Noord-Holland	Beerenhout &Dütting 1987	Monica Dütting	Not used (outside 450-1800 range)
474	Velsen-1	Velsen	Velsen 1 Roman harbour AWN-onderzoek 1	Noord-Holland	Brinkhuizen 1989	Monica Dütting	Not used (outside 450-1800 range)
475	Velsen-1	Velsen	Velsen 1 Roman harbour AWN-onderzoek 2	Noord-Holland	Brinkhuizen 1989	Monica Dütting	Not used (outside 450-1800 range)
476	Velsen-1	Velsen	Velsen 1 Roman harbour AWN-onderzoek 3	Noord-Holland	Brinkhuizen 1989	Monica Dütting	Not used (outside 450-1800 range)
477	Velsen-1	Velsen	Velsen 1 Roman harbour AWN-onderzoek 4	Noord-Holland	Brinkhuizen 1989	Monica Dütting	Not used (outside 450-1800 range)
478	Voorburg-Arentsburg	Voorburg, Leidschendam-Voorburg	Voorburg-Arentsburg	Zuid-Holland	Beerenhout 2014	Monica Dütting	450-1800, urban, coastal
479	Voorburg-Arentsburg	Voorburg, Leidschendam-Voorburg	Voorburg-Arentsburg (2)	Zuid-Holland	Beerenhout 2014	Monica Dütting	450-1800, urban, coastal
480	Voorburg-Arentsburg	Voorburg, Leidschendam-Voorburg	Voorburg-Arentsburg (3)	Zuid-Holland	Beerenhout 2014	Monica Dütting	450-1800, urban, coastal
481	Voorburg-Arentsburg	Voorburg, Leidschendam-Voorburg	Voorburg-Arentsburg (4)	Zuid-Holland	Beerenhout 2014	Monica Dütting	450-1800, urban, coastal
482	Voorburg-Arentsburg	Voorburg, Leidschendam-Voorburg	Voorburg-Arentsburg (5)	Zuid-Holland	Beerenhout 2014	Monica Dütting	450-1800, urban, coastal
483	Voorstraat	Kampen	Voorstraat 18 (MA6) Kampen	Overijssel	van Haaster, Brinkhuizen & Zeiler 2001	Chris Muysson	450-1800, urban, inland
484	Voorstraat	Kampen	Voorstraat 20 (MA10) Kampen	Overijssel	van Haaster, Brinkhuizen & Zeiler 2001	Chris Muysson	450-1800, urban, inland
485	Voorstraat	Kampen	Voorstraat 20 (MA11) Kampen	Overijssel	van Haaster, Brinkhuizen & Zeiler 2001	Chris Muysson	450-1800, urban, inland
486	Voorstraat 244, Mijnsherenherberg	Dordrecht	Voorstraat 244 Dordrecht 4mm	Zuid-Holland	Dorst 2011	Inge van der Jagt	450-1800, urban, coastal

487	Voorstraat 244, Mijnsherenherberg	Dordrecht	Voorstraat 244 Dordrecht 2mm	Zuid-Holland	Dorst 2011	Inge van der Jagt	450-1800, urban, coastal
488	Voorstraat 52	Harlingen	Voorstraat 52 Harlingen Hand	Friesland	Prummel 1992	Inge van der Jagt	450-1800, urban, coastal
489	Voorstraat 52	Harlingen	Voorstraat 52 Harlingen Sieve	Friesland	Prummel 1992	Inge van der Jagt	450-1800, urban, coastal
490	Westerveld 2	Vlieland	Westerveld 2 Vlieland	Friesland	Laarman 2017	Inge van der Jagt	not used (ship context)
491	Westnieuwlandgebied	Rotterdam	Westnieuwlandgebied Rotterdam 14-15A	Zuid-Holland	Esser, Rijkelijkhuizen & Beerenhout 2013	Inge van der Jagt	450-1800, urban, coastal
492	Westnieuwlandgebied	Rotterdam	Westnieuwlandgebied Rotterdam 15	Zuid-Holland	Esser, Rijkelijkhuizen & Beerenhout 2013	Inge van der Jagt	450-1800, urban, coastal
493	Westnieuwlandgebied	Rotterdam	Westnieuwlandgebied Rotterdam 15-16A	Zuid-Holland	Esser, Rijkelijkhuizen & Beerenhout 2013	Inge van der Jagt	450-1800, urban, coastal
494	Wierde Englum	Englum, Zuidhorn	Englum	Groningen	Prummel 2008	Monica Dütting	Not used (outside 450-1800 range)
495	Wierde Englum	Englum, Zuidhorn	Englum (2)	Groningen	Prummel 2008	Monica Dütting	Not used (outside 450-1800 range)
496	Winston bioscoop	Hoorn	Winston bioscoop Hoorn 2000 phase B	Noord-Holland	Van Dijk 2003	Inge van der Jagt	450-1800, rural, coastal
497	Winston bioscoop	Hoorn	Winston bioscoop Hoorn 2000 phase C	Noord-Holland	Van Dijk 2003	Inge van der Jagt	450-1800, urban, coastal
498	Winston bioscoop	Hoorn	Winston bioscoop Hoorn 2000 phase D	Noord-Holland	Van Dijk 2003	Inge van der Jagt	450-1800, urban, coastal
499	Winston bioscoop	Hoorn	Winston bioscoop Hoorn 2000 phase E	Noord-Holland	Van Dijk 2003	Inge van der Jagt	450-1800, urban, coastal
500	Winston bioscoop	Hoorn	Winston bioscoop Hoorn 2004 phase I	Noord-Holland	Van Dijk & Beerenhout 2006	Inge van der Jagt	450-1800, rural, coastal
501	Winston bioscoop	Hoorn	Winston bioscoop Hoorn 2004 phase II Hand	Noord-Holland	Van Dijk & Beerenhout 2006	Inge van der Jagt	450-1800, urban, coastal
502	Winston bioscoop	Hoorn	Winston bioscoop Hoorn 2004 phase II Sieve	Noord-Holland	Van Dijk & Beerenhout 2006	Inge van der Jagt	450-1800, urban, coastal
503	Winston bioscoop	Hoorn	Winston bioscoop Hoorn 2004 phase III Hand	Noord-Holland	Van Dijk & Beerenhout 2006	Inge van der Jagt	450-1800, urban, coastal
504	Winston bioscoop	Hoorn	Winston bioscoop Hoorn 2004 phase III Sieve	Noord-Holland	Van Dijk & Beerenhout 2006	Inge van der Jagt	450-1800, urban, coastal
505	Winston bioscoop	Hoorn	Winston bioscoop Hoorn 2004 phase IV	Noord-Holland	Van Dijk & Beerenhout 2006	Inge van der Jagt	450-1800,

							urban, coastal
506	Winston bioscoop	Hoorn	Winston bioscoop Hoorn 2004 phase V Hand	Noord-Holland	Van Dijk & Beerenhout 2006	Inge van der Jagt	450-1800, urban, coastal
507	Winston bioscoop	Hoorn	Winston bioscoop Hoorn 2004 phase V Sieve	Noord-Holland	Van Dijk & Beerenhout 2006	Inge van der Jagt	450-1800, urban, coastal
508	Winston bioscoop	Hoorn	Winston bioscoop Hoorn 2004 phase VI Hand	Noord-Holland	Van Dijk & Beerenhout 2006	Inge van der Jagt	450-1800, urban, coastal
509	Winston bioscoop	Hoorn	Winston bioscoop Hoorn 2004 phase VI Sieve	Noord-Holland	Van Dijk & Beerenhout 2006	Inge van der Jagt	450-1800, urban, coastal
510	Woerden-Hoochwoert	Woerden	Woerden-Hoochwoert	Utrecht	Dütting, M.K., in prep.	Monica Dütting	Not used (outside 450-1800 range)
511	Wortelsteeg	Alkmaar	Wortelsteeg Alkmaar 4H	Noord-Holland	Esser & Gehasse 1995	Inge van der Jagt	450-1800, urban, coastal
512	Wortelsteeg	Alkmaar	Wortelsteeg Alkmaar 4D	Noord-Holland	Esser & Gehasse 1995	Inge van der Jagt	450-1800, urban, coastal
513	Zwanenburgerstraat 23	Amsterdam	Zwanenburgerstraat 23 Amsterdam	Noord-Holland	Bakker 2014	Inge van der Jagt	450-1800, urban, coastal
514	Zwanenburgerstraat 3	Amsterdam	Zwanenburgerstraat 3 Amsterdam	Noord-Holland	Bakker 2014	Inge van der Jagt	450-1800, urban, coastal

APPENDIX 2: RECOVERY METHOD AND NISP OF THE DFB-DATASET (0-2000)

Id	Assemblage/sub-assemblage/complex specification	Recovery method	Minimum sieve mesh	Maximum sieve mesh	Total nusp (unidentified)	Total fish nisp
1	A2-sportpark strijland vleuten-de meern carolingian	Hand collected + sieved	2mm	4mm	-	511
2	A2-sportpark strijland vleuten-de meern late merovingian - early carolingian	Hand collected + sieved	2mm	4mm	-	381
3	A2-sportpark strijland vleuten-de meern merovingian period	Hand collected + sieved	2mm	4mm	-	33
4	Aalmarkt leiden fase 13 hand-collected	Hand-collected	N/a	N/a	4	26
5	Aalmarkt leiden fase 17 hand-collected	Hand-collected	N/a	N/a	1	17
6	Aalmarkt leiden fase 17 sieve (0.5mm)	Sieved	0,5mm	0,5mm	536	662
7	Aalmarkt leiden fase 14 sieve (0.5mm)	Sieved	0,5mm	0,5mm	22	36
8	Aalmarkt leiden fase 13 sieve (5mm)	Sieved	5mm	5mm	21	39
9	Aalmarkt leiden fase 11 hand-collected	Hand-collected	N/a	N/a	39	130
10	Aalmarkt leiden fase 10 hand-collected	Hand-collected	N/a	N/a	30	239
11	Aalmarkt leiden fase 10 sieve (0.5mm)	Sieved	0,5mm	0,5mm	11	27
12	Aalmarkt leiden fase 9 hand-collected	Hand-collected	N/a	N/a	48	296
13	Aalmarkt leiden fase 9 sieve (5mm)	Sieved	5mm	5mm	187	200
14	Aalmarkt leiden fase 9 sieve (0.5mm)	Sieved	0,5mm	0,5mm	45	36
15	Aalmarkt leiden fase 11 sieve (5mm)	Sieved	5mm	5mm	183	224
16	Aalmarkt leiden fase 14 hand-collected	Hand-collected	N/a	N/a	2	15
17	Aalmarkt leiden fase 7 hand-collected	Hand-collected	N/a	N/a	0	5
18	Aalmarkt leiden fase 5 hand-collected and sieved (1mm)	Hand collected + sieved	1mm	1mm		39
19	Aalmarkt leiden fase 2 hand-collected	Hand-collected	N/a	N/a	0	3
20	Abdijplein middelburg	Sieved	0,25mm	0,25mm	-	934
21	Abdijpein middelburg complex 1	Sieved	0,6mm	0,6mm	249	87
22	Abdijpein middelburg complex 2	Sieved	0,6mm	0,6mm	103	95

23	Achlumer terp sieve 5mm lmb	Sieved	5mm	5mm	0	6
24	Achlumer terp sieve 5mm kp	Sieved	5mm	5mm	10	9
25	Achlumer terp sieve 5mm lma	Sieved	5mm	5mm	7	43
26	Achlumer terp sieve 2mm mp	Sieved	2mm	2mm	5	2
27	Achlumer terp sieve 5mm mp	Sieved	5mm	5mm	0	1
28	Achlumer terp sieve 2mm kp	Sieved	2mm	2mm	14	27
29	Achlumer terp sieve 2mm k/o	Sieved	2mm	2mm	0	1
30	Achlumer terp sieve 2mm lma	Sieved	2mm	2mm	19	17
31	Achlumer terp sieve 2mm lmb	Sieved	2mm	2mm	10	7
32	Achter blokker kampen	Hand collected	N/a	N/a	27	203
33	Achter de broeren zwolle	Sieved	0,5mm?	10mm	-	69
34	Achterom den haag phase 3	Sieved	0,5mm	0,5mm	0	12
35	Achterom den haag phase 1	Sieved	0,5mm	0,5mm	3	38
36	Achterom den haag phase 0	Sieved	0,5mm	0,5mm	6	1000
37	Agnietenklooster den haag 077	Hand collected	N/a	N/a	23	49
38	Agnietenklooster den haag 301 v308	Hand collected	N/a	N/a	26	52
39	Agnietenklooster den haag 216	Hand collected	N/a	N/a	0	4
40	Agnietenklooster den haag 032	Hand collected + sieved	0,5mm	0,5mm	146	201
41	Agnietenklooster den haag 301 v301	Hand collected	N/a	N/a	0	4
42	Anjum sieve terpsterweg hand-collected late medieval	Hand-collected	N/a	N/a	1	6
43	Anjum terpsterweg sieve (5mm) early medieval	Sieved	5mm	5mm	1	2
44	Anjum terpsterweg sieve (5mm) late medieval	Sieved	5mm	5mm	0	56
45	Anjum terpsterweg hand-collected early medieval	Hand-collected	N/a	N/a	0	1
46	Assendelver polder -site f	Hand collected + sieved	?	2.5mm	546	651
47	Berghuijskazerne middelburg phase 4 hand	Hand collected	N/a	N/a	18	107

48	Berghuijskazerne middelburg phase 5 hand	Hand collected	N/a	N/a	7	41
49	Berghuijskazerne middelburg phase 5 sieves	Sieved	2mm	2mm	94	111
50	Berghuijskazerne middelburg phase 6 sieves	Sieved	2mm	2mm	37	210
51	Berghuijskazerne middelburg phase 4 sieves	Sieved	2mm	2mm	242	501
52	Berghuijskazerne middelburg phase 2	Hand collected	N/a	N/a	3	31
53	Berghuijskazerne middelburg phase 6 hand	Hand collected	N/a	N/a	-	7
54	Berghuijskazerne middelburg phase 3	Hand collected	N/a	N/a	9	15
55	Berghuijskazerne middelburg phase 1	Hand collected	N/a	N/a	-	2
56	Berghuijskazerne middelburg phase 7	Hand collected	N/a	N/a	2	23
57	Bergstraat-west venlo s20	Sieved	4mm	4mm	178	505
58	Bergstraat-west venlo s21	Sieved	4mm	4mm	145	599
59	Bethlehemstraat - voogdijstraat roermond bp05	Hand collected + sieved	1mm	4mm	398	587
60	Bethlehemstraat - voogdijstraat roermond kl033	Hand collected + sieved	1mm	4mm	1	2
61	Bethlehemstraat - voogdijstraat roermond afkl03	Hand collected + sieved	1mm	4mm	40	22
62	Bethlehemstraat - voogdijstraat roermond bp01/afkl02	Hand collected + sieved	1mm	4mm	237	134
63	Bethlehemstraat - voogdijstraat roermond kl064	Hand collected + sieved	1mm	4mm	16	12
64	Bierstraat den haag southern ditch	Hand collected + sieved	1mm	4mm	509	330
65	Bierstraat den haag northern ditch	Hand collected	N/a	N/a	2	84
66	Bierstraat den haag well	Hand collected	N/a	N/a	0	36
67	Bierstraat den haag cess pit s34	Hand collected	N/a	N/a	1	4
68	Bierstraat den haag cess pit s404	Hand collected + sieved	1mm	4mm	1303	932
69	Boerenmouw 's-hertogenbosch dbbm f8 sieve	Sieved	2mm	Unknown	-	283
70	Boerenmouw 's-hertogenbosch dbbm f8 hand	Hand collected	N/a	N/a	-	240

71	Boerenmouw 's-hertogenbosch dbbm f86/87 sieve	Sieved	2mm	Unknown	-	22
72	Boerenmouw 's-hertogenbosch dbbm f86/87 hand	Hand collected	N/a	N/a	-	7
73	Bolwerk gouda phase 2	Hand collected + sieved	1mm	4mm	-	373
74	Bolwerk gouda phase 5	Hand collected + sieved	1mm	4mm	-	1894
75	Bolwerk gouda phase 3	Hand collected + sieved	1mm	4mm	-	1214
76	Bolwerk gouda phase 1	Hand collected + sieved	1mm	4mm	-	3
77	Bolwerk gouda phase 4	Hand collected + sieved	1mm	4mm	-	35
78	Breestraat/peperstraat beverwijk sample m170	Sieved	0,25mm	4mm	66	16
79	Breestraat/peperstraat beverwijk sample m181	Sieved	0,25mm	4mm	59	40
80	Breestraat/peperstraat beverwijk cess pit 2	Sieved	4mm	4mm	8	38
81	Breestraat/peperstraat beverwijk sample m84	Sieved	0,25mm	4mm	2	3
82	Breestraat/peperstraat beverwijk sample m169	Sieved	0,25mm	4mm	12	58
83	Breestraat/peperstraat beverwijk later period	Hand collected	N/a	N/a	0	2
84	Breestraat/peperstraat beverwijk early period	Hand collected	N/a	N/a	0	3
85	Bruggestraat 8-10 harderwijk 4mm 13th century	Sieved	4mm	4mm	-	479
86	Bruggestraat 8-10 harderwijk 4mm 17th century	Sieved	4mm	4mm	-	122
87	Bruggestraat 8-10 harderwijk 4mm 16th century	Sieved	4mm	4mm	-	1013
88	Bruggestraat 8-10 harderwijk 4mm 14th century	Sieved	4mm	4mm	-	1032
89	Bruggestraat 8-10 harderwijk 1mm 1550-1600 ad	Sieved	1mm	1mm	122	84
90	Bruggestraat 8-10 harderwijk 1mm 1300-1350 ad	Sieved	1mm	1mm	18	76
91	Bruggestraat 8-10 harderwijk 4mm 15th century	Sieved	4mm	4mm	-	263
92	Buiten ij, wrak val7 amsterdam	Sieved	4mm	4mm	0	136
93	Burseplein deventer 19-20th century	Hand collected + sieved	2mm	2mm	-	10

94	Burseplein deventer 17-18th century	Hand collected + sieved	2mm	2mm	-	2037
95	Burseplein deventer 15-16th century	Hand collected + sieved	2mm	2mm	-	2236
96	Burseplein deventer 13-14th century	Hand collected + sieved	2mm	2mm	-	58
97	Burseplein deventer 9-12th century	Hand collected + sieved	2mm	2mm	-	5524
98	Canadaplein alkmaar	Sieved	2mm	2mm	-	561
99	Canadaplein alkmaar bp4	Sieved	2mm	2mm	-	561
100	City building rotterdam sieve	Sieved	0,25mm	0,25mm	24	49
101	City building rotterdam hand	Hand collected	N/a	N/a	0	2
102	De beyerd breda waste pit 1	Sieved	1mm	4mm	115	85
103	De beyerd breda waste pit 2	Sieved	1mm	4mm	210	185
104	De dorpen schagen	Hand collected + sieved	Unknown	Unknown	47	64
105	De krocht limmen v3466	Sieved	1mm	1mm	44	26
106	De krocht limmen v3572	Sieved	0,5mm	2mm	96	23
107	De krocht limmen m452	Sieved	1mm	1mm	5	5
108	De krocht limmen v340	Sieved	4mm	4mm	0	1
109	De krocht limmen v5796	Sieved	4mm	4mm	0	1
110	De krocht limmen v3545	Sieved	4mm	4mm	0	4
111	De krocht limmen v5796 (1)	Sieved	4mm	4mm	0	1

112	De krocht limmen v345	Sieved	4mm	4mm	2	3
113	De schans oude schild hand	Hand collected	N/a	N/a	0	2
114	De schans oude schild sieve	Sieved	0,5mm	0,5mm	-	310
115	De vrieswijk heiloo	Hand collected + sieved	0,25mm	5mm	22	83
116	Den haag-scheveningseweg laag i (2)	Sieved	1 cm	1cm	0	207
117	Den haag-scheveningseweg laag i	Sieved	1 cm	1cm	0	6
118	D'engelsche boomgaert vlaardingen	Hand collected + sieved	Unknown	Unknown	147	140
119	Elfhuizen dordrecht phase ii s878	Unknown	N/a	N/a	435	177
120	Elfhuizen dordrecht phase iv s390	Unknown	N/a	N/a	47	52
121	Elfhuizen dordrecht phase iv s486	Sieved	Unknown	Unknown	39	65
122	Elfhuizen dordrecht phase v s506	Hand collected + sieved	Unknown	Unknown	391	632
123	Elisabeth bloemenkampklooster 's-hertogenbosch	Sieved	Unknown	Unknown	1199	646
124	Firdgum terp sieve (2mm) early medieval	Sieved	2mm	2mm	160	90
125	Firdgum terp hand-collected late medieval	Hand-collected	N/a	N/a	0	1
126	Firdgum terp hand-collected early medieval	Hand-collected	N/a	N/a	1	7
127	Firdgum terp sieve (5mm) late medieval	Sieved	5mm	5mm	1	10
128	Firdgum terp sieve (5mm) early medieval	Sieved	5mm	5mm	174	344
129	Firdgum terp sieve (2mm) late medieval	Sieved	2mm	2mm	133	95

130	Forum hadriani-vm effathaterrein	Hand collected + sieved			0	8
131	Forum hadriani-vm effathaterrein (2)	Hand collected + sieved	5 mm	0.25 mm	3	17
132	Forum hadriani-vm effathaterrein (3)	Hand collected + sieved	5 mm	0.25 mm	41	142
133	Ganzenmarkt oldenzaal	Hand collected + sieved	0,25mm	2mm	47	34
134	Gat in de markt vlaardingen period 5 sieve	Sieved	1mm	2mm	190	458
135	Gat in de markt vlaardingen period 3 sieve	Sieved	1mm	2mm	8	1
136	Gat in de markt vlaardingen period 3 hand	Hand collected	N/a	N/a	2	19
137	Gat in de markt vlaardingen period 2	Hand collected	N/a	N/a	1	6
138	Gat in de markt vlaardingen period 4 hand	Hand collected	N/a	N/a	2	13
139	Gat in de markt vlaardingen period 5 hand	Hand collected	N/a	N/a	100	256
140	Gat in de markt vlaardingen period 4 sieve	Sieved	1mm	2mm	1	1
141	Gedempte kattendiep groningen	Hand collected + sieved	5mm	5mm	-	1390
142	Gedempte nieuwesloot 29-31 alkmaar	Hand collected	N/a	N/a	9	84
143	Gerner marke dalfsen	Sieved	0,5mm	0,5mm	32	55
144	Groene linde rossum	Sieved	0,25mm	0,25mm	89	384
145	Groot olmen bloemendaal site 14	Hand collected + sieved	0,25mm	4mm	2	33
146	Groot olmen bloemendaal site 8	Hand collected + sieved	0,25mm	4mm	0	2
147	Groot olmen bloemendaal site 3	Hand collected + sieved	0,25mm	4mm	1	2

148	Groot olmen bloemendaal site 5	Hand collected + sieved	0,25mm	4mm	0	1
149	Grote markt dordrecht v64	Sieved	2mm	4mm	188	233
150	Grote markt dordrecht v93	Sieved	2mm	4mm	75	136
151	Haarlemmerplein 18 amsterdam	Hand collected + sieved	0,25mm	2mm	18	98
152	Haarlemmerplein 20 amsterdam	Hand collected	N/a	N/a	4	51
153	Haarlemmerplein 22 amsterdam	Hand collected	N/a	N/a	17	234
154	Haarlemmerplein 24 amsterdam	Hand collected + sieved			153	604
155	Haarlemmerplein 28 amsterdam	Hand collected	N/a	N/a	38	237
156	Havezate de kranenburg zwolle	Sieved	10mm	10mm	6	39
157	Havezate werkeren zwolle 8.1.3	Hand collected + sieved	0,5mm?	10mm	20	138
158	Havezate werkeren zwolle 6.1.3 en 8.1.42	Hand collected + sieved	0,5mm?	10mm	110	103
159	Helenius de cockschool kampen	Hand collected	N/a	N/a	1	31
160	Het regthuys wassenaar	Hand collected + sieved	2mm	5mm	1442	2036
161	Hofstraat ijsselstein	Sieved	0,25mm	2mm		54
162	Hoogdijk terrein 89, houten	Sieved	0,25mm	2mm	92	503
163	Hoogeland zuidweg naaldwijk merovingian period	Hand collected + sieved	0,5mm	0,5mm	2	19
164	Hoogeland zuidweg naaldwijk carolingian period	Hand collected + sieved	0,5mm	0,5mm	10	40
165	Hoogeland zuidweg naaldwijk roman period remaining	Hand collected + sieved	0,5mm	0,5mm	1	2

166	Hoogeland zuidweg naaldwijk ottonian-late medieval	Hand collected + sieved	0,5mm	0,5mm	3	12
167	Hoogeland zuidweg naaldwijk roman period phase 6	Hand collected + sieved	0,5mm	0,5mm	1	8
168	Hoogstraat iii dorestad 4mm	Sieved	4mm	4mm	251	342
169	Hoogstraat iii dorestad 10mm	Sieved	10mm	10mm	47	148
170	Hoogstraat i dorestad 10mm	Sieved	10mm	10mm	8	21
171	Hoogstraat i dorestad 4mm	Sieved	4mm	4mm	727	815
172	Hoogstraat i dorestad hand	Hand collected	N/a	N/a	-	2
173	Huis malburg kerk-avezaath ottonian period	Hand collected + sieved	2mm	4mm	79	110
174	Huis malburg kerk-avezaath high Middle Ages	Hand collected + sieved	2mm	4mm	148	214
175	Huis malburg kerk-avezaath late Middle Ages	Hand collected + sieved	2mm	4mm	28	22
176	Huis malburg kerk-avezaath post Middle Ages	Hand collected + sieved	2mm	4mm	63	16
177	Huis te vleuten	Sieved	2mm	10mm	93	353
178	Huis ter kleef 4mm iv	Sieved	4mm	4mm	302	480
179	Huis ter kleef hand collected ii	Hand collected + sieved	10 mm	10 mm	36	145
180	Huis ter kleef 4mm ah	Sieved	4mm	4mm	247	232
181	Huis ter kleef hand collected ak	Hand collected + sieved	10 mm	10 mm	0	15
182	Huis ter kleef 4mm ak	Sieved	4mm	4mm	149	157
183	Huis ter kleef 2mm ak	Sieved	2mm	2mm	102	42

184	Huis ter kleef hand collected xx	Hand collected + sieved	10 mm	10 mm	14	21
185	Huis ter kleef 4mm xx	Sieved	4mm	4mm	583	273
186	Huis ter kleef hand collected iv	Hand collected	N/a	N/a	121	230
187	Huis ter kleef hand collected ah	Hand collected + sieved	10 mm	10 mm	42	121
188	Huis ter kleef 4mm ll	Sieved	4mm	4mm	315	131
189	Huis ter kleef 4mm iii	Sieved	4mm	4mm	344	294
190	Huis ter kleef hand collected ll	Hand collected + sieved	10 mm	10 mm	5	11
191	Huis ter kleef hand collected iii	Hand collected + sieved	10 mm	10 mm	5	63
192	Huis ter kleef 4mm ss	Sieved	4mm	4mm	96	314
193	Huis ter kleef hand collected ww	Hand collected + sieved	10 mm	10 mm	0	5
194	Huis ter kleef 4mm ww	Sieved	4mm	4mm	667	801
195	Huis ter kleef 4mm i	Sieved	4mm	4mm	6608	9387
196	Huis ter kleef hand collected i	Hand collected + sieved	10 mm	10 mm	304	883
197	Huis ter kleef 2mm ii	Sieved	2mm	2mm	59	67
198	Huis ter kleef 4mm ii	Sieved	4mm	4mm	159	190
199	Huis ter kleef 2mm iii	Sieved	2mm	2mm	74	38
200	Huis ter kleef 2mm i	Sieved	2mm	2mm	578	859
201	Huys ter werve rijswijk layer 1 t/m 5 mix	Sieved	1mm	1mm	54	119

202	Huys ter werve rijswijk layer 3	Sieved	2mm	2mm	35	73
203	Huys ter werve rijswijk layer 4	Sieved	2mm	2mm	37	112
204	Huys ter werve rijswijk layer 5	Sieved	2mm	2mm	11	88
205	In den struys' veere	Hand collected + sieved	2mm	2mm	-	2797
206	Jansstraat 46/gerechtsgebouw haarlem	Hand collected + sieved	Unknown	Unknown	135	373
207	Johan van oldenbarneveltlaan den haag	Hand collected + sieved	10mm	10mm	-	547
208	Kastanjelaan leiderdorp hand	Hand collected	N/a	N/a	11	4
209	Kastanjelaan leiderdorp v148	Sieved	1mm	1mm	789	939
210	Kastanjelaan leiderdorp v189	Sieved	1mm	1mm	81	49
211	Kastanjelaan leiderdorp v220	Sieved	1mm	1mm	74	47
212	Kasteel de haar haarzuilens	Sieved	4mm	4mm	18	171
213	Kasteel van breda well 153	Unknown	Unknown	Unknown	4	2
214	Kasteel van breda chute layer 1010	Sieved	Unknown	Unknown	570	713
215	Kasteel van breda chute excl. Layer 1010	Hand collected + sieved	2mm	5mm	1176	3043
216	Kasteel van eindhoven 18.1	Hand collected	N/a	N/a	0	4
217	Kasteel van eindhoven 20.15	Hand collected	N/a	N/a	58	13
218	Kasteel van eindhoven 20.1	Sieved	Unknown	Unknown	1254	1047
219	Kasteel van eindhoven 19.1	Hand collected	N/a	N/a	2	5

220	Kasteel voorst zwolle	Unknown	Unknown	Unknown	-	83
221	Kavel m11 biddinghuizen	Sieved	2mm	2mm	-	28952
222	Kazerneplein gorinchem	Hand collected + sieved	Unknown	Unknown	-	81
223	Keizershof 's-hertogenbosch period a	Sieved	2mm	2mm	90	148
224	Keizershof 's-hertogenbosch period b	Sieved	2mm	2mm	508	1110
225	Keizershof 's-hertogenbosch period c	Hand collected	N/a	N/a	0	2
226	Keizershof 's-hertogenbosch period d	Sieved	2mm	10mm	108	343
227	Keizershof 's-hertogenbosch period e	Hand collected	N/a	N/a	9	26
228	Kerklaan rijswijk	Sieved	2mm	2mm	-	914
229	Kerkstraat sint-oedenrode phase 3	Hand collected	N/a	N/a	-	3
230	Kerkstraat sint-oedenrode phase 2	Sieved	5mm	5mm	117	390
231	Kesteren-de woerd fase c	Sieved	2 mm	2mm	17	2
232	Kesteren-de woerd fase d	Sieved	2 mm	2mm	7	5
233	Kesteren-de woerd fase b	Sieved	2 mm	2mm	4	7
234	Kesteren-de woerd fase a	Sieved	2 mm	2mm	75	32
235	Kesteren-de woerd fase c-e	Sieved	2 mm	2mm	2	1
236	Klokkenveld utrecht bp3	Hand collected	N/a	N/a	0	3
237	Klokkenveld utrecht bp2 sieve 2mm	Sieved	2mm	2mm	42	24

238	Klokkenveld utrecht bp2 sieve 4mm	Sieved	4mm	4mm	4	6
239	Klokkenveld utrecht bp2 hand	Hand collected	N/a	N/a	0	18
240	Klokkenveld utrecht bp1 sieve 2mm	Sieved	2mm	2mm	33	37
241	Klokkenveld utrecht bp4	Hand collected	N/a	N/a	0	5
242	Klokkenveld utrecht bp1 hand	Hand collected	N/a	N/a	4	34
243	Klokkenveld utrecht bp1 sieve 4mm	Sieved	4mm	4mm	13	3
244	Kloosterstraat 3-5 nijkerk	Sieved	1mm	1mm	55	31
245	Kokpanden kampen	Hand collected + sieved	Unknown	Unknown	23	111
246	Konigsstraat dokkum (v219)	Sieved	2mm	2mm	6	10
247	Konigsstraat dokkum (v224)	Sieved	2mm	2mm	47	60
248	Koningstraat 18 arnhem hand	Hand collected	0,25mm	4mm	1	44
249	Koningstraat 18 arnhem sieve	Sieved	0,25mm	4mm	221	1567
250	Koornmarkt tiel sieve	Sieved	4mm	4mm	56	48
251	Koornmarkt tiel hand	Hand collected	N/a	N/a	9	42
252	Korte begijnestraat haarlem cess pit 1 layer b	Hand collected	N/a	N/a	0	3
253	Korte begijnestraat haarlem cess pit 2-layer c sieve scanned	Sieved	4mm	4mm	166	119
254	Korte begijnestraat haarlem cess pit 2 chute	Hand collected	N/a	N/a	0	7
255	Korte begijnestraat haarlem cess pit 2-layer c hand	Hand collected	4mm	4mm	59	238

256	Korte begijnestraat haarlem cess pit 1 layer e sieve scan	Sieved	4mm	4mm	75	50
257	Korte begijnestraat haarlem cess pit 1 layer e sieve analysed	Sieved	4mm	4mm	55	47
258	Korte begijnestraat haarlem cess pit 1 layer e hand	Hand collected	N/a	N/a	13	68
259	Korte begijnestraat haarlem cess pit (cellar)	Hand collected	N/a	N/a	0	12
260	Korte begijnestraat haarlem cess pit 2-layer c sieve analysed	Sieved	4mm	4mm	225	222
261	Korte houtstraat 28 amsterdam	Sieved	0,5mm	2mm	231	416
262	Krijtstraat gorinchem 16th-early 17th century	Sieved	2,5mm	2,5mm	13	93
263	Krijtstraat gorinchem late 16th-17th century sieve 0,5 mm	Sieved	0,5mm	0,5mm	1	6
264	Krijtstraat gorinchem 14th-early 15th century hand	Hand collected	N/a	N/a	0	3
265	Krijtstraat gorinchem late 16th-17th century sieve 2,5 mm	Sieved	2,5mm	2,5mm	134	341
266	Krijtstraat gorinchem 14th-early 15th century sieve	Sieved	0,5mm	0,5mm	8	58
267	Laat 233-237 alkmaar	Hand collected	N/a	N/a	21	139
268	Lange houtstraat 6 amsterdam 2mm	Sieved	2mm	2mm	5	72
269	Lange houtstraat 6 amsterdam 0,5-1mm	Sieved	0,5mm	1mm	2388	629
270	Langestraat 115/117 alkmaar cess pit 13b	Hand collected + sieved	6mm	6mm	110	167
271	Langestraat 115/117 alkmaar cess pit 12a	Hand collected + sieved	0,5mm	6mm	98	200
272	Langestraat 115/117 alkmaar cess pit 11b	Hand collected + sieved	6mm	6mm	27	27
273	Langestraat 115/117 alkmaar cess pit 13c	Hand collected + sieved	0,25mm	6mm	105	162

274	Langestraat 3-5 alkmaar bp5 sieve	Sieved	2mm	2mm	43	151
275	Langestraat 3-5 alkmaar bp2	Hand collected	N/a	N/a	34	381
276	Langestraat 3-5 alkmaar bp5 hand	Hand collected	N/a	N/a	9	107
277	Loerik terrein 9, houten	Sieved	2mm	2mm	0	63
278	Lr31-wachttoren fase 1a	Sieved	1 mm	5 mm	37	608
279	Lr31-wachttoren fase 1b 50-62	Sieved	1 mm	5 mm	37	105
280	Lr31-wachttoren fase 1a/b 40-62	Sieved	1 mm	5 mm	0	2
281	Lr31-wachttoren fase 1/2 c. 40-80/90	Sieved	1 mm	5 mm	0	20
282	Lr31-wachttoren fase 2 c. 61-80/90	Sieved	1 mm	5 mm	1	7
283	Lz1 flevoland	Sieved	4mm	4mm	113	328
284	Maasboulevard venlo 15th-16th century	Hand collected + sieved	1mm	10mm	91	160
285	Maasboulevard venlo 17th-18th century	Hand collected + sieved	1mm	10mm	11	179
286	Maasboulevard venlo 16th-17th century	Hand collected + sieved	1mm	10mm	41	97
287	Maasboulevard venlo 13th-14th century	Hand collected + sieved	1mm	10mm	0	2
288	Maasboulevard venlo 16th-17th century cesspit 63	Hand collected + sieved	1mm	10mm	160	2616
289	Maaskade-zuid venlo bp5	Sieved	0,5mm	2mm	140	91
290	Maaskade-zuid venlo bp1	Sieved	0,5mm	2mm	22	16
291	Maaskade-zuid venlo bp2	Sieved	0,5mm	2mm	18	33

292	Maaskade-zuid venlo bp4	Sieved	0,5mm	2mm	24	71
293	Maaskade-zuid venlo bp3	Sieved	0,5mm	2mm	78	89
294	Marktenroute/vismarkt leiden	Hand collected + sieved	Unknown	Unknown	-	440
295	Valkenburg-marktveld geul (5)	Hand collected + sieved	?	?	17	155
296	Valkenburg-marktveld geul (4)	Hand collected + sieved	?	?	19	288
297	Valkenburg-marktveld geul (3)	Hand collected + sieved	?	?	17	188
298	Valkenburg-marktveld geul (2)	Hand collected + sieved	?	?	6	87
299	Valkenburg-marktveld geul	Hand collected + sieved	?	?	3	32
300	Marnixlaan utrecht bp218 sieve 2mm	Sieved	2mm	2mm	-	63
301	Marnixlaan utrecht hand	Hand collected	N/a	N/a	-	5
302	Marnixlaan utrecht bp124 sieve 4mm	Sieved	4mm	4mm	-	81
303	Marnixlaan utrecht bp124 sieve 2mm	Sieved	2mm	2mm	-	616
304	Marnixlaan utrecht bp124 sieve 1mm	Sieved	1mm	1mm	-	19
305	Marnixlaan utrecht bp218 sieve 4mm	Sieved	4mm	4mm	-	246
306	Martiniplein sneek 18th-19th century	Hand collected + sieved	2mm	2mm		143
307	Martiniplein sneek 16th-17th century	Hand collected + sieved	2mm	2mm		97
308	Martiniplein sneek 12th-14th century	Hand collected + sieved	2mm	2mm		50
309	Martiniplein sneek 16th century	Hand collected + sieved	2mm	2mm		295

310	Martiniplein sneek 15th century	Hand collected + sieved	2mm	2mm		731
311	Martiniplein sneek 17th century	Hand collected + sieved	2mm	2mm		353
312	Meeuwenweg kampen	Hand collected	N/a	N/a	4	12
313	Middelhof alkmaar find number 415	Sieved	1mm	1mm	-	785
314	Middelhof alkmaar find number 402 hand	Hand collected	N/a	N/a	-	2
315	Middelhof alkmaar find number 414	Sieved	1mm	1mm	-	418
316	Middelhof alkmaar find number 412	Hand collected	N/a	N/a	-	4
317	Middelhof alkmaar find number 402 sieve	Sieved	1mm	1mm	-	132
318	Middelhof alkmaar find number 400	Hand collected	N/a	N/a	-	28
319	Minderbroedersklooster 's-hertogenbosch period monastery pit 2 15	Hand collected + sieved	5mm	9mm	711	1560
320	Minderbroedersklooster 's-hertogenbosch period ducal court	Hand collected	N/a	N/a	65	202
321	Minderbroedersklooster 's-hertogenbosch period monastery pit 1	Sieved	2mm	2mm	446	1511
322	Minderbroedersklooster 's-hertogenbosch period monastery pit 2 14d	Hand collected + sieved	5mm	5mm	98	117
323	Minderbroedersklooster 's-hertogenbosch period monastery pit 2 15a	Hand collected + sieved	5mm	5mm	63	74
324	Minderbroedersklooster 's-hertogenbosch period inn	Hand collected + sieved	5mm	5mm	202	593
325	Molenstraat/oude vest breda sieve	Sieved	Unknown	Unknown	-	1377
326	Molenstraat/oude vest breda hand	Hand collected	N/a	N/a	-	2
327	Muggenborch kapel-avezaath s3.40	Sieved	1mm	1mm	0	1

328	Muggenborch kapel-avezaath s1.96	Sieved	1mm	1mm	0	1
329	Muggenborch kapel-avezaath s1.48	Sieved	1mm	1mm	47	48
330	Muggenborch kapel-avezaath s2.2	Sieved	1mm	2mm	107	29
331	Museumkwartier 's-hertogenbosch f922 layer 8 sieves	Sieved	2mm	4mm	211	243
332	Museumkwartier 's-hertogenbosch f538 layer 3 sieves	Sieved	2mm	4mm	61	123
333	Museumkwartier 's-hertogenbosch f538 layer 2 sieves	Sieved	2mm	4mm	15	82
334	Museumkwartier 's-hertogenbosch f887 layer 3 hand	Hand collected	N/a	N/a	17	95
335	Museumkwartier 's-hertogenbosch f922 layer 8 hand	Hand collected	N/a	N/a	0	25
336	Museumkwartier 's-hertogenbosch f1114	Hand collected + sieved	4mm	10mm	1018	1797
337	Museumkwartier 's-hertogenbosch f922 layer 6 hand	Hand collected	N/a	N/a	2	37
338	Museumkwartier 's-hertogenbosch f922 layer 6 sieves	Sieved	2mm	4mm	232	436
339	Museumkwartier 's-hertogenbosch f538 layer 3 hand	Hand collected	N/a	N/a	0	1
340	Museumkwartier 's-hertogenbosch f753 layer 7 sieves	Sieved	2mm	4mm	14	70
341	Museumkwartier 's-hertogenbosch f753 layer 7 hand	Hand collected	N/a	N/a	15	40
342	Museumkwartier 's-hertogenbosch f1495	Hand collected	N/a	N/a	0	4
343	Museumkwartier 's-hertogenbosch f1408	Hand collected	N/a	N/a	11	33
344	Museumkwartier 's-hertogenbosch f1403	Hand collected + sieved	2mm	2mm	97	174
345	Museumkwartier 's-hertogenbosch f1147	Hand collected + sieved	2mm	2mm	392	1226

346	Museumkwartier 's-hertogenbosch f887 layer 3 sieves	Sieved	2mm	4mm	601	672
347	Museumkwartier 's-hertogenbosch f538 layer 2 hand	Hand collected	N/a	N/a	0	21
348	Nieuw rhijngeest-zuid 2014 oegstgeest 1mm	Sieved	1mm	1mm	2	3
349	Nieuw rhijngeest-zuid 2009/2010 oegstgeest 1mm/2mm	Sieved	1mm	2mm	206	52
350	Nieuw rhijngeest-zuid 2014 oegstgeest hand	Hand collected	N/a	N/a	2	2
351	Nieuw rhijngeest-zuid 2009/2010 oegstgeest hand/5mm	Hand collected + sieved	5mm	5mm	307	1229
352	Nieuw rhijngeest-zuid 2014 oegstgeest 4mm	Sieved	4mm	4mm	1882	1404
353	Nieuw rhijngeest-zuid 2014 oegstgeest 2mm	Sieved	2mm	2mm	12435	3880
354	Nieuwendijk 1979 amsterdam	Sieved	Unknown	Unknown	371	725
355	Den haag-ockenburgh ii (3)	Sieved	0,5 mm	10 mm	0	10
356	Den haag-ockenburgh ii (2)	Sieved	0,5 mm	10 mm	26	10
357	Den haag-ockenburgh ii	Sieved	0,5 mm	10 mm	24	11
358	Oostenburgermiddenstraat amsterdam	Hand collected + sieved	2mm	2mm	-	1751
359	Oosterbeintum terp sieve (2mm) early medieval	Sieved	2mm	2mm	635	162
360	Oosterbeintum terp sieve (5mm) early medieval	Sieved	5mm	5mm	156	223
361	Oosterbeintum terp hand-collected early medieval	Hand-collected	N/a	N/a	0	3
362	Oude en nieuwe gasthuis delft 15th century	Hand collected + sieved	2mm	5mm	262	690
363	Oude en nieuwe gasthuis delft 17th century	Hand collected + sieved	2mm	2mm	32	77

364	Schipluiden-oudebuurtseweg site 21.23	Hand collected			208	195
365	Oudezijds voorburgwal 107 amsterdam	Hand collected + sieved			446	739
366	Paardenmarkt alkmaar s-574	Sieved	4mm	4mm	195	172
367	Paardenmarkt alkmaar s-397	Sieved	4mm	4mm	26	20
368	Tiel-passewaaijsche hogeweg (2)	Hand collected + sieved			0	2
369	Tiel-passewaaijsche hogeweg (3)	Hand collected + sieved			434	185
370	Tiel-passewaaijsche hogeweg	Hand collected + sieved			1	3
371	Peperstraat venlo	Hand collected	N/a	N/a	4	45
372	Plantage leiderdorp early carolingian-carolingian	Hand collected + sieved	4mm	4mm	89	106
373	Plantage leiderdorp merovingian	Hand collected + sieved	2mm	10mm	107	379
374	Plantage leiderdorp late merovingian-carolingian	Sieved	2mm	10mm	35	74
375	Plantage leiderdorp carolingian	Hand collected + sieved	4mm	10mm	858	1466
376	Postelstraat 's-hertogenbosch	Unknown	Unknown	Unknown	-	101
377	Regulierenklooster 's-gravenzande pit 161	Hand collected + sieved	Unknown	Unknown	-	7
378	Regulierenklooster 's-gravenzanden pit 60	Hand collected	N/a	N/a	-	141
379	Rijksweg 9 zweins	Hand collected	N/a	N/a	-	72
380	Ritsevoort 32 alkmaar	Hand collected	N/a	N/a	45	179
381	Salvatorplein susteren 8th/13th century	Sieved	0,25mm	1mm	36	46

382	Salvatorplein susteren 11th/13th century	Sieved	0,25mm	1mm	2276	425
383	Salvatorplein susteren 14th/15th century	Sieved	0,25mm	1mm	17	22
384	Salvatorplein susteren 16th/17th century	Sieved	0,25mm	1mm	47	25
385	Salvatorplein susteren 13th/17th century	Sieved	0,25mm	1mm	105	26
386	Salvatorplein susteren 8th/10th century	Sieved	0,25mm	1mm	566	186
387	Scheldekwartier vlissingen period 2	Hand collected + sieved	1mm	4mm	453	631
388	Scheldekwartier vlissingen period 3	Hand collected + sieved	1mm	4mm	56	202
389	Scheldekwartier vlissingen period 4	Hand collected + sieved	1mm	4mm	46	363
390	Scheurrak so1 waddenzee barrell 1	Unknown	Unknown	Unknown	-	4067
391	Scheurrak so1 waddenzee barrell 2	Unknown	Unknown	Unknown	-	2052
392	Sint janskerkhof 's-hertogenbosch phase 3	Hand collected + sieved	0,25mm	4mm		17
393	Sint janskerkhof 's-hertogenbosch phase 2	Hand collected + sieved	0,25mm	4mm		6
394	Sint janskerkhof 's-hertogenbosch phase 1	Hand collected + sieved	0,25mm	4mm		6
395	Sint janskerkhof 's-hertogenbosch phase 4	Hand collected + sieved	0,25mm	4mm		109
396	Sint-hieronymusdal delft	Hand collected + sieved	2mm	2mm	-	2720
397	Speelmansstraat leeuwarden	Hand collected	N/a	N/a	6	131
398	St. Agnesklooster oldenzaal	Hand collected + sieved	2mm	2mm	47	216
399	St. Jacobsstraat leeuwarden	Hand collected	N/a	N/a	3	96

400	St. Nicolaasgasthuis den haag - infirmary	Hand collected + sieved	0,5mm	0,5mm	355	373
401	St. Nicolaasgasthuis den haag - 14th century pits	Sieved	0,5mm	0,5mm	-	2348
402	Stadhuis zutphen	Hand collected + sieved	0,5mm	4mm	618	4346
403	Stadhuiskwartier deventer 284 sieve 2mm (botanical)	Sieved	2mm	2mm	115	270
404	Stadhuiskwartier deventer 316 sieve 2mm	Sieved	2mm	2mm	43	70
405	Stadhuiskwartier deventer 298 sieve 2mm	Sieved	2mm	2mm	264	545
406	Stadhuiskwartier deventer 298 sieve 4mm (botanical)	Sieved	4mm	4mm	12	13
407	Stadhuiskwartier deventer 284 sieve 4mm (botanical)	Sieved	4mm	4mm	0	3
408	Stadhuiskwartier deventer 316 sieve 4mm (botanical)	Sieved	4mm	4mm	16	6
409	Stadhuiskwartier deventer 298 sieve 2mm (botanical)	Sieved	2mm	2mm	41	24
410	Stadhuiskwartier deventer 325	Hand collected + sieved	2mm	2mm	875	796
411	Stadhuiskwartier deventer 316 sieve 2mm (botanical)	Sieved	2mm	2mm	457	274
412	Stadhuiskwartier deventer 288	Sieved	2mm	4mm	57	105
413	Stadhuiskwartier deventer 280 sieve 4mm (botanical)	Sieved	4mm	4mm	8	9
414	Stadhuiskwartier deventer 280 sieve 2mm	Sieved	2mm	2mm	114	1114
415	Stadhuiskwartier deventer 280 sieve 2mm (botanical)	Sieved	2mm	2mm	128	78
416	Stadhuiskwartier deventer 284 sieve 2mm	Sieved	2mm	2mm	53	130
417	Stadhuiskwartier deventer 263	Hand collected + sieved	2mm	2mm	141	400

418	Stadhuiskwartier deventer 336	Sieved	2mm	2mm	23	155
419	Stadhuiskwartier deventer 321	Sieved	2mm	2mm	10	5
420	Stadhuiskwartier deventer 315	Sieved	2mm	2mm	18	205
421	Stadhuiskwartier deventer 330	Sieved	2mm	2mm	37	164
422	Stadhuiskwartier deventer 296	Hand collected + sieved	2mm	2mm	126	784
423	Stadhuiskwartier deventer 284 sieve unknown (botanical)	Sieved	Unknown	Unknown	39	43
424	Stadhuiskwartier deventer 326	Sieved	Unknown	Unknown	11	31
425	Stadhuiskwartier deventer 269 sieve unknown (botanical)	Sieved	Unknown	Unknown	6	34
426	Stadhuiskwartier deventer 269 sieve 2mm	Sieved	2mm	2mm	7	23
427	Stadhuiskwartier deventer 258 sieve unknown (botanical)	Sieved	Unknown	Unknown	13	32
428	Stadhuiskwartier deventer 258 sieve 4mm (botanical)	Sieved	4mm	4mm	1	2
429	Stadhuiskwartier deventer 258 sieve 2mm	Hand collected + sieved	2mm	2mm	1	6
430	Stadhuiskwartier deventer 258 sieve 2mm (botanical)	Sieved	2mm	2mm	75	40
431	Stadhuiskwartier deventer 304 sieve 1mm	Sieved	1mm	1mm	444	1056
432	Stadhuiskwartier deventer 299	Hand collected + sieved	2mm	2mm	177	936
433	Stadhuiskwartier deventer 304 sieve unknown (botanical)	Sieved	Unknown	Unknown	29	33
434	Villa maasbracht-steenakker (2)	Sieved	1 mm	1 mm	1426	591
435	Villa maasbracht-steenakker	Hand collected			72	1

436	Villa maasbracht-steenakker (3)	Sieved	1 mm	1 mm	1	0
437	Villa maasbracht-steenakker (4)	Sieved	1 mm	1 mm	2	1
438	Villa maasbracht-steenakker (5)	Hand collected + sieved	2.5 mm	5 mm	108	53
439	Villa maasbracht-steenakker (6)	Hand collected + sieved	2.5 mm	5 mm	389	187
440	Villa maasbracht-steenakker (7)	Hand collected + sieved	2.5 mm	5 mm	630	506
441	Stenen kamer/linge carolingian period	Hand collected + sieved	1mm	4mm	34	54
442	Stenen kamer/linge ottonian period	Hand collected + sieved	1mm	4mm	209	166
443	Stenen kamer/linge high Middle Ages	Hand collected + sieved	1mm	4mm	175	115
444	Stenen kamer/linge late Middle Ages	Hand collected + sieved	1mm	4mm	2	29
445	Stenen kamer/linge late Middle Ages-recent years	Hand collected + sieved	1mm	4mm	7	9
446	Kloostercomplex vrouwenpolder hand	Hand collected	N/a	N/a	12	12
447	Kloostercomplex vrouwenpolder sieve	Sieved	1mm	1mm	282	116
448	T vliegend hart noordzee	N/a	N/a	N/a	-	2799
449	Themaat utrecht v57	Sieved	2mm	2mm	11	28
450	Themaat utrecht v304	Sieved	2mm	2mm	10	17
451	Themaat utrecht b304 2mm	Sieved	2mm	2mm	7	9
452	Themaat utrecht v418	Sieved	2mm	2mm	7	9
453	Themaat utrecht b304 1mm	Sieved	1mm	1mm	24	6

454	Tiellandtweg houten roman period	Sieved	2mm	2mm	49	62
455	Tiellandtweg houten early Middle Ages	Sieved	2mm	2mm	133	51
456	Tjitsma foarryp wijnaldum migration period	Hand collected + sieved	4mm	4mm	211	1134
457	Tjitsma foarryp wijnaldum ottonian period	Hand collected + sieved	4mm	4mm	69	961
458	Tjitsma foarryp wijnaldum carolingian period	Hand collected + sieved	4mm	4mm	246	936
459	Tjitsma foarryp wijnaldum merovingian period	Hand collected + sieved	4mm	4mm	615	2070
460	Tjitsma foarryp wijnaldum roman period	Hand collected + sieved	4mm	4mm	33	110
461	Valkenburgerstraat 130-146 amsterdam s82 hand	Hand collected	N/a	N/a	8	112
462	Valkenburgerstraat 130-146 amsterdam s83	Sieved	1mm	2mm	336	1029
463	Valkenburgerstraat 130-146 amsterdam s82 sieve	Sieved	1mm	2mm	1750	3358
464	Van de perrehuis middelburg cesspit 2	Sieved	2mm	4mm	24	25
465	Van de perrehuis middelburg find number 3-2-23	Sieved	2mm	4mm	103	408
466	Van de perrehuis middelburg find number 3-1-2	Hand collected	N/a	N/a	2	12
467	Veilingterrein wijk bij duurstede phase 1	Hand collected + sieved	1mm	4mm	143	345
468	Veilingterrein wijk bij duurstede phase 1/2	Hand collected + sieved	1mm	4mm	5	128
469	Veilingterrein wijk bij duurstede phase 2	Hand collected + sieved	1mm	4mm	447	2643
470	Velsen-2	Hand collected			2	67
471	Velsen 1 roman harbour awn-onderzoek 4	Hand collected + sieved			110	920

472	Velsen-1 roman harbour paalgaten	Hand collected			5	12
473	Velsen 1 roman harbour awn-onderzoek 1	Hand collected + sieved			348	2567
474	Velsen 1 roman harbour awn-onderzoek 3	Hand collected + sieved			31	104
475	Velsen 1 roman harbour awn-onderzoek 2	Hand collected + sieved			37	75
476	Velsen-1 roman harbour romeinse laag	Hand collected			54	569
477	Velsen-1 roman harbour baggerlaag	Hand collected			26	261
478	Voorburg-arentsburg (3)	Hand collected + sieved	1 mm	0.5 mm	3	57
479	Voorburg-arentsburg	Hand collected + sieved	1 mm	0.5 mm	65	68
480	Voorburg-arentsburg (2)	Hand collected + sieved	1 mm	0.5 mm	215	393
481	Voorburg-arentsburg (5)	Hand collected + sieved	1 mm	0.5 mm	51	53
482	Voorburg-arentsburg (4)	Hand collected + sieved	1 mm	0.5 mm	1	25
483	Voorstraat 18 (ma6) kampen	Sieved	0,25mm	2mm	58	114
484	Voorstraat 20 (ma10) kampen	Sieved	0,25mm	2mm	3	11
485	Voorstraat 20 (ma11) kampen	Sieved	0,25mm	2mm	24	9
486	Voorstraat 244 dordrecht 2mm	Sieved	2mm	4mm	-	283
487	Voorstraat 244 dordrecht 4mm	Sieved	4mm	4mm	-	388
488	Voorstraat 52 harlingen hand	Hand collected	N/a	N/a	64	201
489	Voorstraat 52 harlingen sieve	Sieved	0,5mm	0,5mm	101	127

490	Westerveld 2 vlieland	Hand collected + sieved	Unknown	Unknown	229	317
491	Westnieuwlandgebied rotterdam 15-16a	Hand collected + sieved	2mm	2mm	47	74
492	Westnieuwlandgebied rotterdam 15	Hand collected + sieved	2mm	2mm	189	223
493	Westnieuwlandgebied rotterdam 14-15a	Hand collected + sieved	2mm	2mm	29	37
494	Englum	Hand collected + sieved			0	385
495	Englum (2)	Hand collected + sieved			0	1
496	Winston bioscoop hoorn 2004 phase iii sieve	Sieved	0,25mm	0,25mm	-	99
497	Winston bioscoop hoorn 2004 phase vi sieve	Sieved	0,25mm	6mm	-	402
498	Winston bioscoop hoorn 2004 phase vi hand	Hand collected	N/a	N/a	-	3
499	Winston bioscoop hoorn 2004 phase v sieve	Sieved	0,25mm	0,25mm	-	57
500	Winston bioscoop hoorn 2004 phase iv	Hand collected	N/a	N/a	-	6
501	Winston bioscoop hoorn 2004 phase iii hand	Hand collected	N/a	N/a	-	1
502	Winston bioscoop hoorn 2004 phase ii sieve	Sieved	1mm	1mm	-	880
503	Winston bioscoop hoorn 2004 phase ii hand	Hand collected	N/a	N/a	-	23
504	Winston bioscoop hoorn 2004 phase i	Hand collected	N/a	N/a	0	2
505	Winston bioscoop hoorn 2000 phase e	Hand collected	N/a	N/a	2	12
506	Winston bioscoop hoorn 2000 phase d	Hand collected	N/a	N/a	2	21
507	Winston bioscoop hoorn 2000 phase c	Hand collected	N/a	N/a	0	28

508	Winston bioscoop hoorn 2000 phase b	Hand collected	N/a	N/a	0	16
509	Winston bioscoop hoorn 2004 phase v hand	Hand collected	N/a	N/a	-	2
510	Woerden-hoochwoert	Hand collected			5	122
511	Wortelsteeg alkmaar 4h	Sieved	Unknown	Unknown	295	265
512	Wortelsteeg alkmaar 4d	Sieved	Unknown	Unknown	-	32
513	Zwanenburgerstraat 23 amsterdam	Sieved	2mm	2mm	282	361
514	Zwanenburgerstraat 3 amsterdam	Sieved	2mm	2mm	93	542

APPENDIX 3: DATE RANGE AND CONTEXT OF THE DFB-DATASET (0-2000)

Id	Assemblage/sub-assemblage/complex specification	Start date CE	End date CE	Site type	Context type
1	A2-sportpark Strijland Vleuten-De Meern Carolingian	715	775	rural settlement	multiple
2	A2-sportpark Strijland Vleuten-De Meern late Merovingian - early Carolingian	650	725	rural settlement	multiple
3	A2-sportpark Strijland Vleuten-De Meern Merovingian period	575	675	rural settlement	multiple
4	Aalmarkt Leiden Fase 13 Hand-collected	1280	1300	town	elevation layer
5	Aalmarkt Leiden Fase 17 Hand-collected	1500	1600	town	cess pit
6	Aalmarkt Leiden Fase 17 Sieve (0.5mm)	1500	1600	town	cess pit
7	Aalmarkt Leiden Fase 14 Sieve (0.5mm)	1350	1400	town	elevation layer
8	Aalmarkt Leiden Fase 13 Sieve (5mm)	1280	1300	town	elevation layer
9	Aalmarkt Leiden Fase 11 Hand-collected	1240	1260	town	elevation layer
10	Aalmarkt Leiden Fase 10 Hand-collected	1225	1240	town	elevation layer
11	Aalmarkt Leiden Fase 10 Sieve (0.5mm)	1225	1240	town	elevation layer
12	Aalmarkt Leiden Fase 9 Hand-collected	1225	1225	town	elevation layer
13	Aalmarkt Leiden Fase 9 Sieve (5mm)	1225	1225	town	elevation layer
14	Aalmarkt Leiden Fase 9 Sieve (0.5mm)	1225	1225	town	elevation layer
15	Aalmarkt Leiden Fase 11 Sieve (5mm)	1240	1260	town	elevation layer
16	Aalmarkt Leiden Fase 14 Hand-collected	1350	1400	town	elevation layer
17	Aalmarkt Leiden Fase 7 Hand-collected	1200	1210	rural settlement	multiple
18	Aalmarkt Leiden Fase 5 Hand-collected and sieved (1mm)	1185	1200	rural settlement	ditch
19	Aalmarkt Leiden Fase 2 Hand-collected	1125	1150	rural settlement	ditch
20	Abdijplein Middelburg	1500	1600	monastery	sewer
21	Abdijpein Middelburg complex 1	1275	1350	monastery	occupation layer
22	Abdijpein Middelburg complex 2	1350	1400	monastery	occupation layer
23	Achlumer terp Sieve 5mm LMB	1100	1400	rural settlement: terp	multiple
24	Achlumer terp Sieve 5mm KP	700	900	rural settlement: terp	multiple

25	Achlumer terp Sieve 5mm LMA	1000	1200	rural settlement: terp	multiple
26	Achlumer terp Sieve 2mm MP	500	700	rural settlement: terp	multiple
27	Achlumer terp Sieve 5mm MP	500	700	rural settlement: terp	multiple
28	Achlumer terp Sieve 2mm KP	700	900	rural settlement: terp	multiple
29	Achlumer terp Sieve 2mm K/O	800	1000	rural settlement: terp	multiple
30	Achlumer terp Sieve 2mm LMA	1000	1200	rural settlement: terp	multiple
31	Achlumer terp Sieve 2mm LMB	1100	1400	rural settlement: terp	multiple
32	Achter Blokker Kampen	1300	1800	town	diverse
33	Achter de broeren Zwolle	1525	1575	town	cess pit
34	Achterom Den Haag phase 3	1625	1720	town	sewer
35	Achterom Den Haag phase 1	1450	1500	town	multiple
36	Achterom Den Haag phase 0	1350	1450	town	multiple
37	Agnietenklooster Den Haag 077	1475	1600	monastery	pit
38	Agnietenklooster Den Haag 301 V308	1475	1600	monastery	pit
39	Agnietenklooster Den Haag 216	1475	1600	monastery	pit
40	Agnietenklooster Den Haag 032	1475	1600	monastery	pit
41	Agnietenklooster Den Haag 301 V301	1475	1600	monastery	pit
42	Anjum Sieve Terpsterweg Hand-collected late medieval	1000	1400	rural settlement: terp	terp body
43	Anjum Terpsterweg Sieve (5mm) early medieval	500	1000	rural settlement: terp	terp body
44	Anjum Terpsterweg Sieve (5mm) late medieval	1000	1400	rural settlement: terp	terp body
45	Anjum Terpsterweg Hand-collected early medieval	500	1000	rural settlement: terp	terp body

46	Assendelver Polder -site F	0	200	Nederzetting	
47	Berghuijskazerne Middelburg phase 4 Hand	1400	1560	town	multiple
48	Berghuijskazerne Middelburg phase 5 Hand	1550	1613	town	multiple
49	Berghuijskazerne Middelburg phase 5 Sieve	1550	1613	town	multiple
50	Berghuijskazerne Middelburg phase 6 Sieve	1613	1809	town	multiple
51	Berghuijskazerne Middelburg phase 4 Sieve	1400	1560	town	multiple
52	Berghuijskazerne Middelburg phase 2	1200	1350	town	multiple
53	Berghuijskazerne Middelburg phase 6 Hand	1613	1809	town	multiple
54	Berghuijskazerne Middelburg phase 3	1350	1400	town	multiple
55	Berghuijskazerne Middelburg phase 1	1000	1250	rural settlement	multiple
56	Berghuijskazerne Middelburg phase 7	1809	2002	town	multiple
57	Bergstraat-west Venlo S20	1850	1950	town	cellar
58	Bergstraat-west Venlo S21	1850	1950	town	cellar
59	Bethlehemstraat - Voogdijstraat Roermond BP05	1600	1800	monastery	cess pit
60	Bethlehemstraat - Voogdijstraat Roermond KL033	1200	1400	town	pit
61	Bethlehemstraat - Voogdijstraat Roermond AFKL03	1400	1500	monastery	pit
62	Bethlehemstraat - Voogdijstraat Roermond BP01/AFKL02	1400	1600	monastery	multiple
63	Bethlehemstraat - Voogdijstraat Roermond KL064	1350	1450	town	pit
64	Bierstraat Den Haag southern ditch	1580	1643	town	ditch
65	Bierstraat Den Haag northern ditch	1580	1616	town	ditch
66	Bierstraat Den Haag well	1580	1643	town	well
67	Bierstraat Den Haag cess pit S34	1700	1800	town	cess pit (cellar)
68	Bierstraat Den Haag cess pit S404	1700	1800	town	cess pit (cellar)
69	Boerenmouw 's-Hertogenbosch DBBM F8 Sieve	1450	1650	town	cess pit
70	Boerenmouw 's-Hertogenbosch DBBM F8 Hand	1450	1650	town	cess pit
71	Boerenmouw 's-Hertogenbosch DBBM F86/87 Sieve	1575	1650	town	cess pit

72	Boerenmouw 's-Hertogenbosch DBBM F86/87 Hand	1575	1650	town	cess pit
73	Bolwerk Gouda phase 2	1350	1450	town	multiple
74	Bolwerk Gouda phase 5	1500	1700	town	multiple
75	Bolwerk Gouda phase 3	1375	1438	monastery	cess pit (barrell)
76	Bolwerk Gouda phase 1	1300	1350	town	proparty boundary
77	Bolwerk Gouda phase 4	1438	1500	monastery	cess pit (barrell)
78	Breestraat/Peperstraat Beverwijk sample M170	1250	1500	town	hearth
79	Breestraat/Peperstraat Beverwijk sample M181	1250	1560	town	cess pit
80	Breestraat/Peperstraat Beverwijk cess pit 2	1690	1800	town	cess pit
81	Breestraat/Peperstraat Beverwijk sample M84	1250	1450	town	barrell well
82	Breestraat/Peperstraat Beverwijk sample M169	1250	1450	town	pot
83	Breestraat/Peperstraat Beverwijk later period	1500	1950	town	diverse
84	Breestraat/Peperstraat Beverwijk early period	1200	1500	town	diverse
85	Bruggestraat 8-10 Harderwijk 4mm 13th century	1200	1300	town	barrell well
86	Bruggestraat 8-10 Harderwijk 4mm 17th century	1600	1700	town	multiple
87	Bruggestraat 8-10 Harderwijk 4mm 16th century	1500	1600	town	multiple
88	Bruggestraat 8-10 Harderwijk 4mm 14th century	1300	1400	town	multiple
89	Bruggestraat 8-10 Harderwijk 1mm 1550-1600 AD	1550	1600	town	cess pit (cellar)
90	Bruggestraat 8-10 Harderwijk 1mm 1300-1350 AD	1300	1350	town	pit
91	Bruggestraat 8-10 Harderwijk 4mm 15th century	1400	1500	town	multiple
92	Buiten IJ, wrak VAL7 Amsterdam	1575	1625	ship	bun'
93	Burseplein Deventer 19-20th century	1800	2000	town	multiple
94	Burseplein Deventer 17-18th century	1600	1800	town	multiple
95	Burseplein Deventer 15-16th century	1400	1600	town	multiple
96	Burseplein Deventer 13-14th century	1200	1400	town	multiple
97	Burseplein Deventer 9-12th century	800	1200	town	multiple

98	Canadaplein Alkmaar	1700	1785	town	cess pit
99	Canadaplein Alkmaar BP4	1700	1785	town	cess pit
100	City Building Rotterdam Sieve	1000	1100	rural settlement	dung layer
101	City Building Rotterdam Hand	1000	1100	rural settlement	multiple
102	De Beyerd Breda waste pit 1	1450	1550	town	waste pit
103	De Beyerd Breda waste pit 2	1450	1650	town	waste pit
104	De Dorpen Schagen	1100	1300	rural settlement: terp	unknown
105	De Krocht Limmen V3466	1175	1200	rural settlement	multiple
106	De Krocht Limmen V3572	1175	1200	rural settlement	well
107	De Krocht Limmen M452	875	900	rural settlement	pit
108	De Krocht Limmen V340	1100	1100	rural settlement	ditch
109	De Krocht Limmen V5796	1250	1850	rural settlement	pit
110	De Krocht Limmen V3545	1025	1050	rural settlement	ditch
111	De Krocht Limmen V5796 (1)	1075	1200	rural settlement	pit
112	De Krocht Limmen V345	1150	1200	rural settlement	well
113	De Schans Oude Schild Hand	1575	1925	sconce	multiple
114	De Schans Oude Schild Sieve	1525	1725	sconce	multiple
115	De Vrieswijk Heiloo	1700	1800	moated site	cess pit

116	Den Haag-Scheveningseweg laag I (2)	100	150	Nederzetting	laag I
117	Den Haag-Scheveningseweg laag I	100	150	Nederzetting	laag I
118	d'Engelsche Boomgaert Vlaardingen	1275	1351	monastery	moat
119	Elfhuizen Dordrecht phase II S878	1300	1400	town	barrell well
120	Elfhuizen Dordrecht phase IV S390	1550	1600	town	barrell well
121	Elfhuizen Dordrecht phase IV S486	1550	1600	town	barrell well
122	Elfhuizen Dordrecht phase V S506	1600	1650	town	cess pit (cellar)
123	Elisabeth Bloemenkampklooster 's-Hertogenbosch	1625	1700	monastery	cess pit
124	Firdgum Terp Sieve (2mm) early medieval	500	1000	rural settlement: terp	terp body
125	Firdgum Terp Hand-collected late medieval	1000	1400	rural settlement: terp	terp body
126	Firdgum Terp Hand-collected early medieval	500	1000	rural settlement: terp	terp body
127	Firdgum Terp Sieve (5mm) late medieval	1000	1400	rural settlement: terp	terp body
128	Firdgum Terp Sieve (5mm) early medieval	500	1000	rural settlement: terp	terp body
129	Firdgum Terp Sieve (2mm) late medieval	1000	1400	rural settlement: terp	terp body
130	Forum Hadriani-vm Effathaterrein	170	270	Romeinse stad	Romeinse periode, 1e bewoningsfase
131	Forum Hadriani-vm Effathaterrein (2)	170	270	Romeinse stad	Romeinse periode, 2e bewoningsfase
132	Forum Hadriani-vm Effathaterrein (3)	170	270	Romeinse stad	Romeinse periode, 2e bewoningsfase
133	Ganzenmarkt Oldenzaal	1425	1500	church	cess pit

134	Gat in de Markt Vlaardingen period 5 Sieve	1170	1350	rural settlement	multiple
135	Gat in de Markt Vlaardingen period 3 Sieve	1000	1050	cemetery	multiple
136	Gat in de Markt Vlaardingen period 3 Hand	1000	1050	cemetery	multiple
137	Gat in de Markt Vlaardingen period 2	891	1000	rural settlement	multiple
138	Gat in de Markt Vlaardingen period 4 Hand	1050	1170	rural settlement: terp	multiple
139	Gat in de Markt Vlaardingen period 5 Hand	1170	1350	rural settlement	multiple
140	Gat in de Markt Vlaardingen period 4 Sieve	1050	1170	rural settlement: terp	terp body
141	Gedempte Kattendiep Groningen	1575	1600	town	cess pit
142	Gedempte Nieuwesloot 29-31 Alkmaar	1610	1660	town	cess pit
143	Gerner Marke Dalfsen	800	1200	rural settlement	multiple
144	Groene Linde Rossum	850	1200	rural settlement	multiple
145	Groot Olmen Bloemendaal site 14	700	800	rural settlement	multiple
146	Groot Olmen Bloemendaal site 8	700	750	rural settlement	multiple
147	Groot Olmen Bloemendaal site 3	475	675	rural settlement	multiple
148	Groot Olmen Bloemendaal site 5	750	850	rural settlement	find layer
149	Grote markt Dordrecht V64	1350	1400	town	cess pit
150	Grote Markt Dordrecht V93	1320	1400	town	waste layer
151	Haarlemmerplein 18 Amsterdam	1633	1700	town	cess pit

152	Haarlemmerplein 20 Amsterdam	1633	1700	town	cess pit
153	Haarlemmerplein 22 Amsterdam	1633	1700	town	cess pit
154	Haarlemmerplein 24 Amsterdam	1633	1700	town	cess pit
155	Haarlemmerplein 28 Amsterdam	1633	1700	town	cess pit
156	Havezate De Kranenburg Zwolle	1500	1600	moated site	cess pit (cellar)
157	Havezate Werkeren Zwolle 8.1.3	1368	1750	moated site	cess pit (cellar)
158	Havezate Werkeren Zwolle 6.1.3 en 8.1.42	1630	1750	moated site	moat
159	Helenius de Cockschool Kampen	1300	1500	town	diverse
160	Het Regthuys Wassenaar	1350	1450	rural settlement	cess pit
161	Hofstraat IJsselstein	1480	1520	town	cess pit
162	Hoogdijk terrein 89, Houten	900	1300	rural settlement	multiple
163	Hoogeland Zuidweg Naaldwijk Merovingian period	500	750	rural settlement	multiple
164	Hoogeland Zuidweg Naaldwijk Carolingian period	700	1000	rural settlement	multiple
165	Hoogeland Zuidweg Naaldwijk Roman period remaining	75	350	rural settlement	multiple
166	Hoogeland Zuidweg Naaldwijk Ottonian-Late medieval	900	1300	rural settlement	multiple
167	Hoogeland Zuidweg Naaldwijk Roman period phase 6	290	350	rural settlement	pit
168	Hoogstraat III Dorestad 4mm	725	899	trade centre	multiple
169	Hoogstraat III Dorestad 10mm	725	899	trade centre	multiple

170	Hoogstraat I Dorestad 10mm	725	899	trade centre	multiple
171	Hoogstraat I Dorestad 4mm	725	899	trade centre	multiple
172	Hoogstraat I Dorestad Hand	725	899	trade centre	multiple
173	Huis Malburg Kerk-Avezaath Ottonian period	900	1049	rural settlement	multiple
174	Huis Malburg Kerk-Avezaath High Middle Ages	1050	1249	rural settlement	multiple
175	Huis Malburg Kerk-Avezaath Late Middle Ages	1250	1499	rural settlement	multiple
176	Huis Malburg Kerk-Avezaath Post Middle Ages	1500	1900	rural settlement	multiple
177	Huis te Vleuten	1650	1750	castle	moat
178	Huis ter Kleef 4mm IV	1350	1573	castle	moat
179	Huis ter Kleef hand collected II	1350	1573	castle	moat
180	Huis ter Kleef 4mm AH	1550	1600	castle	latrine
181	Huis ter Kleef hand collected AK	1400	1600	castle	latrine
182	Huis ter Kleef 4mm AK	1400	1600	castle	latrine
183	Huis ter Kleef 2mm AK	1400	1600	castle	latrine
184	Huis ter Kleef hand collected XX	1400	1450	castle	latrine
185	Huis ter Kleef 4mm XX	1400	1450	castle	latrine
186	Huis ter Kleef hand collected IV	1350	1573	castle	moat
187	Huis ter Kleef hand collected AH	1550	1600	castle	latrine

188	Huis ter Kleef 4mm LL	1375	1450	castle	well
189	Huis ter Kleef 4mm III	1350	1573	castle	moat
190	Huis ter Kleef hand collected LL	1375	1450	castle	well
191	Huis ter Kleef hand collected III	1350	1573	castle	moat
192	Huis ter Kleef 4mm SS	1375	1450	castle	well
193	Huis ter Kleef hand collected WW	1500	1570	castle	drain (open)
194	Huis ter Kleef 4mm WW	1500	1570	castle	drain (open)
195	Huis ter Kleef 4mm I	1350	1573	castle	moat
196	Huis ter Kleef hand collected I	1350	1573	castle	moat
197	Huis ter Kleef 2mm II	1350	1573	castle	moat
198	Huis ter Kleef 4mm II	1350	1573	castle	moat
199	Huis ter Kleef 2mm III	1350	1573	castle	moat
200	Huis ter Kleef 2mm I	1350	1573	castle	moat
201	Huys ter Werve Rijswijk layer 1 t/m 5 mix	1400	1700	moated site	waste/cess pit
202	Huys ter Werve Rijswijk layer 3	1400	1600	moated site	waste/cess pit
203	Huys ter Werve Rijswijk layer 4	1400	1600	moated site	waste/cess pit
204	Huys ter Werve Rijswijk layer 5	1400	1600	moated site	waste/cess pit
205	In den Struys' Veere	1425	1500	town	cess pit

206	Jansstraat 46/Gerechtsgebouw Haarlem	1100	1800	town	multiple
207	Johan van Oldenbarneveltlaan Den Haag	450	700	rural settlement	multiple
208	Kastanjelaan Leiderdorp Hand	525	1250	rural settlement	multiple
209	Kastanjelaan Leiderdorp V148	700	1000	rural settlement	pit
210	Kastanjelaan Leiderdorp V189	700	900	rural settlement	riparian zone
211	Kastanjelaan Leiderdorp V220	700	900	rural settlement	riparian zone
212	Kasteel De Haar Haarzuilens	1590	1650	castle	well,/cess pit
213	Kasteel van Breda well 153	1525	1540	castle	well
214	Kasteel van Breda chute layer 1010	1525	1540	castle	chute
215	Kasteel van Breda chute excl. layer 1010	1525	1540	castle	chute
216	Kasteel van Eindhoven 18.1	1500	1650	castle	moat
217	Kasteel van Eindhoven 20.15	1420	1486	castle	moat
218	Kasteel van Eindhoven 20.1	1500	1650	castle	moat
219	Kasteel van Eindhoven 19.1	1500	1610	castle	moat
220	Kasteel Voorst Zwolle	1280	1362	castle	unknown
221	Kavel M11 Biddinghuizen	1500	1600	ship	multiple
222	Kazerneplein Gorinchem	1500	1700	town	diverse
223	Keizershof 's-Hertogenbosch Period A	1475	1500	palace	cess pit (cellar)

224	Keizershof 's-Hertogenbosch Period B	1525	1600	palace	cess pit (cellar)
225	Keizershof 's-Hertogenbosch Period C	1600	1675	palace	cess pit (cellar)
226	Keizershof 's-Hertogenbosch Period D	1725	1800	palace	cess pit (cellar)
227	Keizershof 's-Hertogenbosch Period E	1800	1870	palace	cess pit (cellar)
228	Kerklaan Rijswijk	1600	1700	town	cess pit (cellar)
229	Kerkstraat Sint-Oedenrode phase 3	1232	1575	castle	moat
230	Kerkstraat Sint-Oedenrode phase 2	1175	1232	castle	moat
231	Kesteren-De Woerd fase c	70	130	Nederzetting	fase c
232	Kesteren-De Woerd fase d	100	180	Nederzetting	fase d
233	Kesteren-De Woerd fase b	40	80	Nederzetting	fase b
234	Kesteren-De Woerd fase a	1	50	Nederzetting	fase a
235	Kesteren-De Woerd fase c-e	70	270	Nederzetting	fase c-e
236	Klokkenveld Utrecht BP3	1392	1580	monastery	cess pit
237	Klokkenveld Utrecht BP2 Sieve 2mm	1392	1580	monastery	cess pit
238	Klokkenveld Utrecht BP2 Sieve 4mm	1392	1580	monastery	cess pit
239	Klokkenveld Utrecht BP2 Hand	1392	1580	monastery	cess pit
240	Klokkenveld Utrecht BP1 Sieve 2mm	1392	1580	monastery	cess pit
241	Klokkenveld Utrecht BP4	1392	1580	monastery	cess pit

242	Klokkenveld Utrecht BP1 Hand	1392	1580	monastery	cess pit
243	Klokkenveld Utrecht BP1 Sieve 4mm	1392	1580	monastery	cess pit
244	Kloosterstraat 3-5 Nijkerk	1450	1572	monastery	pit
245	Kokpanden Kampen	1275	1850	town	diverse
246	Konigsstraat Dokkum (V219)	1200	1300	town	elevation layer
247	Konigsstraat Dokkum (V224)	1200	1300	town	pit
248	Koningstraat 18 Arnhem Hand	1575	1649	town	cess pit
249	Koningstraat 18 Arnhem Sieve	1575	1649	town	cess pit
250	Koornmarkt Tiel Sieve	1707	1778	town	cess pit
251	Koornmarkt Tiel Hand	1707	1778	town	cess pit
252	Korte Begijnestraat Haarlem cess pit 1 layer B	1675	1739	town	cess pit
253	Korte Begijnestraat Haarlem cess pit 2-layer C Sieve scanned	1575	1600	town	cess pit
254	Korte Begijnestraat Haarlem cess pit 2 chute	1575	1600	town	chute
255	Korte Begijnestraat Haarlem cess pit 2-layer C Hand	1575	1600	town	cess pit
256	Korte Begijnestraat Haarlem cess pit 1 layer E Sieve scan	1400	1450	town	cess pit
257	Korte Begijnestraat Haarlem cess pit 1 layer E Sieve analysed	1400	1450	town	cess pit
258	Korte Begijnestraat Haarlem cess pit 1 layer E Hand	1400	1450	town	cess pit
259	Korte Begijnestraat Haarlem cess pit (cellar)	1400	1450	town	cess pit (cellar)

260	Korte Begijnestraat Haarlem cess pit 2-layer C Sieve analysed	1575	1600	town	cess pit
261	Korte Houtstraat 28 Amsterdam	1700	1750	town	cess pit
262	Krijtstraat Gorinchem 16th-early 17th century	1500	1625	town	cess pit (cellar)
263	Krijtstraat Gorinchem late 16th-17th century Sieve 0,5 mm	1575	1675	town	cess pit (cellar)
264	Krijtstraat Gorinchem 14th-early 15th century Hand	1300	1425	town	multiple
265	Krijtstraat Gorinchem late 16th-17th century Sieve 2,5 mm	1575	1675	town	cess pit (cellar)
266	Krijtstraat Gorinchem 14th-early 15th century Sieve	1300	1425	town	cess pit
267	Laat 233-237 Alkmaar	1450	1600	town	cess pit
268	Lange Houtstraat 6 Amsterdam 2mm	1725	1775	town	cess pit
269	Lange Houtstraat 6 Amsterdam 0,5-1mm	1725	1775	town	cess pit
270	Langestraat 115/117 Alkmaar cess pit 13B	1575	1640	town	cess pit
271	Langestraat 115/117 Alkmaar cess pit 12A	1475	1575	town	cess pit
272	Langestraat 115/117 Alkmaar cess pit 11B	1400	1500	town	cess pit
273	Langestraat 115/117 Alkmaar cess pit 13C	1640	1825	town	cess pit
274	Langestraat 3-5 Alkmaar BP5 Sieve	1350	1450	town	cess pit
275	Langestraat 3-5 Alkmaar BP2	1418	1500	town	cess pit
276	Langestraat 3-5 Alkmaar BP5 Hand	1350	1450	town	cess pit
277	Loerik terrein 9, Houten	1000	1300	rural settlement	pit

278	LR31-Wachttoren fase 1a	40	55	wachttoren	wachttoren, druipgoot en loopvlak
279	LR31-Wachttoren fase 1b 50-62	50	62	wachttoren	Wachttoren, m.n. wandgreppel benedenvertrek
280	LR31-Wachttoren fase 1a/b 40-62	40	62	wachttoren	wachttoren
281	LR31-Wachttoren fase 1/2 c. 40-80/90	40	90	wachttoren	wachttoren
282	LR31-Wachttoren fase 2 c. 61-80/90	61	90	wachttoren	wachttoren
283	LZ1 Flevoland	1600	1625	ship	ship floor
284	Maasboulevard Venlo 15th-16th century	1400	1600	town	multiple
285	Maasboulevard Venlo 17th-18th century	1600	1800	town	multiple
286	Maasboulevard Venlo 16th-17th century	1475	1750	town	multiple
287	Maasboulevard Venlo 13th-14th century	1150	1360	town	multiple
288	Maasboulevard Venlo 16th-17th century cesspit 63	1500	1625	town	cess pit
289	Maaskade-zuid Venlo BP5	1600	1650	town	cess pit
290	Maaskade-zuid Venlo BP1	1600	1800	town	cess pit
291	Maaskade-zuid Venlo BP2	1575	1700	town	cess pit
292	Maaskade-zuid Venlo BP4	1600	1700	town	cess pit
293	Maaskade-zuid Venlo BP3	1575	1625	town	cess pit
294	Marktenroute/Vismarkt Leiden	1300	1350	town	unknown
295	Valkenburg-Marktveld geul (5)	200	260	Kampdorp	fase 5

296	Valkenburg-Marktveld geul (4)	150	200	Kampdorp	fase 4
297	Valkenburg-Marktveld geul (3)	120	149	Kampdorp	fase 3
298	Valkenburg-Marktveld geul (2)	70	120	Kampdorp	fase 2
299	Valkenburg-Marktveld geul	40	69	Kampdorp	fase 1
300	Marnixlaan Utrecht BP218 Sieve 2mm	1392	1580	monastery	cess pit
301	Marnixlaan Utrecht Hand	1392	1580	monastery	multiple
302	Marnixlaan Utrecht BP124 Sieve 4mm	1392	1580	monastery	cess pit
303	Marnixlaan Utrecht BP124 Sieve 2mm	1392	1580	monastery	cess pit
304	Marnixlaan Utrecht BP124 Sieve 1mm	1392	1580	monastery	cess pit
305	Marnixlaan Utrecht BP218 Sieve 4mm	1392	1580	monastery	cess pit
306	Martiniplein Sneek 18th-19th century	1700	1900	town	multiple
307	Martiniplein Sneek 16th-17th century	1500	1700	town	multiple
308	Martiniplein Sneek 12th-14th century	1100	1400	town	multiple
309	Martiniplein Sneek 16th century	1500	1600	town	multiple
310	Martiniplein Sneek 15th century	1400	1500	town	multiple
311	Martiniplein Sneek 17th century	1600	1700	town	multiple
312	Meeuwenweg Kampen	1500	1800	town	diverse
313	Middelhof Alkmaar find number 415	1400	1600	monastery	waste pit

314	Middelhof Alkmaar find number 402 Hand	1400	1600	monastery	waste pit
315	Middelhof Alkmaar find number 414	1400	1600	monastery	waste pit
316	Middelhof Alkmaar find number 412	1400	1600	monastery	waste pit
317	Middelhof Alkmaar find number 402 Sieve	1400	1600	monastery	waste pit
318	Middelhof Alkmaar find number 400	1400	1600	monastery	waste pit
319	Minderbroedersklooster 's-Hertogenbosch period monastery pit 2 15	1400	1500	monastery	waste pit
320	Minderbroedersklooster 's-Hertogenbosch period ducal court	1175	1228	palace	ditch/moat
321	Minderbroedersklooster 's-Hertogenbosch period monastery pit 1	1350	1450	monastery	waste pit
322	Minderbroedersklooster 's-Hertogenbosch period monastery pit 2 14d	1375	1400	monastery	waste pit
323	Minderbroedersklooster 's-Hertogenbosch period monastery pit 2 15a	1400	1425	monastery	waste pit
324	Minderbroedersklooster 's-Hertogenbosch period inn	1629	1650	town	waste pit
325	Molenstraat/Oude Vest Breda Sieve	1400	1500	town	unknown
326	Molenstraat/Oude Vest Breda Hand	1400	1500	town	unknown
327	Muggenborch Kapel-Avezaath S3.40	1200	1300	rural settlement	pit
328	Muggenborch Kapel-Avezaath S1.96	1200	1300	rural settlement	ditch
329	Muggenborch Kapel-Avezaath S1.48	1250	1300	rural settlement	well
330	Muggenborch Kapel-Avezaath S2.2	1250	1300	rural settlement	ditch
331	Museumkwartier 's-Hertogenbosch F922 layer 8 Sieve	1500	1550	town	cess pit

332	Museumkwartier 's-Hertogenbosch F538 layer 3 Sieve	1500	1600	town	cess pit
333	Museumkwartier 's-Hertogenbosch F538 layer 2 Sieve	1500	1625	town	cess pit
334	Museumkwartier 's-Hertogenbosch F887 layer 3 Hand	1525	1600	town	cess pit
335	Museumkwartier 's-Hertogenbosch F922 layer 8 Hand	1500	1550	town	cess pit
336	Museumkwartier 's-Hertogenbosch F1114	1475	1550	monastery	waste pit
337	Museumkwartier 's-Hertogenbosch F922 layer 6 Hand	1500	1600	town	cess pit
338	Museumkwartier 's-Hertogenbosch F922 layer 6 Sieve	1500	1600	town	cess pit
339	Museumkwartier 's-Hertogenbosch F538 layer 3 Hand	1500	1600	town	cess pit
340	Museumkwartier 's-Hertogenbosch F753 layer 7 Sieve	1475	1550	town	cess pit
341	Museumkwartier 's-Hertogenbosch F753 layer 7 Hand	1475	1550	town	cess pit
342	Museumkwartier 's-Hertogenbosch F1495	1613	1629	monastery	waste pit
343	Museumkwartier 's-Hertogenbosch F1408	1613	1629	monastery	waste pit
344	Museumkwartier 's-Hertogenbosch F1403	1613	1629	monastery	waste pit
345	Museumkwartier 's-Hertogenbosch F1147	1475	1550	monastery	waste pit
346	Museumkwartier 's-Hertogenbosch F887 layer 3 Sieve	1525	1600	town	cess pit
347	Museumkwartier 's-Hertogenbosch F538 layer 2 Hand	1500	1625	town	cess pit
348	Nieuw Rhijngeest-zuid 2014 Oegstgeest 1mm	475	725	rural settlement	multiple
349	Nieuw Rhijngeest-zuid 2009/2010 Oegstgeest 1mm/2mm	475	725	rural settlement	multiple

350	Nieuw Rhijngeest-zuid 2014 Oegstgeest Hand	475	725	rural settlement	multiple
351	Nieuw Rhijngeest-zuid 2009/2010 Oegstgeest Hand/5mm	475	725	rural settlement	multiple
352	Nieuw Rhijngeest-zuid 2014 Oegstgeest 4mm	475	725	rural settlement	multiple
353	Nieuw Rhijngeest-zuid 2014 Oegstgeest 2mm	475	725	rural settlement	multiple
354	Nieuwendijk 1979 Amsterdam	1225	1325	town	unknown
355	Den Haag-Ockenburgh II (3)	150	250	castellum + vicus	Quick scan van afvaldump van fort en vicus samen uit put 7
356	Den Haag-Ockenburgh II (2)	150	250	castellum + vicus	Vicus
357	Den Haag-Ockenburgh II	150	250	castellum + vicus	Fort
358	Oostenburgermiddenstraat Amsterdam	1708	1805	town	cess pit
359	Oosterbeintum Terp Sieve (2mm) early medieval	500	1000	rural settlement: terp	terp body
360	Oosterbeintum Terp Sieve (5mm) early medieval	500	1000	rural settlement: terp	terp body
361	Oosterbeintum Terp Hand-collected early medieval	500	1000	rural settlement: terp	terp body
362	Oude en nieuwe Gasthuis Delft 15th century	1400	1450	town	cess pit
363	Oude en nieuwe Gasthuis Delft 17th century	1650	1675	town	cess pit
364	Schipluiden-Oudebuurtseweg site 21.23	20	120	Huisterp	
365	Oudezijds Voorburgwal 107 Amsterdam	1650	1675	town	cess pit
366	Paardenmarkt Alkmaar S-574	1125	1200	town	waste pit/well
367	Paardenmarkt Alkmaar S-397	1125	1200	town	waste pit/well

368	Tiel-Passewaaijsche Hogeweg (2)	40	150	Nederzetting	periode III, fase 3
369	Tiel-Passewaaijsche Hogeweg (3)	270	350	Nederzetting	period III, fase 7
370	Tiel-Passewaaijsche Hogeweg		50	Nederzetting	periode III, fase 2
371	Peperstraat Venlo	1600	1700	town	cess pit
372	Plantage Leiderdorp Early Carolingian-Carolingian	750	850	rural settlement	gully
373	Plantage Leiderdorp Merovingian	650	675	rural settlement	gully
374	Plantage Leiderdorp Late Merovingian-Carolingian	675	850	rural settlement	multiple
375	Plantage Leiderdorp Carolingian	800	850	rural settlement	multiple
376	Postelstraat 's-Hertogenbosch	1475	1600	town	multiple
377	Regulierenklooster 's-Gravenzande pit 161	1475	1572	monastery	pit
378	Regulierenklooster 's-Gravenzanden pit 60	1430	1550	monastery	pit
379	Rijksweg 9 Zweins	1250	1400	castle	multiple
380	Ritsevoort 32 Alkmaar	1575	1650	town	cess pit
381	Salvatorplein Susteren 8th/13th century	700	1300	monastery	multiple
382	Salvatorplein Susteren 11th/13th century	1000	1300	monastery	multiple
383	Salvatorplein Susteren 14th/15th century	1340	1400	monastery	well
384	Salvatorplein Susteren 16th/17th century	1500	1700	monastery	cess pit/cellar
385	Salvatorplein Susteren 13th/17th century	1200	1700	monastery	occupation layer

386	Salvatorplein Susteren 8th/10th century	700	1000	monastery	multiple
387	Scheldekwartier Vlissingen period 2	1609	1648	town	multiple
388	Scheldekwartier Vlissingen period 3	1648	1705	town	cess pit
389	Scheldekwartier Vlissingen period 4	1705	1809	town	cess pit
390	Scheurrak SO1 Waddenzee barrell 1	1580	1589	ship	barrell
391	Scheurrak SO1 Waddenzee barrell 2	1580	1589	ship	barrell
392	Sint Janskerkhof 's-Hertogenbosch phase 3	1275	1325	town	multiple
393	Sint Janskerkhof 's-Hertogenbosch phase 2	1250	1275	town	pit
394	Sint Janskerkhof 's-Hertogenbosch phase 1	1175	1250	town	pit
395	Sint Janskerkhof 's-Hertogenbosch phase 4	1300	1425	town	pit
396	Sint-Hieronymusdal Delft	1600	1635	town	waste pit/well
397	Speelmansstraat Leeuwarden	1000	1400	town	occupation layer
398	St. Agnesklooster Oldenzaal	1400	1500	monastery	cess pit
399	St. Jacobsstraat Leeuwarden	1000	1400	town	occupation layer
400	St. Nicolaasgasthuis Den Haag - Infirmary	1400	1550	town	unknown
401	St. Nicolaasgasthuis Den Haag - 14th century pits	1300	1400	town	pit
402	Stadhuis Zutphen	1125	1175	palace	waste layer
403	Stadhuiskwartier Deventer 284 Sieve 2mm (botanical)	1350	1400	town	cess pit

404	Stadhuiskwartier Deventer 316 Sieve 2mm	1725	1775	town	cess pit
405	Stadhuiskwartier Deventer 298 Sieve 2mm	1680	1720	town	cess pit
406	Stadhuiskwartier Deventer 298 Sieve 4mm (botanical)	1680	1720	town	cess pit
407	Stadhuiskwartier Deventer 284 Sieve 4mm (botanical)	1350	1400	town	cess pit
408	Stadhuiskwartier Deventer 316 Sieve 4mm (botanical)	1725	1775	town	cess pit
409	Stadhuiskwartier Deventer 298 Sieve 2mm (botanical)	1680	1720	town	cess pit
410	Stadhuiskwartier Deventer 325	1350	1425	town	cess pit
411	Stadhuiskwartier Deventer 316 Sieve 2mm (botanical)	1725	1775	town	cess pit
412	Stadhuiskwartier Deventer 288	1650	1700	town	cess pit
413	Stadhuiskwartier Deventer 280 Sieve 4mm (botanical)	1620	1650	town	cess pit
414	Stadhuiskwartier Deventer 280 Sieve 2mm	1620	1650	town	cess pit
415	Stadhuiskwartier Deventer 280 Sieve 2mm (botanical)	1620	1650	town	cess pit
416	Stadhuiskwartier Deventer 284 Sieve 2mm	1350	1400	town	cess pit
417	Stadhuiskwartier Deventer 263	950	1050	town	pit
418	Stadhuiskwartier Deventer 336	1725	1750	town	cess pit
419	Stadhuiskwartier Deventer 321	850	850	trade centre	pit
420	Stadhuiskwartier Deventer 315	885	925	town	pit
421	Stadhuiskwartier Deventer 330	885	925	town	pit

422	Stadhuiskwartier Deventer 296	925	950	town	pit
423	Stadhuiskwartier Deventer 284 Sieve unknown (botanical)	1350	1400	town	cess pit
424	Stadhuiskwartier Deventer 326	950	1050	town	pit
425	Stadhuiskwartier Deventer 269 Sieve unknown (botanical)	950	1050	town	pit
426	Stadhuiskwartier Deventer 269 Sieve 2mm	950	1050	town	pit
427	Stadhuiskwartier Deventer 258 Sieve unknown (botanical)	1100	1200	town	pit
428	Stadhuiskwartier Deventer 258 Sieve 4mm (botanical)	1100	1200	town	pit
429	Stadhuiskwartier Deventer 258 Sieve 2mm	1100	1200	town	pit
430	Stadhuiskwartier Deventer 258 Sieve 2mm (botanical)	1100	1200	town	pit
431	Stadhuiskwartier Deventer 304 Sieve 1mm	1300	1400	town	cess pit
432	Stadhuiskwartier Deventer 299	900	950	town	pit
433	Stadhuiskwartier Deventer 304 Sieve unknown (botanical)	1300	1400	town	cess pit
434	Villa Maasbracht-Steenakker (2)	70	724	Villa	silt layer
435	Villa Maasbracht-Steenakker	70	724	Villa	silt layer
436	Villa Maasbracht-Steenakker (3)	70	724	Villa	rubble
437	Villa Maasbracht-Steenakker (4)	70	724	Villa	top fill
438	Villa Maasbracht-Steenakker (5)	70	724	Villa	silt layer, manually collected
439	Villa Maasbracht-Steenakker (6)	70	724	Villa	silt layer, 5.0 mm sieve

440	Villa Maasbracht-Steenakker (7)	70	724	Villa	silt layer, 2.5 mm sieve
441	Stenen Kamer/Linge Carolingian period	725	900	rural site	multiple
442	Stenen Kamer/Linge Ottonian period	900	1050	rural site	multiple
443	Stenen Kamer/Linge High Middle Ages	1050	1250	rural site	multiple
444	Stenen Kamer/Linge Late Middle ages	1250	1550	moated site	multiple
445	Stenen Kamer/Linge Late Middle Ages-recent years	1550	2000	moated site	multiple
446	kloostercomplex Vrouwenpolder Hand	1450	1550	monastery	waste layer
447	kloostercomplex Vrouwenpolder Sieve	1450	1550	monastery	waste layer
448	t Vliegend Hart Noordzee	1735	1735	ship	storage jar
449	Themaat Utrecht V57	1250	1425	rural settlement	ditch
450	Themaat Utrecht V304	1250	1425	rural settlement	ditch
451	Themaat Utrecht B304 2mm	1250	1425	rural settlement	ditch
452	Themaat Utrecht V418	1250	1425	rural settlement	ditch
453	Themaat Utrecht B304 1mm	1250	1425	rural settlement	ditch
454	Tiellandtweg Houten Roman period	-12	450	rural settlement	well
455	Tiellandtweg Houten Early Middle Ages	450	1050	rural settlement	well
456	Tjitsma Foarryp Wijnaldum Migration period	425	550	rural settlement: terp	multiple
457	Tjitsma Foarryp Wijnaldum Ottonian period	850	950	rural settlement: terp	multiple

458	Tjitsma Foarryp Wijnaldum Carolingian period	750	850	rural settlement: terp	multiple
459	Tjitsma Foarryp Wijnaldum Merovingian period	550	750	rural settlement: terp	multiple
460	Tjitsma Foarryp Wijnaldum Roman period	175	350	rural settlement: terp	multiple
461	Valkenburgerstraat 130-146 Amsterdam S82 Hand	1750	1820	town	waste pit
462	Valkenburgerstraat 130-146 Amsterdam S83	1725	1825	town	waste pit
463	Valkenburgerstraat 130-146 Amsterdam S82 Sieve	1750	1820	town	waste pit
464	Van de Perrehuis Middelburg Cesspit 2	1400	1450	monastery	cess pit
465	Van de Perrehuis Middelburg Find number 3-2-23	1325	1400	monastery	drainage channel
466	Van de Perrehuis Middelburg Find number 3-1-2	1325	1575	monastery	drainage channel
467	Veilingterrein Wijk bij Duurstede phase 1	675	775	trade centre	multiple
468	Veilingterrein Wijk bij Duurstede phase 1/2	675	900	trade centre	multiple
469	Veilingterrein Wijk bij Duurstede phase 2	775	900	trade centre	multiple
470	Velsen-2	39	47	castellum	
471	Velsen 1 Roman harbour AWN-onderzoek 4	15	28	Haven	Vondstnr Velsen 6500, tussen sloten 5 en 6
472	Velsen-1 Roman harbour Paalgaten	15	28	Haven	Paalgaten
473	Velsen 1 Roman harbour AWN-onderzoek 1	15	28	Haven	Romeinse haven
474	Velsen 1 Roman harbour AWN-onderzoek 3	15	28	Haven	waterput 5
475	Velsen 1 Roman harbour AWN-onderzoek 2	15	28	Haven	waterput 2

476	Velsen-1 Roman harbour Romeinse laag	15	28	Haven	Romeinse laag
477	Velsen-1 Roman harbour Baggerlaag	15	28	Haven	Baggerlaag
478	Voorburg-Arentsburg (3)		450	Romeinse stad	Geul3, 160-230 AD
479	Voorburg-Arentsburg		450	Romeinse stad	Stad1
480	Voorburg-Arentsburg (2)		450	Romeinse stad	Geul2, 160-230 AD
481	Voorburg-Arentsburg (5)		450	Romeinse stad	Geul5, post 230 AD
482	Voorburg-Arentsburg (4)		450	Romeinse stad	Geul4, post 230 AD
483	Voorstraat 18 (MA6) Kampen	1450	1575	town	cess pit
484	Voorstraat 20 (MA10) Kampen	1450	1575	town	cess pit
485	Voorstraat 20 (MA11) Kampen	1450	1575	town	cess pit
486	Voorstraat 244 Dordrecht 2mm	1300	1585	town	cess pit (cellar)
487	Voorstraat 244 Dordrecht 4mm	1300	1585	town	cess pit (cellar)
488	Voorstraat 52 Harlingen Hand	1625	1675	town	cess pit
489	Voorstraat 52 Harlingen Sieve	1625	1675	town	cess pit
490	Westerveld 2 Vlieland	1525	1575	ship	bun'
491	Westnieuwlandgebied Rotterdam 15-16A	1400	1525	town	multiple
492	Westnieuwlandgebied Rotterdam 15	1400	1500	town	multiple
493	Westnieuwlandgebied Rotterdam 14-15A	1300	1450	town	multiple

494	Englum	0	150	Wierde	period 3, werkput 5, spoor 49
495	Englum (2)	0	150	Wierde	period 3, werkput 5, spoor 50
496	Winston bioscoop Hoorn 2004 phase III Sieve	1310	1350	town	manure pit
497	Winston bioscoop Hoorn 2004 phase VI Sieve	1575	1800	town	cess pit
498	Winston bioscoop Hoorn 2004 phase VI Hand	1575	1800	town	multiple
499	Winston bioscoop Hoorn 2004 phase V Sieve	1400	1575	town	faeces layer
500	Winston bioscoop Hoorn 2004 phase IV	1350	1400	town	multiple
501	Winston bioscoop Hoorn 2004 phase III Hand	1310	1350	town	elevation layer
502	Winston bioscoop Hoorn 2004 phase II Sieve	1280	1310	town	multiple
503	Winston bioscoop Hoorn 2004 phase II Hand	1280	1310	town	multiple
504	Winston bioscoop Hoorn 2004 phase I	1200	1280	rural settlement	multiple
505	Winston bioscoop Hoorn 2000 phase E	1400	1700	town	multiple
506	Winston bioscoop Hoorn 2000 phase D	1400	1500	town	multiple
507	Winston bioscoop Hoorn 2000 phase C	1300	1400	town	multiple
508	Winston bioscoop Hoorn 2000 phase B	1275	1300	rural settlement: terp	multiple
509	Winston bioscoop Hoorn 2004 phase V Hand	1400	1575	town	multiple
510	Woerden-Hoochwoert	40	270	castellum + vicus	Grachten castellum en vicus
511	Wortelsteeg Alkmaar 4H	1574	1677	town	cess pit

512	Wortelsteeg Alkmaar 4D	1574	1677	town	cess pit
513	Zwanenburgerstraat 23 Amsterdam	1600	1625	town	cess pit
514	Zwanenburgerstraat 3 Amsterdam	1650	1675	town	cess pit

APPENDIX 4: DATA QUALITY OF THE DFB-DATASET (0-2000)

Id	Assemblage/sub-assemblage/complex specification	Data quality (green, amber, or red)	What variable(s) a red or amber quality indicator applies to and
1	A2-sportpark Strijland Vleuten-De Meern Carolingian	green	
2	A2-sportpark Strijland Vleuten-De Meern late Merovingian - early Carolingian	green	
3	A2-sportpark Strijland Vleuten-De Meern Merovingian period	green	
4	Aalmarkt Leiden Fase 13 Hand-collected	green	
5	Aalmarkt Leiden Fase 17 Hand-collected	green	
6	Aalmarkt Leiden Fase 17 Sieve (0.5mm)	green	
7	Aalmarkt Leiden Fase 14 Sieve (0.5mm)	green	
8	Aalmarkt Leiden Fase 13 Sieve (5mm)	green	
9	Aalmarkt Leiden Fase 11 Hand-collected	green	
10	Aalmarkt Leiden Fase 10 Hand-collected	green	
11	Aalmarkt Leiden Fase 10 Sieve (0.5mm)	green	
12	Aalmarkt Leiden Fase 9 Hand-collected	green	
13	Aalmarkt Leiden Fase 9 Sieve (5mm)	green	
14	Aalmarkt Leiden Fase 9 Sieve (0.5mm)	green	
15	Aalmarkt Leiden Fase 11 Sieve (5mm)	green	
16	Aalmarkt Leiden Fase 14 Hand-collected	green	
17	Aalmarkt Leiden Fase 7 Hand-collected	green	
18	Aalmarkt Leiden Fase 5 Hand-collected and sieved (1mm)	red	natural deposit of fish, caused by the closing of a ditch
19	Aalmarkt Leiden Fase 2 Hand-collected	green	
20	Abdijplein Middelburg	green	
21	Abdijpein Middelburg complex 1	green	
22	Abdijpein Middelburg complex 2	green	
23	Achlumer terp Sieve 5mm LMB	red	Zoological remains were analysed by a (master) student (compared with the collection of the Groningen); Number of samples is mentioned but no volume is given.
24	Achlumer terp Sieve 5mm KP	red	Zoological remains were analysed by a (master) student (compared with the collection of the Groningen); Number of samples is mentioned but no volume is given.
25	Achlumer terp Sieve 5mm LMA	red	Zoological remains were analysed by a (master) student (compared with the collection of the Groningen); Number of samples is mentioned but no volume is given.
26	Achlumer terp Sieve 2mm MP	red	Zoological remains were analysed by a (master) student (compared with the collection of the Groningen); Number of samples is mentioned but no volume is given.
27	Achlumer terp Sieve 5mm MP	red	Zoological remains were analysed by a (master) student (compared with the collection of the Groningen); Number of samples is mentioned but no volume is given.
28	Achlumer terp Sieve 2mm KP	red	Zoological remains were analysed by a (master) student (compared with the collection of the Groningen); Number of samples is mentioned but no volume is given.
29	Achlumer terp Sieve 2mm K/O	red	Zoological remains were analysed by a (master) student (compared with the collection of the Groningen); Number of samples is mentioned but no volume is given.
30	Achlumer terp Sieve 2mm LMA	red	Zoological remains were analysed by a (master) student (compared with the collection

			of the Groningen); Number of samples is mentioned but no volume is given.
31	Achlumer terp Sieve 2mm LMB	red	Zoological remains were analysed by a (master) student (compared with the collection of the Groningen); Number of samples is mentioned but no volume is given.
32	Achter Blokker Kampen	amber	Acipenser sturio might be Acipenser oxyrinchus
33	Achter de broeren Zwolle	amber	minimum sieve mesh not known
34	Achterom Den Haag phase 3	amber	not analysed by a fish specialist; uncertainty about collecting method
35	Achterom Den Haag phase 1	amber	not analysed by a fish specialist; uncertainty about collecting method
36	Achterom Den Haag phase 0	amber	not analysed by a fish specialist; uncertainty about collecting method
37	Agnietenklooster Den Haag 077	red	NISP unsure for Gadus morhua and gadidae: in total list Gadus morhua 45 but in feature list total amount 44/in total list Gadidae 70 but in feature list total amount 71; not analysed by a fish specialist; not specifically mentioned who of the authors look
38	Agnietenklooster Den Haag 301 V308	red	NISP unsure for Gadus morhua and gadidae: in total list Gadus morhua 45 but in feature list total amount 44/in total list Gadidae 70 but in feature list total amount 71; not analysed by a fish specialist; not specifically mentioned who of the authors look
39	Agnietenklooster Den Haag 216	red	NISP unsure for Gadus morhua and gadidae: in total list Gadus morhua 45 but in feature list total amount 44/in total list Gadidae 70 but in feature list total amount 71; not analysed by a fish specialist; not specifically mentioned who of the authors look
40	Agnietenklooster Den Haag 032	red	NISP unsure for Gadus morhua and gadidae: in total list Gadus morhua 45 but in feature list total amount 44/in total list Gadidae 70 but in feature list total amount 71; not analysed by a fish specialist; not specifically mentioned who of the authors look
41	Agnietenklooster Den Haag 301 V301	red	not analysed by a fish specialist; not specifically mentioned who of the authors looked at the fish
42	Anjum Sieve Terpsterweg Hand-collected late medieval	red	Analysed by a student not a fish specialist; Unclear if properly supervised; no specific context is known; very broad dating period
43	Anjum Terpsterweg Sieve (5mm) early medieval	red	Analysed by a student not a fish specialist; Unclear if properly supervised; no specific context is known; very broad dating period
44	Anjum Terpsterweg Sieve (5mm) late medieval	red	Analysed by a student not a fish specialist; Unclear if properly supervised; no specific context is known; very broad dating period
45	Anjum Terpsterweg Hand-collected early medieval	red	Analysed by a student not a fish specialist; Unclear if properly supervised; no specific context is known; very broad dating period
46	Assendelver Polder -site F	amber	Reference collection limited e.g., small specimen; student's thesis.
47	Berghuijskazerne Middelburg phase 4 Hand	green	
48	Berghuijskazerne Middelburg phase 5 Hand	green	
49	Berghuijskazerne Middelburg phase 5 Sieve	green	
50	Berghuijskazerne Middelburg phase 6 Sieve	green	
51	Berghuijskazerne Middelburg phase 4 Sieve	green	
52	Berghuijskazerne Middelburg phase 2	green	
53	Berghuijskazerne Middelburg phase 6 Hand	green	
54	Berghuijskazerne Middelburg phase 3	green	
55	Berghuijskazerne Middelburg phase 1	green	
56	Berghuijskazerne Middelburg phase 7	green	
57	Bergstraat-west Venlo S20	green	
58	Bergstraat-west Venlo S21	green	
59	Bethlehemstraat - Voogdijstraat Roermond BP05	amber	Unclear if there is also hand-collected material. It says in the text: the contents of the tracks were (partially) sieved

60	Bethlehemstraat - Voogdijstraat Roermond KL033	amber	Unclear if there is also hand-collected material. It says in the text: the contents of the tracks were (partially) sieved
61	Bethlehemstraat - Voogdijstraat Roermond AFKL03	amber	Unclear if there is also hand-collected material. It says in the text: the contents of the tracks were (partially) sieved
62	Bethlehemstraat - Voogdijstraat Roermond BP01/AFKL02	amber	Unclear if there is also hand-collected material. It says in the text: the contents of the tracks were (partially) sieved
63	Bethlehemstraat - Voogdijstraat Roermond KL064	amber	Unclear if there is also hand-collected material. It says in the text: the contents of the tracks were (partially) sieved
64	Bierstraat Den Haag southern ditch	green	
65	Bierstraat Den Haag northern ditch	green	
66	Bierstraat Den Haag well	green	
67	Bierstraat Den Haag cess pit S34	green	
68	Bierstraat Den Haag cess pit S404	red	total in table is not the sum of the NISP/ Acipenser sturio might be Acipenser oxyrinchus
69	Boerenmouw 's-Hertogenbosch DBBM F8 Sieve	red	sieve mesh unsure; not analysed by a fish specialist
70	Boerenmouw 's-Hertogenbosch DBBM F8 Hand	amber	not analysed by a fish specialist
71	Boerenmouw 's-Hertogenbosch DBBM F86/87 Sieve	red	sieve mesh unsure; not analysed by a fish specialist
72	Boerenmouw 's-Hertogenbosch DBBM F86/87 Hand	amber	not analysed by a fish specialist
73	Bolwerk Gouda phase 2	green	
74	Bolwerk Gouda phase 5	green	
75	Bolwerk Gouda phase 3	amber	Acipenser sturio might be Acipenser oxyrinchus
76	Bolwerk Gouda phase 1	green	
77	Bolwerk Gouda phase 4	green	
78	Breestraat/Peperstraat Beverwijk sample M170	green	
79	Breestraat/Peperstraat Beverwijk sample M181	amber	determination of Liza ramada possibly with ? (Is given like this in the table with the totals)
80	Breestraat/Peperstraat Beverwijk cess pit 2	green	
81	Breestraat/Peperstraat Beverwijk sample M84	amber	number of Perca fluviatilis in the total table is 41. I think this is a mistake if you read the tekst.
82	Breestraat/Peperstraat Beverwijk sample M169	green	
83	Breestraat/Peperstraat Beverwijk later period	green	
84	Breestraat/Peperstraat Beverwijk early period	green	
85	Bruggestraat 8-10 Harderwijk 4mm 13th century	green	
86	Bruggestraat 8-10 Harderwijk 4mm 17th century	green	
87	Bruggestraat 8-10 Harderwijk 4mm 16th century	green	
88	Bruggestraat 8-10 Harderwijk 4mm 14th century	green	
89	Bruggestraat 8-10 Harderwijk 1mm 1550-1600 AD	green	
90	Bruggestraat 8-10 Harderwijk 1mm 1300-1350 AD	green	
91	Bruggestraat 8-10 Harderwijk 4mm 15th century	green	
92	Buiten IJ, wrak VAL7 Amsterdam	green	
93	Burseplein Deventer 19-20th century	red	determinations only based on vertebrae; Cyprinidae category includes also Perca fluviatilis; small reference collection used
94	Burseplein Deventer 17-18th century	red	determinations only based on vertebrae; Cyprinidae category includes also Perca fluviatilis; small reference collection used
95	Burseplein Deventer 15-16th century	red	determinations only based on vertebrae; Cyprinidae category includes also Perca fluviatilis; small reference collection used
96	Burseplein Deventer 13-14th century	red	determinations only based on vertebrae; Cyprinidae category includes also Perca fluviatilis; small reference collection used

97	Burseplein Deventer 9-12th century	red	determinations only based on vertebrae; Cyprinidae category includes also Perca fluviatilis; small reference collection used
98	Canadaplein Alkmaar	red	only vertebrae analyzed
99	Canadaplein Alkmaar BP4	amber	only vertebrae analysed
100	City Building Rotterdam Sieve	amber	not analysed by a fish specialist
101	City Building Rotterdam Hand	amber	not analysed by a fish specialist
102	De Beyerd Breda waste pit 1	green	
103	De Beyerd Breda waste pit 2	green	
104	De Dorpen Schagen	amber	mesh size unknown
105	De Krocht Limmen V3466	green	
106	De Krocht Limmen V3572	green	
107	De Krocht Limmen M452	green	
108	De Krocht Limmen V340	green	
109	De Krocht Limmen V5796	green	
110	De Krocht Limmen V3545	green	
111	De Krocht Limmen V5796 (1)	green	
112	De Krocht Limmen V345	green	
113	De Schans Oude Schild Hand	green	
114	De Schans Oude Schild Sieve	green	
115	De Vrieswijk Heiloo	amber	unclearity about sieve mesh sizes
116	Den Haag-Scheveningseweg laag I (2)	amber	positive identification of Salmo/Trachurus en Acipenser sturio may be biased
117	Den Haag-Scheveningseweg laag I	amber	positive identification of Salmo/Trachurus en Acipenser sturio may be biased
118	d'Engelsche Boomgaert Vlaardingen	red	could contain some older bones; sieve mesh unknown; not analysed by a fish specialist
119	Elfhuizen Dordrecht phase II S878	red	collection method unclear
120	Elfhuizen Dordrecht phase IV S390	red	lack of clarity about dating, similar phases used as is used for the zoological remains in the report; collection method unclear
121	Elfhuizen Dordrecht phase IV S486	red	lack of clarity about dating, similar phases used as is used for the zoological remains in the report; collection method unclear
122	Elfhuizen Dordrecht phase V S506	red	collection method unclear
123	Elisabeth Bloemenkampklooster 's-Hertogenbosch	red	uncertainty about collecting method; not analysed by a fish specialist
124	Firdgum Terp Sieve (2mm) early medieval	red	Analysed by a student not a fish specialist; Unclear if properly supervised; no specific context is known; very broad dating period
125	Firdgum Terp Hand-collected late medieval	red	Analysed by a student not a fish specialist; Unclear if properly supervised; no specific context is known; very broad dating period
126	Firdgum Terp Hand-collected early medieval	red	Analysed by a student not a fish specialist; Unclear if properly supervised; no specific context is known; very broad dating period
127	Firdgum Terp Sieve (5mm) late medieval	red	Analysed by a student not a fish specialist; Unclear if properly supervised; no specific context is known; very broad dating period
128	Firdgum Terp Sieve (5mm) early medieval	red	Analysed by a student not a fish specialist; Unclear if properly supervised; no specific context is known; very broad dating period
129	Firdgum Terp Sieve (2mm) late medieval	red	Analysed by a student not a fish specialist; Unclear if properly supervised; no specific context is known; very broad dating period
130	Forum Hadriani-vm Effathaterrein	amber	no details given apart from species and numbers
131	Forum Hadriani-vm Effathaterrein (2)	amber	no details given apart from species and numbers
132	Forum Hadriani-vm Effathaterrein (3)	amber	no details given apart from species and numbers

133	Ganzenmarkt Oldenzaal	green	
134	Gat in de Markt Vlaardingen period 5 Sieve	amber	end date unsure; Acipenser sturio might be Acipenser oxyrinchus
135	Gat in de Markt Vlaardingen period 3 Sieve	green	
136	Gat in de Markt Vlaardingen period 3 Hand	green	
137	Gat in de Markt Vlaardingen period 2	amber	Acipenser sturio might be Acipenser oxyrinchus
138	Gat in de Markt Vlaardingen period 4 Hand	green	
139	Gat in de Markt Vlaardingen period 5 Hand	amber	end date unsure; Acipenser sturio might be Acipenser oxyrinchus
140	Gat in de Markt Vlaardingen period 4 Sieve	green	
141	Gedempte Kattendiep Groningen	amber	some elements not counted
142	Gedempte Nieuwesloot 29-31 Alkmaar	green	
143	Gerner Marke Dalfsen	green	
144	Groene Linde Rossum	amber	broad dating from multiple contexts (remains are from different context but are not specified this way in the report)
145	Groot Olmen Bloemendaal site 14	green	
146	Groot Olmen Bloemendaal site 8	green	
147	Groot Olmen Bloemendaal site 3	amber	Acipenser sturio might be Acipenser oxyrinchus
148	Groot Olmen Bloemendaal site 5	green	
149	Grote markt Dordrecht V64	green	
150	Grote Markt Dordrecht V93	green	
151	Haarlemmerplein 18 Amsterdam	amber	analysed by a student not a fish specialist
152	Haarlemmerplein 20 Amsterdam	red	analysed by a student not a fish specialist, not sure about collecting method
153	Haarlemmerplein 22 Amsterdam	red	analysed by a student not a fish specialist, not sure about collecting method
154	Haarlemmerplein 24 Amsterdam	red	analysed by a student not a fish specialist, sieve mesh unknown
155	Haarlemmerplein 28 Amsterdam	amber	analysed by a student not a fish specialist
156	Havezate De Kranenburg Zwolle	green	
157	Havezate Werkeren Zwolle 8.1.3	amber	Acipenser sturio might be Acipenser oxyrinchus; minimal sieve mesh unclear
158	Havezate Werkeren Zwolle 6.1.3 en 8.1.42	amber	minimal sieve mesh unclear; date unclear
159	Helenius de Cockschool Kampen	green	
160	Het Regthuys Wassenaar	green	
161	Hofstraat IJsselstein	green	
162	Hoogdijk terrein 89, Houten	red	broad dating from multiple contexts; the nature of the fish remains is debated
163	Hoogeland Zuidweg Naaldwijk Merovingian period	amber	Acipenser sturio might be Acipenser oxyrinchus
164	Hoogeland Zuidweg Naaldwijk Carolingian period	green	
165	Hoogeland Zuidweg Naaldwijk Roman period remaining	green	
166	Hoogeland Zuidweg Naaldwijk Ottonian-Late medieval	green	
167	Hoogeland Zuidweg Naaldwijk Roman period phase 6	amber	Acipenser sturio might be Acipenser oxyrinchus
168	Hoogstraat III Dorestad 4mm	red	Acipenser sturio might be Acipenser oxyrinchus; no context dates
169	Hoogstraat III Dorestad 10mm	red	Acipenser sturio might be Acipenser oxyrinchus; no context dates
170	Hoogstraat I Dorestad 10mm	red	Acipenser sturio might be Acipenser oxyrinchus; no context dates
171	Hoogstraat I Dorestad 4mm	red	Acipenser sturio might be Acipenser oxyrinchus; no context dates

172	Hoogstraat I Dorestad Hand	red	Acipenser sturio might be Acipenser oxyrinchus; no context dates
173	Huis Malburg Kerk-Avezaath Ottonian period	red	Acipenser sturio might be Acipenser oxyrinchus; not analysed by a fish specialist
174	Huis Malburg Kerk-Avezaath High Middle Ages	red	Acipenser sturio might be Acipenser oxyrinchus; not analysed by a fish specialist
175	Huis Malburg Kerk-Avezaath Late Middle Ages	amber	not analysed by a fish specialist
176	Huis Malburg Kerk-Avezaath Post Middle Ages	red	Material from post medieval ditches is probably of earlier date; not analysed by a fish specialist
177	Huis te Vleuten	green	
178	Huis ter Kleef 4mm IV	amber	it is unclear who looked at the fish remains/remains were not analysed by a fish specialist
179	Huis ter Kleef hand collected II	green	
180	Huis ter Kleef 4mm AH	red	some material comes from layer A, which is not considered a closed context; it is unclear who looked at the fish remains/remains were not analysed by a fish specialist
181	Huis ter Kleef hand collected AK	amber	it is unclear who looked at the fish remains/remains were not analysed by a fish specialist
182	Huis ter Kleef 4mm AK	amber	it is unclear who looked at the fish remains/remains were not analysed by a fish specialist
183	Huis ter Kleef 2mm AK	amber	it is unclear who looked at the fish remains/remains were not analysed by a fish specialist
184	Huis ter Kleef hand collected XX	green	
185	Huis ter Kleef 4mm XX	amber	it is unclear who looked at the fish remains/remains were not analysed by a fish specialist
186	Huis ter Kleef hand collected IV	amber	it is unclear who looked at the fish remains/remains were not analysed by a fish specialist
187	Huis ter Kleef hand collected AH	red	some material comes from layer A, which is not considered a closed context; it is unclear who looked at the fish remains/remains were not analysed by a fish specialist
188	Huis ter Kleef 4mm LL	green	
189	Huis ter Kleef 4mm III	green	
190	Huis ter Kleef hand collected LL	green	
191	Huis ter Kleef hand collected III	green	
192	Huis ter Kleef 4mm SS	red	some material comes from layer A, which is not considered a closed context; it is unclear who looked at the fish remains/remains were not analysed by a fish specialist
193	Huis ter Kleef hand collected WW	green	
194	Huis ter Kleef 4mm WW	green	
195	Huis ter Kleef 4mm I	green	
196	Huis ter Kleef hand collected I	green	
197	Huis ter Kleef 2mm II	green	
198	Huis ter Kleef 4mm II	green	
199	Huis ter Kleef 2mm III	green	
200	Huis ter Kleef 2mm I	green	
201	Huys ter Werve Rijswijk layer 1 t/m 5 mix	green	
202	Huys ter Werve Rijswijk layer 3	green	
203	Huys ter Werve Rijswijk layer 4	green	
204	Huys ter Werve Rijswijk layer 5	green	
205	In den Struys' Veere	green	

206	Jansstraat 46/Gerechtsgebouw Haarlem	red	not analysed by a fish specialist; no species list but listed in the tekst; no detailed determinations; sieve mesh unknown
207	Johan van Oldenbarneveltlaan Den Haag	red	Acipenser sturio might be Acipenser oxyrinchus; small reference collection used
208	Kastanjelaan Leiderdorp Hand	green	
209	Kastanjelaan Leiderdorp V148	amber	Acipenser sturio might be Acipenser oxyrinchus
210	Kastanjelaan Leiderdorp V189	green	
211	Kastanjelaan Leiderdorp V220	green	
212	Kasteel De Haar Haarzuilens	green	
213	Kasteel van Breda well 153	red	collection method unknown
214	Kasteel van Breda chute layer 1010	amber	Acipenser sturio might be Acipenser oxyrinchus; sieve mesh unknown
215	Kasteel van Breda chute excl. layer 1010	amber	Acipenser sturio might be Acipenser oxyrinchus
216	Kasteel van Eindhoven 18.1	red	not sure if only hand collected; not analysed by a fish specialist
217	Kasteel van Eindhoven 20.15	red	not sure if only hand collected; not analysed by a fish specialist
218	Kasteel van Eindhoven 20.1	red	sieve mesh variable; Acipenser sturio might be Acipenser oxyrinchus; not analysed by a fish specialist
219	Kasteel van Eindhoven 19.1	red	not sure if only hand collected; not analysed by a fish specialist
220	Kasteel Voorst Zwolle	red	recovery method unknown; not analysed by a fish specialist
221	Kavel M11 Biddinghuizen	green	
222	Kazerneplein Gorinchem	red	sieve mesh unknown; not analysed by a fish specialist
223	Keizershof 's-Hertogenbosch Period A	red	not a fully closed context, possible material from later dates included not explicit about collecting method
224	Keizershof 's-Hertogenbosch Period B	red	not a fully closed context, possible material from earlier/later dates included not explicit about collecting method
225	Keizershof 's-Hertogenbosch Period C	red	not a fully closed context, possible material from earlier/later dates included not explicit about collecting method
226	Keizershof 's-Hertogenbosch Period D	red	not a fully closed context, possible material from earlier/later dates included not explicit about collecting method
227	Keizershof 's-Hertogenbosch Period E	red	not a fully closed context, possible material from earlier dates included not explicit about collecting method; Acipenser sturio might be Acipenser oxyrinchus
228	Kerklaan Rijswijk	amber	begin date unsure
229	Kerkstraat Sint-Oedenrode phase 3	green	
230	Kerkstraat Sint-Oedenrode phase 2	amber	Acipenser sturio might be Acipenser oxyrinchus
231	Kesteren-De Woerd fase c	green	
232	Kesteren-De Woerd fase d	green	
233	Kesteren-De Woerd fase b	green	
234	Kesteren-De Woerd fase a	green	
235	Kesteren-De Woerd fase c-e	green	
236	Klokkenveld Utrecht BP3	amber	Acipenser sturio might be Acipenser oxyrinchus
237	Klokkenveld Utrecht BP2 Sieve 2mm	green	
238	Klokkenveld Utrecht BP2 Sieve 4mm	green	
239	Klokkenveld Utrecht BP2 Hand	green	
240	Klokkenveld Utrecht BP1 Sieve 2mm	green	
241	Klokkenveld Utrecht BP4	green	

242	Klokkenveld Utrecht BP1 Hand	green	
243	Klokkenveld Utrecht BP1 Sieve 4mm	green	
244	Kloosterstraat 3-5 Nijkerk	green	
245	Kokpanden Kampen	red	sieve mesh unknown; Acipenser sturio might be Acipenser oxyrinchus
246	Konigsstraat Dokkum (V219)	green	
247	Konigsstraat Dokkum (V224)	green	
248	Koningstraat 18 Arnhem Hand	green	
249	Koningstraat 18 Arnhem Sieve	green	
250	Koornmarkt Tiel Sieve	amber	not analysed by a fish specialist
251	Koornmarkt Tiel Hand	amber	not analysed by a fish specialist
252	Korte Begijnestraat Haarlem cess pit 1 layer B	red	not analysed by a fish specialist; not specifically mentioned who of the authors looked at the fish
253	Korte Begijnestraat Haarlem cess pit 2-layer C Sieve scanned	red	not analysed by a fish specialist; not specifically mentioned who of the authors looked at the fish
254	Korte Begijnestraat Haarlem cess pit 2 chute	red	not analysed by a fish specialist; not specifically mentioned who of the authors looked at the fish
255	Korte Begijnestraat Haarlem cess pit 2-layer C Hand	red	not analysed by a fish specialist; not specifically mentioned who of the authors looked at the fish
256	Korte Begijnestraat Haarlem cess pit 1 layer E Sieve scan	red	not analysed by a fish specialist; not specifically mentioned who of the authors looked at the fish
257	Korte Begijnestraat Haarlem cess pit 1 layer E Sieve analysed	red	not analysed by a fish specialist; not specifically mentioned who of the authors looked at the fish
258	Korte Begijnestraat Haarlem cess pit 1 layer E Hand	red	not analysed by a fish specialist; not specifically mentioned who of the authors looked at the fish
259	Korte Begijnestraat Haarlem cess pit (cellar)	red	not analysed by a fish specialist; not specifically mentioned who of the authors looked at the fish
260	Korte Begijnestraat Haarlem cess pit 2-layer C Sieve analysed	red	not analysed by a fish specialist; not specifically mentioned who of the authors looked at the fish
261	Korte Houtstraat 28 Amsterdam	green	
262	Krijtstraat Gorinchem 16th-early 17th century	green	
263	Krijtstraat Gorinchem late 16th-17th century Sieve 0,5 mm	green	
264	Krijtstraat Gorinchem 14th-early 15th century Hand	green	
265	Krijtstraat Gorinchem late 16th-17th century Sieve 2,5 mm	amber	total fish in species list (340) is not the sum of the indivdual NISP (341)
266	Krijtstraat Gorinchem 14th-early 15th century Sieve	green	
267	Laat 233-237 Alkmaar	green	
268	Lange Houtstraat 6 Amsterdam 2mm	green	
269	Lange Houtstraat 6 Amsterdam 0,5-1mm	green	
270	Langestraat 115/117 Alkmaar cess pit 13B	red	NISP not good readable in pdf; not analysed by a fish specialist; not specifically mentioned who of the authors looked at the fish
271	Langestraat 115/117 Alkmaar cess pit 12A	red	NISP not good readable in pdf; not analysed by a fish specialist; not specifically mentioned who of the authors looked at the fish
272	Langestraat 115/117 Alkmaar cess pit 11B	red	NISP not good readable in pdf; not analysed by a fish specialist; not specifically mentioned who of the authors looked at the fish
273	Langestraat 115/117 Alkmaar cess pit 13C	red	NISP not good readable in pdf; not analysed by a fish specialist; not specifically mentioned who of the authors looked at the fish
274	Langestraat 3-5 Alkmaar BP5 Sieve	green	

275	Langestraat 3-5 Alkmaar BP2	green	
276	Langestraat 3-5 Alkmaar BP5 Hand	green	
277	Loerik terrein 9, Houten	green	
278	LR31-Wachttoren fase 1a	green	
279	LR31-Wachttoren fase 1b 50-62	green	
280	LR31-Wachttoren fase 1a/b 40-62	green	
281	LR31-Wachttoren fase 1/2 c. 40-80/90	green	
282	LR31-Wachttoren fase 2 c. 61-80/90	green	
283	LZ1 Flevoland	green	
284	Maasboulevard Venlo 15th-16th century	green	
285	Maasboulevard Venlo 17th-18th century	green	
286	Maasboulevard Venlo 16th-17th century	green	
287	Maasboulevard Venlo 13th-14th century	green	
288	Maasboulevard Venlo 16th-17th century cesspit 63	green	
289	Maaskade-zuid Venlo BP5	green	
290	Maaskade-zuid Venlo BP1	green	
291	Maaskade-zuid Venlo BP2	green	
292	Maaskade-zuid Venlo BP4	green	
293	Maaskade-zuid Venlo BP3	green	
294	Marktenroute/Vismarkt Leiden	red	sieve mesh unknown; not analysed by a fish specialist
295	Valkenburg-Marktveld geul (5)	red	if sieving took place is unclear; reference collection limited; student's identification
296	Valkenburg-Marktveld geul (4)	red	if sieving took place is unclear; reference collection limited; student's identification
297	Valkenburg-Marktveld geul (3)	red	if sieving took place is unclear; reference collection limited; student's identification
298	Valkenburg-Marktveld geul (2)	red	if sieving took place is unclear; reference collection limited; student's identification
299	Valkenburg-Marktveld geul	red	if sieving took place is unclear; reference collection limited; student's identification
300	Marnixlaan Utrecht BP218 Sieve 2mm	green	
301	Marnixlaan Utrecht Hand	green	
302	Marnixlaan Utrecht BP124 Sieve 4mm	green	
303	Marnixlaan Utrecht BP124 Sieve 2mm	green	
304	Marnixlaan Utrecht BP124 Sieve 1mm	green	
305	Marnixlaan Utrecht BP218 Sieve 4mm	green	
306	Martiniplein Sneek 18th-19th century	amber	context is a bit vague
307	Martiniplein Sneek 16th-17th century	amber	context is a bit vague
308	Martiniplein Sneek 12th-14th century	amber	context is a bit vague
309	Martiniplein Sneek 16th century	amber	context is a bit vague
310	Martiniplein Sneek 15th century	amber	context is a bit vague
311	Martiniplein Sneek 17th century	amber	context is a bit vague
312	Meeuwenweg Kampen	green	
313	Middelhof Alkmaar find number 415	green	

314	Middelhof Alkmaar find number 402 Hand	green	
315	Middelhof Alkmaar find number 414	green	
316	Middelhof Alkmaar find number 412	green	
317	Middelhof Alkmaar find number 402 Sieve	green	
318	Middelhof Alkmaar find number 400	green	
319	Minderbroedersklooster 's-Hertogenbosch period monastery pit 2 15	green	
320	Minderbroedersklooster 's-Hertogenbosch period ducal court	amber	Acipenser sturio might be Acipenser oxyrinchus
321	Minderbroedersklooster 's-Hertogenbosch period monastery pit 1	amber	Acipenser sturio might be Acipenser oxyrinchus
322	Minderbroedersklooster 's-Hertogenbosch period monastery pit 2 14d	green	
323	Minderbroedersklooster 's-Hertogenbosch period monastery pit 2 15a	green	
324	Minderbroedersklooster 's-Hertogenbosch period inn	green	
325	Molenstraat/Oude Vest Breda Sieve	red	analysed by a student not a fish specialist; sieve mesh unknown
326	Molenstraat/Oude Vest Breda Hand	amber	analysed by a student not a fish specialist
327	Muggenborch Kapel-Avezaath S3.40	green	
328	Muggenborch Kapel-Avezaath S1.96	green	
329	Muggenborch Kapel-Avezaath S1.48	green	
330	Muggenborch Kapel-Avezaath S2.2	green	
331	Museumkwartier 's-Hertogenbosch F922 layer 8 Sieve	green	
332	Museumkwartier 's-Hertogenbosch F538 layer 3 Sieve	green	
333	Museumkwartier 's-Hertogenbosch F538 layer 2 Sieve	green	
334	Museumkwartier 's-Hertogenbosch F887 layer 3 Hand	green	
335	Museumkwartier 's-Hertogenbosch F922 layer 8 Hand	green	
336	Museumkwartier 's-Hertogenbosch F1114	amber	sieve mesh is a bit uncertain
337	Museumkwartier 's-Hertogenbosch F922 layer 6 Hand	green	
338	Museumkwartier 's-Hertogenbosch F922 layer 6 Sieve	green	
339	Museumkwartier 's-Hertogenbosch F538 layer 3 Hand	green	
340	Museumkwartier 's-Hertogenbosch F753 layer 7 Sieve	green	
341	Museumkwartier 's-Hertogenbosch F753 layer 7 Hand	green	
342	Museumkwartier 's-Hertogenbosch F1495	green	
343	Museumkwartier 's-Hertogenbosch F1408	green	
344	Museumkwartier 's-Hertogenbosch F1403	green	
345	Museumkwartier 's-Hertogenbosch F1147	green	
346	Museumkwartier 's-Hertogenbosch F887 layer 3 Sieve	green	
347	Museumkwartier 's-Hertogenbosch F538 layer 2 Hand	green	
348	Nieuw Rhijngeest-zuid 2014 Oegstgeest 1mm	amber	no site report yet therefor date not specified, not sure if the material also contains a few bits of 10th century
349	Nieuw Rhijngeest-zuid 2009/2010 Oegstgeest 1mm/2mm	amber	no site report yet therefor date not specified, not sure if the material also contains a few bits of 10th century
350	Nieuw Rhijngeest-zuid 2014 Oegstgeest Hand	red	Acipenser sturio might be Acipenser oxyrinchus; no site report yet therefor date not

			specified, not sure if the material also contains a few bits of 10th century
351	Nieuw Rhijngeest-zuid 2009/2010 Oegstgeest Hand/5mm	red	Acipenser sturio might be Acipenser oxyrinchus; no site report yet therefor date not specified, not sure if the material also contains a few bits of 10th century
352	Nieuw Rhijngeest-zuid 2014 Oegstgeest 4mm	red	Acipenser sturio might be Acipenser oxyrinchus; no site report yet therefor date not specified, not sure if the material also contains a few bits of 10th century
353	Nieuw Rhijngeest-zuid 2014 Oegstgeest 2mm	red	Acipenser sturio might be Acipenser oxyrinchus; no site report yet therefor date not specified, not sure if the material also contains a few bits of 10th century
354	Nieuwendijk 1979 Amsterdam	red	unknown sample: the author tried to figure out site, context, date, and collection method in his research
355	Den Haag-Ockenburgh II (3)	green	quick scan easily identifiable elements
356	Den Haag-Ockenburgh II (2)	green	
357	Den Haag-Ockenburgh II	green	
358	Oostenburgermiddenstraat Amsterdam	red	only vertebrae analysed; Cyprinidae category includes also Perca fluviatilis
359	Oosterbeintum Terp Sieve (2mm) early medieval	red	Analysed by a student not a fish specialist; Unclear if properly supervised; no specific context is known; very broad dating period
360	Oosterbeintum Terp Sieve (5mm) early medieval	red	Analysed by a student not a fish specialist; Unclear if properly supervised; no specific context is known; very broad dating period
361	Oosterbeintum Terp Hand-collected early medieval	red	Analysed by a student not a fish specialist; Unclear if properly supervised; no specific context is known; very broad dating period
362	Oude en nieuwe Gasthuis Delft 15th century	red	collection method is dubious; not analysed by a fish specialist
363	Oude en nieuwe Gasthuis Delft 17th century	red	collection method is dubious; not analysed by a fish specialist
364	Schipluiden-Oudebuurtseweg site 21.23	amber	no details provided; student thesis
365	Oudezijds Voorburgwal 107 Amsterdam	red	analysed by a student not a fish specialist, not sure about collecting method
366	Paardenmarkt Alkmaar S-574	green	
367	Paardenmarkt Alkmaar S-397	green	
368	Tiel-Passewaaijsche Hogeweg (2)	yellow	Acipenser sturio can also be A oxyrinchus
369	Tiel-Passewaaijsche Hogeweg (3)	green	
370	Tiel-Passewaaijsche Hogeweg	green	
371	Peperstraat Venlo	amber	not analysed by a fish specialist
372	Plantage Leiderdorp Early Carolingian-Carolingian	green	
373	Plantage Leiderdorp Merovingian	green	
374	Plantage Leiderdorp Late Merovingian-Carolingian	green	
375	Plantage Leiderdorp Carolingian	green	
376	Postelstraat 's-Hertogenbosch	red	not recovery method known; not analysed by a fish specialist
377	Regulierenklooster 's-Gravenzande pit 161	red	sieve mesh unknown; not analysed by a fish specialist; not specifically mentioned who of the authors looked at the fish
378	Regulierenklooster 's-Gravenzanden pit 60	red	not analysed by a fish specialist; not specifically mentioned who of the authors looked at the fish
379	Rijksweg 9 Zweins	amber	number of Rutilus rutilus is approximate and they could be from one individual
380	Ritsevoort 32 Alkmaar	green	
381	Salvatorplein Susteren 8th/13th century	green	
382	Salvatorplein Susteren 11th/13th century	green	
383	Salvatorplein Susteren 14th/15th century	green	

384	Salvatorplein Susteren 16th/17th century	green	
385	Salvatorplein Susteren 13th/17th century	green	
386	Salvatorplein Susteren 8th/10th century	green	
387	Scheldekwartier Vlissingen period 2	amber	hand collecting not sure
388	Scheldekwartier Vlissingen period 3	amber	hand collecting not sure
389	Scheldekwartier Vlissingen period 4	amber	hand collecting not sure
390	Scheurrak SO1 Waddenzee barrell 1	red	collecting method unknown; number of gadidae partly estimated
391	Scheurrak SO1 Waddenzee barrell 2	red	collecting method unknown
392	Sint Janskerkhof 's-Hertogenbosch phase 3	red	maximum mesh size not sure; not analysed by a fish specialist
393	Sint Janskerkhof 's-Hertogenbosch phase 2	red	maximum mesh size not sure; not analysed by a fish specialist
394	Sint Janskerkhof 's-Hertogenbosch phase 1	red	maximum mesh size not sure; not analysed by a fish specialist
395	Sint Janskerkhof 's-Hertogenbosch phase 4	red	maximum mesh size not sure; not analysed by a fish specialist
396	Sint-Hieronymusdal Delft	green	
397	Speelmansstraat Leeuwarden	green	
398	St. Agnesklooster Oldenzaal	green	
399	St. Jacobsstraat Leeuwarden	green	
400	St. Nicolaasgasthuis Den Haag - Infirmary	green	
401	St. Nicolaasgasthuis Den Haag - 14th century pits	amber	NISP based on a limited amount of counted remains. Only a part of the elements is sorted out, i.e., counted (NISP) and viewed
402	Stadhuis Zutphen	amber	Acipenser sturio might be Acipenser oxyrinchus; sieve mesh size unclear
403	Stadhuiskwartier Deventer 284 Sieve 2mm (botanical)	green	
404	Stadhuiskwartier Deventer 316 Sieve 2mm	green	
405	Stadhuiskwartier Deventer 298 Sieve 2mm	amber	Acipenser sturio might be Acipenser oxyrinchus
406	Stadhuiskwartier Deventer 298 Sieve 4mm (botanical)	green	
407	Stadhuiskwartier Deventer 284 Sieve 4mm (botanical)	green	
408	Stadhuiskwartier Deventer 316 Sieve 4mm (botanical)	green	
409	Stadhuiskwartier Deventer 298 Sieve 2mm (botanical)	amber	Acipenser sturio might be Acipenser oxyrinchus
410	Stadhuiskwartier Deventer 325	amber	Acipenser sturio might be Acipenser oxyrinchus
411	Stadhuiskwartier Deventer 316 Sieve 2mm (botanical)	green	
412	Stadhuiskwartier Deventer 288	green	
413	Stadhuiskwartier Deventer 280 Sieve 4mm (botanical)	green	
414	Stadhuiskwartier Deventer 280 Sieve 2mm	red	Acipenser sturio might be Acipenser oxyrinchus, determination of Alosa alosa is unsure (it looked like Clupea harengus or Alosa fallax, but it was neither of them)
415	Stadhuiskwartier Deventer 280 Sieve 2mm (botanical)	green	
416	Stadhuiskwartier Deventer 284 Sieve 2mm	amber	Acipenser sturio might be Acipenser oxyrinchus
417	Stadhuiskwartier Deventer 263	green	
418	Stadhuiskwartier Deventer 336	green	
419	Stadhuiskwartier Deventer 321	green	
420	Stadhuiskwartier Deventer 315	green	
421	Stadhuiskwartier Deventer 330	green	

422	Stadhuiskwartier Deventer 296	amber	Acipenser sturio might be Acipenser oxyrinchus
423	Stadhuiskwartier Deventer 284 Sieve unknown (botanical)	amber	sieve mesh unknown
424	Stadhuiskwartier Deventer 326	amber	sieve mesh unknown
425	Stadhuiskwartier Deventer 269 Sieve unknown (botanical)	amber	sieve mesh unknown
426	Stadhuiskwartier Deventer 269 Sieve 2mm	green	
427	Stadhuiskwartier Deventer 258 Sieve unknown (botanical)	amber	sieve mesh unknown
428	Stadhuiskwartier Deventer 258 Sieve 4mm (botanical)	green	
429	Stadhuiskwartier Deventer 258 Sieve 2mm	amber	Acipenser sturio might be Acipenser oxyrinchus
430	Stadhuiskwartier Deventer 258 Sieve 2mm (botanical)	green	
431	Stadhuiskwartier Deventer 304 Sieve 1mm	green	
432	Stadhuiskwartier Deventer 299	green	
433	Stadhuiskwartier Deventer 304 Sieve unknown (botanical)	amber	sieve mesh unknown
434	Villa Maasbracht-Steenakker (2)	amber	Aspius aspius should be Leuciscus cephalus & in this context Scomber may be Sc. Japonicus also
435	Villa Maasbracht-Steenakker	amber	Aspius aspius should be Leuciscus cephalus & in this context Scomber may be Sc. Japonicus also
436	Villa Maasbracht-Steenakker (3)	amber	Aspius aspius should be Leuciscus cephalus & in this context Scomber may be Sc. Japonicus also
437	Villa Maasbracht-Steenakker (4)	amber	Aspius aspius should be Leuciscus cephalus & in this context Scomber may be Sc. Japonicus also
438	Villa Maasbracht-Steenakker (5)	amber	in this context Scomber may be Sc. Japonicus also
439	Villa Maasbracht-Steenakker (6)	amber	in this context Scomber may be Sc. Japonicus also
440	Villa Maasbracht-Steenakker (7)	amber	in this context Scomber may be Sc. Japonicus also
441	Stenen Kamer/Linge Carolingian period	green	
442	Stenen Kamer/Linge Ottonian period	amber	Acipenser sturio might be Acipenser oxyrinchus
443	Stenen Kamer/Linge High Middle Ages	amber	Acipenser sturio might be Acipenser oxyrinchus
444	Stenen Kamer/Linge Late Middle ages	green	
445	Stenen Kamer/Linge Late Middle Ages-recent years	green	
446	kloostercomplex Vrouwenpolder Hand	green	
447	kloostercomplex Vrouwenpolder Sieve	green	
448	t Vliegend Hart Noordzee	green	
449	Themaat Utrecht V57	green	
450	Themaat Utrecht V304	green	
451	Themaat Utrecht B304 2mm	green	
452	Themaat Utrecht V418	green	
453	Themaat Utrecht B304 1mm	green	
454	Tiellandtweg Houten Roman period	green	
455	Tiellandtweg Houten Early Middle Ages	green	
456	Tjitsma Foarryp Wijnaldum Migration period	green	
457	Tjitsma Foarryp Wijnaldum Ottonian period	green	
458	Tjitsma Foarryp Wijnaldum Carolingian period	green	
459	Tjitsma Foarryp Wijnaldum Merovingian period	green	

460	Tjitsma Foarryp Wijnaldum Roman period	green	
461	Valkenburgerstraat 130-146 Amsterdam S82 Hand	amber	not analysed by a fish specialist
462	Valkenburgerstraat 130-146 Amsterdam S83	green	
463	Valkenburgerstraat 130-146 Amsterdam S82 Sieve	green	
464	Van de Perrehuis Middelburg Cesspit 2	amber	dating feature not sure
465	Van de Perrehuis Middelburg Find number 3-2-23	green	
466	Van de Perrehuis Middelburg Find number 3-1-2	amber	dating feature not sure
467	Veilingterrein Wijk bij Duurstede phase 1	green	
468	Veilingterrein Wijk bij Duurstede phase 1/2	amber	Acipenser sturio might be Acipenser oxyrinchus
469	Veilingterrein Wijk bij Duurstede phase 2	amber	Acipenser sturio might be Acipenser oxyrinchus
470	Velsen-2	green	
471	Velsen 1 Roman harbour AWN-onderzoek 4	green	
472	Velsen-1 Roman harbour Paalgaten	amber	identification may be blurred bytoo positive identification to subspecies based on ribs and dorsal spines; Conger conger in report should be read as (large) Anguilla anguilla
473	Velsen 1 Roman harbour AWN-onderzoek 1	green	
474	Velsen 1 Roman harbour AWN-onderzoek 3	green	
475	Velsen 1 Roman harbour AWN-onderzoek 2	green	
476	Velsen-1 Roman harbour Romeinse laag	amber	identification may be blurred by positive identification to species based on ribs and dorsal spines; Conger conger in report should be read as large Anguilla anguilla
477	Velsen-1 Roman harbour Baggerlaag	amber	identification may be blurred by positive identification to species based on ribs and dorsal spines; Conger conger in report should be read as large Anguilla anguilla
478	Voorburg-Arentsburg (3)	red	identification several elements and species incorrect
479	Voorburg-Arentsburg	red	identification several elements and species incorrect
480	Voorburg-Arentsburg (2)	red	identification several elements and species incorrect
481	Voorburg-Arentsburg (5)	red	identification several elements and species incorrect
482	Voorburg-Arentsburg (4)	red	identification several elements and species incorrect
483	Voorstraat 18 (MA6) Kampen	green	
484	Voorstraat 20 (MA10) Kampen	green	
485	Voorstraat 20 (MA11) Kampen	green	
486	Voorstraat 244 Dordrecht 2mm	green	
487	Voorstraat 244 Dordrecht 4mm	green	
488	Voorstraat 52 Harlingen Hand	green	
489	Voorstraat 52 Harlingen Sieve	green	
490	Westerveld 2 Vlieland	amber	no mesh width of the sieve
491	Westnieuwlandgebied Rotterdam 15-16A	green	
492	Westnieuwlandgebied Rotterdam 15	green	
493	Westnieuwlandgebied Rotterdam 14-15A	green	
494	Englum	green	
495	Englum (2)	green	
496	Winston bioscoop Hoorn 2004 phase III Sieve	green	

497	Winston bioscoop Hoorn 2004 phase VI Sieve	green	
498	Winston bioscoop Hoorn 2004 phase VI Hand	green	
499	Winston bioscoop Hoorn 2004 phase V Sieve	green	
500	Winston bioscoop Hoorn 2004 phase IV	green	
501	Winston bioscoop Hoorn 2004 phase III Hand	green	
502	Winston bioscoop Hoorn 2004 phase II Sieve	green	
503	Winston bioscoop Hoorn 2004 phase II Hand	green	
504	Winston bioscoop Hoorn 2004 phase I	green	
505	Winston bioscoop Hoorn 2000 phase E	amber	not analysed by a fish specialist
506	Winston bioscoop Hoorn 2000 phase D	amber	not analysed by a fish specialist
507	Winston bioscoop Hoorn 2000 phase C	amber	not analysed by a fish specialist
508	Winston bioscoop Hoorn 2000 phase B	amber	not analysed by a fish specialist
509	Winston bioscoop Hoorn 2004 phase V Hand	green	
510	Woerden-Hoochwoert	green	
511	Wortelsteeg Alkmaar 4H	red	sieve mesh unknown; not analysed by a fish specialist; not specifically mentioned who of the authors looked at the fish
512	Wortelsteeg Alkmaar 4D	red	sieve mesh unknown; recovery method unknown; not analysed by a fish specialist; not specifically mentioned who of the authors looked at the fish
513	Zwanenburgerstraat 23 Amsterdam	green	
514	Zwanenburgerstraat 3 Amsterdam	green	

APPENDIX 5: LIST OF ALTERNATIVE SPECIES NAMES

Id	In data table	alternative for analysis
1	Anguilla anguilla	Anguilla anguilla
2	Abramis brama	Abramis brama
3	Abramis cf. brama	Abramis
4	Abramis brama|Blicca bjoerkna	Cyprinidae
5	Abramis/Blicca	Cyprinidae
6	Alburnus alburnus	Alburnus alburnus
7	Barbus barbus	Barbus barbus
8	Blicca bjoerkna	Blicca bjoerkna
9	Carassius carassius	Carassius carassius
10	Chondrostoma nasus	Chondrostoma nasus
11	Cyprinidae	Cyprinidae
12	Cyprinus carpio	Cyprinus carpio
13	Gobio gobio	Gobio gobio
14	Leuciscus	Leuciscus
15	Leuciscus idus	Leuciscus idus
16	Leuciscus leuciscus	Leuciscus leuciscus
17	Leuciscus idus/Squalius cephalus	Cyprinidae
18	Leuciscus leuciscus/Squalius cephalus	Cyprinidae
19	Rutilus	Rutilus

20	Rutilus rutilus	Rutilus rutilus
21	Rutilus rutilus/Scardinius erythrophthalmus	Cyprinidae
22	Scardinius erythrophthalmus	Scardinius erythrophthalmus
23	Squalius cephalus	Squalius cephalus
24	Tinca tinca	Tinca tinca
25	Cyprinidae/Perca fluviatilis	nvt
26	Gymnocephalus cernua	Gymnocephalus cernua
27	Perca fluviatilis	Perca fluviatilis
28	Percidae	Percidae
29	Esox lucius	Esox lucius
30	Gasterosteidae	Gasterosteidae
31	Gasterosteus	Gasterosteus
32	Gasterosteus aculeatus	Gasterosteus aculeatus
33	Silurus glanis	Silurus glanis
34	Lota lota	Lota lota
35	Acipenser oxyrinchus	Acipenser oxyrinchus
36	Acipenser sturio	Acipenser sturio
37	Acipenser	Acipenser
38	Alosa alosa	Alosa alosa
39	Alosa cf. alosa	Alosa

40	Alosa fallax	Alosa fallax
41	Alosa fallax|Alosa alosa	Alosa
42	Alosa	Alosa
43	Coregonus lavaretus	Coregonus lavaretus
44	Coregonus oxyrinchus	Coregonus oxyrinchus
45	Coregonus	Coregonus
46	Coregonidae	Salmonidae
47	Salmo	Salmo
48	Salmo salar	Salmo salar
49	Salmo cf. salar	Salmo
50	Salmo salar|Salmo trutta	Salmo
51	Salmo trutta	Salmo trutta
52	Salmonidae	Salmonidae
53	Osmerus eperlanus	Osmerus eperlanus
54	Ammodytes tobianus	Ammodytes tobianus
55	Ammodytidae	Ammodytidae
56	Belone belone	Belone belone
57	Brosme brosme	Brosme brosme
58	Ciliata mustela	Ciliata mustela
59	Gadidae	Gadidae
60	Gadus morhua	Gadus morhua

61	Gadus morhua/Merlangius merlangus	Gadidae
62	Gadus morhua/ Brosme brosme	Gadidae
63	Gadus morhua/Melanogrammus aeglefinus	Gadidae
64	Melanogrammus aeglefinus	Melanogrammus aeglefinus
65	Merlangius merlangus	Merlangius merlangus
66	Molva molva	Molva molva
67	Molva molva/Molva dypterygia	Molva
68	Pollachius virens	Pollachius virens
69	Trisopterus minutus	Trisopterus minutus
70	Chelon labrosus	Chelon labrosus
71	Mugil labrosus	Chelon labrosus
72	Mugilidae	Mugilidae
73	Mugil	Chelon
74	Liza ramada	Liza ramada
75	Chondrichthyes	Chondrichthyes
76	Clupea harengus	Clupea harengus

77	Clupea sp./Alosa sp.	Clupeidae
78	Clupea harengus/Sprattus sprattus	Clupeidae
79	Clupeidae	Clupeidae
80	Engraulis encrasicolus	Engraulis encrasicolus
81	Sprattus sprattus	Sprattus sprattus
82	Conger conger	Conger conger
83	Dasyatis pastinaca	Dasyatis pastinaca
84	Dicentrarchus labrax	Dicentrarchus labrax
85	Elasmobranchii	Elasmobranchii
86	Eutrigla gurnardus	Eutrigla gurnardus
87	Trigla	Trigla
88	Trigla/Eutrigla	Triglidae
89	Chelidonichthys lucerna	Chelidonichthys lucerna
90	Chelidonichthys cf. lucerna	Chelidonichthys
91	Triglidae	Triglidae
92	Hippoglossus hippoglossus	Hippoglossus hippoglossus
93	Limanda limanda	Limanda limanda
94	Platichthys flesus	Platichthys flesus
95	Pleuronectes platessa	Pleuronectes platessa

96	Platichthys flesus/Pleuronectes platessa	Pleuronectidae
97	cf. Platichthys flesus/Pleuronectes platessa	Pleuronectidae
98	Pleuronectidae	Pleuronectidae
99	cf. Limanda limanda/Solea solea	nvt
100	Solea solea	Solea solea
101	Solea solea/Solea lascaris	Solea
102	Lophius piscatorius	Lophius piscatorius
103	cf. Lophius piscatorius	Lophiidae
104	Merluccius merluccius	Merluccius merluccius
105	Mustelus mustelus	Mustelus mustelus
106	Myoxocephalus scorpius	Myoxocephalus scorpius
107	Myoxocephalus scorpius?	Cottidae
108	Pagellus bogaraveo	Pagellus bogaraveo
109	Raja batis	Raja batis

110	Raja clavata	Raja clavata
111	Raja montagui	Raja montagui
112	Raja	Raja
113	Rajidae	Rajidae
114	Scomber scombrus	Scomber scombrus
115	Scophthalmus maximus	Scophthalmus maximus
116	Scophthalmus rhombus	Scophthalmus rhombus
117	Scophthalmidae	Bothidae
118	Squalus acanthias	Squalus acanthias
119	Squalidae	Squalidae
120	Trachurus trachurus	Trachurus trachurus
121	Zoarces viviparus	Zoarces viviparus
122	cf. Scardinius erythrophthalmus	Cyprinidae
123	cf. Perca fluviatilis	Percidae
124	cf. Osmerus eperlanus	Osmeridae
125	cf. Dicentrarchus labrax	Percichthyidae
126	cf. Melanogrammus aeglefinus	Gadidae
127	Alburnus alburnus?	Cyprinidae
128	Cyprinus carpio?	Cyprinidae

129	Squalius cephalus?	Cyprinidae
130	Perca fluviatilis?	Percidae
131	Coregonus lavaretus?	Salmonidae
132	cf. Gymnocephalus cernua	Percidae
133	cf. Gadus morhua	Gadidae
134	cf. Pollachius virens	Gadidae
135	Coregonus oxyrinchus?	Salmonidae
136	Merlangius merlangus?	Gadidae
137	cf. Gadidae	Gadidae
138	Eutrigla gurnardus?	Triglidae
139	Platichthys flesus?	Pleuronectidae
140	cf. Raja clavata	Rajidae
141	Salmo trutta fario	Salmo trutta fario
142	Barbatula barbatula	Barbatula barbatula
143	Coregonus sp.	Coregonus
144	Galeorhinus galeus	Galeorhinus galeus
145	Gasterosteus sp.	Gasterosteus

146	Trachinus draco	Trachinus draco
147	Xiphias gladius	Xiphias gladius
148	Thunnus thynnus	Thunnus thynnus
149	Squatina squatina	Squatina squatina
150	Sardina pilchardus	Sardina pilchardus
151	Gymnocephalus cernuus	Gymnocephalus cernua
152	Acipenser sp.	Acipenser
153	Rajiformes	Rajiformes
154	Trigla lucerna	Chelidonichthys lucerna
155	Aspitrigla cuculus	Chelidonichthys cuculus
157	Liza ramada|Liza aurata	Mugilidae
158	Mullus surmeletus	Mullus surmuletus
159	Scyliorhinus canicula	Scyliorhinus canicula
160	Apode	nvt
161	Leuciscus cephalus	Squalius cephalus
162	Alosa sp.	Alosa
163	Scomber japonicus	Scomber japonicus
164	Argyrosomos regius	Argyrosomus regius
165	Cyprinidae/Perca fluviatilis	Cyprinidae/Perca fluviatilis

APPENDIX 6: CLASSIFICATION OF FISH GROUPS

Id	Group	Latin	Dutch	English	Group sequence	Order	Family
1	Fresh-water fishes	Blicca bjoerkna	Kolblei	White bream	Ca.	Cypriniformes	Cyprinidae
2	Fresh-water fishes	Blicca bjoerkna|squalius cephalus	Kolblei|kopvoorn	White bream|chub	Ca.	Cypriniformes	Cyprinidae
3	Sea-fishes	Bothidae	Tarbotten	Lefteye flounders	Cc.	Pleuronectiformes	Bothidae
4	Sea-fishes	Brosme brosme	Lom	Torsk	Cc.	Gadiformes	Gadidae
5	Sea-fishes	Buglossidium luteum	Dwergtong	Solenette	Cc.	Pleuronectiformes	Soleidae
6	Sea-fishes	Callionymus lyra	Pitvis	Common dragonet	Cc.	Perciformes	Callionymidae
7	Fresh-water fishes	Carassius carassius	Kroeskarper	Crucian carp	Ca.	Cypriniformes	Cyprinidae
8	Sea-fishes	Chelon labrosus	Diklipharder	Thick lipped grey mullet	Cc.	Perciformes	Mugilidae
9	Sea-fishes	Chondrichthyes	Kraakbeenvissen	Cartilaginous fishes	Cc.	Indet.	Indet.
10	Fresh-water fishes	Chondrostoma nasus	Sneep	Nase	Ca.	Cypriniformes	Cyprinidae
11	Sea-fishes	Ciliata mustela	Vijfdradige meun	Five bearded rockling	Cc.	Gadiformes	Gadidae
12	Sea-fishes	Clupea			Cc.	Clupeiformes	Clupeidae
13	Sea-fishes	Clupea harengus	Haring	Atlantic herring	Cc.	Clupeiformes	Clupeidae
14	Sea-fishes	Clupeidae	Haringen	Herrings	Cc.	Clupeiformes	Clupeidae
15	Fresh-water fishes	Cobitis taenia	Kleine modderkruiper	Spined loach	Ca.	Cypriniformes	Cyprinidae
16	Sea-fishes	Conger conger	Kongeraal	Conger eel	Cc.	Anguilliformes	Congridae

17	Anadrome fishes	Coregonus	Houtingen	Whitefishes	Cb.	Salmoniformes	Salmonidae
18	Anadrome fishes	Coregonus lavaretus	Grote marene	Common whitefish	Cb.	Salmoniformes	Salmonidae
19	Anadrome fishes	Coregonus oxyrinchus	Houting	Houting	Cb.	Salmoniformes	Salmonidae
20	Fresh-water fishes	Cottus gobio	Rivierdonderpad	Bullhead	Ca.	Scorpaeniformes	Cottidae
21	Fresh-water fishes	Ctenopharyngodon idella	Graskarper	Grass carp	Ca.	Cypriniformes	Cyprinidae
22	Sea-fishes	Cyclopterus lumpus	Snotolf	Lumpsucker	Cc.	Scorpaeniformes	Cyclopteridae
23	Fresh-water fishes	Cyprinidae	Karpers	Cyprinids	Ca.	Cypriniformes	Cyprinidae
24	Fresh-water fishes	Cyprinus carpio	Karper	Carp	Ca.	Cypriniformes	Cyprinidae
25	Sea-fishes	Dasyatis pastinaca	Pijlstaartrog	Sting ray	Cc.	Rajiformes	Dasyatidae
26	Sea-fishes	Dicentrarchus labrax	Zeebaars	Bass	Cc.	Perciformes	Percichthyidae
27	Sea-fishes	Echiichthys vipera	Kleine pieterman	Lesser weever	Cc.	Perciformes	Trachnidae
28	Sea-fishes	Elasmobranchii	Haaien en roggen		Cc.	Indet.	Indet.
29	Sea-fishes	Engraulis encrasicolus	Ansjovis	Anchovy	Cc.	Clupeiformes	Clupeidae
30	Sea-fishes	Enophrys bubalis	Groene zeedonderpad	Long spined bullhead	Cc.	Scorpaeniformes	Cottidae
31	Fresh-water fishes	Esox lucius	Snoek	Pike	Ca.	Salmoniformes	Esocidae
32	Sea-fishes	Eutrigla			Cc.	Scorpaeniformes	Triglidae

33	Sea-fishes	Eutrigla gurnardus	Grauwe poon	Grey gurnard	Cc.	Scorpaeniformes	Triglidae
34	Sea-fishes	Gadidae	Kabeljauwen	Cods	Cc.	Gadiformes	Gadidae
35	Sea-fishes	Gadus morhua	Kabeljauw	Cod	Cc.	Gadiformes	Gadidae
36	Sea-fishes	Galeorhinus galeus	Ruwe haai	Tope	Cc.	Carcharhiniformes	Triakidae
37	Fresh-water fishes	Gasterosteidae	Stekelbaarzen	Stickleback	Ca.	Gasterosteiformes	Gasterosteidae
38	Fresh-water fishes	Gasterosteus aculeatus	Driedoornige stekelbaars	Three spined stickleback	Ca.	Gasterosteiformes	Gasterosteidae
39	Fresh-water fishes	Gobio gobio	Riviergrondel	Gudgeon	Ca.	Cypriniformes	Cyprinidae
40	Fresh-water fishes	Gymnocephalus cernua	Pos	Ruffe	Ca.	Perciformes	Percidae
41	Sea-fishes	Hippoglossus hippoglossus	Heilbot	Halibut	Cc.	Pleuronectiformes	Pleuronectidae
42	Sea-fishes	Hyperoplus lanceolatus	Smelt	Greater sandeel	Cc.	Perciformes	Ammodytidae
43	Fresh-water fishes	Leucaspius delineatus	Vetje	Belica	Ca.	Cypriniformes	Cyprinidae
44	Fresh-water fishes	Leuciscus			Ca.	Cypriniformes	Cyprinidae
45	Fresh-water fishes	Leuciscus idus	Winde	Orfe	Ca.	Cypriniformes	Cyprinidae
46	Fresh-water fishes	Leuciscus leuciscus	Serpeling	Dace	Ca.	Cypriniformes	Cyprinidae
47	Sea-fishes	Limanda limanda	Schar	Dab	Cc.	Pleuronectiformes	Pleuronectidae
48	Fresh-water fishes	Abramis			Ca.	Cypriniformes	Cyprinidae

49	Fresh-water fishes	Abramis brama	Brasem	Bream	Ca.	Cypriniformes	Cyprinidae
50	Fresh-water fishes	Abramis brama|blicca bjoerkna	Brasem|kolblei	Bream	Ca.	Cypriniformes	Cyprinidae
51	Anadro me fishes	Acipenser oxyrinchus			Cb.	Acipenseriforme s	Acipenserida e
52	Anadro me fishes	Acipenser sturio	Steur	Sturgeon	Cb.	Acipenseriforme s	Acipenserida e
53	Sea-fishes	Agonus cataphractus	Harnasmannetje	Armoured bullhead	Cc.	Scorpaeniformes	Agonidae
54	Fresh-water fishes	Alburnus alburnus	Alver	Bleak	Ca.	Cypriniformes	Cyprinidae
55	Sea-fishes	Alopias vulpinus	Voshaai	Common thresher	Cc.	Lamniformes	Alopiidae
56	Anadro me fishes	Alosa			Cb.	Clupeiformes	Clupeidae
57	Anadro me fishes	Alosa alosa	Elft	Allis shad	Cb.	Clupeiformes	Clupeidae
58	Anadro me fishes	Alosa fallax	Fint	Twaite shad	Cb.	Clupeiformes	Clupeidae
59	Anadro me fishes	Alosa fallax|alosa alosa	Fint|elft	Shad	Cb.	Clupeiformes	Clupeidae
60	Sea-fishes	Ammodytes marinus	Noorse zandspiering	Raitts sandeel	Cc.	Perciformes	Ammodytida e
61	Sea-fishes	Ammodytes tobianus	Zandspiering	Lesser sandeel	Cc.	Perciformes	Ammodytida e
62	Sea-fishes	Anarhichas lupus	Zeewolf	Wolf fish	Cc.	Perciformes	Anarhichadid ae
63	Fresh-water fishes	Anguilla anguilla	Paling	Eel	Ca.	Anguilliformes	Anguillidae
64	Sea-fishes	Argyrosomus regius	Ombervis	Meagre	Cc.	Perciformes	Sciaenidae
65	Sea-fishes	Aspitrigla cuculus	Engelse poon	Red gurnard	Cc.	Scorpaeniformes	Triglidae

66	Fresh-water fishes	Aspius aspius	Roofblei	Asp	Ca.	Cypriniformes	Cyprinidae
67	Sea-fishes	Atherina boyeri	Kleine koornaarvis	Big scale sand smelt	Cc.	Atheriniformes	Atherinidae
68	Sea-fishes	Atherina presbyter	Koornaarvis	Sand smelt	Cc.	Atheriniformes	Atherinidae
69	Fresh-water fishes	Barbatula barbatula	Bermpje	Stone loach	Ca.	Cypriniformes	Nemacheilidae
70	Fresh-water fishes	Barbus barbus	Barbeel	Barbel	Ca.	Cypriniformes	Cyprinidae
71	Sea-fishes	Belone belone	Geep	Garfish	Cc.	Cyprinodontiformes	Belonidae
72	Sea-fishes	Lipophrys pholis	Slijmvis	Shanny	Cc.	Perciformes	Blenniidae
73	Sea-fishes	Liza aurata	Goudharder	Golden grey mullet	Cc.	Perciformes	Mugilidae
74	Sea-fishes	Liza ramada	Dunlipharder	Thin lipped grey mullet	Cc.	Perciformes	Mugilidae
75	Sea-fishes	Liza ramada|liza aurata	Dunlipharder|goudharder	Thin lipped grey mullet|golden grey mullet	Cc.	Perciformes	Mugilidae
76	Sea-fishes	Lophius piscatorius	Zeeduivel	Angler fish	Cc.	Batrachoidiformes	Lophiidae
77	Fresh-water fishes	Lota lota	Kwabaal	Burbot	Ca.	Gadiformes	Gadidae
78	Sea-fishes	Melanogrammus aeglefinus	Schelvis	Haddock	Cc.	Gadiformes	Gadidae
79	Sea-fishes	Merlangius merlangus	Wijting	Whiting	Cc.	Gadiformes	Gadidae

80	Sea-fishes	Merluccius merluccius	Heek	Hake	Cc.	Gadiformes	Merlucciidae
81	Sea-fishes	Molva dypterygia	Blauwe leng	Blue ling	Cc.	Gadiformes	Gadidae
82	Sea-fishes	Molva molva	Leng	Ling	Cc.	Gadiformes	Gadidae
83	Sea-fishes	Mugilidae	Harders	Grey mullets	Cc.	Perciformes	Mugilidae
84	Sea-fishes	Mullus surmuletus	Mul	Red mullet	Cc.	Pectiformes	Mullidae
85	Sea-fishes	Mustelus asterias	Gevlekte gladde haai	Starry smooth hound	Cc.	Carcharhiniformes	Triakidae
86	Sea-fishes	Mustelus mustelus	Gladde haai	Common smooth hound	Cc.	Carcharhiniformes	Triakidae
87	Sea-fishes	Myoxocephalus scorpius	Zeedonderpad	Short spined bullhead	Cc.	Scorpaeniformes	Cottidae
88	Anadrome fishes	Oncorhynchus mykiss	Regenboogforel	Rainbow trout	Cb.	Salmoniformes	Salmonidae
89	Anadrome fishes	Osmerus eperlanus	Spiering	Smelt	Cb.	Salmoniformes	Osmeridae
90	Sea-fishes	Pagellus bogaraveo	Zeebrasem	Red sea bream	Cc.	Perciformes	Sparidae
91	Fresh-water fishes	Perca fluviatilis	Baars	Perch	Ca.	Perciformes	Percidae
92	Fresh-water fishes	Percidae	Zoetwaterbaarzen	Perciform fish	Ca.	Perciformes	Percidae
93	Fresh-water fishes	Phoxinus phoxinus	Elrits	Minnow	Ca.	Cypriniformes	Cyprinidae
94	Sea-fishes	Platichthys flesus	Bot	Flounder	Cc.	Pleuronectiformes	Pleuronectidae
95	Sea-fishes	Pleuronectes			Cc.	Pleuronectiformes	Pleuronectidae
96	Sea-fishes	Pleuronectes platessa	Schol	Plaice	Cc.	Pleuronectiformes	Pleuronectidae

97	Sea-fishes	Pleuronectidae	Schollen	Pleuronectidae	Cc.	Pleuronectiformes	Pleuronectidae
98	Sea-fishes	Pleuronectiformes			Cc.	Pleuronectiformes	Indet.
99	Sea-fishes	Pollachius pollachius	Pollak	Green pollack	Cc.	Gadiformes	Gadidae
100	Sea-fishes	Pollachius virens	Koolvis	Coalfish	Cc.	Gadiformes	Gadidae
101	Sea-fishes	Pomatoschistus lozanoi	Lozano's grondel	Lozano's goby	Cc.	Perciformes	Gobiidae
102	Fresh-water fishes	Pomatoschistus microps	Brakwatergrondel	Common goby	Ca.	Perciformes	Gobiidae
103	Sea-fishes	Pomatoschistus minutus	Dikkopje	Sand goby	Cc.	Perciformes	Gobiidae
104	Fresh-water fishes	Pungitius pungitius	Tiendoornige stekelbaars	Ten spined stickleback	Ca.	Gasterosteiformes	Gasterosteidae
105	Sea-fishes	Raja batis	Vleet	Flapper skate	Cc.	Rajiformes	Rajidae
106	Sea-fishes	Raja clavata	Stekelrog	Thornback ray	Cc.	Rajiformes	Rajidae
107	Sea-fishes	Raja miraletus	Bruine rog		Cc.	Rajiformes	Rajidae
108	Sea-fishes	Raja montagui	Gevlekte rog	Spotted ray	Cc.	Rajiformes	Rajidae
109	Sea-fishes	Rajidae	Roggen	Skates and rays	Cc.	Rajiformes	Rajidae
110	Fresh-water fishes	Rhodeus amarus	Bittervoorn	Bitterling	Ca.	Cypriniformes	Cyprinidae
111	Fresh-water fishes	Rutilus	Voorn	Roach	Ca.	Cypriniformes	Cyprinidae
112	Fresh-water fishes	Rutilus rutilus	Blankvoorn	Roach	Ca.	Cypriniformes	Cyprinidae
113	Anadrome fishes	Salmo			Cb.	Salmoniformes	Salmonidae
114	Anadrome fishes	Salmo salar	Zalm	Atlantic salmon	Cb.	Salmoniformes	Salmonidae

115	Anadrome fishes	Salmo salar|salmo trutta	Zalm|forel	Atlantic salmon|trout	Cb.	Salmoniformes	Salmonidae
116	Anadrome fishes	Salmo trutta	Forel	Trout	Cb.	Salmoniformes	Salmonidae
117	Anadrome fishes	Salmonidae	Zalmen	Salmonidae	Cb.	Salmoniformes	Salmonidae
118	Fresh-water fishes	Sander lucioperca	Snoekbaars	Pikeperch	Ca.	Perciformes	Percidae
119	Sea-fishes	Sardina pilchardus	Sardien	Pilchard	Cc.	Clupeiformes	Clupeidae
120	Fresh-water fishes	Scardinius erythrophthalmus	Ruisvoorn	Rudd	Ca.	Cypriniformes	Cyprinidae
121	Sea-fishes	Scomber japonicus	Spaanse makreel	Chub mackerel	Cc.	Perciformes	Scombridae
122	Sea-fishes	Scomber scombrus	Makreel	Mackerel	Cc.	Perciformes	Scombridae
123	Sea-fishes	Scophthalmus maximus	Tarbot	Turbot	Cc.	Pleuronectiformes	Bothidae
124	Sea-fishes	Scophthalmus rhombus	Griet	Brill	Cc.	Pleuronectiformes	Bothidae
125	Sea-fishes	Scyliorhinus canicula	Hondshaai	Lesser spotted dogfish	Cc.	Carcharhiniformes	Scyliorhinidae
126	Fresh-water fishes	Silurus glanis	Meerval	Catfish	Ca.	Siluriformes	Siluridae
127	Sea-fishes	Solea lascaris	Franse tong	Sand sole	Cc.	Pleuronectiformes	Soleidae
128	Sea-fishes	Solea solea	Tong	Sole	Cc.	Pleuronectiformes	Soleidae
129	Sea-fishes	Soleidae	Tongen	Soles	Cc.	Pleuronectiformes	Soleidae
130	Sea-fishes	Sphyraena	Barracuda	Barracuda	Cc.	Perciformes	Sphyraenidae
131	Sea-fishes	Spinachia spinachia	Zeestekelbaars	Sea stickleback	Cc.	Gasterosteiformes	Gasterosteidae

132	Sea-fishes	Spondyliosoma cantharus	Zeekarper	Black sea bream	Cc.	Perciformes	Sparidae
133	Sea-fishes	Sprattus sprattus	Sprot	European sprat	Cc.	Clupeiformes	Clupeidae
134	Fresh-water fishes	Squalius cephalus	Kopvoorn	Chub	Ca.	Cypriniformes	Cyprinidae
135	Fresh-water fishes	Squalius cephalus|leucis cus idus	Kopvoorn|winde	Chub|orfe	Ca.	Cypriniformes	Cyprinidae
136	Sea-fishes	Squalus acanthias	Doornhaai	Spiny dogfish	Cc.	Squatiniformes	Squalidae
137	Sea-fishes	Squatina squatina	Zee-engel	Angel fish	Cc.	Squatiniformes	Squatinidae
138	Sea-fishes	Syngnathus acus	Grote zeenaald	Great pipe fish	Cc.	Syngnathiforme s	Syngnathida e
139	Sea-fishes	Thunnus thynnus	Tonijn	Northern blue fin tuna	Cc.	Perciformes	Scombridae
140	Fresh-water fishes	Thymallus thymallus	Vlagzalm	Grayling	Ca.	Salmoniformes	Salmonidae
141	Fresh-water fishes	Tinca tinca	Zeelt	Tench	Ca.	Cypriniformes	Cyprinidae
142	Sea-fishes	Trachinus draco	Grote pieterman	Greater weever	Cc.	Perciformes	Trachnidae
143	Sea-fishes	Trachurus trachurus	Horsmakreel	Horse mackerel	Cc.	Perciformes	Carangidae
144	Sea-fishes	Triakidae	Ruwe en gladde haaien	Triakidae	Cc.	Carcharhiniform es	Triakidae
145	Sea-fishes	Trigla			Cc.	Scorpaeniformes	Triglidae
146	Sea-fishes	Trigla lucerna	Rode poon	Tub gurnard	Cc.	Scorpaeniformes	Triglidae
147	Sea-fishes	Triglidae	Ponen	Sea robins	Cc.	Scorpaeniformes	Triglidae
148	Sea-fishes	Trigloporus lastoviza	Gestreepte poon	Streaked gurnard	Cc.	Scorpaeniformes	Triglidae

149	Sea-fishes	Trisopterus luscus	Steenbolk	Pouting	Cc.	Gadiformes	Gadidae
150	Sea-fishes	Trisopterus minutus	Dwergbolk	Poor cod	Cc.	Gadiformes	Gadidae
151	Sea-fishes	Zoarces viviparus	Puitaal	Eelpout	Cc.	Perciformes	Zoarcidae
152	Anadrome fishes	Acipenser			Cb.	Acipenseriformes	Acipenseridae
153	Sea-fishes	Ammodytidae	Zandspieringen		Cc.	Perciformes	Ammodytidae
154	Sea-fishes	Chelidonichthys	Poon		Cc.	Scorpaeniformes	Triglidae
155	Sea-fishes	Chelidonichthys lucerna	Rode poon	Tub gurnard	Cc.	Scorpaeniformes	Triglidae
157	Fresh-water fishes	Cottidae	Donderpadden		Ca.	Scorpaeniformes	Cottidae
158	Fresh-water fishes	Gasterosteus	Stekelbaars	Stickleback	Ca.	Gasterosteiformes	Gasterosteidae
159	Sea-fishes	Lophiidae	Zeeduivels	Angler fish	Cc.	Batrachoidiformes	Lophiidae
160	Sea-fishes	Molva	Leng		Cc.	Gadiformes	Gadidae
161	Sea-fishes	Chelon	Harder		Cc.	Perciformes	Mugilidae
163	Anadrome fishes	Osmeridae	Spieringen	Smelt	Cb.	Salmoniformes	Osmeridae
164	Sea-fishes	Percichthyidae	Zeebaarzen	Temperate perches	Cc.	Perciformes	Percichthyidae
165	Sea-fishes	Raja	Rog		Cc.	Rajiformes	Rajidae
167	Sea-fishes	Solea	Tong		Cc.	Pleuronectiformes	Soleidae
168	Sea-fishes	Squalidae	Doornhaaien		Cc.	Squaliformes	Squalidae
170	Fresh-water fishes	Salmo trutta fario	Beekforel	Brown trout	Ca.	Salmoniformes	Salmonidae
171	Sea-fishes	Squatina squatina	Zee-engel	Angelshark	Cc.	Squatiniformes	Squatinidae
172	Sea-fishes	Sardina pilchardus	Sardien	Pilchard	Cc.	Clupeiformes	Clupeidae

173	Sea-fishes	Trachinus draco	Grote pieterman	Greater weever	Cc.	Perciformes	Trachinidae
174	Sea-fishes	Xiphias gladius	Zwaardvis	Swordfish	Cc.	Tetraodontiformes	Xiphiidae
175	Sea-fishes	Thunnus thynnus	Blauwvintonijn	Bluefin tuna	Cc.	Perciformes	Scombridae
176	Sea-fishes	Rajiformes			Cc.	Rajiformes	Indet.
177	Sea-fishes	Chelidonichthys cuculus	Engelse poon	Red gurnard	Cc.	Scorpaeniformes	Triglidae
182	Fresh-water fishes	Cyprinidae/perca fluviatilis			Ca.		

APPENDIX 7: AORISTIC ANALYSIS FORMULA BREAKDOWN

This is the aoristic analysis formula as created by Ivo Poldervaart. This formula helps to calculate the aoristic weight for a specific bin (0-25 years in this case) by examining the overlap of the time range of the specimens with the bin's time range. It then adjusts this value based on the number of specimens.

=((1/$M3)*(ALS(EN($K3<AT$2;$L3<AT$2);0;ALS(EN($K3<=AT$2;$L3<AU$2);$L3 AT$2;ALS(EN($K3<=AT$2;$L3>=AU$2);$AT$1;ALS(EN($K3>AT$2;$L3<AU$2);$L3-$K3;ALS(EN($K3>AT$2;$K3<AU$2;$L3>=AU$2);AU$2-$K3;0))))))*$AS3)

1/$M3 takes the inverse of the range of years (cell M3), thereby evenly distributing the probability across each year within that range.

The ALS(EN(...)) function evaluates several conditions concerning the start and end dates (columns K and L) and the current bin year (AT$2 and AU$2).

EN($K3<AT$2;$L3<AT$2);0 checks if both the start and end dates are less than the bin's start year. If so, the formula returns 0, as there's no overlap with the bin.

EN($K3<=AT$2;$L3<AU$2);$L3-AT$2 checks if the start date is less than or equal to the bin's start year and the end date is less than the bin's end year. If so, it calculates the portion of the time range that overlaps with the bin (from the bin's start year to the end date).

EN($K3<=AT$2;$L3>=AU$2);AT1 checks if the start date is less than or equal to the bin's start year and the end date is greater than or equal to the bin's end year. If so, the entire bin's time range (AT$1, i.e., 25 years in this example) overlaps with the time range.

EN($K3>AT$2;$L3<AU$2);$L3-$K3 checks if the start date is greater than the bin's start year and the end date is less than the bin's end year. If so, it calculates the portion of the time range that overlaps with the bin (from the start date to the end date).

EN($K3>AT$2;$K3<AU$2;$L3>=AU$2);AU$2-$K3 checks if the start date is greater than the bin's start year, the start date is less than the bin's end year, and the end date is greater than or equal to the bin's end year. If so, it calculates the portion of the time range that overlaps with the bin (from the start date to the bin's end year).

**$AS3 scales the result according to the Number of Identified Specimens (NISP) of fish remains, thereby giving more weight to bins with more specimens.*