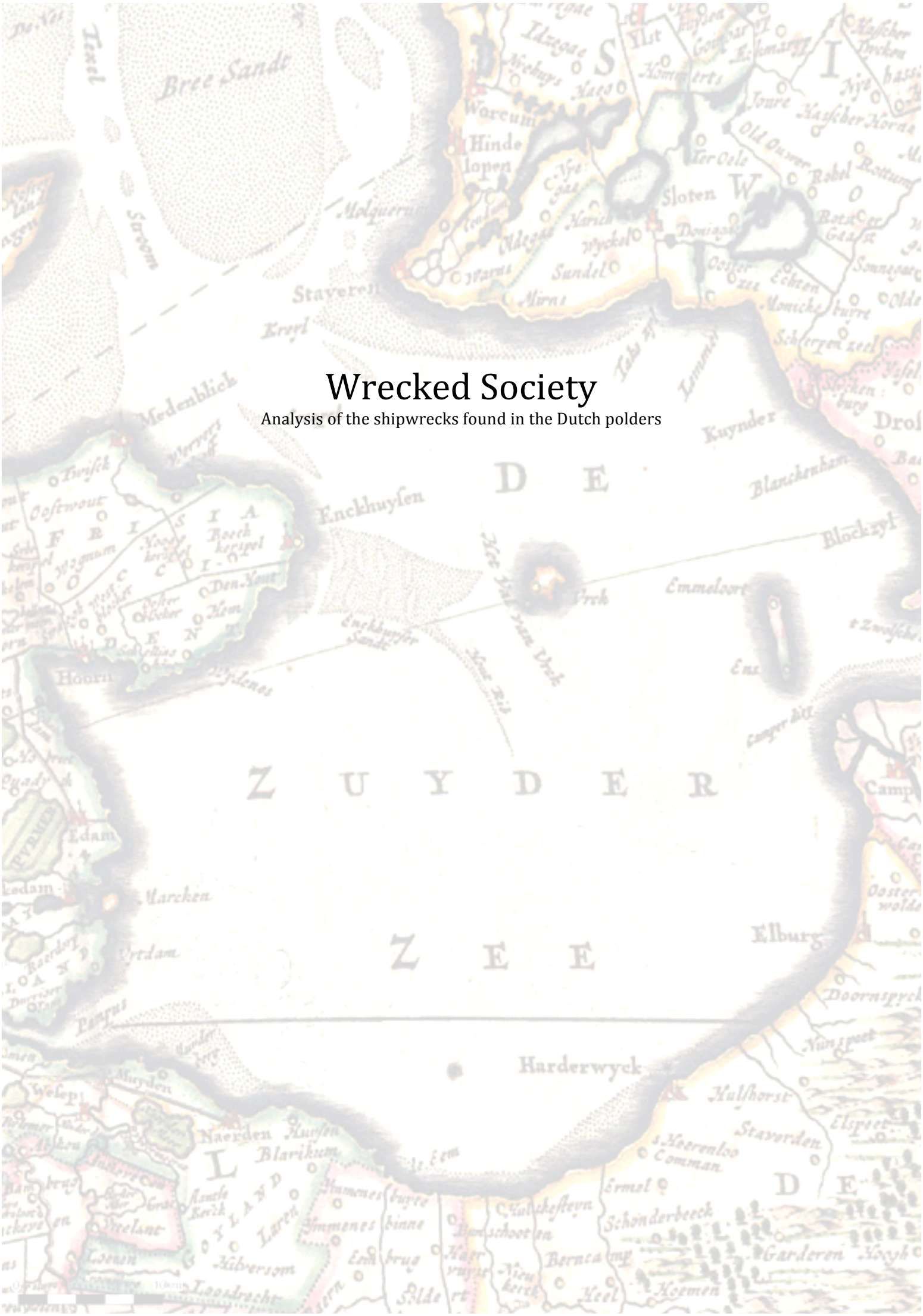

Wrecked Society

Analysis of the shipwrecks found in the Dutch polders

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FACULTY OF HUMANITIES
Wrecked Society – Analysis of the shipwrecks found in the Dutch polders
By Liselore An Muis

A dissertation submitted in partial fulfilment of the requirements of the degree of Msc Maritime Archaeology

Preface

Before you lay my dissertation about the analysis of the shipwrecks that are found in the Dutch polders. The last couple of months I have been working on this dissertation, which marks the end of my study, both for my masters that I have been following at the University of Southampton for the last year, as for my study in archaeology in general. I have really enjoyed being active in archaeology, especially the maritime side of it, and I hopefully will be doing it for quite a long time.

My choice of writing a dissertation with this particular topic is based on the fact that I, of course as a Dutch citizen, wanted to investigate the maritime history of my own country further. Furthermore, a research and analysis of the wrecks found in the Dutch polders was never been done before and therefore a good topic to write a master thesis about. The idea of this topic came up after a talk with Jon Adams, when talking about an excavation I had been doing the previous year, with the International Fieldschool of Maritime Archaeology Flevoland (IFMAF).

Therefore, I want to thank Jon Adams for helping me deciding on and defining my topic. Besides that I want to thank him for being my supervisor and also a great lecturer for the last year. Other people I want to thank are Johan Opdebeeck, for helping me a lot with data and information, ideas and other opinions that were essential within this research. Also I would like to thank my current colleagues from Periplus Group and in particular Seger van den Brenk, for the opportunity to work on my dissertation at a nice workspace with all the facilities I needed and for all the information and data that was available, which I could use. At last I want to thank my friends and family and all other people I forgot to mention for all the help and support and also for the sometimes necessary distraction they gave me over the last few months and the year before. I could not have done it without all these special moments.

Liselore An Muis

Table of Content

Introduction

This dissertation is about the Dutch[1] IJsselmeer, what used to be called the Zuiderzee or Zuyder Zee (Southern Sea). It was until the nineteenth century assumed that the name 'Zuiderzee' was originated from the Frisians, which with this name the lake southern of Friesland designate. However, by 1912 it is known that the name Zuiderzee was first mentioned in a script from 1340 of hanseatic merchants (merchants that were part of the Hanseatic League, see chapter 1) of the city Lübeck. Probably the name Zuiderzee was used by cities in Scandinavia around the Baltic to denote the hanseatic cities south of Scandinavia, such as the Dutch cities Kampen, Harderwijk and Stavoren (Walsmit 2010, 18).

This former inland sea was from prehistory onward an important waterway. From the beginning the sea was of influence, particularly for coastal settlements where water was of great importance for the necessities of life. With time, it also became important for transport and trade. As maritime activities grew trading developed not only between Dutch coastal settlements but also on an international level. The strategic position of the sea made it very easy to reach the Baltic and from there gave access to the principal sea routes to the Mediterranean. In fact because of its location within a context of northern European states it became a principal trading hub for many centuries.

However, the predominantly shallow depth, profusion of shifting sandbanks and silting waterways, made the Zuiderzee a hazardous sea, especially in heavy weather. Therefore, it is not surprising that over time large numbers of ships were wrecked. Because of the soft seabed many were covered with sand and clay in the centuries after wrecking, and in these optimal preservation conditions many of these wrecks survived in astonishing condition.

In the 1950's parts of the Zuiderzee were reclaimed and the Netherlands was expanded with another province, called Flevoland. Before, the area was large open water, in which shipping did not have fixed sailing routes. When reclaiming this polder several hundreds of shipwrecks were found. To date, in the polders of the IJsselmeer this amounts to an average of one wreck per 100 hectares (ministerie van verkeer en waterstaat 1995, 38). Most wrecks are still in situ, which makes the Flevopolders the largest ship graveyard on dry land. The polders have therefore provided an exceptionally large assemblage of maritime archaeological wreck data.

The aim of this dissertation is therefore to look at Dutch maritime enterprise, through the lens of the shipwrecks that are found in the polders. On the basis that ships as complex maritime

[1] *With Dutch the geographic outlines of the Netherlands such as they are known today are meant. When speaking about the earlier prehistoric and Roman times, the same outlines will be mentioned.*

material culture can tell us a great deal about their respective societies, the main research question will be: *How do shipwrecks from the Dutch polders represent Dutch maritime enterprise, and what does this tell us about underlying maritime society?*

At the time of writing the sample numbers some 400 shipwrecks dating from prehistory to the nineteenth century, mainly located on land with a few exceptions of records of other wrecks that are located in the surrounding water. By putting these data into a geographic information system (GIS), the nature of this database can be analysed in order to interpret the patterning and clustering of type, function, date, location, etc. Such patterning is known to exist but to date no formal analysis of the total database has been attempted; therefore a great deal of the archaeological potential of these wrecks has yet to be realised. With this dataset I will correlate the maritime material culture with archaeological and historical data from wider society in which they existed, in order to learn more about both maritime enterprise and its development and the societies where it originated. Other sources will include historic maps of the Zuiderzee, records of the main sea-lanes, historical documentation, which in the later periods relates to the maritime traffic of the coastal towns.

In this context, different types and functions of the ships, their dates and wrecking locations and their various technologies may reflect the intensity of maritime traffic at any particular time and the wider strategic commercial/naval concerns of Dutch maritime commerce. For example with the increase or decrease in numbers at certain periods, do we see changes in the predominant types and changes in function? In these ways I will track the expansion of Dutch maritime activity from prehistory through the 'golden century' via its manifestation in wreck patterning.

This dissertation consists of five chapters, each of which describes different stages of the research. The first chapter summarises the history of the area. Not only natural changes but also changes due to human interference and changes in shipping/ maritime activity will be described. The second chapter details the maritime databases that are used to collect all the data on which this research is based. Besides that the ways the data were acquired and how they are processed will be explained. The third chapter is about the GIS Base map. This is where all the collected data are put together and a map is created on which the wrecks are depicted with their exact location on a geographical background. From this base map the analysis, which will be explained in the next chapter, will take place. In this fourth chapter all the data will be analysed. In the last chapter the conclusion of this analysis will be given and the main research question will be answered.

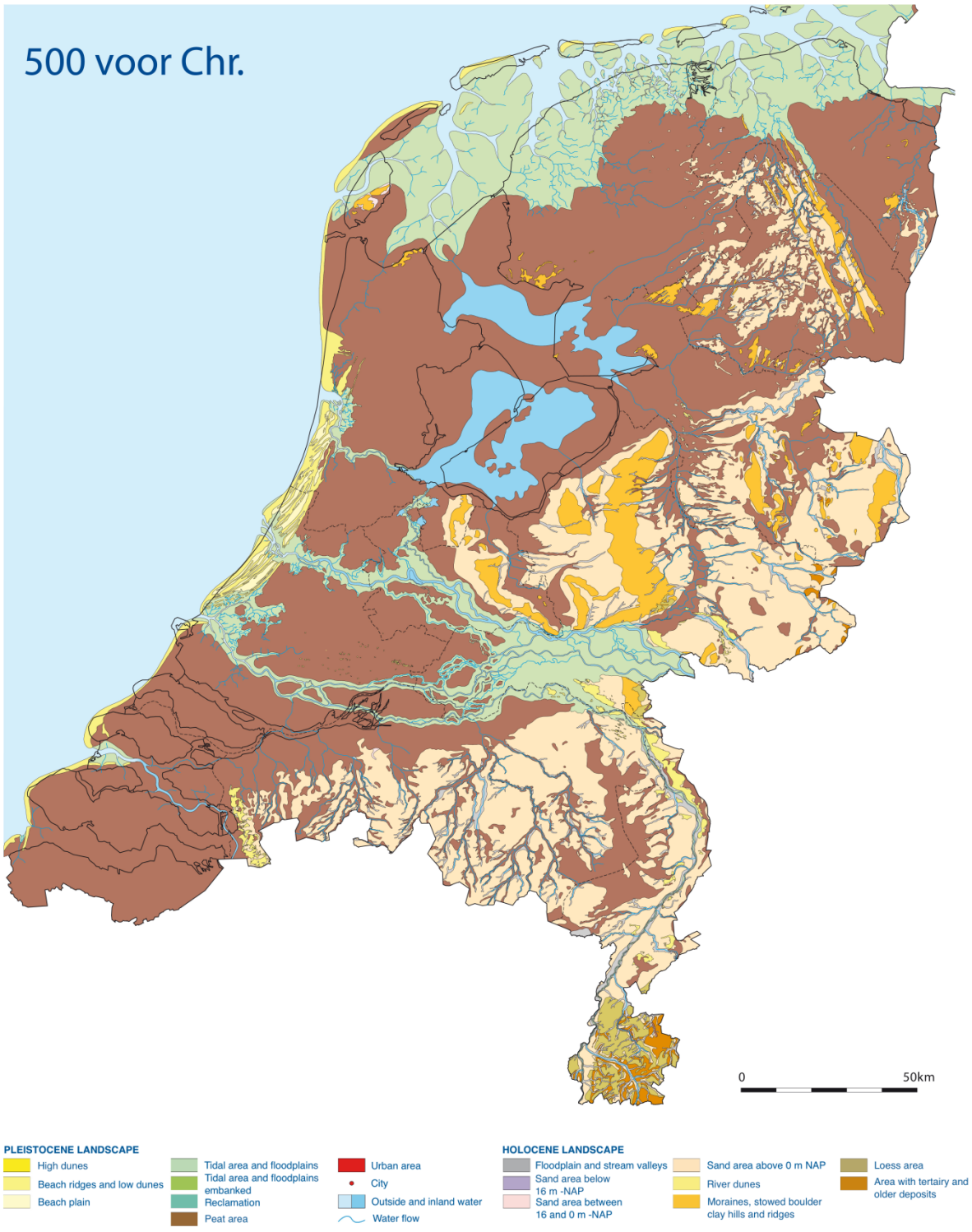

Figure 1: Geological map of the Netherlands ca. 500 BC (Vos 2011, 59)

Chapter 1: The Zuyder Zee

The Zuiderzee has undergone a number of changes in the course of its history. Initially marshland, over centuries this area was transformed into a network of lakes before evolving into its present day form. In the following sections these changes, and with that the maritime activities that took place there, will be described.

1.1 Early times

The Zuiderzee as it is exists today (i.e. one large inlet) was not formed until the thirteenth century. However, several archaeological finds indicate that in prehistory the area of the Zuiderzee was inhabited, especially around the freshwater rivers, and maritime travel with the use of log boats was also known (Heide 1974a, 31), the influence of this maritime environment, which later became the Zuiderzee, was not as important as it became in medieval periods.

The first mention of a previous state of the Zuiderzee in historical sources is in the Roman period. In contrast to the present day, the coastline of what is now the Netherlands was almost completely closed, with the exception of the estuaries of the main rivers and some small inlets. Behind the dunes were bogs within which freshwater lakes were formed. When these bogs were reclaimed for peat extraction, the ground level of these areas began to decline, thus increasing the size of the lakes (figure 1). These newly formed lakes were called *Flevum* or *Flevo Lacus* (Walsmit 2010, 15).

Although *Flevo Lacus* existed and was known in the Roman period, it does not seem that the Romans were using the lakes that later became the Zuiderzee, with few archaeological finds indicating a relation between *Flevo Lacus* and the Romans themselves. From historical sources *Flevo Lacus* is named in combination with seafaring further north (Heide 1974a, 40). The most common descriptions are in regards to geological aspects of this area. An interesting part of this description is that the Romans seem to have had some trouble with discrete areas of peat, which were called 'floating islands' and hindered seafaring (Heide 1974a, 42). The absence of shipwrecks from this period is a possible indication of the lack of Roman seafaring in this area.

However, other areas do indicate Roman seafaring (figure 2). The main maritime route that was used in the Roman period was the river Rhine, which also formed the most northern border of the Roman Empire. In addition to the Rhine, several other rivers and estuaries were also used. This network of rivers and estuaries could be followed all the way inland to different ports and harbours. The places that were reached were mostly placed on strategic locations alongside these rivers but were not only present-day Dutch ports and harbours. It is very likely that the rivers were also used to navigate as far as Koln and Trier (Asaert 1976, 16). From here

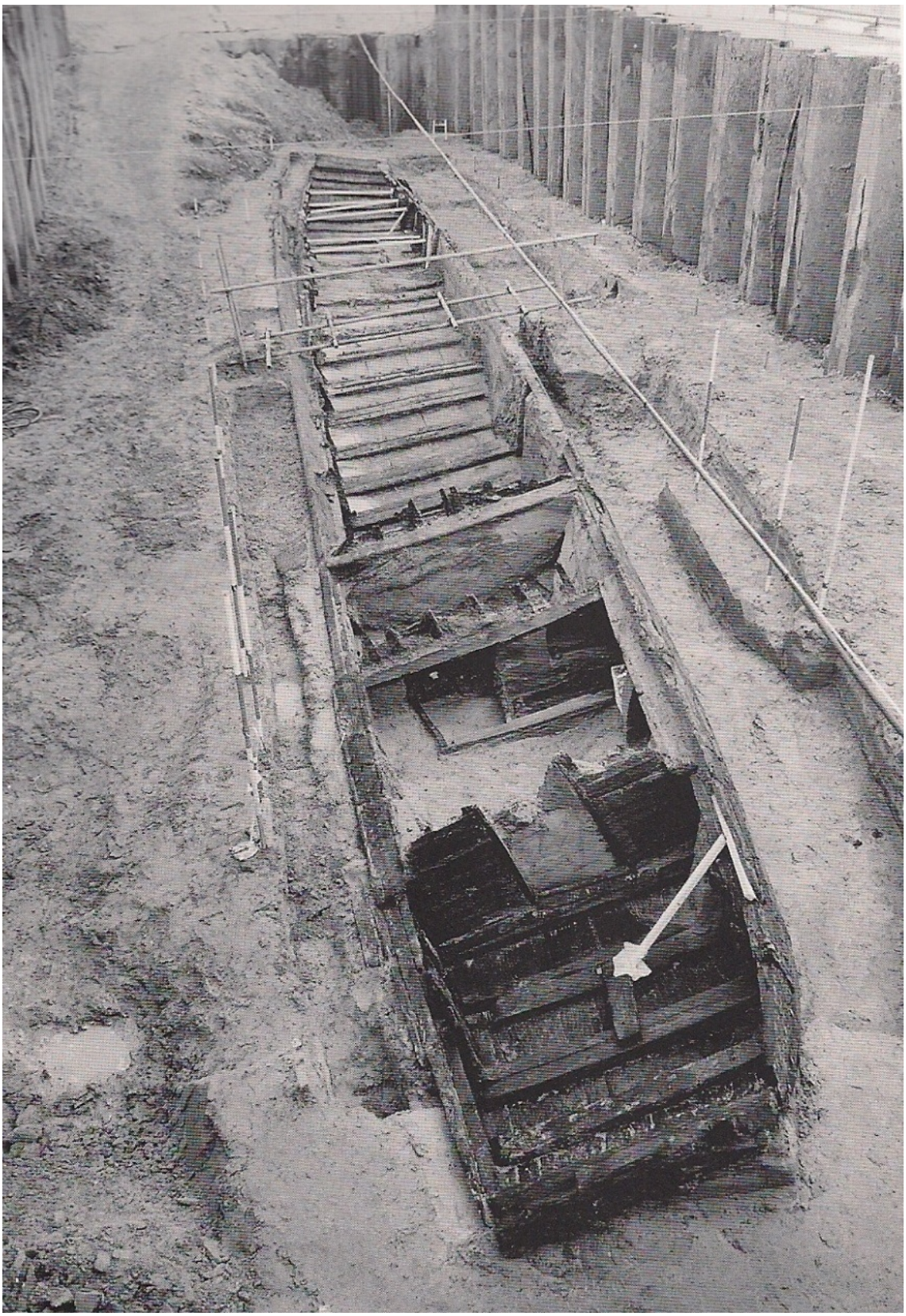

Figure 2: Excavation of a Roman ship called the *Meern 1*, found in the former riverbed of the river Rhine, which was used as natural boarder of the Roman Empire. The wreck is dated 148 AD +/- 6 (Rijksdienst voor het Cultureel Erfgoed).

the Romans embarked numerous construction materials, such as basalt and tuff; roof tiles and bricks are also known to have originated from these places.

1.2 Medieval times and later

In the centuries after the Roman period, maritime activities increased gradually. The northern part of the Netherlands was by then inhabited by the Frisians. Their residential area was not only based on the coastal parts as it is today, but stretched to the rivers and possibly even further south. Thus places such as Dorestad (Wijk bij Duurstede), an important trading port in the Viking period located on the river Rhine, and Utrecht also belonged to the Frisians (Aseart 1976, 75). The environment, namely small artificial hills surrounded by water, precluded terrestrial agriculture, thus creating reliance upon the water for transport, food, warfare and trade. Therefore, they had a long tradition of sea and river trade, which made them important intermediaries and carriers for the northern Netherlands, Scandinavia and north and west England (Blockmans 2009, 117).

In the ninth century, the sea played a major part in re-shaping the landscape (figure 3). In the northern part the coastal area changed into several islands, which were divided by inlets. Because of the tides these inlets increased, which made that when storm surges occurred land was easily reclaimed. On the 26th of December 838 A.D. such a storm surge occurred, which resulted in the loss of an enormous area (Walsmit 2010, 15). From this date onwards the loss of land to the sea would continue until the thirteenth century.

In the early Middle Ages *Flevo Lacus* were called *Aelmere* or *Almere*, which means 'great lake'. Further storm surges in 1170, 1173 and 1196 resulted in the several lakes of *Almere* becoming one big sea inlet - the Zuiderzee (Walsmit 2010, 15).

The geological aspects of the landscape helped determine the shape of the Zuiderzee. On the east side were the high sand soils of the 'Veluwe', and elevated levels of boulder clay south of Vollenhove affected the formation. The four different islands of Wieringen, Gaasterland, Urk and Schokland that were located in the Zuiderzee consist of a soil of boulder clay. Pleistocene soil to the south and marine clay to the west prevented further expansion of the Zuiderzee in these directions (Heide 1974a, 8).

These changes of the Zuiderzee were reflected by an increase in maritime activities. Although this inland sea was initially very shallow and so unsuitable for shipping, this changed rapidly due to the tidal regime that became established with higher sea levels and connection with the North Sea. So in the eleventh and twelfth century important ports and harbours, like Harderwijk

Figure 3: Geological map of the Netherlands ca. 800 AD (Vos 2011, 67) Because of the occurring storm surges the lakes are enlarged.

and Stavoren, arose. These new ports, next to the important ports and harbours that already existed alongside the rivers, like Kampen and Utrecht, made the transport and trade of a wide variety of goods a constant activity. Seaborne trade with the British Isles, Denmark and other places in the Baltic Sea became very common in this period. Many of the cities surrounding the Baltic were also part of the Hanseatic League, which meant that they were part of an economic alliance of trading cities, and their merchant guilds dominated trade along the coast of Northern Europe. This economic alliance stretched from the Baltic to the North Sea and also inland.

In the thirteenth century this organisation of overseas trade changed. Because of the more expensive construction of bigger ships like the cog, trade became centralised into the hands of wealthy ship-owners. Several merchants became owners of just a small part of the ship via shares, so the necessary finances could still be raised and the risks of losses were spread. This method of conducting trade was especially prevalent during the fourteenth century in the eastern part of the Zuiderzee and on the river IJssel, and marked the beginning of a long period of ship-owners in maritime trade. In the fifteenth century this way of trade was partly superseded by the rise of cities in the more western part of the Zuiderzee, like Amsterdam (Alseart 1976, 95).

Although the Hanseatic League was still active around 1400 and the trade in the Baltic Sea was the most important for the Dutch seafarers, it wasn't only the seafarers from the east but also from the western parts of the Netherlands sailed to the Baltic for trade. However, the seafarers from the western ports were not part of the Hanseatic League and therefore they were not required to keep the alliances the cities from the Hanseatic League had agreed to. This led to conflicts that lasted almost the whole of the fifteenth century (Alsaert 1976, 262).

Several events took place during the fifteenth century, which led to an increase of trade in the western part of the Netherlands at the expense of the Hanseatic League. In particular, Amsterdam became a very important port for maritime trade, expanding into the international trade in the Baltic and later on also to the East Indies. As a result of this increasing international trade, companies such as the Dutch East India Company (*Vereenigde Oost-Indische Compagnie or* VOC) arose and gained a globally dominant position in maritime trade. These maritime activities became so crucial to the economy and led to such an increase in the prosperity of the Netherlands that the seventeenth century is seen as the Dutch 'Golden Age'.

1.3 Maritime activities on the Zuiderzee

However, on a national level, numerous maritime activities also took place. Increases in international trade were mirrored by increases in the national fishing industry. For various places around the Zuiderzee this was another main source of income. The unique physical

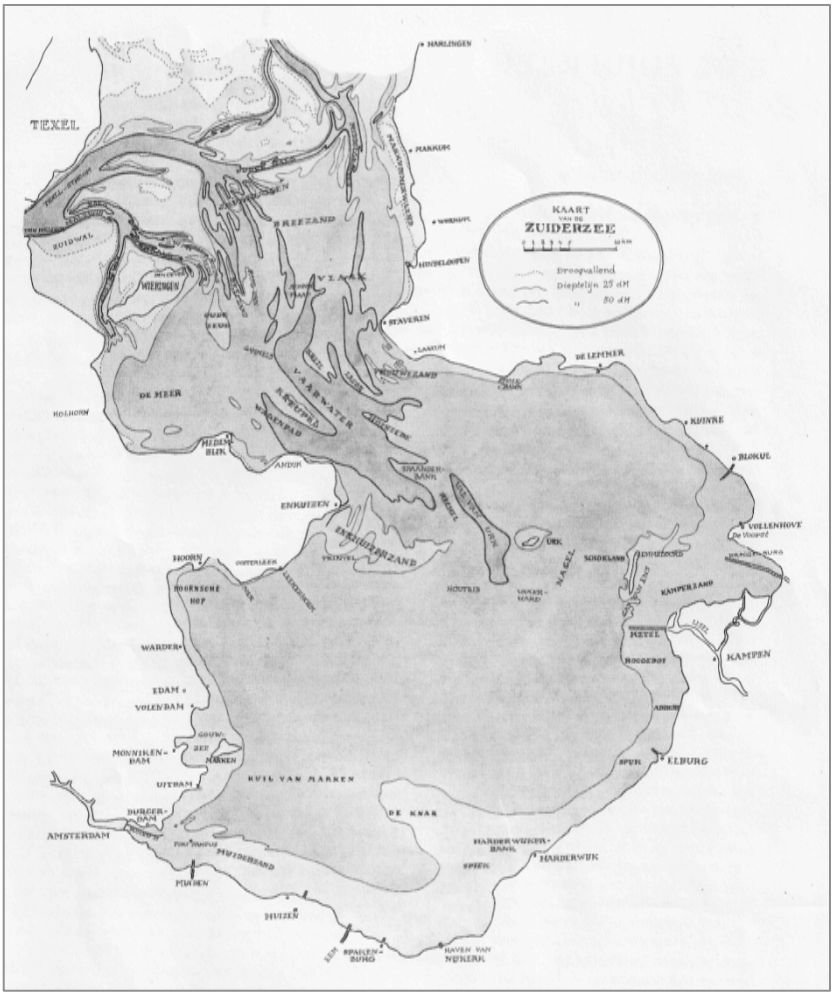

Figure 4: Picture of the Zuiderzee with the variation in depth, gullies and plateaus in the northern part and the more shallower and flattened seabed in the south (Dorleijn 1982, 15)

characteristics of the Zuiderzee (of which the biggest changes took place in the fifteenth and sixteenth century) resulted in the development of a large variety of fishing vessels, techniques and even cultures (Dorleijn 1982, 14).

The numerous storm surges formed not only the outer shape of the Zuiderzee, but also the water depth and bottom profiles during these periods. The former Zuiderzee could be divided into two parts: the northern Frisian part and the southern part, which was also called the 'Kom'. The delimitation between these two parts lay from Enkhuizen to Stavoren (Dorleijn 1982, 14).

Because of the fast currents that originated from the North Sea and the inlets between the Frisian islands, the northern part varied more in depth in comparison to the south, and gullies were created, interspersed with higher plateaus. These currents were slowed down by the narrow passage between Enkhuizen and Stavoren. The southern part was therefore shallower and the seabed flattened out. Here the sediments consisted mainly of mud, whereas in the northern part they consisted mainly of sand (figure 4). Water depth was dependent upon tides, although the wind was also a main factor. The wind moved water from the North Sea into the Zuiderzee and back again, which in extreme conditions led to enormous differences in water depth. These same factors also led to changes in salinity.

The changes of these different milieus meant that the flora and fauna in the Zuiderzee was very varied. Thus the prevailing factor of seasonality affecting the various fish populations was joined by those of salinity, sediment and depth of this sea, resulting in large variations of fish located in different areas. As a result, fish such as herring and anchovies could be found in the northern part, where the salinity was highest, the currents stronger and water depth deeper. In the southern part, where the fresh water inlet of the IJssel caused a more brackish environment, fish like the smelt were found (Dorleijn 1982, 16).

A final factor for the appearance of different species of fish was temperature. Because of the shallow depth the water temperature of the Zuiderzee could vary from 25 degrees Celsius in the summer and to freezing in the winter months. Thus resilience to these temperature changes also had an effect upon the presence of individual species (Dorleijn 1982, 16).

These factors naturally had a profound effect upon fishing in the Zuiderzee. Not only did the different kinds of fish that were caught make a difference in the method of fishing, but also nets and traps were adjusted to the different species. Also, in the Zuiderzee two different types of rigging could be found, namely the 'Staand' and 'Gaand' rigging, which was specific for the different types of seabed sediment, and therefore of influence to the fishing technique that was used. The first were nets and traps that were fixed in a specific location while the other was dragged behind a vessel. The different types of rigging that were used were depending on both bottom types and species. (Dorleijn 1982, 23).

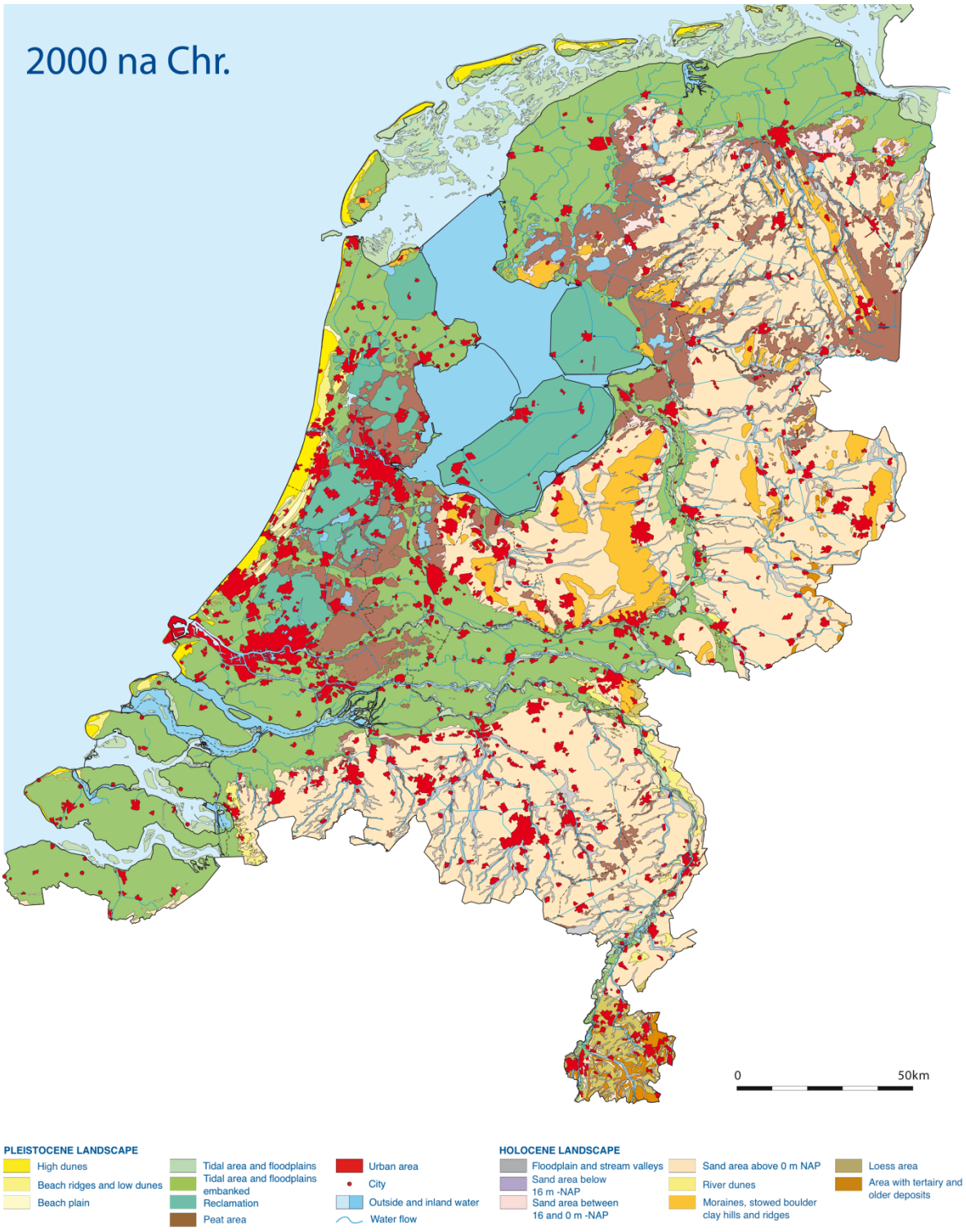

Figure 5: Geological map of the Netherlands ca. 2000 AD (Vos 2011, 79). The Zuiderzee is closed by the *Afsluitdijk* and the Flevopolders are reclaimed.

Another factor of influence for maritime activity was the cultural-historic background of the fishermen. Every city along the coast of the Zuiderzee had their own traditions relating to technique and methods. These ideas are represented not only in the nets and traps, but also the vessels that were used. This is one of many reasons that there was not one single type of fishing vessel, but instead an enormous variety. It resulted in the fact that for every branch within the fishery and also for all the different areas, different vessels were used (Dorleijn 1982, 39).
Within this cultural-historic background the characters of the fishermen themselves were also very diverse. The characters of the fishermen reflected the isolation of the towns and cities where they came from. Different cultures were created, divided by the different religions that were formed, which made that these can be traced again in the method of fishing. Then again, there were also areas where fishing was part of a broader social composition and not divided between smaller areas (Dorleijn 1982, 49). However, despite of all the previously stated differences that sometimes led to disagreement, maritime activity on the Zuiderzee continued till the early twentieth century.

1.4 Maritime activity decreased

In the eighteenth century, international trade decreased primarily due to a lack of innovation. Other countries, such as Britain, Denmark and Sweden, moved ahead, partly due to improvements in their ship construction and techniques. Dutch shipping could no longer compete due to the lack of these improvements and also because they were still relying on the status they previously gained within maritime trade. Today, the monumental buildings and canals in cities such as Amsterdam, Utrecht and Kampen stand testament to this period of prosperity (Heide 1974a, 113).

However, the cities around the Zuiderzee were not abandoned. They still served as trading centres, albeit on a smaller, national scale. Additionally, the national fishing activities continued and even reached a peak around 1900. The construction of the *Afsluitdijk* (enclosure dam) in 1932 however marked a final end to this role of the Zuiderzee (figure 5). With this, many of the maritime activities decreased or disappeared completely. The Zuiderzee was transformed from a salt or brackish environment to a freshwater environment again, now called IJsselmeer, entailing the disappearance of several marine species. Only the eel formed an exception, which naturally resulted in eel fishing becoming the most important maritime activity. The different techniques and gear all disappeared, while some were transformed so they could be used within the new environment. The once large diversity so characteristic of the Zuiderzee changed into something far more uniform (Dorleijn 1982, 46, 51).

In 1940, reclamation of land in the IJsselmeer of what became Flevoland commenced. The reclamations were completed in three stages; the first polder was the Noordoostelijke polder (North-East polder). The second was Oostelijk Flevoland (Eastern Flevoland), which was completed in 1957. The last third polder is Zuidelijk Flevoland (Southern Flevoland), which was completed in 1968.

During the construction of Flevoland approximately 400 shipwrecks and many other archaeological traces have been found so far. All these traces tell their story of the people that lived in this area, from prehistory to the modern period. Looking at the wrecks alone, they tell a remarkable story of the transformation and use of the former Zuiderzee on a maritime level. In the next chapter the database of these shipwrecks will be investigated to further explore the maritime history of this area through its archaeological remains.

Chapter 2: Maritime records

For the research of the shipwrecks that were found in the twentieth century in the Flevopolders several records are available and used. The quantity and quality of these records are very diverse and therefore have to be rearranged to be useful for this research. The two main sources that will be discussed below are combined with several historic maps to create an extra dimension within this research. With the combination of the records and the historic maps a more visual image is obtained, which in turn aids interpretation.

2.1 Archis

The main maritime record that is been used within this research is Archis. Archis is the automatic archaeological information system of the Netherlands (Rijksdienst voor het cultureel erfgoed 1999). It is a database in which the information and details of all the archaeological sites form Prehistory to the Modern eras of the Netherlands are tracked. The records contain information about the location and type of the site, the finds and features that are found, the status of the site (and with that if the sites is protected) and also the sites where further research is undertaken. Combined with this information are data included about the soil and ground use, but also documentation, archives and literature are described.

In Archis all this information can be combined with a diverse selection of digital maps, such as topographic map, soil maps and maps upon which land use is represented. Besides these maps are also the Archeologische Monumentenkaart (archaeological monuments map) and the Indicatieve Kaart Archeologische Waarden (indicative map of the archaeological value) present in Archis.

The data that Archis contains is only available for persons that are active in a professional archaeological environment, because for the interpretation of the data and for creating maps, knowledge about archaeology is necessary. The people who have access are therefore most of the time working at archaeological departments of governments, archaeological research companies and/or universities with a course in archaeology. The reason for this protected policy is to guarantee the quality of the data. This is also why all the users have to be authorised to consult and add information like finds, planned researched and the results of these researches.

In Dutch ancient monuments law it is stated that archaeological finds and features must be reported to a competent person or body, which is in most cases is the archaeological department of the county. Some municipalities also have their own archaeological departments where mainly finds from the city centre can be reported. The information on the finds are added to Archis, which then again is controlled by the government department for cultural heritage. They are responsible for the management and effective processing of the data of find- and research reports. When a find report is judged to be complete, the observations will be added to Archis.

The records in Archis are built up from different data. The quality of the records depends on their origin and for example in the case of wrecks still under water it is divers. Within Archis just a few wrecks are included, which are not precisely located within the polders but actually in the surrounding water. Therefore, the information about these wrecks is gained completely different than the usual data derived from Archis. An extensive database of the wrecks found in the surrounding water does not exist in such a manner. It is therefore useful for the user to know where the date comes from to make an indication of the value of the data that they utilize.

In Archis different research areas are registered, which are called research report. Besides these research reports there are also find reports that are called 'waarnemingen' (observations), finds and features called 'artefacten', find spots called 'complexen' (complexes), and archaeological site of value called 'monuments' are registered. All these different data are not only connected in the database, but also by their functional and spatial relationship. When using Archis for research, one search can contain zero, one or more find reports; an observation can contain one or more artefacts; artefacts of one or more observations can together form an archaeological find spot; and a monument contains the whole of a part of one or more archaeological find spots. Because of this complex system some knowledge of archaeology is required.

Together with the counties, the government department for cultural heritage, the archaeological value of a find spot can be determined. If the spot still exists in its original location it will become a monument. Monuments are most of the time defined by natural features, like ditches and roads. When these bounded locations are included in the land register, limitations will be put on the use of the site.

The data that are derived from Archis are observations that are located in the Flevopolder and are also maritime focused. This means that all the results has something to do with shipping, but does not necessarily mean that it concerns a wreck. As is stated above, the observations are very different in origin, age, accuracy and degree of detail. It sometimes just contains artefacts or

other aspects that are related to shipping. However, with further filtering of the data at the end 363 records were found to be useful for this research.

2.2 Ship catalogue

The ship catalogue is a record, which was set up in 2007. It was however, a project that ended before the list was complete and the latest version of this catalogue is made in 2009. It contained 442 records that were gathered and combined from different data sources derived from land-based activities, of which Archis was one. Besides Archis also other sources like the 'baggerspeciedepot' (records that were gained when dredging activities were carried out, such as dredging of canals or construction of ditches) were used to set up this list.
Because the project was ended prematurely, the data that was selected varies again enormously in quality. Some records are complete, with ship type, length and dating included, while from other source sometimes only the coordinates are known. This meant that not all records could be used. Besides that, the records derived from Archis were already known and had to be removed to avoid duplication.

The ship catalogue contains several columns with different information. A short summary of all the different columns will be given below:

FB-Record: FB-record stands for FreeBase-record. This is a database in which in an earlier period various types of metadata on the wrecks was saved. However, this program is almost out of use and the relevant metadata is included in the ship catalogue.

Ship: Contains the code of the wreck. The code is a combination of letters, which are related to the demarked property number, and a number, which is a specific wreck number within that demarked property. The first letter corresponds with the regarding polder, so N stands for Noordoostpolder (North-East polder), O for Oostelijk Flevoland (Eastern Flevoland) and Z for Zuidelijk Flevoland (Southern Flevoland). These numbers are also displayed on distribution maps that are available of the different polders

MH-code: The MH-code indicates if the wreck is named on an old inventory list made by Modderman and/or Van der Heide. However, the meaning of the codes with x, 2 and 3 are unknown.

Wrecknr.: This number refers to an old overview with wreck numbers.

Mon. nr.: Refers to the monument number that is known in Archis. Sometimes also the observation number is logged. In this case a 'W' from 'Waarneming' (observation) stands before the number. An 'M' before the number refers explicit to the monument number.

Ligging: Means location. In this column the exact location is described.

Gemeente: Is the county in which the wreck is found.

CMA-nr. Is the number that refers to the Centraal Monumenten Archief (Central Monument Archive) from Archis. These are find spots that are still in situ. Other find spots are noted in the Centraal Archeologisch Archief (Central Archaeological Archive) and have a CAA-nr.

Waarde: Indicates the archaeological value of a find. ZHAW stands for 'Zeer Hoge Archeologische Waarde' (Very high archaeological value), HAW stands for 'Hoge Archeologische waarde' (High archaeological value) and AW stands for 'Archeologische Waarde' (Archaeological value). BM means 'Beschermd Monument' (Protected monument).

Klasse: Klasse stands for the class of the condition of the wreck. Four different classes are distinguished: 'a' is 'Almost complete existing'; 'b' stands for 'Partly existing'; 'c' stands for 'heavily damaged'; 'd' stands for 'only fragment present'.

Coordinaten: Contains the coordinates.

Vondstenlijst: Gives an overview if a find list is present.

Dossier: Tells if a dossier of the wreck exists in the archives of the Rijksdienst voor het Cultureel erfgoed.

Diepte: Is the depth (in centimetres) of the wreck below ground level.

Scheepstype: Gives an indication of the ship type. Not only types of the wreck but also descriptions wherefrom the type could be reduced are given.

Lengte: Gives the length of the wreck.

Datering: Gives a dating of the wreck.

Melding: Is the date on which the find is reported.

Verkend: Is the date on which the find is explored.

Opgegraven: Is the date on which the excavation has been taken place

Status: Gives a update of the state of the wreck. 'Verwijderd' means removed; opgegeven means abandoned; 'nog aanwezig' means still present; 'afgeschreven' means depreciated; 'ingekuild' means ensiled (This is a special treatment to protect the wreck in situ from further decay. With the use of polyethylene cover the level of ground water will remain stable, which provide better circumstance of preservation of wrecks so for example future research can still be performed.

Opmerkingen: These are comments, which can include anything.

Uitrusting: This means equipment. It is just a checklist if (parts of) the equipment are found with the vessel.

Inventaris: Means inventory. This is again just a checklist if (a part of) the inventory of the wreck was still present.

Lading: Checklist for the presence of a cargo.

Modellen: Checklist for models that are made of the wrecks.

Publikaties: Publications of researches of the wrecks.

Tekeningen: Drawings that are made, with their codes if available.

Foto's: Includes the availability of pictures/ photograph and their numbers.

Microfilm: Checklist if a microfilm is available

Aanwinst 97: Acquisition of 1997. The exact meaning of this column is unknown.

2.3 Construction of a new Maritime Record

From both Archis and the ship catalogue in total 370 records have been gathered. The quality of the data of these records varied enormously due to the amount of research that had been carried out, whether follow-up studies had been taken place, but also the condition in which the archaeological material was found.

In order to make it possible to use as much of the information contained the records described above in this research, the data needed to be incorporated in a new database for entry into the GIS, which in order to distinguish it from other records is denoted the Maritime Record. Specific data were selected and where necessary complemented.

The way in which wrecks are found tells a lot of the state of the wrecks and therefore also the quality of the data. Something that becomes very clear from this maritime record is that if a wreck is found by archaeological inspection or by dredging the data are most of the times less complete than when an excavation has been carried out. It also happened that the state of the wrecks was even more damaged when the wreck was found during dredging activities. However, it often occurred that the lower parts of the wrecks were better preserved than the parts that were located right under ground level, due to the presence of ground water. To increase the preservation conditions several wrecks were ensiled. This means that the ground water level artificially was increased with the use of plastic film. This method is applied to several wrecks that are now protected and saved for future research.

In the new Maritime Record all data are included that concerns wrecks located in the Flevopolders. For this maritime record, the main columns of the ship catalogue were kept, because all the information that is needed was clearly defined. Also it simplified matters to keep the same layout because a lot of data obtained from Archis were already added. The missing data just needed to be added.

The construction of the new maritime records was therefore almost the same as the ship catalogue. The following columns are transferred across:

- Ship or object code
- MH-code
- Wreck number
- Observation/ monument number
- County
- Value
- Class
- X-coordinate
- Y-coordinate
- Ship type
- Length
- Dating
- Reported
- Explored
- Excavated
- Acquisition
- Status
- Comments

As can be seen, the layout is mostly the same. Columns that were judged to be of no importance were left out. The new Maritime Record has been structured to give the more administrative information first, followed by the more technical/ archaeological information such as length, type and date, but also information about when research has taken place and in what state the wreck is in now. The last column consists of recommendations where useful information is noted. When all the data of the records are logged, a search can be preformed of the distribution of wrecks by dating, ship type or any other combination of criteria in order to reveal patterning and relationships.

2.4 Historic Maps

In order to get a better understanding of the distribution of the wrecks within this research they need to be viewed in the context of historic maps.

In the sixteenth and seventeenth century people of the Netherlands became more interested in the history of their region (Walsmit 2010, 15). Next to this interest of the Netherlands, the knowledge of waterways for shipping became more important. Because images of the Zuiderzee didn't exist, mapmakers, who responded to this need, were occupied with creating these images.

However, active navigation on the Zuiderzee did not happen till the beginning of the fourteenth century. Before that period it was impossible to sail because of the extreme low water levels that sometimes occurred, especially in the north of the Zuiderzee where parts became dry land (Walsmit 2010, 142). It was when shipping increased that navigation *charts* became necessary.

The first map on which the Zuiderzee is depicted appeared in the 1579 (Walsmit 2010, 15). It is a map that mainly included the Northern Netherlands with just a small area of the Zuiderzee visible. After this first depiction many other images with the depiction of the Zuiderzee followed.

Today there is a distinction between maps, of which the primary aim is to depict the land, as opposed to charts that are for navigation which although they may show land often don't include the same degree of detail. However, early maps blur this distinction as will become evident.

The first maps were the so-called *leeskaarten* (*rutters* – from the French *routier*). As the Dutch name suggests, these were not so much maps in the modern sense as lists of sailing instructions for specific routes and were based on the knowledge gained from experience, and included information about for example movement of sandbanks and the presence of shoals and their changes. All these instructions were written down by hand or printed until the end of the sixteenth century. Together with these *leeskaarten*, the sounding lead and the compass were the most important nautical instrumentation (Walsmit 2010, 142).
In the sixteenth century coastal profiles were added to the *leeskaarten*. The *leeskaarten* were transformed to little books and not much later sailing routes all the way to Portugal were created and written down. However, the maps that were included were still provided with notes and certainly not always as accurate.

In the same period *zeemansgidsen* (sailor guides) and *zeeatlassen* (sea atlases) were introduced because of the expansion of active worldwide shipping. The difference between the guides and

the atlases were that the guides also included instruction of seamanship and coastal descriptions with sailing descriptions while atlases had more emphasis on maps. One of the most famous creators of guides and atlasses was Lucas Jansz. Waghenaer (1533 - 1606). Waghenaer was a sailor himself so he knew the needs of navigation and how important trustworthy navigation instruments were. His guide *Spieghel der Zeevaerdt* from 1584 was of great importance for the maritime cartography (Walsmit 2010, 146).

For this research, a total of 12 maps have been selected, which vary in date from 1573 to 1909. A brief description of each is given.

Christiaan Sgro(o)ten, 1573 - *Atlas Bruxellensis*

The first map (see appendix A) on which the Zuiderzee is depicted is dated 1573 and was made by Christaan Sgro(o)ten (ca. 1525-1603). He was a Dutch cartographer, employed by the Spanish king Phillip II. Because of the Eighty years' War or Dutch War of Independence between Spain and the Netherlands, reliable maps of the countries were required. Sgrooten made the *Atlas Bruxellensis*, which existed of two parts. The first part, made in 1573, contains 38 maps of different regions in Europe, from Ireland to Austria. The second part of 1592 contains, besides the previous maps, also maps of other parts of the world.

The map on which the Zuiderzee is depicted is called '*Delineatio sinus Meridionalis maris, vulgo de Zuyder Zee ab occidente Waterlandia[m] ab oriente vero Phrisiam occide[n]talem attingentis*'. On this map the Northern counties of the Netherlands (Holland and Friesland) are visible, with the Zuiderzee in the middle. Besides showing roads and cities the map also shows the main sailing routes and shoals. The map appears very accurate even for a sailing map because of the different names that are depicted with the different shoals and passages between the Frisian Islands.

Zacharias Heyns, 1598 - *Hollandia*

The second map (see appendix B) dated from 1598 and is made by Zacharias Heyns (1566-1638), a poet and proser from Belgium, who for religious reasons moved to Amsterdam in 1594. Although Heyns was initially a typographer, the first work he published in 1599 was called '*Den Nederlandtschen Landtspiegel in ryme gesteld*'. This was an atlas that included captions. His most famous work was the *Imitatio of Du Bartas' La Sepmaine en Seconde Sepmaine: De weke* (1616) en *De tweede weke* (1621) (Verkruijsse 1985).

The map of the Zuiderzee however was called *Hollandia* and made in 1598. The map is a woodcut, a technique that was in the sixteenth century rather out of fashion. The map belongs to a pocket atlas that contains 80 maps of which 30 relate to the Netherlands (Utrecht University

Library, 2012). Although the map represents the main routes and cities of the county Holland and around the coast of the Zuiderzee, as a sailing map, it is less accurate than *Atlas Bruxellensis*. For example, around the Frisian Islands the shoals are depicted but not named and the shoals of the Zuiderzee are not displayed at all.

Willem Jansz. Blaeu, 1645 – Novus XVII Inferioris Germaniae

The third map (see appendix C) is from Willem Jansz. Blaeu (1571-1638). Blaeu is one of the most famous cartographers and globe makers of the Netherlands in the Dutch 'Golden Age'. His sailor guides began to appear from 1608, of which *Licht der Zeevaert* is the most well known, and in 1630 he published his first atlas (Walsmit 2010, 157-158). After Blaeus death his sons took over the business. It is probably one of these sons who published the map of *Novus XVII Inferioris Germaniae*.

The map displays all the seventeen counties of the United Provinces of the Netherlands. Although the main roads and cities are depicted on this map, no sailing routes are visible. However, the shoals are present and are slightly changed from the ones that are displayed on the map of Christiaan Sgrooten. Also the names of the shoals and passages are present. It is therefore useful as a comparison for the change of the Zuiderzee, especially the shoals.

Claes Jansz. Visscher, 1652 – Comitatus Hollandiae

Claes Jansz. Visscher (1587-1652) was a cartographer, which at first worked as a decorator of maps from for example Blaeu. However, after a while he opened his own typography studio. He was besides being a talented draftsman and etcher also one of the important publishers of prints, maps and topographical views. He visualized his own environment and from 1607 onwards he also made landscapes of Haarlem and Amsterdam. One of his most famous works is the large city profile of Amsterdam of 1611.

Although this map (appendix D) looks like Blaeu's *Novus XVII Inferioris Germaniae* with regard to the information that can be gained, there are some special details that are interesting. At first there are again the shoals displayed as on the other maps, but this map has a separate framework in which the shoals south of the Frisian Islands are displayed with the buoyage that is present. Another special detail of this map is that the Naardermeer (Naarder lake) is displayed as reclamation. However, after several attempts this never succeeded. Because of details such as these this map has important qualities for this research.

Hendrick Doncker, 1664 – Pas Caart van de ZUYDER-ZEE

Hendrick Doncker (1626-1699) made the first edition of this map (appendix E) in 1664. After that five later versions followed in which small changes and corrections can be traced. The map

is mainly focused on the Zuiderzee Area with small parts of the counties Holland and Friesland. The map is interesting because of the designations of the shoals and passages. However, the reason why this map distinguishes itself from the others is because of the water depths of the main sailing routes that are displayed. Also other aspects of seafaring that are represented on the map, such as buoyage and anchorages, are useful when determining possible maritime activities that have taken place on the Zuiderzee. And although the depth of the sailing route to Kampen is missing the extra features this map are of great importance within this research.

N. Visscher, 1680 – Belgica Foederata

This map (see appendix F) of the United Provinces of the Netherlands is published by Nicolaas Visscher I (1608-1679). It is a new edition of a map that was published earlier in the seventeenth century by his father Claes Jansz. Visscher (1587-1652), who created the previous named map *Comitatus Hollandia*. The map is not only focused on the Zuiderzee but on the Netherlands as a whole. Although the main shoals with their names are depicted, it doesn't give much more information than could be gained from the other maps.

Johannes Loots, 1707 – PasCaart

This map (see appendix G) of Johannes Loots (1665-1726) comprises two different versions, which vary from each other because of the degrees on which they are projected (formal and mercator projection) (Walsmit 2010, 294). However, besides a few aspects the map looks a lot like the map Hendrick Doncker made in 1664 and therefore the information that can be gained from this map provides no additional value. The similarity however can be taken to be indicative of the lack of change in the several passages through the Frisian Islands in the northern Zuiderzee in the period between the creations of these two maps.

Johannes van Keulen, 1771 – Paskaarte van de ZUYDERZEE

From this map also several versions exist, the first dated from ca. 1756 whilst the second map, which is the one that is been used within this research, dates from 1771 (appendix H). Johannes van Keulen (1654-1715) settled in Amsterdem in 1678 or 1679 and made besides maps also quadrants. The map includes the same area as the previous named maps but is again slightly different. The biggest change is the fact that this map is less decorated and the full title *"…met alle des Zelfs inkomende Gaaten: Soo als die op 't Zeekerts konnen Bezeyld worden: naa Haare Correkte Course, Opdoeningen, Droogten en Diepten*." ("… with all the passages that can be sailed, with the correct boat headings, appearances, shoals and depths.") (Walsmit 2010, 301) suggest that this map is more functional for using on board a ship. Also the beacons that and lighthouses that are depicted on this map confirm this statement.

W.J. Struick, 1875 – Schetskaart Marine

For this research is this map (appendix I) not wholly applicable. The map displays the whole Zuiderzee area but is for the details mainly focused on the Northern part and the passages and shoals between the Frisian Islands. The only reason why this map is included is because it is made by the Dutch Navy and therefore more trustworthy qua coastal outline than the previous maps.

Zuiderzeevereniging, 1891 – Dieptekaart

The *Zuiderzeevereniging* (The Zuiderzee Association) existed between 1886 and 1949 when plans were made to reclaim parts of the Zuiderzee. This association did research into the possibilities of the closure of the Zuiderzee and the reclamation of the polders for agriculture. The first plan was to close the Zuiderzee all the way up north between the Frisian Islands, but due to the lack of expertise this was not a reasonable proposition. However in 1913 they finally got a design, which was accepted. Although this decision was made just before the First Wold War, a heavy storm in 1916 caused such extensive flooding that the plan went ahead (Walsmit 2010, 138).

During the research that this association carried out, several plans and maps were made. One of the first designs for the reclamation of the Zuiderzee is depicted on this map (appendix J). Besides that the map from 1891 shows the different depths of the Zuiderzee, it does little to extend our knowledge on other areas. However, these depths aid the analysis of the different wrecks by type and location.

E. de Geest & S. Mars , 1909 – Zuiderzee

E. de Geest made this most recent map (appendix K) of the Zuiderzee and a review is made in 1939 by S. Mars. After this first version six other versions followed (Walsmit 2010, 363). The map, which was used by Rijkswaterstaat (the executive arm of the Dutch Ministry of Infrastructure and the Environment), shows again the Zuiderzee area but this time the whole Zuiderzee is provided with water depths, both as numbers and lines. Again in this map the main buoyages and also beacons and lighthouses are also depicted and sometimes the type of seabed is described. With this map again an extension of the information of the Zuiderzee is displayed.

Bosatlas, 1904 – Sailing Routes

This last map (appendix L) is part of an image of the Zuiderzee on which the most common sailing routes are depicted. The map is originally from the bosatlas (a Dutch atlas) from 1904.

Some of these main sailing routes are previously depicted on other historic maps, which match with the routes that are depicted on this map. Although most of the time only the sailing route from Amsterdam northwards to the Frisian Islands was depicted, this map also shows several other routes that were presumably less important but leading to different places on the shores of the Zuiderzee. Therefore, with this map the distribution of the wrecks that are found, and with that the maritime activities that have taken place could be more defined.

Chapter 3: The GIS Base Map

To use the data that are described in the previous chapter a GIS database was created within the program ArcGIS allowing the data to be plotted on a coordinate system. With this the interrelationships between the different records and data will become visible. Actually a map will be created on which the wrecks are depicted in their exact location on a geographical background. This background can be a contemporary map or one of the historic maps that are described earlier, which are geo-rectified. By doing so, a GIS base map will be created on which the maritime activities of the former Zuiderzee can be analysed.

In the next chapters the selection of data from the maritime records are described and explained. After that the different relationships and distributions revealed by the data will be described. These outcomes are divided in three different chapters, namely distribution, ship type and dating. Of these three subjects the main and most notable features will be described and where possible explained.

3.1 Used data

Although the maritime records are very extensive, only what have been judged as the primary data from the records are used in the GIS Base Map. This was done to keep the Base Map clear. However, the data of the maritime records can always be traced back if further information is needed.

The data that was selected from the digital file, which contained the data gained from Archis and the ship catalogue, consists of the object or ship code, the county, the x- and y-coordinates, the ship type, ship length, archaeological period and dating, and finally the comments. The object or ship code is the identification code that can trace the data back to the digital file. The county and the x- and y-coordinates give an indication of the area where the wreck is found and are also the coordinates necessary to plot the data in the GIS Database. The information about ship type, length, archaeological periods and dating are the most important columns for this research. As described in the introduction within this research the main factors that will be looked at are the distribution; changes in ship types over area and time.

The last column contains the comments. This can be extra information of the shipwreck, e.g. whether it was a whole, almost complete or just a fragment of a vessel. Also if the vessel was built with carvel or clinker construction is indicated here if known. Other things that can be mentioned here are the way the wreck was dated, for example by dendrochronology or typology, if there were finds found near the wreck and other things that were worth mentioning

within this research. This extra information can however also be used for future researches, for example changes in ship construction and further research of the artefacts.

As is written above, the quality of the data, from both Archis as from the ship catalogue, was not consistently good and often incomplete. So, to make a first selection of the wrecks an extra column, which is called archaeological period, is added to the data. By adding this column and then cross-referencing it with the coordinates, even the data that was not of such good quality could still be used.
The archaeological period is decided at first by actual dating based on dating methods, such as dendrochronology. Of most of the other wrecks was a dating or an estimate on the basis of artefacts, construction or stratigraphy known. Based on this dating an archaeological period could be added to the records. Another way to achieve an archaeological period was from the records that were derived from Archis. Most of the time these records were already attributed to a general archaeological period, which could then be simply transferred across. When no archaeological period could be determined for a record the archaeological period of this record has been listed as unknown.

The following dates have been held when deciding the archaeological period:

Archaeological periods in Europe

Archaeological periods			**Year from - to**
Modern Era		C	1850 AD - present
		B	1650 - 1850 AD
		A	1500 - 1650 AD
Middle Ages	Late	B	1250 - 1500 AD
		A	1050 - 1250 AD
	Early	D	900 - 1050 AD
		C	725 - 900 AD
		B	525 - 725 AD
		A	450 - 525 AD
Roman Era	Late	B	350 - 450 AD
		A	270 - 350 AD

	Middle	B	150 - 270 AD
		A	70 - 150 AD
	Early	B	25 - 70 AD
		A	12 BC - 25 AD
Iron Age	Late		250 - 12 BC
	Middle		500 - 250 BC
	Early		800 - 500 BC
Bronze Age	Late		1100 - 800 BC
	Middle	B	1500 - 1100 BC
		A	1800 - 1500 BC
	Early		2000 - 1800 BC
Neolithic	Late	B	2450 - 2000 BC
		A	2850 - 2450 BC
	Middle	B	3400 - 2850 BC
		A	4200 - 3400 BC
	Early	B	4900 - 4200 BC
		A	5300 - 4900 BC
Mesolithic	Late		6450 - 4900 BC
	Middle		7100 - 6450 BC
	Early		8800 - 7100 BC
Palaeolithic	Late	B	18000 - 8800 BC
		A	35000 - 18000 BC
	Middle		300000 - 35000 BC
	Early		370000 - 300000 BC

The coordinate system that is used within the GIS Base map is the RD-new system. RD stands for *Rijksdriehoek* (empire triangle). The system contains the coordinates that are used nationally in the Netherlands for geographical designations and files, like a Geographical Information System (GIS) or topographical maps. The RD system is based on triangulations. The primary

Figure 6. The province Flevoland with its different counties (S. van den Brenk)

measurements were gained between 1885 and 1904 and were derived from the base-point in Bonn, Germany, which was measured in 1892. By doing so, a network was created with interconnected points that were measured with triangulations. Later, some adjustments were made such as the expansion of the amount of base-points. Between 1960-1978 the system was revised and shifted and again in 1987 a GPS-web was created which is connected with the RD-system to which depths have been added (Bruijne 2005, 12-16).

3.2 Distribution

As can be seen with the GIS Base map, the distribution of the wrecks is rather spread. Focusing solely on the wrecks prevents any distinction being made and no further analysis is possible. However, when looking at the distribution by counties, distribution can be explained in greater detail. In the table below the distribution of the wrecks by the different counties is shown:

Distribution of wrecks by the different counties:

County	**Amount**
Noordoostpolder	107
Dronten	119
Lelystad	51
Zeewolde	56
Almere	30
Urk	7
Total:	**370**

When the total is compared with the division of the different counties and their surface (figure 6) it becomes clear why for example Urk only has seven wrecks while in the Noordoostpolder and Dronten a much greater amount of wrecks are found.

Urk and Schokland – the Zuiderzee-islands

Besides the different surfaces of the counties other aspects can be of influence when looking at the distribution of the wrecks. As is written in the first chapter, the former Zuiderzee contained four islands, of which two are included in the Flevopolders when they were reclaimed. These two islands were named Urk (also the name of the county) and Schokland (located in the county Noordoostpolder).

Both Islands were populated around 800 A.D., although they must have been completely surrounded by water at ca. 966 A.D. (Walsmit 2010, 42). This encirclement, combined with peat farming that took place simultaneously, resulted in heavy losses of land for both islands, which continued until ca. 1600. Around this date Urk reached its size, as it was still known before the polders were reclaimed (Walsmit 2010, 43). For Schokland the land losses were less severe, with a larger area of ca. six square kilometres still present in the Late Medieval period. The fact is however, due to several storm surges in the fourteenth century on both islands, the living conditions deteriorated and from ca. 1300 a migration to the city of Kampen becomes visible (Walsmit 2010, 44).

Despite the land losses and migration of the inhabitants, the islands were important landmarks from the beginning of seafaring on the Zuiderze*e*. As can be seen on the map of Christiaan Sgro(o)ten of 1573 (see previous chapter), the *Enkhuizer sandbank* forced the ships to sail past Urk. For the sailing route to Kampen, Schokland became important, because of the shallow lee shore located at *IJsseldelta* (estuary of the IJssel), which was hard to recognise when coming from out to sea (Walsmit 2010, 46). Besides the landmarks the lee side of the island Urk also provided a very good for anchorage when heavy weather occurred (Walsmit 2010, 46).

Although these islands were important for seafaring, it was not until ca. 1660 that steps were taken to prevent the islands from further decline. Urk was by then part of the city Amsterdam, which due to the advantages gained by the use of this island as a landmark, protected it with a fixed construction existing of wooden revetment and other structures. However Schokland was less fortunate, because only part of this island belonged to the city of Amsterdam and wasn't seen as important for shipping travelling to and from Amsterdam. The other half of Schokland was part of the county Emmeloord, which was financially inadequate to protect the island. By the nineteenth century only a quarter of the island was still left (Walsmit 2010, 48). Eventually, between 1850 and 1860 Schokland was vacated because habitation was deemed unsafe.

However, before habitation on the islands was limited or came to an end, both islands were besides being important landmarks also very active themselves in seafaring. Because of the decrease in landmass, agriculture wasn't possible anymore at a certain point. From the middle of the seventeenth century fishing activities became increasingly important for the economy of the islands and in the eighteenth and nineteenth century they were completely dependent on fishery. Typical vessels that are originated from these islands prove this, like the Schokker (named after the island Schokland).

When the Flevopolders were reclaimed both Urk as Schokland became part of dry land (see historic maps, appendixes A - L). Urk became a county while Schokland was included in the

county Noordoostpolder. It is also for this reason that in the county Urk only seven wrecks were found. However, Schokland was just a narrow strip of land and has not as much influence on the amount of shipwrecks that are found within the county Noordoostpolder. However, although Schokland was just a small area, in the immediate surrounding of this former island several wrecks are found. This will be described in the next chapter.

Another reason that was of influence of the density of the wrecks that are found is the way the drainage pattern in county of Noordoostpolder is constructed. It is known that the distance between the drainage ditches in this county are more widespread than in the other polders. And because the most wrecks are found when constructing these ditches, this made a difference in the numbers of wrecks known.

3.2 Ship types

The ship types that are gained from the different databases are very diverse. In total 30 different ship types are described in the databases and of them, 125 are classified as unknown. Ship types and numbers therefore are displayed in the table below.

Ship type	Amount
Aak	2
Ankerbootje	1
Baggerschuit	1
Beurtschip	1
Bokje	1
Botter	2
Cargo vessel	50
Cog	17
Fishing vessel	38
Galleon	1
Hollandsche boat (Dutch boat)	1
Jol	2
Katschip	1
Koopvaarder	16
Log boat	1
Modderschouw	1

Ship Type	Amount
Pram	29
Puinschip	1
Punter	2
Rowing boat	2
Schokker	5
Sloop	6
Steam ship	2
Tjalk	23
Uitlegger	1
Veenschip	1
Ventjager	1
Vlet	2
Volendammer kwak	1
Water ship	31
Unknown	125
Total:	**370**

Figure 7. Reconstruction of cog, called the Kamper Hanze Kogge, from the Netherlands. This reconstruction is based on a cog-find of the fourteenth century, found in the Flevopolders

Figure 8. Hold of a water ship found in ‘t IJ near Amsterdam. Clearly visible are the holes pierced through the strakes (Periplus Archeomare).

As shown in the table, most ship types have only a few wrecks attributed to them. It is therefore very difficult to trace a distribution pattern of these wrecks on the GIS Base map. Fortunately there are larger numbers for the more common ship types, enabling the distribution of these particular ship types to be analysed.

Of wrecks of which the exact type was not known, but from for example, artefacts or construction the function could be deduced, a separate group of functional types emerges. For these classes of wrecks two groups are included, namely cargo vessels and fishing vessels. However, ship types within these two classes could be anything. This notwithstanding, by looking at the function of these classes and the location where they were found, information can be gained of the presence of wrecks with these functions in different areas of the Zuiderzee.

To gain a greater understanding of the types of vessel of which larger numbers are found, a short description of those vessels is given below.

Cogs

Cogs were already mentioned and depicted in the ninth century. These reference seem to increase in the thirteenth and fourteenth century, when they were a dominant cargo vessel during the period of the Hanseatic League for voyages to Scandinavia in the north, to Germany in the east, and Britain and Ireland and the Rhine region in the Netherlands far to the south (McGrail 2001, 232; Heide 1974b, 19). Alongside their use as trading vessels, cogs during these centuries were also used as warships and for transporting troops.

Of the cog many variations are known. Most of the wrecks that are found and described as cog have several features in common (figure 7). Because it is not known how cogs differ from other contemporary boat types, the cogs that are found in the Zuiderzee are designated as "cog-like" vessels (Moortel 1991, 14).

Water ships

A water ship got its name from a hold that was sometimes pierced with holes allowing water into the compartment so the fish could be transported alive (figure 8). Water ships were mainly used on the Zuiderzee between ca. 1500 and 1700, and in the sixteenth century they were besides transport of fish also used for fishing activities itself due to the increasing demand for fish (Daalder 2005, 44). In the eighteenth century water ships were still used in the fishing fleet of for example Hoorn, Marken, Uitdam and Zaandam (Haalmeijer 2002, 113); however, they were soon after replaced by Botters.

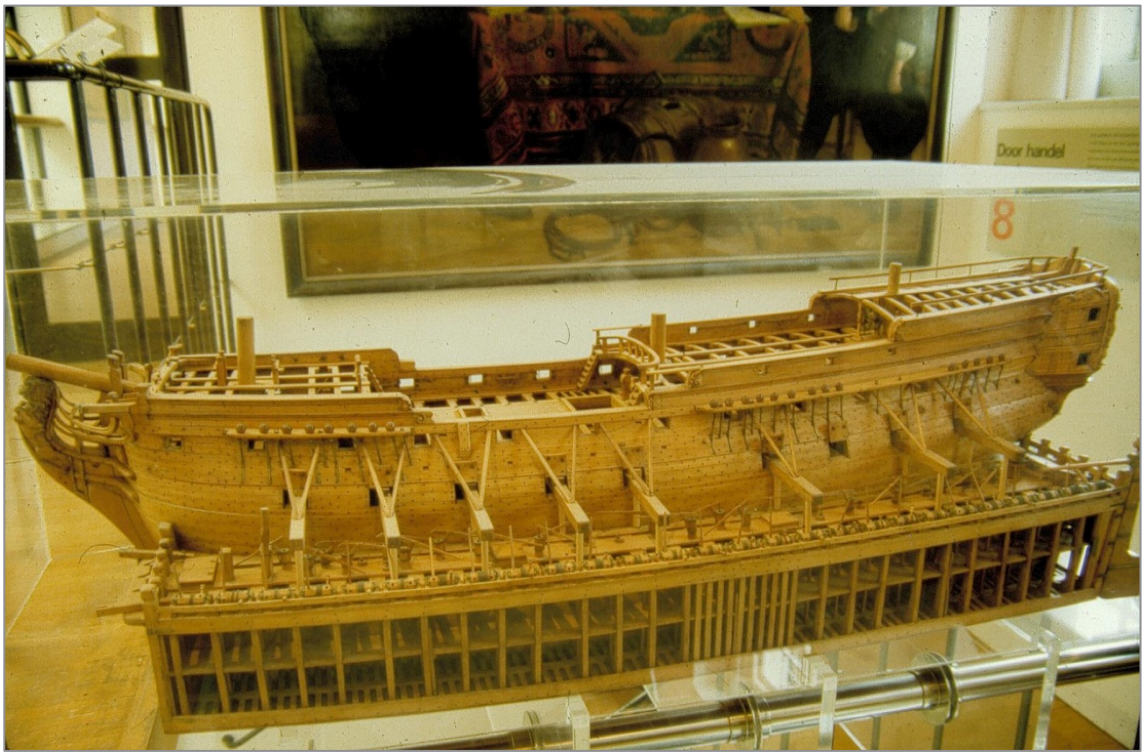

Figure 9. Model of the new 150 foot class of VOC ships designed in 1742 of which the Amsterdam lost in 1749 was to be one, here shown within the camels that would be need to float her high enough to reach the open sea (Model Rijksmuseum).

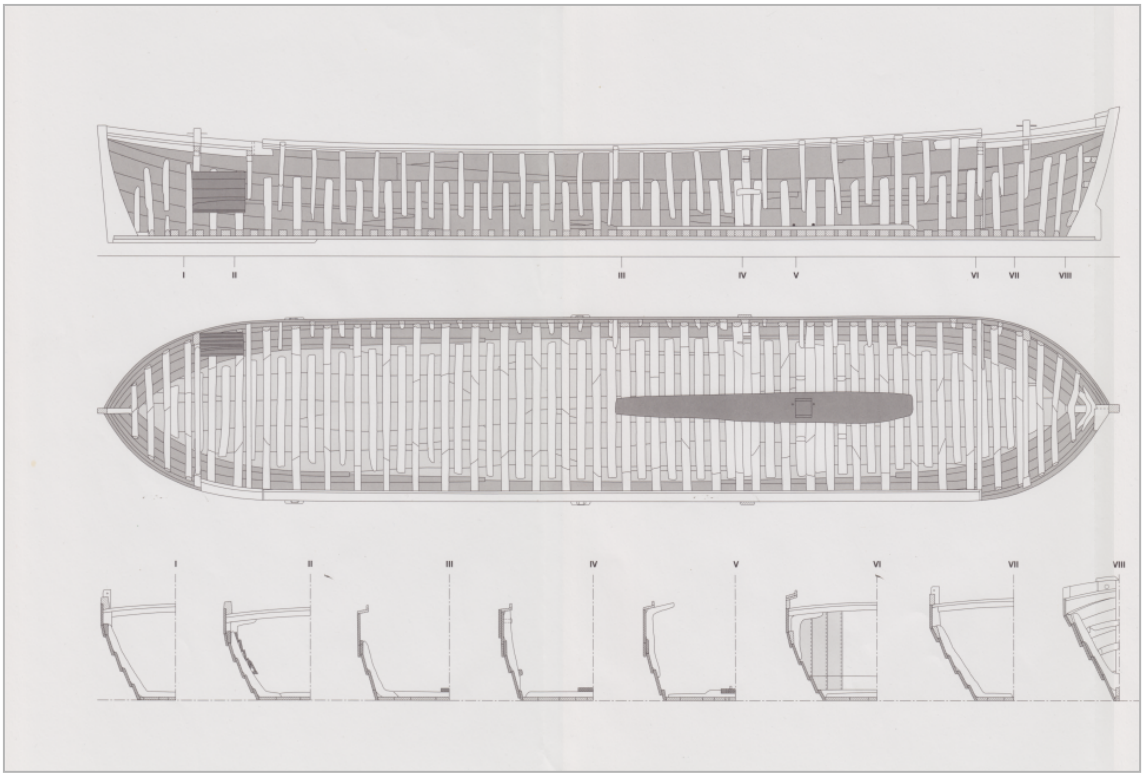

Figure 10. Reconstructed plan view drawing, longitudinal section and cross sections of a pram of the eighteenth century found in the Flevopolders (McLaughin 1993, appendix).

However, the water ships were not known only for the fishing activities but for the pulling of ships and so-called "ship camels" past the shoal of the Island of Pampus near Amsterdam. A "camel" was a construction specially made for larger cargo vessels to make it possible for them to cross the shoals (figure 9).

The pair of camels was put around the vessels in a flooded state and by pumping out the water, lifted the vessel up. Because of their strong construction water ships were particularly suitable as tugboats. Another possibility was the use of water ships as "lichters" (lighters). This means that they transported cargo to and from larger merchant vessels, like Fluyt ships or East Indiamen, for the same reason ship camels were used. However, the construction of the Noord-Hollands Kanaal (canal between Amsterdam and the North Sea) in 1824 marked the end of water ships (Daalder 2005, 47).

Another ship type that was sometimes mixed up with water ships are those with a closed bun in which water was transported, either for salt extraction or fresh water that was used for brewing in Amsterdam. However, this ship type had nothing to do with the activities that took place in the Zuiderzee area (Daalder 2005, 47).

Prams

Prams or pram-like vessels are known from eighteenth and nineteenth century representations. Structural characteristics of this kind of vessels are: a medium-sized vessel having a box-like shape with a fairly constant breadth throughout, a dead-flat bottom, and a sharp angular chine (figure 10). These vessels primarily transported bulk cargoes such as peat, mud, stone, coal, lumber and grain (McLaughin 1993,12).

The characteristics that are assigned to the wrecks found in the Zuiderzee area are specifically the Overijssel varieties. This is because the term 'pram' has a broad usage defining either a sturdy seagoing vessel or a small, flat-bottomed boat. Outside of the Netherlands, other areas of Northern Europe also had vessel-types referred to by names spelled similarly to the Dutch 'praam' such as the English 'pram', the French 'prame' and the German 'prahm'. However, how similar these were to the prams found in the Netherlands, remains to be seen (McLaughin 1993, 91). Yet, within this research it is assumed that these different names refer to similar vessels and therefore the English translation 'pram' refers to the same vessel, the Dutch 'praam'.

Tjalks

A tjalk is a cargo vessel that was mainly used on the inland waterways but sometimes also at sea, for example as ferries over the Zuiderzee for people or cargo (Heide 1974b, 63). The vessels were provided with a large hold in which cargo could be transported. The tjalks that are found in the Zuiderzee are traditionally made out of wood. However, tjalks are still constructed only

currently out of iron and steel (Heide 1974b, 63). The round bow was one of the features that were typical of tjalks, but not diagnostic. Many Dutch ship types share this characteristic form (Adams 1990, 54). Besides, in different regions, different types of tjalks were constructed. To still make a distinction between these types, an extra addition was given to the name of this specific type; the Groninger tjalk and Frysk tjalk are examples of these specific names.

Koopvaarders

Koopvaarders were merchant vessels, which could also be used to transport a (large) cargo or people. They were part of the merchant fleet and were besides, for example the Zuiderzee, also sailing outside the inland waters for trade, to international places such as the Baltic. However, they could when looking at construction and use (partly) be abscribed to cargo vessels. Yet because of the specific name that is been given to these wrecks it is a group that stand-alone.

3.3 Dating

As is noted above there is another column added because the dating of the wrecks was most of the time hard to ascertain. It is therefore that the column with archaeological period is added. In total eleven periods are distinguished, namely:

Archaeological period	Amount of wrecks
Iron Age – Roman Period: 1100 BC – 450 AD	1
Late Medieval: 1050 AD – 1500 AD	4
Late Medieval B: 1250 AD – 1500 AD	21
Late Medieval – Modern: 1050 AD – present	35
Modern: 1500 AD – present	51
Modern A: 1500 AD – 1650 AD	62
Modern A/ B: 1500 AD – 1850 AD	56
Modern B:	77

1650 AD – 1850 AD	
Modern B/ C: 1650 AD – present	16
Modern C: 1850 AD – present	28
Unknown	20
Total:	**370**

From this table it becomes clear that most of the wrecks are from the Modern Era, namely from 1500 onward. In particular the period 1650 – 1800 (Modern Era B) includes the most dated wrecks, which is not surprising given the fact that the Zuiderzee was sailable after 1400. Additionally, in the nineteenth century further changes took place, such as the construction of the Noord-Hollands Kanaal (Reinders 1982, 8), leading to a decrease in maritime activities.

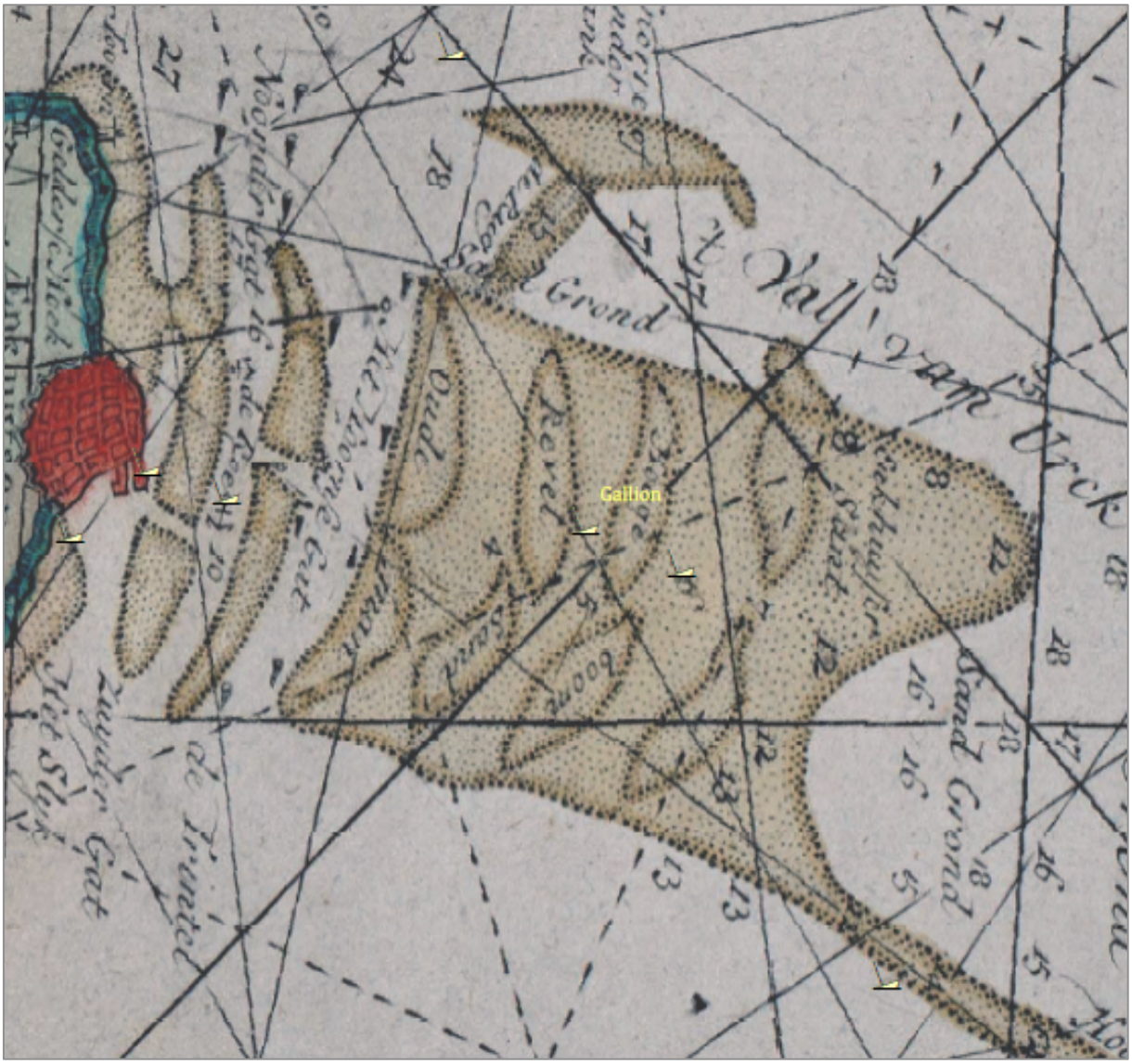

Figure 11. Cluster of wrecks in the shoals of the *Enkhuizer zandbank* (Sandbank) near Enkhuizen.

Chapter 4: Analysis

Within this chapter the data derived from the new Maritime Record and which are displayed in the GIS base map will be analysed. Three main classifications are used, namely: analysis of the distribution, changes in ship types and dating. Of these three classifications the main aspects of appearance will be described and of course analysed.

4.1 Analysis of the distribution

When the wrecks are examined together, a number of clusters become apparent (appendix M). The first is a small cluster of eight wrecks that have little in common other than their location. The wrecks are located near the former estuary of a river, which is called *Tjonger* or *Kuunder*, near the village Kuinre. Kuinre used to have a harbour, with fishing being a known activity. However, after the reclamation these activities naturally ceased; the landing places of this former fishing village now terminate in agricultural land.

A second cluster can be found around the former island of Schokland. 26 wrecks are mostly located on the southwest side of the island. The wrecks are very diverse, both in dating and in ship type. As is seen in chapter 3 the island was an important landmark for shipping and also fishing activities took place. The east side of the island, which was the lee side, was also a good sheltered anchorage, which explains why on this side less wrecks are found.

The third cluster can be seen in the shoals of the *Enkhuizer zandbank* (Sandbank) (figure 11). In front of the shore of West-Friesland, numerous sandbars are located, which together formed the *Enkhuizer zandbank*. These oblong sandbanks reach out from the shores of West-Friesland all the way to the *Val van Urk* (passages near the island Urk) and consist of alternating sandbars and gullies (Willemsen 1988). Five wrecks of this cluster that are located near Enkhuizen are all found between the sandbanks in the gullies. One of these vessels is a galleon, a large cargo vessel which was often used by the VOC. Six other wrecks are located on the 'Hout rib', a spit that reaches all the way up to the *Val van Urk* and which is connected to the sandbank.

A large cluster, approximately 30 wrecks, is located in front of the IJssel estuary near Kampen. Because Kampen was an important port it is not surprising that many vessels were sailing in this area. As was noted in chapter 3, the estuary of the IJssel was not easy to find and also changed sometimes because of the silting up and movement of sandbars. In early medieval times Kampen was one of the main ports located alongside the IJssel because it acted as a link to the hinterland. However, in the fifteenth century the navigability of the IJssel decreased, because of the

increasing draught of ships and the silting up of the river itself. This caused that several ports along the IJssel could no longer be reached and as a result did not survive. Kampen however was in ca. 1400 still an important harbour, orientated on shipping to the Baltic (Walsmit 2010, 75). Nevertheless, several factors in the fifteenth century caused a shift towards the ports on the west side of the Zuiderzee, resulting in Kampen losing also its prominent position. The wrecks of this cluster give a good indication of the important port Kampen used to be.

The last cluster can be found in front of the estuary of 't IJ near Amsterdam. Approximately fourteen vessels are wrecked at this location, with eight of them precisely located on the shoal of the island Pampus. This island was a large obstacle for ships that were coming from and going to Amsterdam. As noted in chapter 3 several solutions foremost of which was the use of water ships and camels to make it possible for especially larger vessels to reach the harbour of Amsterdam. The wrecks are diverse and can indicate different activities that are specific for this area, and the port of Amsterdam. As noted above, Amsterdam became increasingly important from the fifteenth century onwards, with a consequent increase in maritime activities.

When the wrecks within the different counties are compared with the ship type also other conclusions can be made. For example in the county Almere, seven of the 30 wrecks are cargo vessels, two are prams, three are tjalks and three are water ships. All of these wrecks were or could be used to transport cargo. This is not really surprising, because of the fact that the county Almere lays in the sailing route to the port of Amsterdam. Although the dates of the ships vary, from this evidence it is hard to escape the conclusion that Amsterdam have been an important trading port for a long period of time, as is also written in chapter 1.

For the county Noordoostpolder a total of 107 wrecks were found. Although the shiptype of 33 wrecks could not be defined, the other wrecks are more diverse than for example the wrecks found in the county of Almere. The distribution of both cargo- as fishing vessels is very widespread and patterns or clusters are absent.

In the county Dronten, 119 wrecks are found of which 31 could not be conclusively catagorised. An additional 31 wrecks can be described as cargo vessel, while the other remaining vessels had a function of fishing vessels. The distribution of these different ship types indicates that in this particular area of the Zuiderzee both activities frequently occurred.

For the county of Urk, as is noted above, a smaller amount of wrecks is found. The wreck themselves have again little in common. There is only one wreck that could be specified by a ship type and that is the earlier mentioned galleon. However, the coordinates of this wreck are indicating a location, which is much closer to Enkhuizen than Urk. So from only the distribution of wrecks located in the county of Urk, not much further information could be gained.

Lelystad is a county in which 51 wrecks are found. Most of these ship types that occur in this county are most probably cargo vessels. However, almost the same amount of wrecks is connected with fishery. This almost equal division seems logical for the area in which the county in located, namely in the centre of the Zuiderzee. This also corresponds with the dating of all the wrecks, which are with a few exceptions all dated between 1500 AD - present.

The last county is Zeewolde. This county lies in the most south-eastern corner of the Flevopolder. In total 56 wrecks are found of which the two main groups are cargo vessels and water ships. Additionally, a relatively large amount of cogs is present in this county that are located in close proximity to each other. The reason for this cluster will be further described at paragraph 4.2.

Sailing routes

The sailing routes as depicted variously in the maps mentioned in paragraph 2.4, are almost identical to each other. The most important routes, from late medieval times to the Modern period, were from Amsterdam to Kampen or further north, to Lemmer for instance. Other sailing routes that are often depicted are to the Frisian Islands, and the passages between them. Because of the shoals that are prevalent in the northern part of the Zuiderzee, the depiction of these sailing routes is not surprising.

On the image from 1904 on which all the sailing routes are depicted, it appears that many more sailing routes were used. In addition to the Amsterdam to Kampen route, routes to Zwolle and Enkhuizen and onwards from Enkhuizen to places like Lemmer, Stavoren and even Harlingen are shown.

When looking at the wrecks it does not become immediately clear that these sailing routes were also used, or just give an indication of the interaction between the places that are connected through these routes (appendix N). To determine the main sailing routes that were used by means of the wrecks and how they have changed over time, the location of cargo vessels gives some indication. It is plausible that vessels with such a purpose were following a sailing route to reach their destination as quickly as possible. Other ship types, like the fishing vessels, were sailing all over the Zuiderzee. As is noted in chapter 1, there were various amounts of fishing vessels, especially in the nineteenth century, all with different techniques and backgrounds etc. that could be found all over the Zuiderzee. Unfortunately, the lack of specific data differentiating between the different types of fishing vessels and their relative home ports precludes the possibility of correlating fishing vessel types with specific locations. However, it is unlikely that specific routes could be discerned by examination of the wreck data alone.

With cargo vessels the result might be different. Although it seems logical that cargo vessels would have followed specific routes, on the Zuiderzee however, this does not seem the

case. There is no specific pattern or even cluster of one particular ship type that can be recognised on all the routes. On the route from Amsterdam to Kampen numerous cargo vessels are found suggesting that they are following the main route. Even though it is not possible to be sure that any individual wreck was using this sailing route, this is not to say that the shown routes were not of importance. They might represent the main routes that in combination with landmarks were important guidelines.

4.2 Development in ship types

Although most of the ship types inevitably only contained small numbers of wrecks, there are some exceptions and it is the distributions of these that are numerous enough to perhaps reveal other significant clustering or patterning.

Cargo vessels

Within the group of cargo vessels (appendix O), two clusters could be detected. The first cluster was located on the sailing route to Kampen and contained eleven wrecks, while the other cluster was located on the sailing route to Amsterdam and contained seven wrecks. In the cluster in front of Kampen four wrecks had a cargo that varied from municipal waste, to shells and basalt stones. Most of the wrecks had a length between 16,5 and 17 metres, except for one that had a length of 19 metres. The dating of these wrecks was set to Late Medieval to the Modern Era: 1050 AD – present. Although within this research the cargo of a vessel was not included, the cargo of these vessels does tell something about the maritime activities that took place and where these vessels were used for.

It is known that municipal waste and shells were transported from larger cities to the hinterland. Municipal waste, which was sometimes thrown in the canals, which were later on dredged, was shipped to be used as manure for the peatlands. It was also used for constructing artificial elements, such as dikes. The dike by a place called Wilnis is an example. After the dike was shifted, this municipal waste became visible again (Butijn 2003).

Shells were used for the lime kilns that were located in the area of Kampen and Zwolle. The shells were collected mainly from beaches on the North Sea and were used to create chalk (Gerding 2003). Lime kilns in the Netherlands were already active before 1500 and were used until the nineteenth and even into the early twentieth century. The resultant chalk was used in a variety of ways for example in building materials e.g. cement.

The cluster near Amsterdam bears few similarities to the Kampen cluster. Some of them are carvel, some clinker built and two of them are described as *platbodems* (ships with the first

few strakes up from the keel carvel built). The length of the vessels varies from twelve to eighteen metres. In contrast with the cluster found near Kampen, no maritime activities could be gained from these wrecks.

Cog (appendix P)

Most of the Cogs date to the Late Medieval Period (1050 AD – 1500 AD), with the exception of a small number of wrecks that are dated to the Modern A (1500 AD – 1650 AD) and Modern A/B era (1500 AD – 1850 AD). However, after the seventeenth century and probably even earlier, cogs were not used anymore on the Zuiderzee, when they were superseded by prams and tjalks. These vessels were better constructed for their purpose on the Zuiderzee where less draught was preferable. Another reason for cogs being superseded may be connected to the very wide planks required e.g. big trees, lots of splitting and sawing, whereas later types had much smaller planks.

In the southern part of the Zuiderzee is a cluster of five wrecks. The wrecks are located east of the estuary of the river Eems, which lead to the city Amersfoort, between the places Nijkerk and Spakenburg. Although the reason for this cluster at this particular location is not precisely known, Nijkerk and Spakenburg were important places for respectively trade and fishing activities that were focused on the Zuiderzee. Also the bigger towns Amersfoort and also Hardewijk that are located nearby were of importance. Hardewijk, which was also part of the Hanseatic League, was an important port for trade and acted even as a link for the hinterland. Because the wrecks are dated between the Late medieval B and Modern A period (1250-1650 AD) it is very plausible that trade within these different places is a good explanation for the presence of these wrecks.

In the northern part of the Zuiderzee, in the county Noordoostpolder, another two wrecks of cogs were found. These two wrecks are defined as fishing vessels instead of cargo vessels. Of both the wrecks the ship type is not sure; one is possibly a pram and the other could be a transitional type. This combined with the fact that they are defined as fishing vessels indicates that they most certainly relate to cogs but their specific use and even type cannot be determined for sure.

Fishing vessels (appendix Q)

A cluster of six fishing vessels, which are dated late Medieval – Modern (1050 AD – present), are located near the east shore, of which three are located near the estuary of the IJssel to Kampen. This however, does not imply any further information, besides the fact that Kampen was an important city in the Zuiderzee Area.

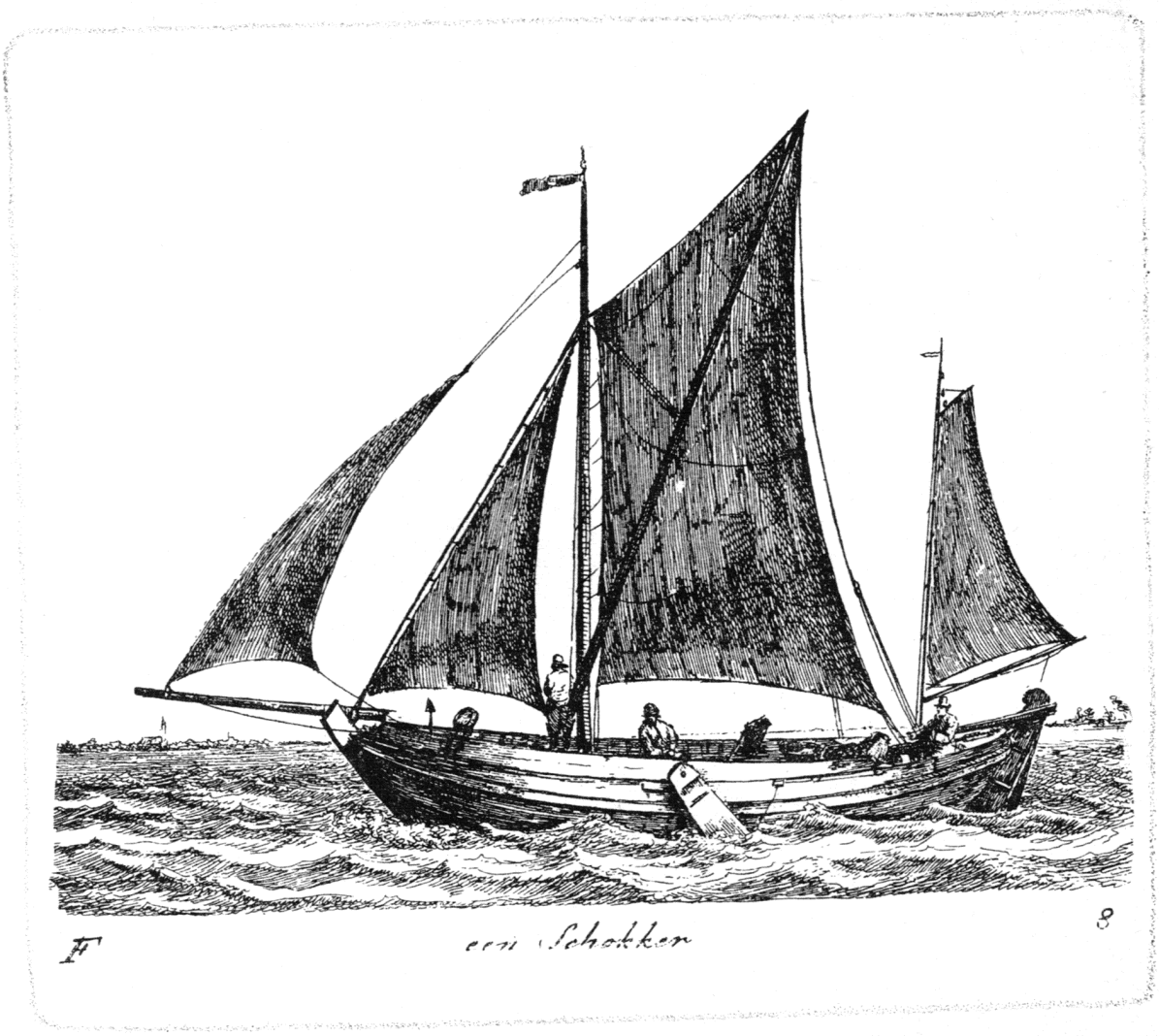

Figure 12. Sketch of a Schokker (Groenewegen 1789)

Near the island of Schokland eight fishing vessels are located, of which two are indicated as possibly a fishing vessel of the type Schokker (figure 12). This type is assumed to be the oldest type of fishing vessel of the Zuiderzee. It is sometimes thought that the name is derived from the island Schokland. This however, is not as straightforward because the island did not gain this name until 1806, when these types already existed (Heide 1974b, 77).

Another cluster of fishing vessels is located in the middle of the sea (seven wrecks, most of them dated seventeenth/ eighteenth century) and several other fishing vessels are found widespread over the rest of the polders. Four of these vessels that are dated in the modern period (between 1250 AD and present) are coated with iron sheets. However, part from their location and their function as fishing vessels no further resemblance can be made between those wrecks.

Koopvaarder

One koopvaarder that had a cargo of *IJsselsteentjes* (small yellow bricks that are specially made in the north-eastern part of the Netherlands) is found in the county of Dronten. This koopvaarder was wrecked near a cargo vessel that was likewise carrying a cargo of bricks. It is known from historic sources that ships, especially on the upward voyages to for example the East Indies, were laden with bricks. In the seventeenth century these bricks were taken as 'paying ballast' because of their weight. In other words they functioned ballast for ships but also were a paying cargo. At the end of the voyage this ballast was sold in exchange for trade goods. Here they were used for the construction of buildings, churches and other structure. In Suriname and Indonesia are constructions still surviving that are built with those bricks (Rijn 2011).

In the north are two wrecks of koopvaarders found that were probably constructed with more decks and two or three masts. One of these wrecks is the largest koopvaarder that has been found in the polders, namely 45 metres. Another wrecks had a length of 40 metres but this one was located in the middle of the Zuiderzee Area (on her way from or to Amsterdam). This variety of these vessels is not surprising, because it is actually not a specific ship type. As was explained in the previous chapter, koopvaarder can be seen as a cargo vessel, with many different functions.

Pram

Analysis of the distribution of prams unfortunately reveals very little. All the prams are dated in the Modern Era (1500 AD – present) with noting in their distribution to indicate anything of note. The wrecks of the prams are very regular spread, with just a few more wrecks located near the IJssel estuary.

Tjalk

As with the distribution of prams, the wrecks of tjalks fail to provide any pertinent insights. One wreck, again found with a cargo of bricks, is located near the cargo vessel and koopvaarder with the same cargo mentioned above. Because tjalks were also used as cargo vessels the purpose of this wreck with the cargo is believed to be the same as the other wrecks. Two other tjalks had a cargo of coal, which act as an indicator of ships on their way to urban or industrial centres. Another use for coals can be the beacons that were placed to indicate the waterway with fire, which at a certain point were made with these coals (Schaper 2010).

Wrecks of which the type of vessel was unsure, and especially the ones that were also tjalk-like, are without exception found in the Noordoostpolder. It is clear that in this area, vessels with a flat, tjalk-like construction are more frequently found than in other parts of the polders. However, when looking solely at the distribution of wrecks that were certainly tjalks it does not appear to be the case. Only five of all the tjalks are located in the northern part of the polders.

Water Ship

Of the water ship only four of 31 wrecks are found in the northern parts, with two of those wrecks also really on the outer edge on the north and west side of the county of Noordoostpolder (appendix U). It is clear that, having regard to the use of these types of vessels that they are found in the more southern part. The water ships, which had a triple function, were used as both fishing vessels, tugboats or as *lichters* (lighters) (see chapter 3) In these roles one would expect them to be found near the areas associated with those functions and the fact that the only water ship that was indicated as a cargo vessel is located quite far to the east is consistent with this.

4.3 Dating

The Zuiderzee only became navigable from the beginning of the fourteenth century. Before that period it was possible with extreme low water levels that, especially in the north, parts of the Zuiderzee became dry land (Walsmit 2010, 142). It is for this reason that there is a big gap in the dating of the wrecks that are found. No wrecks from the archaeological period commencing from the end of the iron age/ roman period to the late medieval period (between 450 and 1050 AD) have been found. In this next section, the different archaeological periods and how they represent the changes in dating of the wrecks will be examined.

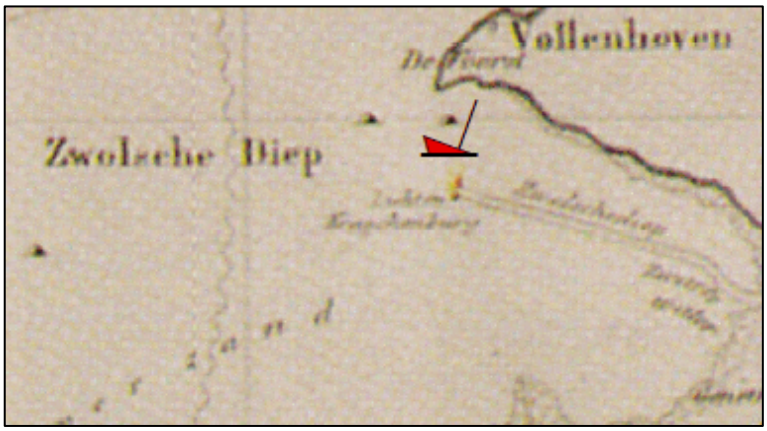

Figure 13. Detail of the historic map from W.J. Struick, 1875 (Appendix I). Depicted is the wreck of the log boat on its located next to the coastal spit near Vollenhove

Iron age – Roman period.

Concerning the Iron age/ Roman period (1100 BC – 450 AD) only one wreck of a log boat is known, despite the fact that the Zuiderzee was only navigable from the fourteenth century onwards. The find of this wreck is however possible because it was located next to what was a coastal spit of land near Vollenhove (figure 13). Vollenhove is a settlement that is located on a boulder clay hill that already existed even before the Zuiderzee got is final appearance. This location must have been attractive for early habitation because of the water and the surrounding land, which was suitable for activities such as agriculture, cattle breeding and fishery (Mooijweer 2007, 149). The find of this wreck is therefore not completely surprising. The location of the wreck belongs meanwhile to the province of Flevoland, which is the reason that this wreck is part of this research.

Late medieval

Only four wrecks are dated late medieval (1050 – 1500 AD). This period include both Late medieval A and/ or B and thus covers a large period. Whilst it did not initially appear that there is any connection between these wrecks qua distribution, closer research reveals that two of the wrecks are cogs, of which one is located near Nijkerk in the south (and are part of the cluster of cogs that are noted in paragraph 4.2) and one is located near Kampen and the *Zwolsche diep* (see appendix L). The *Zwolsche diep* is an inlet, which lead inland to Zwolle and further to the provinces of Overijssel and Drenthe. Like Kampen, Zwolle was also part of the Hanseatic League and therefore in this period a town that had an important focus on shipping. The *Zwolsche diep* is today still in use

The other two wrecks are located on the sailing route to or from Amsterdam. Although these wrecks don't provide much more information, the location of these wrecks in this period indicate even before Amsterdam became the most important port of the Zuiderzee sailing to this city was already undertaken.

Late Medieval B

When the distribution of all the wrecks that are dated Late Medieval B (1250 – 1500 AD) are compared with the distribution of the previous selection, Late Medieval, it becomes apparent that the vessels are much further away from the shore and also located at the middle of the sea (see appendix V). Also the division between the northern and southern polders is very similar. It can therefore be said that it is a fact that navigability on the Zuiderzee already took place extensively and maritime activity took place all over the Zuiderzee and not only at the shores.

In this dataset nine of the 21 wrecks are cogs. Although the locations of these vessels are widespread, the majority lie in the counties of Dronten and the Noordoostpolder, which can be explained by the presence of Kampen and Zwolle.

Another wreck from this dataset is a rowing boat. This wreck is striking because it is located in the middle van de Zuiderzee and lays also the farthest away of any shore of all the wrecks in this dataset. However, it seems unlikely that it was in use this far from shore. The most likely explanation for its loss in this location is that it was a dinghy for a larger vessel and might have been tow astern or stowed on deck. Such boats were often lost in the sudden onset of heavy weather.

Late Medieval – Modern

This dataset, which includes the period between 1050 AD and present, contains (again) a ship with the cargo of bricks, which is located near the east shore of the southern counties. In spite of this one wreck no further information could be gained from these data. It is clear, as is already shown by the large area the archaeological period covers, that the quality of these data was not really sufficient to use and therefore an analysis is not possible.

Modern

Although this dataset does not cover as large a period as the previous one, from 1500 AD to present, little more is revealed from this dataset. Of 28 of the 51 wrecks that this dataset contains, not much more information is known besides the coordinates. Nonetheless, they do demonstrate that in the Modern era, the sailing route from Amsterdam to Kampen became much more important, with 31 of the wrecks that are included in this dataset are located on this particular sailing route. On the sailing route to the *Zwolsche diep* again two more wrecks are located and on the sailing route from Kampen to Enkhuizen via Urk also three wrecks are found.

Again in this dataset four sloops are found that are located on the main sailing route. It is again, like the rowing boat from the previous dataset Late Medieval B, assumable that these vessels belonged to larger ships. Another possibility is that sloops were also used on the Zuiderzee, and therefore can be seen as a freestanding ship type. Because there is also a rowing boat present in this dataset, which is also indicated as working boat, this function can be a realistic alternative. However, because of the length of most of the sloops, between 4,5 and 5 metres, and because the rowing boat has a length of 7 metres, it is more likely that the sloops had a function as dinghy.

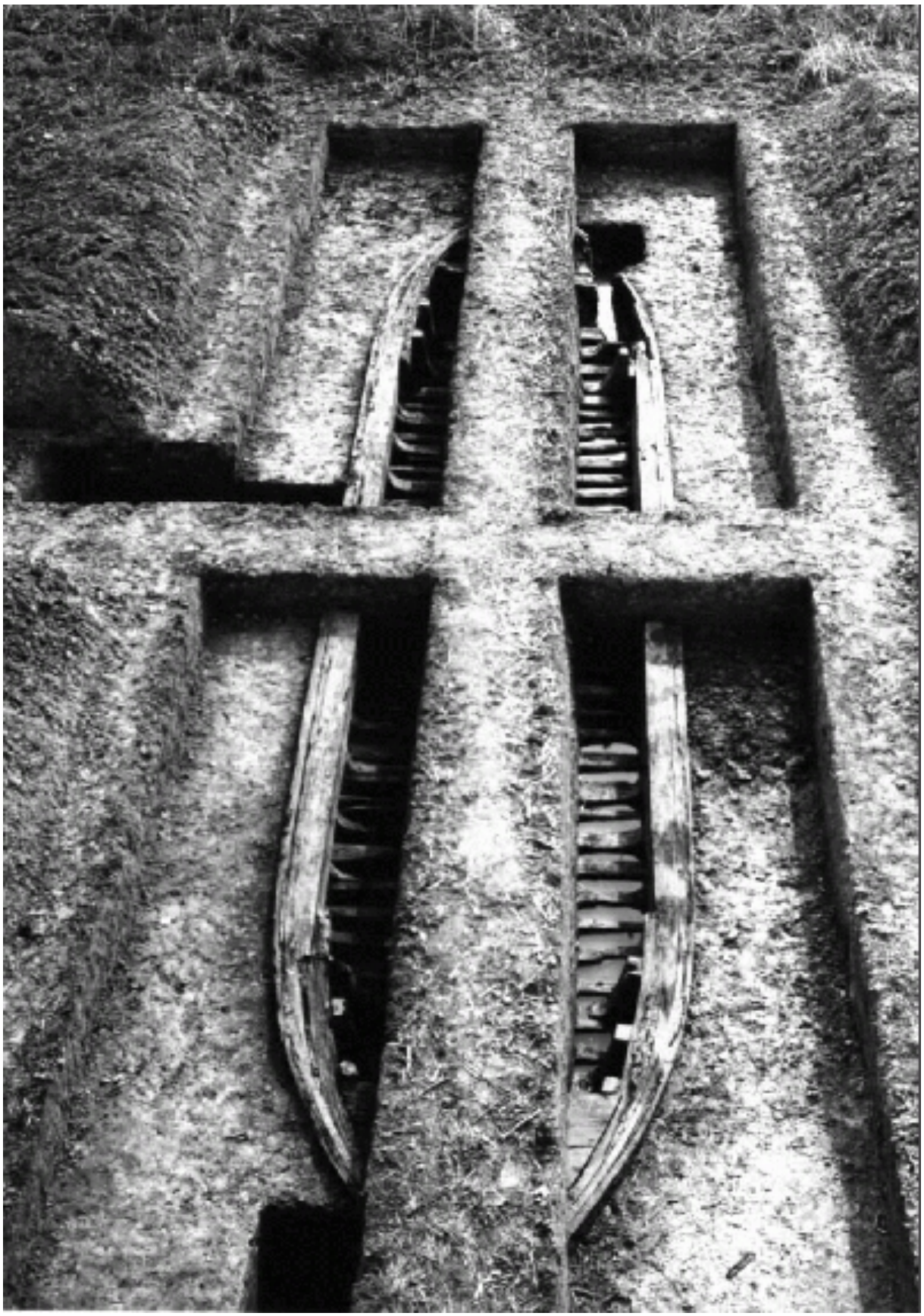

Figure: 14. Excavation with the quadrant method of a *Veenderijschuit* from the seventeenth century, found in Lelystad (Nieuw Land Erfgoedcentrum 2012).

Modern A

This dataset shows that in this period (from 1500 to 1650 AD) the fishing vessels, of which fifteen of 65 are water ships, dominate over cargo vessels. The distribution of these fishing wrecks do not follow the main sailing routes as was the case with most of the wrecks that are attributed to the Modern period (1500 AD – present), which is logical given that fishing activities took place all over the Zuiderzee. The distribution of the cargo vessels also does not show any regular patterning. It is therefore clear that there is no obvious pattern of fishing or cargo vessels.

In the Northern part is a cluster of wrecks located of which a few are described as cargo vessels. However, some of the wrecks of this cluster have the description of 'lost', 'not of archaeological importance' or 'completely gone after drainage'. Because of this status these wrecks don´t provided any further information besides their location and in this case date. This cluster can therefore, unfortunately, not be included in this analysis.

Modern A/ B

In this dataset (from 1500 to 1850 AD) 23 of 57 wrecks can be ascribed to the use as cargo vessels, while seventeen of these wrecks are not ascribed to any function at all. Compared with the information that could be obtained from the dataset of Modern A, the ratio between cargo and fishing vessels seems more significant.

In the county of Almere a cluster is shown of four wrecks that are located on the sailing route to or from Amsterdam and almost all can be ascribed to the use as cargo vessels. Two of these wrecks are recognized as such, one is described as a pram and from the last wreck one no type could be given. However, this last wreck has a construction made of a flat bottom with a square board, which indicates that this vessel was also a cargo vessel. Another cluster, located around Schokland, is a cluster of seven wrecks of which a majority of five wrecks are classified as fishing vessels. Three of these wrecks are Schokkers, a specific type of vessel that was used on the Zuiderzee (see paragraph 4.2). The other wrecks are described as a fishing vessel, a water ship, a cargo vessel and of one was the type unknown. This again shows that the division between fishing and cargo vessels is more similar.

As for ship other types; in this period only one cog is left. It is clear, when comparing the numbers of cogs that were present in the earlier periods and this single cog that is left, other types of vessels were taking over the maritime activities cogs performed before. As is noted in paragraph 3.2, tjalks and prams were the ship types that took over these activities, which seems obvious given the large numbers in which these ship types are already present.

The two prams that are found are described as 'veenderijschuiten' (boats to transport peat) (figure 14). Peat was used for the heating of homes and also for industrial activities. In the

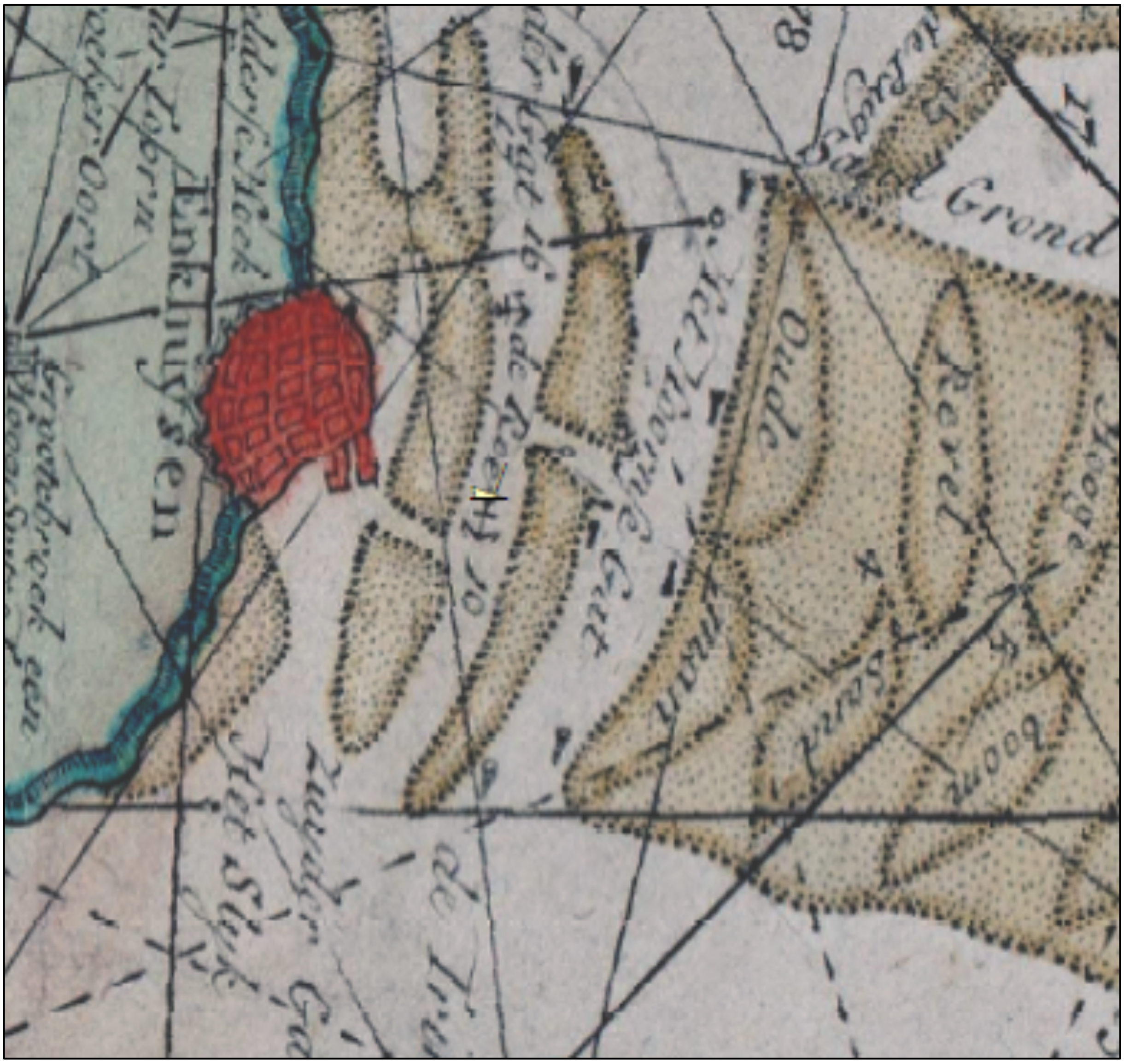

Figure 15. Detail of the historic map from Johannes van Keulen, 1771. Wreck located between to sandbanks at the anchorage called *'De Ree'*. The channels sometimes silted up and due to changes in sea currents new channels and gullies were created.

sixteenth century peat farming increased because of the growing need (Flevoland erfgoed, 2012). Furthermore, one unidentifiable wreck had a cargo of shells for lime kilns, which indicate maritime activity that had to do with creating chalk, were already existing.

Modern B

Notable with this dataset (see appendix X) (which includes the period from 1650 to 1850 AD) is the shift of fishing vessels to cargo vessels, because this dataset contains more cargo vessels than fishing vessels.

Two wrecks that are particular for this dating are the galleon, which is found on the spit of the *Enkhuizer zandbank,* and a *katschip* (also a larger sailing vessel), which is located on the west side of the county of Noordoostpolder. From this position it could be both heading for Enkhuizen or other important cities, such as Amsterdam or Hoorn. In the seventeenth century, the VOC was founded (see chapter 1) and these types of vessels were a major part of the fleet for this company. The presence and the location of the galleon in this timeframe is explicable when one considers the role that these cities played with the VOC. Large vessels like the galleon and the *katschip* sailed to here and other main cities within this network with cargo that came from the East Indies.

Other notable wrecks are the ones filled with cargo that are already previous mentioned. Cargo's that occur in this period are for instance municipal waste, bricks and mud or soil. The appearances of these cargos indicate that the maritime activities that belong with these cargos still exist in this period.

Modern B/ C

In this archaeological period from 1650 AD to present, which covers again a large period, only seventeen wrecks are included, of which most can be ascribe to the function as cargo vessels.

Some particular single wrecks indicate specific maritime activity. For example, two wrecks that are found are again filled with shells and both are located on the route from Amsterdam to Kampen or Zwolle. Another wreck is found on the shoals of the *Enkhuizer zandbank*. On the 1771 Johannes van Keulen map, it shows that this wreck is located precisely between two sandbanks at an anchorage, which is called '*de Ree*' (figure 15). The channels sometimes silted up and due to changes in sea currents new channels and gullies were created. To sail via Enkhuizen to the North Sea two possibilities were available: via the *zuidergat* heading southwest, and from there to the east around the *Enkhuizer zandbank*. When the *Val van Urk* was reached they could sail further north. The second possibility was straight up north via the *Nieuwe Diep* heading directly to Texel. The second possibility was preferable because the distance to the North Sea was much

shorter. However, precisely this channel silted up in the seventeenth and eighteenth century (Willemsen 1988). It is quite possible that this vessel is sunk because of this reason.

The same wreck was also loaded with a cargo of basalt stones. It is known from archaeological research that in the eighteenth and nineteenth century the dikes that were constructed between Enkhuizen and Hoorn were strengthened. The old dikes, of which the earliest construction dated from the twelfth and thirteenth century, were no longer satisfactory. Hence why in the nineteenth century the decision was taken to strengthen the dikes with the use of large rocks. These dikes were improved and heightened with the use of debris and also, at the end of the nineteenth century, even basalt stones (ADC ArcheoProjecten 2011). The presence of a vessel with such a cargo and the archaeological remains of a dike that is partly constructed with the same material make it plausible that there is a connection between the two.

A notable ship type that is included in this dataset is the *botter*. As noted earlier *botters* became in use instead of water ships, which were mainly used between 1500 and 1700. The appearance of this ship type within this period, while the water ship is not, seems a confirmation of this fact.

Also another sloop is present which this time is located near the shoal of Nijkerk and Spakenburg. Although the length of this vessel again does indicate a function as dinghy for a larger vessel, the location close to the shore and also close to a city of which is known that fishery was an important activity, it can be more logical that this sloop does not belong to another vessel, but was particular used as a rowing vessel.

Modern C

The distribution of these wrecks dating in this archaeological period (1850 AD – present) is not very significant (appendix Y). As regards the distribution between cargo and fishing vessels, only two of the 28 wrecks are fishing vessels. However, because all the wrecks are very recent, it is possible that there is still oral history left concerning some of these wrecks. For two wrecks that are included in this dataset this is the case. The wreck of the *Zeehond* (Seal) and the *Lutina* are still stories left that gives a nice background of these particular vessels. See website of www.verganeschepen.nl. This website shows a selection of the 400 or so ships that used to sail the Zuiderzee until the land was reclaimed to create the Flevopolder. Both the *Zeehond* and the *Lutina* are described on this website.

To other ship types that are notable within this dataset are again a *botter*, of which in the previous dataset also a wreck was found, and a steam ship. Between the bigger cities in the northern part of the Netherlands steam traction was used for a while. The first shipping company was founded in 1870, which mainly sailed between Groningen, Sneek and Lemmer.

From here also lines to Amsterdam were undertaken. Besides the transport of persons and cattle also the carrying trade from the province Groningen to the province Holland became more significant. In the late twenties, steam ships were replaced by motor ships and even road transport (Spanjaard-Visser 2011).

Also within this dataset two wrecks are found that had a cargo of coal. The meaning of these cargo is however noted above when the ship type of tjalks were analysed (chapter 4.2). This period gives however an indication of time in which these activities have taken place.

Unknown

For twenty wrecks no dating could be given. The rest of the information about these wrecks is also far from complete so the knowledge that could be gained from these records is sparse. A notable aspect is that seventeen of these wrecks are located in the county Zeewolde and the one wreck that is located in the county of Almere actually lies really close to those seventeen wrecks. This cluster of wrecks can mean two things; either the wrecks from this part of the Flevopolder are less researched, or the conditions for the preservation of wrecks in this part of the polder are not as good as in other parts.

Besides that, there are a few things that could be gained from this dataset. Some of the wrecks are known by ship type, which can be useful when attempting to determine the date. For example one cog and three water ships are found. These wrecks can therefore be given a particular dating, especially as there are more of the same ship types found.

Another aspect is the cargo of some of the wrecks. There is for example another vessel, which is filled with bricks. From other datasets it is known that this cargo is common in this part of the Zuiderzee and what the purpose was of this cargo. The same applies for the cargo of waste, of which also other wrecks are found in previous datasets.

Chapter 5: Conclusion

The data that has been gained from different sources enables an analysis of the wrecks that were found with the reclamation of the Noordoostpolder and the Flevopolder in the Netherlands. In total 370 wrecks were used, within which there is a wide variance in quality of data. However, with some additions to the source databases, a maritime record in which all the wrecks are included could be created. By transferring this maritime record to a GIS base map a clear overview of the distribution of the different wrecks were obtained.

With the use historic maps more information is gained about shoals, main sailing routes and other features that were of importance for shipping in the Zuiderzee. Because of the fact that these features were known, more insight in the distribution and patterns of wrecks and therefore the Dutch maritime enterprise became clear. Not only did the shoals influence the sailing routes but were also an ever-present hazard for wrecking. Other aspects such as the Zuiderzee islands and main ports and harbours have also been of influence for the spread of the different wrecks. Integrating this information with wreck locations in this way has in many cases demonstrated or at least indicated relationships that would not be apparent on the basis of location alone.

That these aspects were of influence can for one be traced at the *Enkhuizer zandbank*, on which several wrecks are located. Its location on the sailing route from Amsterdam to Kampen explains the pattern of those wrecks found here. Also the presence of other wrecks around other important aspects that were of influence for the maritime activities that took place, such as the islands of Urk and Schokland, can explain the analysis of the wrecks.

In addition, the wrecks that are found near main ports and along sailing routes, which are depicted on the historic maps, are somehow linked with each other. The fact that Kampen was for such a long time an important port can be correlated with the distribution of the wrecks. The clusters of wrecks that are located in front of the IJssel estuary near Kampen and the presence of a large number of wrecks on the main sailing route from Amsterdam to Kampen can also be explained because of this fact and the knowledge that is obtained from the historic maps.

Cities grew alongside the east side of the Zuiderzee. Kampen was one of the main ports because of the location on the IJssel, which was connected with the river Rhine. From here a lot of raw materials, also from the hinterland, could be easily transported. Furthermore, the close location on the Zuiderzee, in which the IJssel led, meant that Kampen was connected with other cities both national and international. As a result Kampen had a very strong strategic and geographic position. In the fourteenth century the whole city was focused on international trade. Kampen possessed the biggest merchant fleet at that time that was used by traders, which,

sometimes with the system of shared hold-space, shipped their cargo from Kampen to various other important ports and cities (Alseart 1976, 90-91).

Besides the main ports and harbours that can be traced from the appearance of larger numbers or wrecks, when looking at time and dating there is a small change visible in the distribution of wrecks from the east side of the Zuiderzee to the west side. Places like Kampen and Zwolle see a fall in the numbers of wrecks, whilst places such as Amsterdam and Enkhuizen see an increase. This slight change that takes place of the important cities of the east side to the west side is, as already was known from the historic background (see chapter 1), due to both the decline of the Hanseatic league and the rise of the Dutch East-India Company is visible in the movement of the distribution of wrecks.

Another striking fact in the distribution of the wrecks while looking at dating is the change in ship types. Although in only a few types were enough numbers present to make an analysis, in the earlier periods mainly cogs are part of the datasets. This however changed over time to mainly prams and tjalks. Because all ship types were used for the same purpose it can be said that cogs were at a certain point replaced by the other two types of vessels. Another aspect of the change of ship types can be seen with the botter that slowly took over the activities that were at first carried out by water ships. With the ship types of the log boat and the galleon included, actually a wide range of ship types come by, which, although just one or a few wrecks of each ship type was found, all clearly represent a very specific time period because of the ship type itself but also purpose that they were used for was specific to that one period.

Continuing on the changes of purpose and usage of vessels, a further profound change is visible. In the Late Medieval periods (e.g. 1050 to ca. 1650 AD) fishing vessels are the most common ones that are represented. However, in the modern era this changes to mostly cargo vessels. This contradicts the historical sources, because fishing-related activities on the increased, especially in the nineteenth century. As can be deduced from the historic map of 1771 of Johannes van Keulen (appendix H), at a certain point buoyages, beacons and at a certain point even lighthouses were constructed to give a better indication of the main waterways of the Zuiderzee and especially of all the obstructions that were present (Zwaag 2012). This might be a possible reason for this decrease of shipwrecks.

The purpose of vessels can, besides the ship type, also be traced from the cargo, or other artefacts that belonged to the same find spot. The vessels with cargo that were found mostly existed on the Zuiderzee of municipal waste, ballast stones, coal, shells, mud or peat and IJsselsteentjes or bricks. When the cargo of a vessel is included in the interpretation of a wreck it is easier to recognise a pattern, especially with larger numbers of wrecks that contain the same

cargo. The presence of mostly shells/ chalk and IJsselsteentjes in the southern part of the Zuiderzee means that these types of cargo were often shipped from or to Amsterdam and Kampen or Zwolle. The presence of coal as a cargo could be important as an indicator of ships on their way to urban or industrial centre and also from the other cargos information could be gained. The presence of all the cargo could be reduced to several meanings and with that to activities that have been taken place.

When the purpose of a specific cargo or maybe even of a specific ship, such as the *Zeehon*d or the *Lutina* (paragraph 4.3) can be traced, a story can be told. With this, not only maritime activities that took place on the Zuiderzee in a specific period, but also interesting facts of the Dutch maritime cultures can be discovered. This knowledge of maritime activities can put an extra dimension on the maritime history of the Zuiderzee and the Netherlands.

When returning to the main research question it is clear that the shipwrecks of the Flevopolder do represent Dutch maritime culture. Although at first it looked as though few relationships or any significant patterning could be gained from the distribution of the wrecks, in fact in many cases combining the various classes of data proved otherwise. When focussing on more defined classifications of data, from both the distribution itself as from the specific ship types and also dating, new knowledge about the underlying maritime society can be generated.

The maritime activities that have been taken place on the Zuiderzee are very various, which is also the reason why the data are numerous and varied. There are not really distinct patterns visible of one particular enterprise, like fishery, but as is said above the different maritime activities are certainly represented. Both fishery and trade happened on the same time and at the same place. There were several changes in these activities during time but also how they were preformed. It is clear that the Zuiderzee was for the period from the fourteenth till the twentieth century a melting pot of numerous activities that were part of the Dutch maritime enterprise.

5.1 Future research

This research was done with the records that could be selected form different data sources. Although some data were extensive, the majority were far from complete. To restore these data more research would be necessary. When this happens, the database would represent a wider knowledge base, which in turn can lead to more insight into the maritime activities that have taken place on the Zuiderzee. An analysis would also be more secure than it was now.

In addition to this, if data from other areas, for example construction and inventory, are included in this research, a much wider interpretation could be made. However, for research where all these data is contained, the quality of the data sources should be improved or extended.

IFMAF – International Fieldschool Maritime Archaeology Flevoland

The International Field School for Maritime Archaeology Flevoland (IFMAF) is an educational programme in which the University of Groningen joins forces with the Rijksdienst voor het Cultureel Erfgoed, the province of Flevoland, the municipality of Lelystad and Nieuw Land Heritage Center. The annual field school includes the excavation of a shipwreck in Flevoland during which the specific field techniques that are needed in maritime archaeology can be developed under controlled conditions on land.

Every year the IFMAF performs an excavation of a wreck, which is located in Flevoland. These excavations are the start for a better, more extensive research. Although it will take a long time to before all the wrecks are researched in such a way, notwithstanding the fact that some wrecks no longer exist, it represents a promising start to gain more information of the maritime activities that took place and with that, to obtain a better understanding of the Dutch maritime culture on a national level.

Another way to extend this research is to include extensive databases in which wrecks are recorded that are located in the surrounding water of the Marker- and Ijsselmeer. When looking at the density of the distribution of wrecks within the polders, the density of both the Marker- and IJsselmeer must be as tight, for both lakes also where part of the Zuiderzee. Although in this analysis just a few wrecks located underwater where included, to today such an extensive database of wreck underwater does not exist. It is for this reason that there is still a lot to be done, both terrestrial as underwater, to complete this research to the Dutch maritime enterprise and culture.

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Appendixes

Appendix A: Christiaan Sgro(o)ten, 1573 - Atlas Bruxellensis

Appendix B: Zacharias Heyns, 1598 - Hollandia

Appendix C: Willem Jansz. Blaeu, 1645 – Novus XVII Inferioris Germaniae

Appendix D: Claes Jansz. Visscher, 1652 – Comitatus Hollandiae

Appendix E: Hendrick Doncker, 1664 – Pas Caart van de ZUYDER-ZEE

Appendix F: N. Visscher, 1680 – Belgica Foederata

Appendix G: Johannes Loots, 1707 – PasCaart

Appendix H: Johannes van Keulen, 1771 – Paskaarte van de ZUYDERZEE

Appendix I: W.J. Struick, 1875 – Schetskaart Marine

Appendix J: Zuiderzeevereniging, 1891 – Dieptekaart

Appendix K: E. de Geest & S. Mars , 1909 – Zuiderzee

Appendix L: Bosatlas, 1904 – Sailing Routes

Appendix M: Distribution of all wrecks

Appendix N: Distribution of all wrecks on main sailing routes

Appendix O: Distribution of all cargo vessels

Appendix P: Distribution of all cogs

Appendix Q: Distribution of all fishing vessels

Appendix R: Distribution of all koopvaarders

Appendix S: Distribution of all prams

Appendix T: Distribution of all tjalks

Appendix U: Distribution of all water ships

Appendix V: Distribution of all wrecks in the Late Medieval B period (1250-1500 AD)

Appendix W: Distribution of all wrecks in the Modern A period (1500-1650 AD)

Appendix X: Distribution of all wrecks in the Modern B period (1650-1850 AD)

Appendix Y: Distribution of all wrecks in the Modern C period (1850-present AD)

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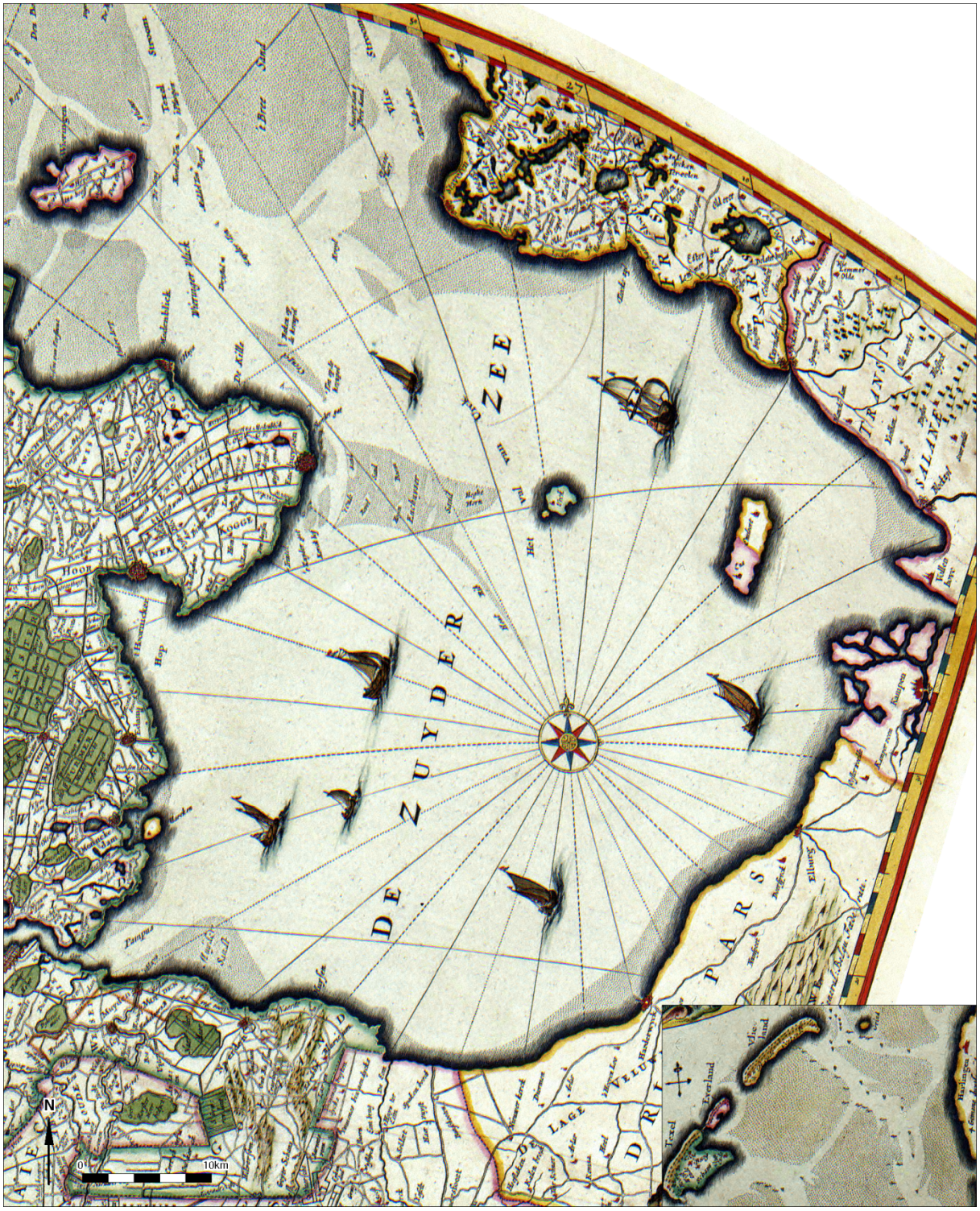

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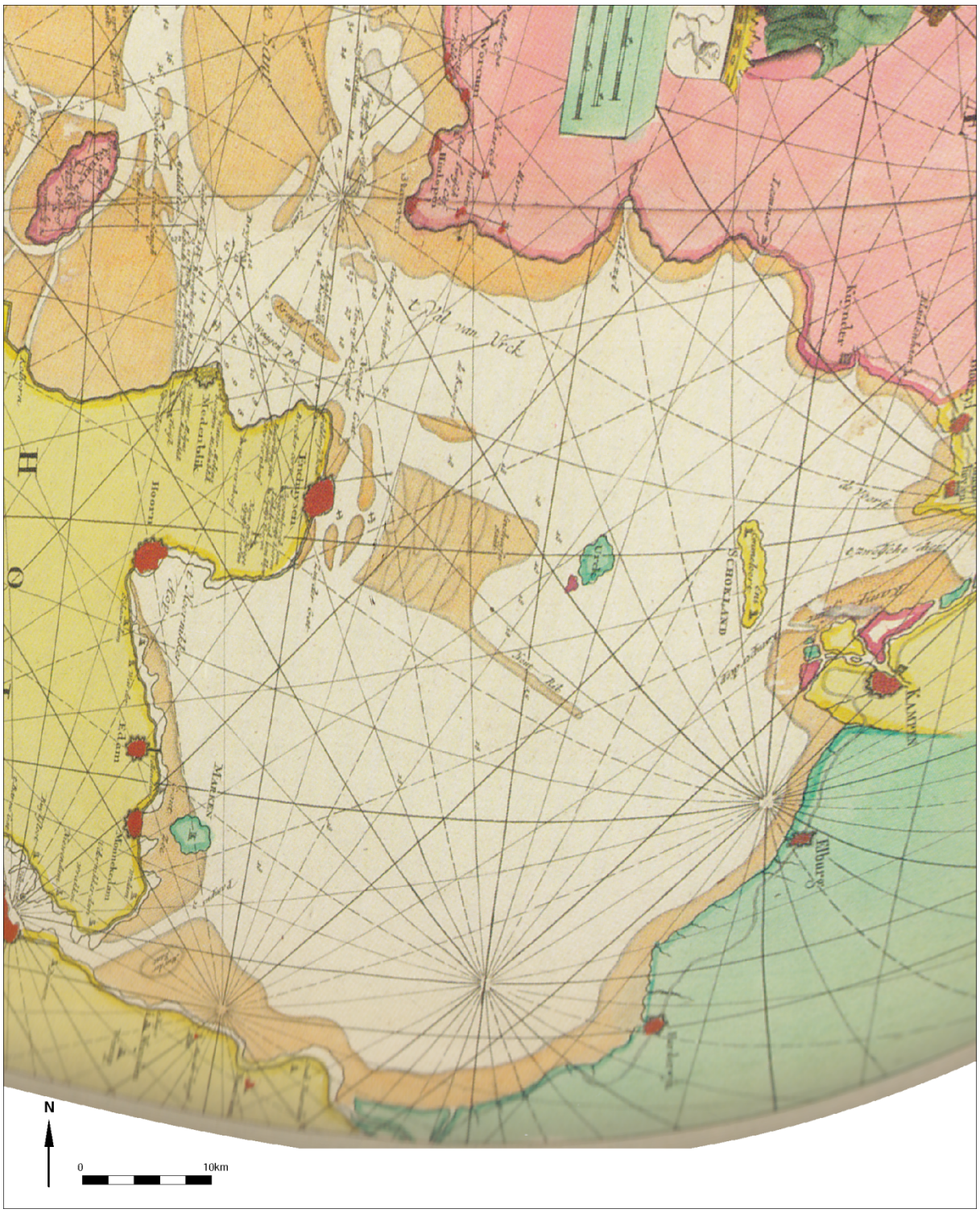
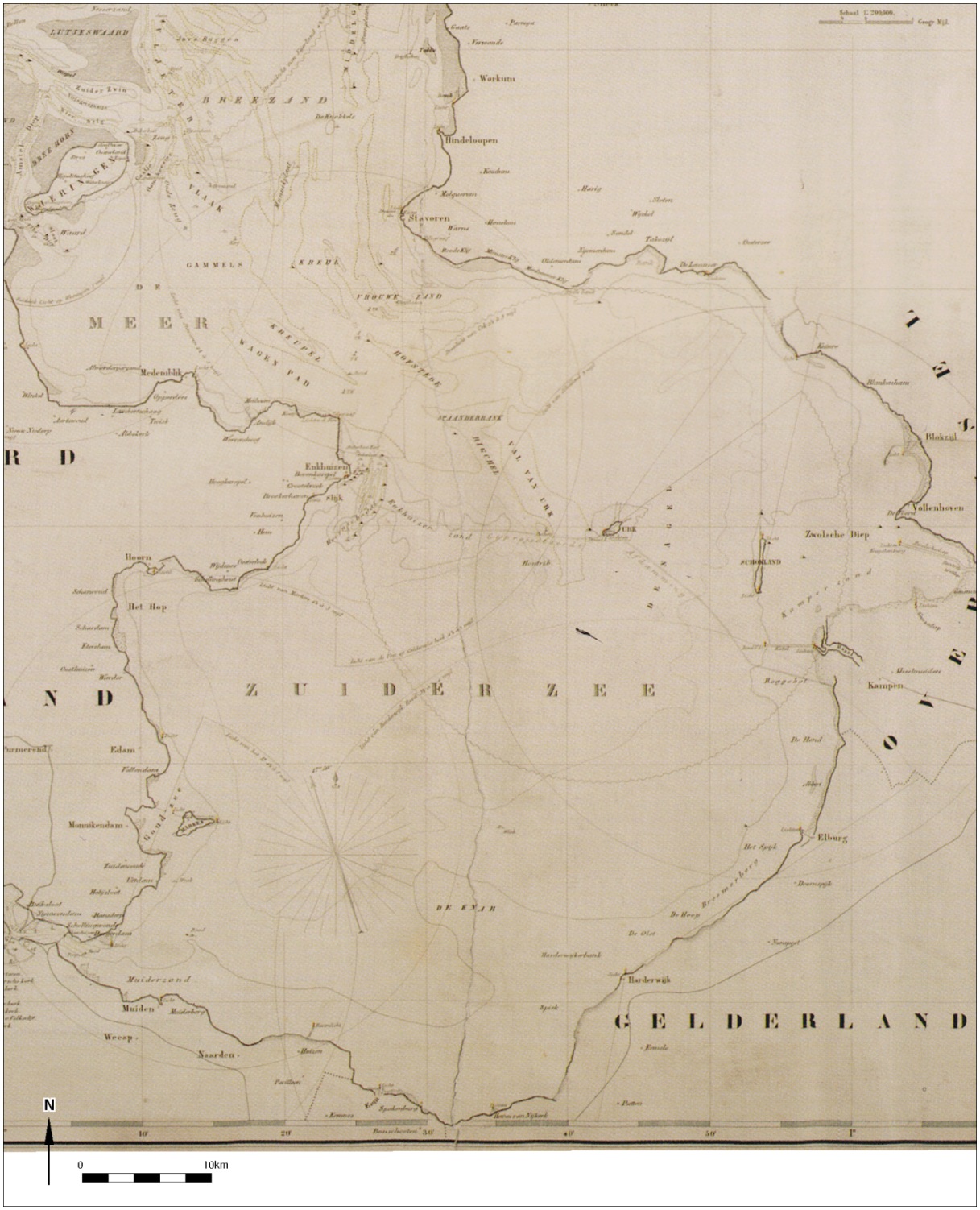
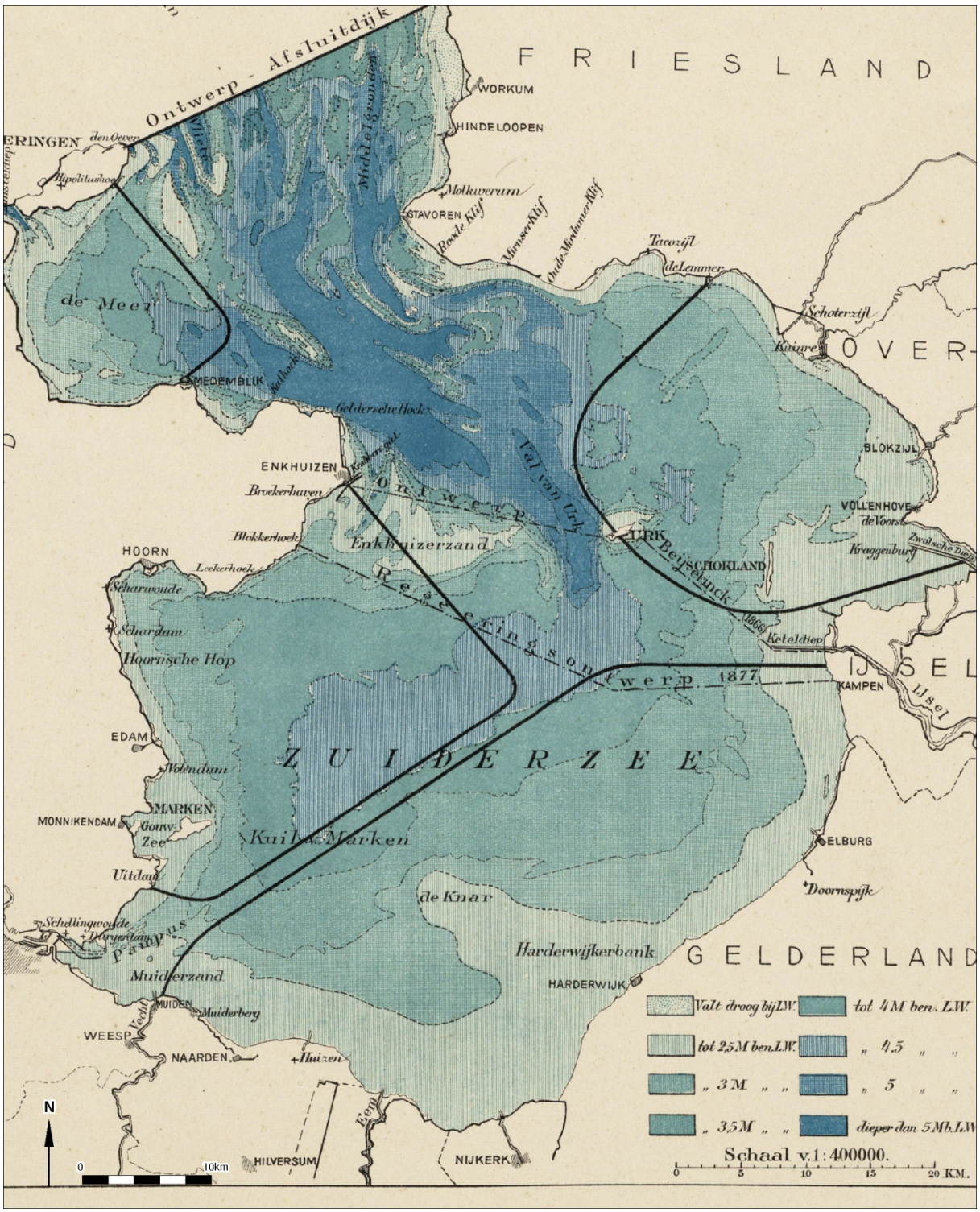


Appendix H: Johannes van Keulen, 1771 – Paskaarte van de ZUYDERZEE

Appendix I: W.J. Struick, 1875 – Schetskaart Marine



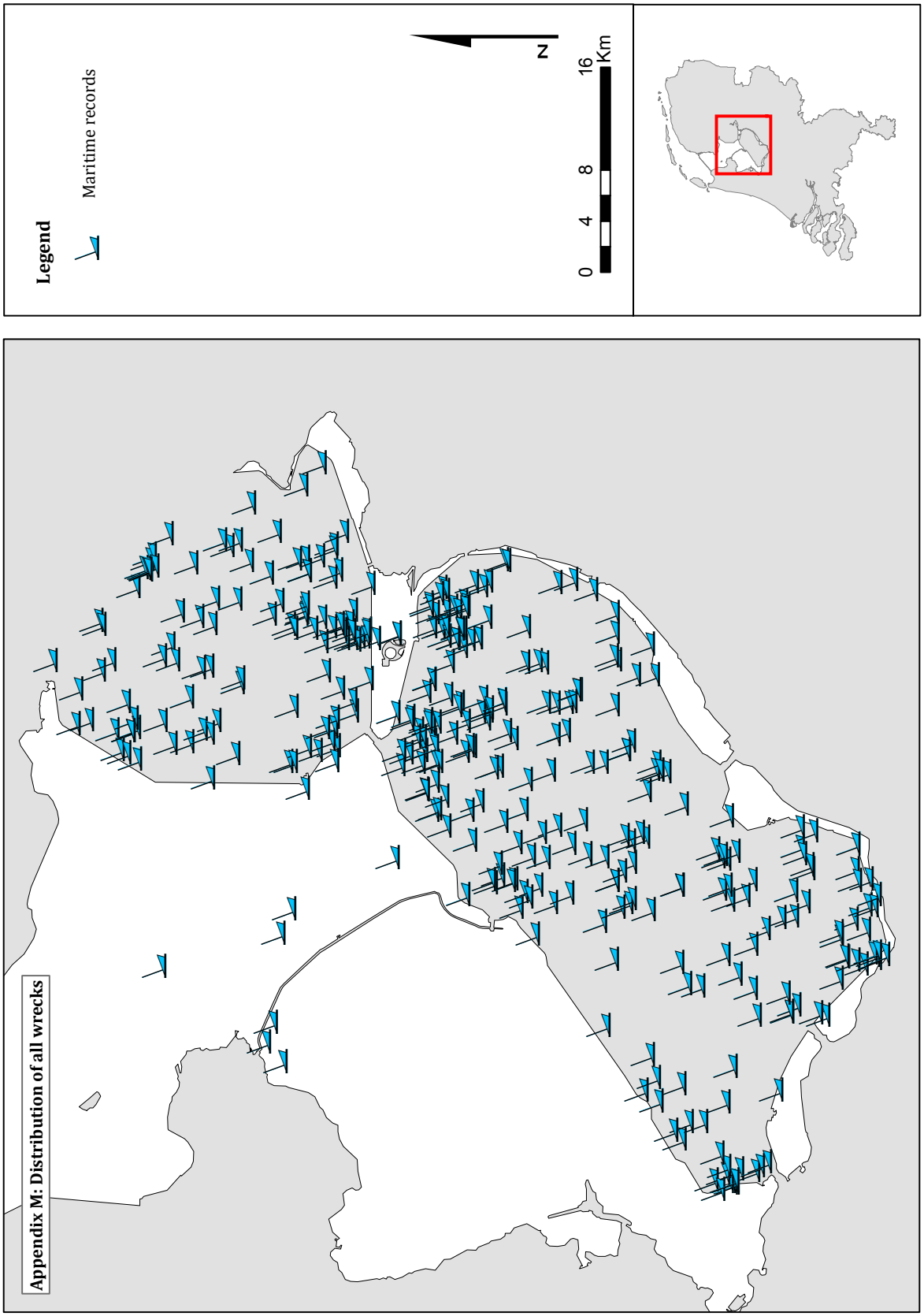
Appendix J: Zuiderzeevereniging, 1891 – Dieptekaart



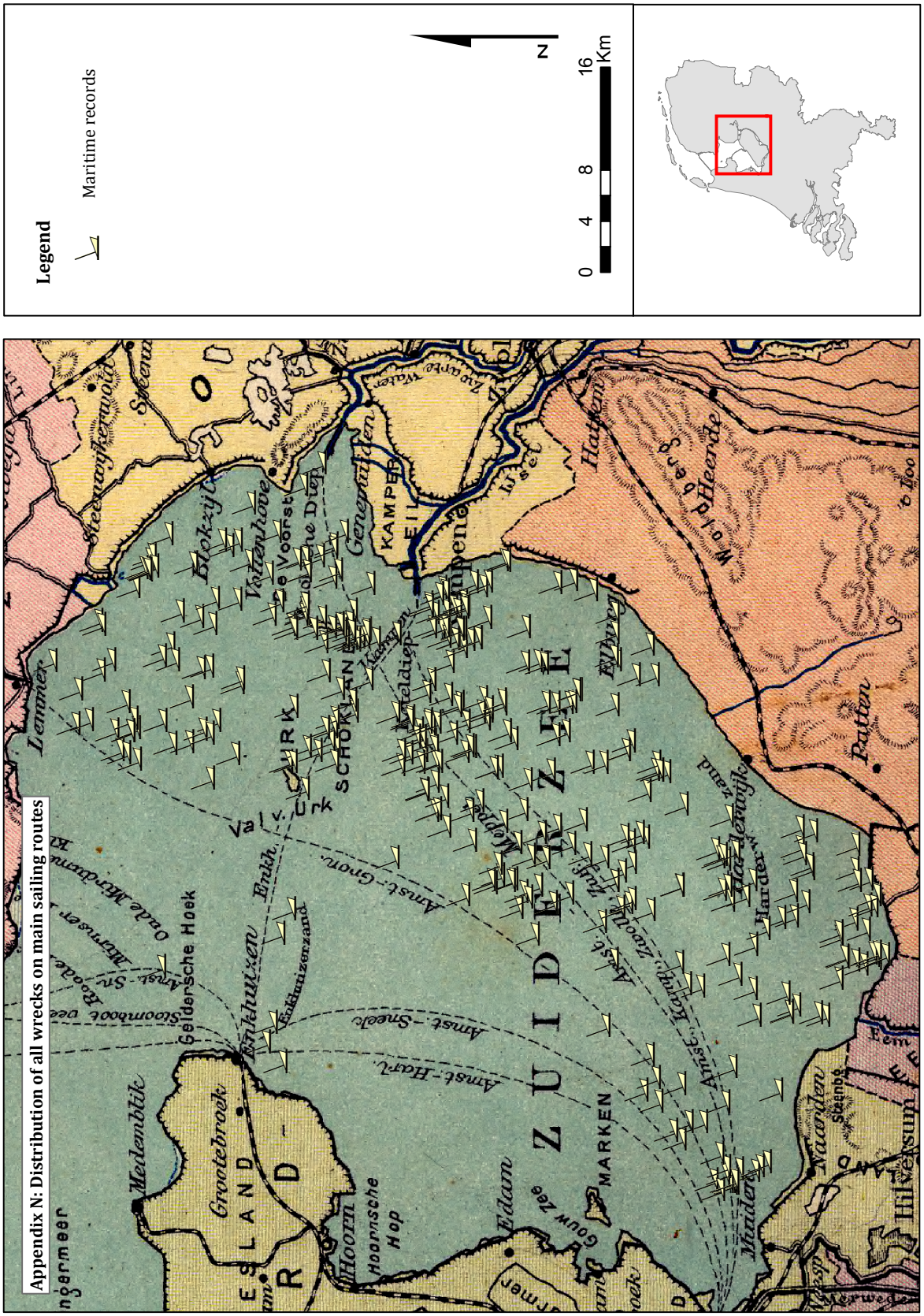
Appendix K: E. de Geest & S. Mars , 1909 – Zuiderzee

Appendix L: Bosatlas, 1904 – Sailing Routes

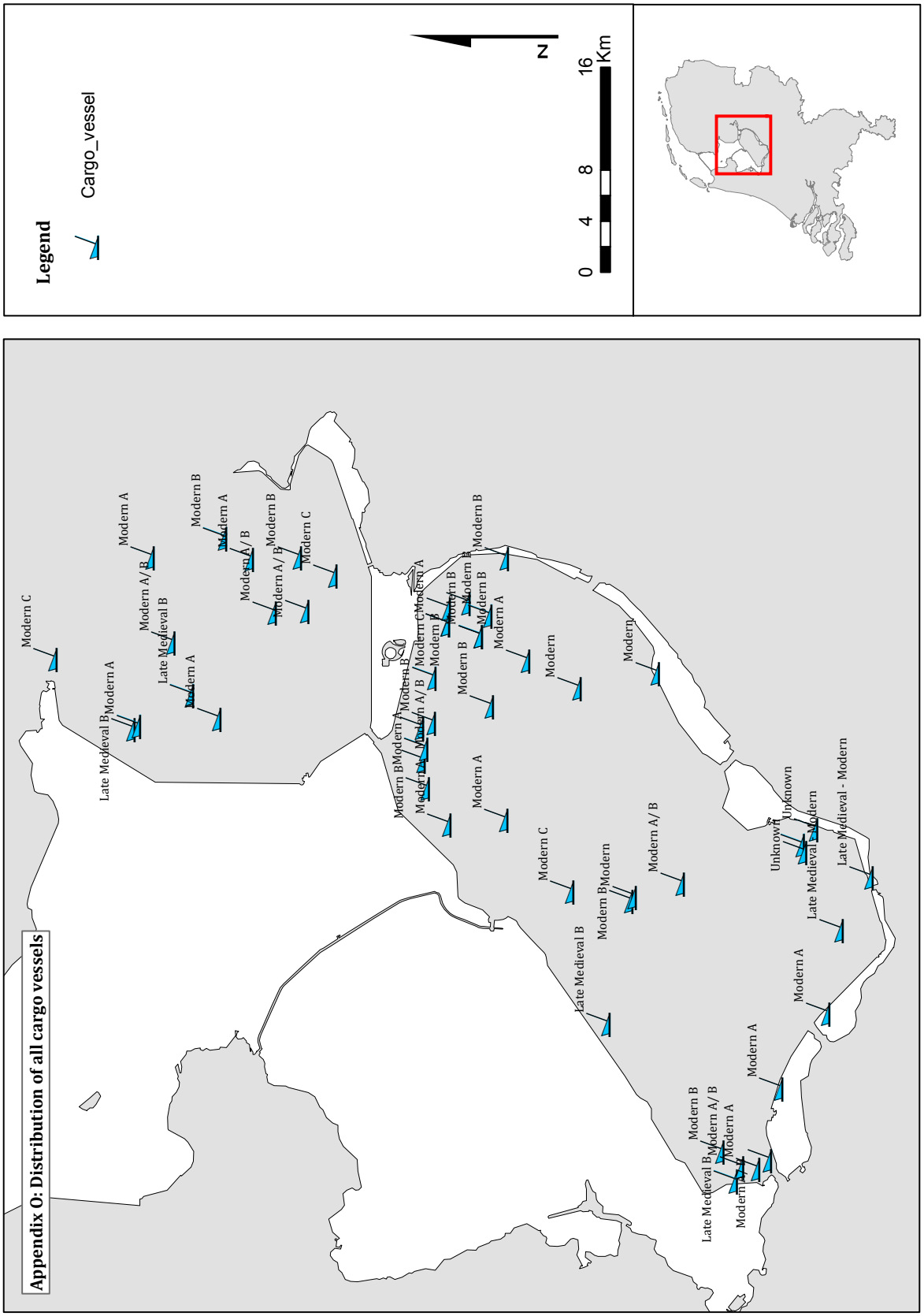
Appendix M: Distribution of all wrecks



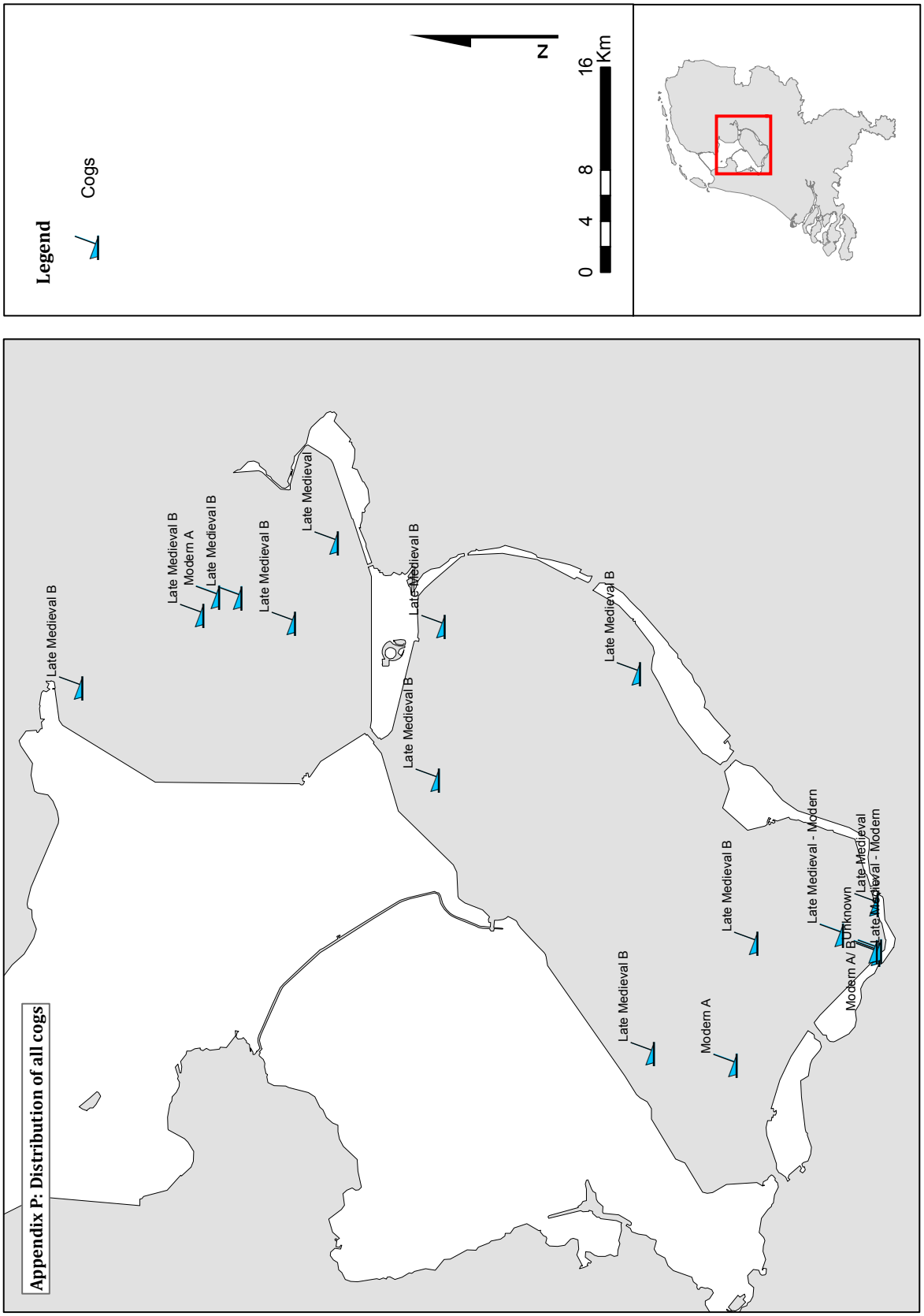
Appendix N: Distribution of all wrecks on main sailing routes



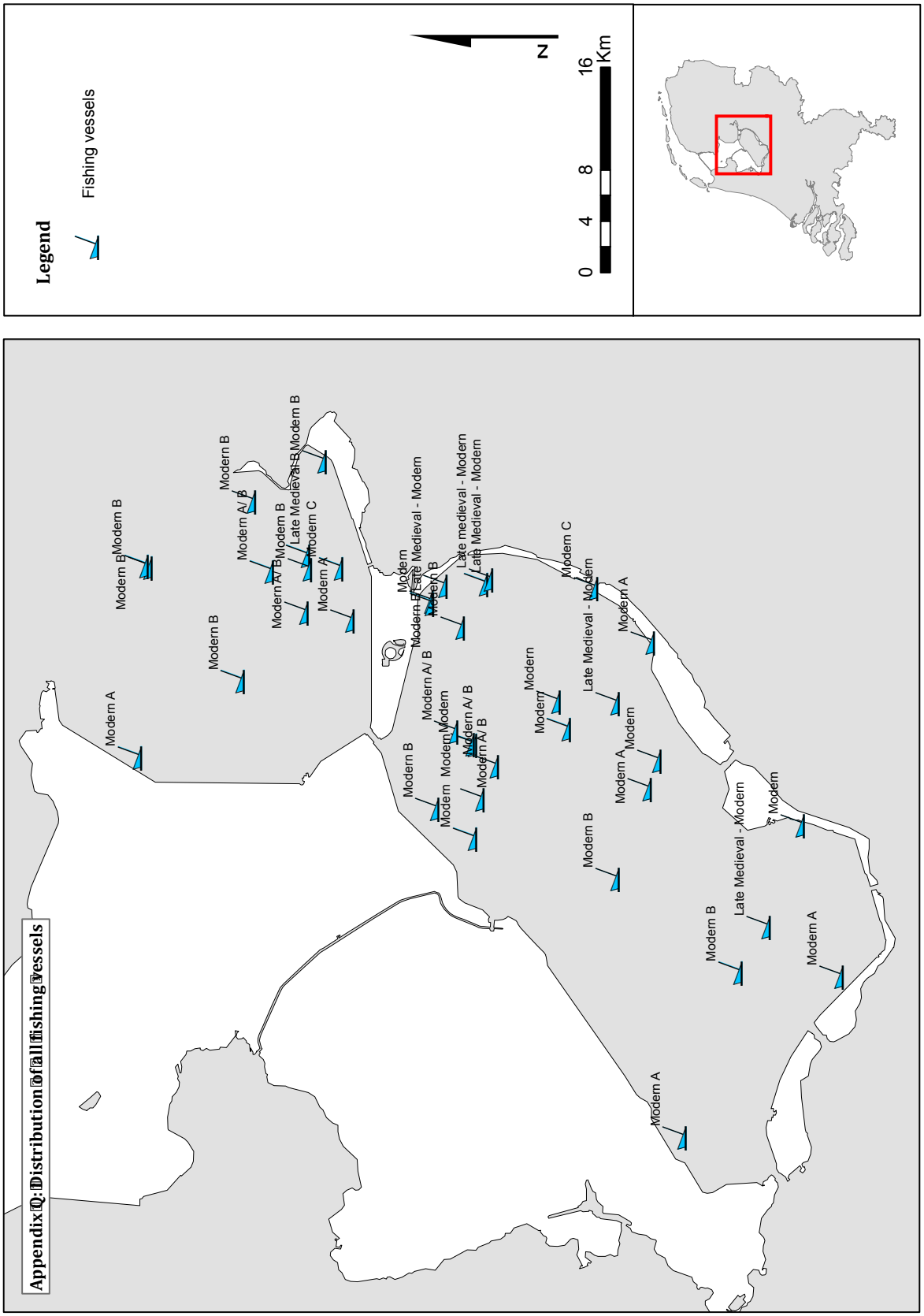
Appendix O: Distribution of all cargo vessels



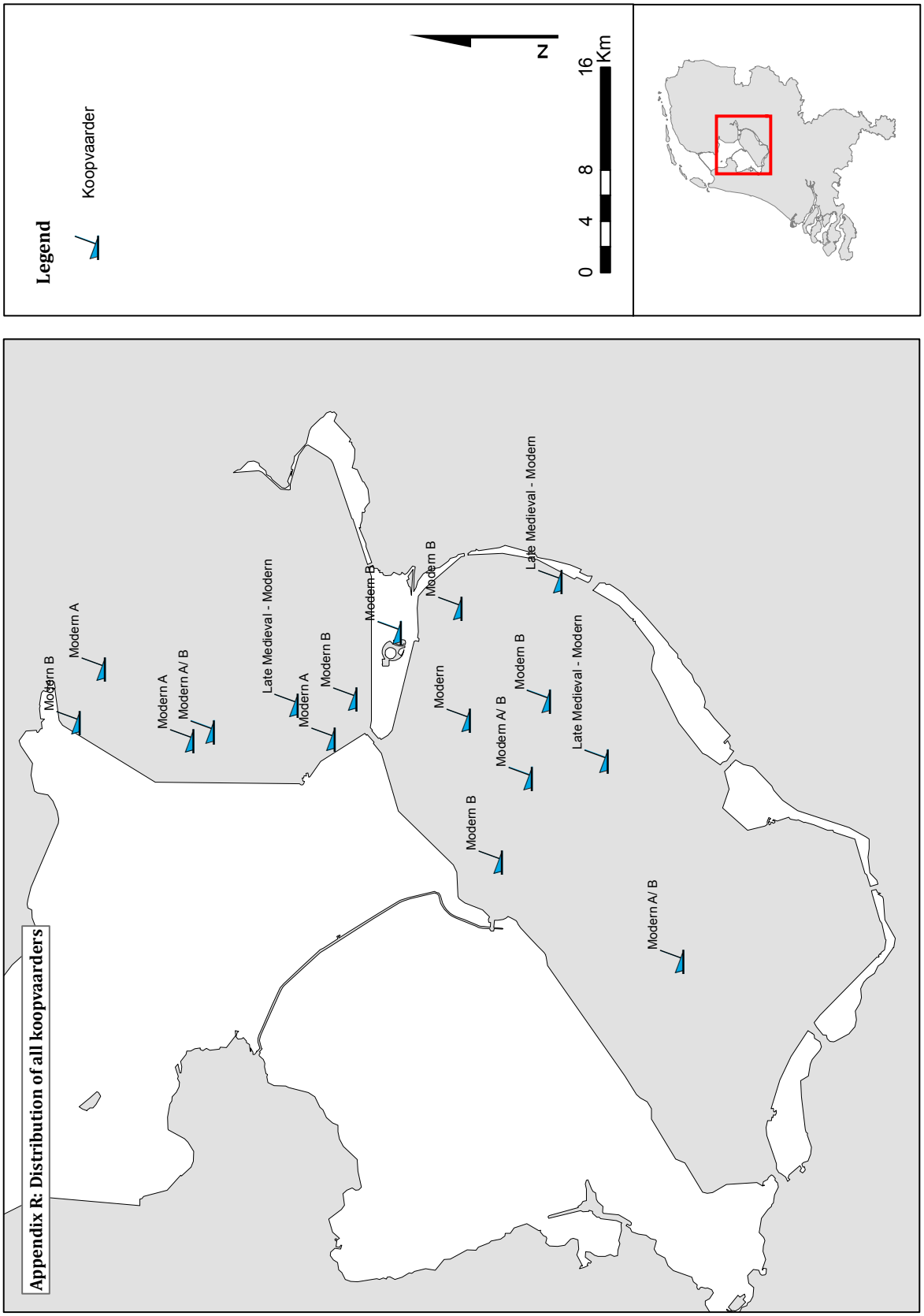
Appendix P: Distribution of all cogs



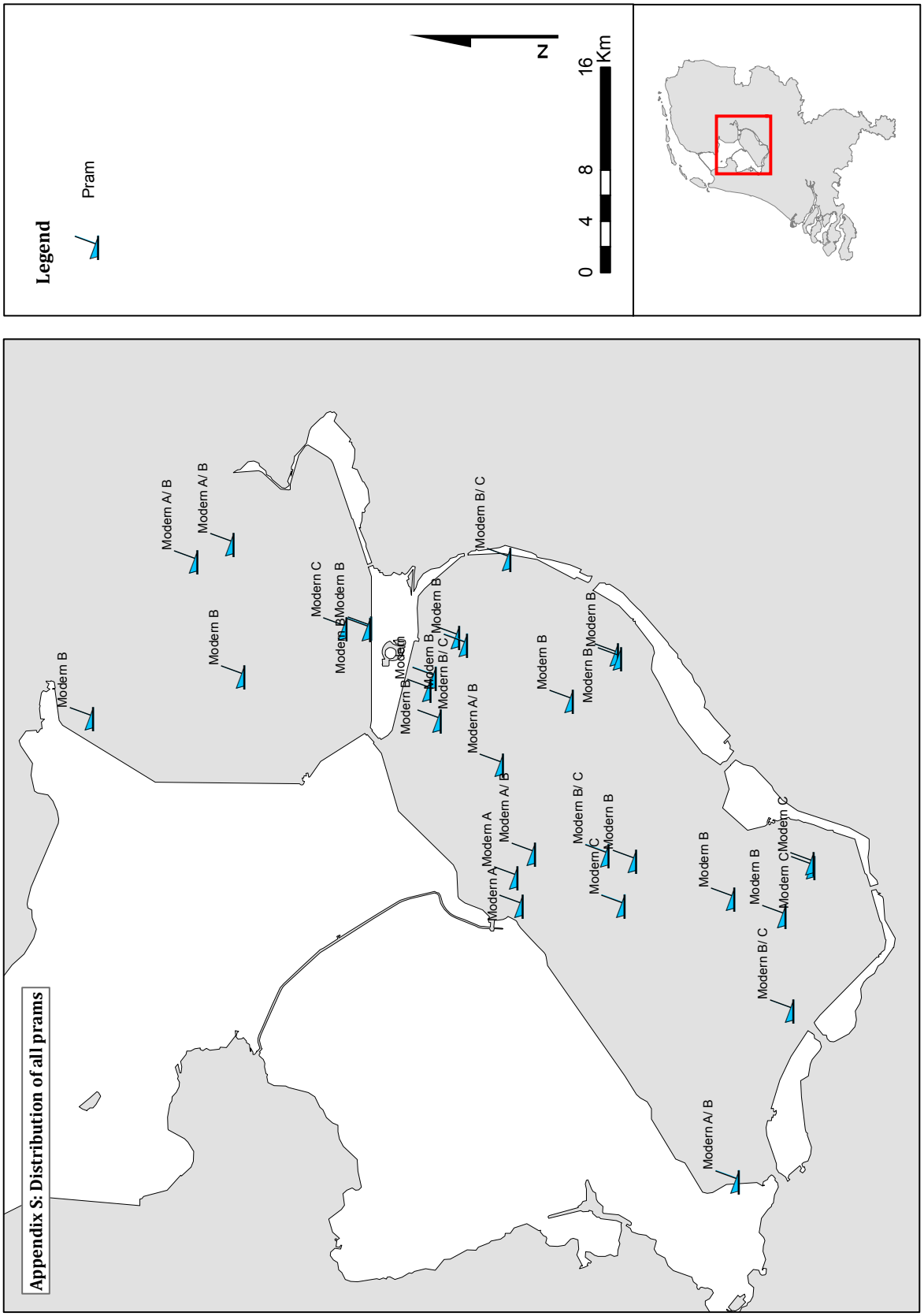
Appendix Q: Distribution of all fishing vessels



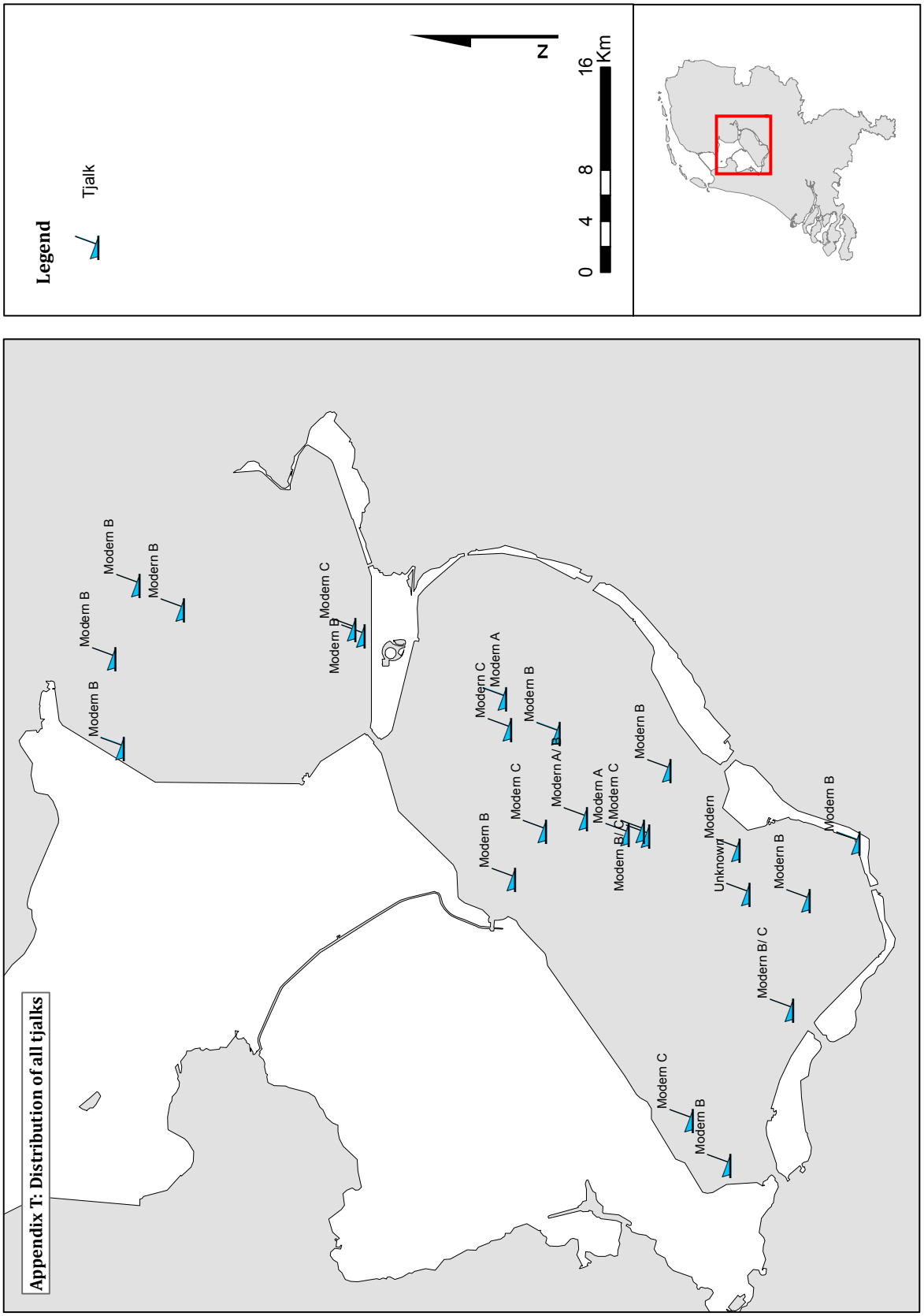
Appendix R: Distribution of all koopvaarders



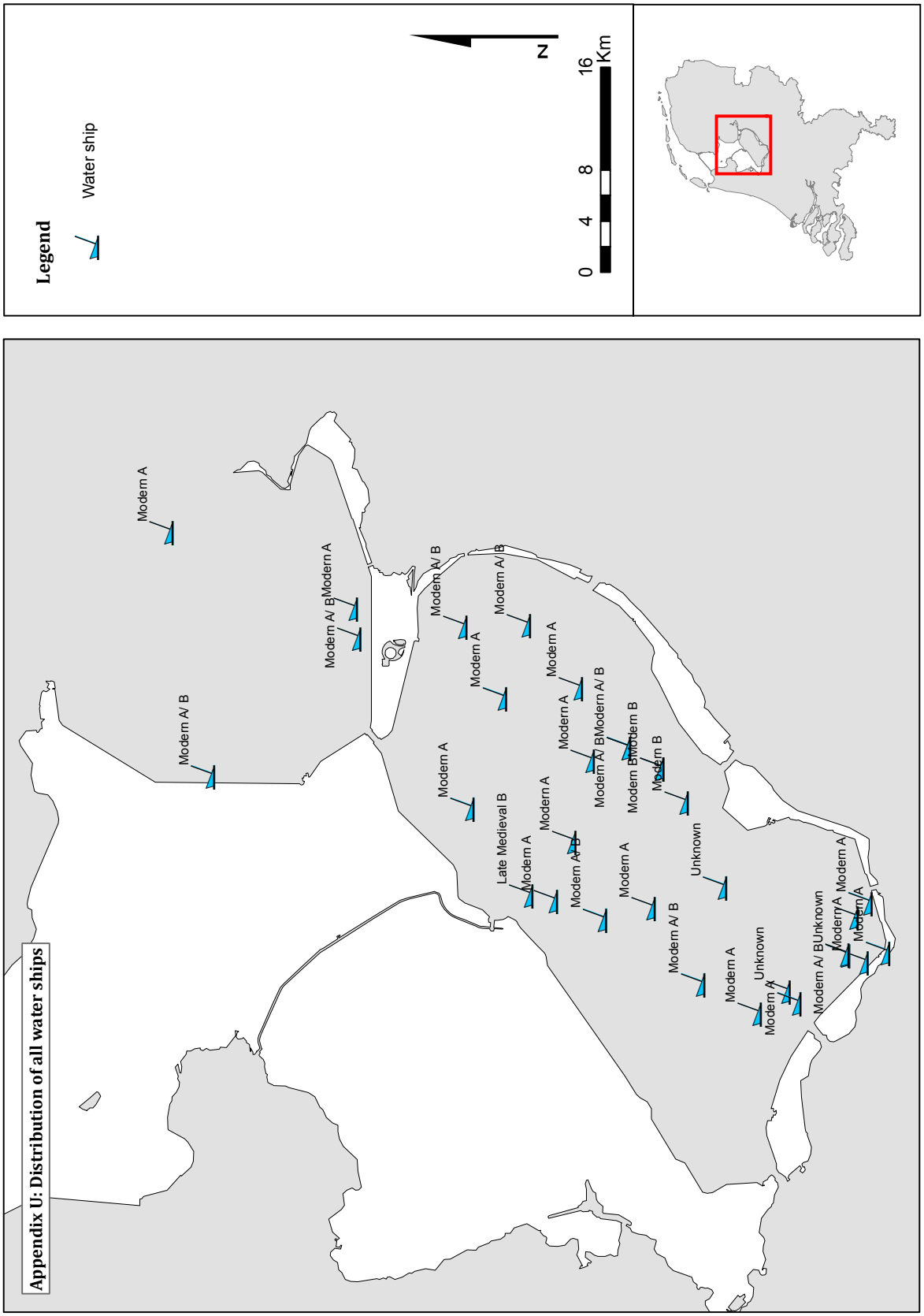
Appendix S: Distribution of all prams



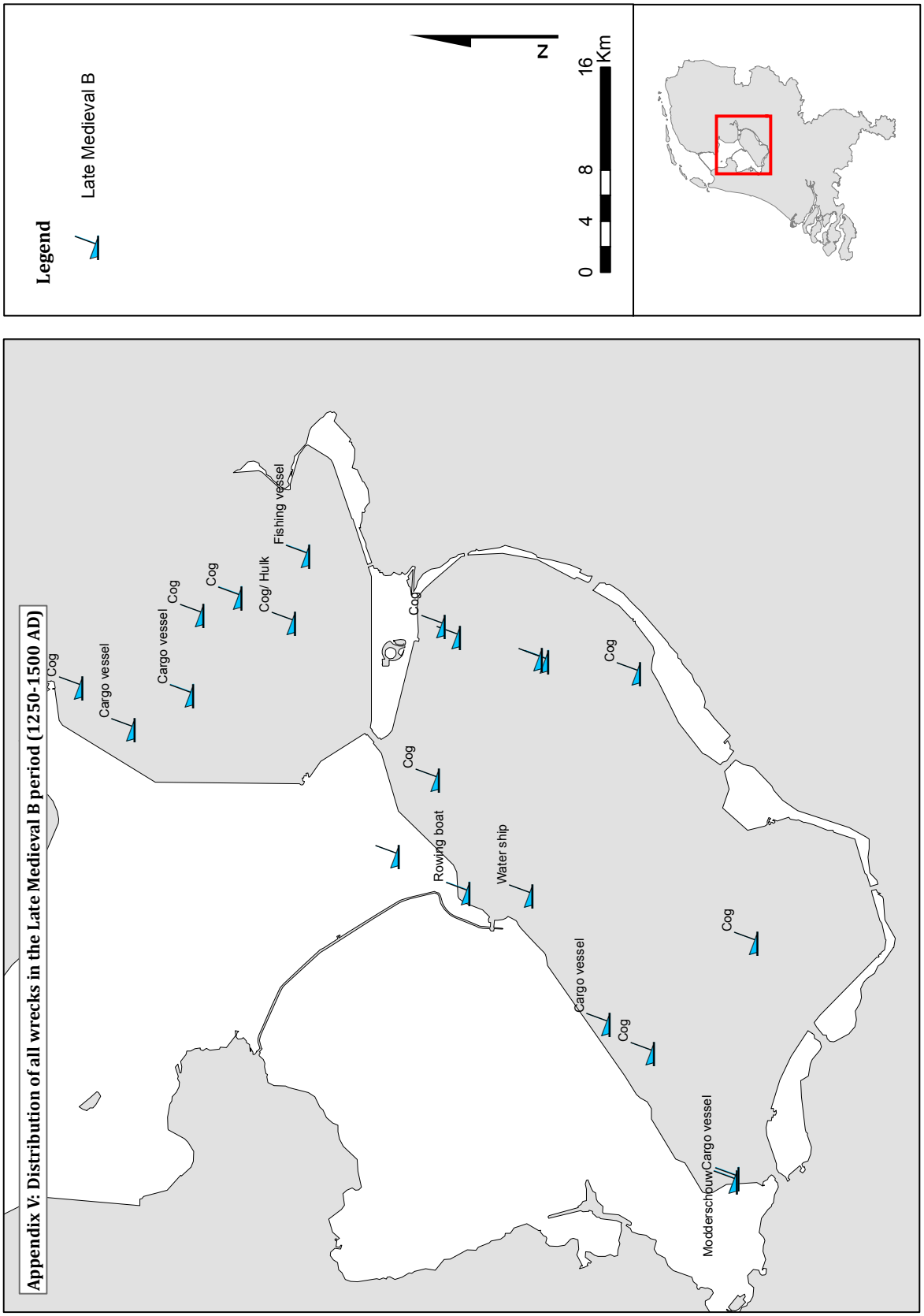
Appendix T: Distribution of all Tjalks



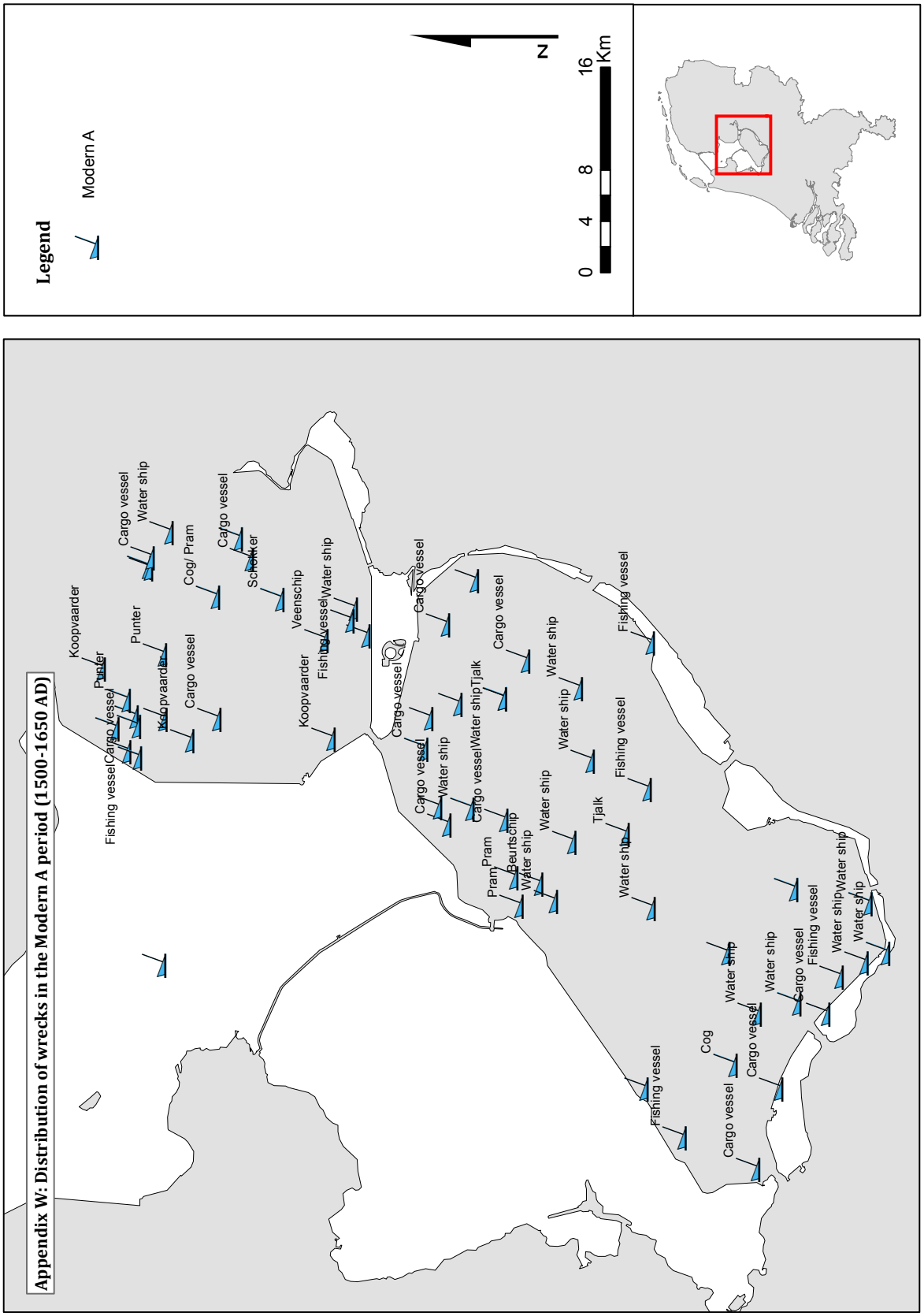
Appendix U: Distribution of all Water ships



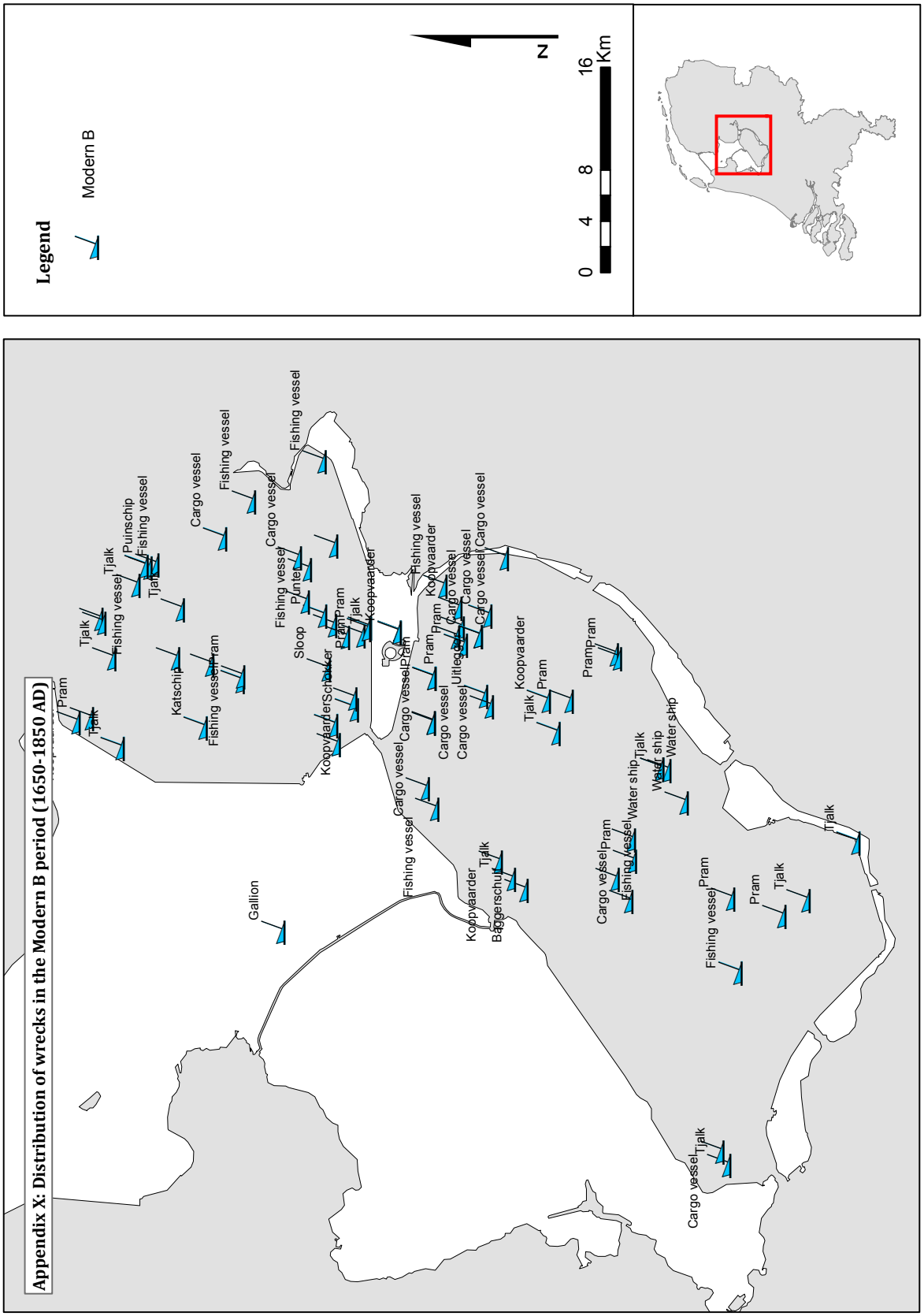
Appendix V: Distribution of all wrecks in the Late Medieval B period (1250-1500 AD)



Appendix W: Distribution of all wrecks in the Modern A period (1500-1650 AD)



Appendix X: Distribution of all wrecks in the Modern B period (1650-1850 AD)



Appendix Y: Distribution of all wrecks in the Modern C period (1850-present AD)