Introduction

While zooarchaeological cetacean material is frequently recovered from medieval sites, the study of it has been lacking in comparison to their terrestrial mammalian counterparts. The field of zooarchaeology has often even ignored cetacean material, resulting in a poor understanding of past cetacean exploitation. The situation is further construed by a lack of expertise and methods dealing with these animals in the field of zooarchaeology. The lack regarding research on cetacean exploitation can presumably be ascribed to the continuous influence of evolutionary thought in archaeology which perceives hunting in farming societies as a remnant of a backward evolutionary stage (Zvelebil, 1992, 8).

Several studies have attempted to tackle the lack of research being performed on cetacean exploitation in pre-modern Europe. The first major study concerned with the archaeology of whales and their relationship with humans was conducted by Clark (1947). Clark focused on Prehistoric Europe as a whole and created a database of archaeological sites where cetacean remains had been discovered. Clark was able to collect data for 79 archaeological sites in Northern and Western Europe. The main purpose of his study was to find out to what extent cetaceans played an economic role in Europe and since most of the sites were found in Scotland, most of the attention went to that region in combination with the rock engravings depicting whaling in northern Scandinavia. This study was undertaken 73 years ago, and a lot of new information has been acquired since. Furthermore, the archaeological discipline has changed as well during these years, not solely focused on the "economic" aspects of zooarchaeology anymore, but also analysing social and cultural aspects of past foodways.

Though Clark's study is still the most extensive one for Europe, it is limited in its scope, generalizes a lot and made uncritical use of sources of evidence (Szabo, 2008, 15). New extensive studies were undertaken almost 40 years later. In 1997 Gardiner published his study "The Exploitation of Sea-Mammals in Medieval England: Bones and their Social Context" which, though not specifically a zooarchaeological study, used historical sources to argue that in the High Medieval Period, cetaceans (especially porpoises) were seen as a luxury food and were claimed by royal figures or religious complexes.

Following this, new research was conducted by Mulville (2002a, 2002b). Her research can be seen as one of the first true modern zooarchaeological studies in North-Western Europe concerned with cetaceans and focused primarily on the Hebrides in Scotland. Furthermore, she has argued that archaeological remains are getting increasingly more attention in the modern whaling debate. Zooarchaeological remains are often used in it to argue that whaling has been a vital part of cultures of specific groups for a long time and therefore these people should be allowed to practice whaling now as well (Mulville, 2002b). In this way, zooarchaeology of cetaceans is connected to the debate in regard to modern whaling practices.

More recent studies focusing on the archaeology of cetaceans, focused especially on species identification, have more regularly used molecular-based analysis. The application of mtDNA analysis on cetaceans has been conducted by Foote *et al.* (2013) and has shown excellent results for cetacean species identification. However, DNA analysis remains an expensive technique and as a result it has only occasionally been undertaken.

This financial issue has limited identification of zooarchaeological cetacean remains up until recently, but the development of a new method tackled this problem. This is the method of Zooarchaeology by Mass Spectrometry (ZooMS) of collagen fingerprinting, which allows an efficient and low-cost possibility of species identification (Buckley *et al.*, 2014). It has been applied on zooarchaeological cetacean remains and has proven to be an excellent identification method. However, it is less precise in comparison to aDNA, not always allowing identification to the species level.

In comparison to zooarchaeological studies, historical studies concerned with medieval whaling practices, have been undertaken more frequently. These studies have however also been limited to several cultural groups. One of these groups are the Normans and historical sources concerned with this group have been extensively studied for decades. Examples are studies conducted by Lestocquoy (1948), Musset (1964), Lebecq (1997), and Guizard (2011, 2018), and have provided a wealth of information regarding the history of cetacean exploitation in Normandy and bordering regions. Even though zooarchaeological remains have been discovered at medieval contexts in France, no extensive study has been undertaken comparing the zooarchaeological record to the historical record.

A similar situation is evident for the Basque Country (both the Spanish and the French parts). Historical sources have been studied by Jenkins (1921), Aguilar (1981; 1986), Goyheneche Farnie (1984), Proulx (1986), Kurlansky (1999), Loewen (2009), and Laist (2017), but zooarchaeological remains appear to be rare and understudied (personal communication Grau-Sologestoa, 2016).

To date, the most extensive historical study concerned with medieval cetacean exploitation is the book "Monstrous Fishes and the Mead-Dark Sea" by Szabo (2008). This comprehensive work focused on the Medieval Period of Northern Europe by considering historical sources and sagas. Limited zooarchaeological remains are considered, and Szabo (2008) highlights that zooarchaeological remains can provide a wealth of new information in regard to the reconstruction of medieval whaling endeavours.

Historical sources appear to suggest a pattern in medieval cetacean exploitation. Gardiner (1997) has proposed that whale populations along the English coast were declining in the late twelfth and early thirteenth century. The records of Battle Abbey suggest that strandings appear to occur less frequently from the mid-twelfth century onwards (Gardiner, 1997). This has been proposed for the English Channel coastline for France as well by Musset (1964). The historical records for that region suggest that whaling was most frequently practiced during the eleventh and first half of the twelfth century but declined soon after. Whaling in the Bay of Biscay peaked during the twelfth and thirteenth centuries, but after that, Basque whalers ventured to other regions in pursue of whales (Fischer, 1881, 24; Kurlansky, 1991).

This suggested pattern based on historical sources, has led to Gardiner (1997) proposing a three-phase system for England. In the first phase, during the Anglo-Saxon period until the eleventh century (AD 410-1066), cetacean exploitation was limited to coastal communities. Active whaling was occasionally undertaken, but opportunistic scavenging of stranded individuals was the most common source of procurement. Cetacean meat did not travel far inland, and it was not restricted to the social elite.

The second phase started in the early eleventh century and lasted until AD 1300, in which the King, nobility and clergy were interested in cetacean consumption and tried to monopolize its consumption. It was during this period that porpoises were occasionally exploited, and whale meat was imported from France to England. Active whaling was undertaken in Normandy during this period and for England, as well as several other European countries, stranded cetaceans were from this period onwards a royal and seigneurial right.

The third phase started at AD 1300 and as mentioned, the whale population appears to have been in decline from this period onwards. This led to less whale meat being available to the social elite and it fell out of favour. Stranded cetaceans remained a royal and seigneurial right but claiming of these stranded cetaceans by the social elite was less frequently undertaken. Porpoise meat however continued to be sold as a high-status food.

This system was set out over twenty years ago, was based on historical sources and limited zooarchaeological data, and was restricted to England. Up until this point no extensive study has attempted to combine zooarchaeological and historical sources in order to reconstruct medieval whaling practices. Many studies have focused on the one discipline and used some arguments or sources from the other discipline, but a truly interdisciplinary study, connecting historical and zooarchaeological sources, has not been conducted and has limited our understanding of past cetacean exploitation. On top of this, even though many medieval historical sources hold valuable data in regard to human-animal interaction, many zooarchaeological reports concerned with historical periods, refer to historical texts only in anecdotal or factual manners instead of interpretative (Ervynck, 2004).

Moreover, though more research has been performed on medieval whaling from a historical perspective than from an archaeological one, historical sources concerned with cetaceans are also still understudied, without a comprehensive overview of European medieval whaling practices being created. Lindquist (1997) noted that studies regarding Norse whaling and cetacean exploitation are limited and not comprehensive. It has even been suggested that "no detailed comprehensive presentation of Scandinavian medieval whaling and whale utilisation" exists (Schnall, 1992). This appears to not only be the case for the Norse, but for many other medieval cultural groups as well.

This study aims to combine the historical sources and zooarchaeological sources in order to reconstruct medieval whaling practices, leading to the main research question: **What are the Social Implications of Cetacean exploitation in Medieval Northern and Western Europe?** This question is primarily based on an assessment of Gardiner's proposed three-phases, though the analysis will encompass a larger region than Gardiner was concerned with, namely northern and western Europe (see figure 1, for all the countries assessed as part of this study, and table 1 for time periods considered).

To answer this question, it will be attempted to reconstruct whether cetacean exploitation was limited to particular social strata. It will be analysed whether the undertaking of whaling itself, the scavenging of stranded cetaceans, the consumption of cetacean meat, and the utilisation of raw resources (e.g. bone, baleen, and teeth) was limited to the social elite. Moreover, the species exploited will be identified through the study of both the historical and

Table 1. Time periods considered in this study. *For Scandinavia this includes the Germanic Iron Age (fifth to eighth centuries AD) and the Viking Age (late eighth – mid eleventh century AD)

Time period	Dates
Early Medieval*	AD 400 - 1066
High Medieval	AD 1066 - 1300
Late Medieval	AD 1300 - 1500
Post Medieval	AD 1500 - 1600

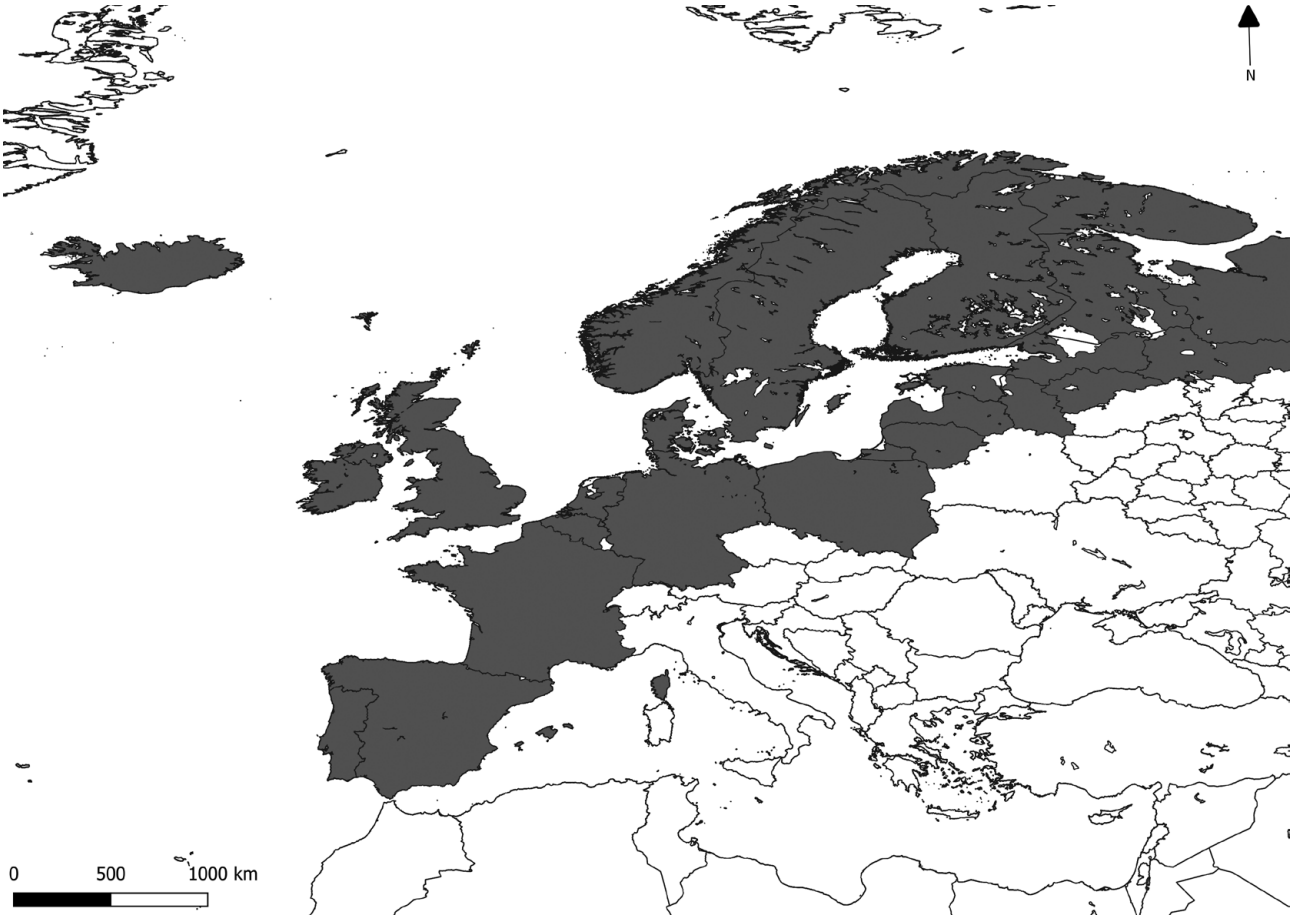

Figure 1. Map of Europe, with countries and regions considered as part of this study in dark grey.

zooarchaeological sources and it will be attempted to find out in which regions and periods active whaling was undertaken, and in which opportunistic scavenging of stranded individuals was the main source of procurement.

In this study a clear distinction between "whaling" and "cetacean exploitation" is made. "Whaling" in this study is considered active hunting of cetaceans in its widest sense (e.g. hunting using spears or harpoons, driving them to shore, poisoning them, trapping them in bays of inlets, etc.). "Cetacean exploitation" on the other hand both encompasses actively caught individuals through "whaling" or the (opportunistic) exploitation of stranded individuals.