THE COASTAL DEFENCE IN SCANDINAVIA : THE ROLE AND COMPOSITION OF THE MILITARY ORGANISATION IN THE VIKING AND EARLY MIDDLE AGES

Fredrik Kvarme Skoglund

A Thesis Submitted for the Degree of MPhil
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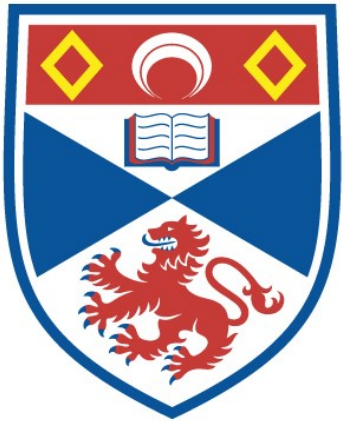
University of St Andrews



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THE COASTAL DEFENCE IN SCANDINAVIA;

The Role and Composition of the Military Organisation in the Viking and Early Middle Ages

SUBMITTED FOR THE DEGREE OF M.PHIL

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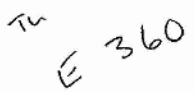
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"The best-laid schemes o' mice an' men,
gang aft agley ..."

Robert Burns-"To a mouse"

DECLARATIONS

(i) I, Fredrik Kvarme Skoglund, herby certify that this thesis, which is approximately 40 000 words in length, has been written by me, that this is the record of work carried out by me and that it has not been submitted in any previous application for a higher degree.

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(ii) I was admitted as a research student in September 1999 and as a candidate for the degree of MPhil in September 1999; the higher study for which this is a record was carried out in the University of St. Andrews between 2000 and 2002.

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(iii) I hereby certify that the candidate has fulfilled the conditions of the Resolution and Regulations appropriate for the degree of MPhil in the University of St. Andrews and that the candidate is qualified to submit this thesis in application for that degree.

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ABSTRACT

This thesis sets out to examine the coastal defence in Scandinavia in the Viking and early middle ages, with main emphasis on Norway, the organisation and the elements' level of co-existence. The idea is that the military organisation consisted of three main elements. First and foremost the levy system, based on ships being mustered from the various administrative districts in the countries, in order to protect the land from sea-borne attacks. Secondly a signalling system, consisting of several sites, to be lit and warn the settlements of approaching fleets or other danger, so that a defence could be mustered. Thirdly, underwater fortifications, man made defensive constructions positioned in water at favourable locations to prevent enemy vessels from using fjords and inlets as inroads. As the latter category has only been researched in Denmark and Sweden, special interest will be put in studying this element and to evaluate the possibilities for it having been employed in Norway. A study of the various available, and valid, sources in order to obtain knowledge regarding each of the elements will be presented, emphasising on the ramifications involved when applying them in research.

The study will be multi-disciplinary, for though the basis being archaeological, the lack of archaeological material will in many cases, make the use of other sources necessary. Additionally will various sources make the picture more complete and a better understanding can be reached. Especially will place-names be regarded as a valuable source.

ACKNOWLEDGEMENTS

First and foremost I am much indebted to my supervisor Dr. Colin Martin, without whom this thesis would not have happened. Of invaluable help and support, initially believing in the thesis and helping me out in so many ways, always with a cheerful smile.

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And all others who have contributed in so many ways, your help and assistance has been very much appreciated.

LIST OF ILLUSTRATIONS

Chapter 1: Introduction

1.1 The Topic

This thesis is about coastal defence in Scandinavia in the Viking[1] and Early Middle Ages, relevant to the study of the defensive structures that evolved in northern Europe and contributed to state formation processes in early medieval Scandinavia.

In the Viking Age almost all communication, trade, and warfare involved the sea. It provided people with their basic needs of food and transport, but additionally constituted a threat. It was from the sea that attacks normally came, and Scandinavia's long and indented coastlines provided numerous landing-places. This is the setting for the coastal defence systems. If the coast was protected the adjacent land could be controlled too, a factor of significance to state formation processes.

Coastal[2] defence at this time consisted of three main elements. The first was the levy fleets; the second the signalling networks; and the third underwater fortifications. In considering these it must be asked whether these elements operated independent of one another, or whether they formed a more symbiotic system, each benefiting from the others' presence and effectiveness, so forming a robust and integrated means of coastal defence.

It is not the purpose of this study to determine the origins of any of these elements. It is, rather, to reconstruct how Scandinavian defensive systems, particularly in Norway, functioned during a particular phase of their history.

Underwater fortifications provide a convenient starting point. It must be asked why they are barely mentioned in Norwegian sources when they have proved so numerous in Denmark and Sweden. To understand the function of underwater fortifications it is necessary to consider them in the wider context of coastal defence of which they were

[1] The term *Viking* is in itself problematic, as for instance "the northern marauders were never called 'Vikings' in the Scottish or the Irish sources. The terms there used are *geinte* ('gentiles' or 'pagans') until the middle of the ninth century, with specific reference to their religion; Danes, Northmen and *Lochlannaibh* with reference to their origins; and *Gall* or foreigners" (Crawford 1987:2).

[2] The coastal zone is defined as an area, where the sea can be reached in one day (e.g. Näsman 1991:27).

a part. By focusing on this aspect it is hoped to explain why such structures are not known in Norway. Were they never used there, or is it just that evidence has not yet been recognised? If the latter, might a better knowledge of their constructional features and locational criteria based on evidence elsewhere be helpful in conducting further investigations in Norway?

1.2 The Study Period

The thesis focuses on the Viking and Early Middle Ages, c. 800-1200. During this era the Scandinavian region developed into realms, with territories tied together through kingship, the church, and legislation. 793 - the date of the Viking attack on Lindesfarne[3] - provides a convenient starting-point. The close of the period is set at 1200, by which time it is generally accepted that the levy had become a largely fiscal concept. When king Sverri died in 1202 he left his successor as a form of taxation rather than a military system. This transformation changed the whole nature of coastal defence. Unfortunately this proto-historical period is poorly documented, and to a considerable degree its study must be based on later sources. These will be critically evaluated as they appear.

In this period, on a nationwide level, we see great political and administrative changes, from numerous chieftaincies with their warband level of warfare, via an increasingly stronger king with a levy towards the formation of the state, as well as religious changes with the conversion to Christianity and the church thus becoming a powerful entity, and huge landowner. On a macro-level, on the other hand, there are few major social changes and the period is rather mirrored by a high degree of conservatism, with virtually the same use of equipment, weapons, tools, house building and use of technology throughout the period. Although changes did happen, they seem more vernacular than projecting a nationwide conformity.

[3] As mentioned in the Anglo Saxon Chronicles from 793 A.D. See e.g. Roesdahl 1994a and Myhre 1992c; 1993 for more on the beginning of the Viking Age.

1.3 The Geographical Area

The setting is the Scandinavian countries: Norway, Denmark, and Sweden. These were part of a general 'Viking' culture, with common elements in language, religion, politics, and military systems. These three distinct areas (it is too early to describe them as countries) sought to gain control over each other's territories, and this is reflected in the similarity of their coastal defences. All used similar military and naval tactics, similar weapons, and similar types of ships.

Comparative analysis is difficult. Research carried out in the three countries is variable, due partly to the sources available but also because of differences in approach and fields of study. Thus each country provides information, which does not always lend itself to comparison with its neighbours[4]. The levy system, for example, has been comprehensively studied in Norway, rather less so in Denmark and Sweden[5]. On the other hand underwater fortifications have been thoroughly investigated in Denmark, increasingly so in Sweden, but not at all in Norway. None of the three countries has yet begun a systematic nationwide study of signalling systems.

Norway, as the country with most untapped research potential, is the focal point of this study, though comparative material from Denmark and Sweden will be used to complement it wherever appropriate. The aim is to identify differences as well as similarities.

1.4 Defining Coastal Defence

Coastal defence is an amalgam of military resources, organisation, and action designed to secure coastal areas from attack by sea. It can consist of one or more elements, each acting independently or interacting with others, depending on contemporary levels of technology, organisation, and administration, local geography and topography, and the needs and abilities of the people involved. The main elements of coastal defence in medieval Scandinavia include the levy system, signalling systems, and underwater fortifications.

[4] One problem with this source material, especially the Swedish, is that it is often locally printed and so difficult to come by and/or get hold of.
[5] E.g. Lindkvist 1988 and Varenius 1998.

The levy system divided the country into districts each of which was required to produce a prescribed number of ships, crews, and equipment. Laws set out who was to muster and when, and the penalties for failing to do so. The king or his representative was authorised to call the levy, and decide how long it should remain mustered.

The signalling system comprised an organised system of *veter* along the coast, activated when an enemy fleet was sighted. It depended upon optical fire signals, transmitted through the network when triggered by an initiating station. By alerting a pre-ordained response mechanism involving the levy system and the manning of key locations (of which underwater fortifications might be an element) the threat could be countered. The main vete-systems were locating in coastal areas, but sub-systems often extended along fjords and to inland settlements. Laws regarding the *veter* and duties associated with it were codified in regional and national legislation.

Underwater fortifications were usually permanent structures, which prevented hostile ships from entering narrow waterways or landing on shore. By denying enemy access at key points they also provided time for other defensive responses to be activated. They were of many types, and could be erected either as individual barriers or in combination with other fortifications. They were custom-built to suit local resources and topography. Underwater fortifications were usually maintained on a permanent basis, in contrast to the levy and the *veter*, which were only manned in times of perceived danger.

1.5 Focal Points

The thesis generally focuses on military aspects of the coastal defence and the three elements rather than the political and economical, although this will be discussed when appropriate.

The main focal point will be the underwater fortifications, as they have neither been researched nor found in Norway, thus having the best research potential. Why they have not been discovered and also the validity of further research will be sought answered in the thesis. Due to the lack of Norwegian material, Danish and Swedish material will be employed as a foundation for further research, and through a

methodological approach provide an introduction to relevant localisation factors. The socio-functional aspects connected with the fortifications being part of the maritime cultural landscape will be emphasised, as well as the illumination of important technical aspects. Furthermore, the types of underwater fortifications that might have existed in Norway and the available localisation factors will be dealt with. Other aspects addressed will include; materials used, influence on the shipping, whether located where underwater topography made it most feasible, or where they best could be utilised in military actions, who built them, as well as possible misinterpretations. Examples of fortifications prior to and after the Viking Age will be presented, in order to elucidate the development of constructional features and their application.

It is true in archaeology that it is hard to discover something that one does not know exists, and therefore this thesis aims to introduce the underwater fortifications as an archaeological category to Norway.

The origin of both the levy and the signalling system is for all the Scandinavian countries uncertain, and it will not be attempted to venture into a spiral of beliefs and assumptions based on fragmentary evidence to find the origin. Instead an attempt will be made to illuminate the contents of the two systems, their practical function, their effects on society and what sources are available to shed light on their organisation.

The levy system was important for those in power, aiding in their governing. The thesis will put some focus on the boathouses for the levy ships and the levy-vessels, as both can be found and investigated archaeologically. The levy system constitutes much of the core for the coastal defence, the view in the thesis would be that of a state of research, as thorough investigations within this system requires a thesis of its own. A general description will be given, and the available sources will be discussed, rather than go into too much detail, unless where it is vital for the scope of the thesis; to present the role and composition of the coastal defence in the Viking and Early Middle Ages.

The signalling system is a vital part of the thesis, especially as it has not yet been the main scope of thorough archaeological research. Some sites can still be seen today due to their strong continuity in site-location. Their appearance, who built, maintained and manned them, as well as when they were to be lit are questions sought answered. As

an example of their use, a suggestion of how the signal might have been sent along the coast and to the town of Trondheim in Norway will be presented.

The signaling system became an integrated part of the levy system, but being important in its own right, it will be presented separately. This will also make the multitude of aspects regarding the veter more comprehendible. As the vete-sites are hard to date, sites post-dating the Viking Age will be treated, this will also illuminate the continuity, and sites still recognizable will provide better understanding of the physical features and factors such as toponymy.

1.6 Multi-Disciplinary Approach

This primarily being an archaeological thesis, it is mainly depending on the archaeological source material. Unfortunately the archaeological material is in many cases simply non-existing. This being particularly true regarding the levy system, where only the boathouses and ships might be tested and found archaeologically. The rest of the material and our knowledge about the levy system derive almost entirely from historical sources, mainly the laws. Neither the veter have been investigated archaeologically. Therefore it will bear the shape of a multi-disciplinary approach[6].

Additionally, the full picture is only obtained by using all relevant and available sources with the appropriate critical view. Using only one or few sources will limit the level of knowledge, and often lead to dubious or incorrect conclusions. One science might shed light on vital facts that might else be excluded and left in the dark. A multi-disciplinary approach is, not only preferable, but also necessary to deprive the past of its secrets in order to expand the historical jigsaw puzzle.

1.7 Style Of Writing

In general it will be referred to the three countries as Norway, Sweden and Denmark, although the names were not necessarily given in the beginning of this period. In fact

[6] "The need to consider and understand the different source materials is paramount; but they are, by their nature, so very different and conclusions drawn from them so disparate in their significance, that it is to some extent an artificial exercise to attempt a complete integration" (Crawford 1987: 10).

they were not necessarily countries at all at that time, but their present names will be used to make it more comprehendible.

When referring to people the anglicised version will be preferred when possible, such as Harold Fairhair rather than the Icelandic Haraldur inn hàrfagri, or the modern Norwegian Harald Hårfagre. To use the old versions, correct as it might be, might be utterly confusing as modern terms are accepted.

Some quotes will have to be cited in the original language, as the meaning would be generally lost in the translations. However additional translations will be provided.
Some words might have to be used in its original form, as English terms do not exist, or being inadequate to suit the purpose. In these cases, the words will be put in italic the first time used, and will also be explained. Footnotes will be used for adding relevant information and giving the references to the text used.

Chapter 2: The Levy Organisation

2.1 INTRODUCTION

2.1.1 Definition

The levy[1] is a military organisation under the king's control, though not without the approval of the regional Things. Its purpose was to provide protection against attack. It divides the land into administrative units, which have to present a number of manned warships to the fleet, the main component of the levy. When called out by the king or his representatives, people in each region take part in the defence of the shores against sea-borne attacks - often outside their own area. The levy legislation describes the role of both king and subject, defining their duties in most matters, and setting fines for non-compliance.

The word *leiðangr* meant both the defence itself, but also the later tax-system, which replaced it[2]. Linguistically the Norse term for levy, *leiðangr*, might derive from either a "compound of *leið* 'warband' or 'host', and *gagn* inter alia 'provision' or 'equipment', the second a compound of *leið* 'way', 'direction', or 'expedition', and *gangr* 'going'[3]. A third possibility is that of a defensive army, is from the compound *leið-gagn*, where *gagn* means 'opposed' or 'against'[4]. The word *leiðangr* is first used in the skaldic poem *Eiriksdràpa* believed to date from late 10th century and quoted by Snorri in Saga of Olaf Tryggvason[5]. This usage implies that some form of defence conceivably existed during Hakon's reign.

2.1.2 Origin

The origin of the levy system is different in the three Scandinavian countries, and will be discussed further in each of their individual chapters. The following is a general introduction to the origins of the levy.

[1] Norwegian: *leidang*, Danish: *leding*, Swedish: *ledung*
[2] Steinnes 1927:5
[3] Williams 1997:22
[4] Williams 1997:22
[5] Sturluson d) I:151

The levy system was not devised as a local defence system; local defence against small-scale attacks was already more or less sound. However, when a larger external threat arose, a more robust defence force was needed. This was the case in Norway, where the threat from the Danes made people realise the need for a united response.

The role of the king or chieftain is key. He needs to maintain control over military power and is interested in consolidating and expanding the territory and population under his control. A strong central figure is also necessary to unify people from often disparate areas and to induce them to defend territory not their own. Clear legislation is needed defining duties and responsibilities; people need to be persuaded that they would benefit directly from this military organisation. So what came first: did the levy prepare the ground for a strong king and subsequently a state, or did an already relatively strong king introduce the levy to increase and consolidate his power? Does a nationwide defence system arise only after the state formation process, or is it a pre-requisite for the state? According to C. A. Christensen[6], a levy cannot exist without a state. This is not necessarily so. In Norway the levy was introduced while no king had nationwide control; indeed, one cannot yet even talk of a nation. There were petty-kings and chieftains who ruled regional kingdoms[7]. The levy became an influential tool in the king's ongoing pursuit of national supremacy[8], and it required some administrative apparatus, but not necessarily a state. For a state would presumably control regular, professional military forces, and not necessarily the levy, which is a common duty.

2.2 THE LEVY ORGANISATION

2.2.1 Introduction

As mentioned above, the introduction of the levy system was not uniform across Scandinavia. In all three countries there is a development from more locally-based defence under a local chieftain or petty-king with his own retinues, to a more national level, where larger geographical areas are united in the same military organisation led

[6] KLNM X b)
[7] A kingdom can be defined as "a larger, united political area with fairly defined borders" (Ersland, 2000:24).
[8] Crumlin-Pedersen *et al.* 1996a:191; Nielsen KLNM XIII:526

by a king. Finally the levy is transformed into a tax-system where the farmers pay an annual tax to the king in lieu of military duty.

This chapter will concentrate primarily on the levy as a military organisation, but as the transformation to a fiscal system occurs at different stages in Scandinavia, this will also be treated.

2.2.2. Norway

According to Heimskringla and Fagrskinna, Hakon the Good introduced the levy system to Norway around A.D. 955, when he enshrined in legislation for all the coastal strip and "as far inland as the salmon goes" a division of the districts into *skipreider,* and the skipreider into *fylker* (counties)[9].

But to credit Hakon for the whole of Norway would be anachronistic, as he controlled only parts of western Norway at this time, namely the Gulathing area. In this case Snorri must be projecting back to Hakon the notion of a nationally regulated levy from the norm during Snorri's lifetime. However, Bull[10] and many other historians[11] seem to agree with the hypothesis that an old levy-system existed in the Gulathing area, possibly instigated by Hakon[12], but that he introduced it to other judicial districts is more questionable[13].

Whoever introduced the levy system to Norway, did so for a reason. Control of this new military system must have been important, for in the time before the unification of Norway where chieftains and petty kings ruled smaller areas, being in control of the military resources was crucial in the consolidation of power. In this case, the Danes were a potent threat, and the levy would thus give the king the support he needed to ensure domestic security.

The Norwegian levy system, which developed in the mid-10th century, was similar to contemporary military organisations on the continent. Along the coast of what is now

[9] Sturluson d) I ch.20. See also chapter 3.1.3 regarding the origin of the vete-system; Fagrskinna p.53-54. Heimskringla probably written c.1230-35 and Fagrskinna c.1220 (Williams 2001:112)
[10] Bull 1920
[11] E.g. Steinnes 1927:65 and Bjørkvik KLNM X:434
[12] This notion seems now to have been so incorporated amongst more modern historians that it is not always reflected upon, e.g. Ersland 2000
[13] As there is hard to find crucial evidence as to whether he did introduce it or not, it will be assumed that he was one of the main instigators in this part of Norway

Germany, we find that one had developed from an offensive to a more defensive organisation during the eight-century, where all free men were to take part in the defence of the realm, as was the case in Norway[14]. The British fyrd, too, must have been influential, especially since Hakon was the foster-son of King Athelstan. On their Viking raids, the Norwegians experienced both these systems, which may even have developed as they did due to the Viking raids[15].

As there must have been locally-based defensive structures before the introduction of the levy, Hakon basically organised and institutionalised a phenomenon which already existed, transferring it to the national level and enshrining it in law.

The coastal defence, or in Norway *Landvern*[16], represents all the means of conscription and defence in the laws, in Magnus the Lawmender's Land Law[17] of 1274 this is known as *Landvarnabolkr*. In MLL we get a picture of the coastal defence in the 13th century, and it appears to have consisted of two main elements. Firstly the ship levy for defensive purposes, known as *full allmenning*, and secondly a duty for all men in the land, including slaves and other un-free men[18], to defend their local community if danger loomed until back-up arrives[19]. This is known as *mann av huse*, or all out attack, and a version of this must have been the basic defensive mechanism prior to the introduction of the ship-levy system. In both cases the *veter*, or signalling sites, would provide a warning of external threat[20].

Although the differentiation between these two elements is not clear-cut in the laws, there are some points of difference that can be discerned[21]. Whereas the ship-levy came to be a system organised on a more regional and later a national level and was called every summer[22] often in advance of expected attacks, the latter had more of an

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[14] Ersland 2000:45-47

[15] Ersland 2000:48. Even closer is the analogy with the Anglo-Saxon unit 'ship-soke' from the late 10th century, also responsible for presenting a ship with crew and provisions (Williams 2001:122). At the court of Athelstan, hakon would have become familiar with Christianity, law-giving and the Wessex tradition of military organisation (Williams 2001:123)

[16] *'konungr liggr til landuarnar'* (MLL III 13); *'liggr i leidangr'* (Frtl VII 11); *landvorn 'vara a skra setta'* (Gtl 314).

[17] Henceforth MLL

[18] MLL III 3

[19] Blom KLNM X:308

[20] See ch.3. GL 311; FL V ch.1; MLL III ch.4.

[21] Blom KLNM X:308

[22] Albeit the laws state that the levy might be called every summer, does not necessarily mean that it actually was, just that the king had this opportunity ready at hand

ad-hoc nature, for use in emergencies. It was also locally based; even inland regions were subjected to it, and no exemptions were made. In order to make the levy organisation effective, the land was divided into regions and further subdivided into smaller units. The intention was to produce units of farms that were to present one man to the levy ship, as well as larger units that were to produce the ship from each region[23]. The levy probably escalated this division of land and did not simply adopt already existing administrative areas[24]. An introduction will now be provided to the various types of units and their duties under the levy.

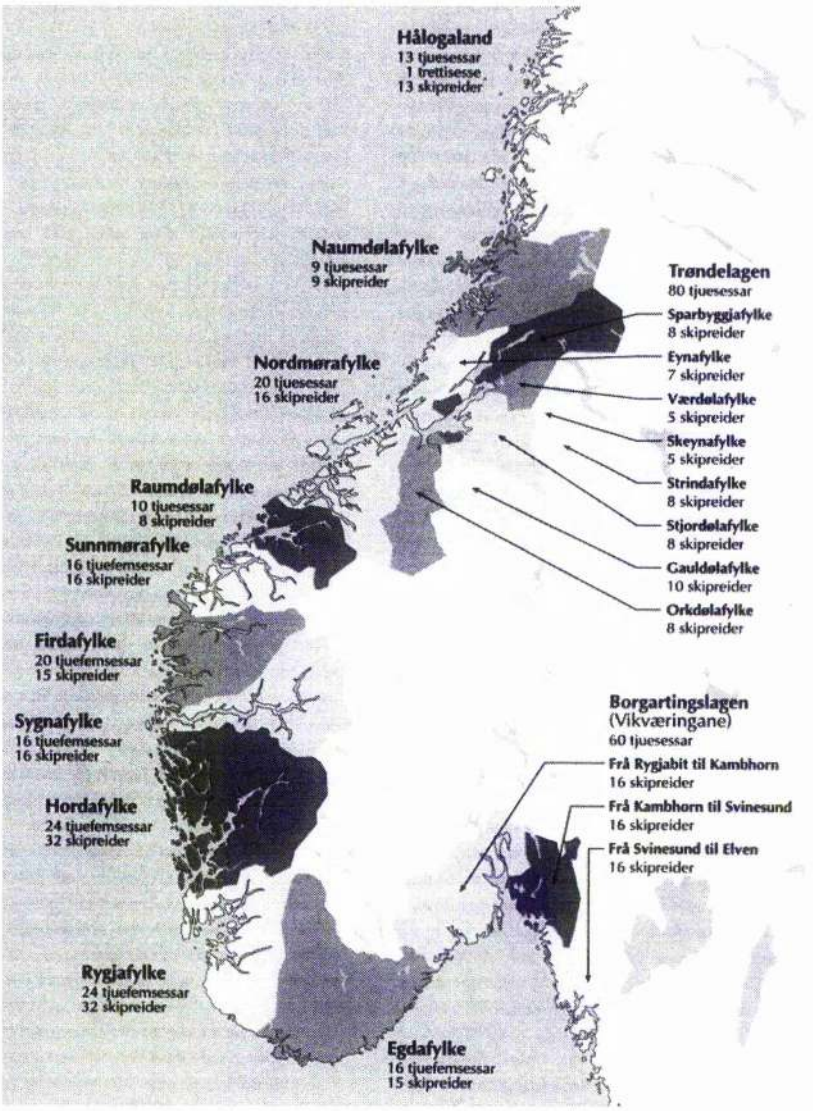

Figure 1 – *Skipreider and fylker with the number of vessels each contribute. Number of skipreider based on MLL, number of sesser based on GL 315 (Ersland 2000:83)*

[23] Fig.1 and Appendix II
[24] E.g. Bjørkvik KLNM X:434

Manngerd (gera mand, or to present one man) is seen as one of the smaller, and also oldest divisional units for the levy in the Gulathing region[25]. According to the Gulathing Law[26] the *manngerd* consisted of three farms and had to present one man to the levy ship. Later it became the rule that in the case of a full call-out of the levy, one out of seven men was to present himself to the levy[27].

Lide[28] is the equivalent of the *manngerd*, although the *lider* consisted of four farms. Mainly known from the Borgarting area in south-eastern Norway, where the term *leidangstufta* was similarly applied[29]. The term *Lid* is also known from Denmark, reflecting the fact that this part of Norway was under Danish control for most of the Viking Age.

The largest units were the *skipreider*, which consisted of many *manngerds*, and as the name indicates, these had to present a ship for the levy fleet[30]. The skipreider were only introduced in Hakon's own Gulathing area at first [31], and subsequently spread to the other regions and later became the general term for these largest administrative regions.

In several parts of the country the division into skipreider is of a secondary nature. One such case is the Trøndelag area, consisting of central Norway and the jurisdiction of the Frostathing, where it probably substituted locally-based administrative units in the 13th century, probably coinciding with the transformation of the levy from a military to a fiscal system[32]. The origin of the levy organisation in Trøndelag is hard to establish, but according to Dybdahl[33] it dates back to the 11th century at least, probably earlier. In this region the skipreider are only known from later sources, the *skipssysla* or *fylker* seeming to be the main unit[34].

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[25] E.g. Lund 1994:103 and Bjørkvik KLNM X:434
[26] Henceforth GL; 298 and 304
[27] GL 297; Bjørkvik KLNM X:434. Transition by Bull placed to beginning of the 12th century (1920:38) when using 25- rather than 20-benchers (Bjørkvik KLNM X:434).
[28] *Liði*, originally meaning 'follower' (Steinnes 1927:95-102). Later the retinue of a chieftain or petty king, often his household.
[29] Bjørkvik KLNM X:534
[30] Ersland 2000:52
[31] Bull 1920:142
[32] Bull 1920:47; Bjørkvik KLNM X:434
[33] Dybdahl 1987:25
[34] FL VII 1 and Dybdahl 1997:211. See Dybdahl 1987; 1997 and Skevik 1996 for a division of skipreder in Trøndelag.

Skevik[35] is of the opinion that the skipreider in Trøndelag as we know them from the written material stem from the 13th century and the regulations instigated by the crown. This view is based on the discrepancy in the number of farms in each skipreide, so that the new regulations in the 13th century sought to achieve a similar number of farms in each skipreide for tax purposes. In this respect he agrees with a number of other historians[36]. As the levy already existed at the time, it must have been organised differently in Trøndelag than in the later skipreider. According to Bull[37] the levy was drawn from *fylker*, the term *fylke* also being referred to in the oldest part of FL[38]. And Bjørkvik[39], to some extent basically agree with Bull as it is his opinion that a smaller number of farms, within the fylker, was organised to provide men for the levy ships. A second option is presented by Skevik[40], who believes that more or less rigid regional societies existed, based on the assumption that the levy was instigated in the 10th century.

With the introduction of the levy system, the king increased his power considerably and gained influence on subjects' lives as he was the only one who could call out the levy[41]. The first paragraph of GL XIII beings with a statement that the king is to take responsibility for laws and fines, as well as the military campaigns, and that none shall deny him the right to take the levy to the land's end[42]. To ensure that the law was followed, the king appointed representatives to each administrative area to look after his interests[43+44]. They were to be in charge of the census[45], the annual Things with weaponry inspection, the ship's equipment (especially the sails[46]), ensure that all levy

[35] 1996:21
[36] E.g. Bull 1920:47
[37] 1920:38
[38] VII 1
[39] KLNM X:436
[40] 1996:22
[41] Harbitz 1951:24
[42] GL XIII 295 "Kongen skal råda for bod og bann og for utferdene våre. Ikkje skal me nakta han leidang til landsenden, når han byd ut seg til tarv og oss til gagn". In MLL III it is however "sig selv til gagn og oss til tarv".
[43] In Trøndelag at least one in each *fylke* (FL VII 14; FL X 33), while fewer in Gulathing area (GL 271) (Andersen KLNM XX:448).
[44] These representatives are in the laws (see footnote above) referred to as *lendmenn*. This is however anachronistic for the early periods, as it reflects a medieval notion, as that of a feudal lord or vassal. They are thus in these cases projecting the medieval understanding of the term back to earlier periods.
[45] FL VII 8 and 10
[46] GL 308

ships were properly manned[47], and to check that the veter were manned when necessary[48].

GL 315[49] states how many ships each administrative area, whether skipreider or fylker, is to submit to the fleet. The standard levy ships were 20-and 25-benchers. The number refers to the number of oar-sets there were on each ship; a 20-bencher would thus have 40 rowers. It was usually the custom to have two sets of rowers, especially on the royal vessels, so that they could row in turns. In addition came the helmsman and other officials, so a 20-bencher would carry around 80 men in total.

Figure 2 – *The types of weapons,* folkevåpen, *to be possessed by each free man (Molaug I 1985:33)*

MLL III 1 states that the king cannot demand more than *halv almenning* in peacetime unless the farmers agree otherwise. This is half the force he could muster in wartime, i.e. *full almenning*. This notion is also described in the sagas. This differentiation must be of later origin after the levy became a taxation system, as it was not customary to call the levy unless in wartimes, and the saga writers must thus be projecting their contemporary knowledge back through the centuries. Bull assumes that the king was able to muster all the men and ships he wanted, prior to the transition of the system[50], but that the change came as people then began paying annual taxes. A full call-up would only turn the farmers against the throne.

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[47] GL 301; FL VII 14
[48] GL 301; Andersen KLNM XX:448
[49] "Vikværingane skal reida ut seksti tjugesessor og dessutan grønaskipet. **2.** Egdene skal reida ut 16 skip, femogtjugesessor. **3.** Rygene skal reida ut 24 skip, femogtjugesessor. **4.** Og hordane like mykje. **5.** Sygnene 16 skip, femogtjugesessor. **6.** Firdene 20 skip, femogtjugesessor. **7.** Mørene 16 skip, femogtjugesessor. **8.** Romsdølene 10 skip, tjugesessor. **9.** Nordmørene 20 skip, tjugesessor. **10.** Trønderne 80 tjugesessor. **11.** Namdølene 9 tjugesessor. **12.** Håløygene 13 tjugesessor og ei trettisesse, 7 i den søre helvti, men 6 i den nordre helvti, for dei har vakthald mot aust".
[50] Bull 1920:74-75

When the levy was called, the laws stated that every man was to bring his own supply of provisions for two months, *månadsmat*[51], in addition to the prescribed personal weapons[52]. These were a broadaxe or sword, a spear and a shield fitted with at least three iron bars. Additionally, farmers had to present a bow and 24 arrows for every seat in the levy ship before it could set out[53]. Every year the farmers had to show that they had these weapons and that they were in good condition, otherwise they were fined[54]. Every law paragraph authorised financial penalties if the law were broken.

Very few were exempted from the levy, and these were, according to GL 298 and Frostathing Law VII 17[55], apart from the king's representatives, restricted to representatives of the clergy and their limited households. According to Bull[56] this must be seen in relation to Christianisation, for later as the churches' power grew, more of their men were exempted.

2.2.3 Denmark

It is important to distinguish between the types of coastal defence. First one had the locally-based defence system where people defended their own property by every means necessary. This was later replaced by the levy which moved the organisation to the national level. There must obviously have been some intermediate phases in between these two stages, as one does not automatically leap from one to the other, but the form and nature of this seems very dim. Christensen[57] assumes that the locally based defence, the so-called *mand af huse*, combined with a signalling system, is as old as the first settlements. The levy system, uniting the land and dividing it into local administrative regions, replaced the old system, though did not make it obsolete[58]. The levy is a military system controlled by the king and consisting of ships and crew from

[51] GL 300 8; GL 300: farmers are to bring food for two months, this according to Oppegård (1951:167) to limit the amounts of food each is to bring, so that the king had to supply the additional food longer journeys
[52] Fig.2
[53] GL 309 15; FL VII 13, 15; MLL III Ch.10, 11
[54] GL 309 15; MLL III ch.12
[55] Henceforth FL
[56] 1920:94
[57] KLNM X:306
[58] Christensen (KLNM X:443) also see the levy as a system of transportation, which within short time could muster and deploy large military forces

all Denmark required to do service, to protect the land and territories through defensive as well as offensive action[59].

There is an ongoing discussion on the origin of the levy system in Denmark. Some date the levy to the 11th century or even earlier, as the first written account of *leding* is found in a letter of 1085 A.D.[60]. The Skuldelev 5, dated to the same period, has been interpreted as a levy ship, which also supports this view[61]. The other view is maintained by Niels Lund[62], who does not regard the Skuldelev 5 as a levy ship. For although Lund accepts that some form of levy existed in 1085, he dates the levy to 1170 when it is first mentioned in the Land laws and that this system was new to the time in question. He thus depends solely on written accounts for his hypothesis.

Lund[63] concludes that the *Leding* was introduced around 1170 as a wholly new concept, not a gradual development. The consolidation of the crown in the late 1100s gave the crown a chance to introduce administrative principals for the whole of Denmark and unify the realm into one military organisation, and thus were of another character than the previous, more regionally-based defensive structures where the chieftains had their own military units, *lid*, which were taken into the king's campaigns[64]. The levy introduced around 1170 is one based on direct bonds between the farmers and the king with taxes collected. Lund's definition of the Danish levy is as an offensive instrument, *expeditio*[65] compared to its more defensive Norwegian and Swedish counterparts[66]. But to rely solely on the scarce written sources prior to the Land laws is unsound, and so the levy was probably introduced, or at least accepted during the late 11th century seen in context with the first written sources.

There are three stages of the Danish Levy according to Lund[67]. The first stage is the *full hafnæ* including those who could serve at their own expense, the rest taking part only when demanded. Then an intermediate stage consisting of co-operating units

[59] Christensen 1965a KLNM X; Crumlin-Pedersen *et al.* 1996a:189
[60] Crumlin-Pedersen 1991b:186
[61] More on Skuldelev 5 in ch.2.3.2
[62] 1996
[63] 1996:246
[64] Lund 1994:103.
[65] "First appearance of the word *expeditio* in a Danish charter, St Knud's charter to St Lawrence at Lund of 1085 … it is not however, evidence that the system was operating, only that Knud made the claim to it" (Lund 1994:100)
[66] Lund 1997:195
[67] 1994:102

formed of groups of three farms, together forming a *hafnæ*. The final stage begins when the service of the *full hafnæ* was no longer adequate and when the reduction in the landowner's wealth was below what was needed for the full *hafnæ*.

According to the 13th century laws the Danish farmers had two main obligations under the levy. First, each *havne* had to pay a tax of three marks every year, called *ret leding.* Secondly, they had to serve on the ships every four years, known as *utgærdsleding*. This was a rotation system so every year one quarter of the farmers were serving[68]. The levy ships became manned with more professional soldiers, many without connections at home and thus the king had more freedom in how he deployed this force. And from the 13th century onwards it became more usual to use mercenaries in campaigns[69].

The land was divided into *skiben*[70], one to four from each *herred* (township)[71]. The *herreder* were initially divided so that each had a coastal strip or a waterway incorporated within its borders[72]. Every *skiben* was to provide one ship with crew for the levy fleet. Every *skiben* generally consisted of 42 *havne/hafnæ*[73], each to provide one man for the levy ship[74]. The taxes and other burdens were shared amongst the farmers based on their wealth. Three gold marks were called *full havne* and equipped one soldier. One *havne* could consist of just one farm or of several farms[75].

In Denmark it was the helmsman on the local levy ship, elected by the King, who was the crown's representative in each area, making sure that taxes were collected and supply and provisions were as stated in the laws[76]. The helmsman's, or *styresmand*, post was actually passed on from father to son and so became powerful locally[77]. Apart from the regular weapons, from the 13th century onward, he was also required to

[68] Lund 1997:195
[69] Crumlin-Pedersen *et al.* 1996a:191
[70] Similar to Norwegian *skipreder*
[71] The Danish geographical division into *herreder* and *skiben* most likely derives from the introduction of the ship levy system (Crumlin-Pedersen 1991b:185).
[72] Christensen KLNM X:443; Crumlin-Pedersen *et al.* 1996a:189
[73] *Hafnæ* originally one man's seat in a ship
[74] The levy duty rested on each farm in the *havne,* not only the men as widows (i.e. their male substitutes) had to do service according to JyL III:1 (Rasmussen KLNM VI:97).
[75] Christensen KLNM X:443; Lund 1994:101
[76] Crumlin-Pedersen *et al.* 1996a:191 and Nielsen KLNM XIII:526
[77] Christensen KLNM X:443 based on JyL III:20

carry a cross-bow[78], a man to operate it if he was himself unfit, a horse and armour[79]. The extra costs were covered by extra taxes from the *havne*[80]. The same rules regarding the provisions seem to apply here as in Norway and Sweden[81].

Due to the helmsman system, the Danish king obtained a 1000-man strong cavalry force, financed by the *havne.* An amphibious force with cavalry aboard levy ships, gave Denmark a military dominance in the Baltic, after a pre-cursor of the system had been deployed by Eric Emune at the battle of Foteviken in 1134[82]. The cavalry later constituted a social class[83].

2.2.4 Sweden

The term *landvärn* describes the oldest defence of the land, which was locally based and implied a duty for all free men to defend their territory[84]. The levy then emerged but it could only be used internally, and only applied outside its borders if the local things agreed. In times of severe danger, even bonded men were to serve[85]. The levy lost much of its impact when military tactics changed and the cavalry became the essential cornerstone. Also, men were increasingly conscripted to land-based fortifications which became important with the impact of terrestrial warfare[86].

The Swedish levy is not mentioned in written sources until the 13th century[87]. And as it is difficult to get a notion of the system prior to this, the Swedish material will have to be presented from this stage. After the introduction of taxes, the Swedish levy consisted of the expeditions, *útróðr,* the signalling system, *wardhald,* and the taxes[88]. As in Denmark, the smallest districts were the *hamna* who were to provide one man to

[78] Thrane and Porsmose 1996a:176
[79] Christensen KLNM X:443 based on JyL III:3-4
[80] Known as *hesteleje* and *brynjepenge* (Christensen KLNM X:443)
[81] Nielsen KLNM XIII:526
[82] See ch.4.2.7.1
[83] Christensen KLNM X:443
[84] Muster troops in *landwern* (BSH 4:299) or sätta riket *i landwärn* (BSH 5:168) (Yrwing KLNM X:302)
[85] Yrwing KLNM X:302
[86] Yrwing KLNM X:302
[87] Lund 1994:100
[88] Hafström KLNM X:450

the levy fleet[89]. The word *hamna* seems to derive from the Norse *hamla* (*hǫmluband*), oar-grommet, thus implying one man's place onboard a vessel[90]. According to Larsson's calculations, every ship had 12 rowers as each ship got their crew from twelve *hamna*[91]. These small warships, contrary to their much larger counterparts in Norway and Denmark, were vernacularly adapted for the Swedish coastline. In later periods, however, larger crews were needed for larger ships and so the districts adapted accordingly. It is from later sources that the district known as *hundare* (hundred) originates. In addition to others known as *skeppslag*, these districts were to furnish one ship for the levy fleet.

The king decided for what periods the levy was to be mustered[92]. If he chose not to call it, the *hamna* were to pay taxes instead. Based on these taxes, Hafström is of the opinion that each *hamna* initially consisted of six or three farms[93].

Figure 3 - *"On the instant summoning of the community to arms". The stick represents that if they do not muster their house will burn [the charred end] or the master of the house will hang [the rope tied to it] (Olaus Magnus book 7, ch.4)*

[89] Hafström KLNM X:450. The men to be equipped with shield, sword, spear and a helmet. Later, with the introduction of a more professional organisation, they were also to have armour, in addition to a bow and arrows (Hafström KLNM VI:96).
[90] Larsson 1987:42
[91] Larsson 1987:42. According to this number, if Hafström is correct in his assumptions, there cannot have been a double set of rowers, as seem to be more normal in Norway.
[92] Summoning of men fig.3
[93] Hafström KLNM VI:96

2.2.5 From A Military To A Fiscal Organisation

Initially the levy was a military organisation devised to protect against enemy attacks on the realm, and called only when necessary. Later, the kings demanded annual conscription of the farmers, which during peacetime was paid in food. Thus began the transition to a fiscal system.

2.2.5.1 Norway

There are regional differences regarding when the levy became a tax, and an exact date is nearly impossible to give, but the transition must have taken place prior to MLL of 1274, as the laws state that the levy is to be defrayed on the basis of the value of land and fortune[94]. Bull believes that the levy had become a tax around the mid-12th century in the Gulathing area, as GL amongst others in §298 give an account of who were to pay the levy and on what basis[95]. According to Dørum,[96] the transition took place in the latter part of the 12th century in the Oppland region. This is an inland region, and as they did not directly produce men for the levy, it is likely that such areas would be amongst the first to undergo the transition.

The saga of King Sverri tells of an episode in 1182[97] where the king speaks to the men and demands that they pay the levy they owe him for that and the two preceding years. 1182 seems however slightly premature for the Trøndelag area, and the passage must be seen in relation to Sverri's feuds with King Magnus resulting in the levy being summoned each year, a situation disliked by the farmers. Dybdahl places the transition in Trøndelag to the beginning of the 13th century[98], and this seems more correct as it is from then on that it seems to be written in the laws that levy were to be paid annually.

The tax the farmers had to pay in peacetime, according to MLL[99], was called *bordleidang*, implying that it was paid to the king's table (i.e. *bord* in No.)[100]. In case of war they were required to muster for defence, *utfareleidang,* in case of military

[94] MLL III 6
[95] 1920:38
[96] 2000
[97] Ch.71
[98] Dybdahl 1987:27
[99] III 1
[100] Recognised as the first Norwegian tax (Bjørkvik KLNM XII:281).

attack[101]. Seemingly only Gulathing and Frostathing were exempt as the other districts are known to have received further taxes[102]. The towns were also required to pay taxes[103].

Bjørkvik[104] regards the military levy as an impractical solution to a military and administrative problem at an early stage, and that it was the beginning of a more effective system of professional warriors maintained by the tax-paying public. A military system consisting of professionals is one of the basic elements in a state, but it needs to be dynamically developed from the levy. The levy was an ideal instrument for the kings in their construction of a state, as to some degree it united people under the king's authority, and the laws legitimised royal power. However, it is easy to see the levy as just a stepping-stone along the way to a state, but this is a retrospective view. Whether the kings themselves had such ideas is a different matter.

The campaign to Scotland and the Western Isles in 1263 ended in defeat for Hakon Hakonson, who could not maintain his control over all his territories. Furthermore the campaign showed that the Norwegian levy, with its purely naval tactics was becoming outdated[105]. To counter these problems and to create a more professional and standing military force, Magnus the Lawmender included in legislation a provision that all those who had received royal land, were to place a certain number of men at the king's disposal[106]. According to this the king could demand three months service annually, retaining a back-up force for the remaining nine. Additionally *full almenning,* (all men including slaves) could be called in wartime[107]. *Utfareleidangen* implied that the farmers started to pay taxes to the king so that he could have a more permanent military force. The farmers themselves were content to pay instead of joining military campaigns[108].

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[101] The *utfareleidang* was established in mid-14th century (Bull 1920:154).
[102] Steinnes 1927
[103] Bjørkvik KLNM X:434
[104] KLNM X:434
[105] The last time the levy fleet action was in 1429, when nearly one hundred ships from the Bergen region were beaten by a small number of privateers operating for the Hanseatic League (Ersland 2000:122-127)
[106] Ersland 2000:77-78
[107] MLL III 3
[108] Blom KLNM XIII:523

2.2.5.2 Denmark

From 1170 the levy was transformed from a military to a tax-paying system, and from then on only every fourth levy-ship was to be manned and ready for war, the rest became taxes[109]. If necessary, the so-called *udgærdsleding* was called by the king, either as a military campaign, *expeditio*, or as a military-tax. The transition in 1170 made farmers taxpayers rather than military contributors, while the helmsmen were relieved of this tax serving as the king's knights. From 1304 a cog was to be conscripted instead of the old levy-ships, at the rate of one cog for every 10,000 mark the king got from taxes,[110] although this is of technical interest, as the tax-transformation was already complete[111]. After 1370 no farmers were required to do military service in the *udgærdsleding* or in any other form[112].

2.2.5.3 Sweden

In Sweden the transition was accomplished by the end of the 12th century, and this is the picture presented by the regional laws as regards the levy-taxes. After 1240, the provisions earlier conscripted to the levy ships were instead presented to the king and thus became an annual tax[113].

2.3 SOURCES

2.3.1 Archaeology

The levy is difficult to trace using archaeological methods; the laws and written material are the best sources. However, archaeological finds can be invaluable as they can shed more light on two important elements within the levy: the vessels and the boathouses. These are probably the only elements that can be investigated archaeologically. Though few vessels and boathouses investigated so far can be linked with certainty to the levy system, they do show nonetheless the directions most likely to prove fruitful for further research. These two categories, the vessels and the

[109] Christensen KLNM X:443
[110] Zealand thus conscribed from five to nineteen cogs, in contrast to the former 120 levy-ships (Christensen KLNM X:443)
[111] Crumlin-Pedersen *et al.* 1996a:193; Christensen KLNM X:443 both referring to DD 2.rk. V nr.310
[112] Christensen KLNM X:443
[113] Hafström KLNM X:450

boathouses, and aspects concerning their connection with the levy system will be studied below.

2.3.1.1 The Vessels[114]

Ships were the main components in the levy system. They were the presupposition for Viking influence[115], and so they and the crew can be seen as a metaphor for Viking society.

"The boat or the ship is the most complex tool created by man before the age of industrialisation. The vessels are thus important mirrors of the technological, social and economical levels of a society"[116]. The ships thus act as cultural indicators and are vital in the interaction between people and different groups[117]. The ship can also be said to be a microcosm of society, displaying a multitude of socio-related aspects of the society which built them, such as symbols of status, military ability, means of power and control, technological capacity and transport requirements. Therefore it is both interesting and important to look at the contemporary types of vessels and what sources describe these, in order to improve our understanding of the levy system.

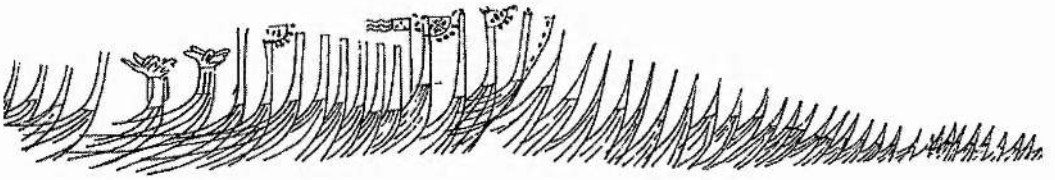

Figure 4 – *'The king's levy encompasses the land'. Carving of ship prows found in Bergen (Drawing: Mary Storm)*

The vessels used in the levy-fleet prior to the transition to the cogs, were vessels of the Nordic type, recognised by the great sheer in the hull, the clinker built sides, the t-shaped keel and a symmetrical system of ribs and diagonal beams[118]. They come in many sizes, from small rowing boats to large longships more than 30m in length. In

[114] The term *vessel* will be employed to cover the multitude in sizes, being both *boats* and *ships*.
[115] Christensen 1984, fig.4
[116] Westerdahl 1989:19 ["*Båten eller skeppet är det mest komplicerade redskap som människan skapade sig före industrialismens tidevarv. Farkosterna är således värdefulla mätare av ett samhälles teknologiska, sociala och ekonomiska nivå*"].
[117] Randsborg 1991:11
[118] Crumlin-Pedersen 1991b:196

Norway the vessels employed in the levy-fleets were initially 20-benchers, and so had 20 pairs of oars. According to Harbitz,[119] there would be a distance of one meter between each oar on one side, giving a normal 20-bencher a 20m long mid-section. There were usually two sets of crew on each vessel so that there could be a change of rowers, so a 20-bencher would have carried about 80 men.

13-benchers appear to have been the smallest ones allowed[120]. The largest seem to be a 30-sesse mustered in the northernmost *skipreide* of Norway, Hålogaland, deployed against the threat from the east[121]. At the turn of the 13th century there was a transition from 20- to 25-benchers in the Gulathing area amongst others, whereas other districts such as Trøndelag seem to have continued to use the 20-bencher[122]. The 30m long Skuldelev 2, for example, would have been a 28- to 30-bencher[123].

Most sea battles in the Viking Age were fought in such a way that the ships would position themselves side by side, tying the stem- and sternposts together so that one fleet would be connected and act collectively. The idea was to stand in one's own ship fighting off those attempting to storm the ship, or if that failed, the interconnected ships would provide ample space for fighting. As ships evolved, height became important as the larger ships would raise themselves over the smaller thus enabling the men in the former to throw missiles down from above. But the increase in height also demanded improved hull structures for increased stability, made possible by the use of protruding crossbeams, thus binding the port and starboard sides together. Removable superstructures were later replaced by standing superstructures, as seen in the Bremen cog, and the introduction of castles on ships began in the 12th century. There is a remarkable transition from the slim, elastic and light Viking vessels to the later cogs[124] that developed in the Middle Ages with the establishment of the Hanseatic League. While the Viking ships were easy to beach and pull ashore, or even over land, the cogs were heavy, sturdy and nearly flat-bottomed enabling them to load and unload their

[119] 1951:70
[120] GL 301: if they are not enough numbers to man a 13-bencher then they shall join other crews instead.
[121] GL 315
[122] Harbitz 1951:68-69; Oppegård 1951:166. This must explain the difference between the number of men transcribed for the levy in GL and MLL
[123] Crumlin-Pedersen 1991b:201. Scuttled in the Skuldelev fortification, see 4.2.3.1
[124] Their clinker build sides and the long keelson with mast slot indicate influence by Scandinavian shipwrights (Crumlin-Pedersen 1993:257).

cargo whilst sitting on dry land at low tide[125]. One reason for the transition was that the cogs were almost invincible in fights with the Viking ships due to their high sides from which they could shoot arrows and throw stones down into the open Viking ships[126].

Figure 5 – *Vessel portrayed in the Bayeux tapestry (Rud 1996:41)*

Ships can be difficult to date using traditional archaeological methods such as typology, as they are vernacular crafts and hence very conservative[127]. Dendrochronology[128] is the prime method, revealing the felling date of the tree. But we must bear in mind that many vessels are constantly repaired. Re-use of materials was common so there is a danger of false results. But although we cannot find the exact date of origin by this method, we will be able to tell from what period it stems, and also where the trees were felled.

"A few scraps of information can be snatched from the laws, but the huge mass of diplomas, are nearly silent on maritime matters"[129]. Twenty-one volumes of Diplomatarium Norvegicum were primarily concerned with agricultural matters and property[130]. Trade by sea, building and selling of ships, fishing and the sale of fish, all

[125] Crumlin-Pedersen 1978:21-22
[126] Crumlin-Pedersen 1978:22
[127] "There seems to be a remarkable degree of continuity in Scandinavian boat building, which makes the use of retrospective methods more relevant here than elsewhere" (Christensen 1985:50).
[128] Observation of a tree's production of annually concentric growth rings, with dry years producing thin and wet years thicker rings. Distinct and unique patterns of the ring's thickness emerge over series of decades; by comparing the patterns from archaeological samples with known tree ring sequences, precise dates can be produced (Johnston 1997:17). But the date provided only tell the felling date of the tree, and not when used in a specific structure, thus only providing a *terminus post quem*
[129] "These letters are in all probability a result of the ruling in the city law that transactions of more than 10 marks value should be recorded in writing" (Christensen 1985:247).
[130] Christensen 1985:243

must have been resolved with oral agreement as the only form of contract[131]. Little is thus known about the levy vessels from documents. They are, however, frequently mentioned in the sagas, as ships were used in most battles, and battles constitute the bulk of the sagas, but "practical information on how ships were built and handled is rare". The building of the *Long Serpent*, Olaf Tryggvason's infamous ship, being one rare example.

One vessel that has been interpreted as belonging to the levy is Skuldelev 5 from the Skuldelev fortification[132].

Figure 6 - *Silhouette of Skuldelev 5; grey indicating the preserved parts of the wreck (Crumlin-Pedersen 1991a:74)*

Skuldelev 5 was a medium-sized warship 17.4m in length. It was worn and patched to an as yet unparalleled degree before ending up in the fortification[133]. It consisted of a lot of reused materials of many types of wood. Finally, a part of the prow was changed, but by then the rest of the ship was so worn that this last repair did not help, and the ship was scuttled[134]. The dating of a vessel composed of so much reused materials was difficult as so many different dates resulted, but dendrochronology has dated it to between A.D. 1000-1050. Crumlin-Pedersen is in no doubt that this ship belonged to the levy, and that it is a remarkable example "of how far people were prepared to go in terms of sailing in a coffin ship, in order to avoid the trouble and expense of building a new boat"[135]. To show that it is indeed a levy vessel and not one owned by a lord or magnate[136], he refers to the Norwegian laws, which state how

[131] Christensen 1985:246
[132] Fig.6; see also ch.4.2.3.1
[133] Crumlin-Pedersen 1993:258
[134] Crumlin-Pedersen 1991b:202
[135] Crumlin–Pedersen 1991a:75
[136] Crumlin-Pedersen 1993:258

much bailing is required for a levy ship to be classified as unseaworthy[137]. From both Bjarkøyretten[138] and MLL we find that a ship requiring bailing more than three times every 24 hours is not seaworthy. Crew can join such ships but at their own risk. However, if the helmsman in charge of the ship bails the ship secretly, that shall be regarded as treason[139]. According to GL the test of seaworthiness is that the ship is to be in the water for five nights, and if one man can bail it out to the fairway, it is seaworthy[140].

Lund however[141] does not support Crumlin-Pedersen's hypothesis, and nor can he, for as the ship has been dated to the beginning of the 11th century it pre-dates the assumed introduction of the Danish levy in A.D. 1170. Lund therefore prefers to see this ship as belonging to a local magnate or perhaps even the bishop of Roskilde, and so he claims that unless his hypothesis is disproved, Crumlin-Pedersen's hypothesis remains mere speculation. For one single ship is far from sufficient evidence to prove the existence of a levy organisation at this early stage[142]. But neither can Lund prove that it did not exist prior to 1170. Both present hypothesis', neither so far proven wrong nor right, but to refuse to use archaeological sources, one of the few ways of confirming matters prior to written material, and depend solely on historical documents, often very biased in their contents, would be an unfortunate retrograde step in research methodology.

2.3.1.2 The Boathouses[143]

Although we know that all wooden vessels of some size and importance were stored during winter in boathouses, it is difficult to find direct evidence for levy vessels being stored in them[144]. The boathouses from the Viking Age are in fact those we know least[145]. The laws have several paragraphs about the boathouses for levy vessels - both on their construction and stipulating that they were to be built on crown land[146]. Even though several boathouses have been dated to the Viking Age and their size more than

[137] Crumlin-Pedersen 1993:258
[138] Bjarkøyretten VIII:145
[139] Christensen 1985:255
[140] GL b) 310
[141] 1996
[142] Lund 1997: footnote 6
[143] Norwegian; *Naust*, Danish; *Nøst.* Swedish: *Skips-/skepphus*
[144] Fig.7
[145] Westerdahl 1989:247
[146] GL 307; MLL III 2

indicates that they could have housed levy vessels, it is difficult to be absolutely certain, since the vessels concerned may have been privately owned and not necessarily part of the levy[147]. The main parameters regarding boathouses for the levy are connected with size, the distribution within the levy districts and place-names. The boathouses are nevertheless one of our main sources for insight into the levy system. They are an immensely important and very scarce finds category. In the following section several points concerning the boathouses and their connection to the levy will be explored.

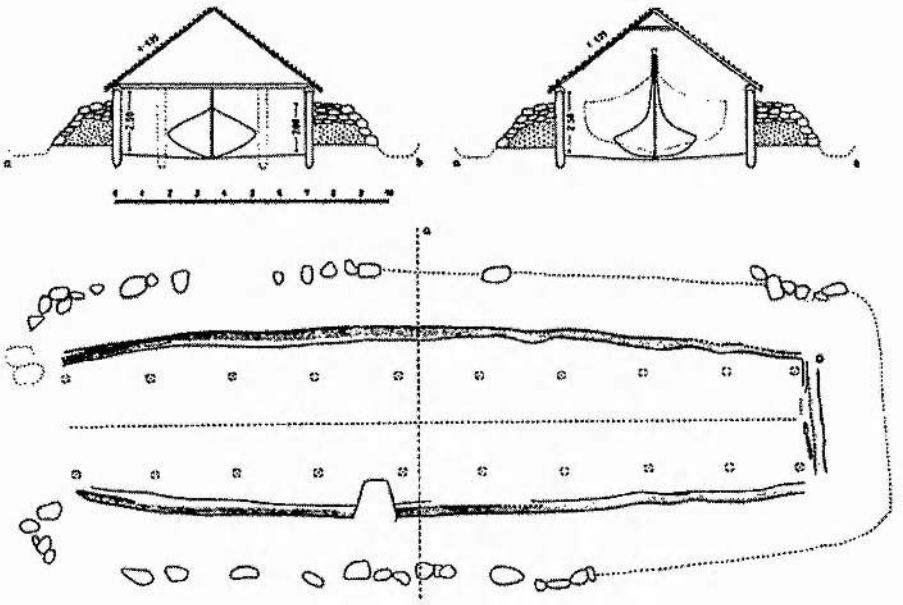

Figure 7 - *Boathouse from Bjelland at Stord, Hordaland (Rolfsen 1974)*

A boathouse is a house on land adjacent to the sea, or waterway, where primarily the vessel but also tools and equipment were stored[148]. The coastal regions of Norway with all its rain makes the sheltering of wooden vessels a necessity during winter when the rain freezes and expands"[149]. Additionally the summer sun is also damaging to wooden boats[150], due to salt crystallisation. Iron rivets in vessels would initially have been a symbol of great power, and would have needed some protection[151]. The boathouse has been described by Westerdahl as a "local centre for maritime

[147] C.850 pre-modern (before 1500 A.D.) boathouses are known in Norway. Of these c.200 are 'huge' (minimum length of 18m). Few fishing vessels would be of this size, and as there was then only one ship per boathouse, Grimm reckons that they housed military ships (Grimm forthcoming)
[148] Stigum KLNM XII:251
[149] Westerdahl 1989:248-9
[150] Rolfsen 1974:12
[151] Westerdahl 1989:250

culture"[152], because of all the remains that can be found there such as fireplaces for cooking or heating tar, secondary graves, and smelting pits used for making rivets.

There are several ways to date boathouses. One can apply traditional archaeological methods such as C^{14} and dendrochronology, or use their height above sea level since they cannot have been situated too far from the shore. The boathouses can also be categorised according to the ratio of their inner length/breadth at entrance and the height above sea level. Using this structural analysis, Myhre suggests the measurements 2.5m above sea level and a 4:5 ratio as the dividing line between the prehistoric and the Medieval boathouses[153]. The prehistoric ones have higher values than the later ones, while those from the Viking Age are situated in between. This has so far proved valid.

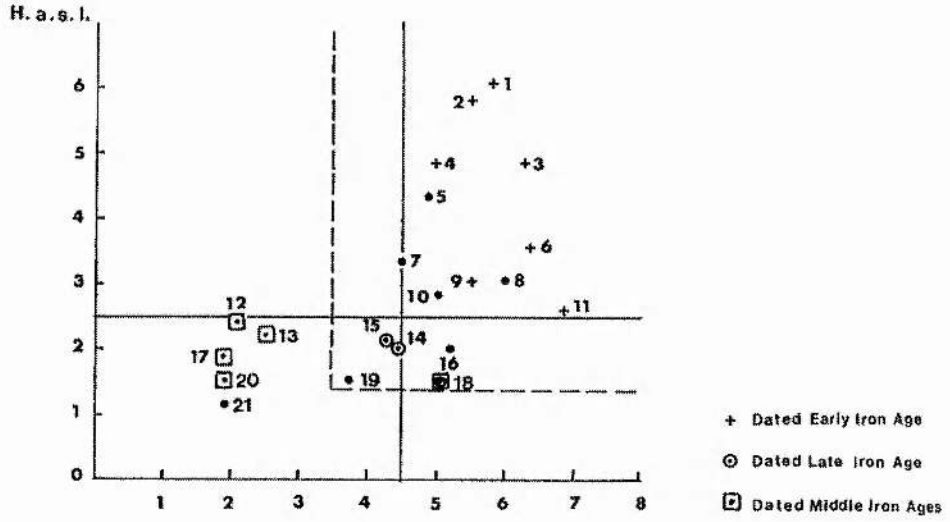

Figure 8 - *Relationship of the height above sea level and the L/B ratio for dating purposes (Myhre 1985:fig10)*

The oldest boathouses, those from the Late Roman and Migration periods have thus far only been found in Norway[154]. This is not strange as boathouses found outside Norway are a scarce group. Only two have so far been found in Denmark, found lying parallel to each other at Harrevig in northern Jutland. They are 24m in length and 6m

[152] Westerdahl 1989:252
[153] Fig.8; Myhre 1985:39-45
[154] Grimm 1999:46

wide and are from the Viking Age[155]. Later Danish sources only tell of boats being taken on land, not sheltered, the smaller being turned keel-up[156]. The Swedish term *skiphus/skepphus* indicates those buildings housing ships and not only boats, e.g. *skiphuset* known from Stockholm in 1440[157]. The scarce material does not necessarily mean that they no longer exist; it is rather an indication of how they were built[158]. Whereas the Norwegian ones are built with substantial stonewalls[159], their presumably all-wooden counterparts in Sweden and Denmark have left few traces. The possibility that there were wooden, hence undiscovered, boathouses in Norway too must also be considered[160].

Figure 9 – *Structural remains of the Medieval boathouse at Kinsarvik, Hardanger. Within its walls, a more modern boathouse fits nicely (Ersland 2000: 53)*

Before the unification of Norway, local chieftains had their own retinues, and we can assume that they constructed boathouses to shelter their prestigious ships. It is tempting to use geographical dividers in the search for the boathouses. The Iron Age boathouses appear to be found in clusters in economic and political centres of

[155] Crumlin-Pedersen 1991b:185
[156] Stoklund KLNM XII:254
[157] Ståhl KLNM XII:254
[158] Westerdahl 1989:246; Crumlin-Pedersen 1991b:185 and 1996:20. Old boathouse remains are visible in the terrain with their massive outer earthen or stonewalls and by the depression between the walls
[159] Fig.9
[160] Myhre 1985

power[161]. This in contrast to the larger boathouses from the Viking and Middle Ages situated more evenly along the coast in the various *skipreider*, when the crown had an interest in these buildings[162]. Dybdahl[163] is of the opinion that, after the replacement of the *fylker* with the *skipreider* in Trøndelag, the *fylker* still controlled the levy. Many of the new *skipreider* were located inland, whereas all *fylker* had a coastline on which the boathouse could be built and the vessel stored. The boathouses can thus be seen as indicators of a change in political, military and administrative power.

The boathouses were to some extent multi-functional, as most of the larger ones contain thick cultural layers mirroring social usage while the vessels were afloat[164]. According to Hakon Hakonsen's saga, he allegedly used a huge boathouse for the feast held for his coronation in Bergen in 1247[165]. Grimm[166] points out that the multitude in usage can be related to relevant differences such as war or peacetime, seasonal differences as well as change of usage from one period to another, for example if they were used for warships, trade or social happenings[167]. The boathouses also provided craftsmen with shelter when carrying out annual or other required repairs to the vessels. One key problem relating to the usage of the boathouses is to what extent they housed privately owned warships or ships for the levy. This is a question very hard to answer, for the size of the boathouse itself can only tell the size of the vessel and not the vessels usage. Artefacts found in or within the vicinity of the boathouses has neither so far been helpful in that respect. One possible clue is the location of the boathouse. For if a single large boathouse is found within the borders of a known skipreide, it might be possible to assume that it is connected to the levy. Especially if this location is at a central position within the skipreide, close to the church, or formerly the *hov*, or other such sites. On the other hand, the boathouse of for instance a chieftain might also be positioned thus. But how then can we be sure as

[161] Myhre 1985. The huge boathouses is seen as indicators of power in their own right (Grimm forthcoming)
[162] Crumlin-Pedersen 1991b:187; Myhre 1985:50-52; Myhre 1997:176ff. On the southern bank of the Beistadfjord in Trøndelag, the remains of five large boathouses with a length of 30-38m and 3-19m wide exists, linked to the levy as they are so evenly distributed within the old borders for the levy district (Almaas 1988:29)
[163] 1997:242
[164] Grimm 1999:53-54
[165] *Hákonar saga Hákonarsonar* ch.252
[166] 1999:55-56
[167] Two huge boathouses found at Borg, Lofoten. As there are few finds of artefacts and only a minimal cultural layer, and no indications of cattle or domestic animals, they might have been used for military purposes (Grimm forthcoming)

to whether in some instances the vessel of a chieftain might not also have been used by the levy, or vice versa?

Grimm[168] supports Myhre's[169] hypothesis regarding the boathouses' military usage, as the Nydam ships were clearly military, and the larger boathouses could easily house these vessels. In this respect it is also interesting to note that many of the older boathouses have been found close to centres of power[170]. These centres are mainly found in south-western Norway in areas with high population density such as Karmøy. Often hill-forts are in the vicinity, and are thus reminders of the pre-levy local systems. However, it is difficult to verify whether some boathouses were built purely for the shelter of warships, because as the boathouses were sturdy constructions they show imprints from several periods.

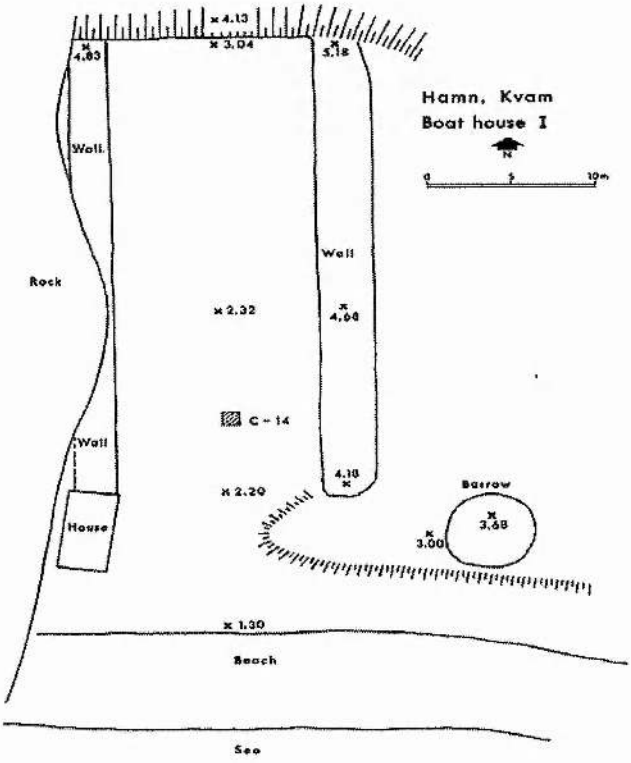

Figure 10 – *The outlines of Boathouse I at Kvam, dated to 1390±30, with height above sea-level measurements (Myhre 1985:41)*

[168] 1999:55
[169] 1985
[170] Myhre 1993:48

In the Middle Ages there seems to be a transformation in the size of the boathouses[171]. Boathouses had mainly been constructed to house one ship, but this was no longer necessarily the case for the Medieval boathouses. They became broader in relation to their length[172]. So while the Iron Age boathouses would reflect the size and proportions of the vessels they sheltered, this does not hold for the Medieval ones. Some may have housed more than one ship, but they might also simply reflect the increased size of the levy ships in the Middle Ages[173].

2.3.2 Place-Names

2.3.2.1 Place-Names In General

Place-names are a vital source for the knowledge of past societies, even though they may change over time; they are often the only surviving element, which indicate the presence of humans. Place-names appear as people feel the need to navigate their way around the landscape. And "place-names have certain semantic characteristics which to some degree reflect the community in which they were coined"[174]. A coastal community may use maritime associations when giving names, and an inland agricultural one would use terrestrial and farming terms. Holmberg stresses however that there is not necessarily a straightforward connection between the practical function of a place and the name given to it. The characteristics of the locality may have had as great an impact[175]. Even so it may often prove difficult to isolate for example the maritime sphere in a society from the place-name evidence, as there is often a strong interaction between different spheres as well as changes over time.

Names can be metonymic, where one feature of a place generates the name of the whole. They may also have been borrowed from another location[176+177]. Place-names

[171] Fig.10. Two main types from south-western Norway; long and narrow from the Iron Age (Stend is 34.5x5, Myhre 1997:fig4), and long and broad from the Middle Ages (Kinsarvik is 30x16 inside, Myhre 1997:fig 4) (Grimm forthcoming)
[172] Myhre 1985:45-48 (see also figure 8 regarding ratio). According to Rolfsen (1974:102), the size of the vessels could be measured from the measurements for the Iron Age boathouses. The maximum width of the vessel must be narrower than the width of the opening of the boathouse. The length will additionally be shorter than the inner length of the house, allowing for working space. It could also be that the following vessels were built to match the size of the boathouse, rather than a new house being built.
[173] Westerdahl 1989:250
[174] Holmberg 1991:233
[175] 1991:239
[176] "*Opkaldelsesnavne*" [Danish]

are to some degree incidental, as every location often has a variety of features, making the choice of name difficult. The choice cannot be accidental. It was important to highlight the feature most typical of that particular site, and not the more common features, to make the navigation as unambiguous as possible. The main elements in compounds generally constitute a much more reliable source than the other elements[178]. If all places with the same usage had been named the same, total chaos would arise, so although a huge selection of e.g. harbours exist along the coast, they have been given different names to maintain distinctions[179].

Westerdahl[180] regards the place-names as codes based on oral tradition, and the problem facing the researcher is to break the code and gain access to the cognitive landscape. He also considers them part of the oral tradition, following its laws.

The interpretation of place-names must, according to Westerdahl[181], deal with four main points: 1. The oldest versions available should be used as they are subject to change and reinterpretation over time 2. The local pronunciation of the name, as misspellings and misinterpretations may occur when written down on maps and charts, especially by outsiders. 3. Morphological rules. 4. Local points of importance such as topography, vernacular place-name culture and way of life, which may shed light on the interpretation of the names. The landscape may change considerably, while the place-names remain on the same sites[182], which might be rather confusing as coastal names might be found some distance inland. It is important to ascertain what exact locality is associated with each name[183] as maps can be misleading. It is important to address local people if in any doubt.

Barbara Crawford has exemplified the importance of investigating the place-names in her study of Scandinavian Scotland:

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[177] Holmberg 1996:55
[178] "Det er nemlig kun i de tilfælde, hvor det aktuelle ord optræder som hovedled, at navnet markerer det nøjaktige sted for fænomenets eksistens" (Holmberg, 1996:55). [It is, however, only where the word has been used as the main element of the compound that it indicates the exact place for the existence of that very phenomenon].
[179] Holmberg 1996:57
[180] 1989:61-65
[181] 1989:61
[182] Westerdahl 1989:63-4
[183] Westerdahl 1989:64

"*Odd finds of a Norse weapon tell us nothing beyond the fact that a Viking warrior might have passed that way [or the weapon has been distributed]. A scatter of Norse place-names, however tell us quite clearly that there was a sufficiently permanent community of Scandinavian speakers established in the neighbourhood to impose their nomenclature on the local toponymy*[184]".

2.3.2.2 The Dating Of Place-Names

The dating of place-names often proves difficult. Some aspects are however self-evident, they must for instance be older than the first written record. Place-names referring to a special event or system, must have come about after the introduction of these events. Christianisation can often be of help regarding the place-name material as the ideological transition led to a lot of places being dedicated to saints and patrons. Although the date is not precisely given, we can be sure that these places at least are not older than the introduction of Christianity in that area. In Scandinavia, and Norrland in particular, a range of places were thus named after the patron saint of shipping, namely St. Olaf, as is the case with St. Olof's harbour in Sundsvall[185] and also names with *kors* [cross] can be dated this way[186]. But a lot of place-names were lost as the names were Christianised. One can seldom use a place-name to learn of the origin of something else, it is mostly the other way around. The real problems are all the names referring to nature itself as they could originate from any time period when the landscape had such features[187]. The dating of place-names therefore generally only provides approximate information[188].

2.3.2.3 Place-Names And The Levy

The place-names connected with the levy can be divided into three categories:
Firstly, those connected with the various types of vessels that could have been used in the levy fleet. Secondly, names in connection with the boathouses or other types of shelter. Thirdly, the names related to the division of the land into levy-districts. Again,

[184] Crawford 1987:6. "Toponymic evidence is a linguistic problem, but the historical information to be derived from place-names is exceedingly valuable" (Crawford 1987:5).
[185] Westerdahl 1991:114-5
[186] Westerdahl 1989:68
[187] Holmberg 1991:234
[188] Holmberg 1996:56

onomastic studies have not been particularly emphasised in Norwegian research and so most of the following examples will be taken from the Swedish and Danish material, and Norwegian examples added where possible.

Ship-names are a common feature in place names, be they vessels which have sunk or gone aground, shipyards building ships, or places where ships were anchored or moored. We have to find the specific reference to learn if they are connected with the levy. The levy ship in the Swedish sources is mainly referred to as *snäcke*[189]; they were large and needed more than a small anchorage[190]. On Gotland 13 *snäck*-names have been found, including *Snäckhus* where the remains of a Viking Age boathouse have been located[191]. In Denmark, where the *snekke* name is also present, all the places investigated by Holmberg[192] appear to be sites suitable for sheltering levy ships. *Snekke*-names are not known in the Norwegian data. It must be pointed out that no particular type of vessel is known only to have been used as levy ships, the various types might additionally have been used as privately owned ships. This being a common problem when studying place-names; their multi-functionality. But in this respect it must be noted that *snekkja-* and *skeið*-names are the two most common in sagas and skaldic literature whence referring to the levy. The snekkja is generally thought to be the larger of the two, being 40-60 bencher, while the *skeiðs* were 25-40 benchers. Both were fast clinker-built longships, *skeið* as a mater of fact means racer[193].

Westerdahl[194] have also identified a number of other names connected with the levy. *Skeið* is mainly known from Denmark, and not from Sweden or Norway. Levy ships in Norse texts are often described as *snekkjur ok skeidir*. *Skede* could in this respect mean a border of some sort, such as a hill[195]. *Bus(s)*-names, *buza,* is another form[196]. In Norway we know the *Bussesund* near Vardø where the first component is recognised as that of a ship, a loanword from Latin and so of Medieval origin[197]. *Ask*-names

[189] Westerdahl 1989:253-54; Crumlin-Pedersen 1991b:187
[190] *Snäck/snekke* is similar to the German word for snail *Schnecke* (Westerdahl 1989:68)
[191] Westerdahl 1989:142
[192] 1991 and 1996
[193] *World's Watercraft* 2001:543,554
[194] Fig.11. Westerdahl 1989:149-51
[195] Westerdahl 1989:149-50
[196] But *Bus(s)* have a lot of meanings; *bus(e)*=wolf, *bu*=livestock, *buss, boss*=straw, 'to be *buss* with someone=be friends, *buse*=viper [dialect], *bussa*=freeze over (Westerdahl 1989:150).
[197] Sandnes and Stemshaug 1997:110

indicate that the vessels were built of ash so it is thus difficult to distinguish between the ship-type and the type of wood in place-names[198]. Several names are known from Norway containing *ask*, but all are invariably connected with the type of wood[199]. *Drak*-names[200] are problematic. For not only can they be confused with the mythical dragons, *Drake* occurs as a Swedish family-name in the Middle Ages[201], and in Norway the variation *drag* is usually connected with portages – to pull something. There are also more general names such as *båt, skut, skip/skepp,* and *skut*[202], names attached with naval vessels at some point.

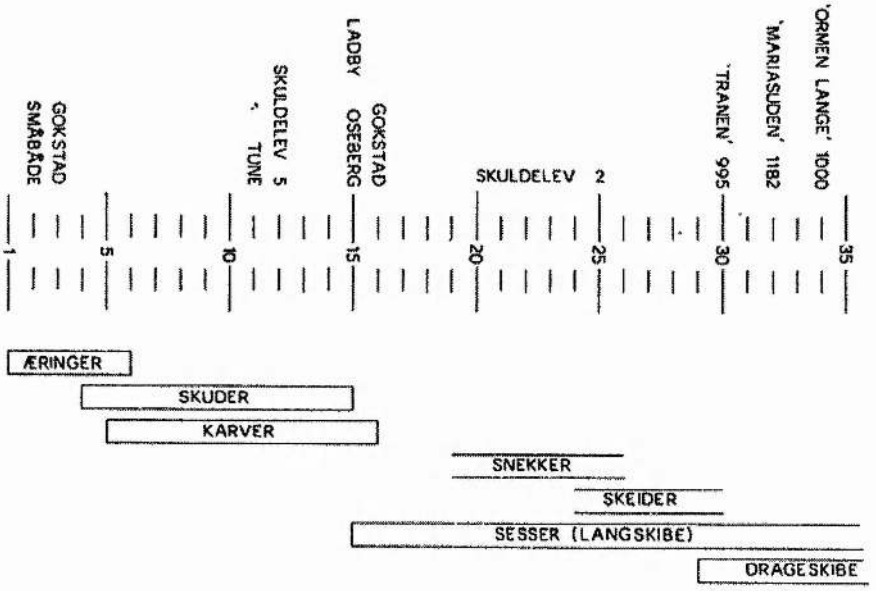

Figure 11 – *Types of vessels and their sizes, based on pairs of oars (Westerdahl 1991:248)*

Names of rendezvous-sites are also known, indicated by the Old Norse name for the fleet *skeppshär, skipaherr*. This can be seen in place-names with the component *Herr-* (*herr-, här-)*, e.g. *Heröy* in Møre and Romsdal County in Norway[203].

An example of a site with several place-names indicating levy usage is found on Varaldsøy in Sunnhordaland, Norway[204]. MLL III 2 state that the levy ships are to be

[198] Westerdahl 1989:151
[199] Sandnes and Stemshaug 1997:76
[200] *Drak*-ships had more than 29 pairs of oars, although all carrying more than 25 were large ships (Westerdahl 1989:254).
[201] Westerdahl 1989:151
[202] Westerdahl 1989
[203] Westerdahl 1989:255-56; Sandnes and Stemshaug 1997:211-212

built on crown lands and the materials are to be taken from crown forests. On Varaldsøy the house-site of a large boathouse has been found adjacent to the farm *Havn.* A plot of forested land is found nearby, named *skiprei(d)teigen,* which according to tradition was where the timbers and materials for the vessels were cut. In 1917 it still had good oak and pine growth.

2.3.3 Written Sources

2.3.3.1 Introduction

Written sources were once thought to be the only way to gather valid information about the past[205]. Now we have a much wider range of sources, including archaeology, available to us. Written sources are important, often contemporary, and where archaeology only provides silent artefacts, the written material provides us with thoughts, opinions and past ways of thinking[206]. There are, however, many pitfalls. Most importantly, "all written sources are evidence only of a state of mind"[207]. The words are usually the thoughts of only one person. They may be a valuable contribution, perhaps the only one in existence, but are not to be treated as purely factual. As the art of writing was only mastered by a few, so was reading. The texts were usually ordered to be written, and it is always essential to ask questions such as: who ordered this text to be written, and why? Few would have something written as remembrance of a battle lost. History is usually written by the winners of battles. This gives a generally unilateral and often misleading impression. The reverse also occurs, as is the case with the myth of the bloodthirsty Vikings; in this case the sources usually derive from those who suffered Viking attacks[208]. Later research has showed that the Vikings were far more than merely savage warriors.

Only a fragmentary picture can be deduced from the earliest written material; Scandinavia in the early Viking Age was no more than a semi-historical society. Some aspects may not be recorded in writing, but that does mean they did not exist. This is

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[204] Christensen 1985:245 based on Edvard Bull 1917 "Skipstomter og naustetomter fra Vikingtid eller middelalder"
[205] Westerdahl 1991:110
[206] The historian chooses his material from the testimonies of the past and creates a new synthesis as a reflection of the past, but the synthesis is his own and not the past's (Sørensen 1991:236).
[207] Crawford 1987:9
[208] Crawford 1987:3

what gives archaeology its crucial function. Furthermore, historical sources seldom deal with the more general and day-to-day topics, but seem more related to special events and happenings of some importance.

The transition from prehistoric to historic time is defined by the first appearance of written material; in Denmark this is around 1000 A.D. with the oldest surviving document dating from A.D. 1085[209]. The art of writing was introduced to the Scandinavian countries more or less simultaneously with the introduction of Christianity, making the transition from prehistoric to historic time one of cultural historic relevance[210]. Crawford questions whether "it would be simpler to see the [Viking] age as purely prehistoric", as there are so few written sources[211]. It is apparent that for the early Viking Age the archaeological sources are the most useful, with written sources supplementing these, not the other way around which is usually the case for historical periods.

One of the problems investigating maritime matters through written records is that in earlier times the taxes and other duties were solely based on agricultural production, often leaving few traces of other occupations and use of resources such as fishing and ship-building. Place-name interpretation is not straightforward as "most were first recorded in the fifteenth or sixteenth centuries, long after they were coined and when their original meaning had been forgotten"[212]. The same can also be said of the first sagas which told the tales of kings from previous centuries and not from their contemporary society. We should, however not be afraid to interpret them, as they are an invaluable source, treated properly.

2.3.3.2 Law Texts

2.3.3.2.1 Introduction

Law texts are generally more reliable than most written material as they initially had to be accepted by the Things. More effort was taken to assure that the laws were properly and accurately recorded as they were judicially binding to both kings and

[209] Porsmose 1996a:43
[210] Porsmose 1996a:43
[211] Crawford 1987:4
[212] Sawyer and Sawyer 1993:8-9

subjects. This is in contrast to many written texts which had been passed on orally prior to being recorded in writing[213].

There are various types of laws, dealing with different aspects of society, issued by different interests. There are the church-laws that came into being after the conversion in the 11th century, issued by the church to consolidate and extend their influence on society. Then there were the provincial laws, issued by the kings and the people of the region, to give directions on how the people should carry out their duties, pay their taxes and how they were to defend themselves.

Norway had regional laws for the four judicial regions, passed by the Things, for the Gula-Thing, Frosta-Thing, Eidsiva-Thing and Borgar-Thing, although only the first two are preserved today. The laws concerning the levy can be divided into two main categories: the regulations concerning the king's rights to take the levy out on campaigns outside the realm, and mobilisation against attacks on the home territories[214]. These two main categories can further be sub-divided into four minor themes: the organisation of the census, the organisation of the levy campaigns, equipment and war preparations and fines connected with breaking any of the laws passed[215]. Though both the GL and FL in many ways are almost identical, they still portray many regional differences. The laws as we know them today consist of several versions, and many laws were updated, some are from the 12th century and some made before the mid-11th century. It is however difficult to distinguish between them[216]. Both Sweden and Norway had Medieval land laws concerning the whole realm, while Denmark had no such general laws. Supplementing the land laws were the town laws. The Norwegian land laws and town laws were issued in the late 13th century by Magnus the Lawmender[217].

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[213] "*The decisions of courts, commissions, judges, and arbitrators began to be recorded in the late thirteenth century, and little is known about the observance of laws before that*" (Sawyer and Sawyer 1993:20)
[214] Ersland 2000:54
[215] Ersland 2000:53
[216] Ersland 2000:50
[217] Sawyer and Sawyer 1993:17

2.3.3.3.1 Skaldic Poetry

"*There were scalds in Harold's* [Fairhair] *court ...and take all to be true that is found* [their] *poems about their feats and battles: for although it be fashion with the scalds to praise most those in whose presence they are standing, yet no one would dare to relate to a chief what he, and those who heard it, knew to be false and imagery, not a true account of his deeds; because that would be mockery, not praise*"[218].

These lines are taken from Snorri's introduction to Heimskringla, mirroring his trust in their work[219]. To Snorri, the skalds are the messengers of the truth, for as court poets in the household of kings or noblemen, their task were to record the actions of their masters, and only the truth would be well accepted, though it could be a modified truth. For they dared not speak ill of their employers, and not wanting to tell lies, they could slightly alter the events. The skalds' audience would additionally be people who were familiar with the events, and thus knew what had happened[220]. The skaldic poetry were stanzaic with very complicated rules of alliteration and metre, and had a much higher chance of being correctly passed on as one had to recite the whole thing, in comparison with a lot of the other historical material later used by Snorri and others, which were nothing but stories, which could easily be altered as long as the main points were conveyed. The skalds basically performed poetry, from time to time putting the historical facts out of focus, but as eyewitness depictions they can produce evidence from certain events, in contrast to the sagas that seek to present the broader picture.

There are several aspects to be aware of when using this poetry as a historical source. Some of the poems after being passed on are likely to have undergone some alterations, and some are made at a later stage and claimed to be of older origin. "A more fundamental problem is that all but one of the skaldic poems composed before the twelfth century are only preserved in texts of the thirteenth century or later, in which verses are cited separately, not as poems"[221]. There is also the problem that poems do not deal with the more day-to-day events, and it therefore comes as a no

[218] Sturluson b):4
[219] But "the conditions that Snorri set out for accepting skaldic verses as reliable historical sources, do not necessarily apply to [minor episodes] ... and to 'free verse'" (Page 1995:25)
[220] Sawyer and Sawyer 1993:24
[221] Sawyer and Sawyer 1993:25

surprise that excavations have presented small and vernacular vessels, "ships of such low status that they were not mentioned in the Skaldic verses"[222].

The levy is for example mentioned in a skaldic verse from 1062, where it is said that 'the king's levy encompasses the land with the stems of the warships'[223]. Regarding maritime matters, a lot can be gathered from the skaldic poetry. Battles such as Hjørungavåg c 980 A.D., Svolder 1000 A.D. and Nesjar 1015-16 A.D. are recorded in various poems. According to Judith Jesch[224] there are several clues in the poems which historians to learn more of where the battles took place. They are for example very keen to mention quite explicitly where the battle took place, not just 'off the coast of ...', but also the mentioning several place-names increases the possibility of localising the place of battle and making what they say more plausible. However, skaldic poetry is not necessary accurate, and different poems may vary quite considerably on the size of the fleets taking part in the same battle.

2.3.3.4 Saga Literature[225]

2.3.3.4.1 Introduction

The sagas are generally unreliable as historical texts. Most were written centuries after the events they portray, i.e. compilations[226]. This is particularly true for Heimskringla, while Sverri's Saga was written mostly during Sverri's reign and is thus the first contemporary saga. They are, however, still helpful in shedding light on places of events and should therefore not be totally overlooked[227]. The traditions were recorded after being handed down by word of mouth for centuries[228]. The sagas were primarily written as records of the lives of kings and other great men, and if not ordered by

[222] Crumlin-Pedersen 1991a:75
[223] *'kongens leding omgir landet med hærskibenes stavner'* (Bull 1920:41).
[224] Information presented at a conference in Copenhagen, May 2000: *Maritime warfare in Northern Europe 500 B.C. – 1500 A.D.*
[225] "The Old Norse word *saga* (plural *sögur*, cognate with the verb *segja*, 'to say') originally meant 'what is said', but it came to be used for the narratives written in Iceland and Norway from the twelfth century to the fourteenth" (Sawyer and Sawyer 1993:21).
[226] The sagas are rather to be thought of as historical novels than histories (Page 1995:25)
[227] Lindh 1991:216-7
[228] "Whether sagas derived from written or oral tradition is immaterial to the evaluation of the historical accuracy of the sagas. Since we do not precisely of what, if anything, earlier written and oral tradition consisted, and in any case have no reliable means of verifying either, it is impossible to argue with any certainty that one tradition was more reliable than the other" (Williams 2001:110)

them, the presumably by someone in the clan as a great epitaph for the people concerned and the clan.

Over the past few decades opinion on the sagas has shifted from regarding them as historically accurate records to a fundamental scepticism until the opposite has been proved[229]. The truth will probably lie somewhere in between these two extremes. They are neither an accurate record, nor pure fiction. Few exact dates are known regarding historical figures from the Viking Age, so one tends to rely on relative chronology[230], as archaeological excavations seldom manage to name the persons buried. So the written material can link the archaeological material and historical figures, although we cannot be sure whether the persons portrayed in the sagas ever really existed[231].

As some of the most contemporary sources available, the sagas cannot be disregarded, and neither can they be fully accepted as something other than prose woven around historical events, coloured to various degrees by the author's imagination and intention[232]. If all the dubious layers of prose, fiction, flaws and errors are peeled off, we are left with a small, but valuable core of information, invaluable if used properly. It is therefore important to compare this with other sources to understand what is fact and what is fiction. "Simply dismissing the evidence of the sagas without qualification is just as uncritical as accepting them without reservation".[233]

2.3.3.4.2 Heimskringla[234]

Heimskringla, the sagas of the Norwegian kings from Harold the Black to Magnus Erlingson, from c 839 – 1184 A.D., is a valuable narrative of early Norwegian history. However, the saga was written centuries after the main events took place, and this time-span put great strain on the author. We cannot expect it to be an accurate record. The author also used his epic skills to fill in the gaps and make the story more presentable.

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[229] Crawford 1987:8-9; Whaley 1992:55
[230] Myhre 1992a:267
[231] Christensen *et al.* 1992:8
[232] "The contents of sagas and other narratives should be critically interpreted in the light of their genesis and that one should always be aware of contemporary influences on presentations of the past" (Helle 1992:5).
[233] Williams 2001:126
[234] Also known as 'Sagas of the Norwegian Kings'.

The Icelander Snorri Sturluson wrote Heimskringla around 1225 A.D.[235] It is particularly his later use of skaldic poetry that makes Snorri unique as a chronicler, and his work is often regarded as more reliable than many of his contemporaries[236]. His work can be claimed to be a collection of contemporary knowledge of the past, derived from both written and oral sources.

Heimskringla is also politically tainted; Snorri focuses on one line of kings seeking to authenticate their role as the true line of kings in Norway[237]. Some discrepancies can be found in the saga. For instance the saga of St. Olaf constitutes about one third of the entire Heimskringla. St. Olaf was without doubt the most influential king of Norway, but with such an uneven emphasis on a king who only reigned for twelve years[238], Snorri contributes to a mild form of historical forgery. King Olaf the Peaceful[239], who reigned for over 25 years, is barely mentioned. Snorri is to be remembered as a man of his time, and what was interesting for the sagas were battles, bravery and big occasions, while sheep herding and cooking were of little interest[240]. Some clear-cut errors are also evident, and Snorri has in some cases projected too much from his day of age back to the historical events he was recording.

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[235] Snorri was born 1178/79. Although Snorri is recognised as the author of Heimskringla, it is most likely that he was more of a main author, with others contributing
[236] Crawford 1987:7-8
[237] For example is the Farmannshaug near Tønsberg, claimed by Snorri to have been built for Bjorn Farmann was buried in the 10th century, it has now been dendro-dated to the Roman Age (Myhre 1992b:280).
[238] 1016 – 1028 A. D.
[239] Olav Kyrre
[240] Hødnebø 1979:690

Chapter 3: The Signalling System

"Þat skyldi ok fylgja útboði því, at vita skyldi gera á hám fj llum, svá at hvern mætti sjá frá örum. Segja menn svá, at á vii. nóttum fór herboðit frá inum synzta vita í ina nørztu þinghá á Hálogalandi"[1].

3.1 INTRODUCTION

3.1.1 Definitions

The *signalling system* was a military system consisting of a number of interconnected signalling sites, known as *vete*, which would send signals of war to nearby settlements and the adjacent *veter* so that the necessary precautions and military arrangements could be made, including summoning the levy.

A *vete* [ve:ˋte] can be defined as an intentional man-made construction of inflammable materials located on a vantage point, which when ignited to produce fire or smoke, sent an optical signal which denoted a warning of war, attack, military threat or war-like intrusion.

The term used for such installations in the Gulathing Law, was the Norse word *vita*. For centuries, these structures were known as *viti*, *vete*[2] being the modern Norwegian term. However, when in 1604 the Danish-Norwegian king Christian IV made his Norwegian Law, he introduced a new term, which complicates modern interpretation. When attempting to translate the Norse term *vita vorðu*[3], meaning to keep vete watch, into more contemporary Danish, his secretaries showed a profound lack of understanding of the Norse language. They thus translated *vita vorðu* with

[1] Saga of Hakon the Good, ch.20. English translation by author: "In addition to this it was ordered that whenever a general levy was called, one should also light veter on high mountains, with such space between them that there was visibility from one to the other. People said that in seven nights the signal travelled from the most southern vete to the most northern one in Hålogaland ".
[2] E.g. Hovda KLNM XIX:674
[3] *Vita* or *viti* [vi:ti] in this respect meaning signal or indication, while *vorðu* is the watch or guard

vædvarder[4]. This term means wooden-varde, and a varde [va:`re] was originally the term for the guard or men who manned the veter, not the construction itself. Thus the term *varde*[5] came to be the term applied in Norway up to the present. In fact the terms vete and *varde* represent two very different constructions with diverse functions. Whereas the *veter* are made of wood and purely part of a military signalling system, the *varder* are synonymous with all types of markers, preferably made of stones, for marking borders or sea-entrances, defining the top of mountains or hill tops, or as road signs marking ancient tracking routes or paths[6]. The term *varde* is thus as diverse as the English *beacon,* also to be interpreted as anything from navigational lights on the coast to road-signs inland.

Figure 12 – *An example of a* varde *construction; marker made of stones. This one from Lyngør, Norway (Molaug II 1985:220)*

The term *vete* will henceforward be used, being the only valid term that pinpoints the exact significance of the old constructions. There is no good English equivalence, as *beacon* is too general a term, and *cairn* means *varde*. The term *beacon fire* has been suggested, but this would be more or less the same as king Christian's *vædvarde.* There are some Swedish and Danish terms synonymous with *vete,* but as this chapter mainly will concentrate on the Norwegian material, and *vete* is known from both Sweden[7] and Norway, contrary to the other names unique to particular countries, *vete* will be employed.

3.1.2 Origin And Continuity

The origin of the vete-system is hard to estimate. The use of fire for sending messages or signals is probably as old as the origin of fire. Most countries have stories of these types of signals being used. In Greece Homer in his Iliad writes of fire signals, *phrycti,*

[4] King Christian IV's Norwegian Law of 1604; *Vdfare, eller Landværne Balcken*; Ch.IV *Om vædvarder at holde*, p.26-27
[5] Fig.12
[6] Varder used as road-markers is described in Smestad 1996.
[7] E.g. Ståhl KLNM XIX:676

being used during the Trojan War[8]. The Romans had coastal signalling stations as well. They were fortified and manned with soldiers[9] and bear a resemblance to the Danish *Warths*[10], more than to the veter seen in Norway. Later examples are e.g. known from Scotland[11], at the battle of Largs in 1263 the Scots allegedly used fire signals to summon people to attack Viking ships run aground during a storm[12], additionally beacons were employed in southern England during the Spanish Armada threat of 1588[13].

Figure 13 – *Section of Olaus Magnus's 'Carta Marina' from 1539 depicting a signalling site somewhere in northern Scotland*[14]*. It illustrates the use of fire-signals, and the problem with inaccurate depictions of these structures*

The signalling system was undoubtedly well suited in Norway with settlements scattered around a vast country, and high mountains provided excellent vantage points. Interesting to us is the introduction of the vete-system, and not the use of fire for signals. How and when did it originate, how was it utilized, and what part did it play in the law-regulated military system?

According to tradition, Hakon the Good[15] introduced the vete-system to Norway[16]. This anachronism stems, again, from Snorri's Sagas, in which Hakon launched the

[8] Scheen 1951:240
[9] E.g. Johnson 1980
[10] See 3.3.1.3
[11] Fig.13
[12] "The coast beacons ... were lighted" (Mackenzie 1938:285).
[13] Rodriguez-Salgado 1988:148
[14] *Olai Magni Gothi Carta marina et descriptio septemtrionalium terrarum ac mirabilium rerum in eis contenarum.* Original published in Venice 1539, this version printed by John Kroon 1949 in Malmo.

signalling system simultaneously with the ship levy system[17]. This concept has been the starting point for later historical research on the subject, and while this idea is easy to accept, it has been very hard to find conclusive proof that Hakon was not the prime instigator. The most likely scenario is however, that while scattered regional systems of fire-signals existed in parts of Norway from prehistory, Hakon the Good was the first to institutionalise and organise this military system and include it in the laws[18]. Using fires for sending optical signals is, as mentioned above, an archaic phenomenon and earlier forms of the veter in Norway, can with all probability be seen in the placement of hill forts from the Migration period[19].

Initially the vete-system was probably introduced only in Hakon's west-Norwegian realm, encompassing mainly the Gulathing area. The system must subsequently have spread to other parts of Norway, and it is later included, for example, in the FL for central Norway[20]. In Heimskringla there is a passage that the signal used only seven nights from the southernmost point to the north of Norway[21], but it must be remembered that this passage probably dates to the 12th-13th centuries, when the saga was written. By then the signal system must have been fully developed to cover most of Norway, and it does not follow that it covered all of Norway to begin with. If the system was to be successful the system must have covered as much land as possible, to amplify the effect. As the land law from 1274 mentions the vete-system in a context that implies it being relevant for the whole country, the system presumably existed nationwide at least prior to this.

The vete-system was thus probably in use from the 10th century onwards, but diminished somewhat due to the Black Plague, and later following the loss of

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[15] King from 930s – c.961, son of Harold Fairhair.

[16] There is also great uncertainty connected with the origin of the Danish signalling system, the oldest mentioning stems however from 1428 and the Zealander's assemblage stating that it had prior been custom "*at naar Fyendæ kommæ for Landet og Bagn brænder oc Widie Brand gingæ*" [English translation by author: "when enemies approach the realm, the *bavne* burns and the signal is passed on"] (Scheen 1951:244). But despite this old mentioning, the system must be much older, as the signalling system in the Roskilde fjord has been dated back at least to A.D. 1000-1050 (Crumlin-Pedersen 1978:50) contemporary to the fortification

[17] Sturluson d) I:98; Fagrskinna:54

[18] Olafsen 1920:2; Dybdahl KLNM XIX:673; Løland 1968:118

[19] Prior to the Viking Age, attacks would not necessarily come by sea, and hill-forts would form part of the local defence system together with veter. Thus a range of beacons might have existed inland prior to the Viking age system, but vanished prior to the launch of 'Hakon's' system in the mid-10th century.

[20] Ersland 2000:56

[21] Footnote 1, this is also found in *Fagrskinna*

Norwegian independence. It was partly re-established in the 17th century in the wars against the Swedes[22], as stated in the laws of king Christian IV in 1604 and Christian V in 1687. It is interesting to note that new regulations concerning the veter were issued, which reflect renewed interest and trust in the ancient military arrangement. Fire-signals were still the speediest and most effective way of sending warning signs in a country where a large percentage of the terrain was inconvenient for using messengers on horse. The vete-system was last used during the Napoleonic Wars[23], but then primarily as a precaution against privateers roaming the southern coasts. That people around 1815 were still keeping an eye on the vete-sites in case of attacks is portrayed in a story from Mo in Northern Norway. Here two men got lost in the fog, and when they lit a fire to warm themselves, they unknowingly did so near the vete-site, other people saw the light, and hence the local defence was mobilized[24].

Gulowsen[25] was the first to attempt making a list of all the known vete-sites in Norway. He based his research on reports from several military regiments in 1767. Most regiments in the southern part were represented and all in the northern part, providing a total of more than hundred sites. The most comprehensive list of vete-sites in Norway, however, was published by Scheen in 1951, and included 768 sites. Many more has been detected locally since then, but the corpus has not been published nationally, so we do not know the exact number. Although the sites stem from different periods, they reflect the great number that has existed at some point, mirroring the importance of this system.

3.1.3 Relationship With The Levy Organisation

The veter are closely linked with the levy organisation, forming a symbiotic relationship in which both elements benefit. The veters' function was to send signals to summon the levy ships, so the levy system depended on the vete-system to identify

[22] From 1652 there is this passage regarding the use of the veter, in a letter from commander of the Infantry regiment in Akershus to the vicegerent; *'Weed Wardene eller Baaler will ochsaa repareris och i thjde forsjunis, at dermed efter Wdfar Balchens 4 Capittel, eller hvorleedis det efter jtxige thiders tillstand och leedighed, kunde good befindis, och commanderis, maatte forholdis'* (Gulowsen 1909:508-9). [English translation by author: 'The wooden varder [SIC!] are to be repaired and constructed in time, according to Christian IV's law ch.4, or according to the usage of old times, and be commanded accordingly'].
[23] Dybdahl KLNM XIX:673
[24] Meyer 1922:39-40
[25] 1909

threats and give signals. The vete-system was, however to some extent independent, for it did not necessarily need the levy ships, it just needed to initiate an appropriate response. But if the veter did not depend on the levy ships, the vete-system was based on the levy-organisation, for it regulated the country and made people take part in the military organisation of coastal defence, in which both the levy- and the vete-systems played vital parts.

Lighting the veter would have a psychological effect on approaching enemies, who would know that they had been disclosed and that, probably, levy ships would intercept them.

The adoption and organisation of both the vete- and the levy systems must be seen in conjunction with the increase in the king's powers. As his realm extended and earls and petty kings became his subordinates, so would the various local defensive systems come to be controlled by the throne. Thus coastal defence systems can, to some extent, be seen as linked to state formation processes.

The Norwegian state is a much younger phenomenon than the origin of the levy- and signalling systems, and may well have come as a consequence of well-established coastal defences which increasingly vested the king and his subordinates with interlinked and hierchical power structures.

3.2 PRACTICAL ASPECTS

3.2.1 Constructional Features

None of the historical sources describe how the veter were constructed. There may have been regional variations of vernacular types, and because their construction would have been common knowledge no purpose would have been served by making written records. In any case the details were of no great importance as long as people received the signal. The constructional features have therefore, to some degree, to be guesswork. Because so many aspects regarding the veter are characterised by continuity, their constructional features may also have changed little through time. The laws from Magnus the Lawmender's Land law of 1274 and later ones state that veter are to be erected on the same sites as they have always been. It would therefore

be logical to construct them in the traditional manner, especially if parts of the foundations or other materials were still present. The remains from later periods point to the same way of construction: a cone-shaped assemblage of upright logs[26]. Continuity is mirrored in the vete-sites that seemingly were the same for centuries[27], and shown by many of the veter still in use in the 19th century. Some of the iconographic material also points in this direction[28].

No visual sources, apart from some dubious iconographic representations, tell us how the veter were constructed. In this respect Ersland[29] finds it unproblematic to obtain this information from more recent sources such as written material from the Middle Ages. As we cannot know for certain what they looked like in the Viking Age, reconstructions based on later material will be assumed in the hope that further research will provide more detailed knowledge. An understanding of their appearance will perhaps acquaint us with the kind of features we should look for when seeking to identify older sites.

Figure 14 – *Example of a* vete*; the cone-shaped assemblage of upright logs. This structure is located at Vrådfjell, Rollag in Buskerud, and said to be preserved from at least 1814 (Pedersen 2000:117)*

Norwegian research, mainly by historians, all give more or less the same picture of how the veter probably appeared[30]. According to this congruence the veter must have been constructed to a common plan, and vernacular solutions only played minor parts,

[26] Fig.14
[27] Dybdahl KLNM XIX:673
[28] E.g. Olaus Magnus and Crumlin-Pedersen 1978: fig 27
[29] 2000:56
[30] See mainly Olafsen 1920:8-10; Scheen 1951:263-65; Walberg 1996:20-21; Eidnes 1999:190-91; Christiansen 2000:10; and Ersland 2000. For Sweden e.g. Ståhl KLNM II:518.

mainly regarding choice of material. There were not many ways that veter could be constructed efficiently, with the tools and technical knowledge available. If we are to use material and knowledge from the later centuries as sources, the veter being difficult to detect archaeologically, then the following picture emerges: The vete consisted of logs of at least two meters in length[31], the length varying according to the timber available and whether there was a foundation or not[32], but the logs had to be of a certain length to make the vete visible. The thickness would also have varied accordingly, but thicker logs must be regarded as less useful, as they would catch fire less easily. Larger logs would also be more difficult to transport, and the largest may have been cleft. The logs were raised in a cone-shape around a vertically positioned master-log inserted in the ground to stabilize the structure. A tree already standing could be utilised, and this would make the construction sturdier as well as save time and labour. It would have been an advantage in the constructional phase if the centre log had twists or boughs left in the top part, making it easier to position the surrounding logs. Osier bands might have been put around the vete to keep it in position. Several layers of logs would be preferable, to keep the inside dry. The cone-shape was constructed with a small opening, and it was here the vete was lighted, providing the necessary draught. The veter could be positioned directly on the bare rock, or on a built stone foundation if necessary for drainage[33]. Dampness affected both the flammability of the logs, and caused them to rot. Veter on raised stone foundations would also amplify the signalling effect[34]. Even Bronze Age cairns might in some cases have been re-used as foundations for the veter, as these were often situated at good locations on the coast[35].

[31] In Sweden central logs of 12m in length have been reported (Scheen 1951:264). With these dimensions the veter themselves could have sheltered the watchmen (Crumlin-Pedersen 1978:51).
[32] Fig.15
[33] Westerdahl 1989:166
[34] One modern example of such a construction is a vete on Svellingen mountain on Sortland, still present in 1872. The circular stone-foundation was c.0.5m high with a diameter of 5-6m (Nicolaissen 1921:13).
[35] Sollund 1996:88

Figure 15 - *The author on remains of the stone-foundation present at* Våttåsen *Tiller. The remains being c.4x4m (Photo: Kjeld H. Helland-Hansen)*

Vernacular constructional methods existed. If there were insufficient timbers for the veter other materials must have been used. There is a surplus of heather in most coastal regions, and this might have been utilised along with other scrub species, in which case a proper foundation would have been obligatory[36]. Later, casks of tar are mentioned, erected on top of long poles[37], but this would presumably have been later than the Viking Age. Tar or other inflammable substances could have been put on the logs to enhance flammability. Another useful material for fires and periodically present on the coast is whalebone. Once ignited they provide a blazing fire, suitable for making signals. The advantages are many; they burn even in rain, while if they contain blubber the flames will burn strongly and would thus be effective by day or night. Whalebones found inland might indicate the presence of veter, especially if they show evidence of burning. Whalebones have been a resource for millennia, but whether they were actually used for veter remains uncertain.

Figure 16 – Lyngveten *from Ropstadknuten in Vennesla. Inflammable material, such as heather was placed on top of the stone foundation (Pedersen 2000:153)*

[36] Fig.16. Løland 1968:118-19
[37] Olafsen 1920:9

Although the veter primarily existed to make fire signals, other options had to be available if the situation demanded, for instance if the signal had to be passed on in daylight[38]. Then fire would not easily be visible, and smoke signals would be required. Juniper would be useful for making smoke-signals by day, and was an available resource most places. Wet hay could also have been employed.

The accommodation for the watchmen must be mentioned. Their cabins were very small constructions of timber or stones, depending on the available material, with four doors or windows to facilitate observation on all sides and keep an eye on nearby veter. These cabins are mentioned in the laws[39], and two even preserved today[40].

Figure 17 – *Cabin for the men on vete-watch. Note the openings, as stipulated in the laws. This is still present on site at Ulvdal in Sogn og Fjordane; the date is unknown (www.sffarkiv.no/atlasleksikon/nor/default.asp)*

3.2.2 Where Were They Situated?

The veter were initially situated on the coast[41]. Later, additional veter were built to take the signal along the fjords and even inland, to warn the general population as well as inform settlements directly involved in levy service.

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[38] Especially valid north of the artic circle during summer

[39] MLL III, ch.4, nr.1 "*vakthus med tag på og fire dører*", Christian IV's law of 1604, Landværne Balcken,ch.IV: "*vardehusze bygge, met tag paa oc fire dørre paa huert husz*"

[40] There is one in-situ at Ulvdal (fig.17) and another displayed at Sogn Folkmuseum.

[41] They were visible from the sea and might have been used as navigational markers. But necessary to distinguish between these and the later beacons made solely to aid shipping.

The vete-sites had to be carefully chosen, and a number of requirements fulfilled[42]. First they had to have good views of other locations, and preferably be visible to settlements. It was important that people in the vicinity were notified as the signal was passed on[43]. But it was not just a question of finding the highest available ground, because the sites had to be within a short enough distance from the settlements to allow people to reach it easily. The highest points also often had several disadvantages: they were more exposed to fog and overcast than the lower hilltops, and they were above the timberline making material-supply additionally demanding. Very few lived above the timberline, and these upland regions would thus in most cases be far away from the settlements.

It was vitally important that the vete itself was visible, not just the hilltop, and steep hillsides increased the suitability of the location. Veter could well be placed on spurs on the hillsides, as it was not necessary to have an all-round view. As a consequence any forest or other vegetation that hindered visibility had to be removed, an operation, which additionally might provide material for construction and fuel.

Place-names such as 'the old vete' and 'the new vete' show that the best site might not always have been located initially. As settlements moved, new ones emerged, or sites proved to be more exposed to fog than anticipated; veter might be relocated. This is however the exception, for generally the sites display impressive continuity.

The distance from one vete to the next cannot be generalised, as local terrain and topography had to be considered[44]. The distance, however, could not be too great due to visibility considerations. Conditions of good visibility might make it possible to skip one or more of the veter, as others might see the signal further along the chain, but this could not be relied on. It was necessary to ensure that the signal would pass along the line under most conditions, and therefore stations would be placed at distances that would accommodate most weather conditions.

[42] Walberg 1996:24
[43] Walberg pers.comm. Jan 2001
[44] Walberg 1996:23

At what distance the light from the vete would be visible at night, is difficult to estimate. It would depend on the size of the vete, the topography, the materials employed and of course the weather conditions. There is also a very important aspect that must be taken into consideration: the fact that lights would generally be a great deal more visible by night than they are today, because of our modern light pollution. Now an enormous amount of light from towns and cities artificially illuminates the surroundings and reflects from the night sky, blurring night vision. During the Viking Age large fires such as those from the veter would be easily seen, as powerful lights did not occur in other contexts[45]. Because the vete-sites were known, moreover, such a signal would be immediately recognisable for what it was. It would have been like a beacon out at sea at night, which is very visible from a distance, there not being many other lights to distract from it.

Figure 18 – *The discernible fire from a lit vete, illuminating the visibility of the fires (Pedersen 2000:53)*

If the weather was too bad for the veter to be lit there was a back-up system, sending the message either by boat on the coast or by horse inland[46]. In foul weather and at night the enemy might seek harbour and not attack anyway, as they generally lacked the local knowledge necessary to ensure safe sailing in foul-weather or after dark[47]. During the later wars with Sweden the vete-system must have been modified, as the threat now came from east and not from south, as was the case in Trøndelag in the Viking Age when the imminent danger came from Danish territory. It would perhaps be more accurate to say that awareness must have been directed towards the Swedish border instead of the sea than to suggest that the system itself was different. This displays flexibility. During the centuries from Hakon's time until the 19th century, the veter are said, in all correspondence and laws, to be erected on the sites where they

[45] Fig.18
[46] Walberg pers.comm. Jan 2001. There is however no real evidence for such a 'back-up system', though it is likely to have been some sort of alternative as the system would be very limited otherwise
[47] Crumlin-Pedersen 1991a:70; Christensen 1984:133

have always been positioned[48], thus emphasising a continuity over an impressive time-span. The continuity of the vete-sites should to a large extent be tolerably easy to trace, for most places suitable around 950 A.D. would also have been so in the 19th century, as the terrain, apart from vegetation, had scarcely changed. Therefore it is possible to identify old sites from remarks made in later sources, as well as from place-names. Many modern day radar installations are positioned on old vete sites, simply because these are still the best places for transmission.

3.2.3 When Were They Lit?

According to the laws, the veter were to be lit when a specified minimum number of approaching ships were sighted. The fact that ships were the decisive factor emphasises that the signalling system was primarily part of a coastal defensive system, and that its extension further inland was a later development.

In the GL[49], the prescribed minimum number was five ships, so if five or more vessels were sighted, the veter were lit. Less than that, the level of danger was considered not so great as to necessitate activating the full system. In practice it may not have been so simple. If for example the five vessels were merchant vessels, then there was no imminent danger and no need to ignite the fire. The operators therefore not only needed good eyesight, but also an ability to recognise various types of vessels, and make the right decisions. If in doubt, MLL state that the vete operators should consult 'judicious men'[50]. Five vessels of any type might carry a substantial number of warriors, and a swift transmission of this fact would be vital, but five merchant ships could equally well be engaging in innocent trade. The severe penalties involved if they wrongly lit the fire, or failed to do so when they should have[51], would have created many a dilemma; either light the fire and risk the penalties if the ships were not hostile, but 'saving' the village if they were, or not lighting and risking penalties and widespread devastation if they were warships, but preventing the system from being started if they were not. Though the sagas mainly tell of instances when fires were not lit, one example from the Orkneyinga Saga[52], show a case when they were ignited

[48] E.g. Gulowsen 1909:509
[49] XII, ch.17, nr.4
[50] MLL III, ch.4, nr.4
[51] From being fined to being outlawed
[52] Orkneyinga Saga ch.69

inappropriately. In this event the system was deliberately falsely triggered to remove trust in the vete-system. And so even though 'false alarms' are essentially non-events, they too have merited inclusion in the sagas.

While five vessels or more constituted what was recognised by the GL as an attacking fleet, MLL reduced this number to three ships, a significant change[53]. One plausible explanation is a general increase in ship size: larger vessels could carry more men, and so fewer ships would constitute as severe a threat as larger numbers had earlier[54]. It could also have come about as a result of smaller fleets inflicting greater damage locally, the new criteria reflecting a reaction to this. As the changes co-incide with a greater centralisation of power, with the king gaining much more control, the new rules might reflect this, for with increased royal power the king was less concerned about attacks from within the realm. It could also have been to make activation of the signal more sensitive as many fleets consisted of fewer than five ships, or the ships initially sighted may have been part of a larger fleet, and would thus according to the old law not have been worthy of attention. It could also indicate that the general usage of the signal system had changed, from the main line along the coast to a more localised system. For local settlements three ships would be a very potent danger, whereas five ships earlier would not have been too substantial a threat to the country as a whole. Devolution into smaller, locally based systems could explain these judicial changes.

The veter were not only lit to warn the people in the vicinity, but also to warn those further away to muster and come to the rescue. It is in this respect of great interest to note that the signal system outlined by Crumlin-Pedersen[55] in the Isefjord and the Roskilde fjord in Denmark, does not directly home in on a particular site such as the town of Roskilde, but appears rather to spread the signal to all inhabited areas in the vicinity of the fjord, thus warning all of the approaching enemy so they could make the necessary arrangements.

[53] MLL III, ch.4, nr.3
[54] According to Sverris Saga:ch.103, the first cog allegedly visited Bergen in 1186
[55] 1978: fig.28

One of the reasons why the veter were not lit when the sons of Eric came to Agder[56] was that those on duty supposedly were used to the signal coming from the east and when this did not happen they did not light the fire. Prior to MLL the perceived threat was most imminent from the east, as it is stated that the vete furthest to the east are to be penalised the most if not lit. Over time not only the eastern approach demanded safeguarding, for in MLL of 1274[57] not only is the most eastern most heavily fined, but also the most northern if the enemy approach was from this direction. Initially the most imminent threat was from the Danes in the southeast, but to only guard against threats from one direction proved to be a weakness and so the law was adjusted to maintain flexibility.

3.2.4 Who Were To Man The Veter?

The laws also state who were to man the veter[58]. This was a time where farmers had slaves and other un-free men in their household, and only the farmers themselves and their children, that is the free men, were assigned to the responsible task of manning the veter and responsibility for lighting them. They were, in consequence, liable for any fines, imposed for offences connected with the veter's operation.

The MLL passage that "two are to do duty together"[59], is considerably differing from the previous passage in FL stating that "three men are to be on duty"[60]. The change from two to three men must be seen in the context of the last words in the FL paragraph, regarding the problems being addressed. It must be assumed that the problems referred to are those which arise if the two men on duty are not sure whether the ships approaching are friendly or not, that is whether they are to light the vete. If in doubt they are to consult judicious men to reach the appropriate decision[61]. By increasing the number of men on duty from two to three, it will have made it easier to

[56] Sturluson d) I:98-99
[57] III, ch.4, nr.2
[58] FL V, ch.1: [English translation by author: 'Farmers or their sons are to keep guard and do so until noon. If not, then both must pay three marks of silver to the king. Two are to be on duty together, and in case of an emergency…'].
MLL III, ch.4, nr.2: [Translation by author: 'three men are to be on vete-duty ... The watch starts at noon and ends the following noon; but if they have started or ended too late then they are fined, unless other men have replaced them'].
[59] III, ch.4, nr.2
[60] V, ch.1
[61] MLL III, ch.4, nr.4. [English translation by author: 'if in doubt whether or not they are ships of war, the most judicious men around shall be consulted, and be advised whether the vete shall be lit'].

reach a sound decision. If the vete was situated at a distance from the settlements, the process of getting another opinion could waste invaluable time, and the whole system depended on swiftly transmitting the signal.

Furthermore MLL states who among the free men were eligible for watch-duty. These were those with "good eyesight, good hearing and healthy feet, free men, of full age and fit for fight, men from the realm and not foreigners"[62]. The initial credentials, being healthy, were essential, for watchmen naturally had to have good eyesight and they needed healthy feet to get to and from the site promptly. Good hearing may have been regarded just as general health criteria, but it could also be of significance for hailing or other sounds made to attract attention. The following credentials are of more general importance. Being yeomen of full age refers to them being capable of making sound decisions and being responsible for their acts, fit for fight also refers to this as it was only the free men who were entitled to carry arms. The criterion, about not being foreigners, reflects the fact that many of the slaves were kidnapped on raids and could not be trusted to light the fire should some of their countrymen approach. The signalling system was of national importance aiding in the coastal defence against foreign enemies. This, however, does not cover times this system was used in parts of the country during military operations in civil wars or feuds. Later there came changes to this, for in Bergen's town law foreigners were required to participate, due to3 the large number of Germans there, two-thirds were to be Norwegians and one-third foreigners[63]. This was the exception, for these foreigners were wealthy merchants from the Hanseatic League, capable of paying fines, and most importantly, as merchants they had a personal interest in the trade and the safety of the town and would therefore be reliable agents in protecting Bergen from raiders.

3.2.5 The Punishment For Not, Or Incorrectly Lighting The Veter

One disadvantage with the vete-system was that once the signal was sent forth, it was almost impossible to stop, causing a great part of the defence system to be activated and organised, perhaps in vain. The system was designed to travel faster than the approaching ships, and thus its activation was necessarily faster than messengers trying to bring it to a halt. King Hakon's concern about this problem led him to

[62] MLL III, ch.4, nr.2
[63] Scheen 1951:255

introduce the death penalty to anyone falsely activating the signal. This again, unfortunately led to people not lighting the veter even with just cause, due to the severe penalties. According to Heimskringla, this supposedly happened, as the veter were not lit prior to the battle at Fitjar in 961 A.D., the reason supposedly being that those on duty were afraid of the sanctions involved[64].

On the other hand, although it would in many cases prove difficult to prevent a false signal from spreading, there must have been some safety valves. Some of the veter might for instance have been hard to see unless positioned on an adjacent vete, and therefore the signal might stop, as the king's representatives in these cases would not have ordered the people to guard them. The king's representatives themselves might stop the signal, for, as they were the ones supposed to initiate the manning of the veter, they either might send out a message that the signal was false, or people would wait for their decision of manning and lighting. The laws state that those who lit the veter without just cause, were to be severely punished[65], and they who start the signal are the ones receiving the largest penalty if it proves false[66]. But also those manning the adjacent veter will be punished, not as severely as the former, but severe enough for it to be a major punishment. On the other hand, they are also to pay a fine if they do not light their fire when the veter to the south and north are burning. So either way they would have been punished. The safest option would be to wait for the signal from the king's representative and thus act accordingly.

King Hakon's use of punishments and fines were probably the most effective sanctions ensuring that the system should operate efficiently. Nevertheless his sanctions must in some cases have reduced the effectiveness of the signalling system, one scenario being that watchmen waited for signals from the king's representatives, or others, before lighting their vete, rather than swiftly lighting it and speeding up the transmission. But of the two evils it must have been preferable to have a slower spread of the signal than a misleading, or none at all. It might be assumed that there were ways to deal with false signals, although the harsh penalties themselves reflect upon the difficulties connected with this point.

[64] Sturluson d) I:98-99
[65] See GL b) ch.17, nr.5-6; MLL III, ch.4, nr.2-3
[66] 40 marks of silver according to GL b) ch.17, nr.5-6

3.2.6 How Did The System Work?

According to the laws[67], the local farmers were in charge of the maintenance of the veter, and later also the watch-cabins, in their local areas. This meant that the veter were to be kept in such condition that they could readily be ignited when called for during the period from spring till autumn[68]. Even though everybody would benefit from the vete-watch if there were an attack, it cannot be assumed that the vete-watch was something done gladly, because a 24 hours watch meant that valuable time was wasted during the height of the agricultural season.

There were three main ways in which men were summoned to their vete-duty. First of all if they sighted ships of war without previous notification, they were to light the vete and notify the king's representative who sent forth the war-arrow[69] and made sure that adjacent veter were manned accordingly. The veter were not to be lit unless the enemy was sighted, and the vete-operators could be called out prior to an active emergency. The better the preparations, the sooner would the system be activated.

Secondly, if an attack were in the offing, the king's representative would make sure that the iron war-arrow was sent along the coast in a ship from county to county[70]. In every county, as well as summoning the people living on the coast, settlements inland or along the fjords were notified by sending wooden war-arrows[71]. The iron arrow was the main one, sent along the coast, which reflects the main purpose of the system, to warn the coastal communities. After having 'received the war-arrow', that is having been summoned to vete-duty, they were to be on duty within five days or sooner if necessary[72]. The levy was preferably summoned at the same time, and so in theory the war-signal rapidly would be transmitted to every village and settlement.

Thirdly, the watchmen could be told at the annual Thing that they were to be on vete-duty at certain periods, or in response to rumours or agents telling of forthcoming attacks.

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[67] GL b) ch.17, nr.2; MLL III ch.4, nr.1
[68] Raids and attacks were usually carried out from spring till autumn.
[69] Norwegian: *Hærpil*
[70] GL a) 312 ch.18, nr.4-5. Also Bøe KLNM X:501
[71] GL a) 312 ch.18, nr.5
[72] MLL III ch.4, nr.2

According to Olafsen[73] it would have been impossible to summon all the men in the land, which was just too vast to make this possible. It is probable that only the veter in a defined locality were lit, for instance the ones in a skibreide, and thus only the men and ships from this area were summoned[74]. Should the enemy attack further, and then a pre-emptive signal might be sent ahead. This would be plausible as it would be futile and unnecessary to have people all over the country making ready for war if the attack was only targeted on a small part of the country. The signal sent would always travel ahead of the attackers and thus it would not be necessary to send the signal to the next region unless the attacking fleet was heading that way. If a long siege developed, then ships from other parts of the country would be of useful aid, but not for the swift raids that most frequently occurred. On the other hand the most usual scenario was rivalling throne pretenders who would attack other areas, and in these cases it would be futile to alarm the whole of the country[75]. There is, in fact, no mention in the sagas, or indeed in any other historical source, that all the men in the country were summoned, only that the signal travelled from one end to the other. This might only be an estimate by Snorri of how important and effective the system was.

3.3 LOCALISATION FACTORS

3.3.1 Place-Names

3.3.1.1 Place-Names And The Signalling System

Place-names come about as people need locational references to navigate through the landscape, and such names reflect either special features such as a mountain looking like an animal, or descriptive terms connected with the site.

Place-names are one of the key factors in research into vete-sites. Due to the often perishable construction of the veter themselves, few physical remains are left. What survives, however, is a wide range of place-names on many sites where veter were

[73] 1920:3-4

[74] There is however a problem here as we do not know how one made a distinction in signalling between an attack that could be fended off locally, or one that needed a larger task force in order to demolish the attack. Maybe there were no such distinction and that an attack simply was seen as an attack if the number of ships matched that number stated in the Laws. This is a notion not previously researched and one, which would be fruitful for further investigation.

[75] One such example being that of King Sverri approaching Bergen and king Magnus has manned the local veter in order to be alerted of Sverri's approach (Sverris Saga verse 79)

once situated. But we must bear in mind that many of the sites might now have acquired names unrelated to the veter. Then again, a hill or mountain might have had another use prior to its being a vete site, or it could have obtained another name at a later stage, for example after the black plague when places were deserted and when they were re-inhabited place-names might have changed in consequence. Place-names will thus in many cases not mirror a former vete usage.

It is hard to predict or even generalise factors influencing the origins and survival of a place-name. They tend to be highly individual, and are often determined by vernacular traditions. Ultimately place-names are determined by local perceptions and usage.

As the veter often had a vital function in a community, the sites used for the veter were often named according to this attribute. This tradition of such use may be preserved, however unintentionally.

According to Westerdahl[76], place-names related to the signalling system in Scandinavia basically derive from four main components. First of all *viti* in western Scandinavia, secondly *bavn,* deriving from *baken* in Old Frisian, known from Denmark and some former Danish territories[77]. Thirdly, the Swedish *böte*, and latterly words with variations of the component *vardh*. The latter is known from all Scandinavia, where Norway has *varde*, Denmark *warth* and Sweden *vård.*

Another problem is that "words of different linguistic origin can assume the same orthographic or phonetic form when they occur as place-name elements"[78]. Example of such is the similarity between the words *bavn*, meaning beacon, and *barn*, meaning child. In some places of Denmark they are pronounced similarly [ba:n], so the possibility that cartographers and others have mistaken one word for the other is imminent.

[76] 1989:172
[77] The Swedish *båk (en)* however stems from the German word *baken* meaning navigational marker, as they can be hard to distinguish topography is decisive regarding the interpretation of the sites (Westerdahl 1989:172). The modern English word *beacon* also stems from this *baken.*
[78] Holmberg 1991:234-5 and 1996:53

3.3.1.2 Norway

In Norway the original Norse term *viti* has later been influenced by local variations, for instance *Våttå* and *Vetta*[79]. The name might have changed gradually, and in some areas even disappeared totally from vernacular vocabulary[80]. As people usually could see one or more veter at the same time, few are named just "Veten", as this would be confusing. Most of the names are consequently combined with the word vete either as the first component of a compound word such as *Våttå*kammen in Trondheim, or as the latter, such as Hanger*våttån* southwest of Trondheim[81]. Vete used, as the second component has however been most common. The first component is in many cases the nearest or most influential farm, as with *Loes*våttån named after the farm Loe in Meldal, or the first component is the name of a mountain or hilltop, such as *Bjørga*veten at Karmøy in Rogaland.

Place-names originating from the Old Norse word *viti* are the genuine vete-sites. The problem occurs with all the place-names containing the term *varde*. The problem to us is the fact that the term *varde* unfortunately has become synonymous with the term *vete* in everyday speech, despite the substantial difference. Many of the old *vete*-names have therefore over the years been replaced with *varde*-names. Unless we have access to the old name, it is difficult to know whether it might have been an old vete-site, for the modern usage might be just that a cairn is placed there as a regional divider or some other mark. The sites with varde-names must be considered, but they often prove to be pitfalls. If one has a range of sites, but there are some blank spots, then the varde-names must be utilised to see if any such fit into the assumed chain of sites. Another aspect is that it is so difficult to date a place-name, so that we cannot be sure whether a vete-name stems from the Viking Age, or was first used as a vete-site in the 17th century[82]. Again older versions are valuable for tracing the development of the names.

[79] Hovda KLNM XIX:674. *Vålan* stems however from the Old Norse *viðr* meaning forest and is thus not a derivation of *viti*.
[80] Scheen 1951:252
[81] Hovda KLNM XIX:674
[82] Hovda KLNM XIX:674

Names containing the words *brenn* [burn] or *brann* [fire][83] in Norway and *Bål-* [bonfire], *Bränn-, Brand-* [fire], *Eld-, Ell-* [fire/flames] and *Rök-* [smoke][84] in Sweden might in some instances be names of the old signalling sites using fire to send an optical signal. But they are dubious, as they might as well indicate forest fires or bonfires[85]. Such sites must therefore be seen in relation to other sites, and whether they appear to fit into a vete-system or not, but it will prove hard to be certain.

3.3.1.3 Denmark

The most common Danish word in connection with the signalling system is *bavn*, in the Middle Ages also the term *baken*, the modern term is *baun* [bau`n]. It is the equivalence to the Norwegian *vete*, with the same description of the pile of wood, but not necessarily cone-shaped as in Norway. According to Crumlin-Pedersen[86], the term *bavn* [`baun] was presumably introduced on Funen into Danish during the middle Ages although the function was already known. No buildings or fortification structures are known from any of the *bavn*-sites on Funen[87], and therefore the place-names are increasingly important, often being the only reminder of former usage.

The word *bavn* is part of many place-names, of which the oldest historical mention is *Bagnœwanghyn* in Gunderslev parish on Zealand, recorded in a diploma from 1404[88]. In Denmark it has been customary to use variations of the word *bavn* as the first component in compounds with words for heights, such as *-høj* [height], *-bjerg* [mountain], and *-bakke* [hill][89]. The place-name *bavnehøj* is the most common, known from most Danish regions.

In addition to the *bavn*system, there was also a signal and watch system maintained and organised by the crown. These sites can be found in place-names with *warth*, meaning 'guard' or 'watch', today also in names containing words such as *vor, var,* and *or*, in spite of a tendency to correlate them with the word *warod*, meaning beach[90]. It is thus striking, with this interpretation in mind, to see how many of these place

[83] Walberg 1996:19
[84] Westerdahl 1989:173
[85] Øystein Walberg have found examples of such being vete-sites (pers.comm. Jan 2001)
[86] *Et al.* 1996a:191
[87] Crumlin-Pedersen *et al.* 1996a:191
[88] Hald KLNM I:394
[89] Hald KLNM I:394
[90] Crumlin-Pedersen 1978:52

names are situated on vantage points, and thus would be suitable for lookouts. On some of these sites ramparts or building structures, probably the remains of watchtowers have been found [91].

All though the warths have much the same purpose as the veter, as optical signalling-sites, they are in most other respects very different and not to be confused. They were fortified and had no collection of firewood. Instead the signal was sent forth with horsemen, and the warths were manned with men from the king's guard. It was not a duty for the farmers to man them, for they represented a much more militarised and standardised part of the royal military organisation. The men stationed at the warths would also, where possible, have operated some of the underwater fortifications[92].

3.3.1.4 Sweden

In Sweden the *vete* equivalences are *böte* and *vårdkas*[93]. The *böte* name is used as both the first and latter component in compounds, such as *Bötes*berget in Oravais parish and Munk*bötet* in the county of Kalmar[94]. In Sweden the *böte* names are found all along the coast from Uppland in the north to Blekinge in the south. Öland also has a chain of these place-names, and the system even stretched across the Bight of Bothnia to Finland and Karelia. That they are predominantly found on the coast indicates that the aim was protection against pirates, rather than land invasion. When an enemy was sighted the *böte* on the coast was lighted, and the signal sent forth to the towns[95].

The signalling constructions are also known in Sweden as *vårdkasar*. Both böte and vårdkas had the same function, and similar constructional features as the veter[96]. They were controlled, firstly by the local authorities, and as the royal power increased, by higher levels of national authority[97].

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[91] Crumlin-Pedersen *et al.* 1996a:191
[92] Crumlin-Pedersen 1978:58
[93] Initially a local variation of *böte* (Ståhl KLNM II:518). *Vård* is watch, *kasi* is pile [of wood]
[94] Ståhl KLNM II:518
[95] Ståhl KLNM II:518
[96] Fig.19
[97] Ståhl KLNM II:518

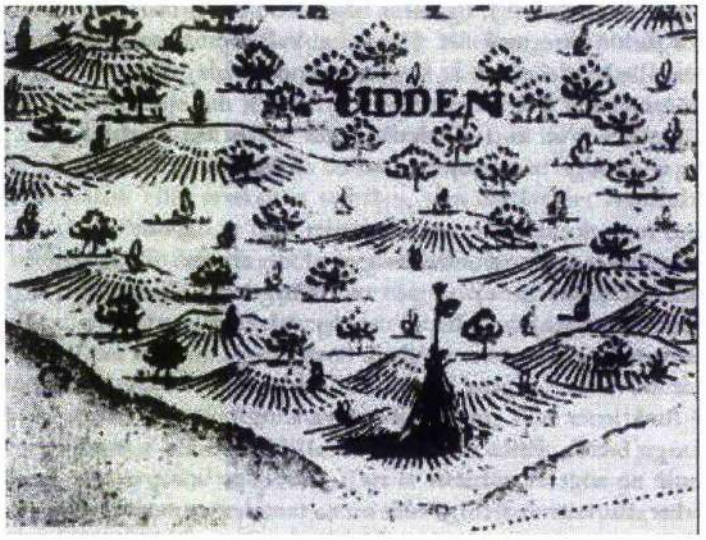

Figure 19 – *A Swedish vårdkas depicted on a 1642 chart, illustrating the generally valid construction. Note the particularly extended master-log and the tar-barrel attached to it (Crumlin-Pedersen 1978:50)*

The vårdkas-names are, together with most place-names, problematic to date. As with the signalling system in Norway, they can be dated back to the levy organisation, and some variations probably prior to this event. As a consequence it is hard to see precise hierarchical differences between the early regional defence and the latter national organisation[98]. Additionally as the vårdkaser primarily were positioned along the coast, they have subsequently been used as navigational markers. This could later have been reflected in a change in place-name, and stone settings from the old vårdkaser reused as navigational markers[99]. In general: the former signalling sites had to be positioned at some height, whereas this aspect not necessarily dictated the location of navigational markers[100].

Swedish versions of the word *viti* are also known, but are mainly limited to the two counties Jämtland and Härjedalen in the mid-western part, both of which until 1645 belonged to Norway. Names from these regions have also been locally influenced and Swedenized, examples are *Vätta*backen in Hammerdal, Jämtland and *Vätta*fjället (*Vatafjället* 1771) in Tännäs, Härjedalen[101]. There are however examples of such place-names from more southern parts, where they appear more as dialect words, such as *Väta*berget in Medelpad, *Vett*berget in Hälsingland and *Vett*åsen in Gästrikkel. But

[98] Westerdahl 1989:178
[99] Westerdahl 1989:178
[100] Westerdahl 1989:177
[101] Ståhl KLNM XIX:676

south of the two former Norwegian counties examples are scarce, and not found at all south of Gästrikkel and Dalarne[102].

In Scania, several place-names including variations of the Danish bavn-names exists, such as *Bågen- (Bogen-), Bång- (Bong-), Bån/n/-, Bon/n/-, Bond-, Band-,* and *Bom-*. The warth-names also exist as *Var-* or *Vår-*[103]. Westerdahl additionally points to the fact that some promising locations might have obtained their name at a later period, taking the name of a similar looking topographical feature accidentally with genuine signalling antecedents[104].

Country	Norway[105]	Sweden	Denmark
Place-names including the components	Vala, vata, vatta,vattan, vede, vedde, vet, veta, vete, veten, vetta, vette, vide, vidde, vita, vite, vitte, votte, væta, væte, vått, våtta, vått, våttå, våtå	Baken, böte, båken, vata, vetan, veten, vett, vetta, vette, väta, vätta, weta, wette	Baken, bavn, bøde, bågne
Other Names	Brann, brenn, bål, eld, ild, ill, vakt, val, var, varde	Band, bogen, bom, bon/n, bong, bond, brand, bågen, bål, bån/n, bång, bränn, eld, ell, rök, val, vard, var, värd, vål, vår, vård, vårblase	Warth, var, vor, or

Table 1 - *Scandinavian place-names connected with signalling-sites*

3.3.2 Archaeological Methodology

An attempt to locate structural remains or other clues relating to signal sites is important for several reasons; to pinpoint their exact location, to obtain more information of their construction, for instance whether assumptions regarding similarities in construction from the Viking Age to modern periods is valid, as well as attempting to date individual constructions. As place-names are difficult to date archaeological methods may help to determine the age of veter from the Viking Age, while other methods can aid the investigations of post-reformation ones. Organic

[102] Ståhl KLNM XIX:676
[103] Westerdahl 1989:177
[104] Westerdahl 1989:178
[105] The variations of the Old Norse word *viti* are more or less definite locations, others prove more dubious.

remains, which can be dated, will perhaps enable us to know more on the origin of the veter.

To my knowledge, no veter have been investigated in Norway using archaeological methods, so the following may be relevant to the initiating of such attempts in the future. To start with, one good reason why no one has tried to identify veter archaeologically may be that little evidence remains to be found. On the other hand, new approaches and techniques might be applied, together with more thorough research aimed at establishing new methodologies and perspectives.

What are the possibilities of finding physical remains in-situ? If stone-settings were used as a foundation for a wooden construction, then these might be found either intact or in fragmentary form. But as stones cannot be dated, and unless a site can be related to documentary sources, or has organic material associated with it, an indication of date will be unobtainable. Another problem is that if a complete stone foundation was not constructed, only rocks piled to support the central log, then this heap might over time, have been turned into a cairn. Even proper stone foundations might have been reused as such. Neither, as the veter was put on vantage points depending nor on hilltops but on intervisibility factors, land upheaval curves cannot be applied. The discovery of burnt layers within the stone settings could be C^{14}-dated, but just to find coal or fire layers on the sites themselves might not necessarily be sufficient, as the coal might stem from a fireplace, used before or after the site was used as a vete-site. On hilltops or mountain peaks, if there were no ready access to stones, it would have been a strenuous task to transport sufficient material for a foundation, and it might have been easier to remove the vegetation and erect the vete directly on the bare rock. In such cases all coal and other organic remains would presumably have been washed away.

If the master logs were inserted into the ground the post-holes might be identified, perhaps associated with organic deposits. But if this were the case, then the vete would be exposed to moisture from the soil, which would probably have been mitigated by using stone foundations. The central log could still be inserted in the ground, even though the rest of the vete was built on top of a foundation. According to Crumlin-

Pedersen[106] Oscar Montelius excavated the site at *Kungshögen* near Foteviken in 1890[107]. On this site a vete was lit as late as the beginning of the 19th century, and Montelius found disturbances in the stratigraphy, caused by the deposition of a huge pole, which he interpreted as the central pole in a vete construction. It has, however, not been proved whether this vete was in use during the battle of Foteviken in 1133/34[108].

What then if the vete was not cone shaped but just a pile of wood, leaving few traces in the soil? Then possibly pieces of wood might be found on the site depending on the humidity, and this can thus be dated using C^{14} or dendrochronology, though the likelihood of such a survival is remote. Even if the remains of logs or other pieces of wood are found in the vicinity of a vete-site, whether charred or not they might stem from a camp-fire or construction. Therefore more than a few pieces must be found, and scrutinised to see whether they are branched off, charred, and include longer pieces, before tentatively identifying them as vete-remains. The best outcome would be to get a date, which corresponded, with an historic event where the veter are known to have been used.

Another option is to find traces of the cabins, as stated by the laws. But these cabins or other types of shelter might have been of flimsy construction, or perhaps the vete itself was used. But any remains found near the vete are most likely to be cabins connected with them, for no other such construction are likely to be found on the hilltops. Hunting cabins, for example, would be positioned in more sheltered locations.

On the face of it, therefore, there seems to be little which can be detected by archaeological methods. But as no one has yet seriously attempted what do we actually know of the true prospects? An archaeological perspective will be essential in a multi-disciplinary approach. This has merely been an attempt to identify possible new approaches.

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[106] 1984:62
[107] Unfortunately the excavation report has not been available
[108] See 4.2.7.1

3.3.3 Local Knowledge

Local knowledge is an invaluable source not to be disregarded. Local inhabitants often possess valuable information, which can be utilised either to contradict other material or to complement it. Where cartographers and others might have misspelled or misunderstood either the meaning of place-names or their locations, local people will often be able to clear up such misunderstandings, unless the mistakes have gradually been incorporated into the vernacular vocabulary. Many vernacular place-names have often not been recorded on maps, and so do not exist outside local tradition. Place-names being part of the cognitive landscape, belong to local folklore and tradition, often being connected with myths or legends, of which some might contain useful information regarding age and usage of certain elements. That the veter have been of great local importance will often have made them part of the local historical tradition, and generations will often have passed on this information.

When a meeting for the youth-farmer's organisation was held in Trondheim in 1937 it was decided to light fires on the old vete sites in Trøndelag as a symbol of unity. Letters were sent to local historians and farmers all over Trøndelag. The replies were many and a large number of sites formerly unknown or overlooked were recorded. This valuable information was unobtainable from sources other than the local personal 'archives'[109]. This is also portrayed in the great multiplicity of local historical publications, which exist in most regions, where people are interested in preserving their local history for future generations, and where people encourage others to collect material[110].

3.3.4 Written Material[111]

3.3.4.1 The Law Texts[112]

There are basically five laws dealing with the vete-system in Norway: the Gulathing Law, the Frostathing Law[113], the Land Law of Magnus the Lawmender of 1274, king

[109] 39 letters were collected by Leirfall in 1937, presently kept in the Gunnerus Library in Trondheim.
[110] E.g. Olafsen 1915:25
[111] Introduction 2.3.3.1
[112] Introduction 2.3.3.2.1
[113] FL was put together around 1260, but is accepted as being much older, and is the main source to the later MLL. Some elements of both GL and FL may date back to the 10th century, but which parts are very tentative.

Christian IV's Norwegian Law of 1604 and king Christian V's Norwegian Law of 1687.

The laws were initially constructed to give the king income from fines, as most of the law-passages refer to the fine stipulated for not following the orders and commands of the king and his men. This is especially true of chapters concerning the defence of the land. In the laws regarding the veter, every command is followed with a fine if the orders are not properly carried out. The fines are raised according to the contemporary economy, and represent severe punishments. The most severe penalty was given to those who lit the veter without just cause. Due to this the number of men on duty were upgraded from two to three from the FL to MLL, a change probably reflecting reluctance on part of the watchmen to take responsibility. An interesting point is that MLL explicitly states that the fines are to be paid to the king, whereas it earlier was just stated that fines had to be paid. This is an interesting turning point regarding the increasing importance of the crown as the central gatherer of taxes.

As Hakon the Good participated in the instigation of both the Gulathing and the Frostathing laws, it is likely that we in these laws find a reflection of some of the original structure of the vete-system as supposedly organised by Hakon[114].

Stated by all laws, except the FL of which only parts exist, was that the king's representatives determined when the vete watch was to be summoned. From the MLL onwards it was also said explicitly that veter were to be situated on the sites where it had been the custom to place them[115]. This implies that there was a solid tradition behind the site locations and that these were known. If new sites were to be acquired it must be assumed that the king's representatives would give directives regarding this. In addition to the veter themselves, MLL also orders the farmers to build cabins in which they could stay, and these were to be fitted with 'roof and four doors'. The later laws from Christian IV and V also give directives regarding this. That the cabins were included in the laws must mean that they were of some importance; the watch lasting 'from noon till noon', some shelter was required. There seems to have been a problem with people falling asleep on duty, as severe fines regarding this are prescribed in all

[114] Scheen 1951:253
[115] MLL III, ch.4, nr.1; Christian IV's law of 1604, *Landværne Balcken,* ch.IV

laws but the last. GL even outlawed those who fell asleep and allowed the enemy to approach.

MLL state that the men had to be on duty within five days of being called out. Where some prior knowledge was available – for example if a fleet was about to leave for Norway, then a time lag of five days would be adequate, but if the vete-men sighted ships themselves, this time delay was clearly excessive. Practical directives regarding this time limit probably varied independently, so that it was up to the king's representatives to give the order. Christian V's law stipulates for instance that everybody had to adhere to instructions issued in times of war, which would cover all possible contingencies.

3.3.4.2 The Sagas[116]

Heimskringla is responsible for our contemporary understanding of the vete-system instigated by Hakon the Good in the mid 10th century. Consequently the sagas are important for the scope of this research. Additionally they constitute, together with the laws, some of the oldest surviving sources. But whereas the laws lay down how the vete-system was to be organised, the sagas give examples on how they were actually used. Whether these stories are accurate or not is difficult to decide, but they must generally be treated with caution. Nonetheless they provide valuable examples of the usage as well as the manifestation of the veter and the signalling system.

3.3.4.2.1 Heimskringla[117]

The story of the vete-system starts in Heimskringla in the saga of Hakon the Good. Snorri describes how Hakon divided the country into skipreider, and how veter was to be lit to warn of approaching enemy fleets. He thus give Hakon the full credit, but says little about where Hakon got this idea, other than that he introduced it when he returned from England where king Athelstan raised him. Neither does he tell of why he introduced it, and what he hoped to gain. What Snorri gives us are stories, anecdotes in which the veter play their parts, and it is from these that we have to deduce any valid data.

[116] Introduction 2.3.3.3
[117] Introduction 2.3.3.3.2

The most striking example from Heimskringla is the event where the sons of Eric together with a larger Danish fleet approached Agder[118]. They were eventually besieged, but the interesting fact was that the veter for some reason were not lit. This was due to two key factors; first the veter were supposed to be lit starting with the southeastern ones, but as the fleet approached the west people might have waited in vain for the vete signal from the east. Secondly, those sighting the fleet, or parts of it, might not have lit the veter, being afraid of the severe fines issued if the veter were lit for no good reason, and at worst of being outlawed. So the veter were not lit and legislation backfired.

The fact that so many of the faults concerning the vete system are portrayed in Hakon's saga is, according to Ersland[119], substantial proof that Hakon actually introduced it. For in a saga designed to portray the regent in the best possible light, the problems concerning the signalling system would not have been included had it not been to emphasise Hakon's major role. Another point of view may be that Snorri wanted to portray Hakon as a strong leader, a survivor who, regardless the mishaps with the military system, ended up victorious. An example in which the vete-system failed paradoxically underlines the importance of the vete-system as described by Snorri centuries later. For in this semi-fictional tradition in which bravery and heroism were the ideals and successes crowned with long epitaphs, a story of failure seems strangely untimely, had the intention not been to show that despite its initial problems the system increased in importance and eventually became an essential part of coastal defence. That the signalling system had initial problems, combined with the fact that most people were unable to see the huge advantages in comparison to their effort with manning them, might be one of the reasons that the veter are not often mentioned in the sagas[120]. It could also be that the signalling system was not of profound importance.

[118] Sturluson d) I:98-99
[119] 2000:56
[120] Ersland 2000:56

3.3.4.2.2 Sverri's Saga[121]

The examples regarding veter in Sverri's Saga are of a profoundly different character to the ones in Heimskringla. For while the use of the signalling system in Heimskringla is targeted solely against attacks from abroad, the examples from Sverri's Saga contrary to this, and display their use in internal feuds between throne pretenders in civil wars. At the same time the system was apparently also used as a defence mechanism against possible attacks from overseas, but as these has not been recorded, the threat was either diminutive or the internal upheavals were of greater importance to the saga tellers.

One example from the spring 1183 A.D. illuminates the above-mentioned notion[122]. King Sverri and his men with twenty small ships sailed the area north of Bergen, where king Magnus had his camp. They managed to capture some of king Magnus' men who told them that they had three vessels scouting further south, in addition to several vete-sites[123] that could send the signal to Bergen. With this information they sought to destroy the closest vete at Håøya, but the men there saw them and lit the vete. Luckily for Sverri the watch at the vete to the south did not see the fire and Sverri thus managed to make a surprise attack, kill the watch, and destroy the vete. Due to these events, according to the saga, Sverri managed to approach Bergen unnoticed.

The examples show that the vete-system could also be exploited for personal profit, as could the levy organisation. It could be of value to leaders wanting to claim their right to the throne or regional supremacy. Interestingly the example additionally illuminates a use of the system other than as a chain of veter along the coast. The example shows a regionally rooted defensive structure, where a few vessels as lookouts together with some veter combine forces in order to bring the signal to a settlement. This suggests a system more flexible and dynamic than the static impression presented by Heimskringla.

[121] Introduction 4.3.5.2.2
[122] Sverris Saga verse 79
[123] Amongst other Håøy and Askøy

3.3.5 Maps

Maps represent one of the best sources for a study of the signalling system. Whereas laws can give information on practical matters, they do not supply information on where they were built. Maps on the other hand provide concrete evidence of the place-names and topography[124].

To find local place-names maps of an appropriate scale are essential. Too small a scale will deprive us of most of the vernacular names. The economical maps in scale 1:5000 are generally the best as they display a sufficient number of place-names as well as the related topographical features[125]. Smaller scale maps are useful for understanding the relation between each site within a system, but are less comprehensive in their place-name information.

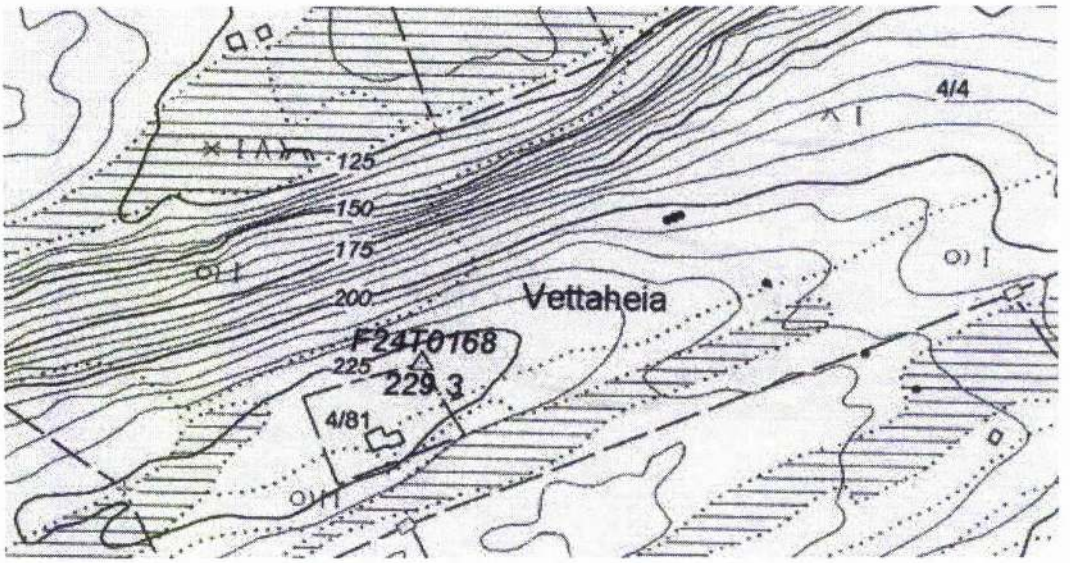

Figure 20 – *Section of an economical (i.e. ordenance survey) map showing the place-name* Vettaheia *and the contour lines (ØK CF 131-5-3, 1:5000)*

Studying maps allow the local topography to be investigated, which is crucial to understand and relocate vete-sites. They had to be situated on vantage points visible from at least one settlement and at least one other vete. Whether they were placed

[124] Fig.20

[125] ØK-kart or Ordenance Survey. These are the standard used for most local surveys, archaeological or other.

directly on a peak, or on a hillside does not matter providing they enjoyed the necessary intervisibility. Maps often use one place-name to describe a larger area, not pinpointing a specific spot. Therefore the topography may provide clues as to a more precise position. However, place-names on maps may not be correct and thereby mislead us, as they might have been misspelled, there might have been misinterpretation as to the position of a place-name, the name might have been misunderstood, or the name given may be an official imposition and not the vernacular name. Additionally we must be careful in assuming that all place-names have been put on the map, which almost certainly will not be the case. With these aspects in mind, it is advisable that more than one map is employed, and the use of earlier editions will often be helpful. In addition, local people will often provide useful information, and can in many cases clear up misunderstandings and provide the vernacular versions of mapped place-names.

Although maps provide many indications to landscapes' appearance, only visual inspection of a given place can determine its actual manifestation. A map cannot reveal the true visibility between one site and another, beyond showing topographical obstacles blocking sightlines. Visual inspections are thus indispensable. Site visits allow an assessment of the vegetation and geology. Naturally this might have changed radically since the Viking Age, but it may still provide useful hints. Topographical features themselves have by and large not changed to a noteworthy extent over such a minor time interval, unless human activities such as mining or road making have left their imprints.

3.3.6 Settlements

It may be supposed that without settlements there will be no veter. This is partly true, as the veter were supposed to warn the settlements of imminent threats. But it is also misleading, for the initial system of veter was the chain along the coast, where they would sight incoming enemies and alert the whole of the country, or at least the coastal regions in the west to start with. However, the veter could not be positioned too far away from settlements, as men were needed to man them. The purpose with the vete-system was that the signal would travel along the coast faster than the approaching fleets, which would be in vain if it took the men too long to get to the

veter. Subsequently, smaller regional systems came into being along the fjords and inland, established solely to transmit warnings to the settlements. These secondary chains of veter clearly developed following the existing patterns of settlement.

Crumlin-Pedersen[126] suggest that in order to date the age of the *bavn*-system, a thorough investigation should be carried out to determine the localisation of these sites in relationship to the different names of settlements if there is a pattern to be discovered. The same might be attempted in Norway with the vete-names, to see if there is any correlation between the settlement-patterns and the old vete-sites. This might make it possible to date the individual sites themselves.

3.3.7 Iconographical Material

Iconographic material is an extremely scarce source relating to the vete-system, as there are very few drawings or other depictions available, and the source is accordingly of limited use.

One example is this depiction from Olaus Magnus' displaying fires being lit on a hilltop[127]. The illustration illuminates many of the problems posed by this sort of material. First of all, the vete itself is not meticulously drawn, and so the image is not accurate. We can glimpse parts of the structure, but not sufficiently to draw conclusions, as the veter seldom is the main motif. Secondly, although the vete appears to be close to the settlements depicted, these are probably artistic conventions, to include both elements within the scope of the picture. Thirdly, the fact that veter are depicted neither proves that they were in use at the time of the depiction, nor in that area, only that the phenomenon was known to the artist. Many illustrations are no more than a textual filling, and are unlikely to be accurate representations.

[126] *et al.* 1996a:191
[127] Fig.21

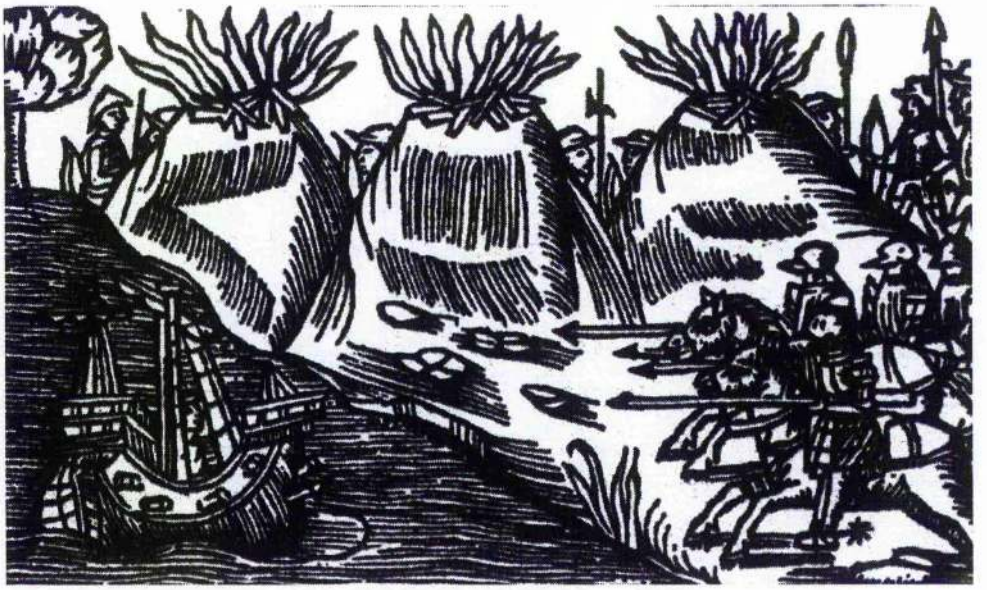

Figure 21 - *"On mountain fires at a time of hostilities", illustrating how the fires were lit to warn of approaching intruders (Olaus Magnus 7:10)*

It is important to date the illustrations accurately, not merely because the more contemporary they are the more valid they will be, but also because later copies might be slightly or indeed severely altered. It is preferable to know why the illustration has been made, and the purpose, but one can seldom hope for this information. Iconographic material is dubious as it provides no more than visualizations of the artists' imagination and can at best tell us that the veter or its system was important enough to be depicted. Only when accurate drawings are made of recognisable sites can valid information can be gathered. The rest is usually too imaginative and unrealistic.

3.4 AN EXAMPLE FROM TRØNDELAG, NORWAY

In the following an example on how the vete-system might have appeared in the western part of the Trondheimsfjord in Norway is illustrated. This will be a suggested version of how the signal might have been transferred from the coast and to the town of Trondheim[128], a most important place, at least from the early 11th century and onwards. Due to the speed with which the attacking ships could advance towards their target given favourable wind conditions, only optical signals would be sufficient as

[128] Fig.22

signals warning the people of the incoming threat[129], and using the Trondheims Fjord as an example, with a terrain difficult to be effectively utilized by horsemen or other means, the optical signals would be of vast importance if a secure defence were to be obtained.

There are some good examples of how people have tried to reconstruct the former signalling routes in specific parts of Norway. One example is Wikander[130] who discusses the veter and the system in the Agder County. Walberg describes an example of a suggested vete-system from northern Trøndelag[131] in relation with his study of the preparations to the battle at Stiklestad in 1030 A.D. Some of the sites he has identified will be shown on the map that will illustrate this example, as they were to some degree connected and the signal would have continued to a larger area using these installations[132].

This example will deal with the veter that sent the signal within the fjord, and thus the veter along the coast are not included. The sites included are those who have been identified either by their place-name, mentioned in historical documents or where the local traditions tell of their existence. There are some blank spots, especially in the vicinity of Orkanger, and hopefully these can be added at a later stage. Though the veter are known, it is not known with which veter they shared intervisibility. The intervisibility-lines are suggestions, mainly based on topographical features, as this has not changed much since the Viking Age apart from human intrusion. The signal could also have gone either way between the veter, the lines just indicating the intervisibility. Visiting most of the sites has also contributed to get a picture of which veter that were visible from the various sites. Some sites are covered with forest, and it must be assumed that this was removed during the time of use.

[129] Crumlin-Pedersen 1978:50
[130] 1983
[131] 1997
[132] The sites with Roman numerals I-VI; Walberg 1997:20-28

Nr.	Location[133]	Height[134]	Inter-visibility with[135]	Comments[136]
1	**Gartvigan**, Ørland	70 m	2,3,4	**Leirfall:** (nr.19) Garten. Gartvigan. Garten is outside the borders of the map, but will still be indicated as it would have sent the signal from south to north
2	**Borgklinten**, Ørland	119 m	1,3,4	**Leirfall:** (nr.19) Borgklinten
3	**Brettingen**, Rissa	297 m	1,2,4,5	**Leirfall:** (nr.31) Brettingsfjellet on the northern side of Haltvika
4	**Vetaliheia**, Agdenes	229 m	1,2,3,5,6	**Christiansen:** Vetaliheia **ØK-kart CF131-5-3**: Vettaheia
5	**Blåheia**, Rissa	393 m	3,4,6	**Leirfall:** (nr.16) In the 1870s-80s a large stone foundation was present here, being 1.5-2m in diameter, on this was placed the vete itself, but it was taken down in the late 1870s
6	**Vettan**, Statsbygd	219 m	4,5,7,11	Adjacent to Øverskot
7	**Vålheia**, Statsbygd	320 m	6,8,9,10, 11	**Gulowsen:** Vaattahougen. Varheia. **Scheen:** [617] Våttahaugen, Varheia, Vålheia. **Leirfall:** Valheia (nr.16), Vålheia (nr.20)
8	**Våttåkammen**, Trondheim	286 m	7,9,16,17, 18,I,II,V, VII	**Scheen 1959:** [600] Våttåkammen
9	**Digermulen**	Exact location not known	7,8,10,V	Partly destroyed during roadbuilding in the 1970-s. Sverri's Saga Ch.53: "The townsmen held their watch by the vete at Digermulen (á Digermúla)", but this might be a misinterpretation and a mix-up with Våttåkammen

[133] This is the current name of the site, as found on some maps, and their location
[134] Present height above sea-level
[135] Indicating which other veter that can be seen from this site, and vice versa
[136] Here is given comments, and listing of sources describing them. The number in brackets after **Scheen**, indicates the number he has given the site in his presentation from 1959. The letters after Leirfall have been numbered when handed in to the library, and so the number used here after **Leirfall,** indicates which letter that particular site is referred to.

10	**Våttahaugen**near Folafoten, near Flakk	Exact location not known	7,9	This is not known from written sources, only the place-name reveals its function. It might have been a relay-station, sending the signal to nr.8 and then to nr.1, or it might send it to nr.3.
11	**Hangeråsvåttan**,Byneset	272 m	6,7,12,14	**Gulowsen**: Hangeraas. **Leirfall:** (nr.20)Hangeråsvåttån **Christiansen (2000):** Hangervåttaån at Byneset.
12	**Våttan**by Kjølen, near Spongdal and Byneset	259 m	11,13,14, 15,16	**Gulowsen:** Sjølaas, Sjøen. **Scheen:** [604] Viten at Sjølås, Sjølen Vaattaaberg
13	**Solbergåsviten**, Lundås	265 m	12,14,15, 16,17	**Gulowsen:** Solberg. **Scheen:** [592] Byåsens vete. Solbergåsviten. Kastet. **Christiansen:** Våttan on the border to Leinstrand
14	**Våttan**, Børsa/Buvika	445 m	11,12,13	**Gulowsen:** Herstad. **Scheen:** [585] Viten ved Herstad **Leirfall:** Herstad (nr.30), Våttan (nr.31)
15	**Holemsviten**, Melhus	308 m	12,13,16	**Gulowsen:** Holem. Holemshoug. **Scheen:** [593] Holemsviten. Holemshoug. Adjacent veter seen burning from this site in 1718. **Christiansen:** Våttåsen. Holemsvåttån. This vete is outside the borders of the map, but is still indicated
16	**Våttåsen**,Tiller	325 m	8,12,13,15	**Christiansen 2000:** Våttåsen. **Gulowsen 1902**: Hougen **Scheen 1959:** [605] Viten ved Hougen. A lot of forest present, thus poor visibility. Stonefoundation found on site, diameter c. 3m
17	**Solemsvåttan**, Ranheim	433 m	8,13,18,I, II,V	**Sceen [602]:** Våtten Very high, but good visibility
18	**Aunvåttan**, Malvik	285 m	8,17,I,II,V	**Gulowsen:** Saksvik. Intervisibility amongst other with Borgåsen in Leksvik **Scheen:** [603] Viten at Saksvik

19	**Borgåsen,** Leksvik	168 m	8, II, III, V	**Leirfall:** (nr.19) Garten. Gartvigan. Garten is outside the borders of the map, but will still be indicated as it would have sent the signal from south to north
I	**Forbordfjellet**	590 m	8,17,18,II, V	
II	**Vikanvåttan**	238 m	8,17,18,I, V,VII	
III	**Fånnåvarden,** Åsen	281 m	V,VII	
IV	**Gullberget**, Åsenfjorden	108 m	V	
V	**Haugan**, Frosta	56 m	8,9,17,18, I,II,III,IV, VI,VII	
VI	**Våttåbakken,** Leksvik	332 m	V	

Table 2 - *Vete-sites by the Trondheimsfjord*

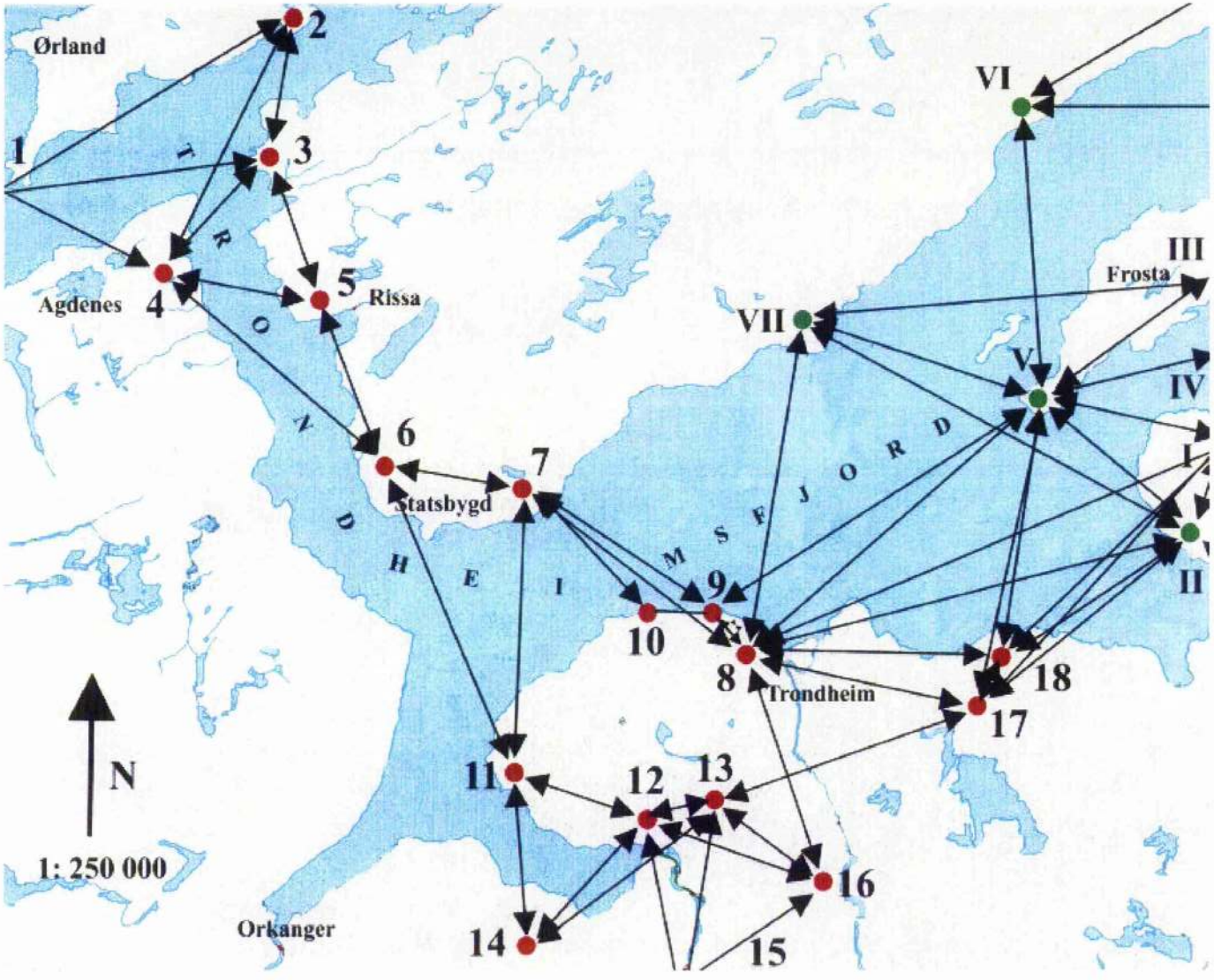

Figure 22 – *Vete-sites and their intervisibility, example from the Trondheimsfjord (Based on Kart serie M 516, Blad 10: Trondheimsfjorden)*

Chapter 4: Underwater Fortifications

4.1 GENERAL INTRODUCTION AND DEFINITIONS

4.1.1 Introduction And Definitions

The Danish term for these military structures is 'sejlspærringer', for which no good English equivalence exists[1]. The term 'blockage'[2] has been used, but its association with medical terminology makes it unsuitable. 'Off-shore defence works' has been applied[3], but this imply that they are positioned some distance from the shore although many were fastened on the shore, and the structures might have had an offensive function in addition to a purely defensive one.

The term 'underwater fortifications' has therefore been coined[4]. This implies structures constructed under water, or partly submerged, for military purposes. Most fortifications are located 'under water'; even the floating ones are mainly thus. 'Fortification' implies the structures being man made deliberately for military purposes, whereas 'obstruction' or indeed 'obstacle' could be a natural phenomenon like a sandbank. The term 'underwater fortification' is thus a man-made obstruction constructed in water to prevent enemy vessels from using fjords and inlets as inroads. A capability of blocking these waters to navigation did this. Such devices could prevent swift sea-borne attacks from penetrating into the hinterland.

These underwater fortifications appear in many forms and shapes, depending on the local topography and the purpose for its construction. In addition, with their variety of technical adaptations to the vernacular landscape, and their varying functions, they also contribute to our understanding of the maritime cultural, or cognitive landscape[5]. The underwater fortifications were "constructed to control traffic between the open sea and the fjords and bays, where settlements or even towns were situated"[6]. Most of the

[1] In Danish *'sejl'* means sail, and *'spærring'* refers to a way of blocking, obstructing or stopping; i.e. the blocking of a sailable channel
[2] E.g. Crumlin-Pedersen 1985; Rieck 1991; Seeberg 1999:37
[3] E.g. Nørgård Jørgensen 1997:200; *"off-shore defence works – constructions of stakes, stones, box caissons, sunken ships etc"*
[4] Acknowledged e.g. by linguist Stewart Clark, NTNU, pers.comm. Oct 2000
[5] Cognitive landscape is a mental map to the users of the landscape. See e.g. Westerdahl 1989; 1991
[6] Rieck 1991:83

underwater fortifications were built to protect fairly large water basins and/or large hinterlands, and a few of the underwater fortifications can be related directly to the defence of a well-known city or town such as Birka[7].

To understand the significance of the underwater fortifications, one must remember that their heyday was a time when communications were largely sea-based. The sea provided easy access to large areas, and was the easiest and most economical way of transporting men and cargo. "Ships trying to penetrate an underwater fortification were exposed to attacks from the defending inhabitants of the area"[8], thus giving the defenders the often-crucial advantage.

That the underwater fortifications were effective means of defence serving their purpose is mirrored by the fact that some of the underwater fortifications from the Late Roman/Early Germanic Iron Age are situated adjacent and related to some of the large bog offerings from that time period[9]. Examples of these are the bog offerings at Nydam[10] and Esbjød[11], where large amount of weapons and equipment from a defeated army were deposited.

The construction of underwater fortifications reflects the technological skills and knowledge of the society constructing them, so by investigating these structures we additionally gain information about their technical abilities and social structures, as it takes a well-organized society to build and maintain such systems. However, as will be shown in the examples below, underwater fortifications, though varying from site to site according to vernacular parameters, are generally conceived as a homogenous group of structures. The way they are constructed and built shows a great deal of conservatism, displaying similar constructional features dating from the Roman Iron Age to the Middle Ages, and conservatism being a substantial feature in most maritime cultures.

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[7] Situated 30 km west of Stockholm. In the 12th century the word *birk* denotes a judicially self-governed trading-place (Thrane and Porsmose 1996b:197)

[8] Rieck 1991:83

[9] Rieck 1991:95. The Æ Lei and Margrethes Bro fortifications in the Haderslev fjord are situated adjacent to the Esbjøl sacrificial bog. Æ Lei has been dendro-dated to A.D. 403, where the Esbjøl offerings stem from A.D. 430-50.

[10] For information on Nydam, see e.g. Rieck and Crumlin-Pedersen 1988; Christensen 1996

[11] Deposited c. 430-50 A.D. For information on Esbjøl, see e.g. Rieck and Crumlin-Pedersen 1988; Nørgård Jørgensen and Grøn 1997:23.

4.1.2 Importance And Function

The heyday of the underwater fortifications was at a time when most communication was by sea. The sea was the dominating geographical element, and of vital importance to almost all people in Scandinavia. Fishing was a vital food source and commercial activity, and the bulk of the trade was carried out by sea. This is mirrored in the fact that all the major trading places in Northern Europe in the Viking Age were situated close to waterways[12].

Most of the Scandinavian countries' military organisations placed emphasis on the naval part, due to their natural geography in which coastlines were prominent features. And it was as sea-borne raiders that the Vikings made a name for themselves in the annals of history. As the sea was of such importance most people came by boats and ships whether being fishermen, traders or pirates. It was therefore of vital importance to the people living on the coast or near the waterways to impose some control over maritime traffic in order to create and maintain a defensive initiative. These systems of defence included underwater fortifications in all their variations and forms.

By studying the evidence for underwater fortifications, one can identify which periods a country or region was under particularly threat from other areas. For instance as will be shown below, the underwater fortifications found so far in Denmark suggest that the majority stem from the 12th century[13], a period where the Wends were particularly active as also shown in the written material[14]. So, by interpreting the underwater structures one can enhance understanding of historically attested times of unrest. As the fortifications were not erected all the time and everywhere, they are usually reliable indicators of times with a certain level of threat[15]. Research will shed more light on this feature.

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[12] The disappearance of Birka during the Viking Age is one example to indicate that the proto-towns established in the 8th and 9th centuries, were not fully utilizing the trade potential, and were thus founded before the trade system had been fully developed. These changes precipitated a change of trading centres (Näsman 1991:37)

[13] Nørgård Jørgensen 1997:fig.5

[14] There is a congruence between the historical, written material, and archaeological material, the underwater fortifications, from this period (Nørgård Jørgensen 1997:200)

[15] E.g. Nørgård Jørgensen 1997; Nørgård Jørgensen and Grøn 1997

Another aspect is the fact that as vessels grew larger and capable of transporting greater loads of men and their weapons, the need for effective defences increased. So the need to be able to protect the hinterland from sea-borne attacks increased proportionally with advances in ship technology[16]. Underwater fortifications might also be seen as modified in response to the challenge of new ship-types[17], although direct evidence for this theory has not been found, mainly due to the fact that it has not been particularly investigated. As underwater fortifications were tailor-made to stop or delay contemporary ships, not only might ship-finds shed light on how the fortifications might have appeared, but the fortifications may also throw light on features concerning the ships, especially their draught[18].

The fact that a fjord or bay has been blocked is a clear indicator that the site and its hinterland were of some significance. Thus we can use the fortifications to gain knowledge of settlement patterns, and contemporary places of wealth, influence and importance.

The underwater fortifications not only played a part in the defence of settlements and towns situated further within sheltered fjords and bays, but additionally enabled the control of sailing routes to and from local waters[19]. This could be of immense importance to local chieftains as well as the regal authorities[20].

Crumlin-Pedersen[21] has attempted to categorize the function of the Danish underwater fortifications by identifying three main types. First there are barrages[22] in the harbours of fortified trading towns such as Birka[23]. In this respect it is worth mentioning the likelihood that defensive aspects were taken into consideration when towns, and other settlements were founded. Secondly, defences for strategically located natural

[16] Rieck 1993:211
[17] Wåhlin 1964:10
[18] See 4.3.8
[19] In comparison with the more modern Sound Toll between Elsinore and Helsingborg
[20] Nørgård Jørgensen 1997:200
[21] Crumlin-Pedersen 1984:62
[22] See 4.3.5.2.2
[23] Birka was by Adam of Bremen in the 1070s said to be partly defended by "underwater obstacles" (Ambrosiani 1991:99) in the harbour area: *They have blocked that bight of the restless sea for a hundred or more stadia by masses of hidden rocks*" (Adam of Bremen 1959, ch.60). Of particular interest is the find of "semicircles of piles and other obstacles" (Ambrosiani 1988:24) erected in the cove outside the rampart.

harbours[24] such as Foteviken in Scania[25]. And last there are works blocking the entrance to a prosperous hinterland, as is the case at Skuldelev, Helnæs and Hominde[26]. In addition to these three categories Westerdahl has suggested three more[27]. These are fortifications securing a harbour or anchorage for the levy fleet, fortifications in close connection to a land-based fortification, and underwater fortifications in larger internal waterways.

4.1.3 Against Whom Were They Targeted?

Underwater fortifications were created to protect people on the coast or near waterways against vessels with hostile intentions; if constructed properly foes would be halted before reaching their destination. This would give the hinterland the possibility to mobilize or flee, either way reducing the chances for surprise attacks. It was especially the draught of the ships, which decided how the underwater fortifications were constructed, as the size of the fortifications had to deny the ships enough water to sail over the defences.

Attacking fleets might be pirates seeking pillage and plunder. They might focus on a particular settlement possessing some identifiable form of wealth. An attacking fleet might also be part of a politically controlled invasion, seeking to gain control over another country, town or area. The battle in Foteviken is one example of such an invasion and there is congruence between the archaeological finds and the written sources[28].

Underwater fortifications were intended to stop enemy ships, and to give the hinterland an advantage. How they were constructed did not depend on whether to counter pirates or politically controlled invasions. Although the latter would probably need a wider system of fortifications in order to be effective.

[24] A natural harbour has by Crumlin-Pedersen (1985:222) been described as "suitable anchorages ... relatively well sheltered from the prevailing winds and [with] a modest depth of water; here ships could lie sheltered"
[25] See 4.2.7.1
[26] See 4.2
[27] 1989:130-1
[28] Crumlin-Pedersen 1984

4.1.4 Organisation: Construction And Maintenance

Unfortunately there is little evidence in written sources on who were responsible for the construction and maintenance of underwater fortifications[29]. On one hand, this aspect of underwater fortifications has not been well emphasised and thus needs to be further researched. It would be interesting to understand more fully this aspect, for not only would it to a further extent identify who was involved from a sociological standpoint, it would also contribute to a greater knowledge of the defensive organisation and duties within smaller communities. It might furthermore shed light on the duties of chieftains and petty kings, and their part in maintaining the well being of their subordinates. The royal powers and the level of administrative organisation might also be mirrored in their capabilities to defend their realm, and the extent to which it was secure from attacking fleets.

That said it would probably prove difficult to get this information from archaeological sources alone. Our interpretations will largely have to be based on written documents. An account such as that of Olaus Magnus does not mention who was in charge, only that fortifications were erected[30]. The most likely place to find references to this 'duty' would be the laws[31]. But perhaps the setting up of these structures was regarded as such an obvious duty that they were not explicitly codified, for no references to underwater fortifications exist in Scandinavian legislation. On the other hand when the Danes in the 12th century erected the underwater fortifications as a precaution against the Wends[32] one might assume that levy forces were involved in the construction and building of the defence works[33]. Part of their duty was to maintain and partly build the number of ring fortresses, so significant for Denmark from the period of Harold Bluetooth[34]. And as the underwater fortifications also were a means of defence, one might assume that the same responsibility applied. There are however several problems with the comparability with the ring fortresses, in particular as they only

[29] Neither the great royal ring-forts from the Viking Age are represented in the contemporary written material (Crumlin-Pedersen *et al.* 1996a:189)
[30] See 4.3.5.4
[31] Danish Land laws only states the duty to build defensive structures, 'Bygningsarbejder til Landets Forsvar', not mentioning underwater fortifications, but they must be regarded in this category.
[32] Crumlin-Pedersen, KLNM XIII:619
[33] Crumlin-Pedersen *et al.* 1996a:189
[34] King of Denmark c.935–985 A.D.

functioned for a very short period of Danish history. If anything they suggest problems with sustained large-scale sponsored work.[35]

It can reasonably be assumed that the people of the hinterland were in charge of constructing the underwater fortifications where they saw fit. They were the ones who faced the possibility of future attacks, and they were the only ones who could conduct the building work. Subsequently maintenance, if carried out, would surely fall on their shoulders.

4.1.5 Form

Underwater fortifications were normally constructed to exploit and enhance natural topographic features, to create the most successful obstructions with the greatest economy. Thus the positioning of an underwater fortification is not random, but a very deliberate act, identifying where they would be most effective, although exceptions might exist. The shape and type of fortification were chosen to best suit, and to take full advantage of, the topography and underwater terrain. What made people choose one type rather than another depended on several factors. It must be remembered that although we today know of a wide range of different types, the variations known at any time will vary from place to place and depend on the level on contact with other regions as well as their own capabilities of thinking and acting practically, thus inventing or improving the various types. On the other hand, the possible variations are not great, and the different types are mainly different ways of combining the various elements.

The main aim was to construct a fortification best suited to the identified purpose. This depended on local topography, available material, time, work force, perceived nature of the threat, the level of technical skill, and the draught of contemporary vessels. Erecting an underwater fortification might demand a huge number of trunks and posts, depending on the type of fortification, and the type of fortification chosen necessarily reflected the building materials available. Constructing a fortification where sandbanks, cliffs or rocks could be used as parts of the structure would save valuable material without diminishing the strength of the barrier. If the intention were

[35] Pers.comm. Gareth Williams October 15th 2002

to close off a deeper fjord or bay, then perhaps the only possible solution would be to make a floating boom. If the necessary time and skills were available, then perhaps a stout barrier made of wooden caissons filled with stones would be preferable. If time was of an essence a floating boom could be stretched across a water basin. Temporary expedients would be relatively easy to remove afterwards, in which case relatively little evidence of their existence can be expected to have survived.

A fjord, bay or coastline often has many navigational passages, but usually require local knowledge to get through safely. By constructing fortifications in well-known channels it was possible to capitalise on the attackers not having the necessary knowledge to make a safe passage through the tricky ones and thus save the labour of erecting barriers in all the channels. This was done at Skuldelev, where one blocked off all the passages apart from the one known as Vimmelskaftet, which in itself acted as a barrier to non-local sailors without disadvantages to local users[36].

It was important when constructing a fortification and adapting it to the seabed to make sure that it did not seal off the passage entirely for all traffic. This could be avoided by having some sort of gate where the vernacular traffic could get through, being left open in times of peace. The intention of most fortifications was to regulate rather than stop all traffic.

4.1.6 Defensive And Offensive Fortifications

The underwater fortifications were constructed where they were most effective for defensive purposes. As enforced stops made the vessels vulnerable to attack, it would have been important to construct fortifications at places best suited for the defenders to form a line of defence, whether on land or at sea. In most cases it was best for the defenders to meet their adversaries in a land battle, because they could exploit the topography to give them the advantage. They would have utilised slopes overlooking the fortification, or other sites where the defenders could use natural surroundings to give an advantage in battle. However, a capability for the defenders to respond on land or at sea was usually a prime requirement as most warfare at this period was carried out at sea.

[36] Olsen and Crumlin-Pedersen 1990

It must be borne in mind that the attackers would probably land when stopped by a fortification, and thus might try to reach their destination by foot. If the fortifications were correctly placed in the terrain the defenders, if reaching them soon enough, would be able to attack the ships from land with arrows and spears, while the ships might be caught in or near the fortification in an unfavourable position.

Underwater fortifications would therefore possess elements, which made them offensive as well as defensive military structures. On the one hand they would be defensive by damaging approach routes to the attackers and giving the hinterland the time to mobilise a defence, but on the other hand they would be offensive by destroying the boats or ships that got caught in them or were rammed by such floating bars as used in the Helnæs fortification. The offensive underwater fortification would block 'the enemy's exit routes'[37], for by so doing they contributed to the tactical manoeuvres whereby the fortifications on one side and the defending villagers on the other trapped the escaping attackers.

4.2 THE TYPES OF UNDERWATER FORTIFICATIONS AND THEIR CONSTRUCTIONAL FEATURES

4.2.1 Introduction

Below are given examples of variations of underwater fortifications[38]. As these are cited as an introduction to the various types of structures, rather than a research history, only one or two examples from each category will be given. Only where several important variations within each category exist will more examples be given.

4.2.2 Barrages[39]

Barrages were rammed into the seabed. Some may have had barbs to prevent them from being pulled out, as the ones found at Helnæs[40], but in most cases they were just simple poles rammed into the sediments. Not only were posts set in a single line, but

[37] Crumlin-Pedersen 1985:218
[38] See Appendix I and II
[39] Row of poles, posts or stakes in the water, will be mentioned as barrages, see e.g. Nørgård Jørgensen 1997.
[40] Rieck 1991:88

also masses of poles were used thus creating a broad fence in the water. Ships were either stopped by hitting the front of the barrage or, if they had enough speed to get past the first row of poles trapped within the barrages, becoming easy targets for any defenders on the shore. The barrages could be strengthened with horizontally floating trunks held in place by vertical posts, as in the barrage at Hominde. The barrages, being impassable barriers when functioning would presumably have had some sort of gate for the vernacular traffic. Cunningly, by having horizontally floating bars along the entire length of the barrage, adversaries would be denied knowledge of the gate's true location.

Crumlin-Pedersen[41] has divided the barrage structures into three main categories. First, they are defensive structures for the protection of Viking Age towns. Second they are defensive structures common from the early Middle Ages for the protection against the Wends[42]. And third, they are defensive structures from the high- and late Middle Ages constructed in the vicinity of towns and harbours. These categories have since been modified to accommodate the many fortifications from earlier periods now discovered, stretching back into the pre-Roman Iron Age with the barrage found in Gudsø Vig[43], though the majority stem from the period between the 11th and 13th centuries[44].

[41] KLNM XIII:619
[42] A chain of fortifications stretches from the east coast of southern Jutland, via southern Funen, Lolland and Falster to southern Zealand, reflecting the serious impact of the attacks
[43] Nørgård Jørgensen and Grøn 1997:20
[44] Fig.23; Nørgård Jørgensen 1997: fig.5

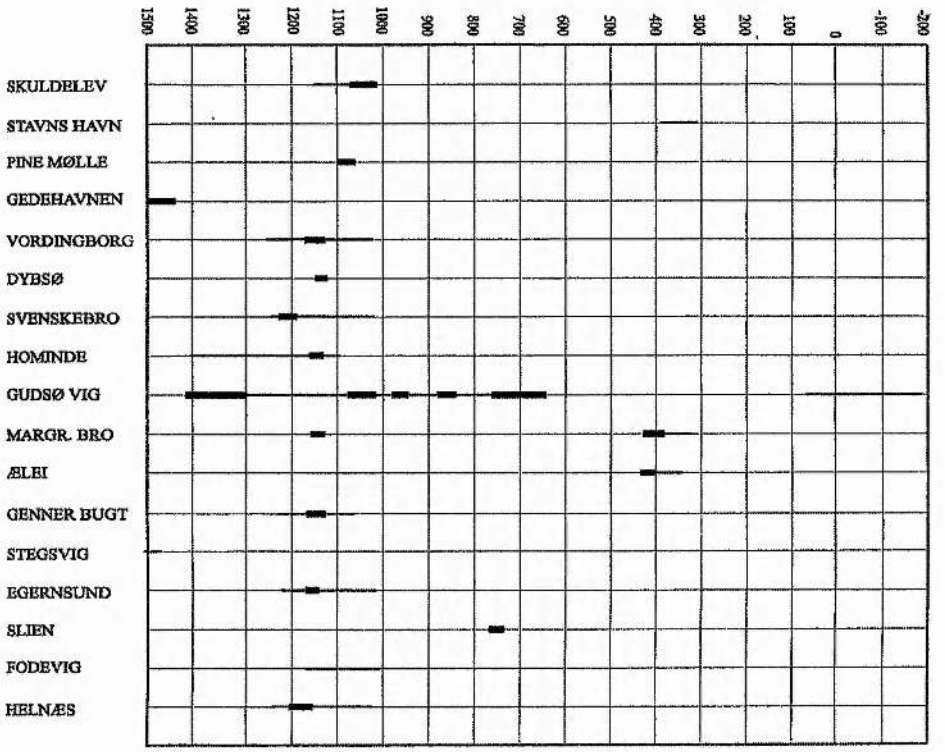

Figure 23 – *Distribution of Danish underwater fortification dates (Nørgård Jørgensen 1997:fig5)*

Being permanent structures, drift ice might get caught in the barrage if situated near the surface, which would also prevent local ships from leaving harbour, as in the case of the Hominde fortification[45]. Ice might also contribute to the destruction of barrages, and sometimes remove evidence of the structures themselves.

4.2.2.1 Hominde

The underwater fortification at Hominde is situated on the southern part of Lolland-Falster in Denmark in the Rødby Fjord[46], and here Schultz[47] in 1933 conducted the first known archaeological investigation of underwater fortifications in Scandinavia[48]. The barrage was situated in a now reclaimed fjord, and the excavation was carried out using terrestrial excavation techniques. In Denmark where much of the old fjord areas are now dry land, this means that many investigations of underwater fortifications can be conducted with conventional terrestrial techniques. In contrast, Norway's quite

[45] Rieck 1991:88
[46] Fig.24
[47] Schultz 1936. Unfortunately this text has not been available to me, I have therefore had to depend on the validity of other sources citing and referring to it
[48] Nørgård Jørgensen and Grøn 1997:24

different topography and little reclaimed land, means that the investigations of most fortifications will almost invariably be marine archaeological.

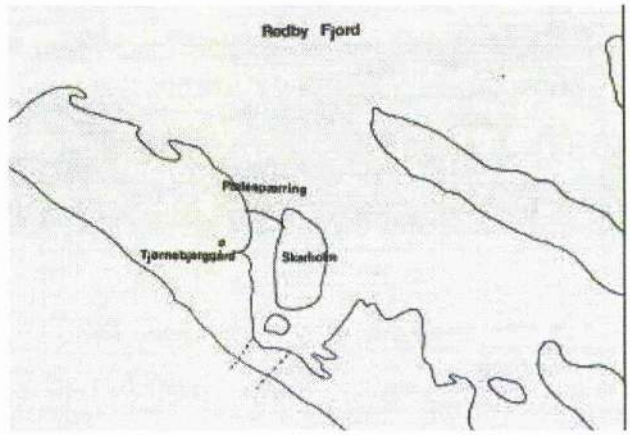

Figure 24 – *The position of the Hominde barrage in the Rødby Fjord (Nørgård Jørgensen 1996:fig2)*

Parts of the Rødby fjord dried out in the early 1930s, and as the soil from its bed was agriculturally used; a number of oak trunks surrounded by vertically rammed posts were discovered[49]. Excavations were conducted in 1933, 1966 and 1994[50]. The underwater fortification appeared to have formed a 6-8.5m broad zone of posts vertically rammed into the seabed, with each $1m^2$ containing about ten posts[51]. From this follows that a ship with a width of about 5m would contact around 500 posts if it was to break its way through the fortification[52].

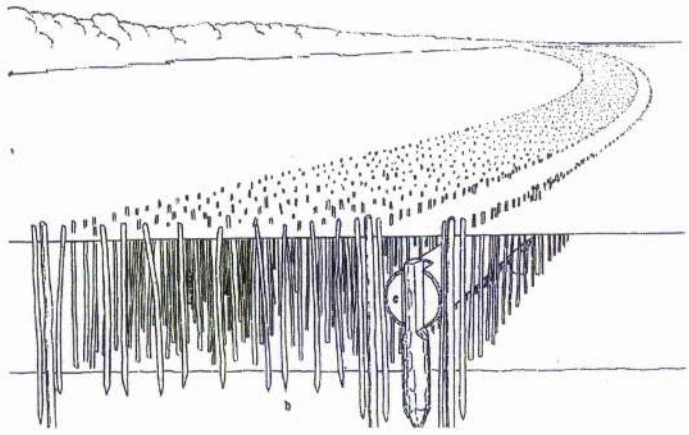

Figure 25 – *Reconstruction drawing of the Hominde barrage (Nørgård Jørgensen & Grøn 1997:24)*

The posts were of oak and beech, each 10-20cm in diameter with a cone-shaped pointed end rammed into the seabed. The fortification was strengthened with "strong horizontally floating bars … made out of minimally worked trunks of oak, each with

[49] Fig.26
[50] Nørgård Jørgensen 1996
[51] Fig. 25
[52] Nørgård Jørgensen 1996:23

two rectangular cut holes through which poles were rammed to hold the horizontal bars in position. The floating bars were able to move vertically with the rise or fall of the water"[53]. The trunks themselves were 6–10m long, and positioned behind the posts in which the ships might be caught. An opening in the underwater fortification was found, for ships to navigate when the system was not active. Including its extension, the barrage had a length of 200m. In the deeper parts in the fjord, the barrage was up to 8.5m in width while at the ends, which were shallower, narrower and only of 1-2m. Unfortunately, due to the deposition of mud and drainage operations in this part of the fjord, it has not been possible to ascertain how deep the fjord was in this area at the time of construction, thus neither determine to what degree the posts themselves were meant to rise above the surface[54].

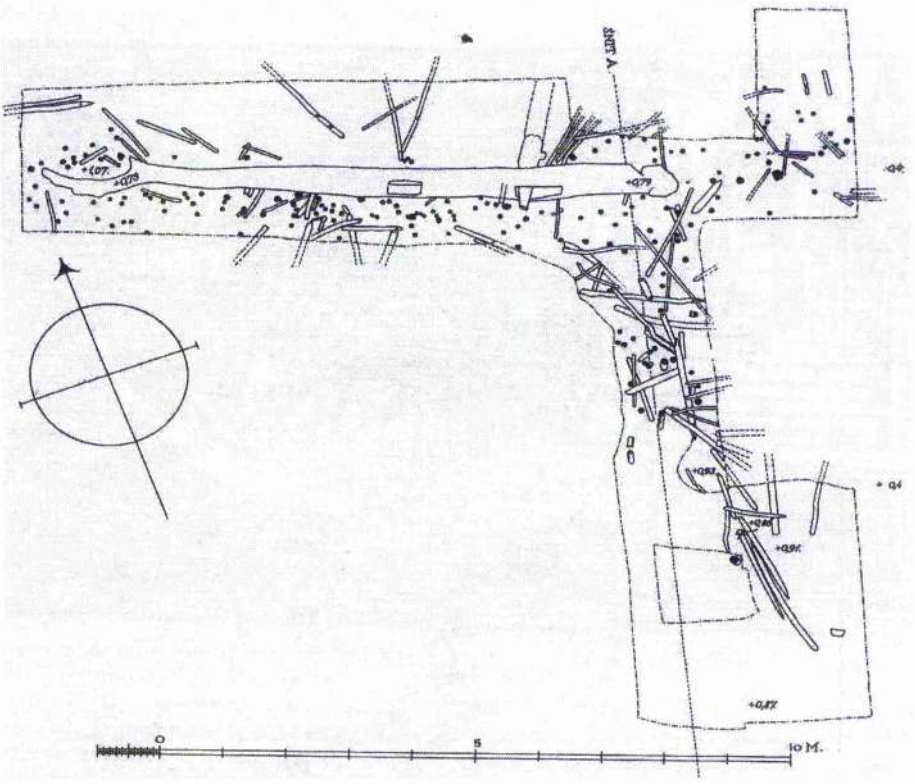

Figure 26 – *Shultz's 1936 excavation plan of Hominde (Rieck 1991:86)*

The building of such an extensive construction must have demanded a large labour force, as the work included the cutting of trees, shaping of posts and trunks, and the construction itself. How large a force is difficult to estimate, for the number of

[53] Rieck 1991:85-86
[54] Nørgård Jørgensen 1996:19-32; Rieck 1991:85-86

workers would have depended on the speed of the construction, and whether the barrage was to be erected as quickly as possible or in several phases[55]. A sample taken in 1966 from one of the trunks was C^{14} [56] dated to A.D. 1020 $\pm$ 100 years. In 1994 a sample was cut from another of the trunks and dated using dendrochronology. This dating indicated that the tree was cut late in A.D. 1139, or early in A.D. 1140. Other C^{14} tests give the years A.D. 1020, 1290 and 1405. This must imply several construction phases, or at least repairs. The main body of the fortification, with the large trunks, must have been constructed shortly after AD 1139/40, to protect the local settlements from enemy attacks, which makes it more or less contemporary with the fortification, found at Foteviken. This should be seen in relation to the political unrest at that time, with a massive threat from the Wends around AD 1150[57].

4.2.2.2 Helnæs

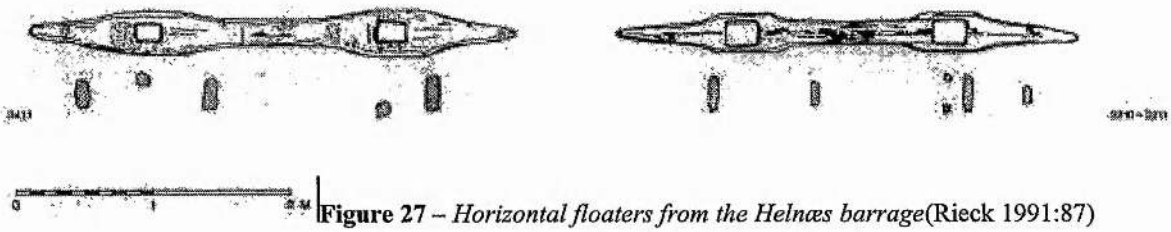

Figure 27 – *Horizontal floaters from the Helnæs barrage*(Rieck 1991:87)

At the *Hæ lnes* fortification on Funen in Denmark, rammed posts are also found. But here the posts were fitted with barbs to prevent removal[58]. Such a precaution might have been adopted because there was no massive row of posts here, the uprights' function being to position floating beech bars, which faced incoming vessels[59]. This is worth noting, as the other barrages with floating bars are positioned so that ships would run into them lengthwise. These bars, however, have sharp pointed ends in the sailing direction, implying that vessels running into the barrage will strike the bars in a way similar to being rammed.

[55] Nørgård Jørgensen 1996:33
[56] Based on measuring the rate of decay of the radioactive isotope of carbon. When an organism dies, it ceases to absorb carbon, and the radioactive isotope begins to revert to normal carbon at a known rate. The half-life of a C^{14} is 5730 years, and by measuring the amount of radioactivity, the age of an organic artefact can be determined precisely (Johnston 1997:17)
[57] Nørgård Jørgensen 1996:33-34
[58] Fig.28
[59] Fig.27

The fortification was erected in the 12th century, and blocked the entrance to the bay, protecting the hinterland from enemy attacks by forcing ships to pass through the narrow strait at Faldsled[60]. From the reconstruction drawings[61] it also appears that the vertical posts protruded well out of the water and would therefore be visible to anyone from a distance. This might, in addition, have had a psychological effect by appearing daunting and unapproachable.

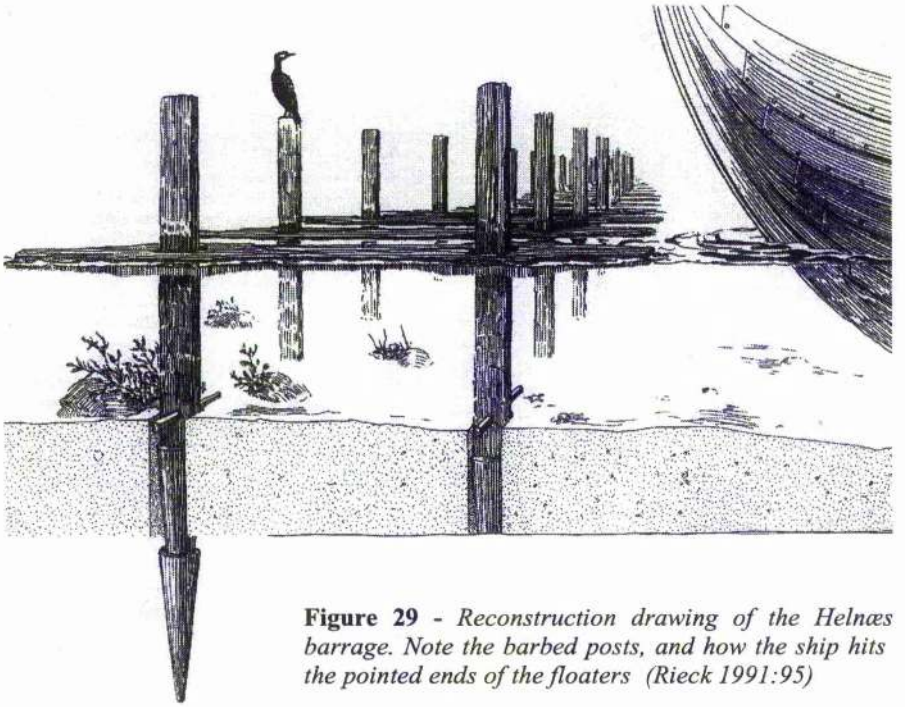

Figure 29 - *Reconstruction drawing of the Helnæs barrage. Note the barbed posts, and how the ship hits the pointed ends of the floaters (Rieck 1991:95)*

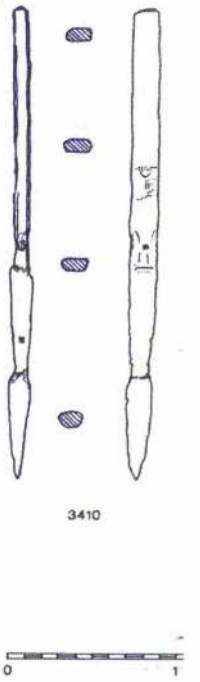

Figure 28 – *Barbed posts from Helnæs (Rieck 1991:87)*

4.2.2.3 Gudsø Vig

At Gudsø Vig on Jutland, more than 900 posts have been found[62]. This is an ideal location for an effective fortification, as there is only one navigable passage into the harbour. That this fortification, which consisted of three rows of posts, was effective was proved by the discovery of a pile of ballast stones. It appeared that a ship may have been caught in the barrage, and thus jettisoned the ballast to escape[63]. Whether this was a normal way of passing barrages has not been

[60] Rieck 1991:86-88; Crumlin-Pedersen *et al.* 1996a:192
[61] Fig.29; Rieck 1991: fig.11
[62] Fig.30
[63] Rieck 1991:93-94

investigated. No ships or the remains of ships caught in underwater fortifications have been found in Scandinavia. Trapped ships would be easy targets for anyone on the shore, or in boats, to finish off. If a vessel were defeated in such a fashion, the defenders would no doubt haul the ship off and use it for their own purposes, or at least salvage the materials.

Figure 30 – *Posts from barrage at Gudsø Vig marked with sticks for recording (Rieck 1991:95)*

The archaeological investigations in Gudsø Vig revealed not only a single underwater fortification, but a whole complex of structures[64], the earliest dated to pre-Roman Iron Age[65]. The latest has been partly dated to the late Viking and Middle Ages[66], from A.D. 600 – c.1300[67]. The barrage structures all seem to be concentrated at the entrance of the bay. A band of shell-debris and gravel 5-15cm below the seabed was noted. This has been interpreted as deposits silted up around a later barrage that was for some reason subsequently removed. One of the structures in Gudsø Vig has also been interpreted as a possible floating boom[68].

[64] Nørgård Jørgensen and Grøn 1997:20-21
[65] Gudsø Vig IV, it is a bit uncertain as it is only registered in one end, and the direction being different to the other barrages.
[66] Gudsø Vig I
[67] Nørgård Jørgensen and Grøn 1997:20-21
[68] See 4.2.4.1

4.2.2.4 Jungshoved Nor

An excavation in 1980[69] discovered a row of poles in the water adjacent to the ruins of an old castle on the eastern shore of Jungshoved Nor[70]. Other sources also told of a possible bridge-structure. Further investigations[71] on this Zealand fortification were carried out using echo-sounders[72] to detect possible wooden structures on the seabed. Using the Chirp II[73] system in –95 greatly improved the resolution and it was even possible to detect single posts. Several structures were located including two barrages at the mouth of the cove, the most southern based consisting of horizontally positioned oak trunks.

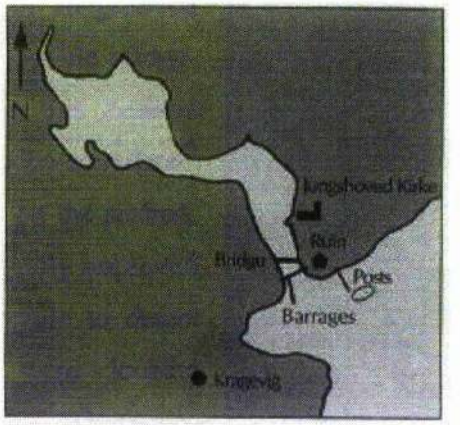

Figure 31 – *Drawing of the Jungshoved Nor barrages and castle ruins (Nørgård Jørgensen & Grøn 1997:19)*

C^{14} samples have been taken from all the three barrages in the cove. One of them, a barrage at the mouth consisting of heavy oak trunks, has been dated to the first century A.D., another stems from the late Viking Age, and as it is situated close to the older structure it may perhaps have replaced this. The third barrage structure is dated to the 13th century, and is hence contemporary with the first phase of the adjacent castle, which was occupied from c.1200-1658 A.D. As no major settlements have been found so far in the hinterland, this is an example of fortification to protect, not a settlement, but a castle structure.

4.2.3 Sunken Vessels

Sailing vessels, or structural remains of such, have been found in several fortifications, for example at Skuldelev and Foteviken which both will be dealt with below. In a society depending heavily on vessels as multi-purpose vehicles, they are likely to have been husbanded carefully over a long life. But they must eventually have been judged beyond economic repair, and the vessels disposed of in the fortifications are

[69] By the Danish National Museum (Nationalmuseet)
[70] Fig.31; Nørgård Jørgensen and Grøn 1997:19
[71] 1994 and 1995
[72] See 4.3.2.1.1
[73] Uses an interval of frequencies from 2-23 kHz, increasing its penetration and resolution abilities (Nørgård Jørgensen and Grøn 1997:18-9)

demonstrably old and worn-out. This was a convenient way of extending the use of the vessels, along with such other uses as shelters or re-use of components. When filled with stones or other materials they would be easy to manoeuvre into position and kept there using rammed posts. Ships also possessed some symbolic value not to be underestimated[74], and therefore might have been seen as appropriate to use in underwater fortifications where they would, symbolically as well as practically, be stopping the ships of the attacker.

The best-known underwater fortification, Skuldelev, provides an example on how vessels might be employed in creating a barrier.

4.2.3.1 Skuldelev

In 1957, in the course of dredging in the Roskilde Fjord, an underwater fortification consisting of several ships from the Viking era was discovered. It proved to be a remarkable find, and initially led to the development of marine archaeology in Denmark.

At Skuldelev three relatively deep passages existed in the Viking Age[75]. All allowed ships to sail down the fjord to the town of Roskilde. The two straightest routes, called Peberrenden and Jydedypet, were both blocked with relatively solid and stationary constructions. The third channel, Vimmelskaftet, demanded great local knowledge for navigating it as it wound itself through the landscape[76].

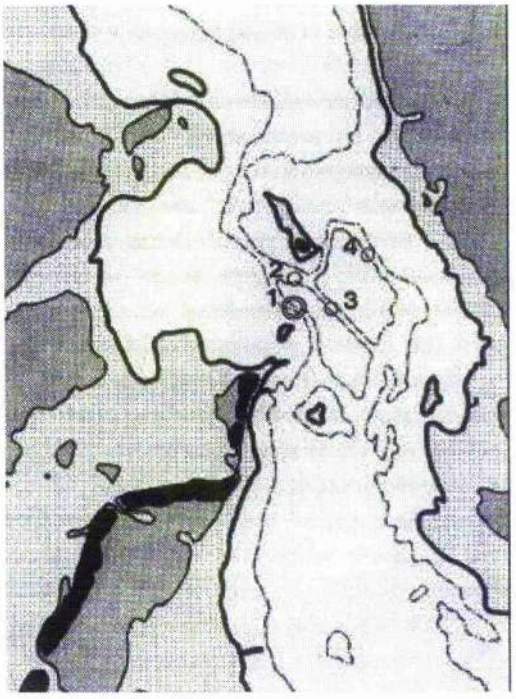

Figure 32 – *The three main passages at Skuldelev. Peberrenden (1), Jydedybet (3) Vimmelskaftet (4) (Olsen & Crumlin-Pedersen 1990:68)*

[74] See e.g. "The ship as symbol in prehistoric and medieval Scandinavia", Crumlin-Pedersen, Ole & Munch, Birgitte Thye (eds.). 1995. Copenhagen
[75] Fig.32
[76] Rieck 1991:90-91

In 1962 an excavation took place in Peberrenden, prior to which the whole site was drained in order to investigate and recover the ships deposited there. During the excavation five Viking ships were found[77]. The vessels show in a remarkable way a broad spectrum of different vessels in use at that time for fishing, trade and warfare. This find was especially important as it contained five vessels that had been used for everyday purposes, an important contrast to the elaborate and highly sophisticated Viking ships which had been found in burial mounds in Norway[78]. They give an exceedingly valuable picture of the kind of vessels that sailed these waters at this time.

Of the five wrecks found, two were warships (wrecks 2 and 5), two were merchant vessels (wrecks 1 and 3), while one was interpreted as a fishing vessel (wreck 6). In the beginning it was thought that there were six vessels, but wrecks 2 and 4 later appeared to be parts of the same ship. The largest of the warships, wreck 2, was 29m long with only a 1.2m draught[79]. Wreck 5 was 17.4m long and had a draught of 0.6m. These are the two most interesting ships to us, as they are of the types Vikings would have used for military purposes, and so the same types that the underwater fortifications were built to stop.

The fortification in Peberrenden at Skuldelev was constructed in two phases. The first phase was around A.D. 1000, when three vessels were sunk (1,3 and 5); they were filled with large stones and held in position with rammed posts. After a few years, about AD 1050, the fortification was partly worn down (the top strake in wreck 1 was cut off, the starboard side of wreck 5 and the aft part of wreck 3 was torn away), and to compensate for this wrecks 2 and 6 were sunk on top of the other ships. Apart from vessels and stones, the underwater fortification also consisted of poles and bundles of branches further hindering ships from sailing through as it encouraged sedimentation. The current was forced into Vimmelskaftet, and prevented this from being silted up with sand. Branches from the fascines have been C^{14} dated to AD 940-980 $\pm$ 100[80]. In Vimmelskaftet there was at least ten feet of water, enough for any ship to pass, if they knew their way that is.

[77] Fig.33
[78] The ships found in the burial mounds at Oseberg, Tune and Gokstad.
[79] Skuldelev 2 (built 1042–1043 A.D. in Dublin). 60-80 oarsmen and warriors. Scuttled in Peberrenden in 1070s A.D. (Crumlin-Pedersen 1991b:201).
[80] Crumlin-Pedersen 1978:34; Olsen and Crumlin-Pedersen 1990; 61-62

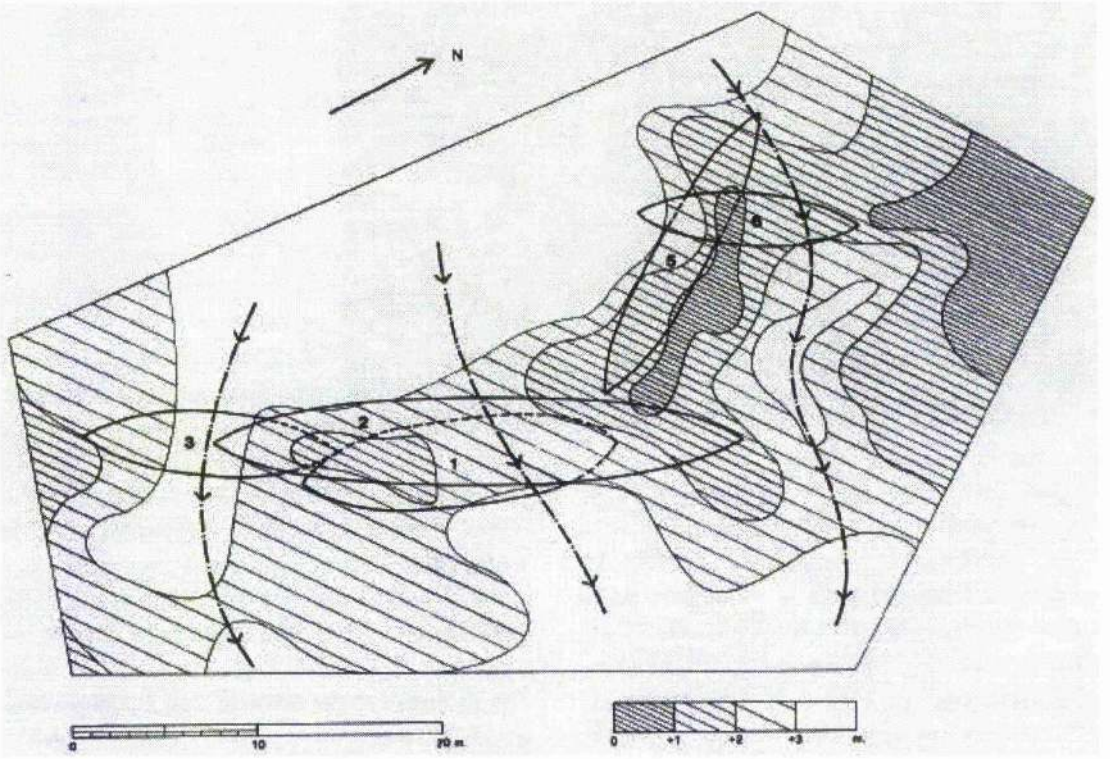

Figure 33 – *The positioning of the five vessels in Peberrenden, Skuldelev. Initially Skuldelev 2 was believed to be two vessels (2 and 4) and thus an incorrect numbering from 1-6 (Olsen & Crumlin-Pedersen 1990:63)*

The other passages at Skuldelev were also blocked, but due to a lot of subsequent activities in the area, most have been destroyed. According to Wåhlin[81] investigations of the seabed in 1813 supposedly discovered an underwater fortification near Eskildsø consisting of stones, posts and caissons. This was according to him seen as late as the 1930s but has never been relocated. The underwater fortification in Jydedypet was sadly destroyed in 1962 due to the exploitation of oyster shell banks, when stones and ship parts were dug up and thrown back into the fjord. Parts of wrecks from this fortification have been C^{14} dated to A.D. 1080 $\pm$ 100. In Vesterrenden, parts of a fortification were located in 1963 in the course of dredging, when investigations revealed a large oak box filled with stones. The passage was presumably filled with stones on either side of this box, which has been dendro-dated to AD 1010 $\pm$ 100. A row of poles was found in Vimmelskaftet, but partly destroyed by dredging. This is not supposed to have been a continuous underwater fortification, but one that only partly blocked the entrance. Beech samples from this area are dendro-dated to AD

[81] Wåhlin 1964:13

1070 ± 100[82]. All the defence structures therefore show significant congruence in time and features.

According to Crumlin-Pedersen[83], the different underwater fortifications in the Roskilde fjord are part of a large fortification complex. They worked in relation to each other to create the desired regulation of traffic in the fjord. It could not have been in the interest of the city of Roskilde to block the entire passage for the local traffic, so it is therefore reasonable to suppose that the deep passage at Vimmelskaftet was never totally blocked, but that there was a movable floating barrier. This must have been located between Vesterrenden and Højrenden, and rigged up in times of war.

The underwater fortifications at Skuldelev must have been very effective, for as late as the beginning of the 19th century, merchants had to unload their cargoes in Fredrikssund and thereafter send them in smaller boats to Roskilde.

4.2.4 Booms[84]

Especially in Norway, booms would be a significant type of fortification. This is because most Norwegian fjords are quite deep, and thus not suitable for barrages or other seabed based structures. The main advantage with booms is that they can be erected when an enemy is approaching, barrages and other fortifications being more permanent constructions. Booms could be ready made and already fastened to one shore. Upon receiving information of an approaching fleet, it would not take too much time to row to the other side and fasten the other part of the boom to a land based structure. The booms would most probably be fastened to large stones on either side, so when trying to detect the old booms, a search for large stones suitable for fastening would be a good way to start[85]. The booms themselves, if kept in the water over a long period, would eventually become waterlogged and sink, unless taken ashore for any reason. How long it would take for the wood to become waterlogged would depend on the type of wood used, and its original moisture content. The possibility of finding remains of these sunken booms would depend on the seabed sediments, and of

[82] Crumlin-Pedersen 1978:34-35
[83] Crumlin-Pedersen 1978:36
[84] The term *boom* has been employed rather than *floating boom*, as iron chains or cables do not float unless buoyed.
[85] Though stones for fastening have been used for centuries for belaying e.g. vessels, known in Norway as *åbol*-stones. So though such stones are found, their function might prove hard to establish.

whether they would provide a sufficient amount of protection against degradation. As many of the Norwegian fjords are quite deep, the preservation environment on the seabed would in many cases be good, as it is often too deep for the *teredo navalis*[86], and also not too much influenced by currents, wave action and other biological and physical intrusions, which would destroy most of the wooden structures situated in shallower waters.

The improvement in technical survey equipment in recent years has made it possible to detect wooden structures, such as booms, on the seabed, for example by using echo sounders or other remote sensing equipment as shown in the investigations carried out in Denmark.

To interpret what might be a former floating boom site might not always be straightforward. If the fastenings holding the various parts of the booms together corrode, or break, the logs might drift off and be lost. The chances of recognising such a boom would be difficult and the remains of fastenings on shore might be the only clue. The 'easiest' cases to interpret are those, as the example from Gudsø Vig below, which are found lying in a row, implying that the fastenings were connected to the timber lengths at the time of sinking, thus keeping them in place.

The splendid iconographic material in Olaus Magnus' *Historia de Gentibus Septentrionalibus* gives a clue as to how the booms were interconnected. In the vignette illustration to ch.10:5 U-shaped irons have been inserted to the ends of the trunks and it appears that the iron staples on the trunks are directly interconnected. However, in the illustration to chapter 9:28 it looks as though chains have been inserted through these irons and to connect the trunks to one another[87], described as *ferreis catenis*[88]. The same illustration also shows how the booms were kept in station by vertically rammed stakes. This shows two possible ways the trunks could have been attached to each other, though it must be borne in mind that the source stems from 1555 and is thus of a later period than that treated in this thesis.

[86] *Teredo navalis* is a bivalve mollusc, aka 'shipworm'. A severe threat to wood materials in water as they bore long cylindrical holes in the wood that they then inhabit, usually in such great numbers that only a thin film of wood exists between the holes (Kemp 1988:861)
[87] Granlund KLNM XIII:618
[88] Fig.34

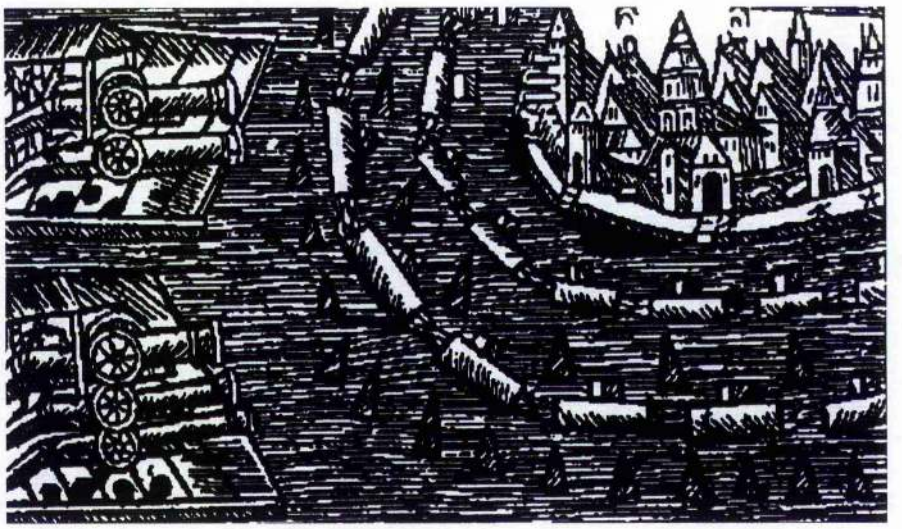

Figure 34 – *Barrage and boom fortification. Note how the logs are interconnected, referred to by Olaus Magnus as* ferreis catenis *(Olaus Magnus 9:28)*

4.2.4.1 Gudsø Vig

One of the structures found during the archaeological investigations at Gudsø Vig in the Kolding Fjord[89] proved to be a former floating boom. The structure consisted of "a single stretch of densely-branching large oak trees with clearly-shaped felling surfaces, placed root-end to tree-tip"[90]. The interpretation of the find as a floating barrier was made on the basis that the structure, buried 0.5m into the sediments, was not fastened to the seabed by posts or any other means. The trunks must therefore originally have been floating on the surface, and in due course the trunks became waterlogged and sank to the seabed. The fact that the trunks are still positioned in a single line makes this assumption plausible. How the trunks were interconnected is not known, as no remains of fastenings were found.

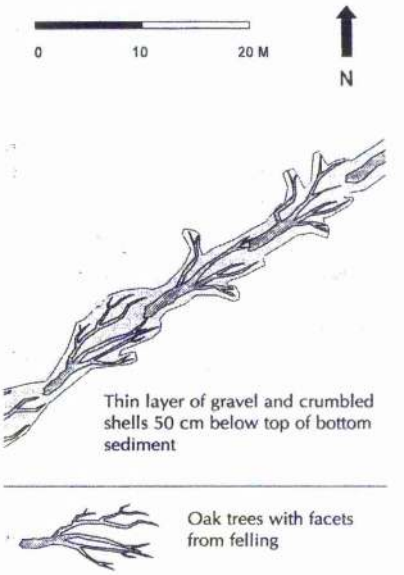

Figure 35 – *Oak trees from Gudsø Vig (Nørgård Jørgensen & Grøn 1997:21)*

[89] See also 4.2.2.3
[90] Nørgård Jørgensen and Grøn 1997:21

4.2.4.2 Bergen

As mentioned above, booms would be ideal for Norwegian purposes, and although none has been found so far, there is a description of such a construction in one of the sagas. In King Magnus the Blind's saga, Snorri describes how a boom were employed by king Magnus in Bergen in 1135 A.D. as a defensive measure against an attack from king Harold Magnuson. According to Snorri, king Magnus "set up a catapult at Holmen, and he made chains, partly of iron and partly of wood, which he put straight across the bay from the king's residence"[91]. The placing of the boom across the bay backfires as king Magnus cannot leave the city with his ships on the beach. Either this is the first time they used the chains, not being a familiar feature easy to erect and take down again. Alternatively king Harold may have been waiting for him, so the booms did not make any difference, as his adversaries were still present.

The boom appears to have been made by floating logs secured together with iron chains, and this is how it is described in the Norwegian and the English translations, that "he had iron chains and wooden booms laid across over the passage"[92]. There is however a discrepancy in the Icelandic text, which clearly states that he had "járnrekeder"[93] set out, the same term used regarding Harold Hard-ruler in encounter with these in Constantinople[94]. This implies iron chains, with no use of timber. One can assume that the Icelandic text on this point is misleading, which shows some of the problems with using the sagas. The use of iron chains implies a relatively permanent fastening arrangement on both sides of the bay, and that the boom was used more frequently than this one occasion which we know of. Logs secured together with iron chains or cable is the easiest way of constructing an efficient boom. The logs are ready to hand in Norway, and as with the example from Gudsø Vig could be left with the branches on.

It must however be mentioned that no evidence of any boom structure from Bergen has been detected during the many excavations over the years, which makes a pure iron construction unlikely as the chain-keepers on either side would be easily

[91] Sturluson d)II:232
[92] Sturluson b):326
[93] Sturluson a)XXVIII:286, ch.VI
[94] Sturluson a)XXVIII:88, ch.15

recognisable. But as no remains have been found, we cannot tell for sure whether it existed in the first place, or being mere saga-fiction.

4.2.5 Iron Chains

Wooden booms can quite easily be made from tree trunks, and do not take much work other than felling them. Iron chains will, on the other hand, have to be custom made, as chains long and strong enough to stop vessels must be specially forged. Metals in earlier societies were always precious materials, and not used unnecessarily. Therefore the use of materials ready to hand, such as timber, was preferable. The use of iron chains, where applied, would be a sign of wealth and power, and perhaps lack of timber.

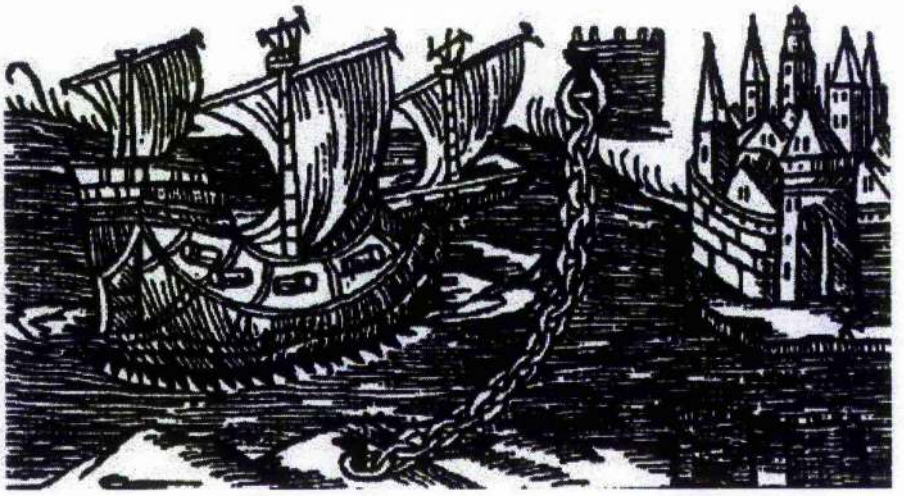

Figure 36 – *Ship trying to break through iron chain. Note the sturdy fastening constructions on either side (Olaus Magnus 10:6)*

Furthermore, iron chains sink unless buoyed, and thus demand sufficiently strong arrangements on either side to carry the weight, as they would sag in the middle[95]. The chains could as well be fastened to caissons or posts between the two sides, as is known with the boom at Fredrikssund[96], however this demands shallow water and is thus not possible in many bays and fjords. The advantage with iron chains would be that they could be lowered to a greater depth when not in use, and thus not affect the vernacular shipping. But to lower the chains demands a greater length of chain and thus stronger winches on either side to surface it when necessary. Due to the need for

[95] Fig.36
[96] Fig. 38

strong winches, or windlasses, iron chains would be quite permanent features, especially compared to easy removable log-made booms. Wooden booms could be used to close a gate in a barrage. This would not be possible with an iron chain. One possible misinterpretation, if found, stems from the later use of cables stretched across rivers or bays to aid ferries and rafts crossing these stretches of water.

Since Viking war-ships were light shallow-draught vessels, a stratagem for crossing a floating boom or a chain, was for the crew to gather at the stern, thus raising the stem to get the keel over the barrier, and then going to the stem to raise the stern and thus slip over the obstruction[97]. This was however not possible with the later, much heavier and deeper-draught vessels, such as the cogs.

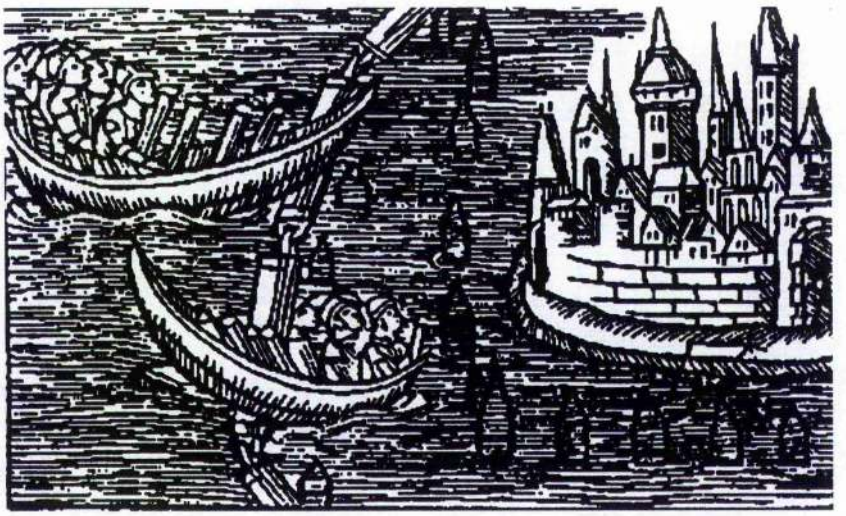

Figure 37 - *"[The warriors combine their weight to] lower or raise the prow or the stern, according to where they are stationed; preserving complete silence they swoop as vigorously as they can upon a suitable place"(Olaus Magnus 10:5). According to Heimskringla (Sturluson d)II:127), Harold the Hard-ruler supposedly escaped iron-chain defences in Constantinople in the described fashion*

4.2.6 Caissons

In the Skuldelev fortification a number of caissons, or wooden square boxes, were found in the passages. These constructions have been interpreted by Crumlin-Pedersen as stone-filled boxes for mooring the booms. One was found in Vesterrenden in the Roskilde Fjord in the middle of the passage[98], and another in 1933 near

[97] Fig.37
[98] Crumlin-Pedersen KLNM XIII:619; Crumlin-Pedersen 1978:36

Fredrikssund[99]. Granlund[100] is also of this opinion regarding the use of caissons when referring to similar boxes found in the fortification at Kalmar in Sweden.

The caisson found in the fjord adjacent to Fredrikssund, was made of timber and filled with stones, and this seems to be the most usual construction. The caisson was situated on an underwater spit, the central point connecting two booms, in combination with two other points towards the shore on either side of the caisson[101]. This structure would then easily have closed the fjord. It is not known, however, whether the booms were permanently fastened to the central caisson, and then attached to either, or both of the other points if necessary, or if it was permanently fastened to the two land-based ones and then attached to the central when necessary.

Additionally the caissons might have been used as structural features of underwater fortifications. The caissons were much easier to manoeuvre into the right position, than single stones dropped from boats, and they would presumably be easier to keep in place. And as will be shown below, they could also be used as foundations for bridges and similar structures, so their use would be multi-functional.

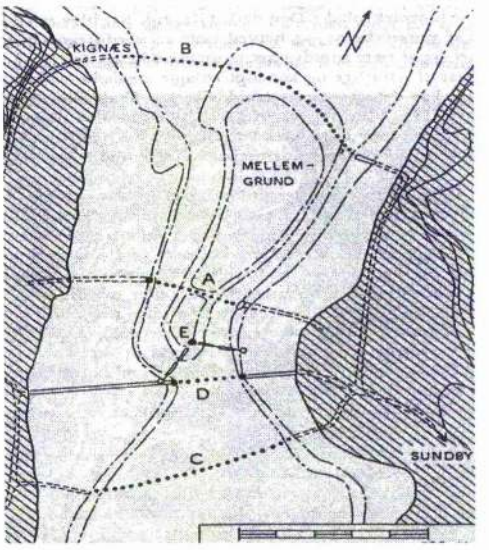

Figure 38 – *The use of a caisson in a boom-structure at Fredrikssund. E is the caisson with the attached booms. The dotted lines are ferry-crossings. (Crumlin-Pedersen 1978:42)*

4.2.7 Stones

Stones constitute one of the most common elements in underwater fortifications, though very seldom the single element, and for good reason. Stones are often ready to-hand on most coastal sites, and therefore are a resource easy to use. All that is needed is simply to lift, or hoist, them into boats and then drop them at the desired location, preferably at slack water with little current. The larger the stones the fewer will be

[99] Crumlin-Pedersen 1978:45
[100] KLNM XIII:616
[101] Fig.38

required and it will be easier to drop them on the desired location, though more difficult to transport them to the drop-zone. And the larger the stones, the more permanent they will be, as currents and wave-action will easily shift around smaller stones. Stones have the great advantage, compared to wood, that they do not decay, are of no interest to the *teredo navalis*, and are not broken down by ice. But even the sturdiest of constructions might be distorted by the actions of the sea, so maintenance will still be demanded. For constructional purposes, stones will often be ideal, as they easily can be put on top of underwater ridges where it will prove difficult to insert posts due to rocks, and taking maximum advantage of the underwater landscape and saving both resources and labour[102].

A lot of the stones forming part of the underwater fortification in Vesterrenden at Roskilde were removed in 1963 by dredging[103]. And stones found on the seabed raise questions of man-made constructions more rarely than worked timber might[104]. Then again, stones on the seabed might have nothing to do with artificial structures, they might just happen to be a fortuitous shape or assemblage. And they might not have anything to do with underwater fortifications, but be the remains of old piers, jetties, bridges or ballast-mounds[105]. As with everything else: presumed structures, artefacts and other finds have to be put into context if their relevance is to be recognised.

4.2.7.1 Foteviken

Although the first phase of the underwater fortification at Foteviken in Scania, Sweden[106] was a barrage, the second and most visible phase consisted of stones and sunken ships constructed in the winter of 1133-34 A.D.[107], "as part of the preparations

[102] In the Oslofjord an artificial stone ridge, 'jetèe', was constructed in 1879 to close one of the entrances to Oslo, forcing all ships to pass the guns at Oscarsborg
[103] Crumlin-Pedersen 1978:32-37
[104] 'Might' is used deliberately, as many entrepreneurs and others often have turned the blind eye to such finds, as it would mean excavations, and timely delays
[105] E.g. Crumlin-Pedersen 1978:25-29
[106] Though Scania was under Danish rule until 1658, illuminating the shifting of powers in this region. The first phase appears to have been constructed in the early 11th century and, as with the second phase, according to Crumlin-Pedersen; "with the aid of the men and material from the levy" (Crumlin-Pedersen 1984:65)
[107] Crumlin-Pedersen 1993:259. Additionally the place-name *Stigen* indicates the structure initially built as a barrage strengthened with stones (Crumlin-Pedersen 1984:57)

prior to the battle at Foteviken on June 4th, 1134"[108]. The vessels found were initially used as sledges for the transport of stones, and ended up as filling in the fortification.

The fortification itself is situated on the narrowest point of the seaward approach to Foteviken, where the channel is only 120m wide[109]. First a narrow strip of posts[110] was rammed into the seabed across the channel[111], and the barrage was then strengthened with large quantities of stones. Subsequently, a fortification consisting of posts and stones was continued 50-60m towards shallower water to the south, and about 120m northwards[112]. Large quantities of moraine blocks in the shallows were included in the fortification to amplify the effect: evident from the number of poles in the southern end of the fortification, assembled in groups between the blocks[113].

The width of the fortification varies from 4 to 12m, the southern part being noticeably thicker than its northern counterpart. To the south the fortification had a clear end at buoy 14, whereas the north end was less distinct. Even though the stonewall ended near buoy 3, dispersed stakes were found northeast of this[114]. The height of the fortification has been calculated as approximately 0.5m to the north and 1m nearer the gate[115]. On the southern part of the gate, the fortification is estimated to have reached 1m below surface, as is the case at buoy 13. Fishermen removing stones, and various other dynamic and mechanical forces have resulted in a different appearance today. If the fortification generally has had the same height as near buoy 13 and additionally a width of 2m, its volume would have been c.1000m^3, or close to 1800 tons of stones[116]. This huge amount was evidently deployed in two phases, and demanded a large work force and many hours of hard labour.

The gate was located between buoys 7 and 8. This was the ideal place as the opening in the fortification was 15-20m, and as the orientation of the fortification changed slightly here, the gate must have been situated at this point[117]. The depth here was 1.3-

[108] Rieck 1991:92
[109] See Appendix IV
[110] 8-10 cm thick posts of birch and oak (Crumlin-Pedersen 1984:57)
[111] C.60m south of buoy 14, a total amount of 59 posts were discovered (Crumlin-Pedersen 1984:24)
[112] Appendix V; Crumlin-Pedersen 1984:57
[113] Crumlin-Pedersen 1984:55
[114] Crumlin-Pedersen 1984:23
[115] Crumlin-Pedersen 1984:52
[116] Crumlin-Pedersen 1984:53
[117] Crumlin-Pedersen 1984:26

1.4m, sufficient for ships to pass. Due to the need for opening and closing the gate as required, floating booms would have been employed[118].

The remains of five vessels were found within the fortification. They all showed traces of wear and tear far beyond what would be expected from use at sea, and it is suggested that they were used as sledges for stones on the ice during construction, and later scrapped and incorporated in the fortification[119]. Using ships as sledges would be a sensible way of transporting the quantities of stones used, saving both time and effort.

Some time after the first phase, there appears to have been renewed interest in the fortification, and due to the degradation over the years caused by ice, wave action and a probable rise in sea-level, repairs were required.

Five vernacular vessels of oak were used as part of the underwater fortification. However, the degree of preservation of each vessel varied widely deciding the level of reconstruction and possibilities to identify the true types and sizes. They all proved to be clinker-built of the Nordic type, and originated from the Viking or Early-Middle Ages.

Wreck 1 showed extensive signs of repair, a number of axe-cuts inside the hull indicating that some parts were deliberately removed. This also implies that the ship was intended scuttled in the fortification after finishing the job as a sledge. The wreck must have been sunk with its last load, and use as sledge would also explain why the keel and strakes were so worn on the outside towards the middle of the hull, as these parts would have been the ones in direct contact with the ice during transport[120]. The stones used to sink the vessel, protected ship-timbers under water, as planking not pinned down by the stones was destroyed[121]. In addition to being destroyed by wave-action and biological processes, reusable parts of the vessel had been salvaged prior to the sinking or worn away during use as a sledge, diminishing the in-situ remains. As the entire mid-section of the ship has disappeared, there is no indication as to whether it carried sails, but it had 5-7 pairs of oars. The reconstructions show that Wreck 1

[118] Crumlin-Pedersen 1984:57
[119] Crumlin-Pedersen 1993:258
[120] Crumlin-Pedersen 1984:32
[121] Crumlin-Pedersen 1984:30

would have been approximately 10.3m in length with a maximum beam amidships of 2.40m. With a width-length ratio of 1:4 it would have been a vessel for war or travel, rather than trade or fishing. Only 8-9m^2 was preserved: presumably 30-35% of the original total[122].

Of Wreck 2 only an approximately 10% has been preserved, but the remains bear much resemblance to wreck 1, as a warship[123]. The few parts found of Wreck 3 were incorporated into the fortification and thus hard to excavate, but indicate that it must have been considerably larger than wreck 1, not less than 20m in length[124]. Wreck 4 was filled with boulders, and only a few strakes close to the keel were found. As little as 8m^2 has been preserved, but it is probable that it was also a small warship[125]. Wreck 5 has been recognised similar in some respects to the large warship Skuldelev 2, with a length not under 20m. This ship was sunken partly in the gate, perhaps as a desperate act before the battle in 1134[126], and attempts to clear the passage must have removed and destroyed much of its hull structure vessel[127].

The Foteviken fortification can in many respects be compared and linked with Skuldelev. Both contain ships, barrages and stones, and both were built in several phases. But whereas the Skuldelev fortification displays a wide variety in the vessels sunken, in respect of origin, types and use, the ones from Foteviken all appears to be vernacular craft intended for warfare[128].

The battle at Foteviken in A.D. 1134 is referred to by Saxo Grammaticus as *pugna forensis*[129]. The battle itself was all about control over the Danish realm, and led to a civil war between the combatants - Niels who was defeated at Foteviken, and Magnus on the one side, and Eric Emune on the other. Eric, as a preparation to the expected battle may have constructed the second phase of the fortification. He already controlled Lund, and might have summoned the Scania levy to service at Foteviken, a secure harbour and an ideal location to defend and protect the fleet[130].

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[122] Crumlin-Pedersen 1984:40
[123] Crumlin-Pedersen 1984:43
[124] Crumlin-Pedersen 1984:43-45
[125] Crumlin-Pedersen 1984:45-46
[126] Desperate, as ships in the harbour consequently had no sea-access
[127] Crumlin-Pedersen 1984:48-49
[128] Crumlin-Pedersen 1984:58
[129] *The battle by the trading place*
[130] Crumlin-Pedersen 1984:60-61

Crumlin-Pedersen[131] has suggested that Foteviken might have served as a natural harbour for the levy fleet in Scania, and the place-name *snekke*[132] is found in the bight of Foteviken[133], a place-name often found in conjunction with such places[134]. Another interpretation could be as a trading place protected by the underwater fortification, which is what Saxo, using the term *forensis*, suggests. However, Crumlin-Pedersen[135] rejects the connection as no other natural harbour acting as a vernacular trading place has such installations. The combination cannot be dismissed purely through lack of tradition, though Saxo is not always the most reliable source.

The place-name *Stijgegabet*[136] has been used to describe the entrance to Foteviken on some maps[137], clearly referring to its underwater fortification. And in the archives in Lund, Sweden is a registration of the place-name *Stegersränne*, which is 'the channel with a barrage', this particular name is not however found locally[138], a clear example that many place-names may change or get out of use over the centuries.

4.2.8 Bridges

The places most suitable for constructing underwater fortifications were also often the best places to build bridges. Many bridges could therefore be 'dual-purpose'[139], either being built as bridges that also served to prevent enemy ships from passing, or fortified structures developing into bridges.

Wåhlin[140] observes that in 870A.D. Charles the Bold erected a bridge on the river Seine, near Pitres, to protect the inner parts of the river against pirates. The bridges on the river Seine were to work as obstructions against the Vikings who attacked Paris in

[131] 1993:259
[132] *Snekke* in Swedish used for the ships of the levy fleet, and *led* navigable channel. S*nekkeled* could also mean portage. However, the snekke was not necessarily used for the levy, but were fast naval longships used until the 12th century, with 20-30 oars to a side (*A dictionary of the world's watercraft*:554).
[133] Crumlin-Pedersen 1991b:187
[134] E.g. 4.3.3 and 4.2.9.1
[135] 1984:64-65
[136] *Stijge-* refers to stakes, and *–gabet*, meaning mouth, must refer to the gate
[137] E.g. Crumlin-Pedersen 1984: fig.46
[138] Crumlin-Pedersen 1984:52
[139] Wåhlin 1964:11; Crumlin-Pedersen 1985:224
[140] 1964:11

885-886, however the bridges did not prevent the Vikings from raiding Paris[141]. The Anglo-Saxon Chronicle describes how, in 895A.D. King Alfred closed the river Lea close to Ware to prevent sea-borne raiders using the river[142]. The saga of St. Olaf describes how a bridge was built across the Thames between the castle and Southwark, wide enough for two carts to pass each other. It was fortified and under the bridge piles were rammed into the bottom of the river, presumably to prevent ships from passing beneath it[143].

4.2.8.1 Borgepollen[144]

During dredging in 1978 a large tree construction was found in Borgepollen, Lofoten in northern Norway, 1m below the surface. Three logs were found, the largest 3.5m long with a diameter of 30cm, and as they appeared to be parts of a larger construction, C^{14} tests were carried out, dating it to A.D. 1000-1100[145]. The two smaller logs were about 1.5m in length and diameters of about 10cm. While the largest log had traces of cogging joints, no such traces were found on the smaller logs[146].

The divers discovered three heaps of boulders on the seabed across the inlet[147]. The two heaps to the east contained partly decayed logs, while the third revealed nothing. The first find was made between the western heap and the land. On the western side of this heap further investigations were carried out, and several logs discovered, the largest again with traces of cogging joints. The smaller, set at 90° to the larger, ones showed no such traces[148]. Although partly decayed on the ends, the general timber condition was very good, due to the brackish water in the area[149]. Survey confirmed that the remains were piers, consisting of square cog-joined boxes 3x3m, filled with boulders to keep them in position[150].

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[141] Anglo-Saxon Chronicle:52
[142] Anglo-Saxon Chronicle:57
[143] Sturluson d)I p.207
[144] *Poll* is round fjord with narrow inlet
[145] Nævestad 1981:40
[146] Nævestad 1981:40
[147] Fig.39
[148] Nævestad 1981:43-44
[149] Thus no friendly habitat for the voracious *teredo navalis*
[150] Nævestad 1981:45

Taking into the account a water level c.1m higher than at present, the bridge would have spanned 50m to cross the inlet, implying that the centre pier must at least have been 3m in height just to break the surface, and considerably higher to accommodate a bridge[151].

The bridge would effectively have blocked the inlet against any traffic by sea, friend or foe, and can thus be characterized as an underwater fortification. It is unclear however whether it was initially built as such, or later took on this additional function. It was the first structure identified as a possible underwater fortification in Norway[152], and remains one of the few such structures so far identified in that country. However, the fact that it may never have acted as an underwater fortification, just as a bridge, and that it is only in retrospect that it has been given this military function, must be considered.

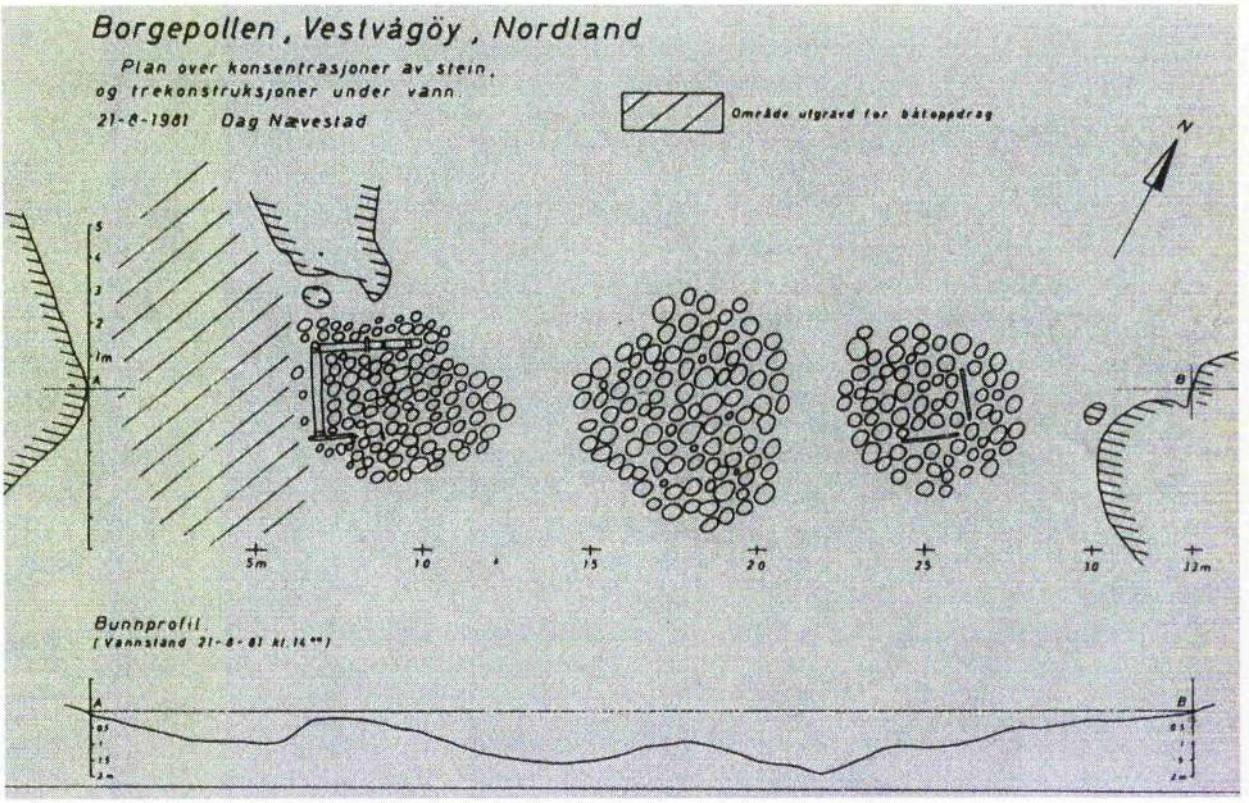

Figure 39 – *Drawing of the caissons and stone-assemblages at Borgepollen (Nævestad 1981:44)*

[151] Nævestad 1981:45
[152] Nævestad 1981:45

4.2.9 Combination Of Elements

As with Skuldelev, Foteviken, and other sites mentioned above, seldom one single type of structure has been employed, rather a combination of several in order to utilise landscape characteristics and resources most effectively, and make the defensive mechanisms most efficient. How the types have been combined varies considerably, and local ingenuity is often apparent, as with Hominde where the barrage was combined with the advantages of the booms, with horizontally positioned trunks incorporated into the barrage. Underwater fortifications were adapted to suit the site, not the other way around, as their builders sought to seize the advantages already offered by local resources, landscape, and topography.

4.2.9.1 Naval Bases

The term *naval base*[153] implies a type of harbour with a military, presumably naval, presence and usage[154]. The terminology covers other types of this phenomenon including; naval harbours, fleet bases/harbours, and levy bases/harbours[155]. A naval base is not necessarily situated in a harbour, although this is where the greatest protection from both weather and foe can be obtained. Harbours can be natural as well as artificial. The word *base* implies something more permanent with some structures present, as opposed to *harbours*, which are there anyway. *Naval bases* will be used as this is already an accepted term, and the sites in question undoubtedly are locations where naval usage, have been more or less permanently present for lengthy periods of time, and where more permanent structures and the favourable location itself defines the site as being anything but fortuitous.

According to Nørgård Jørgensen[156], the assembly places for naval units can be divided into three main groups regarding their character of their size: Local, corresponding to the *herred*, shire. Regional, and latterly, the largest would be of national character.

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[153] Term e.g. used by Nørgård Jørgensen at a conference in Copenhagen May 2000
[154] 'Civilian' harbours could also have been used, though the terms 'civilian' and 'naval' are not rigid at this stage (Westerdahl 1989:247).
[155] "Sea defence of the early Middle Ages was based on manned warships as mobile units, locally equipped and assembled in special levy harbours before they set out in larger fleets" (Crumlin-Pedersen 1993:259).
[156] 1995:14

What is special about the naval bases here considered is their complexity, where various underwater fortifications in addition to installations for soldiers, lookouts, and other aspects are present.

Because of the complexity and different combinations of defensive measures that characterize the naval bases, it is crucial to take a closer look at these characteristics[157]. It must be pointed out that the elements described are not universal, so some sites might incorporate all of them, whilst others might not: particular characteristics should been seen as desired options rather than as definitive criteria. Most significantly, the naval harbours were by preference positioned in inlets, coves or fjords that provided sheltered anchorage. As wooden vessels need to be constantly maintained, a flat beach area where the ships could be drawn up would be important. Furthermore, as naval bases must be secure from enemy ships, the need for a natural or artificial bar at the narrowing of the approach is important. The entrance to the base or its approaches could thus be closed with types of underwater fortifications, though allowing friendly vessels free passage as required[158]. Such structures could be built and maintained by the men in the levy fleet, being the levy fleet that often utilised such places[159]. Apart from approaching vessels, the underwater fortifications could prevent fire-ships from being sent in to destroy shipping at anchor[160]. In the event of an attack, the areas adjacent to the naval bases had to be easy to monitor, and for this purpose vete-sites are often found in their vicinity[161]. If in spite of these defensive measures enemy vessels prevailed, waterborne escape routes were necessary. These could be along a river, a portage or even an artificial canal, enabling the defenders to escape with their ships. Facilities to accommodate a garrison would also be necessary if a levy was using the base, as it might spend several months there. Permanent castles, or hill-fort structures, are often found on land adjacent to the bases[162]. Also boathouses, other shelters for boats and buildings might be found[163]. The size of the bay could vary, but the harbour had to be large enough to house a fleet. But how large

[157] Nørgård Jørgensen, pers.comm. May 2000; Westerdahl 1989:257-58
[158] Westerdahl 1989:258
[159] Crumlin-Pedersen 1993:259
[160] Crumlin-Pedersen 1984:64
[161] Westerdahl 1989:258
[162] Westerdahl 1989:257-58
[163] Westerdahl 1989:257-58

is a fleet? It is reasonable to suggest that a naval base at least had to be large enough for four or five ships.

Below a selection of examples of presumed naval bases investigated in Denmark is presented, reflecting the complexity and range of numerous aspects characteristic of these sites.

4.2.9.1.1 Vordingborg

At Vordingborg in southern Zealand two barrages were found adjacent to the ruins of Vordingborg Castle during archaeological investigations by the National Museum in 1978. The barrages and a shipwreck, though not part of the fortification, were C^{14} dated to the 11th and 12th centuries A.D.[164].

The site has been interpreted as a likely assembly point for the Danish *Leidang* fleet in the 10-and 1100s[165]. What has later been interpreted as the base for a watchtower was found at the end of one of the barrages. It is a large construction of horizontal posts filled with stones. An excavation was carried out in 1995 to test the site's identification as a watchtower[166]. A vertical corner-post with inset horizontal and diagonal beams was found at one of the assumed corners, although the mud made attempts to investigate the lower end of the post unsuccessful. However, what is assumed is that it "probably is a horizontal frame that kept the corner posts anchored in foundations of about five by six m, supported by extra poles rammed down around the timber construction"[167].

[164] Nørgård Jørgensen and Grøn 1997:22
[165] Crumlin-Pedersen and Dokkedal 1995:22
[166] Fig.40
[167] Crumlin-Pedersen and Dokkedal 1995:22-23

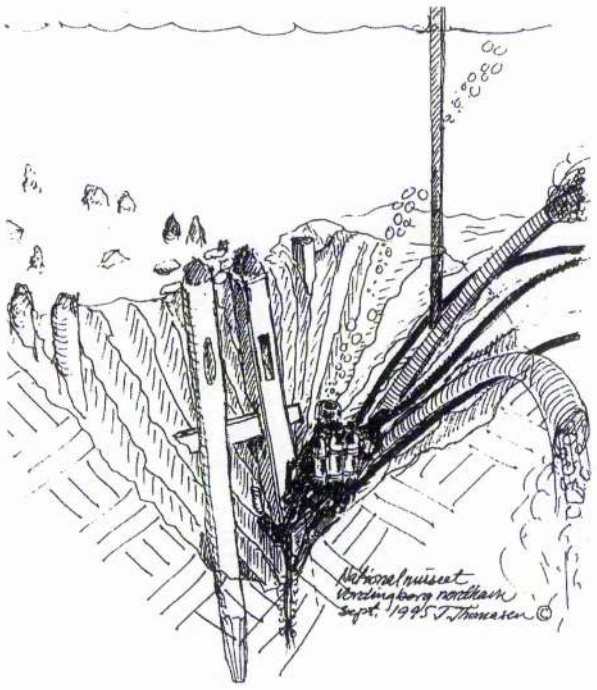

Figure 40 – *Sketch of a diver excavating the timber-construction at Vordingborg (Crumlin-Pedersen & Dokkedal 1995:23)*

The site is strategically well situated with respect to a natural harbour, including a *snekke*-name[168], implying the presence of a levy fleet. There is also a *stig*-name, indicating the barrage, and a *warth* name, now recognised in the name Vordingborg, which has been an old signalling-site. In addition Vordingborg might have had a canal in its hinterland, functioning as a portage and escape route[169]. These points show how this place might have acted as a naval base, where a fleet would have been well protected in the natural harbour, and further secured by a barrage at the end and a signalling-post warning of approaching enemies.

4.2.9.1.2 Stokkeby Nor

Interest in this site, at Ærø on southern Funen was focused by a series of promising place-names around the cove[170]. No barrages have however yet been found,

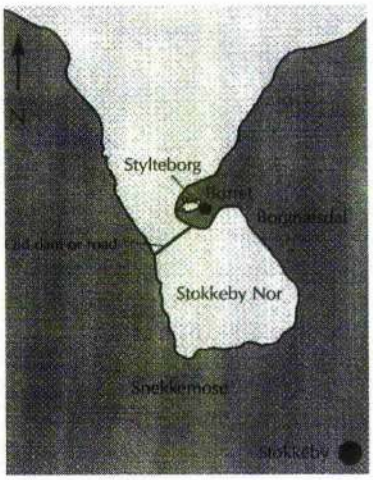

Figure 41 – *Stokkeby Nor and the related place-names (Nørgård Jørgensen & Grø 1997:25)*

[168] *Snekkø*, Crumlin-Pedersen 1991b:187
[169] Nørgård Jørgensen, pers.comm. May 2000
[170] Fig.41

but the likelihood of having once existed is great. The place-names indicated a row of poles (*Stokkeby*), a harbour for ships (*Snekkemose*), land belonging to the church or the king (*Ornum*), a castle (*Borgnæs*), as well as the old land-based fortification *Stylteborg* on the north east side of the cove[171]. Divers also found an old dyke crossing the cove that had been identified on an 18th century map. The structure consisted "of large boulders and the remains of bricks, with a cladding layer of turf on the south side". The use of the dam has not been established, bur it might have functioned as a road.

4.2.9.1.3 Munkebo

In 1989 samples from a wood structure interpreted as a barrage were collected at Munkebo in the bay of Kertinge Nor on Funen. In 1996 a survey using Chirp II detected a structure which divers later confirmed to be a barrage of a 3m wide and 200m long stretch of oak poles[172]. There also seemed to have been a gate at the centre of the barrage. One interpretation of the site is that the bay might have been an assembly anchorage for a fleet, due to the well-protected bay, and the place-name *Snekkeled*, often found in association with fleet-harbours[173]. The problem with this very site is that the ships, however well protected by a barrage would have had few means of escape, with only one entrance to the harbour. Alternatively means of ingress and egress were, as has been argued, of vital importance for naval harbours to be effective.

4.2.9.1.4 The Kanhave Canal

Canals[174] can be seen as an escape route, an advanced portage, or a combination of these. The investigated canal of Kanhave runs for 500m across the island of Samsø from east to west[175].

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[171] Nørgård Jørgensen and Grøn 1997:25
[172] Nørgård Jørgensen and Grøn 1997:20
[173] Nørgård Jørgensen and Grøn 1997:20
[174] A canal has recently been discovered at Spangereid in West-Agder, Norway. It was once 500m in length to cover the isthmus near Lindesnes. Two C^{14} dates known so far; one calibrated to A.D. 1040-1260 taken from a posthole, and another from a horizontal turf layer post the use of the canal, calibrated to A.D. 1010-1190. It thus seems to post-date the Kanhave canal, although a Viking Age usage is probable. The conclusion so far is that the similarities with the Kanhave canal are many, and a similar connection to a naval base is not unlikely (Stylegar and Grimm in print). There are also two hill-forts

Figure 42 – *Aerial photo of the Kanhave canal (Photo: Lars Jørgensen)*

With its width of 11m, it would have been easily negotiable by contemporary ships[176]. Dendrochronology has dated the structure to A.D. 726[177]. Archaeological excavation has shown how the structure was constructed; using bulwarks of horizontally laid wooden planks, two to four planks high[178]. Square holes were inserted into the stout timbers to allow for fastening with wooden dowels, and then fastened to the subsoil by long, angled supporters. As the archaeological investigations showed that the canal contained material dated to the late 8th century, it must have collapsed after only being in use for a short period of time.

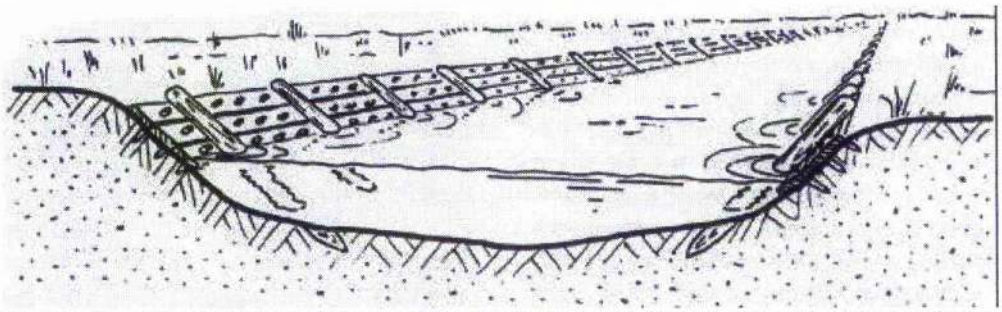

Figure 43 – *Reconstruction drawing of the Kanhave canal. Note how the planking on the inner walls prevents erosion (Nørgård Jørgensen 1995:9)*

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adjacent to the canal adding to the picture of this being a centre of power (Frans-Arne Stylegar pers.comm. Dec 2001).

[175] Fig.42; Nørgård Jørgensen and Grøn 1997:27

[176] The Kvalsund boat from the late seventh century A.D., has a maximum width of c.3m (Marstrander 1986:18; Christensen 1996:78)

[177] Nørgård Jørgensen and Grøn 1997:27

[178] Fig.43; Nørgård Jørgensen 1995:9

A presumed naval base on Samsø was extended in 726 A.D. with the Kanhave canal[179]. Near the eastern entrance to the canal the place-name *Snekkehøj* occurs. A fleet anchored in the Stavnsfjord, supported by lookouts, would have been able to control shipping sailing north–south along the eastern coast of Jutland, and also dominate the route between north and central Jutland, and Scania and Zealand[180]. It is a most strategic location, with the canal giving options of movement in all directions.

4.3 METHODOLOGY, LOCALISATION FACTORS AND SOURCES

4.3.1 Introduction

This chapter deals with where information and knowledge on this subject are to be found, what sources exist, and how to employ this knowledge to gain new and valid information and data regarding underwater fortifications. Some sources are dubious for various reasons, others very dependable. How these sources are dealt with, material available and, most importantly, what we choose to use, is crucial for the outcome of the research.

Below, the most important sources and material are presented. A working methodology for their employment is discussed, though it is emphasised that this is in no way intended to be prescriptive, and other approaches are possible.

The further back into history one conducts research; sources become fewer and less reliable. The scope of this thesis covers the period Viking and Early Middle Ages and so faces some very distinct problems with the available materials. "*In Scandinavia, the Viking period is regarded as a prehistoric age in which all the major source material is archaeological ... Not until the conversion to Christianity ... did written sources of information in the Scandinavian countries begin to build up, and only in the twelfth century do these become an adequate source of information for historians to use*"[181]. Due to this paucity of historical sources, although some do exist, it is necessary to adopt a multi-disciplinary approach. Archaeology is the most important discipline, as

[179] Crumlin-Pedersen *et al.* 1996a:188
[180] Crumlin-Pedersen 1991b:188
[181] Crawford 1987:2-3

it most often can give the most comprehensive and reliable information, but unfortunately it cannot provide all the answers. To be effective it must by complemented by other disciplines.

Many coastal activities and related maritime structures such as fish landing places and ferry crossings were not of a permanent character and thus often hard to trace. This is especially true of building sites for Scandinavian vessels, which could be constructed almost anywhere close to the water and requisite materials. In such cases not even archaeology is necessarily helpful and other sources are required if any data are to be obtained. Often results are simply unobtainable, but negative conclusions are only valid if an interdisciplinary search has first been made.

4.3.2 Archaeological Methodology

"The potential of archaeology is unlimited, whereas the historical sources are finite"[182]. However, the interpretations of both sources can be said to be unlimited, especially as new finds will shed new light on older finds and give way to new explanations. Archaeological conclusions (opposed to the evidence on which they are based) may often be a pitfall, subjected to the biased interpretations of the researcher. This is why the importance of accurate recordings is so paramount, as while the interpretations may change, the factual data will always remain the same and provide a foundation for later research.

Archaeological sources give us a more contemporary picture, as most written material was written down later -sometimes much later- than the events they describe. And whereas written material often tends to be contaminated with political undertones and propaganda, archaeological artefacts are of a more objective character. "Archaeological investigations can, indeed, yield information about such topics as technology and diet on which text cast little or no light, even in richly documented parts of Europe"[183].

One of the problems of archaeology is that what is found through excavations will often be a very small percentage of the actual amount of artefacts or settlements in an

[182] Crawford 1987:5. Finite at least to some extent
[183] Sawyer and Sawyer 1993:3

area, as later cultivation, various works and natural processes have removed or scattered the remains. Much found in archaeological deposits will be discarded rubbish, and therefore not fully representative of a society's material culture, while the characteristics of different materials will further skew survival patterns. Another element is that the different levels of activity by archaeologists and local historians may vary quite considerably from one place to another, and thus one is likely to get a disproportionate amount of finds between particular areas[184].

Archaeology is the prime means of identifying and obtaining technical information about underwater fortifications. Written sources, maps, pictures, and place-names may give us clues and information as to what areas may be of interest, but it is only archaeological investigations that can physically identify these structures. The archaeological methods applied are diving and remote sensing if the structures are located under water, or by terrestrial methods if they are situated in reclaimed land. Once located, the next step is to date them, and as the fortifications were predominantly made of wood, dendrochronology is often the most suitable method, giving (ideally) the felling year of the trees. The timber is likely to have been felled just prior to the construction, although we must expect that reuse occurred. But not all timber is suitable for dendrochronology, other methods such as C^{14} or relative dating, where other objects in or over the fortification will be tested, may prove useful.

Below the aspects of remote sensing and related instrumentation is discussed.

4.3.2.1 Remote Sensing

Remote sensing can be said to be "*the non-intrusive detection, evaluation, or production of useful measurements and observations through electrical and optical sensors of an object or area without physically touching it*"[185]. Remote sensing used in marine archaeology is a combination of the general remote sensing, the use of aerial electromagnetic radiation sensors, and the geophysical instruments and techniques, all of which aim to detect anomalies.

[184] Sawyer and Sawyer 1993:5
[185] Murphy 1997:340

Although technical equipment can never replace the trained eye and skills of a trained archaeologist, remote sensing is a powerful tool if correctly used. Apart from being non-intrusive, it is of great help at many of the sites in Scandinavia where investigations for underwater fortifications are carried out. The reasons are manifold, and vary greatly from site to site. The biggest problem, especially in Danish waters, is the poor visibility, as well as currents and wave action (when working in shallow waters).

When using remote sensing in an archaeological context, there are a number of aspects to be aware of to make this approach scientifically valid. Most important is that it will only do what the people controlling it tell it, and provides no definitive 'answers', only data, which requires informed interpretation. Data processing is fundamental to remote sensing, because the information collected is useless without interpretation and analysis. Modern technical tools can do increasingly more of the interpretation part, but they still cannot tell what the anomaly actually is, which is why human interpretation is so crucial. Much of this phase is subjective, and interpretation is in part science, in part instinct. Skilled operators build up experience in identifying specific phenomena. Skilled scientists are important but they need not however be geophysicists, for "*with appropriate training and sufficient experience the averagely intelligent person, including some archaeologists*, [can] *interpret the readouts*"[186]. It is recommended that those operating remote sensing systems are familiar with archaeological methodology otherwise the context may be lost.

It is essential to be familiar with the instrument in use. Only then can valid and correct data be gathered. Different types of equipment have advantages, and limitations, which must be understood when selecting the tool best suited to the conditions. There is also the crucial importance of correctly positioning both vessel and equipment, to get accurate data.

If, for example, all the posts in a barrage are to be measured, the use of remote sensing equipment will be both effective and accurate. With so many posts to document divers may have problems measuring and drawing individual posts by hand. At best, the operation will be too time consuming, and often impossible if visibility is poor or the

[186] Dean *et al.* 1992:137

posts are buried in mud. One way of doing it, as described by Crumlin-Pedersen[187], is to project all the measuring points to the surface, and then use an EDM to measure and register every post from the surface[188].

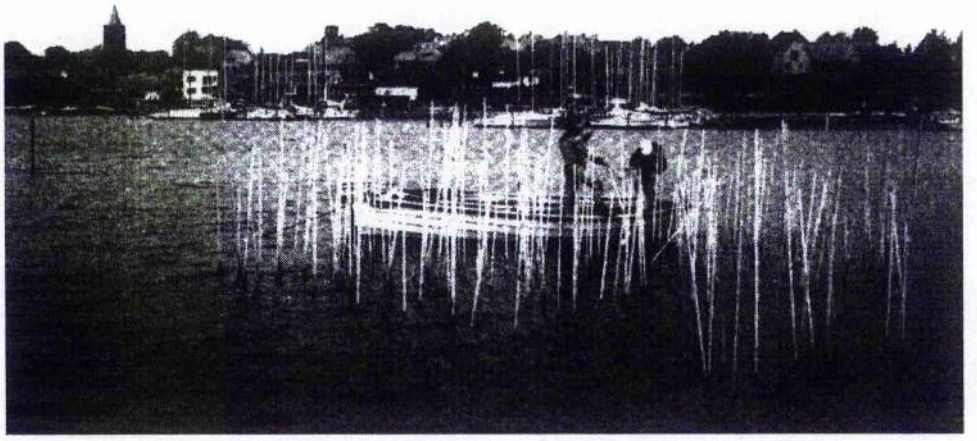

Figure 44 – *Mapping all the posts in a barrage can be easier done from the surface, as from 'Queen Margaret's Stiger' in Vordingborg, unless, however, one gets entangled (Crumlin-Pedersen 1991b:188)*

Equipment based on the use of acoustic sensors records anomalies, which is unusual patterns and features associated with the seabed. Scientists then have to interpret these anomalies to determine whether they are archaeologically interesting and worthy of further investigation.

Different equipment is designed for different conditions, but the operator has some freedom to select optimal settings for each search area. One of these settings refers to the broad spectrum of available frequencies. Low frequencies have a wider range[189] and penetrate and highlight a smaller area. High frequencies have not as wide a range but cover a larger area. Most remote sensing equipment is produced for the oil sector, archaeologists subsequently gaining access to the instruments, adjusting them to the specifications of marine archaeology, and tested thoroughly.

[187] 1993:259
[188] Fig.44
[189] E.g. 1-2 kHz rather than 300 kHz

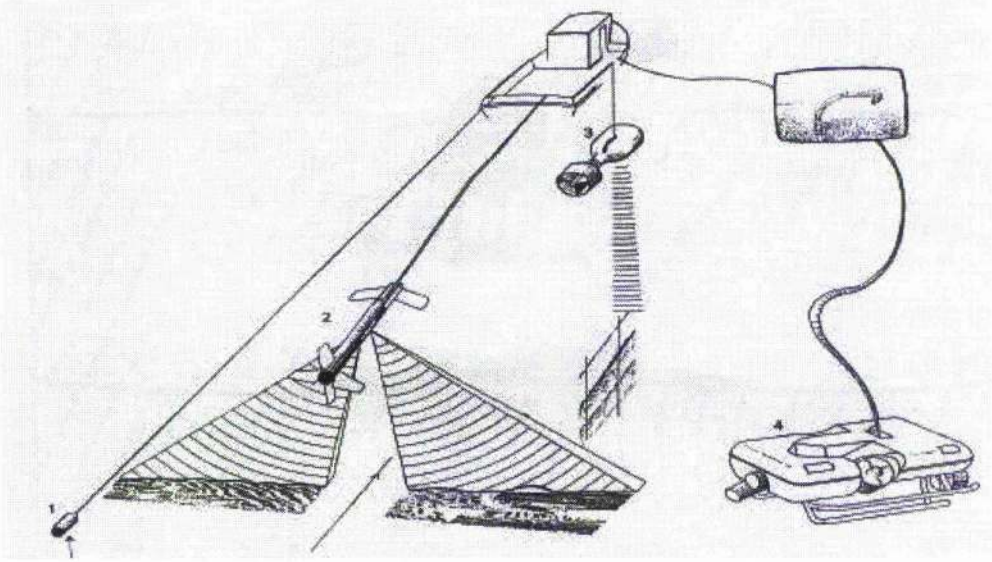

Figure 45 - *Remote sensing equipment: Magnetometer (1), Side-scan (2), Sub-bottom profiler (3) and ROV (4) (Dean et al. 1992:137)*

In archaeology the main task is to gather knowledge of past times. How we collect this information will vary from site to site, the aim being to use the best possible methods with as much accuracy as possible. We can conclude that "no method is universally applicable, and that the choice of methods must depend on the specific situation"[190], and most importantly that it is "*unrealistic to call for 'total accuracy', since there is no such thing: what is needed is 'appropriate accuracy', and this can only be gauged if the excavator is aware of all the ramifications involved in the interpretations of his site*"[191].

Below is given an introduction to the most common remote sensing equipment used in marine archaeology and examples indicating for what purpose they are suitable[192].

4.3.2.1.1 Echo-Sounders

Described as "one of the simplest forms of electronic search equipment"[193], their function being to give the distance from the vessel to the seabed. This is done acoustically with a pulse of energy sent out from a transducer receiving the echo and measures the time elapsed. The echo signals are then transformed to a graphic display,

[190] Abrahamsen and Breiner 1991:249
[191] Muckelroy 1978:250
[192] Fig.45
[193] Dean *et al.* 1992:140

for interpretation. The graphic display also gives an image of what lie between the surface and the bottom. This could include objects erected on the seabed, such as parts of wrecks or barrage posts. Echo sounders are very useful when for instance towing an ROV, and can be used on their own, but are mainly used in combination with other equipment. They can add valuable information to a site map, for example depth and type of seabed. "*Special echo-sounders with a lower frequency signal (around 10 kHz) may be used for mapping of the near-bottom stratigraphy down to depths of typically 10m in the sediment, the depth of penetration being strongly dependant on the local sediment properties*"[194].

4.3.2.1.2 Side Scan Sonar[195]

The side-scan sonar uses acoustic signals, to map the topography of the surface of the seabed and possible objects located there. This method works on the same principles as the echo-sounder[196] but instead of electromagnetic energy being pulsed downwards in a cone shape, two separate fan-shaped beams are directed on either side of a tow-fish and selected signals are interpreted and displayed graphically[197]. The fan-shaped beams are narrow in the horizontal plane and wide in the vertical plane.

On the displayed map, the seabed topography is indicated as an image consisting of acoustic highlights and shadows, due to the signals' ability to look sideways at objects projecting above the seabed. "Coarse sedimentary material and wood provides strong returns, while relatively fine-grained sediment returns weaker signals"[198]. Now digital processing allows sonar images to be presented in a more geometrically correct fashion. Modern side-scan systems can be integrated with electronic positioning systems for accurate positioning[199].

4.3.2.1.3 Sub-Bottom Profiler

This acoustic equipment is designed to penetrate the seabed and reveal buried materials or layers. To penetrate materials like sand and mud, low frequencies are

[194] Abrahamsen and Breiner 1991:251
[195] Acronym for **SO**und **N**avigation **A**nd **R**anging.
[196] With mainly the same frequencies used, 100 kHz for general purposes and e.g. 500 kHz for long range
[197] Dean *et al.* 1992:143
[198] Quinn *et al.* 1998
[199] Murphy 1997

used normally ranging from 1kHz up to 7kHz. As different bottom layers require different frequencies for penetration, this can be altered.

The collected data can be combined with side-scan sonar to present both readings on the same display. The procedure is useful to archaeological surveys because it can differentiate between layers in the seabed, and reveal buried artefacts not exposed above the seabed.

There are some limitations to the use of low frequencies and a narrow beam, compared to the broad beam of the sonar; "*and so they are probably best used as either a method of sampling through the seabed during side-scan work, or as means of homing in on a specific target identified by other means*"[200]. But there is also often a compromise between penetration depth (low frequencies) and resolutions in the displayed graphs (higher frequencies) in different systems[201]. Again it is a question of what best suits the survey. One of the main benefits is that by seeing through the sediments and showing the different layers in a cross section, it is a useful tool for later excavations, giving information on the types of sediments that may be encountered. The information can also be used to identify sedimentation processes and to inform of interpretations of archaeological site-formation.

4.3.2.1.4 Aerial Photography

Aerial photography has been used in archaeological investigations since the 1920s[202], and has proved a very helpful means of research. Aerial photography is important because of its ability to reveal hidden features and patterns in the landscape, unrecognisable when standing close to them. Aerial photography used in underwater investigations depends on light transmittance through the water, and it is thus essential that the proper film and filter combinations are chosen for maximum penetration and sharpness. For the most successful investigations of the seabed, a combination of "low altitude and large-scale images at low solar incidence, which minimizes reflected lights"[203] is essential for recording any structures visible in the sediments. It is also

[200] Dean *et al.* 1992:144
[201] Murphy 1997
[202] Murphy 1997:341
[203] Murphy 1997:341

possible to create three-dimensional images by overlapping pairs of photographs, enhancing the contrast and various topographic features.

Using aerial photography, whether by aeroplane, kite or balloon, gives an archaeologist the means of obtaining the general layout of a site[204], and spot structures not visible from land or underwater. Photographs can be taken of small areas or larger stretches of land, if necessary making several photographs into a mosaic thus creating a large-scale view. There are two types of aerial photographs, oblique and vertical. Oblique photographs are appropriate for recording subjects with some kind of vertical component. The vertical version is used when the subjects have mainly two-dimensional characteristics, such as barrages. Whereas the latter are almost always scale-constant, the former are not and cannot be used for measurements for "the longer the focal lens, the smaller the field of view, and thus the more constant the scale"[205]. Accurate resolutions of scale in photographs, whether vertical or oblique, can only be obtained through photogrammetry.

Figure 46 – *Aerial photo of the Migration period barrage at Æ Lei, linked with the adjacent bog offerings at Esbjøl. Here some of the posts have been marked to visualize the outlines of the barrage (Rieck1991:89)*

It is, as with all remote sensing and archaeological material, the interpretation that is the real test. Again a three-dimensional presentation using the stereographic technique[206] will often prove helpful in interpreting photographs. Archaeological details are anomalies to be distinguished from various factors, such as shadow, contrast, shape and contour.

[204] Fig.46
[205] Svejgaard 1991:275
[206] Svejgaard 1991:276

4.3.3 Place-Names[207]

4.3.3.1 Place-Names And Underwater Fortifications

The first to see the relationship between underwater fortifications and place-names was the Swede Gunnar Bolin. Bolin found that connected to the Swedish words *stok-, stäk- and på l-* were often 'fortifications', such as the place-name *Stockholm*, which must refer to the *stocks*, or logs, once creating a defensive boom near the Old Town[208]. And later, when placing the Skuldelev fortification in a wider context, Vagn Wåhlin found that much the same words could also be applied to Denmark, especially the word components *stik, stek, stang, stav, pæ l and stok*[209].

In Swedish the terms *bomverk, bom* meaning boom or barrier, *farledspärrar* and *på lspärrar* has been used to describe the general form of underwater fortifications[210]. The term *på lverk*, meaning pole construction, describes the barrages[211].

Of the 49 structures reported as off-shore works up to 1997 in Denmark, although not all have been investigated, 21 of those (43%) were recognised by place-names such as *stig, steg, stav* and *stavre*[212], showing the importance of thoroughly investigating plausible names in accordance with underwater fortifications.

Holmberg[213] argues that so many *stege*-names would not have persisted, in some cases becoming the names of villages and other locations in the maritime landscape, if they were of no significance. This suggestion gives support to them being connected with defensive measures.

It is important to conclude that the "absence of promising place-names should not prevent inspections by divers and archaeologists at sites where topography or land-related archaeological knowledge point to the presence of a blockage"[214].

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[207] Introduction ch.2.3.2
[208] Wåhlin 1964:12; Tuulse KLNM II:71
[209] Wåhlin 1964:15
[210] Tuulse KLNM II:71
[211] Granlund KLNM XIII:616
[212] Nørgård Jørgensen 1997:201
[213] 1991:235
[214] Rieck 1991:84

Country	Barrages	Booms	Naval harbours	Portages
Denmark	pæl-, stage-, stage-, stav-, stavre-, steg-, stege-, stek-,stig-, stige-, stijg-, sti-, stik-	Stok	Snekke	-dræt[215]
Sweden	Stäk, stek, steg, stav, stång, pål[216]	Stock-, stok-	sneck, kugg, knarr, karv, skepp, drak, ask, bus(s), snack	Drag[217]
Norway[218]	Stav-, staff, staur, stæur, steik, stælk, stelk, pæl-,pål, pel, sperr	Stok, stokk	Her[219], herr, hær, Knarr[220], skeid, ske(d), skip[221], langskip[222], bus(s) snek[223], snekke	drag, eid, ed

Table 3 - *Scandinavian place-names relating to underwater fortifications and military relations*

4.3.3.2 Misinterpretations

Scandinavian place-names mainly derive from the Old Norse word *stika*[224], but do not directly tell us of underwater fortifications. They simply imply that stakes or posts have been inserted into the seabed or the foreshore. Their function might be that of fishing purposes, fish traps and weirs as is known from the eel fishing in Denmark, mooring posts for vessels, in the fisheries, navigation marks, bridge- or quay constructions or as signs and protective enclosures[225]. In addition the Swedish verb 'to *sticka'* means to mark out a path or road. A promising place-name is not therefore self-sufficient to conclude the presence of a military defence structure. For closer interpretation, other factors such as the landscape itself must more rigorously be interrogated if such identifications are to be made.

[215] Place-names with *dræt*indicate portages (Porsmose 1996b:202).
[216] Westerdahl 1989:131-32
[217] A number of portages have been discovered and investigated in the vicinity of Birka, e.g. *Drag*et (Ambrosiani 1991)
[218] For Norway's part, as no underwater fortifications has yet been discovered, the place-names in the diagram are Norwegian counterparts of the Swedish and Danish.
[219] E.g. *Herøya* in Møre and Romsdal County (Sandnes and Stemshaug 1997:212)
[220] There are boathouse-remains at Rovdestranda in *Knarrdal*, Sunnmøre (Christensen 1984:132)
[221] E.g *Skipnes* on Hitra (Rygh 1901 XIV:68)
[222] E.g *Langskipsøy* i Sunnmøre (Christensen 1984:132)
[223] E.g *Snekvik* [Snekeuigh 1590] on Hitra (Rygh 1901 XIV:71)
[224] Setting up posts or stakes.
[225] Wåhlin 1964:15; Crumlin-Pedersen 1985:224; Holmberg 1996:54

Another problem is that "words of different linguistic origin can assume the same orthographic or phonetic form when they occur as place-name elements"[226]. In Norwegian *stevn*, *stavn*, and *stafn*, originally meaning stem, might be misinterpreted as *stav* and *staff*, meaning post or stake[227].

When using place-names as a source it must be borne in mind that they only present one side of historic reality. Holmberg[228] points out the somewhat peculiar fact regarding *steg*-names, that they are not usually accepted as denotations of underwater fortifications until archaeologists have proven the existence of such structures. This is very much the case in Norway at present, where linguistics generally are unaware of the presence of underwater fortifications, thus interpretations of words containing posts or poles or similar have never been considered an association with underwater fortifications[229].

4.3.4 Geomorphology

In order to locate underwater fortifications, it is important to understand the contemporary physical environment, and seek to recreate the features of the coastline as well as water levels[230]. This will enable us to see more clearly where the underwater fortifications are most likely to have been positioned.

In most Danish fjords, the moraine landscape from the last ice age is evident, with its characteristic green slopes. To create a more detailed picture of a fjord's appearance in the Viking- and Middle Ages, the Stone Age maritime landscape must be used as a starting point, as the slopes provide a continuous record of coastal transformations. As today, there has not been significant differences in the Danish fjords between high and low tide, thus making it relatively easy to construct permanent underwater fortifications. For Denmark's part, there only appear to have been minor changes in water level during the last millennium: Crumlin-Pedersen[231] believes this to have been approximately 1m. This is quite different from the Norwegian situation where

[226] Holmberg 1991:234-5; Holmberg 1996:53
[227] E.g. *Stamnes*; here the same locality is known as *Stamnes* 1590, but as *Staffnes* from 1630 (Rygh 1901 XIV:85).
[228] 1991
[229] Ola Stemshaug, pers.comm. Feb 2001
[230] Crumlin-Pedersen 1978:4
[231] 1985:216

geological changes over the same period has resulted in a present water level 3–4m lower than in the Viking Age. This is the average water level, and there will have been great regional variations. "*Along most of the coasts of Norway and Sweden the relative sea level has dropped, but in Denmark it has risen; the whole region has, in effect, tilted along an axis that crosses north Jutland and the southern tip of* [Scania]... *The overall effect has been greatest in the northern part of the Gulf of Bothnia, where the sea level is still dropping at a rate of about* [80cm] *a century*"[232]. Due to the land-upheaval, which has compressed and partly dried out some of the layers in the sub-soil, it is difficult to precisely show the marine edge, although it can be seen in the stratigraphy[233].

The rising rate of the land is reckoned to be inversely proportional to the distance from the centre, but as the rate will vary regionally, sites cannot directly be compared[234]. It is thus important for geologists and archaeologists to work closely together to fully grasp the complex interplay between geological and archaeological processes, and so obtain knowledge on the shaping of the coastline at various stages in history.

"The sea around Denmark is as shallow as the land is low lying ... and the transition between land and sea is gentle"[235]. The most major differences in Danish water since the Viking Age have been caused by the erosion of projecting parts of the coast in addition to deposition where the coast is indented[236]. The shifting of sand would also have played a vital part in the transformation of the coastline: in many cases silting up the navigable channels perhaps to such an extent that vessels were forced to choose other routes. Crumlin-Pedersen[237] points to the considerable displacements on the seabed in recent years due to socio-economic developments, caused by both the building industry's extraction of sand and gravel[238], and the exploitation of oyster shells. This has made a major impact on waterfront interfaces and the coastline of today is very different and radically altered when compared with the one a thousand years ago. This is very important to remember when searching for underwater fortifications or other submerged sites.

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[232] Sawyer and Sawyer 1993:29
[233] Blindheim *et al.* 1981:17
[234] Blindheim *et al.* 1981:17
[235] Møller 1991:246
[236] Crumlin-Pedersen 1985:216
[237] 1985:216
[238] C.10,000,000 m^3 per annum 1985 figures

It is not only that the coastline changes which is important to us. The series of dredging plans in Denmark from the 1830s onwards not only provided suitable depths for the shipping they also destroyed various underwater fortifications, to create navigable passages[239].

The Norwegian landscape, with its many deep fjords and numerous inlets, differs quite radically from its Danish counterpart. The deep fjords are not as suitable for barrages, so booms must have played a more crucial role. On the other hand, there are many small islands and rocks, and between them the fairway is usually shallow enough for barrages. Another factor that would have caused problems for underwater fortification construction is the difference between high and low tide. This varies quite substantially; in the south there is relatively little tidal range, but it increases further north. Again, where there is a great tidal difference, barrages would often be problematical as effective fortifications, booms being more suitable. Norway, with its extensive coastline and great regional differences in geological and natural features, makes it difficult to give a general impression. Local differences would have made it necessary for people to arrive at vernacular solutions to suit their varied situations.

To create a more detailed impression of the coastline and underwater landscape in the Viking and Early Middle Ages, it is necessary to look at geological changes through evidence of transgression and transformation in the dynamic processes of the last thousand years.

Geological investigations carried out in each region will provide the water level during the different eras, and these can be used to create models of the contemporary coastline during the period under review. This is especially important when trying to locate possible locations of barrages. The place-names are a good indicator when available. But when they are absent and there are still valid causes for expecting a fortification to be present, the water level of the relevant period would give hints as to where it might have been positioned. For instance, barrages cannot be situated in places where the depth is too great, as the length of the posts then would make them too flexible to hinder ships. Good collaboration with geologists is therefore necessary to get as clear as possible a picture of the complex interplay in the coastal zone.

[239] Crumlin-Pedersen 1985:217; Olsen and Crumlin-Pedersen 1990:9

The levels to which wooden materials survive on the seabed will largely depend on the oxygen level in the deposits. Underwater fortifications found in reclaimed land such as Hominde, were very well preserved because they were buried in mud. Wood exposed underwater will be open to biological deterioration caused by attacks from fungi and bacteria, softening the outer layers and making it very vulnerable to wear and wave action, as well as to the *teredo navalis*. The *teredo navalis* is present in the Danish and Norwegian waters, while it does not survive well in the brackish waters of the Baltic, thus making possible the preservation of such ships as the *Vasa*.

Sudden changes to the landscape might also be caused by severe weather conditions, as happened in Denmark in 1931 when an epidemic killed the large concentrations of zostera in the Roskilde fjord and vast sand dunes were exposed, contributed to the silting up of various parts of the fjord[240].

4.3.5 Written Material

One problem with written material, especially translations regarding underwater fortifications, is that historians and translators might be unaware of these structures and misinterpret, or even overlook them.

The find of the Hominde barrage in 1933 was the first archaeological find of underwater fortifications in Scandinavia. Prior to this only the written texts survived as evidence that such structures had existed at all. Shultz's find proved that the written material was correct by providing the archaeological evidence[241]. Albeit the written sources had mentioned fortifications, the various types involved and even how they were employed, their true existence had not been proved. However, when so many sources referred to them independently, the probability was quite substantial. Written sources might indicate something to be proved by archaeological finds, but it is often difficult for archaeology to prove something negative. Only in the most clear cut cases can this be, as something not found at a site does not necessarily mean that it has never existed there. Archaeology can however, when finds are made, make historians and others aware of aspects and artefacts not recognised, not considered, or misunderstood

[240] Crumlin-Pedersen 1978:13
[241] Nørgård Jørgensen 1996:21-22

up until then. As an example, the underwater fortifications on the coast of Funen do not exist in the written material at all though archaeological excavations have proved their existence on several occasions[242].

4.3.5.1 Law Texts[243]

The law texts do not contain passages or legislation regarding the building or maintenance of underwater fortifications. If Crumlin-Pedersen is correct in his assumption that the Foteviken fortification was built using levy manpower, then it should have been mentioned in laws regarding the duties of the levy men. This may imply that the underwater fortifications either were of such general knowledge that one knew when and how to build them, or that they were of local and not of regional or national interest, so that each local community had to provide for itself. Or that the underwater fortifications were of little importance, and that those found were examples of vernacular ingenuity. The latter interpretation can be disregarded as so many structures have been found, some being substantial complexes demanding significant effort and resources to construct them, so that help from externally organised work forces such as the levy men would have been necessary. If however it is assumed that men from the levy would guard the fortifications in wartime it is peculiar that nothing can be found in the law texts regarding such deployments. Maybe we have not been able to thoroughly understand the law texts, or perhaps they were not flawless. It is not necessarily so that it was only the levy-personnel who built and/or maintained the fortifications, this being especially evident in those built prior to A.D. 1000, such as ÆLei and Gudsø Vig. The point being that most of them are such complex and massive constructions, large task-forces were needed in order to build them efficiently, and the men from the levy is such an obvious group to be reckoned with in this matter. Many other options are plausible, but as little is mentioned of this we cannot know for sure, and we have to make assumptions as to have it might have been.

[242] Porsmose 1996a:44
[243] Introduction 2.3.3.2.1

4.3.5.2 Saga Literature[244]

4.3.5.2.1 Heimskringla

Below are presented different examples of underwater fortifications or similar structures mentioned and described in Heimskringla[245]. The examples show that underwater fortifications are mentioned in the text, proving Snorri's awareness of their existence and usage. The descriptions may not be accurate, as Snorri may have used what he knew of these defensive structures and projected it back in time or indeed place, to fit with the stories told.

The first mention of underwater fortifications comes in the saga of Harold Fairhair[246]. "In the spring, when the ice started to melt, the Gøter closed the Gøta River with stakes[247] to prevent king Harold from entering the land with his ships. King Harold then sailed up the river and moored by the stakes, raiding both sides and burning the villages". The Gøter then rode down and met Harold in a battle, which he won. This barrage does not appear to be erected where it would be easy to defend, as Harold still manages to raid the land, so although the Gøter seem to be familiar with barrages, their use of it implies that they were not experts when it came to their application.

From the saga of St. Olaf, the following story is known; "He [St. Olaf] came all the way up till Sigtuna and moored by old Sigtuna. ... With the coming of autumn, Olaf learnt that the Swedish king Olaf had gathered a large army, and that he had laid iron chains[248] across the Stokk Sound[249] and had men to guard it"[250]. As the sound was blocked, Olaf dug a channel by which he escaped. This anecdote makes clear that ways of escape from the fortifications were known to some degree.

A row of poles is mentioned in the Gøta River[251] and the scouts in King Inge's army told Inge that king Hakon's army had moored their sterns to the poles. It seems that the row of poles here is used tactically as the ships are moored to them with the flow

[244] Introduction 2.3.3.3.1
[245] The translations are made by the author based on Sturluson a), b), c) and d).
[246] Sturluson d)I:66
[247] *...stik*(:staura)*uðu Gautar Gautelfi* (Sturluson a))
[248] *járnum* (Sturluson a))
[249] Near Stockholm
[250] Sturluson d)II:204
[251] Sturluson d)II:275

of the river, making it easier to fight the enemy who have to row up-stream in order to engage in battle.

4.3.5.2.2 Introduction to Sverri's Saga[252]

Abbot Karl Jonsson wrote Sverri's saga, and while not finished until three decades after Sverri's death, it was started during Sverri's reign, thus making it more contemporary than most other sagas. It is not necessarily more accurate, but the fact that the author himself was able to view many of the events and talk to the people who had participated in the events first hand produces increased veracity. The fact that the people presented in the saga were in a position to correct any errors must also have put more pressure on the storyteller. However there is no doubt that this saga, like the genre as a whole, was tainted as it "was manifestly intended by the king to present him as the legitimate ruler of the Norwegians"[253]. There is always a catch with these sagas, as there is always a reason why they were written often more compelling than a modern historian's concern for accurate data.

King Sverri was a military leader of great renown, responsible for introducing new military tactics brought with him from the continent. This included the introduction of cavalry to the battlefield. He was also most cunning, and the saga portrays him as a man with charisma and great psychological skills, attributes mirrored by the saga in his alleged speeches[254].

4.3.5.2.2.1 Sverri's Saga

There are not many references to underwater fortifications in Sverris saga, but a few are worth mentioning. The first example comes from 1197 A.D.[255] when Sverri and his men endeavoured to conquer Oslo. They failed to do so partly because the

[252] Sverri became king of Norway in 1184 and remained ruler until his death in 1202 A.D. His 18-year in reign was turbulent, as there were constant claims to the throne.
[253] Sawyer and Sawyer 1993:230
[254] In one of his infamous speeches before a battle against King Magnus and Earl Erling outside Nidaros, he tell his men that they shall be entitled to the status and rank of the man they kill (Sverri's Saga ch.35). The speech apparently worked for they fought bravely. King Magnus fled, for which Sverri should be grateful, for would he have stuck to his promise had one of his men killed King Magnus?
[255] Sverri's Saga ch.135

Bagler[256] had sunk some ships outside the quays, making it difficult for Sverri and his followers to moor and get ashore[257]. It must have been a deliberate act, if that particular event took place at all, and it is likely that the Baglers had learned the stratagem of sinking vessels as a means of defence. The passage does not say how many ships were sunk, or how, but it appears effective.

The following two passages deal with a palisade Sverri erected in the river Nid in Nidaros. The first mention of this is when Sverri restored the wooden fortress at Ilevollen, he additionally erected a wooden palisade, from the fortress and along the river[258]. Its purpose must have been to prevent enemy ships from mooring and denying access to the beach. Unfortunately, as is the case with the sagas, nothing is mentioned regarding the practical building and appearance of these structures. Much guesswork has to be applied to reconstruct their meaning and appearance. The following spring Sverri finished constructing the palisade, which by then was said to surround most of the seaward side of town[259].

No excavations carried out have positively identified the palisades from Sverri's reign, but then little interest has been placed on the foreshore area in general. Some posts do exist, but their function has yet not been fully determined, though with a diameter of only 7-13cm a use as barrage is unlikely[260]. However, a possible barrage might have existed in the river Nid, as construction workers in the 1950s are said to have removed several stakes, pointed in both ends and running across the river. Sadly no record exists of this today[261], and with neither physical remains nor collected data, little but hypothetical speculations can be made.

4.3.5.3 Saxo Grammaticus

Saxo was a Danish historical writer born in the mid-12th century. He worked for the bishop Absalon and wrote the history of the Danes, *Gesta Danorum,* to promote Denmark's literature and history to Europe. It is very evident that Saxo aimed to glorify the Danish kingdom, and especially the clan of the Valdemars. His great words

[256] Sverri's main opposition
[257] Sverri's Saga ch.135
[258] Sverri's Saga ch.58
[259] Sverri's Saga ch.71
[260] Gundersen 2000:70-71
[261] Jostein Gundersen, pers.comm. July 2001.

and prose style is not always compatible with historical accuracy. Though the contents of his chronicles are dubious from time to time, and must be studied critically, several archaeological finds of underwater fortifications in Denmark confirm parts of his stories[262].

One example from Saxo is of particular interest. It stems from c.1150 A.D. when pirates was a constant nuisance in the area around Zealand, and the land lay barren and abandoned. The island of Lolland paid taxes to the pirates while the islanders from Falster fought for their land, and "*Itaque non armis non urbibus confisium anfractus aequoris quo minus piratas admitterent; praelongis palis ac sudibus exstruebantur*"[263].

4.3.5.4 Olaus Magnus[264]

Underwater fortifications have become a well-investigated type of structure in Sweden in the last decades. The subject is well documented in the works of the historian Olaus Magnus, whose accounts provide an invaluable historical description of practical aspects connected with underwater fortifications. Although written in 1555, and thus three centuries after the scope of this thesis, the source has great significance to us. The main reason for including it is that compared to most other sources, merely briefly mention fortifications, Olaus Magnus's account sets out to describe not only their function and importance, but also refers to how they were constructed and even escaped. Compared to most historians, merely interested in portraying great events and famous men, Magnus presents an accurate description of his contemporary world, including species of birds and fish, daily events, geography and so on. What makes the depictions by Olaus Magnus special is the way he portrays ordinary events, and captions his pictures, providing a much greater basis for understanding and interpreting the image. Included in this is a meaningful insight to the socio-technological aspects of the various forms of underwater fortifications. Besides giving a written account of the subject, he has also been considerate enough to add

[262] Rieck 1991:83
[263] Gesta Danorum XIV:XV, translation based on Westerdahl 1989:130: "One did not trust weapons nor defensive works, and the entrances from the sea were blocked with long posts and stakes to prevent the pirates from entering".
[264] Archbishop of Uppsala, Sweden, 1488-1544.

illustrations, displaying many of the constructional features[265]. However, the same level of critical assessment must be applied to this source as to other written and iconographic material.

A number of invaluable descriptions of underwater fortifications exist in Magnus' "Historia de Gentibus Septentrionalibus", though due to space limitations only a few can be dealt with in this thesis. In Book seven, chapter eight – "Concerning battles on the shore" we find this passage, on how to thwart sea-borne enemies:
"*Whenever hostilities are impending from the sea, the northern peoples, in particular the Götar, Swedes and Finns, show amazing energy in their eagerness to fend off or meet the enemy fleet's attack. They drive their adversaries back from [the shore, as they at] the harbour mouth fix sharp, hidden stakes and thick row of piles below the waterline, capable of blocking the foe's entry without need of defenders*"[266].

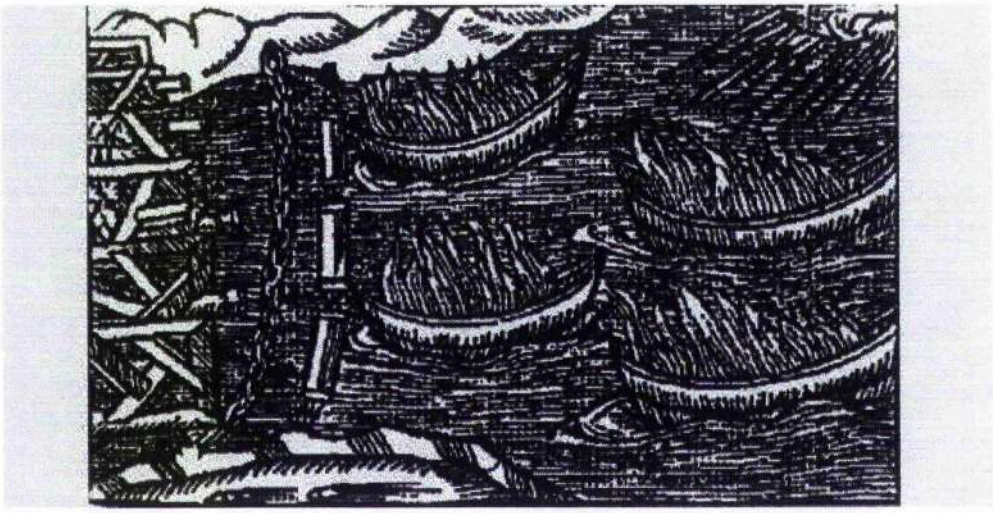

Figure 47 – *A combination of floating booms and chains is employed to deter fire-ships (OM 10:12)*

Book ten, chapter five describes how one of the tactics of the attackers were to send swimmers, and here Magnus describes how this could be countered: "*It is customary, for the surer defence of strongholds and cities, to use careful foresight and oppose the contrivances and brute force of the enemy with towers, walls, earthworks, ramparts and stakes in the water, both upright and slanting. Indeed, apart from other defences, they set up, at a sufficient distance outside the positions exposed to the foe, huge beams made fast to iron poles or sharp stakes alongside poles rammed into the*

[265] Fig.47; See also 4.3.9
[266] Olaus Magnus 7:8

bottom, in order to deter approaching swimmers". Not only swimmers, but also horsemen swimming with their horses appear to have been a nuisance, as the next passage states: "*During a time of hostilities men defend the river shallows farther inland with very sharp piles below the surface to prevent horsemen occupying the far bank by swimming across*"[267].

Besides describing how underwater fortifications could be employed, there are also several passages recounting how the structures were constructed. This is an example: *"When ropes and pulley wheels have been set up in different places among tall beams, a massive, heavy weight is suspended ready to fall sharply and is then let go by the hands of the workmen. By this means iron-pointed piles ... are driven deep into the bottom, very carefully placed in position in a long row, according to whatever method and number seem adequate"*[268]. That many of the barrage structures must have been constructed in wintertime, as with Foteviken, when the ice was a steady platform to work on, must be considered. On the other hand, only the sturdiest posts would be erected in this manner, as they would be able to resist the pressure from the ice, while the smaller ones, for example those at Helnæs, would have snatched with the smallest movement from the ice, presuming a presence of ice at all.

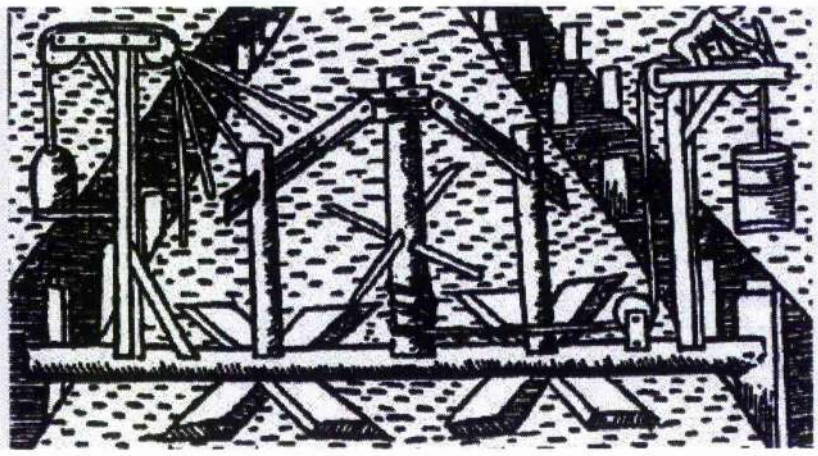

Figure 48 – *Construction of barrage, with use of pile-drivers mounted on the ice (OM 12:10)*

That Olaus Magnus is writing about his world in the 16th century is important to remember, as the techniques and ways of thinking he chronicles might have changed significantly since the 13th century. However, as is true with most things concerning

[267] Olaus Magnus 10:24
[268] Fig.48; Olaus Magnus 12:10

maritime activity, and especially matters of harbour defence, conservatism is a major factor, as things do not often change rapidly. It is therefore reasonable to assume that much of what Olaus Magnus describes would have been valid in the 13th century, and conceivably earlier.

4.3.6 Maps And Charts

Historical-topographical research demands maps featuring the landscape characteristics required of any given investigation. However, few maps contain all the features of interest to do a thorough study of the maritime landscape. An aspect of maritime research is that the information usually has to be drawn together from several maps, as nautical charts display the shorelines and the depths, while the terrestrial maps display the topography and heights on land. The date of which a map was surveyed is also of crucial importance. We therefore have to use different maps highlighting the various features, such as the seabed topography, the coastline, and the shore. Unfortunately, most maps are concerned with the land-based topography and underwater features are duly neglected. It is within the coastal zone most changes to the transformation of the landscape have occurred caused by erosion, land fill, dredging and other processes which changing the topography and navigable passages[269]. By using older maps and comparing them with the more recent ones, an insight can be gained of the various changes that have taken place in the coastal zone, and so help to interpret how the landscape might have looked at the time of interest to the investigation, giving leads as where to look and what might be disregarded. Generally there seldom exist topographic maps and charts earlier than the beginning of the 18th century, when the scientific societies started their investigations. Older maps are generally less informative and reliable, though a useful sources of place-names. Although it should not be assumed that all place-names have been included, correctly recorded, or do not exist in other versions. A map from the 18th century will only partially provide clues as to how the coastline might have looked in the Viking Age, but it must be bore in mind that most significant changes to the coastline are those created by man, most often after the beginning of the 19th century.

[269] Crumlin-Pedersen 1978:6

4.3.7 Contemporary Sea-Routes

Another source pointing to the location of underwater fortifications are contemporary sea-routes. Vessels had to navigate between known accessible points, and given that they had limited access to navigational equipment these routes were often close to land and along sheltered coastlines if available. Such routes were known as inner sailing routes. It was also possible to sail outside the rocks and skerries, following the outer sailing routes. These depended on favourable winds, and the need to avoid coastal hazards. For those sailing at night, or out of sight of land, the outer route would obviously be preferred. The outer sailing routes can be disregarded in connection with underwater fortifications, as the open sea cannot be blocked.

What have to be looked for are the often-narrow passages between islands where it would have been possible to construct underwater fortifications. An important factor would have been that this passage was the only one, so that ships had no other alternative, and therefore would be trapped by the fortification. Alternatively underwater fortifications could be erected so as to force vessels to use a particular passage, and thus come under supervision and control from the defenders. The first would be advantageous if a boom or similar structure could be applied, so that the fortification erected could easily be removed. The latter would be more markedly useful if the fortification was of a permanent type, operated without obstructing vernacular traffic. A number of portages existed and were in constant use, and these must be seen as part of the sailing routes. It is however not known whether any fortifications pertained to these, in order to control these routes via terrestrial sectors.

The actual sailing routes must be seen in accordance with contemporary local topography, and the water level at that time. But it is reasonable to start with the assumption that the sea-routes of past times to a large extent are similar to those we know today.

4.3.8 Contemporary Vessels

It is vital to look at contemporary vessels to understand the underwater fortifications, these being the reasons for their existence. "Knowledge of the size and type of ship is essential for evaluating the interplay between navigation and patterns of settlement

and fortification which have shaped decisively the Danish cultural landscape"[270], true for all Scandinavia. The fortifications were constructed to be effective against contemporary ships, and therefore might presumably have changed and developed responding to changes in shipbuilding. The larger the ship, the larger and sturdier the timbers used to deter it had to be[271]. It is unlikely that the vessels changed as a response to a dynamic development of underwater fortifications; rather it would have been the other way around. The fortifications are to a large extent more vernacular and adapted to the local environment, than the traditions of Nordic shipbuilding at this time. In comparison to the many places where boats were built, a relative small number of places with adjacent fortifications are known, and it is unlikely that these decided the development of ship-types. The fortifications were supposed to stop all contemporary types of vessels, not just particular types. For, to some extent, all vessels could carry some amount of warriors and be a threat in their own right. The decisive element in the vessels was their draught, and this was the main factor the builders had to bear in mind when constructing the fortifications. Until the fortifications are located we will not have the possibility to deduce the size of these contemporary vessels sought stopped.

As the underwater fortifications range in time mainly from Roman Iron Age, to the Middle Ages, the contemporary vessels also change. A representative ship from the Late Iron Age is, to our knowledge, the Nydam ship from c.320 A.D. It was about 23m long and had a draught of 1.2m. From the Viking period, we can use Skuldelev 2 as an example. It was made in Ireland, but later repaired in Denmark and had a draught of 1.7m[272]. The warships replacing the clinker-built long ships were the cogs, with the considerable draught of about 3m. So, until the cogs appear, it was only necessary to construct underwater fortifications allowing less than 1m of water, in order to successfully stop the attacking ships. The cogs had such a draught that they often had problems in the shallow Danish fjords anyway, thus underwater fortifications were not always necessary.

[270] Crumlin-Pedersen 1985:218
[271] Wåhlin 1964:15
[272] Fig.49; Crumlin-Pedersen 1993:258

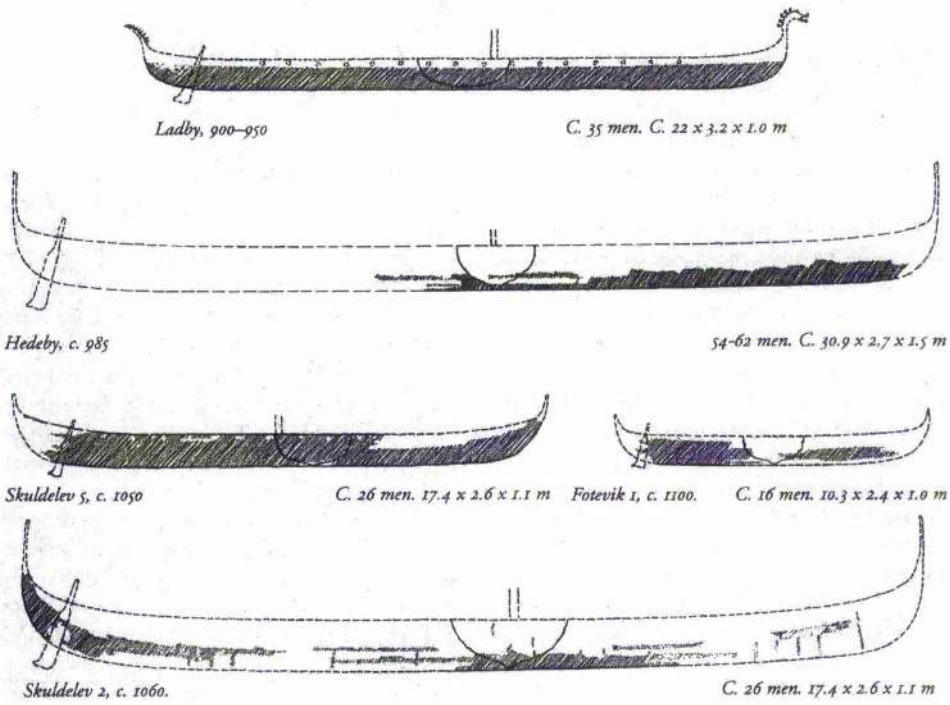

Figure 49 – *10th and 11th century ships drawn to same scale, shaded parts indicating the preserved parts (Crumlin-Pedersen 1997:fig10)*

4.3.9 Iconographic Material

With the exception of Olaus Magnus, few sources have contributed many iconographic depictions of underwater fortifications. Contemporary artists were not interested in depicting things in a factual and realistic way. Their intentions were to portray things in the most interesting light. Scale was a matter little understood or regarded unimportant, and therefore the relative size of objects are usually misleading and figures invariably exaggerated in size. The outcome of using iconographic material is that it usually informs the viewer that something, existed at a given time, but lacks specifics about its size and other characteristics. This level of information is often greater than found in written material, however; so iconographic material where it exists should not be ignored. It might provide invaluable help if its limitations are recognised.

Although Olaus Magnus is our prime source, his work must be treated with reservation. Even though his illustrations are superficially realistic, he often appears to be using artistic conventions often displaying things patently false, as for example depictions of sea-monsters and were-wolves.

4.3.10 Settlements

Settlements are important localisation factors as the fortifications to a large degree were constructed to protect the former.

Settlements do not move from one place to another without valid cause. Something must happen to trigger off such a movement. The reasons can vary, from the soil losing its fertility to changes in military tactics and equipment. The fact that the new and swift longships evolved around the eight-century dramatically changed the way tribes and others were able to attack other areas, without giving warning of their approach. An enemy's new tactics might cause the change in settlement patterns, but on the other hand if settlements move for other reasons, then military tactics might adjust accordingly.

The old settlements seem to be consistent in choosing locations away from the shore. Of the settlements from Denmark existing at the beginning of the Viking Age which have names containing *–inge, -um, -løse, -lev* and *–sted*, only Jellinge was situated closer than 1km to the shoreline[273]. This is not due to the maritime environment having rather little impact: on the contrary it was the massive use of the waterways, especially by pirates, that led to the movement away from the coast.

It is evident that various factors have played an important part in the location of settlements and their relationship to resources. Climate, topography, fresh water, trade and the fertility of the soil are general factors, whereas coastal attributes, currents and underwater topography have all played parts in conditioning the location of coastal settlements. We can investigate the various factors individually, but will probably never be able to quantify all the factors involved, or determine which were given the most importance as different emphasises might have been put on the variables[274].

[273] Crumlin-Pedersen 1978:61
[274] Christoffersen 1996:33-34

Priorities will also have differed between locations, time periods and cultures. Defence and political matters might also have led people to settle on sites with less fertile soil if that seemed advantageous to long-term security.

In Pre-Roman Iron Age the settlements in Denmark were mainly situated close to the shore, as an attack most likely would come over land. In the Iron Age the settlements withdrew from the shore, and on Funen a forest was used as protection against the increase in sea-borne attacks[275]. The forest stretched 2-3km from the coast and inland[276] and heavily contributed to the defence of settlements by hiding them. This gave the villagers valuable time to escape as the attackers required time to get through the forest, and it gave the settlements valuable ambush positions for defensive purposes. That the villages as a precaution moved further inland, mirrors the increased importance of the sea as a way of life, and it is in this light we must view Scandinavia at this period, and thus understand the need as well as the impact of a coastal defence.

That people in some periods moved away from the coastline and perhaps away from the most fertile soil, letting a forest grow up as a protective fence as on Funen, is an indicator that they did not have sufficient defensive structures or organisations to deal with attacks. Conversely there must be a reason for the settlements to move closer to the coastline at later stages, as there is no reason to suppose that the attacks had diminished by then.

Not until around 1200 A.D. was the situation in Denmark and on Funen in particular secure enough for trading places on the coast to be founded, and the majority of the trading places on Funen were established between A.D. 1150 and 1350. Whereas the Iron Age settlements seemed to have moved occasionally from one site to another, between the 9th and the 11th century it appears that the settlements moved one last time to a more permanent site where those not eradicated by the Black Plague can be found today[277].

"*The contribution of place-names to settlement history is limited, however, by the uncertainty about the date of many of them; it is rarely possible to determine the currency of a particular type of name more closely than within three or four*

[275] Christoffersen and Porsmose 1996; Crumlin-Pedersen 1996:19
[276] Christoffersen and Porsmose 1996:158
[277] Porsmose 1996a:44

centuries"[278]. It is however customary to arrange settlement names chronologically, as names containing the same main parts was formed in the same period[279].

The settlements, being of importance, were often associated with some kind of underwater fortification, either in a harbour or further away in the mouths of bays, to protect the settlements in the hinterland: "*Already early in Danish history one took advantage of the protection provided by the large numbers of fjords and bays. Strategically significant centres were situated well protected in the bottom of the fjords or bays, and the often narrow entrance were effectively blocked by various sorts of defensive structures ... depending on the local topography and the purpose of the fortification*"[280].

4.3.11 Local Knowledge

Local inhabitants, fishermen in particular, will know the vernacular underwater landscape, with all its passages and submerged reefs intimately, on the same level as a farmer would know the nuances of his land. Fishermen gave names to different locations, mirroring the special attributes featured in the underwater landscape. It was, and to some extent still is, an essentially cognitive landscape. Fishermen of earlier times depended on their knowledge of the seabed, knowledge passed on from generation to generation. Unfortunately, with the development of modern day fishing and the advanced technical equipment at hand, much of this information have been lost because it now lacks relevance. But local knowledge will still be greater than that recorded on any map, and may give valuable clues that shed new light on the understanding of place-names and features within landscape itself. It must be noted that though local information is generally a very useful source, it may in many cases be misleading. One such example is Skuldelev, which according to local tradition was incorrectly seen as deriving from the time of Queen Margrethe, known as 'Dronning Margrethe's stiger'. This unfortunately is not an uncommon situation, that the name featuring in local tradition stems either from later usage or seen in connection with popular historic events or persons, maybe in order to familiarize with the age of construction.

[278] Sawyer and Sawyer 1993:9
[279] Holmberg 1996:53
[280] Nørgård Jørgensen 1996:19

Fishermen may know where to look for underwater fortifications, as they often can interpret where they would have been most effective, and on a practical level will wish to avoid snagging their nets on obstructions. Myths and legends preserved in local folklore can also help, while farmers might know where transgression has revealed trace of barrages or other structures on dry land. Local knowledge is thus an invaluable source not to be disregarded.

4.3.12 Combination

A combination of sources; a multi-disciplinary approach, is important in obtaining as many pieces of the historical jigsaw as possible. Other disciplines may not always necessary be relevant; it depends on the research in question, but in seeking to unveil aspects on a macro-level, a range of sources and disciplines might offer leads which may be successful when combined. A barrage might be located through archaeology, and later identified in written sources, or visa versa. Either way, an indication is given of what to be sought. The identification of appropriate sources is an art in itself, making the research process more structured and, if optimised, less time-consuming[281].

4.3.12.1 Norrlandsleden - The Norrland Sailing Route

Norrlandsleden is the name of a Swedish sailing route, *led* meaning sea-borne passage, outside the region of Norrland in northern Sweden, that is the Baltic Sea from Stockholm to the Finnish coast. This sailing route and its landscape has been used as a basis for a multi-disciplinary analysis carried out by the archaeologist Christer Westerdahl[282], to investigate the various mechanisms which interact within the sphere of a maritime cultural landscape. This includes elements such as wrecks, place-names, trading places, topography, maps and charts, underwater fortifications as well as transportation and settlement. Westerdahl's intentions have been to focus on aspects not usually emphasised by archaeologists, the maritime cultural landscape being one

[281] Apart from the example used in this thesis of Norrlandsleden, a Danish multi-disciplinary research-study worth mentioning is that of the island Funen (Crumlin-Pedersen *et al.* 1996b)
[282] 1989 and 1991

such, and to see the area investigated as part of a much wider whole, a view of landscape seen from a sea-borne point of view[283].

The use of archaeological sources combined with others such as pollen analysis, geology and scientific dating techniques has proved most useful in an area for which there are few written sources, again proving the importance of multi-disciplinary approaches. As maritime cultures are characterized by conservatism, the use of landscape will often remain largely static for centuries, with any change being skew. Westerdahl emphasises the relevance of oral testimony as in such contexts, where information about the relatively recent past may often shed light on earlier periods[284].

The settlements of Norrlandsleden interacted through trading and other activities, mixing with people and groups outside their particular region. Sailing routes also linked inland communities with coastal ones, especially where rivers or waterways were available.

The area around the Baltic is of geomorphological interest, especially where the process of land upheaval has been fairly linear, thus providing excellent opportunities for assessing sea-level change[285]. The extremely high levels of upheaval in the north – up to almost 10cm per year- has created a very dynamic coastal landscape, in which harbours and sailing routes were silted up and pushed towards the coast. The topography can point to maritime traits, while maritime constructions can be dated using stratigraphy in this environment, because variations in the height above sea level are known through time.

Place-names in this region significantly echo the importance of the maritime relations, and Westerdahl has characterized this aspect as being a "macrotopographical naming system ... maritime in nature"[286]. Place-names also have relevance for people and places inland.

Almost 50 underwater fortification sites have been discovered in this area, mainly through place-name studies in addition to those found by divers or fishermen. Most

[283] Westerdahl 1991
[284] Westerdahl 1991:111-12
[285] Westerdahl 1991:108-9
[286] Westerdahl 1991:106

sites carry the name element *stäk*, referring to posts in the water[287]. The underwater fortifications mainly consist of posts and stone constructions. Complexes of underwater fortifications combined with other means of defences have also been located. The three straits north of the town Gävle deserve special attention. Two have been blocked with barrages, with one dated to the mid 13th century at *Stäken*, whereas the most northern of the three has been destroyed. In addition to the barrages, caissons filled with stones and wrecks of vessels have also been detected. As well as the separate fortifications, also elements relating to the signalling system have been discovered: "At Sörsundet the *Vår* first element is attached to the hill *Vårberget* The original *vardher* meant 'watch'. The use of beacons is normally found at most such sites in later times"[288].

Westerdahl also addresses the question of whether this area was a harbour for the levy fleet. Several things are relevant. First is the presence of five staging points along the coastline, each separated by 32km, which is four units of the old measure *vika*[289] of 8-8.3km[290]. These staging points were under an obligation to help the crown, and therefore seem to correspond with the sites assumed to be levy-harbours. Many place-names also contain the element *snäck*, indicating the levy-ship type in this area. This, in addition to the signalling-sites and the underwater fortifications found, are strong indicators of harbours used for ships of the levy fleet.

4.4 THE NORWEGIAN MATERIAL

4.4.1 Introduction

As references to underwater fortifications in Norwegian publications are nearly non-existing[291], there are no specific terminology as in Sweden and Denmark. Nævestad used the term *seilsperring*[292], but it has been tenably argued by Frode Kvalø[293], that a more suitable term would be *ledsperring, led* being a navigable channel, which is also a more appropriate maritime expression in Norwegian.

[287] Westerdahl 1991:113
[288] Westerdahl 1991:114
[289] The distance rowed by one set of rowers
[290] Westerdahl 1991:115
[291] Nævestad 1981 being one exemption
[292] Nævestad 1981:45
[293] Pers.comm. July 1999.

4.4.2 State of Research

There has not been too much of a general archaeological interest for the underwater archaeological material in Norway, which may be one of the reasons no underwater fortifications has yet been found[294]. Apart from the bridge in Borgepollen, no other archaeological structures have been either identified or suggested interpreted as underwater fortifications; so the potential for further valid research in Norway is thus very good.

The paradox is that though no such structures, apart from Borgepollen, has been suggested, underwater fortifications are in fact listed as automatically protected heritage structures in the Norwegian Cultural Heritage Act of 1978[295]. It was listed as it was the intention during the 1980s to investigate this category, but investigations were not carried out, and so the list of fortifications is at present the same as that of 20 years ago.

At present there seem not to be sufficient collaboration between the terrestrial and maritime archaeologists in Norway, so if any underwater fortifications has been found by terrestrial archaeologists in reclaimed land areas, the possibility that they would not have been able to interpret correctly is likely. On the other hand there has not been any general interest in investigating the underwater fortifications. Either one simply have not been aware of this category, they have not found it interesting enough to pursue or one must have assumed that they did not exist due to the topography and geographical conditions. If the latter have been the case, then they must have given up before any research was done, as no research has yet been carried out to ascertain the latter. Even a negative research would indeed be a most valid one.

[294] The only interest known by the author is the article by Nævestad (1981), and some ad hoc investigations carried out by Dag Nævestad and by Arne Emil Christensen in the 1980s. Nothing was encountered, but both are convinced further and more thorough investigations are necessary. (Pers.comms. by Nævestad and Christensen, June 2000).

[295] The Cultural Heritage Act of 9 Juni 1978 ch.II §4 d) "... båtstøer og båtopptrekk, fergeleier og båtdrag eller rester av slike, **seilsperringer**, vegmerker og seilmerker".

4.4.3 Places Of Interest

Archaeological excavations have not been carried out, much due to the time limit this thesis is subjected to. As the investigation is pre-archaeological, most emphasis has been put on the presence of place-names, topography and the location in regards of close by settlements and/or sea routes. In all, three Norwegian examples will be given, presenting sites that in one or more respects make them interesting in connection with underwater fortifications. Many more sites and a multitude of place-names are available if we know what to look for, these examples highlights some of these parameters.

4.4.3.1 Trøndelag

The region of Trøndelag has been particularly emphasised in this thesis, both regarding the levy and the signalling system. Therefore two examples from the same region will be used as examples regarding the possibility of locating and finding underwater fortifications in Norway.

4.4.3.1.1 Stokksundet

Stokkøya[296] is an interesting place-name in its own right. *Stokk* means stick, cane or log. The Sound between the island and the mainland is called *Stokksundet.* According to Olaf Rygh, the name *Stokksund* denotes from the fact that the Sound is straight as a log[297]. Ola Stemshaug has also visited the place, and agrees with Rygh's hypothesis[298]. This explanation is reasonable, but another solution is also plausible.

[296] Appendix VI and Fig.50
[297] Rygh 1901:12
[298] Stemshaug, pers.comm. Feb 2001. See also Sandnes and Stemshaug 1997:428

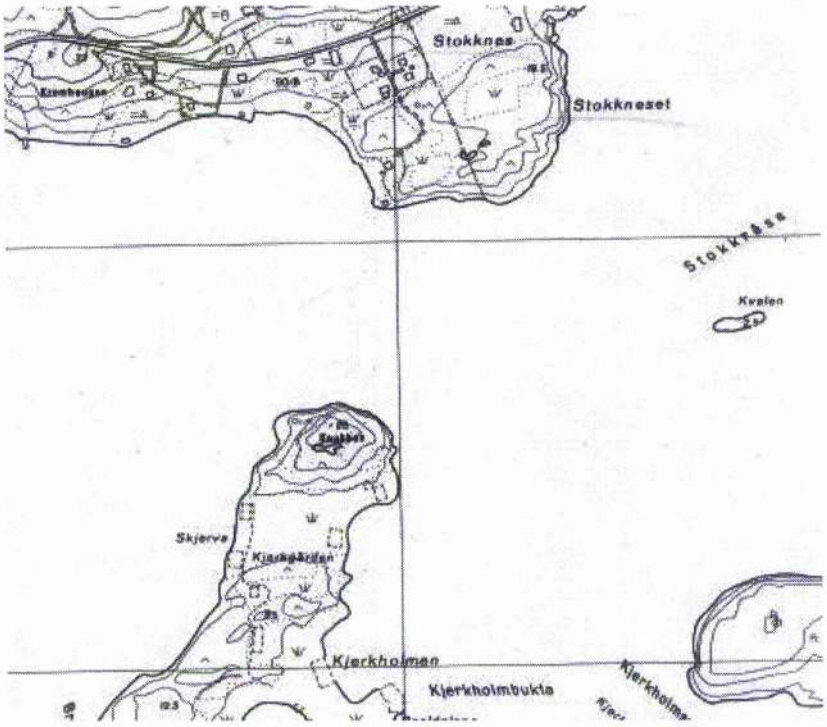

Figure 50 – *Section from economical map (ØK CH141-5-4) from south-eastern part of Stokkøya with the place-name* Stokkneset, *from which a boom might have been located*

If we look to the Swedish place-names, the word *Stock* is one of the most usual in connection with underwater fortifications[299]. In this respect the word does not reflect upon the resemblance to logs, but to the logs themselves, namely those forming part of the booms. The town of Stockholm is said to have got its name due to a defensive boom that at some point existed there[300]. If we are to follow this lead, the name of a headland in the north-eastern part of the island, *stokkneset*, is worthy of note. The modern day sea-route goes between this promontory and the small island Kjerkholmen east of it, and it is very likely that the main sea-route in the Viking Age would have followed much of the passage, as it is easily navigable with necessary draught and protection against the weather. Between these two points the maximum depth is presently 31m, and in the Viking Age it would have been about 4m higher[301], there is additionally a 1-2m difference between the high and low tide. The depth, both here and surrounding most of Stokkøya means that a barrage would have been unsuitable. A boom would on the other hand be very effective. Setting up a removable boom at this place would have controlled much of the shipping, as few ships would sail on the

[299] Westerdahl 1989:131-32
[300] See 4.3.3.1
[301] Reite *et al.* 1999:63

seaward side of Stokkøya if avoidable, and thus the fortification would have been of importance to the local coastal defence. That the place-names coincide with many known fortifications from Sweden makes this site interesting. But there would however probably be a problem finding much physical evidence of such a boom, apart from large stones or other for belaying it in each end, or perhaps waterlogged logs that sank and can be found on the seabed.

4.4.3.1.2 Frengenbukta

In Stjørnfjorden, part of the Trondheimsfjord, we find the bay of Frengen[302]. Here two place-names are of particular interest. The first is the name of the headland at the entrance to the bay, *Stavnes*. Names containing *stav*, meaning staff or stick, is in Norway generally interpreted as used on places being of such a character that it visually had the form of a staff or stick[303]. The name can at some point also have derived from *Stamnes*, which would have meant that the headland had the same shape as a the stem, *stamn*, of a ship but that is has later been misinterpreted. *Stav* can also mean border marker[304]. Then must be added that it can derive from posts being inserted in the water, which again both could be for fish-weirs or indeed a barrage, *stav* being the equivalence to the Danish *steg*. Adjacent to the headland is a tiny skerry, *Frengskjæ ret,* and a barrage between *Stavnes* and this island would effectively have blocked most of the entrance to the bay. However, the depth in the passage is in the middle too great for a barrage to be constructed, particularly if we add the 4m of water that was the case in the 10th century[305]. A fortification consisting of post-construction in each end and a removable boom in the middle is however a possibility.

[302] Fig.51
[303] Rygh 1901: 20. See also Sandnes and Stemshaug 1997
[304] Stemshaug pers.comm. Feb 2001
[305] Reite *et al.* 1999:63

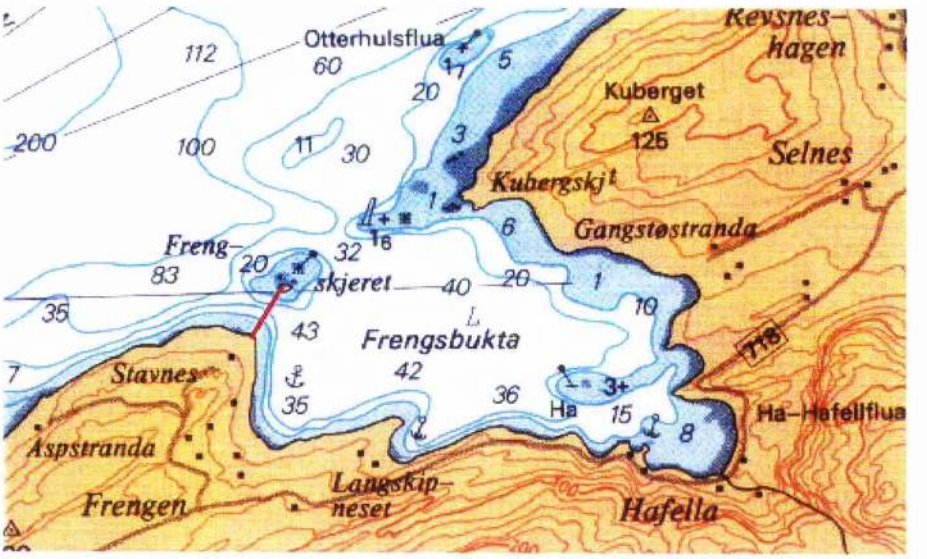

Figure 51 – *Section of chart (Main Chart Series 39, 1:50 000) of Frengsbukta, with the place –names* Stavnes *and* Langskipnes. *The red line indicates suggested location for a barrage or boom-construction*

What further makes this bay interesting is the presence of the name *Langskipneset* further in the bay. *Langskip* means long-ship, and is thus directly pointing to the large vessels employed by the Vikings, as no other vessels has later been referred to as this. This could imply that a levy vessel had its anchorage here, and thus a presence of a naval assembly place, or that one levy ship was positioned when not participating in the levy, or other campaigns. Bull[306] also saw this name in connection with the levy. If it is related to the levy, or just a Viking long-ship, then a further search for a boathouse in the vicinity might shed further light on the issue. And if this is the case, then the likelihood of *Stavneset* stemming from use of a barrage is even more probable.

4.4.3.2 Southern Part Of Norway

4.4.3.2.1 Kaupang[307]

One particular place of interest in southern part of Norway is the area adjacent to the old trading place Kaupang. When in use during the 8th and 9th centuries A.D., the area were controlled by the Danes, and knowing their familiarity with underwater fortifications as protective means connected with important sites, this is attractive. The

[306] 1920:116
[307] Known from the sagas as *Skiringssal* [Sciringsheal]

area around Kaupang would be one of the most interesting places if wanting to search for underwater fortifications in Norway.

Kaupang is argued to be the first Norwegian town, having been founded c.770/780 A.D.[308]. It is one of the few places of some size known from Norway in the early Viking Age. From the rest of Europe we also know of e.g. Birka, Hedeby, Ribe, York, Wolin and Dorestadt.

Axel Christophersen[309] argues that the trading town Kaupang was established by Danish kings as a transit port to take full advantage of the goods in Norway and the exchange system between Jutland in Denmark and the south western area in Norway[310]. It later came, probably during the ninth century[311], under Norwegian control, and the control over the goods exchange system must have played a vital role in the process to gain control over larger areas for the Yngling clan. The trading centre of Kaupang was targeted solely towards the sea, and it provided a good and safe harbour. The importance of worthy harbour facilities seems to be the most influential localisation factor for the early trading places.

The sea level at the time when Kaupang existed, was approximately 2-3m higher than present[312]. There is also a very minimal tidal difference in the area, as in the southern part of Norway in general. The flat landscape in the area implies that the higher water level would have meant that there would have been several more navigable channels in the approach to Kaupang. But it also meant that many of the small islands and rocks now visible would have been submerged at this stage, maybe aiding in a protective way as it would make local knowledge for safe navigation[313]. The many navigable channels were also important as ships could enter and depart regardless of wind direction[314].

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[308] Present excavations, 2000-2003, will hopefully tell whether it was inhabited on an all-year basis.
[309] 1991
[310] As the early towns were instruments used by the kings in the process of establishing a centralised trade with increased income to the crown instead of the church, Kaupang can be seen as an attempt from the Danish crown via the trade to gain further control over the Norwegian territory and its resources (e.g. Christophersen 1991; Crumlin-Pedersen 1996: 17).
[311] Christophersen 1991:168
[312] Blindheim *et al.* 1981:17
[313] Blindheim *et al.* 1981:23
[314] Blindheim *et al.* 1981:23

Kvalø has pointed to some very interesting place-names in the area[315]. The names *Klå stadstæ lka* and *Skarpestelk* are found in the former part of Viksfjorden, now reclaimed land, between Kaupang and Sandefjord. The word *stelk/stæ lk* means to ram posts in the sea. It could imply fishing weirs or others with non-military function, but this being adjacent to a very important trading place, the interpretation as fortifications is thrilling, showing that there are good indications that the area is worth a closer investigation[316].

4.4.4 What Next?

By studying the underwater fortifications in Norway, one is revealing yet another archaeological finds category, which will contribute to shed new light on the military system, as well as open for new approaches in the study of already well-known categories.

In the initial stages of further research, place-names will be one of the main available sources. As shown above, they are present in Norway, one just has to find out whether they are related to the underwater fortifications or not. The written sources do not contain many references to these structures, but possible misinterpretations in translations, or that they have been overlooked, must be borne in mind.

Being that most Norwegian fjords are so deep, one of the most likely types of constructions would have been a boom. In southern Norway, barrages are more likely to have existed. As underwater fortifications are vernacularly adaptable, and dependable, the likelihood that constructions other than mentioned in this text have existed cannot be ignored. If one for example encounters posts on the seabed, it is not sure that they have been part of a barrage, as posts for fastening fishnets also may leave such traces[317]. However, the barrages usually consisted of a huge amount of posts, whereas fish traps and other constructions most often only consisted of a few. There is also the fact that underwater fortifications might not have worked so well many places, as there can be so many choices of navigable channels that blocking one

[315] Kvalø, pers.comm. July 1999
[316] The nearby Tønsberg, with royal residence in the Viking Age, also has research potential. Here place-names such as *Sperrevik (Spervik, Spervikodden, Spervikbukta)* are found (Eli Ulriksen, pers.comm. Aug 2001). The Byfjord is also said to have been an assemblage for the levy-fleet (Lindh 1991:219).
[317] Crumlin-Pedersen 1996:14

of them might be in vain. However, the need to take the necessary precautions against sea-borne attacks must have been apparent in a country where the sea is the main source of life and people live adjacent to it, the question is just: what were the necessary precautions?

Chapter 5: Conclusion

This thesis, focusing on the role and composition of the coastal defence in Scandinavia, has showed that the military organisation varied within Denmark, Sweden and Norway, both in regards to the level of organisation available at different stages, and the types of defensive means, such as installations and weaponry. Although the many regional differences, the Scandinavian countries had much in common, due to much interaction and exchange of impulses and artefacts, through trade and warfare.

The anachronism of Hakon the Good being prime instigator of both levy and signalling system in the Gulathing area, where his political authority was strong, and later most of Norway, seems to be largely agreed upon. The most likely scenario is thus that he hugely participated in the forming of both systems, bringing together and renewing already existing elements in society and adapting them to suit the contemporary needs and purpose. The introduction, or organisation of neither seems to be agreed upon in Denmark and Sweden. The Danish levy must be older than 1170 when the word *leiðangr* is first mentioned in the laws, the question appears to be whether one emphasises archaeological or purely historical sources. Skuldelev 5 was scuttled in c.1050, and it is plausible to interpret this as a levy ship. Archaeological material presents silent evidence from the past which has to be interpreted, one way is to compare it with historical sources, what often happens is that archaeology provides information not found in the historical documents showing their inadequateness, which possibly is the case here. The origin of the Swedish levy is very uncertain but at least by the latter part of the 12th century it must have been present. Prior to the levy system Scandinavia was the ancient *mann av huse*, a regionally rooted defence where all were to protect their community with the necessary means. Initially the coastal defence was a means of survival, the levy organisation made it a duty.

A system of signalling sites existed in Scandinavia, an initially locally based system institutionalised and entered in the laws in the Norwegian laws in the mid-10th century, while the origin in Denmark and Sweden is harder to establish. The last military element, the underwater fortifications are known from Danish territory from pre-Roman Iron Age, though mainly from the 9th century and onwards much due to the

numerous Viking and Wendish attacks. Subsequently, Swedish investigations have showed their importance to the Swedish defence as well, as numerous fortifications have been identified in the last decades. Underwater fortifications are almost non-existing in the written documents. Place-names however, seems to yield such information, and the bulk of fortifications have been identified based on toponymic evidence. It comes down to knowing what to look for and becoming familiar with the source material.

Apart from one example, underwater fortifications are not known from Norway, mainly due to the lack of investigations and research. It would be diffusionistic to claim that underwater fortifications must have existed in Norway, due to their existence in the rest of Scandinavia, and the well-known bonds between the countries. But the thesis has showed that many of the fortifications were constructed as a consequence of the attacks by Norwegian Vikings, and it could thus be assumed that they, having seen their efficiency would be influenced, at least familiar with them. Through various indicators, such as place-names, organisation and geomorphology, discussed in this text, several aspects supporting the probability of their existence in Norway has been pointed out, and thus there is a just cause for expecting to locate them in the future through thorough research. At least by focusing on this heritage category, it is hoped the thesis to some extent have managed to create awareness on these particular structures and the validity of future research in Norway.

The three elements co-operated to a certain extent, though the level varies within the different countries and different time-periods. The signalling system was important as it warned people of danger, thus the levy could be mustered. The levy could not exist without some kind of warning system, while the veter could operate independently, as its main aim was to warn people, not systems. The underwater fortifications had a more independent role, being permanent structures and not needed to be manned in wartime. On the other hand the Foteviken fortification is suggested build by the levy, and although this aspect has not been thoroughly focused on, it will probably show that the underwater fortifications and the levy co-operated to a larger extent than the written documents reveal. That a number of signalling sites have been found adjacent to underwater fortifications, also mirror the collaboration and symbiosis.

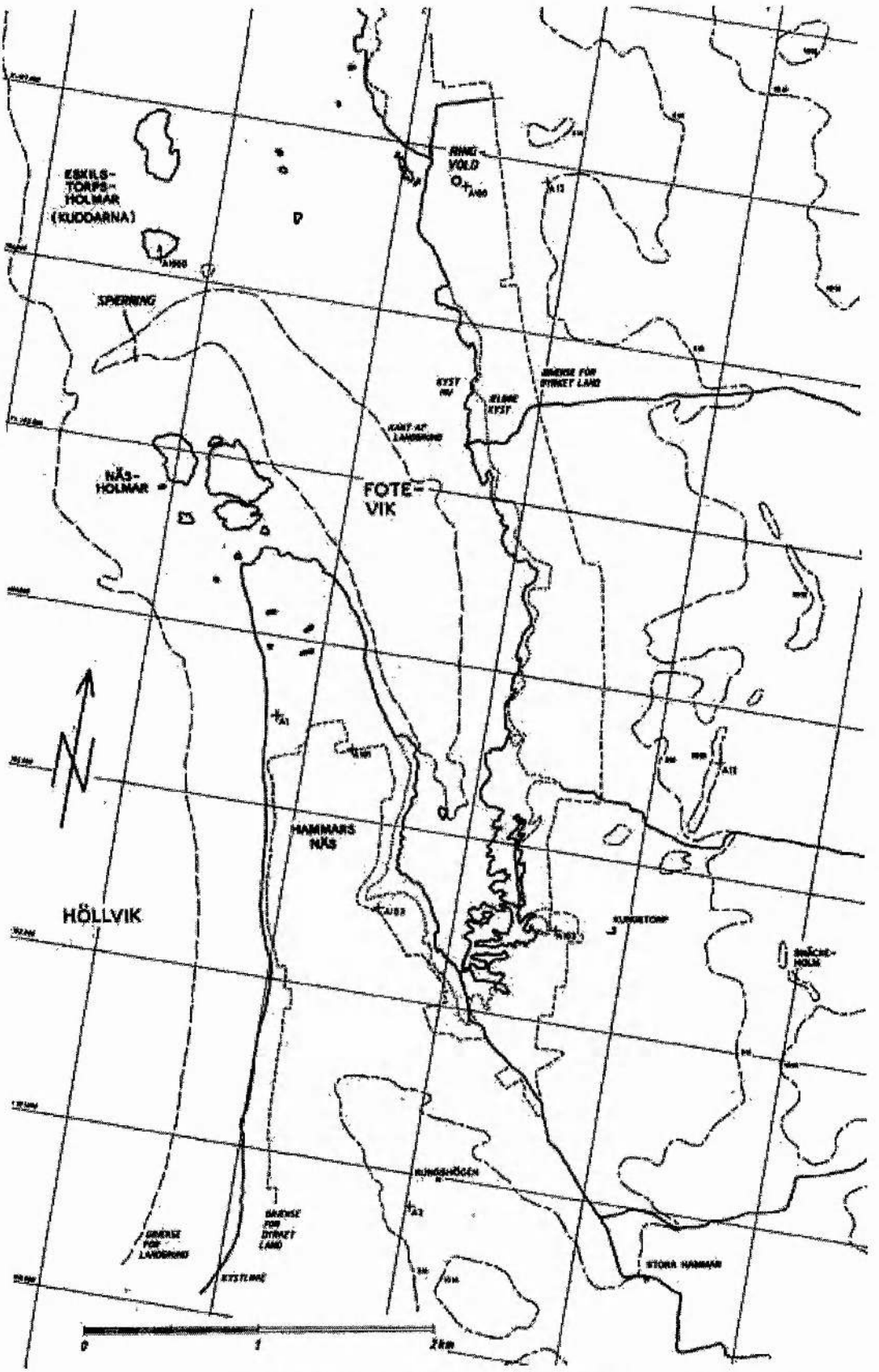
The adoption and organisation of larger defensive military systems must be seen in relation to the increase in the king's powers. As his realm increased and petty kings and chieftains became subordinates, so would also the various defensive systems spread and be utilized here. Thus the defence systems can be linked with the state formation process. The Norwegian state is a much younger phenomenon than the levy- and signalling systems, and it is not unlikely that the state subsequently evolved as a consequence of the well-established coastal defence providing safe home grounds, in which the state could come into being, rather than the other way around. The aspects of the state formation process has not been the aim of the thesis, this survey concentrating on the periods up until the introduction of taxes, being more or less the transition of the levy from a military to a fiscal organisation, but it would be of interest for further studies.

Appendix I - *Map of Scandinavia with sites discussed in this thesis*

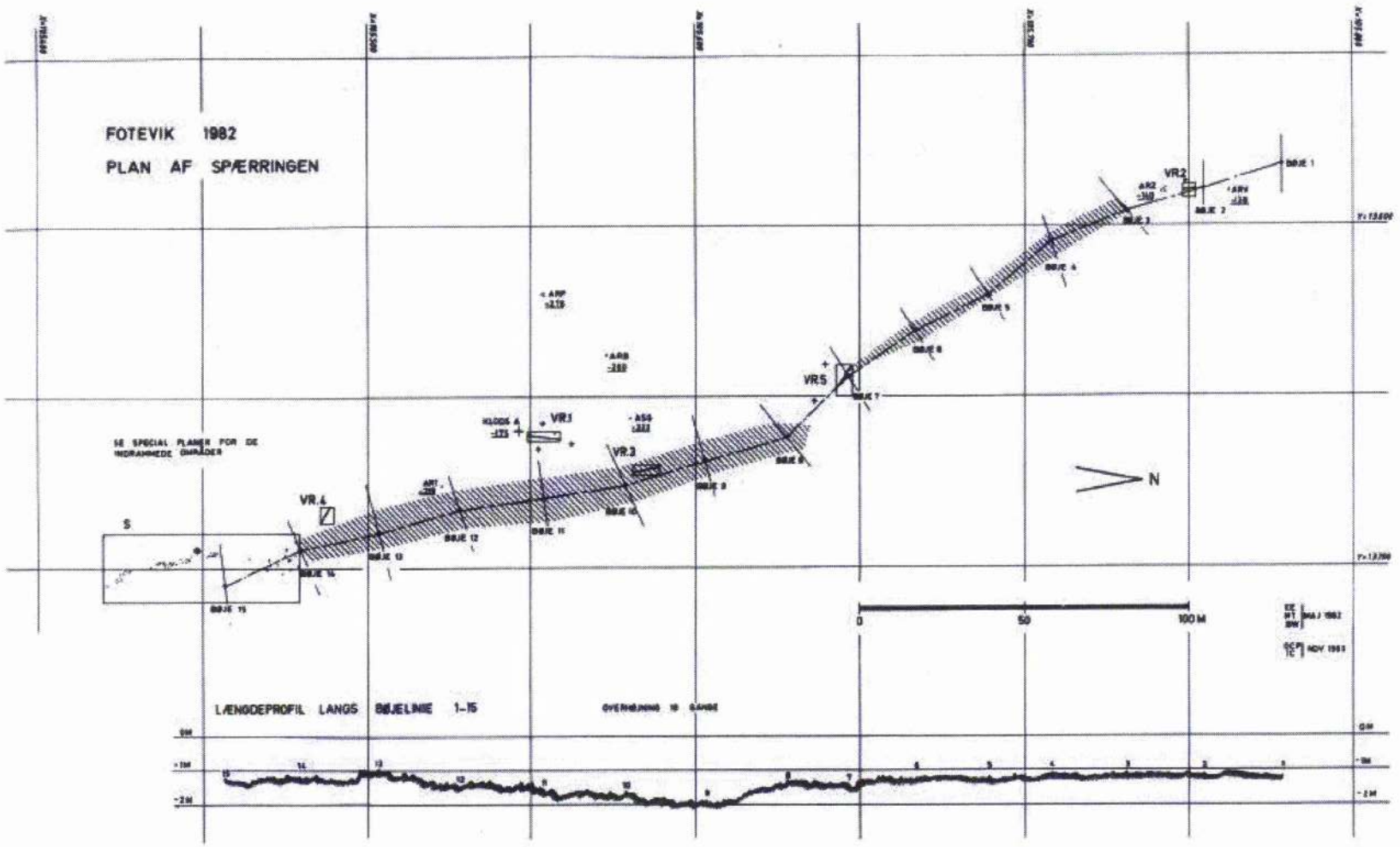
Appendix II - *Map of Denmark showing discussed underwater fortification sites*

Skipreider og sessar i Noreg						
Landsdel	a) Oppheving til skipreider	b) Skipreider i MK lest	c) Tal på skip i GL	d) Sessar per skip etter GL	e) Sessar totalt etter GL	f) Sessar i GL per skipreide MK
Sønnafjelske	48	48	60	20	1200	25,00
Egdafylke	16	15	16	25	400	26,66
Rygjafylke	32	32	24	25	600	18.75
Hordafylke	32	32	24	25	600	18.75
Sygnafylke	16	16	16	25	400	25,00
Firdafylke	20	15	20	25	500	33,33
Sunnmørafylke	16	16	16	25	400	25,00
Romsdølafylke	8	8	10	20	200	25,00
Nordmørafylke	16	16	20	20	400	25,00
Trøndelag	64	59	80	20	1600	27,11
Naumdølafylke	9	9	9	20	180	20,00
Hålogaland	13	13	13	20	260	20,00
Hålogaland			1	30	30	
	290	279	309		6770	

Appendix III - *Table showing the number of* skipreider *and* sesser *in Norway, and the difference in number between GL and MLL (Ersland 2000:83)*



Appendix IV – *Map of the Foteviken area, with the location of the barrage in the top left corner (Crumlin-Pedersen 1984:fig.7)*



Appendix V – *Site-plan of Foteviken showing the outlines and dimensions, including finds of wrecks and poles, shaded are indicates the stone-assemblages (Crumlin-Pedersen 1984:fig.16)*

Appendix VI – *Chart section of Stokkøya, including the place-name* Stokkneset *and the 'log-like'* Stokksund *(Main Chart Series 44, 1:50 000)*

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