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Alexandra Sanmark[i*] and Shane McLeod[i]

Abstract - This article explores the navigation and seafaring strategies used by Norse mariners in and around the Northern Isles of Scotland. To do so we draw upon a diverse range of sources including saga accounts, placenames, archaeological remains, early historic maps as well as logistical considerations. This diachronic perspective is inspired by Christer Westerdahl's "maritime cultural landscapes" methodology as well as recent studies of prehistoric seafaring. It is demonstrated, through close examination of the available evidence, that the Norse mariners had very well-developed strategies to avoid dangers as well as maximize their efficiency at sea to ensure that journeys were as safe and fast as possible. Topics explored include navigation markers, naming strategies, landing places, portages, beacons, anchorages and pilots.

Introduction

This article examines Norse navigation and seafaring in the Northern Isles of Scotland, i.e., the Shetland and Orkney archipelagos, as well as the northern coast of the Scottish mainland. The Norse period (c. 790–1350AD)[1] is characterised as a time when Scandinavians left their homelands in substantial enough numbers to be noted by their neighbours, as they raided, traded and settled across large parts of Europe and beyond. This movement of people and goods was dependent on the Scandinavians' ships and sailing skills which allowed them to reach new lands. Although significant research has been undertaken on Norse-period ships and boats, including excavations of vessels, reconstructions of those found, and re-enactment of sailing voyages (Bill 2007, Crumlin-Pedersen 2010, Englert and Ossowski 2009, Vikingeskibsmuseet), less is known about navigation and the sailing strategies used to minimise travel times through efficient use of currents, winds and natural features, as well as to avoid natural hazards such as storms and hidden rocks (but see Indruszewski and Barton 2008). One reason for this is the lack of detailed sources that provide insight into Norse navigation and seafaring strategies. Indeed, general statements about sea crossings tend to be made, without the backing of any evidence, such as "There would have been … established boat routes between islands" (Fraser 2023:19-20), "hopping from island to island, vessels first reached …" (Clements 2005:99) or "sailing westward through the [Pentland] Firth, Vikings reached the northwest tip of Britian" (Hall 2007:127).

This publication is one outcome of two major ongoing research projects, *Connectivity and Communication in Norse Orkney*[2] and *The Norse and the Sea: The Maritime Cultural Landscape of Scandinavian Scotland*[3]. In view of the lack of research highlighted above this article is intended as a starting point for more in-depth studies of navigation and seafaring in Norse Scotland and the wider geographical region. Further publications on topics, such as beacons, portages and maritime resources are in progress. Together, these publications will build on methodologies developed by others (e.g., Westerdahl 1989, 1992), complement models of seafaring (e.g., Blankshein 2022, Dugmore et al. 2010, Indruszewski and Barton 2008), and help to provide a more complete picture of Norse seafaring strategies.

The period of study begins with the first recorded viking raids in Scotland in the late eighth century AD. The date of the first Norse settlements is debated, with some potentially starting in the first half of the ninth century AD, such as Norwick in Unst, Shetland. Generally, though, permanent settlements do not seem to have been in place until the 850s (Ballin Smith 2007, Barrett 2008:418–22, Crawford 1987:39-48). In the tenth or eleventh century AD, the Earldom of Orkney came into being, which at its greatest extent in the middle of the eleventh century AD seems to have included Orkney, Shetland, Caithness, Sutherland and possibly the Outer Hebrides. Norwegian power gradually increased, and Orkney and Shetland became one of the Norwegian *skattlands* and remained so until 1468/9 AD (Crawford and Taylor 2003:3–10, Imsen 2014:79–88, Woolf 2007:300–8). The significance of seafaring to the Norse is illustrated by the make-up of the Earldom, which at the height of its power, covered large areas and several island groups linked by the sea. The connection between Caithness and the Orkney Islands is worthy of attention as Barbara Crawford has emphasised that the Pentland Firth, despite its dangerous nature, served as a link— not a divider—between the two areas (Crawford 2013:11).

[i]Institute for Northern Studies, University of the Highlands and Islands, Perth, UK. [*]Corresponding author: Alexandra.Sanmark@uhi.ac.uk.

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Approach, Sources, and Methods

In order to provide new insight into Norse seafaring and navigation in and around the Northern Isles, an interdisciplinary approach encompassing a range of source materials using a long-term perspective, from archaeology to written evidence, placenames and maps, has been applied. This method is very much inspired by Christer Westerdahl's work on "maritime cultural landscapes" (Westerdahl 1989, 1992) as well as more recent explorations of prehistoric seafaring (Blankshein 2022, Bradley et al. 2016, Phillips 2004, Robinson 2013). The latter researchers have highlighted the lack of knowledge of past, particularly prehistoric, seafaring and developed useful methodologies to address this gap. Blankshein (2022) argued for a nuanced approach attempted through an integrated land-sea least-cost method used to model seafaring around the Outer Hebrides in the Neolithic period. In this way, new thoughts on Neolithic seafaring are advanced and Blankshein, through the use of material from later time periods (up until the modern day) draws attention to many longstanding traditions and sea travel in the Hebrides (Blankshein 2022). Efforts to simulate Viking-Age seafaring have moreover been attempted through computational modelling in combination with experimental archaeology to simulate sea routes travelled around a thousand years ago (Indruszewski and Barton 2008).

Detailed descriptions of seafaring and navigation in the Norse era are few, especially those that are specific to the Northern Isles, but enough survives to provide some information about general conditions and the strategies and techniques used. For the later Norse period, *Orkneyinga saga*, first composed in c. 1200 AD, includes many passing references to seafaring and navigation within and between the Northern Isles. This saga also incorporates earlier poetry, including some from the mid-twelfth century AD which is discussed herein (Pálsson and Edwards 1981). As a powerful earldom and important stopping place on voyages between Norway/Scandinavia, western Scotland and Ireland, Orkney[4] is also mentioned in other sagas, including *Hákonar saga Hákonarsonar, Njals saga* and *Egils saga* (Cook 2001, Dasent 1894, Scudder 2001). These sagas are set throughout the Norse period and also sometimes provide snippets of information on sailing conditions and navigation. This article moreover refers to relevant sections from sagas about other geographical areas, such as *Fóstbræðra saga* (Hreinsson 1997) and *Grænlendinga saga* (Magnusson and Pálsson 1965) to provide a fuller picture of Norse seafaring in the North Atlantic. Whilst the sagas are literary accounts written down towards the end of the Norse era and with various biases, the events discussed in *Hákonar saga* and *Orkneyinga saga* cited in this article were contemporaneous. For example, for *Orkneyinga saga* it has been stated that the saga seems "trustworthy" as a source for the twelfth and the thirteenth centuries AD and that some of the material "clearly derives from Orcadian narratives of recent events" (Jesch 2005b:14). The text moreover demonstrates detailed knowledge of northern Scotland and its geography (Jesch 2005b:14). Political bias in saga portrayals of travelling have, however, been highlighted where voyages between Norway and Iceland tend to be depicted as standard and relatively uncomplicated, while journeys to Greenland and Vinland are described as very difficult, with bad storms and shipwrecks (Barraclough 2012, Jesch 2005a:120).

This study also draws on other written sources with relevant information on seafaring such as the *Landnámabók* version produced by lawman Haukr Erlendsson, dating from the early fourteenth century AD (Benediktsson 1968, Jesch 2005a:119-20), as well as *The Laws of the Land* issued by King Magnus Hakonson "the Lawmender" of Norway (r. 1263-1280), which covered also the *skattlands* (Friðriksdóttir 2024:ix, Keyser and Munch 1848, 1849). Orkney and Shetland placenames derived from Old Norse (hereafter ON) form another important piece of evidence. Some of these appear in sagas, above all *Orkneyinga saga* (Pálsson and Edwards 1981), but the majority are found in the *Orkney Rentals* of 1492 AD and c. 1500 AD (Marwick 1952:192). Although placenames can be difficult to interpret as their form can drift over time, they do provide clues to the locations of landing places, portages and inland water routes (cf. Stylegar and Grimm 2003), and in some instances seem to have provided sailors with warnings or sailing instructions.

The archaeological evidence from the Norse period employed in this article includes accompanied burials of Scandinavian type, settlements, as well as *thing* (assembly) sites, beacons, and chapels. These remains are overwhelmingly located in the vicinity of the sea (Figs. 1 and 2), as also demonstrated by Anne Allen's detailed analyses of Norse settlements in Orkney (Allen 1995:60, 68-69). These results demonstrate the links between people and the sea and suggests usage of marine resources as well as travel by boat within and between the archipelagos. This in turn highlights the need for landing places and navigation markers, as well as pilots, to help sailors reach their destination, especially for places attracting visitors from farther afield. Moreover, archaeological remains from a much longer time peri-

Figure 1. Burials, *thing* sites and a selection of settlements (attested archaeologically and in place-names) in the Orkney Islands and Caithness, dating from the Norse period (Canmore, McLeod 2015a, Sanmark 2017:197-199). Note the overwhelming distribution along the coast as well as along the water route through the West Mainland of Orkney. This inland water route is shown in greater detail in Figure 5. ©Crown Copyright/database right 2011. An Ordnance Survey/EDINA supplied service. All rights reserved 2010. Map: Alexandra Sanmark and Shane McLeod.

Figure 2. Burials, *thing* sites and a selection of settlements (attested archaeologically and in place-names) in the Shetland Islands, dating from the Norse period (Canmore, McLeod 2015a, Sanmark 2017:197-199). Note the overwhelmingly coastal distribution. ©Crown Copyright/database right 2011. An Ordnance Survey/EDINA supplied service. All rights reserved 2010. Map: Alexandra Sanmark and Shane McLeod.

od can inform studies of seafaring (Blankshein 2022, Bradley et al. 2016, Phillips 2004, Robinson 2013). This is important because Orkney and Shetland were populated from the Mesolithic period, and the Norse therefore interacted with settled populations and used existing structures. Upon the Norse arrival the islands were inhabited by the Picts. The personal interaction between the Norse and the Picts (Smith 2003) will not be examined here, but it is important to note that many Norse farms were established on top of earlier Pictish and Iron-Age settlements. A major reason was presumably that these were situated in prime locations for subsistence. A key feature of many of these long-standing settlements is access to the sea, as seen for example at Buckquoy, Mainland Orkney (Canmore ID 1802, hereafter "ID" will be omitted), Pool in Sanday (Canmore 3422), Orkney and Norwick in Unst, Shetland (Ballin Smith 2007, Ritchie 1979).

Other longstanding links between land and sea have also been demonstrated. It has been argued that the Neolithic chambered cairns in Orkney were sited on the coast and not particularly visible from land, but instead "widely visible *from the sea*" (Phillips 2004:376). These monuments would have been useful to neolithic sea travelers, but likewise to those of later periods. This links into interesting studies arguing that people of the past would have had intricate knowledge and understanding of the sea and its patterns, such as tides, currents and winds. Through regular activities "the sea, like the land, becomes socially constructed" (Robinson 2013:2.2). The sea—in any time period—may be further understood through wayfaring, such as observing stars, waves and winds, as well as landmarks seen from the sea (Robinson 2013:2.2, with references, see also Westerdahl 1989:69-83 for the importance of oral traditions). Anthropological studies have shown that the sea can be woven into mythology and contain "named places frequently inhabited by powerful spirits and ancestral beings", as for example observed among Aboriginal communities in Arnhem Land, Northern Australia (Robinson 2013:2.2). These studies are all significant for this article as they can aid the understanding of the Norse strategies of seafaring and navigation. As will be demonstrated below, the sea was clearly socially constructed in the Norse period through regular and active use of mental mapping. It is also shown that Norse maritime placenames were at times connected to mythological beings.

This leads on to maps, the final type of source material used in this article. The most important are the maps and associated instructions produced by the eighteenth century AD Orcadian hydrographer and cartographer Murdoch Mackenzie. His detailed survey of the Orkney Islands provided the first accurate navigation maps of the area, and became widely used (Groundwater 2019, Mackenzie 1750a-e). Mackenzie's maps are of particular interest for this study as they were produced in the time of non-motorised crafts. They can suggest what strategies were used for successful handling of the sea in these types of boats and ships. They can also provide many navigational details that were significant for Norse sailors, such as the strength and direction of tides and currents, suitable places to wait for the right sailing conditions, safe harbours and anchorages, the best sailing routes between islands, as well as skerries and sand banks (Mackenzie 1750a-e). It is thought that general climatic and large-scale environmental conditions, including currents, have been stable for the last seven thousand years or so (Rahnstorf 2002). Consequently, the tides and currents shown on Mackenzie's maps are probably similar to those of the Norse period and so aid our understanding of the challenges and opportunities offered by the seas around the Northern Isles. There are differences of course: as the boats and ships of the Norse period had considerably shallower drafts (Bill 1999) than those in later periods, a much greater number of harbours and landing places are likely to have been available to sailors than marked on the early modern maps. Other historical maps that have been consulted include the first edition Ordnance Survey (hereafter OS) maps dating from the late nineteenth century AD. Relevant information from these maps have been plotted in ArcGIS, together with placenames and archaeological data, collected from the Canmore database and relevant publications.

The source materials discussed above are used in this study to provide a new overview of Norse seafaring around the Northern Isles. In this way, we are building on longstanding traditions of navigation observed in this geographical area, but also drawing on studies of archaeology and anthropology carried out elsewhere. The intention is not to suggest that sailing conditions, currents and tides are constants and can be studied in this fashion, instead that the different types of evidence can provide insight into navigation and seafaring in a time before motorised crafts and modern navigational aids. By utilising a diverse array of sources, we will discuss under-researched aspects of maritime culture in the Northern Isles including navigation, sentinel sites, landing sites and portages. By using these strategies, not only could dangers be avoided, but travelling became more efficient.

Navigation in and around the Northern Isles

Sources from different periods all show that seafaring and navigation in the North Atlantic, including the Northern Isles, can be challenging and dangerous. The

northern Atlantic seaboard in particular "is exposed to strong winds and ocean swell", has rocky coastlines with "fjords/firths … coastal islands, as well as estuaries with a strong tidal impact", all of which contribute to perilous sailing conditions (Crumlin-Pedersen 2010:15). The Pentland Firth between Orkney and the Scottish mainland is a notoriously dangerous stretch of water, as emphasised by Mackenzie's introduction to his maps, where he stated that "the Tides run with greater Rapidity and Diversity of Motions, than any other Part of *Orkney*, perhaps of *Britain* … this Passage along the *North Coast of Scotland* is thought extremely hazardous" (Mackenzie 1750:4). The same sentiment is expressed in *Orkneyinga saga*, which states that sometime after Michaelmass (29th September) "a fierce gale was blowing and the weather was so bad the Pentland Firth was impassable most of the time" (Pálsson and Edwards 1981:194). *Hákonar saga* moreover asserts that in 1263 AD when King Hakon (1217-1263 AD) returned to Orkney from the Hebrides and crossed the Pentland Firth "there was a "great race", ON *röst mikil*, in the firth, and there a ship from Rygjafylk [in Norway] was lost, and all the men that were in her" (Dasent 1894:364, Vigfusson 1887b:352). ON *röst* translates as "a current/stream in the sea" (Cleasby and Vigfusson 1874:508) and "maelstrom/whirlpool" (Heggstad et al. 1975:351). The dangers of these conditions are further elaborated on in *Orkneyinga saga* when Earl Erlend and Sveinn Asleifarson "ran into dangerous tidal currents and fierce winds at Sumburgh Roost [Shetland] [ON *röst*] and the ships were separated" (Pálsson and Edwards 1981:193). Also, in the time of Mackenzie the whirlpools of the Pentland Firth were seen as "amazing and terrifying to such as have never been experienced in Tide-ways" and that they have cavities "in the form of an inverted Bell, wide and rounded at the Mouth, and growing narrower at the Bottom" (Mackenzie 1750:4 and 2). This illustrates the real danger to crews in small non-motorised crafts in all time periods. Weather conditions moreover affected sailing and the "accuracy of navigation" (Bernáth et al. 2014:16), both in positive and negative ways. Long hours could be spent in harbours or sheltered anchorages waiting for fair winds. Once good winds and clear days arrived, they provided ideal conditions and could enable speedy journeys, as is frequently stated in sagas, for example "they put out to sea before a fair wind and made land at Shetland" (Pálsson and Edwards 1981:130). In order to stay clear of bad weather as much as possible, long-distance voyages tended to be avoided out of season (Ogilive and Pálsson 2003:262). This is evident for example when King Magnus of Norway advised against crossing between Norway and Orkney "until winter had passed, the ice had melted and the sea was navigable" (Pálsson and Edwards 1981:68). Another example from the same saga is when Valthjof Olafsson "set out in a ten-oared boat, but was drowned with his crew in Stronsay Firth on Christmas Eve" (Pálsson and Edwards 1981:124). Similarly, a passage in *Egils saga* also highlights the dangers of sailing out of season, in this case autumn, when Egil left "too late for favourable winds" and, avoiding landing in Orkney for political reasons, sailed south along the east coast of Scotland, where he encountered a storm and ended up running aground in the mouth of the Humber, in northern England (Scudder 2001:109-110). Further insight into the details of planning for the best winds, and therefore safe and fast travel, is found in *Orkneyinga saga* when Earl Rognvald concluded that it was best to "wait till the spring tide coincided with an easterly wind", as under the current conditions sailing between Westray and Mainland was barely possible, although it was added on a more positive note that "with the wind easterly one can sail from Shetland to Westray" (Pálsson and Edwards 1981:133). In this instance, the tides and wind needed to be working in tandem.

There is great debate on how much access to navigational equipment, such as sunstones or a sun compass, Scandinavian seafarers had during the Norse period, with arguments both for and against their use (e.g., Bernáth et al. 2014, Bill 1999:198-199, Filipowiak 2020, Hegedüs et al. 2007, Száz and Horváth 2018). Even if Scandinavian seafarers did not use a compass, with clear skies they could identify their location by the position of the sun and stars. Evidence from the earliest Icelandic law *Grágás* and the tale (*þáttr*) *Stjörnu-Odda draumr* (*"*Star-Oddi's Dream") demonstrates that the sun was used for navigation through measuring its altitude over the horizon, as well as taking bearings and directions in relation to the sun (Indruszewski and Godal 2006:21-22, Lárusson 1981, O'Connor 2012). The Old Norse name for the North Star, *leiðarstjarna,* moreover suggests that it was commonly used for navigation, as this translates as "leading star" (based on *leið* = "that which leads, a lode, way") (Cleasby and Vigfusson 1874:380). In addition, a reference in Adam of Bremen's *History of the Archbishops of Hamburg-Bremen* (1075 AD) to navigating at night between Jutland and Norway makes it clear that the North Star was used for this purpose (Ellmers 1981).

Placenames, sagas and runic inscriptions furthermore show regular use of the four cardinal points, at least in text. For example, a poem by Earl Rognvald Kali Kolsson of Orkney (c. 1100-1158 AD), set in the Mediterranean, notes a "Constantly north-curving the coast" (Pálsson and Edwards 1981:173). Moreover, the Hebrides were commonly referred

to as the *Suðreyjar*, or Southern Isles (e.g., Vigfusson 1887, 4). When Sveinn Asleifarson returned to Orkney it is reported that he "reached almost due west of the Point of Stoer [on the north-west coast of the Scottish mainland]" (Pálsson and Edwards 1981:195). The cardinal points were also used in a vaguer, though still correct, geographic sense, such as the runic inscription which states that Ingvarr son of Sigsteinn "died in the east" (Ög 30, dated to c. 1010-1050 AD), and according to Sö 14, c. 1010-1050 AD, Ragna's husband Sveinn "was in the west with Gautr/Knútr" (Jesch 2001:69, Samnordisk runtextdatabas). The regular use of the cardinal points is further supported by their appearance in placenames, which may be earlier than the written texts, such as the Orkney examples of Westray ("West Isle"), Auskerry (most likely from "East Skerry") Suthirgarth "South Farm" and Norton "Northern part of the Tun" (Marwick 1952:31, 22-23, 137, 181). Together with the quote from *Landnámabók* discussed below, these references demonstrate that the Norse were aware of the cardinal points and used them for geographic regions and sailing directions.

Mental mapping

Mental, or cognitive, mapping is an important aspect that needs further examination in a time when the Norse did not have access to physical maps (cf. Indruszewski and Godal 2006:25). Indeed, it has been argued that in the era before physical maps, travel required "mental maps to locate distant points, in which travelling time, direction and landmarks were embedded in a sequence" (Broodbank 2002:23). Evidence suggests that routes and advice were preserved and passed on via oral traditions (cf. Westerdahl 1989:69-83). The well-known text in Haukr Erlendsson's edition of *Landnámabók* which sets out some common sailing routes provides a useful starting point for this discussion. Judith Jesch has argued that this text is important since it most likely reflects the experiences of Haukr himself, who divided his time between Iceland and Norway, as well as those of sailors over time (Jesch 2005a:120). The part of the text that relates to the voyage between Norway and Greenland reads:

> Learned men say that it is seven days' sailing from Stad in Norway to Horn in eastern Iceland, and four days' sailing from Snæfellsnes [in western Iceland] to Hvarf in Greenland. Hvarf is reached by sailing due west from Hennøya in Norway, and then one will have sailed to the north of Shetland so that it can only be seen in good visibility at sea, and south of the Faroes, so that the sea is [appears to be] halfway up the slopes, and to the south of Iceland so that they can see its birds and whales (Benediktsson 1968:33-35, Jesch 2005a:119-20).

This text implies that using striking topographic features linked to descriptive placenames formed a key part of navigation, both for new arrivals and those who had visited before. This is exemplified by the placenames included above, such as Reykjanes, which translates as "Smoky Headland" and refers to the geothermal springs in south-east Iceland that appear as smoke from afar, and Snaefellsnes, "Headland with the Snowy Mountain", which is also visible from a great distance (Jesch 2005a:121). Names of this type frequently occur in the Northern Isles too, with examples such as Hoy ("High Isle"), Flotta ("Flat Isle"), Kirkwall ("Church Bay"), Sanday ("Sand Isle") all in Orkney (Marwick 1952:6, 178, 187), with Lerwick ("Muddy Bay") and Rerwick ("Reed Bay") in Shetland (Stewart 1987:295). The use of placenames for directions and as conveyors of stories ties in with Stefan Brink's argument that placenames are "geographical memory pegs", without which "it is impossible for us to orientate ourselves in the world" (Brink 2019:565).

The most obvious natural features presumably included prominent hills that were visible from a great distance. This method was still in use in the eighteenth century AD as Mackenzie frequently included in his map's drawings of islands in profile as seen from specific locations as an aid to navigation (Fig. 3a and b; Mackenzie 1750a). Occasionally he also included additional information, such as "Hoy and Walls … dark Weather", thus offering assistance to sailors in different weather conditions (Mackenzie 1750a). The distinctive profile of the hills of Hoy as viewed from across Scapa Flow are also seen in Figure 4. Closer to shore, constructed features would have been of use, especially ancient sites of a visible nature. Constructed features that could serve as navigation markers already existed in the Northern Isles prior to the arrival of the Norse, and these were presumably learnt quickly by sailors. Such structures include the Neolithic chambered tombs mentioned above, as well as cairns, mounds and brochs (drystone Iron-Age towers) (cf. Phillips 2004). One striking example is the Broch on the Isle of Mousa, Shetland, which today is still 13.3 m high (Canmore 944). This site is mentioned as a place of refuge in *Egils saga* and a settlement in *Orkneyinga saga* (Pálsson and Edwards 1981:190, Scudder 2001:54). Mousa is, however, unusual as broch remains in the Norse period often seem to have been visible as large turf covered mounds (O'Grady 2008:199). Other broch sites moreover had Norse settlements, such as The Howe ("The mound") on Orkney Mainland and Old Scatness, Shetland Mainland (Canmore 1731, 190775). The Howe is a particularly interesting example because of its location by the Brig o' Waithe,

which in the Norse era was the entrance to the lochs of Stenness and Harray and the connected inland water route through the West Mainland (Figs. 1 and 5) (Bates et al. 2020). It is therefore interesting to note that according to Canmore, there is a "modern cairn … on the highest point of the mound [The Howe] as a navigational mark" (Canmore 1731). By the later Norse period there were also newly constructed stone buildings that were useful as navigation markers, with St Magnus Cathedral in Kirkwall, begun in 1137 AD, visible up to 8 km away to the North from the water (Phillips 2004:382).

Another example of the use of placenames and distinctive features for navigation may be Fair Isle, located 38 km from the southern tip of Shetland Mainland and 43 km from North Ronaldsay, the most northerly Orkney island. The ON name for Fair Isle is recorded as *Friðarey* "Peaceful/Fair Island" or "Truce Island" (Kruse 2011:18, 21).[5] The earliest Scots forms, however, are different: *Fairyle* and *Fair yle* (1572 and 1576 respectively; Ballantyne & Smith 1999:146, 174; Kruse 2011:17-18) and Arne Kruse has argued that Fair Isle may instead be derived from ON *fara* "to travel" and *far*, "course, trail" and that this name suggests that Fair Isle had a role as a navigational marker and/or shelter (Kruse 2011). Kruse based his conclusion on a study of Norwegian islands with this type of name and added that Fair Isle is a key example because of its location which gave the island a very important role for navigation and travel between Shetland and Orkney and also between Norway and the Northern Isles (Kruse 2011). Viewed from a distance the inclusion of Fair Isle makes the Northern Isles a continuous, visually linked archipelago that stretches over 160 km and, consequently, makes it hard to miss on a westwards course from Norway, even in ships without modern equipment for navigation (Kruse 2011:17).The importance of Fair Isle as a link between Orkney and Shetland is moreover highlighted by a profile drawing of Fair Isle appearing on Mackenzie's map, thus providing instructions for those sailing north from Orkney. Mackenzie also included profiles of Sumburgh Head and Fitful head, both distinctive features in southern Shetland Mainland and therefore useful to travellers arriving from the south (Mackenzie 1750a). In addition, Kruse suggested that in Orkney Faray, situated between Westray and Eday, and Fara, between Hoy and Flotta, may have the same type of name (Kruse 2011:31-32, cf. Marwick 1952:52, 186) and that it is not impossible that the Norse name for the Faroe Islands, *Færeyjar,* carried the same meaning too (Kruse 2011:32-35). This suggestion becomes particularly interesting bearing in mind the

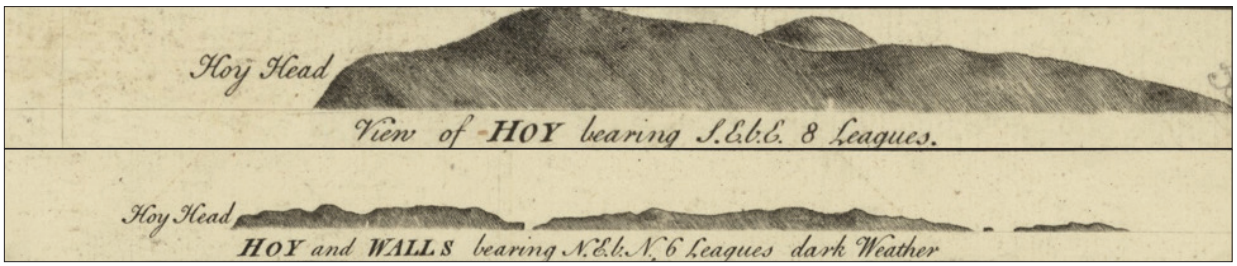

Figure 3. Two of Mackenzie's island profiles designed as navigation aids: a: "View of Hoy bearing S. E. b. E 8 Leagues" and b: "Hoy and Walls bearing N. E. b. N 6 Leagues dark Weather" (Mackenzie 1750a). The location of Hoy and Walls can be seen on Fig. 1. Used with the kind permission of the National Library of Scotland.

Figure 4. The distinctive hills of Hoy as seen from across Scapa Flow. The location of Hoy is seen on Fig. 1. Photograph: Alexandra Sanmark.

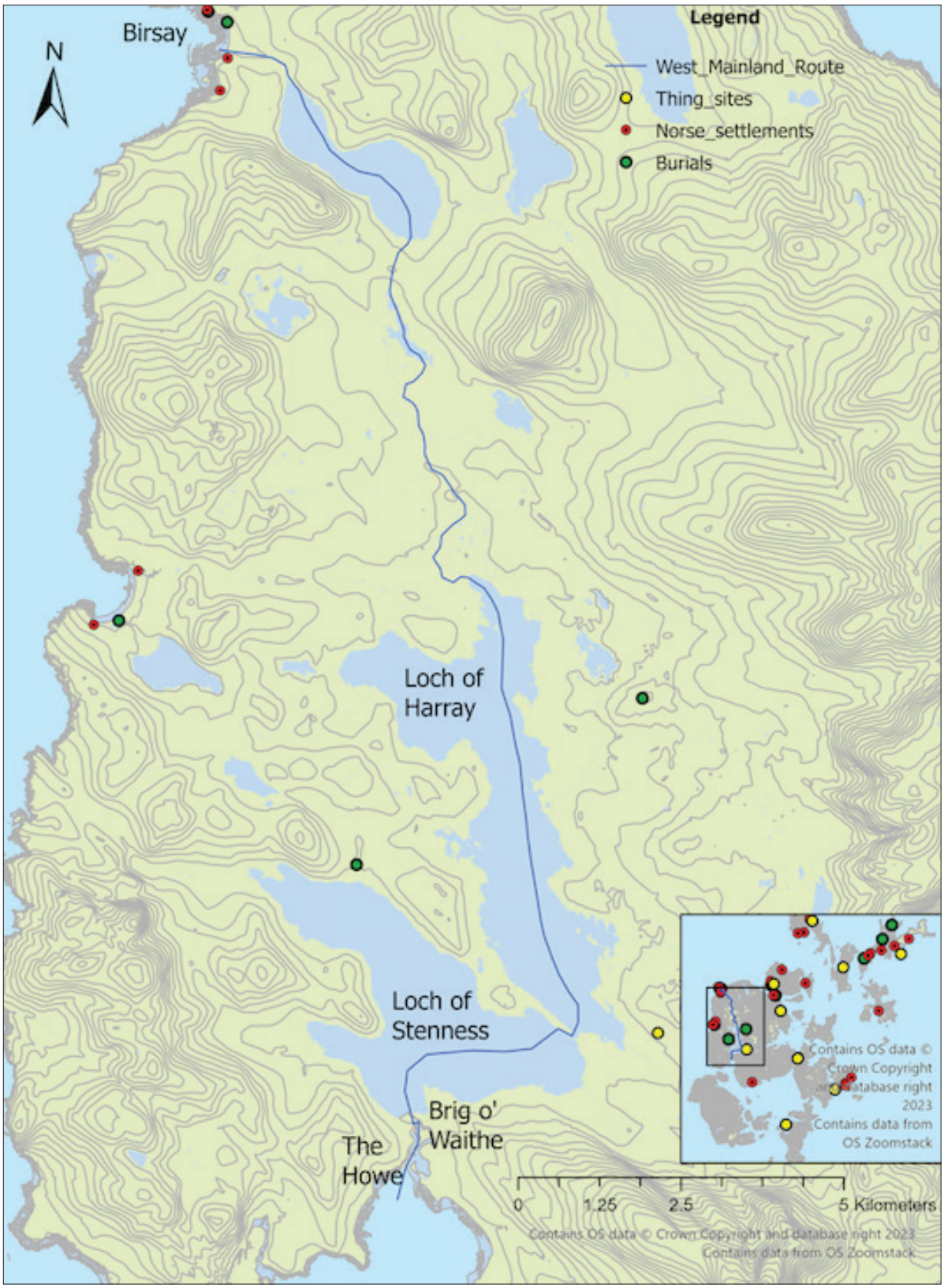

Figure 5. The suggested water route across the West Mainland of Orkney (Bates et al. 2020), also seen on Figure 1. An Ordnance Survey/EDINA supplied service. All rights reserved 2010. Map: Alexandra Sanmark, Shane McLeod and Richard Bates.

mention of the Faroe Islands in the *Landnámabók* sailing instructions (Benediktsson 1968:33-5).

Placenames did not only describe the landscape; there are some that can be seen to contain active sailing instructions. Hvarf, on the southern tip of Greenland, is one such example as the name translates as "turn" or "turning point" and denotes the headland where sailors needed to change course to continue along the western side of Greenland. Cape Wrath on the most north-westerly point of the Scottish Mainland is also derived from *hvarf*. Here sailors crossing from the Western Isles heading north (or vice versa) would have to change direction unless they were to head out into the open ocean (Jesch 2005a:121). Another example of a *hvarf* name is Quarff in the South Mainland of Shetland (Fig. 6, Stewart 1987:175). This is particularly interesting as Quarff is not located at an obvious turning point, but instead seems to have provided directions to a portage, as will be demonstrated below. Other placenames indicating portages are those containing ON *eið*, such as Dingieshowe (ON **þingeiðshaugr*, "Mound of the *Thing* Portage/Isthmus") in Orkney and Aithsting in Shetland (Waugh 2010:545, B. Sandnes, Kartverket Trøndelag, Norway, 2016, pers. comm). *Eið* can be translated purely as "isthmus", but seems to refer to isthmuses that were used as portages for goods or people and probably also stretches of land which served as portages, but which cannot be defined as isthmuses (Heggstad et al. 1975:86, Waugh 2010:545, cf. Nymoen 1995:34-35). Placenames with the ON element *hlunnr,* such as Lunna (**hlunn-eið*) in Mainland Shetland, can also be included among the names seen to provide instructions for sailors, as this is the name for the split wood logs over which boats were pulled across the portage (Stewart 1987:59, 80, Vinner 1997:100-105, Waugh 2010:545). These names thus signal not only a portage, but that there was infrastructure in place to make the crossing easier.

Burials

Scandinavian settlers added to the potential navigation markers during the ninth and early tenth centuries. Accompanied burials, i.e., those with grave-goods, often in or near prehistoric mounds, were created along important water routes, primarily coastal, in the period between roughly 850 and 950 AD, and indicate nearby landing sites (McLeod 2015a, b). Indeed, the numerous boat burials (eg. Graham-Campbell and Batey 1998:64, 135-140) demonstrate that the nearby landing site were used prior to the

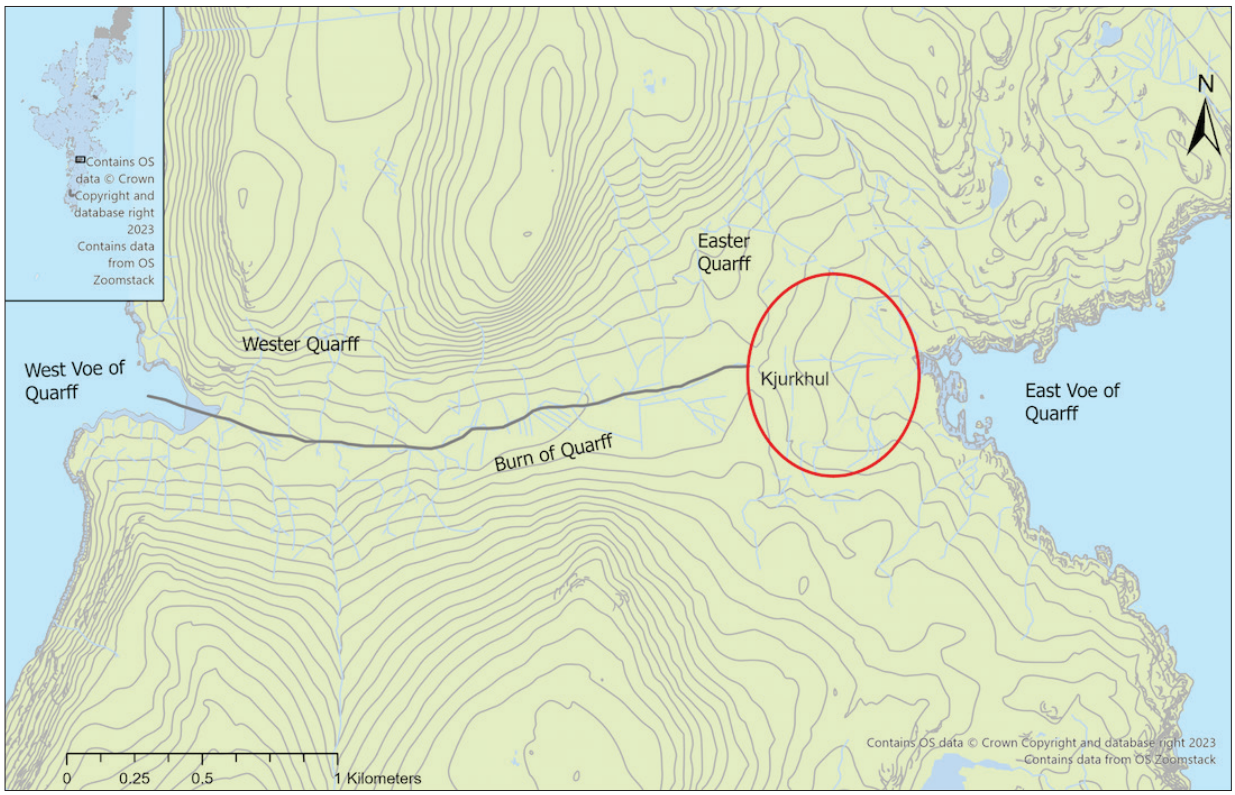

Figure 6. Likely portage site at Quarff, Shetland Mainland. It is envisaged that it would have been possible to enter the water route via the West Voe of Quarff. The grey line is an approximation of the suggested route and the red oval marks the area which is unlikely to have been wetland in the past and over which boats would have been portaged. ©Crown Copyright/ database right 2011. An Ordnance Survey/EDINA supplied service. All rights reserved 2010. Map: Alexandra Sanmark.

burial, and presumably many other times. This may have added to the stories associated with the burials during the first generations of Norse settlement (Figs. 1 and 2). In this regard, the locations of the burials may be significant, as although they presumably relate to nearby contemporary settlements, they are often also in locations important to seafaring and navigation. This is not surprising in view of the argument that neolithic chambered cairns in Orkney were "prominent landmarks to a mariner sailing along the coast" (Phillips 2004:381), so the Norse are likely to have been using the earlier landmarks as well as creating their own. For example, a weapon burial of an eight-to-thirteen-year-old male was discovered in an eroding sand dune on the northern shore of Balnakeil Bay (Low et al. 2000). Not only is this currently a very isolated burial and the most westerly example along the northern coast of the Scottish mainland, but Balnakeil Bay is the last safe place to anchor before reaching the important landmark of Cape Wrath mentioned above, making the bay an important place for sailors, especially in stormy conditions. Consequently, it is feasible that the location in part determined the burial site, and the burial and any stories associated with it may have helped to mark the bay out for passing ships.

By creating culturally Scandinavian burials close to or in existing monuments that could be useful navigation markers, Norse settlers could add their own memories and stories to such markers, thereby making them part of their oral tradition and possibly mythology too. An example of this are the four prehistoric mounds on the Styes of Brough, Sanday, Orkney, one of which had an accompanied culturally-Scandinavian burial added to it (McLeod 2015a). The largest of the mounds is "prominently located on a natural rise", 30 m in diameter and conical in shape and within 10 m of the coast and visible from a distance (Canmore 3509).[6] Such mounds would have been helpful in letting navigators know where they were, and any stories associated with the site, such as about the person buried there, may have let them know not to get too close in order to avoid the rocky shore and dangerous underwater rocks, as marked on Mackenzie's charts (Mackenzie 1750d, cf. Curtis 2011:27).

Similarly, the Broch of Gurness, Orkney Mainland (Canmore 2201**)** with at least two culturally-Scandinavian burials, would have been a distinctive landmark during the Norse period. It is on a coast with low rocky shores and close to a large offshore partly submerged sandbank to the east, but with a relatively sheltered beach with a fresh water source in Aikerness Bay to the west, where Mackenzie has an anchorage and landing site marked (Mackenzie 1750c). One of the burials in the vicinity of the broch included a Thor's hammer on an unusual, for Scotland, iron necklet (Graham-Campbell and Batey 1998:127-128). The amuletic necklet makes it likely that the person buried was in some way special, increasing the likelihood that their burial place, especially when added to an existing landmark, was a noted part of the landscape and community memory. A further example of landmarks potentially imbued with communal memories is the Pictish and early Norse cemetery at Westness, Rousay, Orkney, close to the series of neolithic chambered cairns arguably used as navigation markers in prehistory (Graham-Campbell and Batey 1998:135-138, Phillips 2004:279-280).

It is possible that burials in newly constructed mounds could also have been used as navigation aides, particularly if the grave was marked or kept free of turf. Such a notion does not appear to have been foreign to Scandinavian culture, with the Old English epic poem *Beowulf* set in Scandinavia reporting that Beowulf's burial mound overlooking the sea was built "so high and broad that seafarers might see it from afar" (Alexander 1973:151, Gräslund 2018). An example of a culturally-Scandinavian-built burial mound can be found at Wick of Aith, Fetlar, Shetland, in an elevated position within 6 m from the cliff edge, with the boat-shaped mound currently 10.7 m x 5.5 m and 0.75 m high on the coastal side (Canmore 1405). It is interesting that the Fetlar mound appears to have included quite a few white quartz stones, and if these were on top of the mound it could have increased its visibility (McLeod 2015a). Staying with the Wick of Aith burial mound as an example, it is on top of a sea cliff overlooking dangerous rocks, the Hellier of Aith and Suppel Geos, but close to an accessible beach, so sailors wanting to access the beach may have known to keep the burial to the port side when approaching. The burial itself was a boat burial, and there may have been a story or song associated with the burial and woman (presumed based on the grave-goods) inside which would help sailors remember where they needed to go. Indeed, by the nineteenth century AD there was a local tradition of this being a boat burial, either of a viking or a giant, with it being listed as "Fetlar, Wick of Aith, Giant's Grave" on Canmore, based on early OS maps (Canmore1405).

Sentinel sites

A useful indication of major navigation routes are sentinel sites, places at which people would watch for ships in order to warn the community of the approach of a hostile fleet. Such sites are likely to be located along the busiest sailing routes. A

beacon could be a physical structure, such as the "low earthen platform" later replaced by a stone structure found during the excavation of an undated beacon on Ward Hill, Shapinsay (Canmore 3068, Downes 1998). In addition, a guardhouse may be built nearby in which to keep the fuel—wood, turf, peat—and provisions plus provide shelter for the guard, as seems to be indicated by Warsetter, "Beacon"/"Guard Homestead", on The Wart, the beacon hill on Sanday, Orkney (Marwick 1952:17). *Orkneyinga saga* describes how, during the reign of Earl Paul Hakonson when he faced an invasion from Norway via Shetland in the early twelfth century AD, a beacon was built on Fair Isle, roughly halfway between Shetland and Orkney, and maintained by a farmer, who was to light it if a fleet appeared from Shetland (Pálsson and Edwards 1981:123). This fire smoke could be seen on North Ronaldsay where another beacon would be lit followed by others further south throughout the Orkney archipelago, established "so that each could be seen from the others", thus mobilising the Orkney defence force (Pálsson and Edwards 1981:129). In addition, as seen in *Orkneyinga saga*, there are sites that could be used by watchmen even if a beacon was not present (Pálsson and Edwards 1981:219).

Old Norse speakers in the Northern Isles used two different words for sentinel sites and the distinction between them is not always apparent. The most common form is *varðr*, "guard"/"beacon", but also a heap of stones/cairn, which now usually appears as "ward" (Cleasby and Vigfusson 1874, 679). Warth, derived from *varðr,* was the term used in 1625 AD to describe the beacon system in Orkney, indicating the long usage of many of the sites (Clouston 1932:34). The other form is ON *viti*, "signal"/"beacon", which survives in various forms as seen in Figures 7 and 8 (Cleasby and Vigfusson 1874, 712-713). The term indicates that all *viti* hills were presumably beacon hills, and this is somewhat corroborated by the description of the beacon system in *Orkneyinga saga*, which uses the term *viti* (Pálsson and Edwards 1981:123, 129, 133, Vigfusson 1887:111, 118, 123). However, the excavation of the beacon on Ward Hill, Shapinsay, and the likely beacon stance at Ward Hill, Deerness, Orkney Mainland, a large 2 m high mound containing undated burnt earth and stones, demonstrates that *varð* hills could also have beacons, although equally they may have just been used to guard/watch without a beacon (Canmore 2964, Downes 1998). For example, in *Orkneyinga saga* when Lifolf Pate climbs a hill in South Ronaldsay in c. 1198 AD, he discovers three "watchmen"/"guards", ON *varðhalldzmenn*, of Earl Harald, presumably watching over the Pentland Firth (Pálsson and Edwards 1981:219, Vigfuson 1887:223). Based on its use in *Orkneyinga saga* written in c. 1200 AD (Pálsson and Edwards 1981:9), it is possible that *viti* was the original term used for beacon hills, and that at a later date some *viti* hills became known as *varð* /"ward" hills, with a similar situation evident in Norway (Ødegaard in prep, Scheen 1951:238). In Caithness, only two "ward" hills are known, so perhaps the lack of *viti* names means that the area did not have an early beacon system (Fig. 7).

Beacon warning systems typically form a chain with one signal visible from the next and so on as described in the *Orkneyinga saga* quote above. The saga contains additional evidence for this, for example: "When the beacon on Fair Isle was seen to be alight, Thorstein Rognuson had the beacon lit on North Ronaldsay", allowing time for defenders to prepare and people to seek safety (Pálsson and Edwards 1981:131). Similarly, *Orkneyinga saga* mentions the beacon on North Ronaldsay from where Fair Isle could be seen (Pálsson and Edwards 1981:123), but as neither a *viti* or ward name is recorded on the island, it is listed as Viti OS on Fig. 7. This demonstrates that some sites may be lost, creating further problems in attempts to reconstruct the system.[7] It is possible that some hills do not have *viti* or ward names. For example, Hamly Hill, Orkney Mainland, was part of the beacon system during the seventeenth century AD, and perhaps earlier, but would not be picked up in a placename search (Thomson 2008:166).

While there are approximately double the number of "ward" to *viti* names in Orkney, the imbalance in Shetland is much greater (Fig. 8), which reduces the possibility of recreating the early *viti*/beacon system. Indeed, there are so many ward names in close proximity in Shetland that a large number of them are likely to have been used at different time periods or named due to the other meanings of *varð*, a pile of stones/cairn, as used in *Orkneyinga saga*, or as a place from which to watch (Pálsson and Edwards 1981:111, Vigfusson 1887b:97). Many of the "ward" hills do indeed have stone structures upon them, such as a Bronze-Age cairn on Gamla Vord, and a possible chambered cairn on Ward of Challister, both in Whalsay, Shetland (Canmore 1312, 1305). Regardless of whether the hills had a beacon, guardhouse or a cairn built upon it, they were potentially of use as navigation markers if the structures were visible to approaching ships. Even without a structure, the hills can be used as markers as is evident from some of their profiles appearing on Mackenzie's maps as aids to guide along a route. Fitful Head, Shetland Mainland was mentioned above and Fitty Hill on Papa Westray, Orkney is another such example, both appearing on the map showing all of

Figure 7. Ward and Viti Hills of Orkney and Caithness, showing likely beacon sites that could also be used as navigation markers. The rectangle outlined in black shows the location of the section of Mackenzie's map shown in Fig. 9. ©Crown Copyright/database right 2011. An Ordnance Survey/EDINA supplied service. All rights reserved 2010. Map: Alexandra Sanmark and Shane McLeod

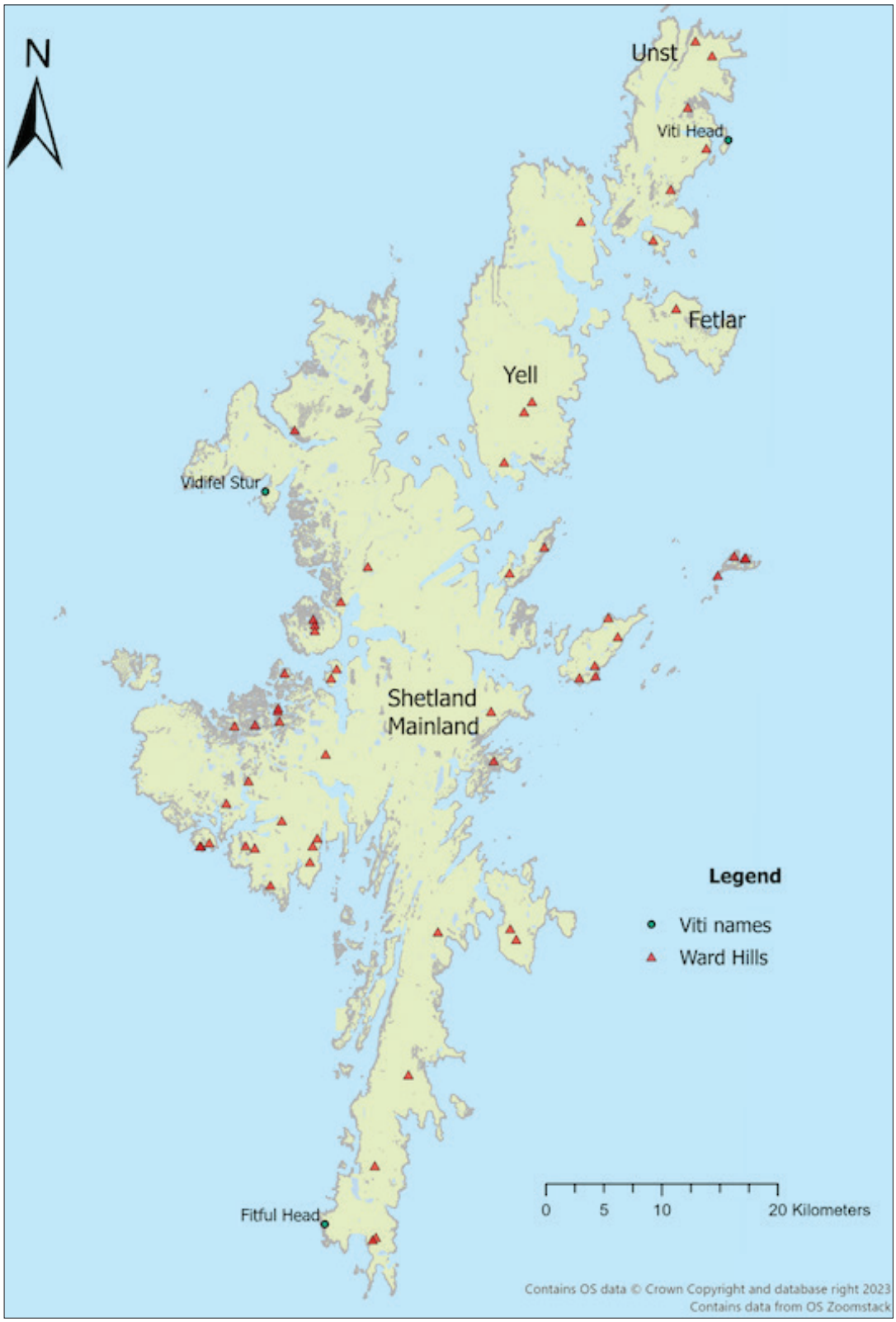

Figure 8. Ward and Viti Hills of Shetland, showing hills that could also be used as navigation markers. © Crown Copyright/database right 2011. An Ordnance Survey/EDINA supplied service. All rights reserved 2010. Map: Alexandra Sanmark and Shane McLeod.

the Orkney archipelago (MacKenzie 1750a). Consequently, when examining sailing routes and navigation both ward and *viti* hills should be considered.

Extreme Dangers

There were other ways of providing warning signs to mariners, for example through placenames. This is perhaps most strikingly suggested by the names of certain whirlpools, such as the "Swelkie" in the Pentland Firth. This name is most likely derived from ON *svelgari,* "swallower" and ON *svelgr* denotes a whirlpool/maelstrom (Heggstad et al. 1975:423, A. Jennings, University of the Highlands and Islands, Lerwick, UK, 2023, pers. comm). This whirlpool appears in *Orkneyinga saga* (Pálsson and Edwards 1981:,138) and also *Hákonar saga*, where it is stated: "Jon of Hesby was driven east along the firth [Pentland Firth], and it was a very near thing that he had not been driven into the Swelchie [*í Svelginn*]; but by God's mercy the ship drifted east into the sea" (Dasent 1894:364, Vigfusson 1887b:352). The "great race" in the Pentland Firth mentioned above may also be a reference to this whirlpool (Dasent 1894:364). In addition, the name Stroma, ON *straumey*, which translates as "island in the current" (Pálsson and Edwards 1981:203, cf. Jesch 2005a:122), and aptly captures the conditions in this area, may have served as another placename of warning.

Returning to the Swelkie, it seems that phenomena of this kind became integrated into Norse mythology, as retold in the story of the millstone Grotti in the eddic poem *Gróttasǫngr* ("The Song of Grotti") and in *Skáldskaparmál* in Snorri's Edda. We are told that two slaves, Fenia and Menia, were made to grind salt using the millstone and thus made the sea salt. The whirlpool is said to be formed by the water running into the hole in the middle of the stone (Larrington 2014:260-63, Pálsson 2003:157-58).[8] In this context, Stefan Brink's detailed discussions on how Old Norse mythological beings were often seen to be imbued in the local landscape and therefore reflected in placenames can help explain this (Brink 2001). A similar phenomenon is observed in relation to two whirlpools, both called Corryvreckan, located north of the Isle of Jura on the Scottish west coast and between Rathlin Island and the Antrim coast of Northern Ireland. The Corryvreckan name is connected to various mythological beings and the miraculous knowledge of St Columba (MacGregor 1937:117-119, McNeill 1959:20-21, Sharpe 1995:118, 264-265). In addition, on Olaus Magnus's *Carta marina et descriptio septemtrionalium terrarum* from 1539 AD, well-known for its depiction of Scandinavia and the North Atlantic as well as many sea monsters, there is by the Lofoten Islands an enormous whirlpool into which a ship is being swallowed. The label reads *Hec est horrenda caribdis,* "This is the horrible Charybdis", which is a Greek sea monster that according to mythology regularly swallowed large amounts of water and thus creating large whirlpools that could sink ships (Carta Marina 1539).[9] These instances are all important as they reflect the studies linking mythology and place examined above (Brink 2001, Robinson 2013:2.2). It may be that particularly dangerous places became connected to mythological beings or events and therefore also gained striking placenames that served as warning signals to seafarers (Robinson 2013:2.2).

The importance of knowing and understanding dangers at sea is further demonstrated by information provided on Mackenzie's maps where whirlpools and other hazardous currents, for example u-shaped currents called eddies, are marked. Many of these appear in the Pentland Firth**,** such as by the Pentland Skerries where a whirlpool, which may be the "Swelkie", is found. Mackenzie also spelt out the danger of whirlpools stating that they can "turn any Vessel quite round" and that "small Boats" have "dropt into and were swallowed up by them". He added that boats can cross a whirlpool safely if they have time to "throw an Oar, or any other bulky Body into it" as this will break the surface tension and "fill up the Cavity" (Mackenzie 1750:2). In view of these descriptions of the dangers faced at sea, it is perhaps not surprising that whirlpools have been connected to mythology and folklore. Dangerous sailing conditions could also be highlighted in poems, which is linked to the important role of poetry for the preservation of knowledge relating to past events (Jesch 2015:323). *Orkneyinga saga* contains stanzas composed by Earl Rognvald of Orkney after his ship ran aground somewhere in Shetland during a storm:

> The breaker battered our boats, cracked in sleet-
> storm our two sisters, our ships. Curling,
> the killer-wave crushed lives, the crew endured:
> the undaunted Earl's story won't die (Pálsson and Edwards 1981:157).

As noted by Jesch, this stanza "refers to the event as something to be kept in memory" (Jesch 2015:323). From a seafaring perspective, preserving knowledge of past disasters could have helped to prevent future shipwrecks at the same location, with the stanza/story becoming part of local oral tradition, sailing knowledge and mental maps.

Pilots

In view of the dangers outlined above, it becomes apparent that local knowledge could save boats and lives. Navigation requires sailors to know

where they are and the safest way of getting to their destination. The use of pilots with in-depth local knowledge is well documented among seafarers (see e.g., Mack 2013). Indeed, the "lack of life-long local knowledge amongst the crew" necessitated the use of modern navigational equipment on a re-enactment of Wulfstan's ninth-century voyage (Englert and Ossowski 2009:259). It would be odd if people with such knowledge were not employed in the Northern Isles, especially as the local sagas make it clear how challenging and dangerous it was to sail in unknown waters. Direct evidence for the use of pilots in the Northern Isles during the Norse era can be found in *Hákonar saga* when King Hakon sent a ship from Norway to Shetland to find pilots in advance of his voyage from Shetland to Orkney and then onto the Hebrides (Dasent 1894:342). The need for pilots in other areas is illustrated in further sagas. In *Grœnlendinga saga* when Bjarni sets sail for Greenland he states that the journey will be "considered foolhardy, for that not one of us has ever sailed the Greenland sea" (Magnusson and Pálsson 1965:52), and it continues to stress the problems of sailing in these waters: "northerly winds and fog set in, and … they had no idea what their course was" (Magnusson and Pálsson 1965:52-53).[10] Although such events are not recorded for Orkney and Shetland as the first sailors from Scandinavia travelled there centuries before sagas were written, a similar situation would likely have occurred as sailors slowly learnt the local conditions and landmarks (cf. Ulriksen 2004:8). Mackenzie's maps moreover provide much information on local dangers, such as underwater (always or sometimes) skerries and sandbanks, which could pose great dangers to ships. This too is illustrated by saga references, for example "they were shipwrecked on a gravel bar in a bay under the glaciers of Greenland. The ship split at its upper deck" (Vilmundarson and Vilhjálmsson 1991**:**282) and "Eventually, the ship was wrecked on a great cluster of skerries in great crashes of breakers" (Vilmundarson and Vilhjálmsson 1991**:**282).

Considering the evidence reviewed above, it is not surprising that the written sources contain further examples of the use of pilots. *Egils saga* refers to Ketill, who was a member of the king's *hirð* and a pilot on the king's ship, which he also steered (Scudder 2001:100). *Brennu-Njáls saga* moreover tells us that Thrain Sigfusson was given a pilot by Earl Hakon's son Eirik with whom "They then sailed south along the coast" (Cook 2001:134). This is interesting and emphasises the fact that pilots are particularly important along coastlines with many hidden dangers rather than in the open sea (cf. Curtis 2011:27). These dangers are highlighted by *Orkneyinga saga* referring to "a large headland with a great deal of rocky debris at its foot" (Pálsson and Edwards 1981:137). The importance of pilots is further suggested by King Magnus' *Laws of the Land* which imply they were a recognised profession and should receive set payments for their duty with the levy fleet, ON *leiðangr* (Friðriksdóttir 2024:23). A royal writ moreover states that pilots formed their own guild in Bergen at this time (Keyser and Munch 1849:25), while other laws make it clear that it was the duty of the coxswain to hire a pilot (Keyser and Munch 1848:33). *Orkneyinga saga* furthermore contains a suggestion that some form of organisation for travel was in place in Orkney too, as it refers to a messenger who was "ferried across the Pentland Firth" (Pálsson and Edwards 1981:221).

The importance of detailed navigation instructions and, perhaps in extension, pilots is further illustrated by Mackenzie's map, which marks out the best routes to key locations. At the entrance to Orkney from the Pentland Firth the following guidance is provided: "The Way through Petland Firth to Stromness & c. with Ebb tide" (1750b) thus bypassing skerries, eddies and whirlpools. Other routes through the archipelago appear for example through the difficult Eynhallow Sound, between Mainland and Rousay, and also between Westray and Eday (Mackenzie 1750e, See Fig. 9). Indeed, the information provided by Mackenzie on his maps was so useful that local pilots in Orkney were soon unemployed (Groundwater 2019).

Landing places and anchorages

Bearing in mind the many dangers and difficulties at sea, mariners needed stopping places along their routes. It is common practice to distinguish between permanent landing places, such as "local harbours" with a "settled hinterland" and temporary ones, which can also be labelled anchorages (Ulriksen 2004:12-14). This distinction is also made by Mackenzie on his map, as well as in modern directions for sailors along the Scottish coastline (Lawrence 2017, MacKenzie 1750a-e). Landing places may have mainly consisted of natural features, with no or few constructions, which makes them very difficult to identify archaeologically (Bill 1999, 196-197). The definition of landing places as ephemeral places that can change depending on the kind of boat or ship used as well as the current maritime routes, offered by Richard Bradley and others (Bradley et al. 2016:126), is suitable for the Norse period. The boats and ships of the Norse period with their low drafts could often be pulled up on to beaches (Vikingeskibsmuseet), but depending on the size of the vessel as well as the length and purpose of the stay, anchoring

Figure 9. Section of Mackenzie's map of North west coast of Orkney, see black outline on Fig. 7 (Mackenzie 1750e). The sailing routes marked in red pass between Westray and Rousay. Used with the kind permission of the National Library of Scotland.

may have been preferable at times, even for vessels of this kind. It is also possible that some beaches utilised by Norse seafarers could have disappeared with the stormier conditions of the Little Ice Age beginning in the fourteenth century AD (Preston et al. 2018, Preston et al. 2020).

Sailing conditions that result in delay and possibly the need of a suitable place to anchor for a while are found in many sagas and a few examples have been selected here. *Egils saga* stated that as part of Skallagrímr's *landnám* he "sailed along Borgarfjǫrðr beyond the skerries, then cast anchor until the storm died down and the weather brightened up" (Scudder 2001:46). In *Fóstbræðra saga* we find the story of Thorgeir and Thormod who were about to set sail in Iceland, but "just as they were ready to start out the wind turned against them and made it impossible for them to leave the fjord" (Hreinsson 1997:336–7). Adverse weather conditions, such as fog, increased the hazards of sailing in part as it makes it more difficult to see the coastline, requiring the ship to either risk coming closer to shore in an attempt to spot landmarks, or to wait for the weather to improve. This is illustrated by another example from *Fóstbræðra saga* when Thorgeir and Thormod "set sail out of Isafjord in good weather", but "the weather turned against them" and "They were so beset with squalls that blustered and blew around them in the freezing cold that they could no longer see their course" and had to take shelter in a fjord (Hreinsson 1997:336–7). Although this refers to Iceland, this must have been a constant danger generally when sailing, including in the Northern Isles.

There were other reasons for seeking land too, such as at nightfall to avoid sailing in the dark (but see Ellmers 1981 for nighttime sailing and navigation). According to *Hákonar saga,* King Hakon arrived in Orkney in the evening and anchored "in a certain sound north of Osmunds-voe [ON Ásmundarvágr, modern Osmundswall]" (Dasent 1894:364, Vigfusson 1887:351). This location is interesting and may have been frequently used. It features also in *Orkneyinga saga* as the place where Earl Sigurd reportedly kept three ships before setting out on a viking expedition and where Earl Einar sheltered from a storm (Pálsson and Edwards 1981:37, 41). Frequent use of Osmundswall is further supported by late traditions of boats sheltering here while waiting for the right conditions to cross the Pentland Firth, and the Old Norse name for this part of Hoy is *vágaland* (now South Walls), which translates as "Land of Voes/Bays" (Marwick 1952:178). Inland water routes and lochs connected to the sea may also have been used as safe places for boats, such as the Orkney West Mainland waterway referred to above (Bates et al. 2020) (Figs. 1 and 5). This idea is further supported by the placename Knarston (ON **knarrarstaðir*), derived from the word for a transport vessel (ON *knörr*) and denotes a farm where these vessels were moored. In Norway these farms are found by significant transport routes and connections with the sea or rivers (Bates et al. 2020:14 with references).

Another potential form of danger that may have required seafarers to take breaks on their journeys were tides. Mackenzie provided detailed information regarding the velocity and direction of the tides for the whole archipelago. The direction is indicated by arrows and the numbers give the speed per hour, both for spring and neap tides. In some areas there is more detailed information, such as for the east coast of Shapinsay: "The Tide here runs South the first two Hours of Flood then North ten Hours viz. till low Water" (Mackenzie 1750c) and the east coast of South Ronaldsay: "The first 4 hours of Flood the Tide here runs Northward from that to the last Ebb it runs Southward" (Mackenzie 1750b). The presence of such statements show the significance of such information for safe and efficient sea crossings. Furthermore, difficult sailing conditions are suggested by variations of "the stream here scarce sensible" as seen to the west of Westray and in Scapa Flow (Mackenzie 1750b&d). Mackenzie's data on the direction and speed of tides again serves as a useful additional source for how sea journeys were planned according to sea and weather conditions. In non-motorised crafts, tides could seriously affect travel times by either delaying or speeding up a trip depending on the direction of travel. Indeed, it has been suggested that prehistoric seafaring involved intricate knowledge and understanding of the tidal patterns so that people could travel at the most efficient times (Blankshein 2022:746). Travelling against the tide, either by oars or sail, could be impossible, which meant that boats had to wait for the tide to turn. Mackenzie provides instructions for sailors, for example "Here a vessel may tack or anchor till a favourable tide" at the southern end of South Ronaldsay and the Pentland Skerries, as well as "Here a vessel may tack or anchor during the flood" just south of the Isle of Stroma (Mackenzie 1750b). For those sailors unfamiliar with the Northern Isles during the Norse period, local knowledge of tides would have been one of the benefits of using a pilot.

Accessing land

Landing places can be studied from the perspective of the land or the sea (Westerdahl 1989:99). People who were passing through the Northern Isles were naturally in need of landing places, for example

for the procurement of food and fresh water. Due to the limited carrying capacity of the ships and boats any significant delay, or indeed a long journey, would require fresh water, as when King Hakon sent eleven men to fetch water in Caithness in 1263 AD on the journey back to Orkney after the Battle of Largs (Dasent 1894:364). Unlike large parts of Scandinavia, access to land can be difficult in coastal Scotland for, as noted by Ole Crumlin-Pedersen "Many parts of the rugged coastal landscape have no foreshore" (Crumlin-Pedersen 2010:17). This statement applies to the Northern Isles in the sense that there are long stretches of steep cliffs, interspersed with beaches of varying kinds so mariners would need to have detailed knowledge of the local area and sea conditions in order to find the nearest place where they could safely come ashore (Preston et al. 2020). In the Northern Isles, there are many beaches and geos (inlets) are abundant, but there are also long stretches of high sea cliffs, which naturally needed to be avoided (Allen 1995:56).

Given the close connection between Norse-period settlements and the sea in the Northern Isles, they tend to be located close to beaches seemingly suitable for landing places (cf. Bradley et al. 2016:149-150) (Figs. 1 and 2). Some landing places are moreover indicated by placenames, such as Höfn ("harbour"), now Pierowall in Westray, and Holm on Orkney Mainland, both derived from *hömn* (Marwick 1952:89, Pálsson and Edwards 1981:133). Both Pierowall and Holm are located by large bays, which are used as harbours still today. An interesting example from Shetland is Sneckerem in Lunnasting, which goes back to ON **Snekkjuhöfn,*"harbour of the snekkja ["war-ship"]" (Ridel 2000:35, Stewart 1987:177). The exact location of this placename has been lost, so no landscape study is possible in this case. In archaeological terms, very few landing places have been identified in the Northern Isles (Allen 1995:56). So far, the most significant findings are from Kirkwall where the twelfth to thirteenth century AD waterfront with slipways has been discovered just below St Magnus Cathedral (Bell et al. 2018, Lamb et al. 1978:34, McGavin 1982:399-40).[11] However, as noted above, boat burials are an indirect indicator of a nearby landing place.

Portages

Portages, whereby ships could be transported across low ground from one body of water to another, formed a significant part of Norse-period communication networks (Westerdahl 2006). As in Scandinavia the use of portages in the Northern Isles is suggested by placenames, low-lying isthmuses as well as oral traditions. As mentioned above, in the Northern Isles *eið* is the most important placename indicator. In addition to locations already named, there are several places simply called "Aith", for example in Aithsting, Cunningsburgh, Shetland, and in Stronsay, Orkney (Marwick 1952:23 148, 182, Stewart 1987:79-80). There are also names containing combinations of *eið* with other elements such as Effirth "Isthmus Firth" (ON Eiðfjörðr) and Eswick "Isthmus Bay" (ON Eiðsvík), Shetland (McCullough 2000:201-4, Stewart 1987:79- 80, 89, 292, Waugh 2010:545-6). In Orkney there is e.g., Hoxa "Isthmus with the Mounds" (ON Haugseið) and Eday "Isthmus Island" (ON Eiðey) (Marwick 1952:48, 172). Quarff, also mentioned above, needs some further consideration, as this is a very likely portage site, although no *eið*-name has been recorded (Fig. 6). The name Quaff refers to a wet and low-lying area where the Burn of Quarff leads to the West Voe of Quarff and the open sea. At the highest point on this stretch of land lies Kjurkhul (Kirkhoull), a medieval chapel and burial ground (Canmore 976). The area to the east of Kjurkhul is shown on early Ordnance Survey maps as consisting of wetlands and drainage ditches, which suggests that this area was most likely even wetter in the past. There are also watercourses leading to the East Voe of Quarff, and thus the likely portage site may well have been considerably narrower than today. This suggestion is further supported by the presence of Kjurkhul, as medieval chapels were regularly located by the sea and landing places (Gibbon 2006:xiii). The evidence above suggests that there are many places across the Northern Isles that may have been used as portages, although this potential practice needs to be carefully evaluated. In the Northern Isles, some good reasons for portaging may well have been to reduce the length of a voyage, avoid wild waters and having to wait for the right wind, tides and currents (cf. Nymoen 1995, Westerdahl 2006).[12] In addition, as portages/isthmuses could be accessed from two different directions and were therefore easier to reach for people from a larger area, they often seem to have formed natural meeting places, where for example assemblies were held (Figa. 1 and 2). Examples of the latter include Doomy Hill in Eday and Dingieshowe (Sanmark 2013, 2017:ch 8). Portages can also be the focus of trade as noted in Norway and Greenland (Nymoen 1995, Petersen 2006, Westerdahl 2006). This is interesting as there are indications of this in the Northern Isles too. Just north of Dingieshowe is the placename Toab, derived from *toll-hóp "Toll Bay", suggesting that a toll was charged from passing boats at this point (Marwick 1952:86). Similarly in Shetland, there is Toab (recorded as Tolob) in Dunrossness, also from *toll-hóp. Stewart suggested

that this was where a toll was paid by foreign merchants arriving in the nearby Pool of Virkie (Stewart 1987:147). It should be noted that the Pool of Virkie extends across most of the narrow Mainland at this point, with a possible portage in its western part.

Attempts to re-enact portages have met with varied success (Crumlin-Pedersen 2010:137-8, Damm 2008:113, Larsson 2007:231-234, McCullough 2000:328-347, Vinner 1997:100-105) and it can therefore be doubted whether portaging was worth the effort and if this was actually practised. Despite this, along with the placenames there are references to portaging in near contemporary sagas, such as when King Hakon sent sixty ships under King Magnus of Man up Loch Long and into Loch Lomond via the portage site at Tarbet, Gaelic *tairbeart,* isthmus, which comes from "tairm-beart, literally "overbringing" (Dorward 1995, 126): "they took their boats, and drew them up there over the land to a great lake which is called Loch Lomond", making it highly likely that this was practised (Dasent 1894:354). One of the less successful modern portage attempts was at Mavis Grind in Shetland where a reconstructed boat was pulled across land using wood rollers and horses (McCullough 2000:328-347). Other re-enactments of portages have worked much better, as seen both in Denmark and Sweden (Crumlin-Pedersen 2010:137-8, Damm 2008:113, Larsson 2007:231-234, Vinner 1997:100-105). Portaging clearly takes great skill, but with experience and the right equipment it can save much time (Søren Nielsen and Triona Sørensen pers. comm). It has been shown that by using the portage at Helgenæs in Jutland, Denmark, up to 5.5 hours could be saved, depending on conditions. This estimate includes the time needed for loading and unloading the boat (including the ballast stones) (Vinner 1997:101).

Gunilla Larsson has shown that portages in northern Sweden, documented from the 18th to the early 20th centuries, often had permanent wooden constructions in place, thus making the portages an integral part of the boat journey (Larsson 2007:224-229). This links in with the argument that the portages were considered an integral part of the sea route (Nymoen 1997:1). In terms of the Norse period, the evidence of the use of wood is so far limited to placenames and the lack of archaeological evidence has been commented on (Vinner 1997:101-103). As such, the placenames in Shetland containing the element *hlunnr*, split wood rollers, are therefore highly significant. The first is the parish of Lunnasting, which appears in the records from 1492 (*i lundeidestingom*), with *Luna* farm from 1507 (Stewart 1987:80, 300). A second example is Lunabister in Dunrossness, most likely derived from *hlunnr* and *bólstaðr* (Stewart 1987:59, A. Jennings, University of the Highlands and Islands, Lerwick, UK, 2023, pers. comm). That this was a portage is suggested by the farm's location at the meeting point of the Lochs of Spiggie and Brow (Fig. 10). These two names moreover support the combination of a portage and wooden constructions, as Spiggie derives from Spikeið, i.e., ON *spiki* (a small bird) and *éið*, while Brow denotes a bridge, ON *brú* (Stewart 1987:65, 80). Seeing that the *hlunnr* element has been embedded in the two placenames, this suggests that these sites had more than a few split logs lying around and that the *hlunnr* element does instead refer to a simple form of "road" (cf. Westerdahl 2006) that was maintained and used over a long period of time, as has been observed in northern Sweden. This suggestion is further supported by intriguing evidence from An Tairbeart in Kintyre on the Scottish west coast, where excavations revealed large pieces of oak timber embedded in the soil (Crone 1994). So far attempts at dendrochronological dating have been unsuccessful, but the site is recorded in *Orkneyinga saga* where King Magnus Barelegs is said to have "had a skiff hauled across the narrow neck of land at Tarbert [on Kintyre]" (Pálsson and Edwards 1981:86).

Conclusion

By drawing on a diverse range of evidence, primarily from the Northern Isles, but also further afield, we have been able to investigate some of the navigation and seafaring strategies employed by mariners in the Norse period. These strategies aimed not only at overcoming the challenging sea conditions which confronted them in northern Scotland, but also maximizing their efficiency at sea to ensure that journeys were as safe and fast as possible. Previous studies of other geographical areas and time periods have demonstrated that sailing conditions and directions tend to be preserved in strong oral traditions and mental maps. The evidence shows that this was the case also in the Norse period. In developing their own mental maps for seafaring in northern Scotland, the Norse presumably not only memorized existing features (natural as well as anthropogenic), but they also added their own layers to the landscape through creating new structures and monuments. Such features would also have been embedded in local myths and stories and in this way Norse mariners and settlers learnt the best ways of travelling throughout the Northern Isles and beyond. Such knowledge may also have been passed on from the people already settled in the islands, even though there is no direct evidence of this. What is known is that the Norse people settled in the same or nearby locations as previous populations, thus con-

tinuing to build on preexisting connections with the sea and marine resources. Extreme sailing dangers, such as whirlpools, also seem to have been linked to mythological tales, and could also enter cultural memory through descriptions in poetry. These dangers further support the use of pilots, people with knowledge of local sailing conditions, and perhaps a ferry system across the Pentland Firth.

It is suggested here that some Norse burial places, all of which were on water routes may have been used in navigation, continuing older traditions reaching back to the Neolithic period. Frequently used Norse sailing routes can moreover be gauged from the beacon systems established in Orkney and north to Fair Isle and Shetland described in *Orkneyinga saga* and evident in placenames. This form of travel can be described as "island hopping" as also suggested by Mackenzie's illustrated profiles of islands, showing what mariners should be looking for on their way to their various destinations. This applied not only to voyages between Orkney and Shetland, but also to those across the Pentland Firth where the islands of Stroma and Swona are found.

Despite a lack of clear archaeological evidence, other than the harbor constructions in Kirkwall, the interdisciplinary approach building also on saga accounts and placenames, supplemented by Mackenzie's maps, provide further indications of the realities facing mariners that are rarely brought up in general considerations of sailing during the Norse period. Due to the reliance on winds, tides and weather, and crafts propelled by oars or sails, all sea travel had to be carefully planned with many safe landing places and anchorage sites available for those needing to wait for favourable sailing conditions. Portages and inland water systems were moreover used to make travel quicker, to avoid dangerous stretches of water, and make the most of prevailing winds and tides.

Taken together, the combination of the evidence provided allows for a greater understanding of seafaring practices during the Norse period, focusing on the difficulties faced and the solutions used. Finally, most of the topics covered in this article are worthy of detailed study themselves, and they have necessarily been treated in brief here. It is therefore hoped that this article will lead to further consideration of these topics, beyond the more well-researched region of the Baltic Sea, and throughout the Norse world.

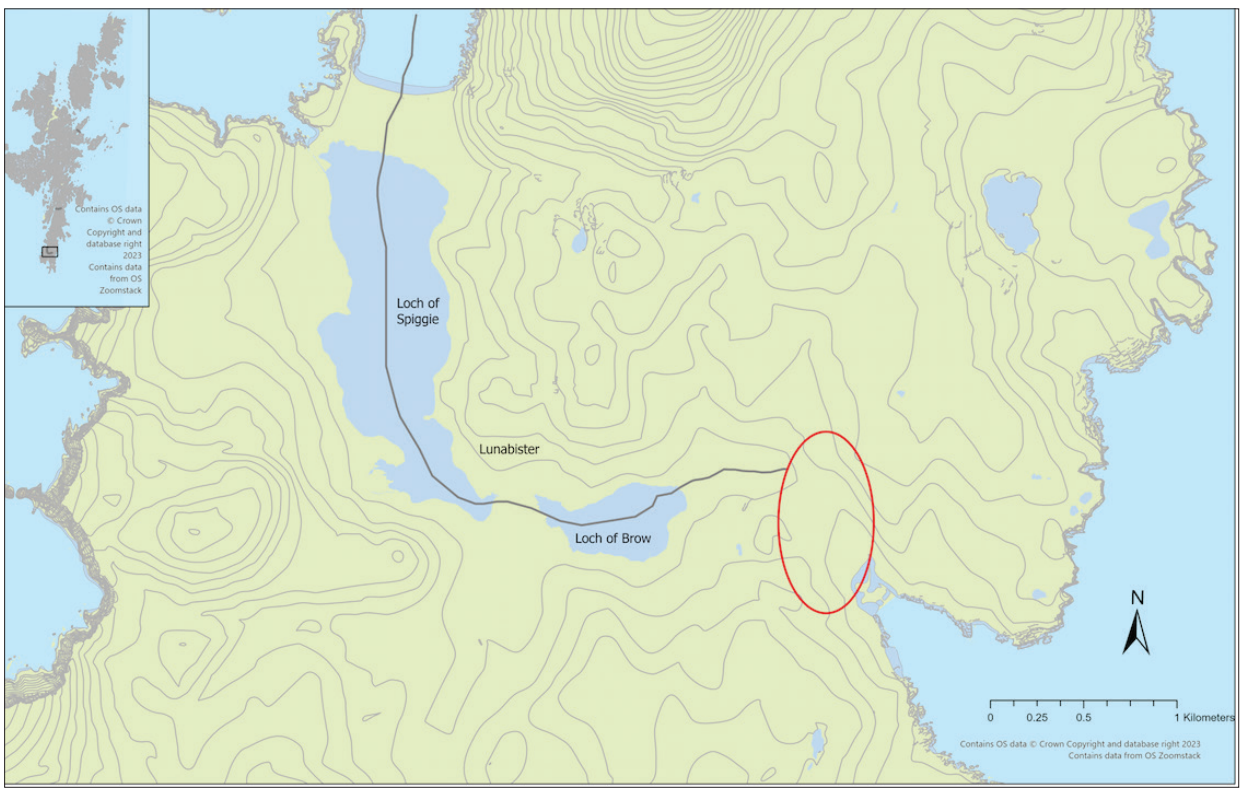

Figure 10. Likely portage site across the South Mainland of Shetland passing Lunabister. It is envisaged that it would have been possible to enter the Loch of Spiggie either through a water route or by a short portage across the beach, then into the Loch of Brow in a similar fashion. The grey line is an approximation of the suggested route and the red oval marks the area which is unlikely to have been wetland in the past and over which boats would have been portaged. ©Crown Copyright/ database right 2011. An Ordnance Survey/EDINA supplied service. All rights reserved 2010. Map: Alexandra Sanmark.

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1. As this article deals primarily with the Northern Isles of Scotland the periodisation is based on that region. "Norse" is used to cover the Viking Age, c. 790-1100, and Late Norse periods.

2. Funded by The Royal Society Apex Award. Project team: Alex Sanmark, Richard Bates, Martin Bates, and Barbara Crawford.

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4. Shetland was part of the earldom until 1195, after which it was placed directly under Norway (Thomson 2008a:121).

5. *Friðarey* could potentially be related to "trading peace" which provided a safe place for mariners (Kalmring 2024, Westerdahl 1989:110).

6. During a visit in 2014 the mound was visible from across the Bay of Brough at the Ayres Rock Hostel and Campsite approximately 875 metres away.

7. For an attempt to recreate the beacon system around Hedeby based on placenames and viewshed analysis, including the issue of missing links in the chain of beacons, see Lemm 2019, 105–107.

8. Furthermore, later Orcadian folklore features two witches, Grotti Finnie and Grotti Minnie, which have been linked to Norse mythology and the Swelkie (Marwick 1975:32).

9. In some variations of the story, Charybdis was simply a large whirlpool instead of a sea monster.

10. Although it was stressed that the reason for describing these voyages as hazardous were political (Jesch 2005a, Barraclough 2012), actual dangers and events are likely to have been taking these forms.

11 The modern waterfront of infilled land started forming in the 13th and 14th centuries.

12. For a study of the distribution and typology of the Outer Hebridean "tarberts", see Macniven 2014.