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Minna Koivikko

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Abstract

The study site is the underwater seascape of the 18th-century fortress islands of Suomenlinna (Sveaborg) in the harbour of Helsinki, Finland. The site is located in the Gulf of Finland, in the eastern part of the Baltic Sea. The fortress has global significance as a UNESCO World Heritage Site.

This study had its origin in the insight that a ship's hull, while comprised of numerous individual artifacts, could be treated as one object from the viewpoint of archaeological research. From that premise, it followed that the study of the ship as an artefact can be continued through processes of reuse. This change in approach allowed evaluating the reuse of ships in a different way than the traditional concept of recycling, which involves demolishing and cannibalizing all the material of the vessel.

This study states that the hull can also be recycled intact to serve the contemporary community. Accordingly, it is called recycling rather than simple reuse, since it involves a change in the function of the hull.

The activities of different periods have left footprints in the underwater seascape, which create a basis for interpretations of a maritime cultural landscape. The author used maritime archaeological field methods to collect data throughout the 80-hectare water area around Suomenlinna. For this study, an interpretation tool was developed for unidentified shipwrecks, especially for data produced in surveys.

The three primary aims of this study are raising awareness of the possibilities of maritime archaeological studies, broadening the concept of recycling, and increasing the appreciation of old and poorly preserved wrecks. In addition, this study reveals recycling processes undertaken on some of the first vessels of the Swedish Army Fleet, and the locations of the last wooden sailing warships of the Russian Baltic Fleet.

Maritime archaeology should be challenged to apply its methods and perspectives to address contemporary global concerns and the well-being of our waters, as well as ourselves.

Keywords: *Baltic Sea, Helsinki, Suomenlinna, Fortress, UNESCO World Heritage Site, Maritime archaeology, Recycling, Shipwrecks, Deliberate Abandonment, Maritime Cultural Landscape*

Preface

A view of the sea gives an overpowering sense of timelessness, which should leave us with the thought that we are an inseparable part of the water cycle. This is expressed by Fabien Cousteau, aquanaut and ocean conservationist:

'No matter how remote we feel we are from the oceans, every act each one of us takes in our everyday lives affects our planet's water cycle and, in return, affects us.'

My home is on an island, which became the landscape for my research because of my children. I am a mother of two boys, and I worry for the future of our planet. The question for me was, what could I do as a maritime archaeologist to improve the situation? My working hours were attached to the opening hours of the local kindergarten, so it was a logical choice to start working in my home waters at Suomenlinna, to see what it could offer — and what I could give in return. I wanted to give a voice to the invisible part of the scenery: the underwater cultural landscape.

The Baltic Sea in general has a unique underwater cultural heritage. It is a very special environment with exceptional cultural assets waiting to be revealed to a larger audience. The biggest threat to this precious world is ignorance. Not knowing means not participating, and therefore not protecting. The aim of this book is to raise awareness of the underwater surroundings of Suomenlinna, a UNESCO World Heritage Site. It is my mission as a maritime archaeologist to draw the attention of people beyond treasure ships, on to recycled and deliberately abandoned ships, which this landscape mainly holds.

This dissertation is about searching for the stories of the people who lived here in the past. What is their footprint in the underwater landscape, and what can we learn from those remains? People have always built things in water, showing remarkable resourcefulness even at times when life was materially poor. In many cases, this was achieved through recycling, something which is so natural and taken for granted that we don't even consider it. I want to honour the work of the past people, as the main reason for our incredible record of history in the underwater landscape.

For future maritime archaeologists, the challenge will be the study of the age of plastics. The biggest modern case is probably the vast plastic garbage patch floating in the Pacific Ocean. The amount of debris is enormous, but the perspectives of archaeologists could make this material visible in a creative way. With modern techniques, the plastic in the oceans could be recycled; the material could be collected with solar power and wave energy, to be sold and re-used. The point is to make this waste useful for society again. Archaeology can make waste interesting, and inspire creative minds to solve environmental problems, and help to save still untouched areas of the planet.

Archaeology is not about the past just for its own sake; it is about creating 'lunch boxes' of information for curious minds, offering something to know, and to learn. Everyone has the right to choose, either to open it, or do without. If you decide to open this box, hopefully I have managed to pack it in a nutritious way to inspire your curiosity.

Acknowledgements

I wish to thank my excellent tutors, professors Mika Lavento and Johan Rönnby, and assistant professor Marcus Hjulhammar. Without knowing that you were there in the background pushing me over the rocky outlets, I would have shipwrecked after the first familiar miles.

For cognitive navigation, I need to pay my respect to maritime archaeologist Christer Westerdahl, a senior colleague, who has always been very willing to come to Finland to teach us. I had the privilege to have excellent pre-examinators for my work, and I send my warmest regards to Lucy Blue, Kerstin Cassel and Jonathan Adams. At the last stage, I had the honour of receiving Brad Duncan all the way from Australia to act as my opponent, and bring this endeavor into the port.

Behind the scenes I had a group of wonderful women: my gratitude goes to Mervi Suhonen, Eeva-Maria Viitanen, Anne Ala-Pöllänen and Magdalena af Hällström. You all were very helpful in different ways, which I can only describe as friendship. Sometimes your comments were challenging for me, but I appreciate your honesty and commitment. That is the way we went through the storms, you were the ballast.

Without financial assistance, it would have been impossible to complete this dissertation. I am very grateful to the Kone Foundation for supporting me for four years. Especially important was the possibility to take part in the Saari Residence program for two months in early 2012. It was a successful writing period, leaving me thankful for this opportunity, and for all the people I had the chance to meet. Especially Hanna Nurminen, I hope I could have your willpower. In addition, the Finnish Cultural Foundation funded some of the dendrochronological datings. The city of Helsinki supported me with a grant at the end, as well as the University of Helsinki. Most important has been the support from the National Board of Antiquities, especially the positive attitude of the general director Juhani Kostet, which included the permission to use photos from the archives of the NBA for this publication. You all have acted as shipowners within this project.

This dissertation has taken me to different places. Stockholm has offered inspiring archival material, as well as support through discussions on different seminars held by Södertörn högskola and MARIS, the PhD group for maritime archaeologists around the Baltic Sea. Klaipėda

in Lithuania offered the opportunity to present and publish one of my first results of reusing a log barrier embankment in 2009. Even more so, I am grateful to Klaipeda for the people I met there, Jim Hansson and Jørgen Dencker, dear colleagues of maritime archaeology from Sweden and Denmark. In a way, you became part of the crew of this expedition.

Later, I have held presentations in Trondheim (Norway), Glasgow (GB), Vilnius (Lithuania), Fremantle (Australia), Funchal (Portugal) and in Finland (altogether 47 presentations). I have travelled to Alaska, Canada, Mexico, Spain and Croatia to meet people, and be inspired by different landscapes. We lived two years in Florida (USA), where I had the opportunity to concentrate on writing. I learned that sitting alone in a study room with my own thoughts was not really my piece of cake. I guess my soul wants to be a sailor and enjoys more of travelling than sitting by the desk.

From all my exciting journeys, I have been able to return to the office at the National Board of Antiquities (NBA). I have had nine different chiefs during this time, and seen three bigger changes in the organization. I miss all the talented people the NBA had to let go of during financial problems. I want to express my gratitude to Pekka Paanasalo, Vesa Hautsalo, Eeva Vakkari, Essi Tulonen and Mari Salminen for all their assistance with the Suomenlinna survey. Those who are still here, were there also in the beginning: thank you Ulla Klemelä, Tiina Mertanen, Sallamaria Tikkanen and Maija Matikka, the mother goose of Finnish maritime archaeology. It has been a privilege to work with you ladies. There are still four remarkable women in the field of maritime archaeology, Riikka Tevali, Immi Wallin, Eveliina Salo and Maija Huttunen, I wish to express my gratitude to all of you. Even people with sailors' souls need a reason to always return.

Special thanks to Riikka Alvik and Päivi Jantunen, my dear diving team, for all the laughs we have had during our field trips. You two make it so easy to wake up in the morning, and rush to work. Archaeological Field Services at the NBA were my sheltering bay for a while, and I highly appreciate that time period. It is hard to find so many like-minded archaeologists anywhere else. Thanks for being there Esa Mikkola, Satu Koivisto, Petro Pesonen, Vesa Laulumaa, Katja Vuoristo, Johanna Seppä, Tuija Väisänen, Jan-Erik Nyman, Simo Vanhatalo, Sara Perälä, John Lagerstedt, Inga Nieminen and Niko Anttiroiko. I am also grateful to my bosses (especially Marianna Niukkanen) at different times for being so flexible with my study leaves. You are in the same fleet with me.

Other like-minded archaeologists can be found at the University of Helsinki! I have jumped in and out, and always found you there, ready to have a fruitful discussion. We have tried so hard to make the waterline disappear from academia, in the sense of archaeologists being in two groups, topsoil and underwater. Since we underwater archaeologists are the minority, our voice had to be stronger so that you would acknowledge us. Perhaps, we have shouted too loud at times, creating frustration. Sorry for that! However, I hope the next generation can grow as archaeologists without the need to feel unfit no matter where their study field exists. However, I feel that there is a connection, and we are sailing on the same sea.

There are two societies I would like to mention, firstly Teredo Navalis ry, a group of grand old divers in the volunteer field of maritime archaeology. I have learned so much from you, for example how to go to sauna for six hours and drink too much beer — shortly expressed: how to be a better person. Those long summer evenings at diving support vessel Teredo are legendary. We were in the same boat.

Another society I would like to give credit is the Finnish Maritime Archaeological Society, which was forward thinking enough to establish a new series for maritime archaeological publications, and this book is the first to be published. Thanks to Kalle Virtanen, who has been leading the society for years: it is your open mind which inspires us all.

This book has also been a presentation of commitment, and I would like to express my gratitude to Ville Peltokorpi, who is an excellent friend, scientific diver and surprisingly a book enthusiast, whom we can all thank for the layout of this book. Ville is definitely an important part of the crew.

It was an ambitious idea to write a doctoral dissertation in English. I would not do it twice — writing a doctoral dissertation is a creative process, and my mind is so connected with the language that at times my reach has sometimes exceeded my grasp. I have been very happy to receive assistance from Sarianna Silvonen, Susanna Ahola, Christopher TenWolde, and most of all, Jessie Cat Kelley, who saved me so many times with her excellent talent of making archaeological excavations for words. You have been the wind in the sails.

I thank also all the volunteer divers, who participated in the survey of Suomenlinna. It has always been a pleasure, and so much fun to explore this landscape with you. I wish to thank the scientific diving students of Luksia, especially Verna Kalmari, Salla Pärssinen and Ari Pajunen,

for your documentation assistance with different sites at Suomenlinna. We all benefit from previous research, and thanks for sharing your experiences, Jari Hacklin and Harry Alopaeus. All seafaring is based on traditions.

A big thank you stays with the people of Suomenlinna, my own 'parent society'. It was a safe and friendly environment to make this type of research. Your curiosity kept me going, and the feedback from the exhibition 'Bubbling Under, the Underwater Cultural Heritage at Suomenlinna' was an encouragement. Some of you, I have known since I moved to Suomenlinna in 1997; some of you are my new friends. I have learned a lot from you, hugs to Maikki, Mia-Maria, Dos Minnas, Mikko, Päivi, Taina, Eevamaija, Mari and Justiina. In particular, I would like to give a big hug to Tero and Jesse, my diving mates. From time to time, you shook me off from the computer, and kept my sparkle for diving going on. You were all ears, and shared your shoulders at the times I was in stress. You were the water element, which kept me floating.

The Governing Body of Suomenlinna was an important partner at the time of creating the exhibition. I wish to thank architect and super-woman Tuija Lind for the support and friendship. Part of the crew, heyhey!

Without my childhood family, I could not have become such a stub-born person, which was extremely important for completing this book. Thank you Mum and Dad, and my siblings Jaana, Niina and Janne. I wish you could live closer to me than 600 km away. My letters of reports always had a familiar address, although today we communicate with Skype.

My deepest feelings go to my sons Veikka and Veli, you guys make my world. You two have followed the process of the birth of my third child, which we are now holding in our hands. She is obviously a persistent girl, since the delivery time was 9.5 years, instead of months. Within this delivery process, two Leinos played very important roles: thank you Ville, the best ex ever, and Marja, super-grandma. You have kept everyday life going on. I am glad that you did not put your own lives aside, waiting for this research to be ready. Otherwise, it could have been a terribly long waiting time. You are simply part of my 'ship-wrecked' family, which I appreciate very much.

Since the beginning of my scientific diving career, I have had two big role models. Roope Flinkman and Kalle Salonen, you guys rock! Thanks

for all the support over the years, and those great and adventurous trips we have had together. You were the rigging of the ship.

In moments like this, I finally realize at the deepest level,
how lucky I have been.

It was not just the days passing by, it was called Life…
and it is not over yet!

In Helsinki, 6 May 2017
Minna Koivikko

Contents

1. Introduction

In nature, everything is part of the cycle of life — even the death of a creature results in nourishing other species. On the other hand, the 're-cycling' of material is typical human behaviour. This behaviour has its roots far back in time, but the history of recycling practices has not been comprehensively studied, and even the terminology is still developing. What do we actually mean when we talk about recycling?

In archaeology, theoretical perspectives on recycling date back to the 1970s, when archaeologist Michael B. Schiffer (1972) borrowed the concept from environmental studies for his theory of reuse. New studies of abandonment by Nathan Richards (2008; 2014) show that Schiffer's ideas are still relevant today, and recycling practices have evoked discussion within academic archaeology (see Amick 2014). It appears that recycling behaviour has a long history reaching back all the way to the Palaeolithic period: archaeological studies are needed to increase our understanding of the motivations for recycling behaviour during different periods and with different materials.

A 2013 international workshop called 'The Origins of Recycling: A Paleolithic Perspective' sparked a discussion on recycling in prehistory (Tel Aviv University, Israel, 2013). Archaeologists have revealed traces of recycled flint tools and bones in various parts of the world; the early appearance of recycling underlines its role as a basic survival strategy (David 2013). Anthropologist Daniel Amick acknowledges opportunism in recycling behaviour, and states that recycling behaviour is better viewed as the economy of human time and effort, rather than a moral and ethical choice, as it is usually framed today (Amick 2014:12).

There are various examples of the term 'recycling' within archaeology. For example, in her study of early Egyptian glass, Chloë N. Duckworth referred to recycling as the re-melting and working of finished glass objects (Duckworth 2011:222). Here, the primary focus is on the recycling of ships' hulls, although other types of recycling practices are acknowledged. This study addresses the reasons and incentives for recycling and discusses how recycling can be recognized in the skeleton wrecks of the underwater cultural seascape, why vessels were recycled in the past, and how the act of recycling forms an underwater cultural seascape.

A skeleton wreck is a poorly preserved ship's hull: the lower frames stick up from the seabed resembling a ribcage. With so little left of the original ship, there are hardly any leads for archaeological studies, and the type of vessel is very hard to determine. These types of ancient remains are difficult to connect with their past; most of them remain unidentified. However, with sites from a recent historical period, interpretations become possible by combining both archaeological evidence and historical documentation.

This dissertation focuses on recycling behaviour related to ships at the UNESCO World Heritage Site of Suomenlinna, Finland. The waters of this 18th-century sea fortress have been used very intensively, creating a rich underwater cultural heritage. The landscape of the site shows signs of the societies that carved, cut, blew up, drained, diverted, filled, and developed these natural rocky islets into a defence system. However, this study proves that the footprint of past generations is larger than previously thought. This becomes visible in the research of the hidden seascape, featuring a variety of cultural relics including the world's largest log frame embankment, numerous wrecks, and even old cannons.

This dissertation covers the whole history of the fortress, representing the Swedish period (1747–1808), the era of Russian rule (1808–1918), and the time of Finland's independence up till the present day. The decision to build a fortress to protect the Finnish coast dates to 1747. At the time, the construction site was one of the largest enterprises in all of Europe.

The name of the fortress has changed over time. The modern name, Suomenlinna, was given in 1918 and means 'the fortress of Finland'. The original name, Sveaborg, means 'the fortress of Sweden'. This dissertation follows the naming tradition set by historians, and the name Sveaborg is used when dealing with the period before 1918 — this includes the Russian period. Otherwise, the name Suomenlinna is used.

The islands on which Suomenlinna is built are located just off the coast of Helsinki, the capital city of Finland. The waters belong to the Gulf of Finland, which forms one of the central parts of the Baltic Sea (Fig. 1.1). Today, the Suomenlinna area is a combination of old architecture and maritime surroundings, including over 200 buildings and fortifications on eight different islands containing over six kilometres of stone walls (Gardberg et al. 1998). The land area is approximately 80 hectares, and the surrounding waters reach even further. The site

is a significant cultural heritage attraction in Finland. Foreign tourists and Finns appreciate the area, which receives over a million visitors annually. In addition, it is a small and lively neighbourhood of Helsinki with 850 inhabitants. Suomenlinna is a historical monument, and it holds an almost iconic role in the history of Finland.

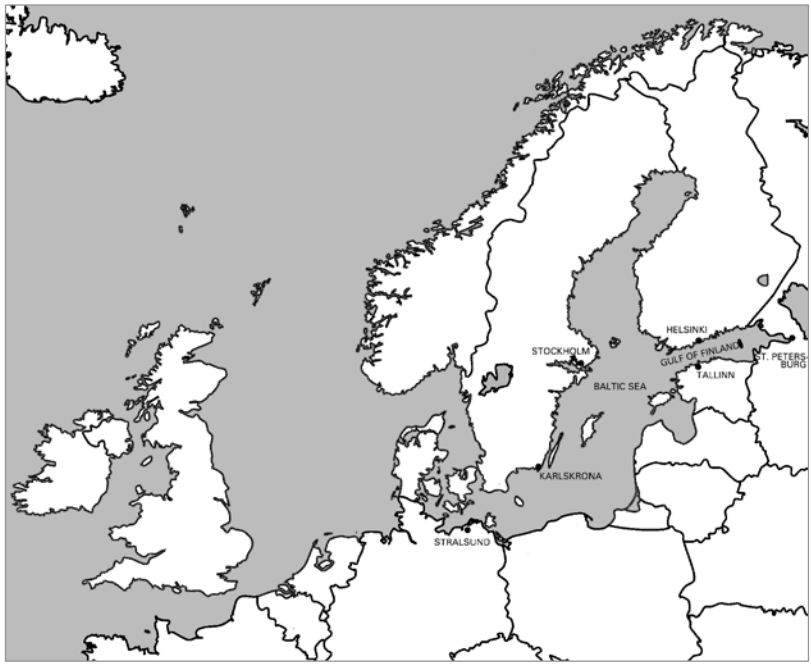

Fig. 1.1. The Baltic Sea and the Gulf of Finland are located in northern Europe (Marja Leino 2014).

Most of the region known today as Finland was a part of the Swedish realm from approximately the 12th century until 1809.[1] Sweden lost to Russia in the Finnish War and had to cede Finland, which became an autonomous duchy of the Russian Empire. Finland declared independence in 1917.[2] The fortress had a significant role in the defence of Sweden and Russia, but its military importance gradually declined during the time of Finnish independence. It was transferred from military to civil administration in 1972–1973. In 1991, Suomenlinna was inscribed on the UNESCO World Heritage List, which includes

[1] However, the fortress succumbed a year earlier, and the Russian period is considered to start from 1808.

[2] Russian occupancy at the fortress lasted until 1918.

sites that are an important part of global cultural and natural heritage. The fortification is considered to be a unique monument of military architecture (UNESCO, World Heritage List 2014).

However, when the World Heritage List accepted the fortress, the underwater areas were not included. For a long time, the waters around the site were seen only as a part of the picturesque environment, the surface of the water mirroring the impressive stone walls and natural formations. And yet, the water has sheltered a unique underwater cultural heritage reflecting the lives of the people living on the islands, as well as tensions between different nations. A vast wealth of information is embedded at the bottom of the sea. Although the Antiquities Act has protected this underwater cultural heritage since 1963,[3] the general public has not been aware of this specific part of the fortress (Fig. 1.2).

Fig 1.2. The fortress viewed from the east; the sheltered water area is seen in the centre of the photo (Mika Karvonen 2014).

This dissertation aims to create a better understanding of the underwater landscape of the fortress and its associated remains. The archaeological data used for this study was collected through an underwater archaeological survey; there were no opportunities to carry out new archaeological excavations. The importance of archaeological surveys as sources of new knowledge in addition to archaeological excavations has grown over the last decades (Lavento 2001). This is even more relevant for underwater remains; costly excavations are rare opportunities. The interrogation of wrecks cannot be as thorough as it would be in an excavation; however, survey methodology has developed significantly during the past few decades. Still, the core purpose of an archaeological survey remains the same: it is a systematic search for and documentation of unknown sites, and an update on

[3] See http://www.finlex.fi/fi/laki/kaannokset/1963/en19630295

the preservation of previously known remains. This study wishes to contribute to maritime archaeology by giving a successful example of how survey results can be exploited and used to produce insights on past generations.

The survey project was organized by the National Board of Antiquities during 2007–2012, and the underwater survey component was conducted during 2007–2010. The author was responsible for planning and directing the project, carrying out the fieldwork and scientific diving, and writing reports, in addition to the dissemination of information to local residents and a wider audience through an exhibition, public statements, and peer-reviewed articles (Leino 2008; Leino and Vakkari 2010; Leino and Flinkman 2012; Leino 2012a; 2012b; 2013).

Numerous unidentified wooden wrecks were recorded through the survey, and became the main topic of this research. The waters of Suomenlinna contain at least 27 different types of wreck. Before this study, none of the known wrecks had been identified by name and year of construction, even though most of them had been discovered over thirty years ago. From the data acquired, these wooden skeleton wrecks could be divided into three different categories based on how the wrecks originated. These three categories are 1) accident (AC) (e.g., shipwreck or foundering), 2) deliberate abandonment (DAB), and 3) recycling (RE). The wrecks that indicated recycling behaviour formed the case studies of this dissertation. The next task was to find out whether a biographical approach could be applied to recycled hulls.

It was Igor Kopytoff (1986) who presented a biographical approach to studying the life cycle of an object. Subsequently, Jonathan Adams (2003) opened the discussion on the biographies of ships. In recycling, a ship's hull can be seen as an object with a biography, not only as raw material to be dismantled. However, the biography of an abandoned and recycled ship is hard to grasp when the ship has been reduced to a skeleton wreck. Obvious clues — such as objects, rigging, and parts of hull structures — have been removed. These types of sites are more naked than shipwrecked vessels, which typically contain a wealth of information. Researchers need to approach recycled vessels with a different mindset to realise their potential value as sources. These sites are not dead ends, but could more usefully be seen as shy and slow sources. In other words, they are challenging sites to study.

The long tradition of recycling behaviour in the maritime environment is very different from the modern idea of recycling ships.

According to a publication on the logistics of the maritime industry, modern marine commerce sees the recycling of ships as one cornerstone of its business (Tapaninen 2013). Almost all of the materials used in ships are recyclable, and, for example, the steel industry in India relies on material originating from vessels (Tapaninen 2013:116–118). It is important to keep material in the systemic context and in use. Awareness of recycling traditions of the past may be able to influence modern ship recycling, by inspiring new ideas from past experience.

1.1 Research design: goals and questions

The Suomenlinna sea fortress was chosen for this study based on the intensive use of its waters in different types of cultural settings over the past centuries, during the Swedish, Russian, and Finnish periods of the fortress. The study area covers six different islands of the fortress and the surrounding waters, which today belong to the Governing Body of Suomenlinna (see Fig. 1.3 and 1.4). In addition to wrecks, underwater structures like embankments were documented in the archaeological survey, and multibeam data on them is also available. However, these constructions were excluded from the analysis, as they were originally built for underwater purposes and remain in similar use without reflecting any significant recycling behaviour.[4]

Recycling in a maritime context has not previously received much attention from scholars. Now that maritime archaeology is widening in scope, there is room to explore this issue, since researchers can handle a ship's biography in many ways. The biographical approach is important to the study of recycled ships — not to explain the whole biography of the vessel, but to highlight some aspects of its life. To tell the life history of a ship, the vessel first needs to be identified, which is a challenge in the case of wooden skeleton wrecks. There are different ways to archaeologically interrogate the objects. In this study, the examination starts from the archaeological survey data, and the first goal is to make the mute wrecks speak by discovering the reason for the location of each wreck on the seabed, and placing it into context within the historical layers of the underwater cultural landscape

[4] There is only one case study dealing with a substantial amount of recycling practices in an underwater construction in Suomenlinna, and this study has already been published in a separate article by the author (Leino 2010a).

of Suomenlinna. This approach can now be used for the first time with the help of modern multibeam data, which was produced for the exhibition and management of the underwater landscape. Multibeam images make the wrecks visible in the landscape and accessible for new interpretation.

Fig 1.3. The study area (Marja Leino 2014).

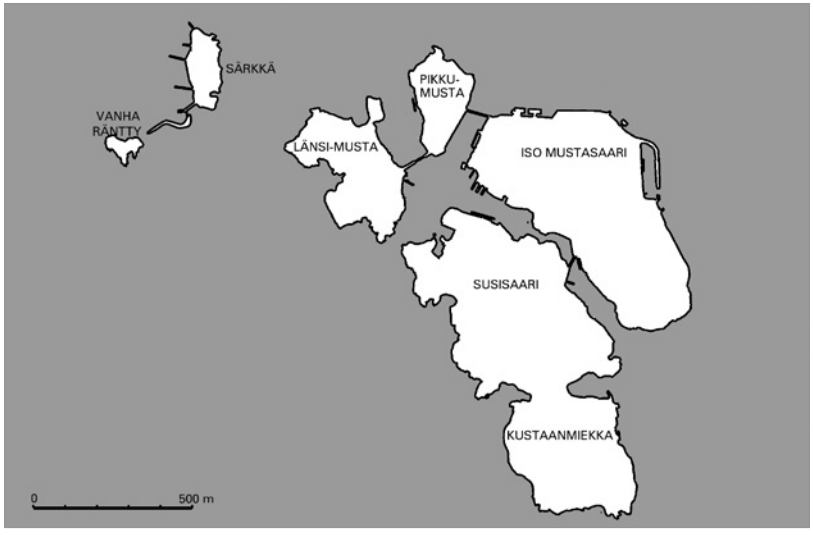

Fig 1.4. The islands of the study area (Marja Leino 2014).

This study builds on the hypothesis that there are three relevant origination mechanisms for wreck sites in the fortress environment. These mechanisms are: 1) accident (AC) (shipwreck or foundering), 2) deliberate abandonment (DAB), and 3) recycling (RE). Each of these mechanisms creates a different kind of a site, and in an archaeological survey there should be specific and detectable features that identify each site's origination mechanism. These features should be predictable as to where the sites are located in the landscape, and in the appearance of the physical remains. This dissertation aims to recognize recycled ships among the wrecks of the underwater cultural landscape. Accordingly, the first and main question of this study is: **How can recycled wrecks be identified among poorly preserved wooden skeleton wrecks, based on survey data?** The analysis within this study is designed specifically for the underwater cultural landscape of the sea fortress.

In shallow waters, a ship's cargo, reusable parts of the rigging, and other equipment were often salvaged from a vessel shipwrecked by accident. Such dismantling would make a shipwrecked vessel superficially resemble an abandoned ship, or even a recycled hull that had been intentionally dismantled before disposal or recycling. In other words, the wrecks that result from an accident, abandonment, or recycling may all look similar when the site is discovered archaeologically. An archaeological excavation could still reveal different features and aid with the interpretation of the origination mechanisms, but this labour-intensive method is seldom available to researchers.

The topography of the underwater landscape should reveal whether the site originated from an accident, abandonment, or recycling. Recycled vessels should be easy to identify from the other two kinds, since they have been scuttled at specific locations to serve their community. Additional constructions or stabilizers may have been added to the hull to allow the recycled ship to fulfil its new function.

This leads to the second research question: **What can be learned from these recycled vessels?** In other words, what is the potential for recycled vessels to shed light on the lives of people in the past? At first sight, the possibilities may seem limited. In the 1970s, Keith Muckelroy (reprint 2004:8) explained how people stripped all usable material from discarded vessels and how scholars saw these wrecks as containing only scant information on their unique economic and social roles. This is true if these sites are compared to ships that were shipwrecked in deep

water and left there — shipwrecked vessels contain a huge amount of leads and new openings for research.

However, this does not mean that vessels abandoned in shallow waters in actively used environments have no research potential at all. Ship abandonment and recycling has to be approached with new types of research questions, to broaden the focus beyond the quantity of objects and their information value. Attention could instead be drawn to how these hulls became part of the underwater landscape, and their value for their contemporary society. This study's task is to evaluate whether the ships and their elements could express *economic*, *tactical,* or *symbolic* motivations for recycling behaviour. Changes in this behaviour at different times may reflect, for example, changing political situations.

Fundamentally, recycling can be described as making use of an object (such as a vessel) in a different way from its original function. In contrast, discarding is when unwanted objects and materials are simply dumped out of sight. Recycling aims at the resourceful reuse of various materials.

The common definition of 'the recycling of a ship' starts from the assumption that practically all reusable material from a vessel will be recycled separately, including the hull. In this case, little will be left for archaeological research; a survey cannot discover material that never ended up in an archaeological context. Instead, usable material has remained in use within the systemic context, as defined below, and cannot be approached through archaeological methods. However, recycling can also eventually put material into an archaeological context. For example, a relevant issue for this study is how a ship's hull may be scuttled for a new use, allowing it to be preserved and available to archaeologists today. Still, recycling a ship is a deliberate act with a certain function at the time it is carried out, and a recycled ship only becomes an archaeological site in later times.

The term 'systemic context' was first defined by Schiffer (1972), who used it for living contexts of the past. A systemic context is the opposite of an archaeological context: in a systemic context, an object is in regular use in its parent society or in a 'living environment', as expressed by McCarthy (2013:35). An archaeological context, on the other hand, means a post-depositional phase. The current tendency in research is to add another living context to the object, namely our

own times. As soon as the object is discovered, it becomes a part of our living cultural heritage system (Hurcombe 2007:38).

Accordingly, recycling can take place in the first cultural context in the past, but what about when the object has already entered the archaeological context? Maritime objects are visible in the topsoil landscape of the fortress, serving the living society. These relocated objects, such as anchors, are visible reminders of the maritime past of the area. This has been acknowledged to promote discussion of how underwater relics could be made easier to approach, and to raise the question if this should be called recycling. Accordingly, the third question discussed in this study is: **Can recycling bring material from the archaeological context into the current cultural context?**

In conclusion, the aim of this study is to chart how recycling behaviour is visible in the underwater landscape and how it can be studied with data gathered in an archaeological survey project. This dissertation tests the biographical method to find out whether it has something new to offer to the archaeological research of ship remains. This study aims to encourage discussion, to expose further research potential, and to strengthen the significance of this often overlooked underwater cultural heritage resource.

1.2 Terminology

The central terminology of this dissertation can have different meanings in different contexts, and for that reason, these terms are explained here.

1.2.1 Recycling

The term 'recycling' has many meanings, and the way a reader understands the concept is important for how this study is received. For that reason, it is necessary to define how recycling is seen in this study, and how it is different from reuse.

For this study, **recycling is a practice that produces something new from used material**. The act implies that there is a need and a motivation to build something new. This 'new' thing is then implemented into specific forms of use. The recycled items discussed in this dissertation are mainly worn-out ships and especially their hulls, which are found on the seabed. If, instead of being recycled, these same hulls were reused, they would still serve as ships since their primary

function would be the same as previously: to serve their communities as floating vessels. Reuse can be considered as 'to use the item again' without significant change in the original function; 'recycling' on the other hand, creates something new from old material, changing the original function of that material.

The concept of recycling is currently receiving more and more attention in archaeology. The 2015 annual conference of the European Association of Archaeologists (EAA) held a session on recycling. The discussion started with the modern concept of recycling, as the third element of the reduce – reuse – recycle hierarchy. It is important to reduce consumption, since the most effective way to diminish waste is to not to create it in the first place. The next step to avoid waste material is to reuse things, for example donating unwanted items. One man's trash can be someone else's treasure. Reduction and reuse are the most effective ways to save natural resources. Recycling material comes in at third place.

The session leader at the EAA, Dr Peter Bray, stated that modern ideas about recycling have made it relevant and fashionable, but have imbued the debate with modern concerns about crisis management and extending and preserving a rare or expensive resource. The debate between scholars in archaeology emerges as nuanced language: 'I don't agree with your recycling idea. It's obviously reuse'. The suggestion from the EAA discussion was to use terms such as 'solid reworking', 'linear recycling', or 'mixing recycling' for materials, such as metal or glass, that can go through a liquid state (Bray, pers. comm. 2015). This does not apply to wooden wrecks, but it is still important to see that there is space for discussion within the archaeological field on the concept of recycling.

Richards used the term 'post-abandonment' when he wrote of behaviour that could also partly be seen as recycling. In an article dealing with the role of isolation in cultural site formation with a case study from Tasmania, Australia, he wrote: 'It is also interesting to note that, even today, some vessels, such as Number 10 Lighter seem to serve a post-abandonment function as makeshift jetties' (Richards 2003:80). In this case, the vessel was not intentionally recycled as a jetty, but it happened to be abandoned in a suitable location; the behaviour of turning it into a makeshift jetty expresses opportunism. Another term used by Richards was 'conflict-inspired abandonment'. However, this

can express recycling behaviour if the abandoned ship has a new and intentional function and is not simply discarded out of sight.

There are some studies in Australia which use the terminology set by Richards. One notable example is the adaptive reuse of the Australian warship *Protector*, which is still in use as a breakwater today. Hunter and Jateff (2016) do not consider the use of the hull as recycling, but instead categorise it as functional post-abandonment use. However, it is not abandonment at all, since it creates something new for the parent society, for ongoing use. According to the terminology of this study, the use of *Protector* as a breakwater could be called recycling.

Extending beyond the scope of archaeology, the modern idea of recycling can be found in the Encyclopædia Britannica:[5]

> **Recycling,** recovery and reprocessing of waste materials for use in new products. The basic phases in recycling are the collection of waste materials, their processing or manufacture into new products, and the purchase of those products, which may then themselves be recycled. Typical materials that are recycled include iron and steel scrap, aluminum cans, glass bottles, paper, wood, and plastics.
>
> …
>
> Society's choice of whether and how much to recycle depends basically on economic factors. Conditions of affluence and the presence of cheap raw materials encourage human beings' tendency to simply discard used materials. Recycling becomes economically attractive when the cost of reprocessing waste or recycled material is less than the cost of treating and disposing of the materials or of processing new raw materials.

1.2.2 From Underwater Seascape to Maritime Cultural Landscape

How does the term 'maritime cultural landscape' relate to 'underwater seascape'? There is no strict definition for either term set by any convention or agreement.[6] However, concurring with O'Sullivan and Breen (2007:240), it is best to imagine our underwater seascapes as encompassing the entire coastline: from the land, across the intertidal zone and onto the seabed.

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[5] http://global.britannica.com/science/recycling

[6] The topsoil landscape has a definition, given by the European Landscape Convention as 'an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors' (European Landscape Convention; Tikkanen 2012:193).

Christer Westerdahl first introduced the description of the maritime cultural landscape, based on his maritime archaeological survey of the coast of Swedish Norrland 1975–1980 (Westerdahl 1980; 1987; 1989; 1992). According to Westerdahl, the maritime cultural landscape signifies human utilization of maritime space by boat, settlement, fishing, hunting, shipping and its attendant subcultures, such as pilotage, lighthouse and seamark maintenance (1992:5). Westerdahl's main point is that maritime cultural landscape is similar to the cultural landscape on land, although not as obviously transformed by human culture. Hidden from sight beneath the water, the maritime cultural landscape is constructed in the mind's eye. Cultural contents are in general cognitive rather than material (Westerdahl pers. comm. 22 February 2017). The term 'cognitive landscape' denotes the mapping and imprinting of the functional and other aspects of the surroundings in the human mind (Löfgren 1981; Westerdahl 1992).

'Seascape' refers to marine and coastal landscapes, i.e the sea seen from its surface. Variations of the term, such as undersea seascape or underwater seascape, specify a sea view, beneath the surface, thus covering all views within and from the body of water (Musard 2014:x, Dû-Blayo and Musard 2014:2). Reference to the underwater seascape dates back at least to the 19th century, however it became a more common term used by deep-sea divers after the 1940s. Since the 1990s, the term has been in use in maritime science, but there are still differences of opinion about whether it should be called seascape, marine landscape, underwater landscape, submarine landscape or submarine scenery (Musard 2014:x; Dû-Blayo and Musard 2014:2). Within this dissertation, the scenery is called underwater seascape or underwater landscape. Although the aim in science is to use only the term 'underwater seascape', it seems that these two terms are used interchangeably within studies dealing with underwater scenery (see for example Musard et al. 2014).

According to Ford (2011:4), a true seascape is constructed of the factors that allow an individual to perceive the location out of sight of land. These factors can include stars, currents, swells, birds, winds etc, which allow navigators to place themselves on a mental map. Ford remarks that some scholars use 'seascape' to describe any landscape viewed from the sea, including seamarks, harbours, reefs, islands etc. However, he sees these as part of the original term 'landscape' — after

all, the shore is a continuum from the uplands to the continental shelf, which has been submerged or exposed during different times.

The underwater seascape is related to the concept of the maritime cultural landscape, although the approach is different. With the maritime cultural landscape, the approach is wider: it covers all uses of the sea, and the focus remains on the cognitive landscape of the past people, like fishermen, seafarers or those living in a maritime fortress. Previously only divers could experience the underwater seascape; today, it can be visualized with modern technology, making it more comprehensible and accessible for all. Accordingly, the underwater seascape can be a model and visualisation of the seabed, based on scientific data, and the archaeological interpretation is not included. Visualized together with new three-dimensional mapping technologies, photographs and films, the underwater seascape can create a basis for interpretations, giving the ability to reconstruct the maritime cultural landscape of people in the past.

With Suomenlinna, the focus is on the parent society, and the way people previously experienced the underwater landscape. Using our knowledge of the underwater seacape, we try to understand the cognitive landscape of the parent society, the way people saw the sea in their own times. A maritime cultural landscape is constructed from different data, combining the visualised underwater seascape with archival material, literature and archaeological survey. This diversity of approaches is unified by a focus on how humans interact with water, how those interactions shape both society and landscape, and how those interactions manifest themselves in material culture (Ford 2014:6). Within this dissertation, the material culture is limited to the wrecks in the underwater landscape, especially the recycled ships' hulls.

1.2.3 Other terms

The following terms are used frequently in this dissertation, and definitions are included here for reference.

Systemic context

'Systemic context' is a term widely used within behavioural archaeology, and especially by Schiffer. A systemic context is the opposite of an archaeological context: in a systemic context, an object is in regular use in its parent society or in a 'living environment' (McCarthy 2013:35). An archaeological context, on the other hand, means a

post-depositional phase. As soon as the object is discovered, it becomes a part of our living cultural heritage system (Hurcombe 2007:38).

Side-scan sonar

Side-scan sonar is a tool widely used for detecting shipwrecks and other archaeological finds. Short pulses of acoustic energy are transmitted along the seabed in fan-shaped beams. The return echoes from any objects in the path of these beams are electronically recorded and processed. The images produced resemble aerial photographs, ready to be interpreted (Klein 2002:667–670).

Multibeam sonar

Multibeam echosounders create a three-dimensional landscape from bathymetric data (x, y, z) from the sea bottom. The system operates in a way that the actual equipment is attached to a survey vessel, which covers systemically the whole study area. The multibeam sonar system emits sound waves with a fan-shaped beam. It measures the time that an acoustic signal takes to travel between the transducer and the seabottom when it reflects the signal back to the equipment. It produces swath bathymetric data, which is then processed further with different types of visual images, to interpret a landscape and different items such as wrecks on top of it.[7]

Lidar

The remote sensing method lidar — Light Detection and Ranging — is used to examine the earth with the help of light. The light is formed as a pulsed laser, which measures variable distances to the target. In this way, an accurate three-dimensional model of the shape of the surface is created, which can be used to study natural and man-made environments. This type of laser scanning is typically conducted from the air by a small plane or a helicopter.[8]

Caisson

Within the maritime archaeological context, the term 'caisson' relates to single-mission barges. They are especially designed to block a spot, to serve as an embankment, preventing water traffic. Caissons could have

[7] Read more in https://www.nauticalcharts.noaa.gov/hsd/multibeam.html

[8] Read more in http://oceanservice.noaa.gov/facts/lidar.html

been modified from an old hull. The term also refers to underwater logframe constructions, which were used as bases for piers and breakwaters. These types of caisson are made of wood, most typically logs.

1.3 From salvage to protection and archaeological research

In the history of maritime archaeology, one topic rises above all the others: the relationship between salvage and archaeological research. Today, salvage can be seen as 'lateral cycling', as expressed by Schiffer (1972). Lateral cycling refers to a change in the user and in the transfer of ownership. There is no change in the object itself, or the way it is used. Salvaged items stay within or are returned to the systemic context.

Maritime archaeology has its roots in both salvage and archaeology. Keith Muckelroy (1978) was the first to make this connection, and he described how shipwrecks have always attracted the attention of potential salvors. In the past, a shipwreck could only escape salvage if it was located in deep water or off an uninhabited coast. However, after the seabed became accessible to divers, the discovery of an old and previously unknown wreck often led to an attempt to save everything valuable. The common thought was that the 'right place' for things lost at sea was on land; people did not see shipwrecks as historical sources, but as material in need of being recovered. Over the course of history, salvage should be seen as one phase in the life cycle of a wreck; part of a ship's extended biography. This type of lateral cycling has great potential for revealing economic and cultural aspects of the society behind the salvage.

As an archaeological approach gradually became more important, underwater cultural heritage started to be protected by legislation — but the change from pure salvage to archaeology was a long process. In some places in the world, it is still more typical to salvage even historical wrecks. In the Baltic Sea, the first attempts at systematic archaeological recovery took place in the 1930s. At that time, work was conducted by helmeted divers with surface-supplied air and a salvage background. The most important pioneering effort took place in Sweden with the wreck *Elefanten* (sunk 1564) in an area called Kalmarsund. Marine officer Carl Ekman directed the research, which consisted of measuring the wreck, recovering elements, and creating a reconstruction of the vessel. Ekman was the first to use the term 'marinarkeologi' related to his actions (Rönnby 2014b:22; Gould 2011:234; Cederlund 1983:53).

The study is regarded as the first scientifically performed underwater investigation in Sweden, and it is the pioneering study in the whole Baltic Sea.

The development of diving gear in the 20th century had a significant impact on underwater archaeology. The self-contained breathing apparatus created a breakthrough in 1942. The work of French navy officer Jacques-Yves Cousteau and engineer Émile Gagnan resulted in an aqualung that any trained person could use (Muckelroy 1978:10–14). Later, it was possible to conduct underwater excavations with the same accuracy as on land. This innovation has changed our perception of the underwater world more than anything else, and it gave a significant boost to scientific maritime archaeology.

The methodology of maritime archaeology has developed slowly, and archaeological inspections of many important sites used land-based techniques. A vital step took place in 1960 in the Mediterranean Sea, when George F. Bass and his team studied a vessel from the Bronze Age at Cape Gelidonya off Turkey (Bass 2013). This excavation was a forerunner in many methodological aspects — for example, photogrammetry — in addition to opening up a new source of information on the past trade of the area. From the 1970s onwards, maritime archaeological studies in the Baltic Sea area also became more established (Rönnby 2014b:34).

In Finland, archaeologically motivated salvage activities occurred during the 1930s, especially at Ruotsinsalmi (in Swedish, *Svensksund*), an old battlefield area (Tiina Mertanen, pers. comm. 11 January 2015). The history of Finnish maritime archaeology has not been studied yet. However, a single case study called Kultakaleeri ('The Gold Galley') is presented here, which clearly expresses the change in attitudes and the way historical wrecks are appreciated. The study of this wreck was most likely the first underwater study referred to as research, and it took place in the 1930s. This case is discussed here because one party involved in this project was the Suomenlinna Museum, although the geographical area is 28 km east of the fortress.

1.3.1 Kultakaleeri: from salvage to archaeology in Finland

The gradual development of archaeological thought away from salvage can be followed through several Finnish case studies. The beginning of maritime archaeology in Finland is regarded as starting with the 1948 discovery of the wreck of the Russian frigate *St Nikolai* (Cederlund

1984:27). The ship sunk in the battle of Ruotsinsalmi in the eastern part of the Gulf of Finland during the Russo–Swedish War (1788–1790, also known as Gustav III's War, and Catherine II's Swedish War). During the years following the discovery, several salvage operations were undertaken, causing damage to the hull.

However, another wreck is more useful for regarding the relationship between maritime archaeology and salvage. This site is a wreck popularly called Kultakaleeri (registered as 'Risskär', named for the closest island) located 28 km east of Helsinki, near Porvoo (ID 1035 in the national register of underwater finds,[9] Fig. 1.5). Its story can be followed back to the early 18th century. According to oral tradition, Kultakaleeri was thought to be the wreck of a ship of Russian origin. It foundered in the 1720s while trying to escape a Swedish fleet during the Great Northern War (1700–1721). There are many stories about galleys left by Russians in the Swedish archipelago. However, these stories are not always accurate — one of these wrecks turned out to be a medieval cog (Hjulhammar 2014).

Fig 1.5. Kultakaleeri ('The Gold Galley') in its current condition (Stig Gustavsson 2009).

[9] The national Ancient Relics Register (in Finnish, *Muinaisjäännösrekisteri*) is a combined register for all monuments on land and underwater. It can be accessed at https://www.kyppi.fi.

The Kultakaleeri ship was believed to carry precious cargo, such as loot and the salaries of Russian troops. It had a reputation as a real treasure ship. The Russians could not salvage their valuables, as they did not have safe access to the site: the wreck was located in an area belonging to Sweden. The rumours of treasure spread and, in 1726, Swedes came to salvage the wreck. At that time, a person called Jacob Gillbert was responsible for the diving operation. The divers managed to raise some minor items and break the deck structure of the wreck (Huhtamies 2012:232–260).

A new attempt took place in 1735, led by the Diving and Salvage Company of Stockholm. The company had reinforcements from England: a diving bell and a diver named John Davies. It was the first time that a diving bell was used in Finnish waters. They managed to recover some items, such as cannon balls, a church bell, silver, and parts of a gun carriage, but the legendary gold remained unfound. An auction of the recovered items was held in Stockholm (Huhtamies 2012:245; Mäntylä 1994:224; Nyberg 1943:160–167, 168–174).

These early contemporary activities cannot be regarded as maritime archaeological research. The motivation for field operations could have been purely economic or, as suspected by Huhtamies (2012), related to efforts to reveal advanced technical methods of Russian shipbuilding. A change of approach towards wrecks came only in the 20th century.

According to the 1931 annual report of the Finnish Archaeological Commission (in Finnish, *Muinaistieteellinen toimikunta*, which in 1972 became the Finnish National Board of Antiquities, or *Museovirasto*), research of the wreck was enabled with the help of a Swedish count, Alarik Wachtmeister. He had an old shipbook (in Finnish, *laivakirja*; could also be translated as 'logbook'), which stated the exact location of the wreck. At the same time, salvage diver Mr Suni learned the story of the treasure. He was working for a salvage company called Finska Bärgnings AB Neptun ('Finnish Salvage Company Neptun') (Hoving 1949:128). This renewed interest led to a new project in 1935. Neptun, the Swedish Naval Museum, and the Suomenlinna Museum made a contract to split the artefacts into three equal collections.

These rescue actions at Kultakaleeri were closely followed in the media. The news explained that salvors raised silver from the wreck; however, later analyses revealed that it was not silver, but corroded iron. Altogether 1,626 items were lifted, mainly old cannon balls (Analecta

Archaeologica Fennica VIII:280). The rumoured fourteen barrels of gold were never discovered.

The next time the wreck is mentioned is in the Finnish Archaeological Commissions's annual report of 1955, when the Suomenlinna Museum cleaned up a boiler room below the hall of Ehrensvärd (see more in section 2.2.1). The items lifted from the wreck were donated as scrap metal to the defence forces. It was done with the permission of the two other stakeholders, the Swedish Naval Museum and the salvage company Neptun. Some other objects were donated to the Military Museum of Finland. Items are described as 'worthless' for the Suomenlinna Museum (Analecta Archaeologica Fennica VIII:88). The story reveals the recycling of maritime objects originating from a wreck as scrap metal, even from museum premises. It can thus be seen that recycling has taken place within extended object biographies even when objects have already been taken into a museum collection.

After World War II, diving gained popularity, although it was still rare to have access to suitable equipment for exploring underwater scenery. Gradually wrecks were acknowledged as historical source material. The salvaging of the wreck of the 17th century warship Vasa in Stockholm in 1961 had a clear impact on the general attitudes in Finland, and also influenced the story of Kultakaleeri. Voluntary divers working in maritime archaeology studied the wreck in the 1960s, and their intentions were already professional, documenting *in situ* and lifting objects for the National Museum (YLE, National broadcast company, *Kultakaleerin salaisuus* 'The secret of the Gold Galley' 1968). These divers were the pioneers of the field. At the same time, on 5 September 1961, the State Archaeologist of Finland, Nils Cleve, was interviewed on national radio to discuss the value of wrecks. He explained how each wreck was a sample of evidence for a particular type of ship of its period. Cleve also described how investigating wrecks was a new field in Finland. He anticipated that in coming years, this type of research would be more important. Cleve explained how Finland was not going to have a wreck as great as the Vasa, but work in Finnish waters could nevertheless provide interesting results (Nordenstreng 1961).

These visions are still current over fifty years later, and past decades have seen many professionally conducted underwater archaeological projects on different types of remains. Nevertheless, it would be worth taking Kultakaleeri into closer archaeological inspection using modern methodology, as its life cycle is truly interesting.

1.3.2 The beginning of official protection in Finland and the pioneering phase of research

Since the establishment of the Antiquities Act in 1963 (Muinaismuistolaki 295/1963), underwater remains in Finland are no longer covered by the 'finders, keepers' tradition. The law officially protects sites as common property, managed by the National Board of Antiquities (NBA). According to the Act, 'the wrecks of ships and other vessels discovered in the sea or in inland waters, which can be considered to have sunk over one hundred years ago, or parts thereof, are officially protected' (NBA, Cultural Environment 2014). A long tradition of plundering the fruits of the sea officially came to an end regarding historical wrecks.

The increase in diving and public interest in wrecks in the 1960s were also signs for the authorities to start protecting these sites from plundering. The old tradition of salvage was now illegal with wrecks over one hundred years of age. Within the National Board of Antiquities, the task was given to the Office of Maritime Archaeology, established in 1968, which later became the Maritime Museum of Finland.

Archaeological excavations were conducted at different wreck sites during the 1960s and 1970s. Research was carried out, and the development of maritime archaeology elsewhere was followed attentively. Numerous publications reflect this active period in the early phase of maritime archaeology in Finland (Ahlström 1972; 1978; 1979; 1981; Alopaeus 1975a–b; 1976; 1979a–b; 1984a–b; Edgren 1978; 1979; Halme 1983). The work concentrated on battle areas and shipwrecked merchant vessels of different ages. No particular attention was given to scuttled and recycled ships, except in studies by Harry Alopaeus (1984) around Suomenlinna in the 1970s and 1980s (see section 2.3).

The progress of scuba diving brought a lot of curious people to different wreck sites and information from the underwater world increased significantly. At that time, the most important method of sharing information was lifting objects to the surface, conserving them, and setting them on display in museums. A great variety of objects have been collected, conserved, preserved, and catalogued in the collections of the Maritime Museum of Finland.

Modern technology has created new possibilities for increasing awareness and studying sites without raising more items (Leino and Flinkman 2012). For example, the survey project conducted as part of this dissertation did not raise any objects. The survey results were shared in a temporary exhibition at the Suomenlinna Museum. The

exhibition was called 'Bubbling Under, the Underwater Cultural Heritage at Suomenlinna', and only objects already in the museum's collections were put on display. More important was the amount of new visual material from different sites around the fortress islands, collected using modern technology (Fig. 1.6). Especially remarkable was the ability to present the underwater cultural landscape for the first time. Museum visitors could move around in the 3D landscape with a program developed to combine new lidar and multibeam data, and usable with a big screen and a 3D mouse.

Fig 1.6. The exhibition Bubbling Under, the Underwater Cultural Heritage at Suomenlinna presented the underwater landscape of the fortress for the first time (photo by the author 2011).

The principles of handling underwater cultural objects are established in the UNESCO Convention on the Protection of the Underwater Cultural Heritage (2001). Finland has not yet ratified the Convention, although Finland was involved with the development of the agreement and is already committed to following its Annexes, which describe the best practices and principles for research activities. For example, as the first doctoral dissertation in Finland in this field, this study has followed the UNESCO Convention rigorously regarding ethical and practical issues. The general trend is to encourage people to access the sites *in situ*, and to view the Baltic Sea as an underwater historical museum. New technology has changed the field of visualization and documentation remarkably, and in the future the underwater seascape will become more and more familiar to the general public.

1.4 Theoretical approaches to recycling practices in maritime archaeology

> 'Underwater archaeologists now need to make greater use of archaeological science to build more believable and generalizable ideas about how people in past human cultures behaved in relation to their maritime environments.'
>
> — Richard A. Gould (2011:4)

In Finland, maritime archaeology is typically conducted from a historical perspective, focusing on the singular characteristics of the studied period. Lately, researchers also include general sociological discussion to shed light on what happened in the maritime past and how it may affect people today (see, for example, Alvik 2012; Tikkanen 2012a; 2012b; Matikka 2012). An important question to ask in building a theory is what kind of behaviours could be linked to different kinds of archaeological remains. Why did certain practices begin, change, or remain stable? When it comes to recycling practices, it is more meaningful to study the cultural catalyst for recycling than the act itself. Amick (2014) argues that archaeological explanations would benefit from greater integration with the larger body of historical and sociological studies on this topic. Different social reasons can explain the evidence for recycling in the archaeological record.

It was not until the 1980s that several archaeologists expressed concern over how little we know about what happens to material goods after their original owners no longer find them useful. However, it is commonly accepted that all societies practise conservation of material resources to some degree (Richards 2008:55; Schiffer et al. 1981:85). Modern recycling is related to production waste: material is first abandoned or collected as waste before it is recycled. Hurcombe (2007:43) states that it is only when things are no longer perceived as useful that our society treats objects as rubbish. Nevertheless, usefulness depends on the person and context, which makes interpretations complex — and far more interesting at the same time.

Within this dissertation, recycling behaviour is approached using ideas borrowed from behavioural archaeology. Behavioural archaeology seeks explanations for variability and change in human behaviour. This is done by emphasizing the study of relationships between people and

their artefacts (Schiffer 1996:644, Hodder and Hutson 2003:33). In this study, the artefact is a ship.

Difficulties in interpretation arise especially in dealing with skeleton wrecks. The lack of certain elements in the wreck could indicate cultural selection: was the ship (or wreck) salvaged at some point in the past? Or is its current condition due to natural formation processes? Both formation types should be explored in creating an interpretation: for example, a ship abandoned in shallow water could be scavenged with the help of a natural process, as it could be accessible by ice in the winter (Moore 2013:75).

Nevertheless, not all cultural transformation processes are visible in the archaeological record. For example, when a blockship was removed after a conflict, it is likely that part of the salvaged vessel ended up as firewood. This type of behaviour might have been common. However, due to the burning of the material, the evidence vanished without leaving physical remains. According to maritime archaeologist Marcus Hjulhammar, one such case is known from Stockholm. During a cold period in January 1733, watchmen chopped and used the bottom of the stricken vessel *Konstapelns* as firewood (Hjulhammar 2014:130). Another example comes from a Canadian harbour at Cataraqui River, a place called Kingston, where the poor were encouraged to scavenge abandoned vessels for firewood (Moore 2013:65).

1.4.1 Archaeological formation processes

Archaeologists learn about human societies of the past by examining debris that has survived into the present. These material remains have not come down to us unchanged, but have gone through archaeological formation processes (LaMotta and Schiffer 2008:121). The concept of formation processes is probably the most widely applied component of behavioural archaeology. The importance of these processes was first introduced into maritime archaeology through the intensive research of Keith Muckelroy on shipwreck site environments. His work created a shift in the paradigm of shipwreck studies.

Archaeological remains at every scale — artefact, site and region — are cumulative records of past events (LaMotta and Schiffer 2008). That is, traces of events accumulate over time; sometimes the traces of earlier events are covered by the traces of later events, which happens easily in the underwater seascape. To make accurate statements about a particular past event, the most relevant traces are isolated by

analytically peeling back the marks of later events. Much research into formation processes is organised in object histories. An object history for a ship is simply the chronological sequence of events that involved that ship from the time that it was first built.

To a certain extent, all ships tend to go through the same general sequence (procurement, manufacture, use, deposition, decay) and some may pass through one or more secondary cycles (reclamation, reuse, recycling). When studying artefacts to answer a specific question about the past, the investigator determines where exactly within this flow model the focus of the question lies (LaMotta and Schiffer 2008:123). Within this dissertation the question is of recycling, not as a simple part of the life history of a ship, but as an act of transforming a floating ship into an element of the underwater seascape.

Cultural transformation processes and natural transformation processes form a part of Michael B. Schiffer's profound work on behavioural archaeology (1972; 1976; 1983; 1987; 1992). These different formation processes create the archaeological record through human activities and natural forces. In ship abandonment studies, L.S. Smith has stated that abandonment and site formation processes typically strip the ship's individual identity (Smith 2013:242). These processes slowly erase the past of the ship and create an anonymous wreck. To understand the skeleton wreck, it is important to understand the site formation process. Within this dissertation, the relevant aspect is the cultural transformation process, since the objective here is not to understand the current state of an individual site, but to understand why the wreck is in its location. However, the basic effects of natural processes should still be acknowledged.

Nature has a powerful impact on every archaeological site. Nature works constantly throughout the centuries, and even a slow degradation process makes a difference over time. Natural forces vary a great deal depending on the site. The underwater environment in the brackish Baltic Sea functions differently to saltier seas. We need to collect more environmental information from the Baltic Sea, as our understanding of wave action, currents, silting, deterioration, the action of marine organisms, and other environmental factors in the Baltic Sea is still developing.

Scientific studies of wreck deterioration have been carried out during the last decades: for example, the 2001–2004 MoSS project. This was a joint European project for monitoring, safeguarding, and

visualizing underwater cultural heritage, and Finland had the leading role. Within the project, our understanding of the degradation process was extended to bacterial and fungal activity (Palma 2005; Leino et al. 2011). The whole project consisted of pioneering research in many respects, including the opportunity to carry out multidisciplinary research between several countries and to compare different wreck sites in various natural environments (see MoSS Project Newsletters 2002:I–2004:III). Another pioneering project, called Wreck Protect, focused mainly on the Baltic Sea. The publication of the project (Björdahl and Gregory 2011) created an understanding of the complex issue of natural formation processes.

When a ship enters the underwater world, it faces a new and different environment. It starts its physical decay, circulating material back into life as part of the degradation process. Wood turns into carbon, oxygen, and hydrogen (Björdal and Gregory 2011:3). Wood polymers (lignin, cellulose, and hemicellulose) are decomposed by microorganisms, liberating carbon dioxide, water, and mineral elements. Typically a wreck site consists of a number of different materials, and the seawater affects them all. It is said that gold is the only material that stays completely unchanged after entering the marine environment — all other materials immediately start to decay or corrode. In addition to chemical reactions, physical actions also affect a site. For example, currents cause erosion, and the strong force of a moving ice cover can cause even more damage to wooden wrecks, and spread wreck elements across the underwater landscape.

The research of cultural processes in site formation rests on the principle that, after using artefacts, humans either reuse or deposit them in some manner (Schiffer 1987). In recycling, we can identify at least three general phases of formation processes. These phases were described by Richards while explaining the principles of abandonment behaviour (Richards 2008:54–55). The first phase is visible in use marks from an object's active life in service. The second phase shows marks from the recycling process, and the third phase shows marks from events that occurred after recycling. These phases are all present in the life history of an artefact, and should be visible in the remains and available for interpretation.

Unfortunately this type of information is not available to a study based on survey material. More important are the context and site distribution patterns, as described by Gibbins (1990:384–385). He

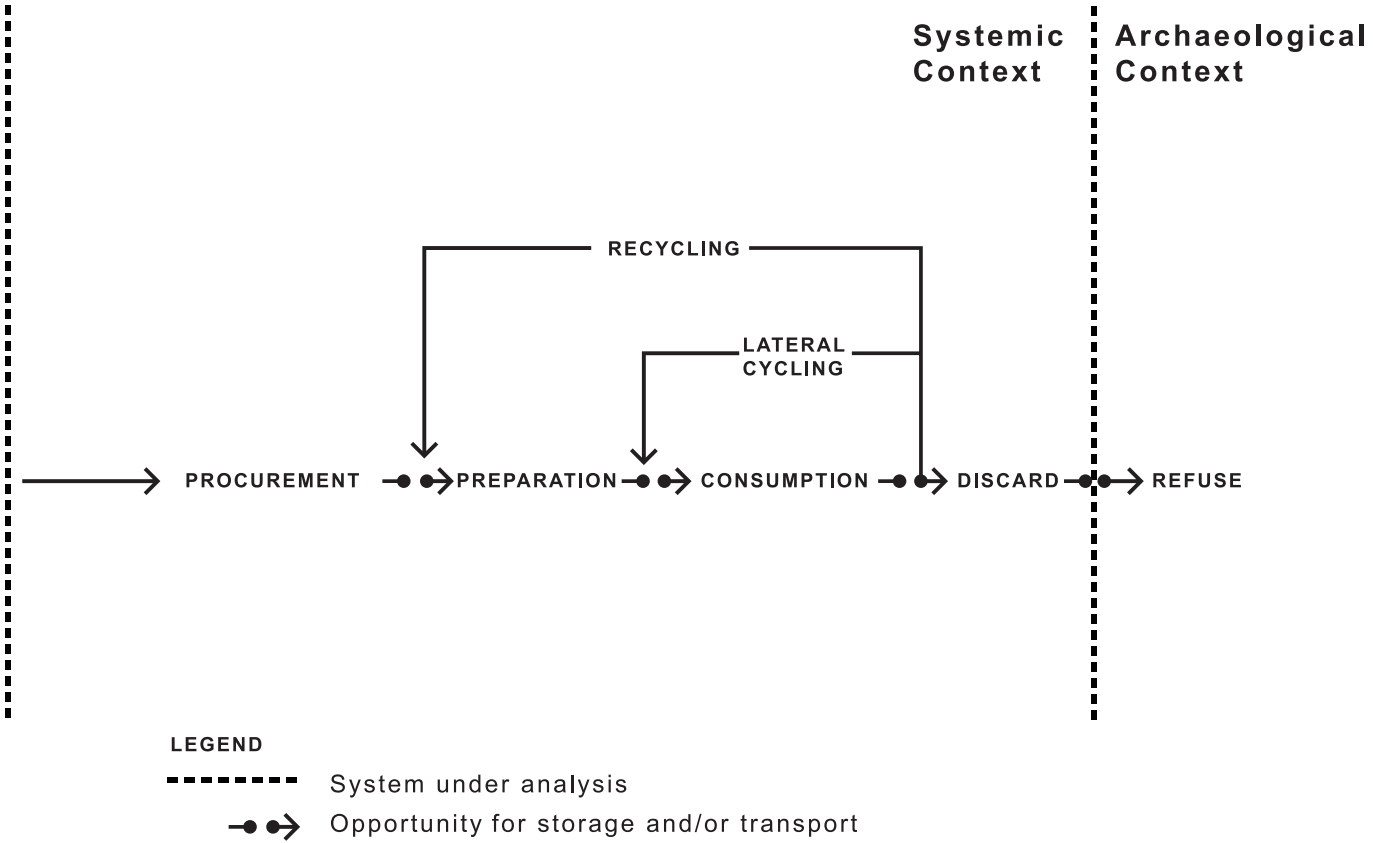


Fig 1.7. Schiffer's reuse mechanisms form the basis for this study. Systemic context means that parent society is still using the object (like a ship) (drawing Leena Luotio 2017, after Schiffer 1987).

explains how a wrecking event could be connected to the remains, using a combination of archaeological and historical evidence. Gibbins explains that context can be established by first exploring the potential range of depositional events — i.e., how a ship could have ended up on the sea floor — then generating models that match the possible events to the archaeological and historical evidence (Gibbins 1990:384–385). It is the opinion of the author that depositional events are especially significant in studying the recycling of ships. Accordingly, site distribution patterns become important in relation to deliberately abandoned ships, since the location is chosen, not random, as it typically is with shipwrecked vessels. The patterns must then be different from each other.

It has been acknowledged within maritime archaeological studies for a long time that non-cultural and cultural processes should be combined, and their sum is relevant (for example Holland 2015:57). This study does not focus on the sum of these processes, but purely on cultural processes. This is due to the lack of evidence on natural processes, although the author acknowledges their significance.

1.4.2 Schiffer's reuse mechanisms

A ship can be viewed through Schiffer's (1987) reuse mechanisms approach. According to these mechanisms (Fig. 1.7), reuse occurs when there is a change in one or more of three categories: the user, use, or form of an artefact. Schiffer presented these ideas in 1987, although he had developed this line of thought since the 1970s in his various writings. Other archaeologists have further developed these ideas over the past decades; in particular, Linda Hurcombe (2007:40) has adapted and expanded Schiffer's concepts (Fig 1.8).

Schiffer's reuse mechanisms are:

- Recycling,
- Lateral cycling,
- Secondary use, and
- Conservatory processes.

The most interesting of these for this study is recycling, and the way Schiffer has expressed it as one mechanism of reuse processes.

In Schiffer's early writing (1976:31), he quotes Darnay and Franklin's (1972:2) Environmental Protection Agency report: 'Recycling is an activity whereby a secondary material is introduced as a raw material into an industrial process in which it is transformed into a new product

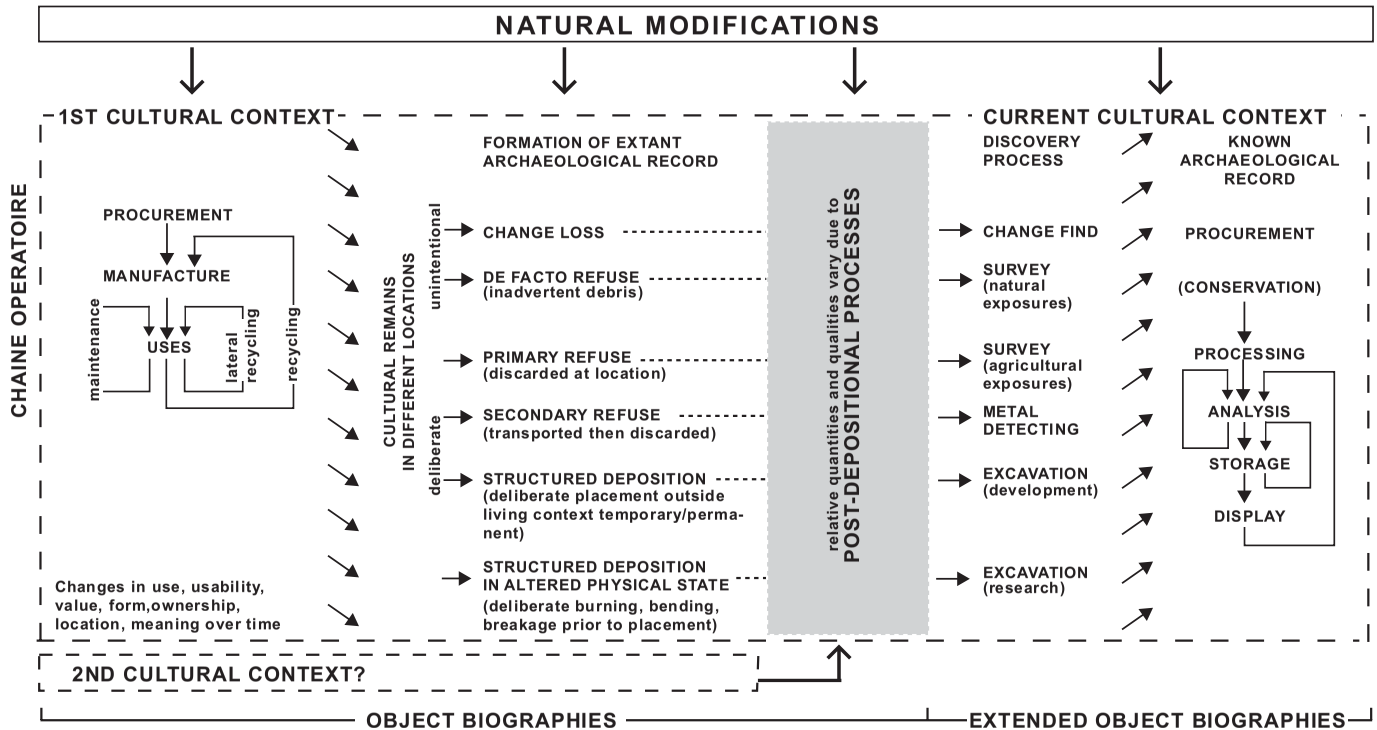


Fig. 1.8. Hurcombe's extended object biography illustrates the importance of the current cultural context (drawing Leena Luotio 2017, after Hurcombe 2007:40).

in such a manner that its original identity as a product is lost'. The secondary materials are those that have fulfilled their useful function. They cannot be used further in their present form or composition, and occur as waste from the manufacturing or conversion of products (Darnay and Franklin 1972:3).

Schiffer concludes that there are significant varieties of recycling, but completely general types useful for archaeological purposes remain to be defined. He adds that recycling may or may not involve a change in the user of the item. This article dates to the 1970s, when the environmental movement was rising. For that reason, Schiffer adds that economists and environmentalists have begun to study recycling, 'and perhaps some concepts and principles can be borrowed from them' (Schiffer 1976:31).

The recycling concept in this study would be limited if it rigorously followed Schiffer's ideas, borrowed from the environmentalists of the 1970s. The idea that recycling 'needs the reintroduction of the material into an industrial process where the material transfers into some other form or function' would mean that maritime recycling could begin only with the appearance of iron hulls (Schiffer 1976:31). At that point, industrial processes rendered the shape, condition, and size of the vessel unimportant due to the transformable nature of metals. Nevertheless, recycling also took place previously, when the process included the salvage of objects, the dismantling of watercraft, and even submerging the whole hull into the underwater environment. One part of Schiffer's definition that does ring true for this study, is that recycling 'transform[s an object] into a new product in such a manner that its original identity … is lost' (Schiffer 1976:31). Here the object is a ship, which appears as a skeleton wreck stripped of its identity.

It has already been suggested — for example by Amick and Schiffer — that the concept of recycling in archaeology should be extended. Linda Hurcombe states that there are materials and technologies, such as metals, that allow complete remanufacture. This is more than recycling-as-modification, which might leave some traces of former use (Hurcombe 2007:44). Perhaps in the future, the remanufacturing process can be traced with the help of chemical analyses of the metals of remanufactured objects.

The concept of recycling in this dissertation covers several types of behaviours without involving industrial processes. Recycling produces something new from used material to be put into a different kind of use.

Recycling is a phase in the life cycle of a ship, which takes place within the systemic context; sometimes this act of recycling transfers material into an archaeological context. For example, a ship may be used as a structural foundation and forgotten under the new construction. The hull was not seen as waste material, but as something that still had value for society.

Another of Schiffer's significant reuse behaviours is 'lateral cycling', which refers to a change in the user and a transfer of ownership. In lateral cycling, there is no change in the object itself or the way it is used. For example, a merchant vessel sold to a new owner that continues to serve as a merchant ship: the vessel stays within the systemic context, leaving no traces in the archaeological record. In a study on the Elizabeth City Ships' Graveyard in the USA, L.S. Smith states that lateral cycling and secondary use was a cost-effective way of running a business. Nevertheless, these behaviours are not visible in the archaeological record in Smith's study (Smith 2013:244).

Schiffer's 'secondary use' mechanism is where the form of an object does not change, but it is used for a new purpose. This type of reuse typically occurs with objects that are worn out. In secondary, supportive roles, a ship may serve in a less demanding capacity than its original function. Richards gives an extensive list of different reuse possibilities for watercraft, beginning with stores, family homes, and warehouses, and continuing with barns, taverns, hotels, restaurants, offices, jails, churches, landing stages, and wharves (Richards 2008:22, 55). With secondary use, the main point is that the owner has not entirely abandoned the vessel. It is still in use in the parent society. This is closely related to lateral cycling, in terms of the relationship with the archaeological record. This phase of an object's life can be studied archaeologically if the reused object ends up as an archaeological site. An example of this is seen in the blockships at Suomenlinna (see section 3.4).

Schiffer described the last reuse mechanism as 'conservatory processes'. This is related to an object's change from techno-function to socio-function or ideo-function. Notable examples are the numerous historical ships functioning as museums: they no longer serve as ships, but as historical objects (Richards 2008:55). This can also be seen as symbolic recycling, where the symbolic value of the recycled object is significant. The maritime past embeds symbolism into several items. One of the best-known symbolic items is an anchor, which brings to

mind all things connected with the sea. Its importance in seafaring made the anchor a symbol of safety; later, Christians adopted it as a symbol of hope. An anchor placed in the landscape sparks an intuitive connection with the sea and seafaring. For example, L.S. Smith explains that these typical decorations of coastal towns strengthen the historical ties to the maritime environment (Smith 2013:245).

As many archaeologists have stressed, the technological and functional properties of objects cannot be divorced from their cultural and social significance. An object's life contains processes such as procurement, manufacture, use, maintenance, and discard, as well as storage, transport, reuse, and recycling. These are all important for discovering the way objects enter archaeological contexts. Concentrating only on the original function of an object diminishes the meaning and value of other processes. This problem affects ships, too: only that part of a ship's life which takes place in active service is well documented. To see objects as existing only in their use life is limiting, as this view is incomplete (Joy 2009). There is evident need to develop the concept of recycling as a reuse process further than Schiffer did during the 1970s.

1.4.3 Recycled ships in relation to Richards' concept of abandonment

Abandonment is an important archaeological concept involving the deliberate discarding of objects (e.g. Hurcombe 2007:45; Cameron and Tomka 1993; Tringham 1991; 1994; Chapman 2000; and Nowakowski 1991; 2001). Abandonment studies conducted by Richards provide a basis for understanding the connection between recycling and abandonment practices (1998; 2002; 2003; 2005; 2006; 2008; 2013). In different contexts, abandonment is also expressed in interpretations of prehistoric and ancient European archaeological sites — such as the Ferriby, Dover, Magor Pill, and Barland's Farm vessels (Flatman 2014; Wright 1991; Nayling 1998; Clark 2004 and McGrail and Nayling 2004).

Objects can be abandoned at different stages of their usable life, and for different reasons. During production, an object might be abandoned if it is broken or otherwise faulty. Whilst in use, abandonment might occur if an object is lost or broken, and following its use life it may be abandoned through recycling, or discarded with no other purpose (Hurcombe 2007:45). All these are applicable to watercraft. According to different studies referred to by Richards, the principal features indicating that a vessel has been deliberately disposed of are the vessel's position close to shore and away from areas of significant

port activity. It must be located where it did not create a hazardous obstacle to navigation (Richards 2008:21–22).

Richards (2008:19) has divided archaeological studies of abandoned watercraft into three main site types:

1) isolated ship finds
2) discarded and recycled disarticulated vessel components
3) accumulations of watercraft (ship graveyards, marine boneyards and rotten rows)

These categories of abandoned vessel sites can potentially display evidence of recycling. Typically recycling practices connected to ships have dealt with dismantling the vessel and its components — which relates most closely to category 2. However, in the case of categories 1 and 3, the whole hull may be adapted for a new purpose.

Richards divides functional and structural adaptations of the hull into three groups:

1) reclamation schemes (in this study, considered 'recycling')
2) foundations (in this study, considered 'recycling') and
3) buildings (in this study, considered 'reuse').

Related to group one, 'reclamation schemes', Richards explains that it has been common to use abandoned watercraft as a form of landfill, to reclaim areas adjacent to waterways. This creates stable foundations for future construction (Richards 2008:21).[10] Only the location gives a basis for the interpretation of a site as belonging to a reclamation scheme. One striking example of reclamation was discovered at the ruins of the World Trade Center towers in New York, USA, where construction workers found the remains of a ten-metre-long vessel. The 18th-century skeleton wreck had been preserved below street level, underneath what had once been the tallest buildings on the planet. This small vessel was probably used to fill the seabed to make new ground for the growing city.

Group two, 'foundations', covers vessels that have been used as a foundation for a new construction. An example is the Ronson ship, also discovered in New York. In the mid-18th century, the vessel was stripped, scuttled, and spiked through the hull with piles before being filled with sand and rocks. These latter two measures were used for stabilization (Richards 2008:23), and give archaeologists a good

[10] Richards gives different examples of this type of behaviour, such as Portus Augusti (Ostia, Italy), the B&W engine factory site (Christianshavn, Denmark), and different sites in the ancient port of London, UK.

indication of the nature of the effort. In 2014 a spiked hull was also recorded in an archaeological excavation in the city centre of Stockholm (Hansson 2014). Spiking the hull or filling it with stones or sand are also called 'placement strategies' or 'stabilisation measures'. Intentional perforation of a vessel's hull has been identified as one of the two most common archaeological signatures of placement assurance (Hunter and Jateff 2016:437; Richards 2008:164).

Category three, 'buildings', concentrates on the reuse of ships as buildings (such as museums, restaurants, and homes). These are typically above-ground structures.

All three categories — reclamation schemes, foundations, and buildings — should be kept in mind in analysing the archaeological evidence from Suomenlinna. However, only two — reclamation schemes and foundations — are considered as recycling in this dissertation, and form the focus of interest for this study. Buildings are still in use in the systemic context.

According to Richards, the acts and processes of discard reflect transitions in values and intentions, which are clues to undocumented human interactions (Richards 2013:12). Richards' concept of abandonment behaviour is an explanation of the archaeological record and why it came to exist. It is closely related to the life history approach. When wrecks become archaeological material, a wide range of different human activities had to take place for their remains to be created.

Wrecks as maritime archaeological study sites are complex, with cases ranging from catastrophic shipwreck events to deliberately discarded vessels to recycled ships. All three types of wrecks can be found in the Suomenlinna waters.

The relationship between shipwrecked vessels and abandoned ships should be clarified. The term 'shipwreck' has at its core a catastrophic event that creates an archaeological site, often very quickly. An abandoned wreck has been intentionally deposited. This leads to the question of whether abandoned and recycled ships even fit under the term 'shipwreck'. Richards (2008:7) states:

> 'Discarded vessels, those ships deliberately thrown away or disposed of by their owners, do not fit the traditional definition of a shipwreck. These semantic differentiations are pivotal for understanding the nature of abandonment processes, discard activities, and, most important, the role of behaviour in the creation of certain types of archaeological sites.'

Richards observes that the word 'abandonment' has many meanings. In principle, it is connected to a vessel's owners giving up control of a vessel. It can be argued that all wrecks have been abandoned by their users in some way — either left behind in distress or deliberately scuttled (Richards 2008:7). Within the category of deliberately scuttled ships, there are two further sub-categories. When a convenient location inspires users to get rid of a ship and have the hull out of sight, it is considered 'dumping'. However, if the ship's new position has a functional purpose, and the ship is used in some way, it can be seen as a recycling practice. The intentions of these acts are different, and this can reveal something of the values and traditions of the societies behind them.

Maritime historians tend to see deliberately discarded vessels just as shipwrecks, only without the drama of the wrecking event. Richards draws attention to shipwrecks as victims of violent natural phenomena, such as storms, commenting on 'the powerlessness of humans within a hostile natural world'. In contrast, abandoned ships are subject to human actions: 'the remains of discarded vessels represent the nature of the power humans have within the landscape of their own construction, the cultural environment' (Richards 2008:7).

This point of Richards is pivotal to the interpretation of recycled vessels, where the location of a wreck expresses cultural selection and the powers people have over their underwater landscape. This leads towards some very interesting questions, such as whether shipwreck sites can be considered as cultural landscapes when the landscape is created by nature (Richards 2008:7). Nevertheless, in the Baltic Sea, shipwrecks are related to sea routes or perhaps sea battles, and their locations are ultimately a reflection of cultural behaviour.

Shipwrecks and abandoned vessels can be viewed as two separate aspects of the maritime archaeological record. It is important to understand clearly the differences between them in order to make a link to cultural processes (Richards 2008:8).

To conclude, a vessel shipwrecked by accident contains, at best, all the material on board the ship when the accident took place, except that lost or jettisoned during the wrecking process — which can be a significant amount. These sites create a wellspring of information on the contemporary society and are best approached through archaeological excavations. This includes merchant vessels as well as warships that entered the archaeological record quickly and unintentionally.

Abandoned and recycled vessels, on the other hand, are totally different kinds of sites: they are stripped of material with practical value. In a way, this allows them to be used as sources in an archaeological survey. The way they are located in the landscape tells more of the people behind the scuttling, and the decision-making and values of the contemporary society. It also reflects and proves people's relationship with the underwater environment.

1.4.4 The biography of a vessel

Ships are one of the most anthropomorphic industrial products ever created, inspiring a biographical approach to their intepretation. Ships are said to have personalities and willpower, including regarding their final resting places. Ships are a direct product of the economic, political, and military climates of the parent culture, and if such a culture changes, it has an outcome for the vessel as well (Holland 2015:106). Taken a step further, recycling can express the value of the vessel for its society.

Igor Kopytoff wrote perhaps the most relevant text on the biographies of objects (Kopytoff 1986). He suggested that it was possible to express the life histories of objects; the biographies of objects could be as successful as the biographies of people (Joy 2009:540; Kopytoff 1986). Anthropological research approaches biographies in various ways. In general, biographies try to explain long-term changes to objects and technology (Joy 2009), and deal with how the archaeological record came to exist. Kopytoff writes that a true biography of an object can be researched and presented, but also that a typical model of a biography can be constructed in the absence of sufficient data (Kopytoff 1986:64).

After Kopytoff's anthropological article, it took some time before archaeologists took up the challenge of seeing the biographies of objects. An article published in *World Archaeology* in 1999 by Chris Gosden and Yvonne Marshall became the central source for archaeological studies of object biographies. Gosden and Marshall (1999:170) wrote that the biographical approach 'seeks to understand the way objects becomes invested with meaning through social interactions they are caught up in'. As an object ages, it accumulates a personal history derived from the people who own and use it, and the events that impact it (Gosden and Marshall 1999:170).

How do ships fit into the biographical approach? In this study, an analogy is drawn between a human life cycle and the life cycle of a ship.

Jonathan Adams first introduced the idea in maritime archaeology. The life and death of a ship include different phases. These are, for example, planning, building, equipping, sailing, and end, when the users finally abandon the vessel on the seabed or the shore. This 'death' of the ship is, however, not always the end of the story. The biography of the vessel can continue. Parts of the hull, equipment, rigging, and even the name of the ship can be reused on other vessels or for other purposes.

A whole new chapter in a ship's life history begins when it becomes the target of archaeological study. A ship's elements may end up in museum collections, and in some cases, the whole hull becomes an exhibition and a connection to the past, like the warships *Vasa* and *Mary Rose*. Archival material on *Vasa* was available, and people remembered its story through the centuries, but the discovery and lifting of the whole ship to the surface made it a celebrity. Today, *Vasa* forms a central attraction in one of the most popular museums in Europe. *Mary Rose*, which was Henry VIII's flagship, saw 34 years of service before sinking. The *Mary Rose* case was a success story of underwater archaeology at the time of its excavation in the 1980s. These two wrecks on display are extremely important for European maritime history and especially maritime archaeology.

Anthropologist Janet Hoskins explains that biography is to some extent a rhetorical conceit, used deliberately to suggest a life trail. In a way, the creation of a biography for an object makes the object more valuable (Hoskins 2006:81). Archaeological investigation also has a role in the ship's life cycle, tying our time and us closer to the people in the past who are already part of the biography of the ship.

Typically wrecks are referred to as time capsules or closed finds; nevertheless, this concept might be problematic for interpretation, as expressed by Jonathan Adams (2003). The accuracy of this depends on numerous factors, such as the circumstances of the loss and the wrecking process, the specific site environment, and the site formation processes. Vessels often reached a remarkable age — perhaps being rebuilt, or having their roles and modes of use changed — before they sank or were abandoned in some way. As stated by Adams, some materials present at a wrecking site might have been on board only for hours, some for decades. A ship can have more time depth than expected, and its biography as a social and technical entity can be positively kaleidoscopic (Adams 2003:22).

Adams explains that some crafts were constructed for specific purposes, but the uses to which a vessel was put could and often did change. Ownership was often transferred through sale, gift, or by force, and this might happen more than once during a ship's life cycle. After wrecking, the site might be salvaged or plundered by different societies than those that originally sailed the ship. All this activity leaves marks in the archaeological record, and shows that oversimplifying things creates false interpretations; a wreck is rarely an easy time capsule for archaeological study (Adams 2003:22).

Ship biographies seem to be an interesting topic for today's maritime archaeology. Maritime archaeologist Sarah E. Holland (2015) wrote on previous shipwreck studies of three different sites, and tested how the biographical approach suits their reinterpretation, in her dissertation. One of the outcomes of her study was a recommendation for the application and use of the phrase 'shipwreck biography'. In accordance, the final output of Holland's study is the conceptual distinction and application of life histories and shipwreck biographies on these sites, in order to identify new management directions for each site. Her shipwreck biographies combined different datasets, such as shipwreck histories, artefact distribution maps, current research, assessment of site formation and transformation processes, and artefact studies (Holland 2015:i).

Examining ship biographies provides a convenient narrative structure of birth, life, and death. As Joy suggests, biographies can be incomplete, consisting of a series of connected events as the object becomes alive within specific clusters of social relationships. It can be inactive at other points in time and space, where the researcher does not have knowledge of events related to the life history (Joy 2009:540). This has the advantage of allowing researchers to pick up the biography at particular moments when enough is known to inspire interpretation.

As complex objects in which so much is invested, and that often have use-lives broadly similar to a human lifespan, a ship's production, use and disposal, can be understood in terms of biography (Gosden and Marshall 1999). Although archaeology has only comparatively recently applied this idea as a way of understanding the accruing social meanings of objects over their use life (see Kopytoff 1986), ships have been conceived of as having a life history for some time. An example is a series of 18th-century engravings by Sieuwert van der Meulen entitled *Navigiorum Aedificato*. It depicts the life history of ships in sixteen

prints. It is easy to draw a human analogy from each stage. Adams brought biography into this discussion by showing that the parallel between a ship and a person in terms of identity and life history was very old (Adams 2003:30):

> 'The ship takes form in the shipyard and is born into the water, there to grow and achieve full stature with masts and spars and adornment. Carneed, armed and fully provisioned the ship puts to sea to face the vicissitudes of life; plain sailing, warfare, storm-tossed seas, perhaps to be cast ashore and wrecked or with luck, reaching old age where, in the hospice of the breaker's yard some of its timbers and perhaps even its name are passed on to a new generation of ships.'

Richard A. Gould expresses how these events in the life cycle are parts of ongoing processes linked to social, economic, and even symbolic activities (Gould 2011:16). Ships are the products of cooperation between different groups or individuals of a sociocultural system. For a ship to come into existence, there had to be a need for a new ship, and in addition, funding, planning, building, equipping, sailing, and even managing for the entire life cycle of the vessel.

Holland takes shipwreck biography even further, stating: 'The current environmental conditions, known historical information about the ship, the wrecking event, and the previous documentation of the archaeological site have been effectively combined to provide the link between the past and present environment, between the ship as a cultural entity and the shipwreck as an archaeological site, between the artefact on the seabed, the current site interpretation, and recommendations for ongoing management practices' (Holland 2015:i). In a way, Holland creates an extended biography where she acknowledges the life history of the wreck at the time of the archaeological research and even mentions management interests. Holland's case studies cover shipwrecked vessels, not recycled or abandoned ships, and she states that the scope of these histories consists of a known point of origin and manufacture of the ship on to its wrecked location, identification, study, and current interpretation as an archaeological site (Holland 2015:102). However, the extended biographical approach can be applied even to unidentified wrecks.

There is still one aspect of Kopytoff's ideas that could be applied to ships. One potential way to find new things in the available data is to study a group of objects. By identifying a common life path for an object type, it becomes easier to recognise objects that deviate from

the 'norm' (Joy 2009; Kopytoff 1986:66–68). With Suomenlinna, the goal is to see which one of the three possible life paths of a vessel is the most typical one. These were deliberately abandoned vessels, accidental sites and recycled hulls.

2. Suomenlinna as a maritime archaeological study site

This chapter presents the fortress area as a maritime archaeological study site and provides a brief history of Suomenlinna and of the underwater archaeological research. The primary sources for earlier studies are the archives and registers of the Finnish National Board of Antiquities (NBA).

The survey section is based on the author's experiences as a leader of that project. The tasks and methods are described, together with the challenges of the fieldwork and complex site formation processes of the area. The distinctive features of the archaeological record are outlined and the results of the survey that are meaningful for this dissertation are presented.

2.1 The study site

The study site of Suomenlinna is located in the eastern part of the Baltic Sea, in the Gulf of Finland (see Fig. 1.1 for the locations). The gulf is oriented west to east; it is a long bay that leads directly into the Baltic Sea basin without any restricting thresholds. There are only a few other environments in the gulf where the waters have been used as actively as at Suomenlinna during the past centuries. In Finland, Suomenlinna is probably the best example of intensive use of the sea.

Suomenlinna consists of eight islands: Kustaanmiekka, Susisaari, Iso Mustasaari, Pikku Mustasaari, Länsi-Mustasaari, Särkkä, Pormestarinluodot, and Lonna (Fig. 2.1). The water area around and between the islands includes little bays and narrow straits that end in the open sea. During the past centuries, the shoreline has been altered and manipulated in many places. These human factors have caused huge changes in the natural environment due to landfills, dredging, widening waterways, and building different types of constructions in the marine landscape.

Suomenlinna is located at the mouth of the Vantaa river in front of the city of Helsinki. The natural land uplift after the last ice age has changed the sea level in the Helsinki district by only approximately

53–80 centimetres since the decision to establish the fortress in 1747. This means that the landscape has stayed almost the same — only a small amount of new dry land has emerged in this undulating landscape of steep bedrock formations, and the water depth over the underwater landscape has stayed almost the same. The depth of the water column on top of underwater sites dating to the establishment of Suomenlinna has changed by less than a metre since the sites originated. The land upheaval in southern Finland has taken place at a rate of 2–3 mm per year (Salonen et al. 2002).

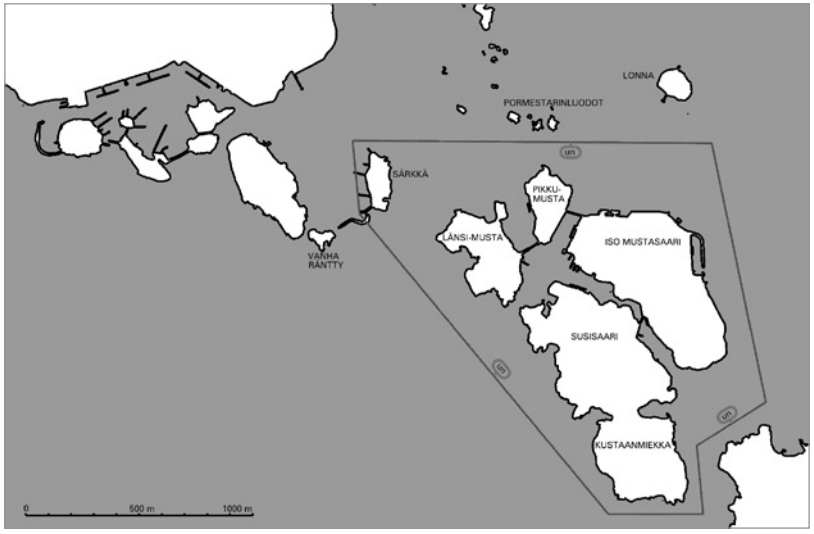


Fig 2.1. The fortress area belonging to the UNESCO World Heritage Site (Marja Leino 2014).

The depth of the water around the fortress is approximately 24 metres at its deepest point. In general, the underwater landscape has an irregular topography. The seabed consists of clay, mud, sand, or bare bedrock. All these aspects of the environment have an influence on how the archaeological data has been formed, and on how it is preserved. The underwater scenery is still under constant change, although today rapid changes are mostly caused by human activities.

2.2 A brief history of Suomenlinna

The history of Suomenlinna is an inspiring and challenging topic for research, as the fortress bears an almost iconic role in Finland's past.

Finns have a relationship with the fortress, as nearly the whole population of Finland has visited the site at least once. Depending on the visitor, the place may represent an old Civil War prison camp, activity in different wars, or a change in political powers. It could also just provide picturesque scenery for a picnic or a wedding, a location where the historical landscape offers beautiful sights without further associations with the past (see Figs. 2.2 and 2.3). The place also has significance for the one million tourists visiting annually due to its UNESCO World Heritage status. In addition, Swedes and Russians may also have a particular relationship with the fortress due to shared history. All these feelings, thoughts, and pre-knowledge have an influence on what people expect from the underwater environment. Although more typically, people do not come to think of what's beneath; we tend to see only the surface of the sea.

Fig 2.2. Archaeological excavation of a pole construction at Iso Mustasaari. Pictured: scientific divers Verna Kalmari (left) and Salla Pärssinen working at the site (photo by the author 2012).

The history of Suomenlinna has been well established by historians with inventories of buildings and different types of archival research. However, the past may be abundantly documented, but still incompletely understood, and there has been hardly any room for an archaeological perspective. Archaeological studies have consisted of small-scale surveys and recordings for restoration projects. This study

is connected to historical periods, with information available from the written record. An overview of events and the importance of the fortress follows, covering three different periods of Finland's history: the Swedish period, the Russian era, and the time of independence.

Fig 2.3. Suomenlinna during the winter. Scientific diving from the top of the ice. Pictured: Ari Pajunen (left), Pekka Paanasalo, Veli Leino and Ville Leino (photo by the author 2009).

2.2.1 Sveaborg: Swedish period (1747–1808)

Finland was part of Sweden from the Middle Ages until 1809. The decision to build a fort was a political resolution of the Swedish crown. It was a reaction to two ruinous wars in 1700–1721 (the Great Northern War) and 1741–1743 (the Russo–Swedish War, also known as the Hats' Russian War or the Hats' War) in which Sweden lost its easternmost regions, along with the fortifications that had been built to defend the border. Russia then had unlimited access all the way to Stockholm, the capital of Sweden (Rosén 2008:16). Sveaborg was an important addition to Sweden's naval stratagem, complementing Karlskrona (see Fig. 1.1 for the locations). The site of Karlskrona on the eastern shore of Sweden was simply too distant to protect Finland against Russia.

The fortification was originally built on six bedrock islands following a bastion system, which was freely applied according to the natural forms of the landscape. The main architect of the fortress was Augustin

Ehrensvärd (1710–1772), a lieutenant colonel in the artillery at the time (Nikula 2011; af Hällström 1986:11; af Hällström 2012). The original idea was to build defensive walls to seal off the waters between the islands of the fortress. The area was planned as a safe harbour for the fleet to spend the winter (Rosén 2008:16) (Fig. 2.4). The building activity concentrated between 1748 and 1772.

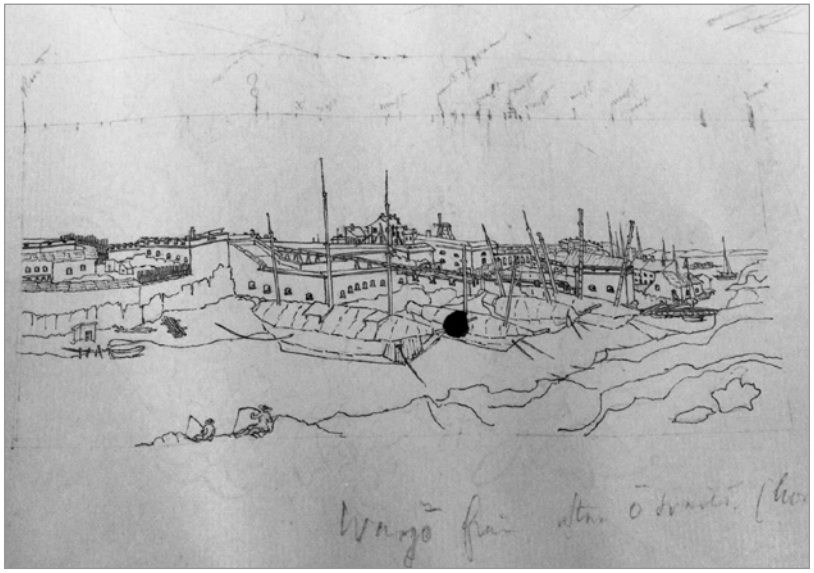


Fig 2.4. Tykistölahti ('Artillery Bay') with ships stored for wintering in the Swedish period. Original drawing: Krigsarkivet, Stockholm (photo by the author 2010).

The most active construction period was in 1748–1757, when financing from France was available. France was preoccupied with the growth of Russian power and encouraged Sweden to build a new fortress. To speed up the construction project, France promised to finance building activities during a period of four years — the original time span for accomplishing the whole building project. Sveaborg was to become a fortified shipyard, harbour, fortress, and base for land troops (Pettersson 1968:124–125). It had several roles and high expectations as the main fortification of Finland. After the third active summer building period, the fortress was finally named on 17 July 1750. The name Sveaborg was given to resemble Göteborg on the western shore of Sweden (Pettersson 1968:124; Silvast 1968:20). The name was soon adapted among the Finnish-speaking population to 'Viapori'.

Military activity in general had increased in the countries surrounding the Baltic Sea. One important development was the founding of the city of St Petersburg by Peter the Great in 1703. Russia thus obtained a connection to the Baltic Sea. This new city moved the military focus of Sweden from the southern Baltic to the east. New fleets were created by all sides, enabling battles at sea. The 18th century was a constant arms race between Sweden and Russia; establishing Sveaborg was a part of the same scheme. For Russia, the new fortress threatened to cut off access to the Baltic Sea (Luntinen 1997:23).

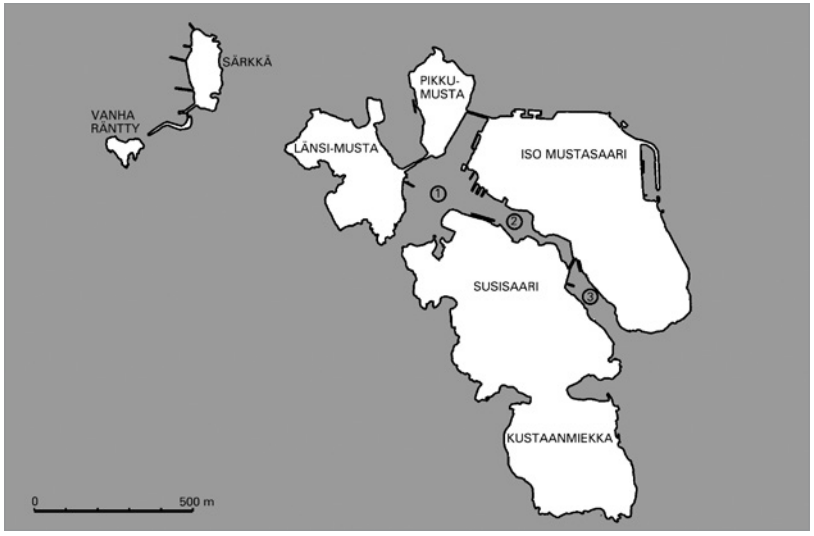


Fig 2.5. The bays of the fortress: 1. Satamalahti ('Harbour Bay'), 2. Varvilahti ('Wharf Bay') and 3. Tykistölahti ('Artillery Bay') (Marja Leino 2014).

After the Great Northern War (1700–1721), there was political discussion on the defence of Finland. The location for the fortress was a difficult decision. Helsinki was only a small coastal city at the time, and not an obvious choice: it had seven waterways that needed protection, and this was regarded as creating additional expense. It would be necessary to block these passages to prevent the enemy from sailing inside the area (Nikula 2011:90). However, Helsinki's location in the middle of the Finnish coastline offered a protected water area for the Swedish fleet (Fig. 2.5). This safe water area was critical for the service, maintenance, and upkeep of the fleet between sea battles. The fortification was intended to protect the navigational passage towards Stockholm against Russian attacks, but it was also to make

Finns feel safe and more attached to the Swedish kingdom. In the beginning, the fortress was a huge construction site, offering work to thousands of people of different professions. The building season took place primarily during the summer months, and the builders did not settle permanently on the islands. Permanent residents consisted of military personnel and, later, also their servants and families (Fig. 2.6). The population changed over time and reflected changes in the political atmosphere. When Sweden entered the Seven Years' War in 1757, the construction work was reduced. Ehrensvärd was dispatched to Pomerania, and later became the commander of the Swedish forces. He returned to Sveaborg with a new fleet in 1763. After the war, the Swedish state had severe financial problems, and political uncertainty also affected the further development of the fortress. Nevertheless, it was a time of both innovative shipbuilding and recycling of old vessels (see section 3.3).

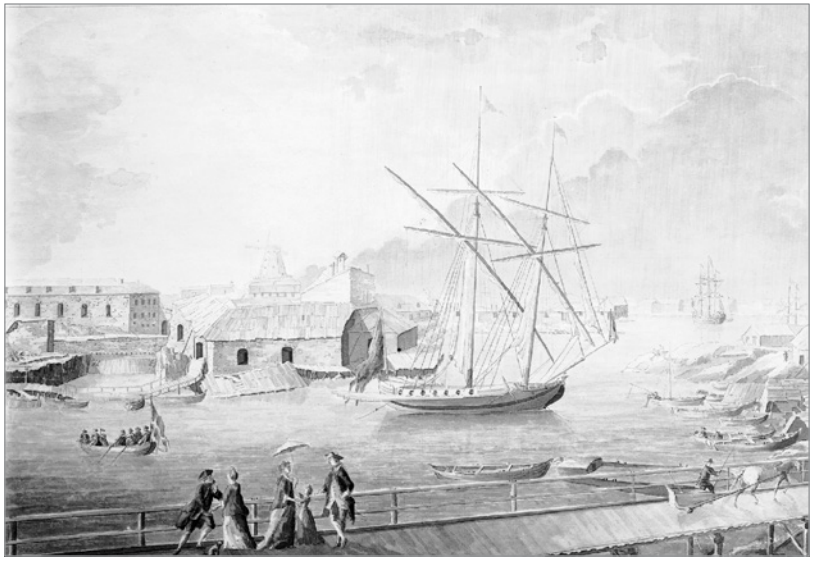


Fig 2.6. Row boats of the fortress and a new Pojama-type vessel during the Swedish period (drawing: A.E. Geete; Kungliga Biblioteket).

The original plan did not include one important feature of the fort: the dry dock. Building a dry dock started to interest Ehrensvärd as early as 1749, when he became familiar with Daniel af Thunberg's new idea of storing ships on dry land. Daniel af Thunberg was one of the leading specialists of the related building techniques. The landscape

of Sveaborg offered an excellent opportunity for testing this idea, and a huge effort took place in the creation of the dry dock. Af Thunberg himself oversaw the operation, which involved building an enormous diversion dam to close off the basins where the ships sheltered from the sea. A natural channel was filled in to create a dock between islands. At the same time, the basin was excavated to make it deeper. According to Helena Rosén (2008:16), the dockyard became one of af Thunberg's most brilliant creations. It is an active dry dock even today.

Ehrensvärd's intention was to strengthen the Swedish Navy by building ships at Sveaborg and settling a fleet at the fortress. The main harbour for the Swedish fleet, Karlskrona, was too distant to protect the Gulf of Finland. The new fleet was to be a separate unit from the offshore fleet, and under the command of the Army. The development began during the Seven Years' War (1756–1763) at a dockyard in Stralsund in Swedish Pomerania, in what is now modern Germany on the southern shore of the Baltic Sea. In 1756 the archipelago fleet, or 'Army Fleet', was established. After the war, Ehrensvärd returned to Sveaborg with the skilled shipwright Fredrik Henrik Chapman. An active shipbuilding period began, during which Chapman and Ehrensvärd created several new types of ships. It was a great moment in 1764, when the first vessel, *Hämeenmaa Oden*, was launched from the shipyard (Berg 2000).After this second active building period, construction work decreased again, and it was only after Gustav III (1746–1792) became king in 1771 that the development of the fleet was again in focus. The Army Fleet was re-established as an independent unit in 1770. New ships were built and crews recruited (Hatakka 2012:109). Enlargement of the fleet also meant more families on the islands. In contrast to the other military forces, officers of the Army Fleet brought their spouses and children into the fortress. Shipbuilding received a boost due to new conflict between Sweden and Russia — known variably as the Russo–Swedish War, Gustav III's Russian War and Catherine II's Swedish War (1788–1790) — which took place mainly in the Gulf of Finland. A wreck in front of Sveaborg, a ship of the line named *Kronprins Gustav Adolf*, dates from these restless times.

At the end of the Swedish period, eyewitnesses report how the fortress was like a town. Dutch traveller Johan Meerman compared Sveaborg to Venice. The relationship between Helsinki and Sveaborg was very intense, and there was no clear border between the two. For

this reason, it was justified to regard them as a 'double city' (Hatakka 2012:120; Odelberg 1954).

The Swedish era came to an end across the whole of Finland in 1809, but the change began at Suomenlinna a year prior. After a brief siege and intensive negotiations during the Finnish War (1808–1809), the fortress surrendered to the Russians on 3 May 1808. The Swedish members of the garrison were made prisoners of war to the Russian governorate and the Finns were sent to their home districts. The spoils of war were enormous, including over half of the warships of the fleet (Lundblad 2000:157). This included 110 military vessels, including three specially designed 28-cannon rowing frigates (such as *Uudenmaa*, *Pohjanmaa*, and *Hämemaa*) and six 24-cannon chebecks. The smaller vessels were one brig, five sloops, 25 gun sloops, 51 dinghies, 19 barges, and a vast amount of navy supplies. The force of the Russian fleet was doubled, whereas the Swedes lost a significant amount of their naval resources. However, there were no sails for the ships, and the tackles and other sailing equipment were practically useless after lying in storage for too long (Halén 2003:4). The fate of these 110 military vessels is still unclear. It would be interesting to discover how the numerous wrecks around Suomenlinna reflect this event.

The last Swedish troops left the fortress on 18 May 1808, and Russian forces occupied the area. The Russian era began at the fortress and lasted for 110 years.

2.2.2 Sveaborg: Russian period (1808–1918)

The Russian era of the fortress is still somewhat unknown to the general public. Finland was an autonomous area; however, as Sveaborg was turned into a foreign fortress, it was truly Russian territory. The development of the area depended on political decisions made in the capital of Russia, St Petersburg. Markus Manninen describes the significance of the fortress during the Russian period. Southern Finland would have been impossible to defend without the fortress, and it protected the important sailing routes to Helsinki (Manninen 2000:11). Sveaborg also formed a vital link in the defence of St Petersburg (Juntunen 2017). At the beginning of the period, Sveaborg served the Russian Baltic Fleet as a harbour for the winter and as a shipyard for repairs.

The population of the sea fortress changed almost completely. Non-Russian civilians still lived on the islands in 1810, namely 87 adults (44 men and 43 women). They were shipbuilders, blacksmiths,

glass specialists, and other craftsmen, and they had permission to work at the fortress. In addition, there were Finnish prisoners on the islands (Halén 2003:5). The fortress was a closed district, and visiting was allowed only with the commandant's permission. Visitors were not allowed to draw pictures of the landscapes, and every month a list of the guests was sent to the Russian Emperor. The strictness of these rules varied over time (Halén 2003:7).

Fig. 2.7. The Russian garrison's 100th birthday in April 1908 (photographer unknown, N190331/Helsinki City Museum).

According to Halén, Russian Sveaborg was a strange and mysterious place for people living in Helsinki. A clear understanding of the actual state of the area is hard to reconstruct. It was not a central place for cultural activities, as it was during the Swedish period (Halén 2003:7). However, the way of life at the fortress is described in some memoirs. Ivan V. Jegorov (1887–1971) spent his childhood and youth at Sveaborg, and his biography describes everyday life on the islands. Corruption flourished in the military organization, and the general condition of the fortress was weak (Fig. 2.7). There was much misuse of alcohol, and violent behaviour. Still, Jegorov's childhood memories also include beautiful accounts of the sea. During fishing trips to nearby islands, the light coloured the landscape as he returned home during

sunset (Halén 2002:33–45). The therapeutic aspect of the archipelago landscape can be felt in these memories.

Even though the sea fortress was necessary for Russian defence, its development stopped during the long period of peace following the fall of Napoleon in 1815 (Manninen 2000:11). This lack of development became apparent during the Crimean War (1853–1856), when a strong Anglo-French squadron bombed the area. The place was an important target for the allied forces, and their task was to destroy the Russian fleet sheltered at the fortress. These actions of the Crimean War have left signs in the underwater scenery of Suomenlinna (see section 3.4).

The decades after the Crimean War were also restless in Europe, prompting a new active building period at Sveaborg. At the same time, warfare changed with new innovations, and war became industrialized. New manufacturing plants produced war supplies, weapons, and ammunition (Manninen 2000:12). During the 1860s, wooden sailing ships withdrew from the military scene. Later, steel replaced iron as a hull material, and armour became stronger than before. One of the ironclads made in that period, HMVS *Cerberus*, is still preserved in Melbourne, Australia (see section 4.1). The Polish Revolt (1863–1864) was particularly important in motivating the renewal of the old fortress. At that time, for example, the wooden caissons for channels to control the traffic were built.

Despite the many conflicts Russia was involved in, the military significance of Sveaborg diminished towards the end of the 19th century. Russia was defeated in the war against Japan (1904–1905), and the Baltic Fleet was destroyed in the Battle of Tsushima, leaving only a few vessels with combat value remaining (Manninen 2000:123). The main tasks of the fortress were to protect St Petersburg from invasion and to maintain Russian rule in Helsinki. This latter assignment became prominent in the early 20th century, when nationalistic and revolutionary movements arose in Finland, as well as elsewhere in Russia. The Sveaborg mutiny in 1906 was part of the so-called First Russian Revolution, which had a violent and bloody end.

Before World War I (28 July 1914 – 11 November 1918), and after the defeat in the war against Japan, Russia's defensive line in the Baltic Sea also retreated to the Gulf of Finland, giving a new significance to the old fortress. A new fortification zone called 'Peter the Great's naval fortress' was built without stinting on expenses. The new defence plan focused on the Gulf of Finland, and building work began in 1913 on

an elaborate naval defensive system. In the following years, the process concentrated on an extensive series of naval bases, coast artillery forts, and mine barriers in southern Finland and along Estonia's northern shores. The intention was to equip Tallinn as the main base for the Russian fleet. Sveaborg was to have at least bases for torpedo boats and submarines. In the end, Sveaborg belonged to the inner part of the fortress line to protect Helsinki.

Before WWI was over, Tsar Nikolai II (1868–1918) was forced to give up his crown in March 1917 and the Provisional Government began to rule Russia. During the Russian Revolution, areas of national minorities started to separate from Russia. Finland was one of them, declaring independence on 6 December 1917. However, many Russian soldiers stayed in Finland until the Brest-Litovsk peace treaty (3 March 1918) forced the Russian troops to leave. It still took some time before all troops were out of Finland. In the Helsinki area, there were at least 35,000 Russian soldiers who needed transportation back to Russia.

2.2.3 Suomenlinna: Finnish period (1918 – present)

Russia handed over the fortress to Finland on 14 April 1918 (Enqvist and Härö 1998:17). The whole population of the fortification changed again. The area fell under the Central Department of War Spoils Administration (in Finnish, *Sotasaaliskeskusosasto*) and Sveaborg's technical administration engineering workshop was established to control its management. In 1921, the fortress was again reorganized, and the Ministry of Defence took direct control of the area. The governing organization included technical sections such as utilities, transportation, fire watch, telecommunication, and general repairs (Härö 1997:8–9).

Despite the newly established independence, the political situation in Finland was very problematic. The country was going through a civil war between socialist Reds and conservative Whites (Fig. 2.8). Probably the most miserable period in the history of the fortress took place when it served as a prison camp in 1918–1919. The Whites ruling the Helsinki area put Red prisoners into camps where famine, disease, and executions led to the loss of one thousand lives. The camp at Suomenlinna was the biggest and lasted for the longest period of all the prisoner camps in the Helsinki region. About 6,000 prisoners lived on the islands, a huge number compared to the buildings' capacities. The last captives left the islands in March 1919 (Tiitta: 1983; Manninen 2000:21).

Fig 2.8. The Reds scuttled a sailing vessel during the Civil War in 1918 at Katajanokka, Helsinki (Ivan Timiriasew, N2218/Helsinki City Museum).

One important action that took place during this time was renaming the fortress. Kyösti Kallio (1873–1940), who later served as the president of Finland during 1937–1940, originally had the idea of renaming the fortress from the fort of Sweden to the fort of Finland: Suomenlinna. Pehr Evind Svinhufvud, the Chairman of the Senate at the time, established the name on 12 May 1918. The renaming took place when the Finnish national flag was raised on Kustaanmiekka for the first time. However, the flag was not the one known today, but a temporary red flag with a golden lion. All members of the Senate were present at this historic moment, which was heavy with symbolism (Fig. 2.9).

The fortress had three different functional purposes: as a military area for a garrison, as an industrial area with shipbuilding industry; and as a museum area for cultural use. As a military area, various units were located on the islands. For example, during WWII, the Air Defence Forces and Coastal Artillery were based there. It also served as a base for submarines. The Council of State established two islands as

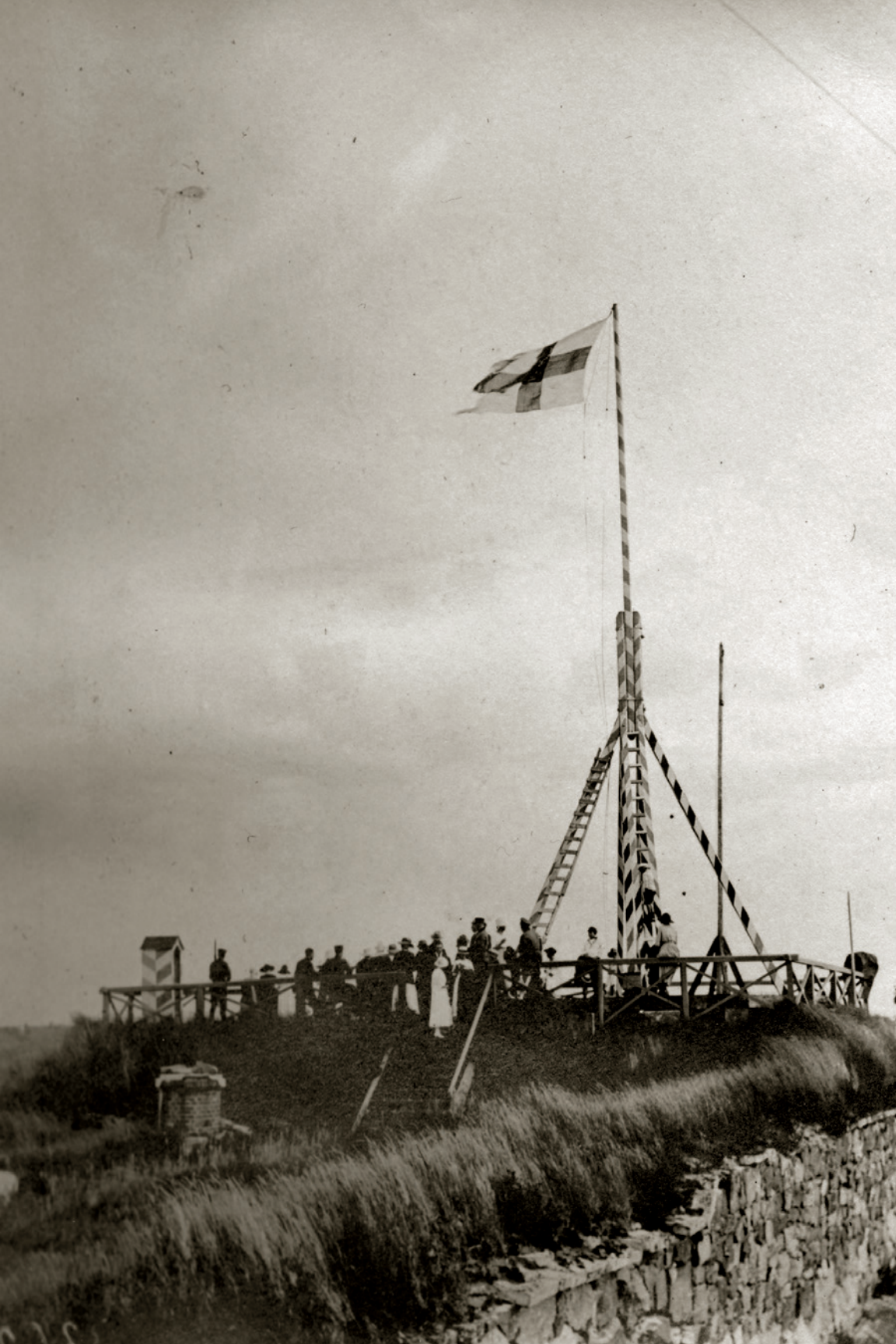
a museum district in 1919 (Härö 2006:147). In the late 1940s, tourism was acknowledged, and since the site's 200-year anniversary in 1948, it became possible to visit without official permission. In the mid-1960s, the Ministry of Defence announced its decision to relinquish management of the fortress area. Over time, different units were relocated, and only the Naval Academy still functions at Suomenlinna today.

The old military fortress came under civil administration in 1973. The Ministry of Education founded the Governing Body of Suomenlinna (GBS) to maintain and develop the area as a historical monument. This maintenance continues. Approximately 80 permanent employees develop the area year-round, with the help of temporary staff for the summer season. Today, the organization has four units: the Restoration Unit, the Maintenance Unit, the World Heritage Services Unit, and the Administrative and Legal Services Unit. This organization does not hire archaeologists, but all archaeological activities are conducted in cooperation with the National Board of Antiquities (NBA). The Board oversaw the restoration and management of the fortress area until GBS was established. This change was made on a recommendation from a preparatory board, whose task was to plan the civilian use of the fortress. Different tasks and responsibilities were divided between the city of Helsinki and the state of Finland, and the new organization was developed.

Fig 2.9. (right) The state flag symbolizes the independence of Finland at the fortress (photographer unknown, 1918–1920, v100_0007/Keravan museo/Pirkko Oikarisen kokoelma).

In addition to being an historical monument, Suomenlinna is also an active neighbourhood of the city of Helsinki with 800 residents. Everyday life goes on smoothly with facilities such as a grocery store, postal services, a library, a church, a kindergarten, and a school. The ferry connection to the mainland aids everyday life at the fortress. Suomenlinna is also a working place for several hundred people. For example, the dry dock, coast guard, customs, fire station, and an open prison function on the islands, together with the GBS. It can be described as a small village, with a unique character and heritage.

When Suomenlinna was transferred from military to civilian administration, the goal to maintain the fortress both as a museum and a viable city district was established from the beginning. The residents are important to the fortress' maintenance. Their presence maintains the identity of Suomenlinna as a neighbourhood (Valkeisenmäki 2014:28).



The importance of residents is also reflected in their knowledge of the underwater landscape: the oral tradition of the unseen landscape is important to pass on.

In 1991, Suomenlinna was accepted to the UNESCO World Heritage Site list. Its criterion for acceptance was expressed as:[1]

> 'In the history of military architecture, the Fortress of Suomenlinna is an outstanding example of general fortification principles of the 17th and 18th centuries, notably the bastion system, and also showcases individual characteristics. Suomenlinna consists of several defensive and utilitarian buildings that blend the architecture and functionality of the fortress within the surrounding landscape.'

After 1991, Suomenlinna has become a popular site especially for foreign visitors. Nevertheless, the task for the future remains: will the underwater cultural landscape be acknowledged as an important part of the fortress islands?

2.3 Previous underwater studies

The previous underwater studies described here relied primarily on the archival material of the National Board of Antiquities (NBA). A Register of Projects (in Finnish, *Kulttuuriympäristön tutkimusraportit*) lists the previous maritime archaeological activities in the area (see Appendix 1). It is a public database for research reports available through the website of the NBA.[2] However, the record is incomplete, and the missing reports make it difficult to create an overall picture of past fieldwork in the Suomenlinna area.

So far, the general development of Finnish maritime archaeology has not been studied comprehensively, therefore it is difficult to interpret the role of recycled ships in the field. However, Suomenlinna is the place where recycled vessels have been researched more intensively than anywhere else in Finland. The NBA first studied the waters around Suomenlinna from an archaeological perspective in the 1970s and 1980s. One important person in this work was the diver and technician Harry Alopaeus of the NBA, who later obtained the education of a maritime archaeologist. His diving projects were for the most part connected with water developments and public works in the area.

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[1] http://whc.unesco.org/en/list/583

[2] See www.kyppi.fi

Risto Halme, the chief intendent of the Maritime Museum of Finland, wrote an informative article on maritime archaeology in Finland from 1976 to 1981, including shipwreck studies. The article was published in 1983 and, at the end, he briefly explains a joint project of the Maritime Museum and a diving club. The aim of the project was to locate underwater blockages of straits leading to Helsinki and to record their structures (Halme 1983:9). At the time of writing the article, the project had only just started; however, that Halme mentions the project indicates its importance.

Fig 2.10. The widening of the strait of Kustaanmiekansalmi, vessel Ladoga 3 heading to the sea (Rista Simo, ser570303/Helsinki City Museum).

A year later, results from this joint project were published by Harry Alopaeus, providing a general overview of marine structures connected to waterways in the Helsinki area (Alopaeus 1984a). The amount of information he was able to present was overwhelming, revealing the potential of the fortress' underwater remains as a rich source of information. An important point in Alopaeus' article was his interest in ships used as sailing obstacles in the waterways leading to Helsinki. These blockships have complex site formation processes, including recycling aspects — however, the word 'recycling' was not used to describe these sites during Alopaeus' pioneering studies. There have been no archaeological excavations of blockships, but, for example, sailing obstacles from several periods have been thoroughly recorded in the Haminansalmi strait (in

Swedish, *Hamnsundet*; much previous research has used Swedish place names). Some of these remains are still regarded as nationally valuable cultural heritage. Three different channels with sailing obstacles are described in more detail in section 3.4.

Fig 2.11. Diving in the early 1980s at Lilla Varvet (Harry Alopaeus, MA200919:95/ National Board of Antiquities).

The first major survey operation at Suomenlinna was connected to the widening of the Kustaanmiekka strait. It was a narrow channel with a critical turn in the middle, making it dangerous for big ships.[3] When the survey was carried out in the 1970s, the Finnish maritime industry was in its heyday, and new types of vessels were much bigger than previous ships. The fast new passenger vessel GTS *Finnjet* was about to start a line between Helsinki and Rostock, Germany.[4] The narrow waterway needed to be dredged and widened by blowing up the bedrock (Fig 2.10). A maritime archaeological survey was conducted at Kustaanmiekka before the widening, but it is hard to evaluate the

[3] This strait had been made wider and deeper already in 1915, to accommodate Russian Sevastopol-class battleships. There was a need to shelter these ships in the war harbour at Katajanokka during WWI (Halén 2008:7).

[4] GTS *Finnjet* had a long and prosperous career, but eventually it was demolished and recycled from September 2008 onwards in India. The ship is probably now in a million pieces, but its path in the landscape is visible on the shorelines of the channel.

results of this project, since no report is available, only a copy of general notes. There is a newspaper article dated 20 April 1975 describing the work (Huurre 1975). However, the value of the paper is restricted to the basic information that the project was conducted; the results of several new wreck discoveries could not be verified for this study. Alopaeus was also involved in the archaeological documentation of the Little Wharf. Today the area is called *Venekerhon ranta* in Finnish; the original name in Swedish was *Lilla Varvet*. The project took place in 1981–1982 and is still one of the biggest field studies around the fortress, covering four different wrecks and a wooden log frame (Fig. 2.11). The case is described in detail later, with a reinterpretation of the wrecks (see section 3.3). The documentation was successful despite a very tight schedule, winter conditions, and the limitations of early 1980s technology.

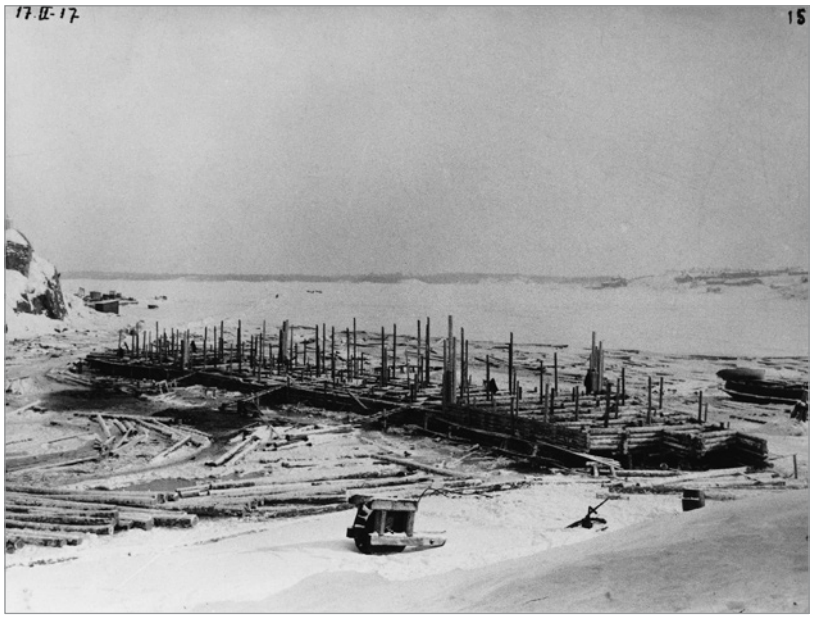


Fig 2.12. The unfinished log barrier embankment (ID 2088) in Tykistölahti ('Artillery Bay') (Photographer unknown/Helsinki City Museum).

Volunteer activity flourished later in the 1980s, and a survey of the entire area was carried out. An important discovery was made during this time. It resembled a huge underwater log house, but was identified as a log frame dam (Tykistölahti log barrier embankment ID 2088).

These remains were immediately the target of intense documentation. Over 100 volunteer diving hours were used to measure and draw the whole structure. It is approximately 12 metres high and 100 metres long, and was certainly a monumental discovery in these surroundings. At first it was thought that the construction was a sailing obstacle, but Alopaeus found an old photograph showing the structure on top of the ice in February 1917 (Fig. 2.12). This embankment was supposed to help build a new basin for the Russian Baltic Fleet in a bay called Tykistölahti ('Artillery Bay'). The plan was never finished, and today, this temporary dam is an ancient monument protected by the Antiquities Act (see Leino 2008) (Fig. 2.13). Original sketches from the volunteer documentation were stored in the archives. The survey conducted for this study finished the drawings and compared them with modern multibeam data.

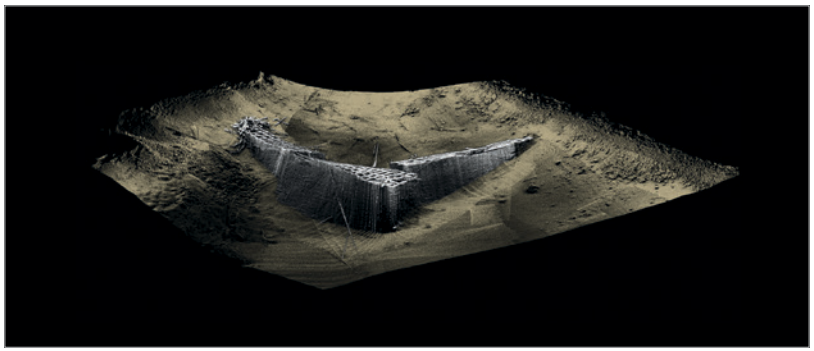


Fig. 2.13. The mouth of Tykistölahti holds probably the world's largest underwater log barrier embankment (ID 2088). It was built during 1917 (Peltokorpi 2011, Meritaito Ltd, courtesy of the Governing Body of Suomenlinna).

Underwater projects of the NBA related to sites around Suomenlinna have been conducted only because of the Antiquities Act. Projects motivated by safeguarding or research were mainly carried out by a private organization, the Teredo Navalis Society.[5] The society was founded in 1975 to aid with the underwater archaeological tasks of the Office of Maritime Archaeology (in Finnish, *Meriarkeologian toimisto*), which

[5] There was also international interest in the area among archaeologists. Harry Alopaeus remembers Professor Richard A. Gould visited Suomenlinna during the winter of 1984–1985 with the idea of diving into the wreck of Susisaari (Susisaaren hylky 1 ID 1292). Unfortunately, due to the winter conditions, the scuba gear froze and prevented diving activity at the time (Harry Alopaeus, pers. comm. 2009).

was responsible for underwater cultural heritage. The surveys conducted by Teredo Navalis provided an overall picture of the underwater remains around the fortress islands at the end of the 1980s (Hacklin 1990). The Teredo Navalis survey was the last diving-based study motivated primarily by research interests. Other surveys at Suomenlinna have taken place in restricted water areas, in connection with water development activities such as pipeline inspections or construction of jetty foundations. Although diving has not lost its relevance, technical development has changed the way surveys are conducted.

Side-scan sonar was used in Finland for the first time in an archaeological survey in Kotka in the 1990s. The local Kymenlaakso Museum commissioned a map of the old sea battle area of Ruotsinsalmi from the National Geological Survey (Tiina Mertanen pers. comm. 12 January 2015). Side-scan sonar is a tool widely used for detecting shipwrecks and other archaeological finds. Short pulses of acoustic energy are transmitted along the seabed in fan-shaped beams. The return echoes from any objects in the path of these beams are electronically recorded and processed. The images produced resemble aerial photographs, ready to be interpreted (Klein 2002:667–670). The method was developed by Harold Edgerton of the Massachusetts Institute of Technology (Broadwater 2002:24). Side-scan sonar was originally invented for military use at the end of WWII, and was used to find a wreck for the first time in 1963. It became famous within maritime archaeology in 1967, when George F. Bass used the system to locate a 2000-year-old wreck at a depth of 92 metres (Klein 2002:667–670).

In the late 1990s, a private company called Baltic Eye Ltd bought side-scan sonar equipment mainly for discovering wrecks. The director of the company, Rauno Koivusaari, found several wrecks with the new equipment. The highlight was the discovery of the famous ship *Vrouw Maria*, which had been shipwrecked in the Finnish archipelago in 1771 while shipping art treasures for Catherine II of Russia. Inspired by this discovery, the National Board of Antiquities bought its first side-scan sonar equipment in 2001.

From that moment, all archaeological surveys began with remote sensing, and only anomalies were checked either by diving or with an ROV (Remotely Operated Vehicle). Maritime archaeologists conducted smaller studies at Suomenlinna for different kinds of water development projects. The next critical technological step was taken with multibeam sonar, which creates three-dimensional bathymetric data (x, y, z) from

the sea bottom. This dissertation is the first maritime archaeological study in Finland that uses multibeam data for the interpretation of sites.

2.4 The survey of Suomenlinna (2007–2010)

This section explains important aspects of the fieldwork and the survey project so the reader can evaluate the quality of the data used for this dissertation. The underwater survey of Suomenlinna was organized by the National Board of Antiquities, and was conducted between 2007 and 2010. Preliminary planning started in 2006, and the final report was published in 2012 (Leino 2012b). The length of this period may give a misleading idea of the volume of the project. The project did not have any specific time scale or funding, and used resources that were available at the Maritime Archaeology Unit (MAU, which existed from 2004 to 2011 as a part of the NBA). These resources included diving gear, ROV and side-scan sonar equipment, and a limited number of the office hours of the staff.

Mapping the study area of 80 hectares by sonar took five days, and a diving team of three to four people worked in the field for 21 days. The project met with time-consuming problems that stretched the project beyond its original schedule, such as the busy schedule of the MAU staff, the challenging field conditions, and coordinating between the two.

The staff of the Maritime Archaeology Unit set tasks and goals for the fieldwork in the autumn of 2006. The aim was to discover remains in the study area and to gain knowledge of the number, location, and types of sites. Another purpose of the fieldwork was to test and develop new survey methods. Other goals were to inspect the management challenges of sites and their level of degradation, with an eye towards the possible future inclusion of underwater remains on the World Heritage Site list. There was a need for accurate geographical and dating information on the already known underwater remains. Valid and reliable information was also necessary for community planning. The assignment was to do the work using non-disturbing methods that could be repeated later, if necessary. A whole new task was producing visual material for an exhibition, in the challenging conditions of murky waters with poor underwater visibility.

The author, then a researcher at MAU, was chosen to lead the project. At the time, the author planned Ph.D. studies at the University of

Helsinki and was looking for a suitable research subject; the timing worked well. The author is a resident of Suomenlinna with an emotional connection and a deep interest in the study area. It was a great opportunity — as well as a huge challenge to conduct research on the survey material. Survey data has specific limitations, which were acknowledged when the topic of this doctoral dissertation was chosen. However, diving at the sites created a more holistic understanding of the underwater landscape for the author, which aided in formulating new interpretations of the empirical data.

2.4.1 Survey methods

The survey process used for this study can be described according to the four types of surveys set out in the second edition of *Underwater Archaeology: The NAS Guide to Principles and Practice* and the recent best practice guidelines produced within the SASMAP project (Manders and Gregory 2015):

1) Assessment survey (desk-based assessment)
2) Topographical survey (archaeological prospection)
3) Recording survey (including pre-disturbance and excavation surveys)
4) Monitoring survey

The first step in the Suomenlinna project was an assessment survey. The author gathered relevant preliminary information about the research history of the area and the general history of the fortress. The data was mainly available from the files of the NBA. At that time, there was a unique archive only for the underwater material, although this material was later integrated into the central files of the NBA. The national register of underwater finds was also very useful in forming an overall picture of known sites. The information on sites was typically limited to expressions such as 'a wooden skeleton wreck in poor condition'. No clear understanding of the landscape existed prior to the survey, and sites were only dots on a nautical map.

The next step was a topographical survey, using remote sensing equipment to inspect the study area. This phase can be called archaeological prospection, which generally refers to non-destructive indentification of features and relics on archaeological sites (Manders and Gregory 2015:25). At this step, most of the sites in the underwater landscape were detected, forming an overall picture of the scenery and remains. Side-scan sonar was the most important method used for locating

sites (Fig. 2.14). However, during the five days of recording with the sonar, only a simple coverage of the whole area could be achieved, with no overlapping of the lines. Nevertheless, the suitability of the method could be evaluated. At the same time, the NBA developed a computer program called Nadir[6] to make analysis and handling of data more useful.

Fig 2.14. Pekka Paanasalo and the author conducting the side-scan sonar survey of the Suomenlinna water area (Tikkanen 2007, MA200706:84/National Board of Antiquities).

The topographical survey produced an enormous amount of side-scan sonar anomalies, which were systematically checked by diving or by ROV in areas with ice coverage (see Fig. 2.15). Too many of the targets were false alarms, and the work became frustrating, especially with a narrow time window for fieldwork during the winter. The study area was partly covered by ice, which restricted diving access and affected the results. It became apparent to the author that the undulating sea bottom was too demanding to interpret with only the side-scan sonar

[6] Designer Vesa Hautsalo created the program itself. It was tested and improved during the survey around Suomenlinna with the cooperation of technician Pekka Paanasalo, Hautsalo, and the author. The program helped to handle the sonar data with an ability to insert the data on top of a nautical map. It was easier to follow the coverage of the seabed, and to combine different lines to create better views from the anomalies, such as shipwrecks. The program was successful in the Finnish scene of side-scan sonar within maritime archaeology during this time.

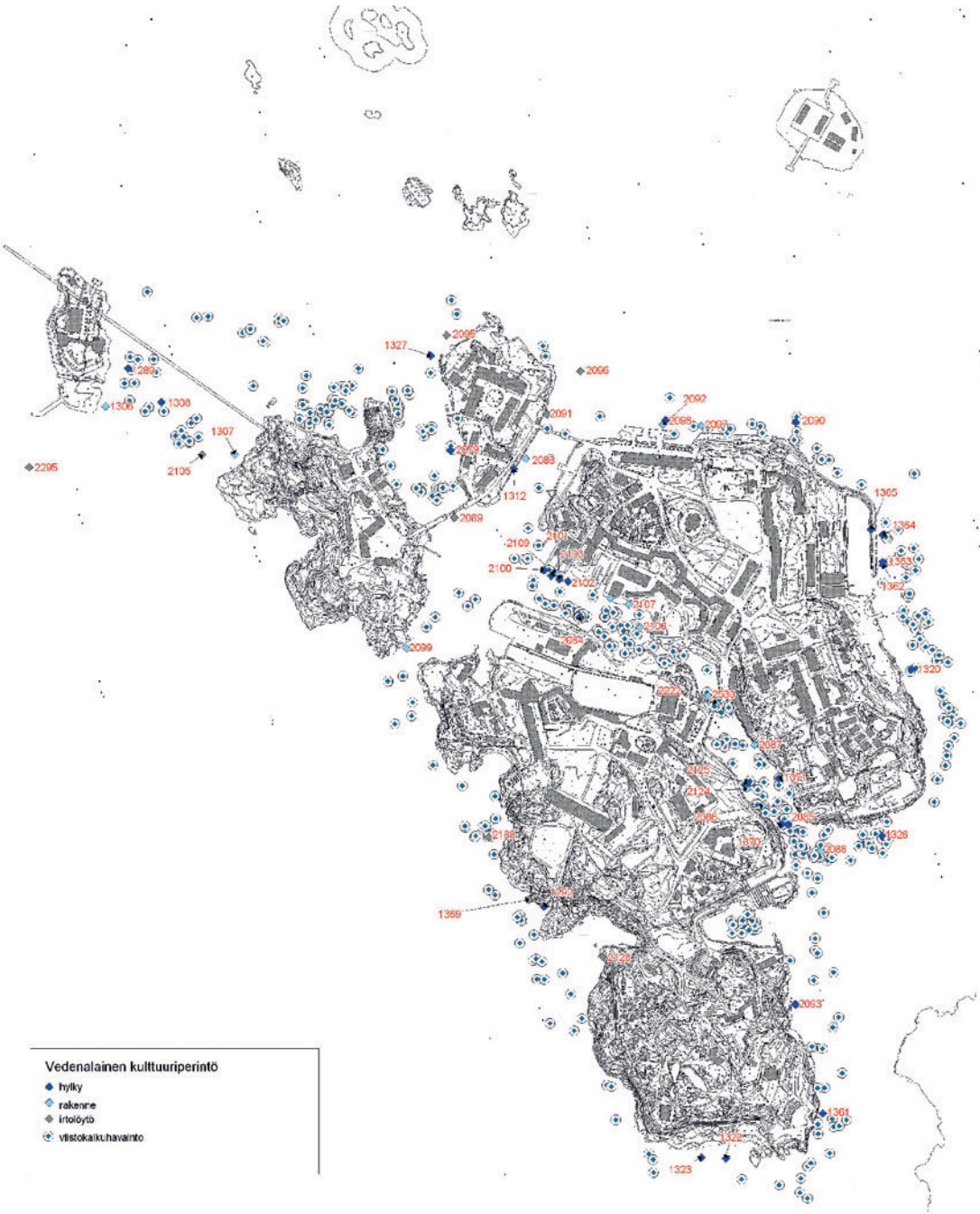


Fig 2.15. The map was produced based on the data of the side-scan sonar survey. Legend: Vedenalainen kulttuuriperintö = 'underwater cultural heritage'; hylky = 'wreck'; rakenne = 'structure'; irtolöytö = 'loose find'; and viistokaikuhavainto = 'sonar anomaly' (Veijola-Reipas 2008, National Board of Antiquities).

data. The NBA did not have access to multibeam technology, which enables creating a 3D landscape, and private funding was unavailable for the project. However, the Governing Body of Suomenlinna saw the benefits of obtaining a 3D landscape of the waters around the fortress and commissioned multibeam coverage of the entire area.

In principal, different types of echosounders can acquire bathymetric data, and multibeam sonar is one type of echosounder. Multibeam echosounders transmit multiple adjacent narrow beams forming a broad, acoustic fan-shaped pulse. From each narrow beam, the return signals received will result in a high-resolution bathymetry chart of the seabed (Manders and Gregory 2015:29). Presented in 3D, this data can easily visualize the underwater landscape.

Fig 2.16. The multibeam mapping project of Meritaito Ltd, gathering data at Suomenlinna (photo by the author 2010).

Eventually, the private Finnish company Meritaito Ltd conducted a multibeam survey during a one-week field operation (Fig. 2.16). It was the first time this kind of mapping was carried out by the firm, whose business was the nationwide maintenance of waterways. Nevertheless, the multibeam survey was a success, visualizing almost every known site (Fig. 2.17). The specialty of this mapping method is the blanket coverage from the deepest points until the waterline, allowing seamless combination with lidar material. Lidar is laser scanning from the air, carried out from a small plane or helicopter. This type of material is

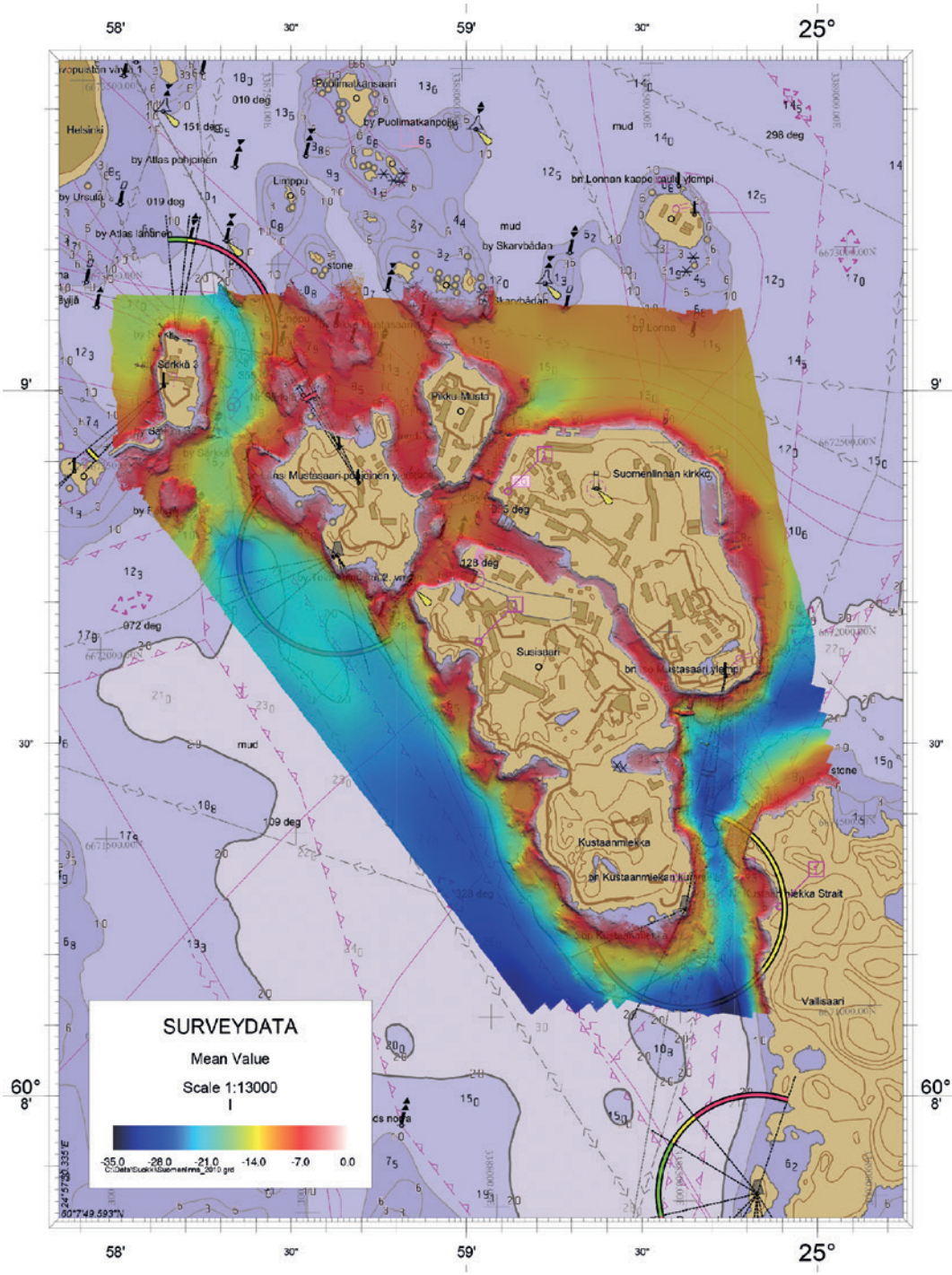


Fig 2.17. The map of the underwater landscape based on the multibeam survey (Meritaito Ltd 2010, courtesy of the Governing Body of Suomenlinna).

available from the National Land Survey of Finland. For the first time, a seamless 3D landscape could be presented from these two types of data. This material became a great asset for this study.

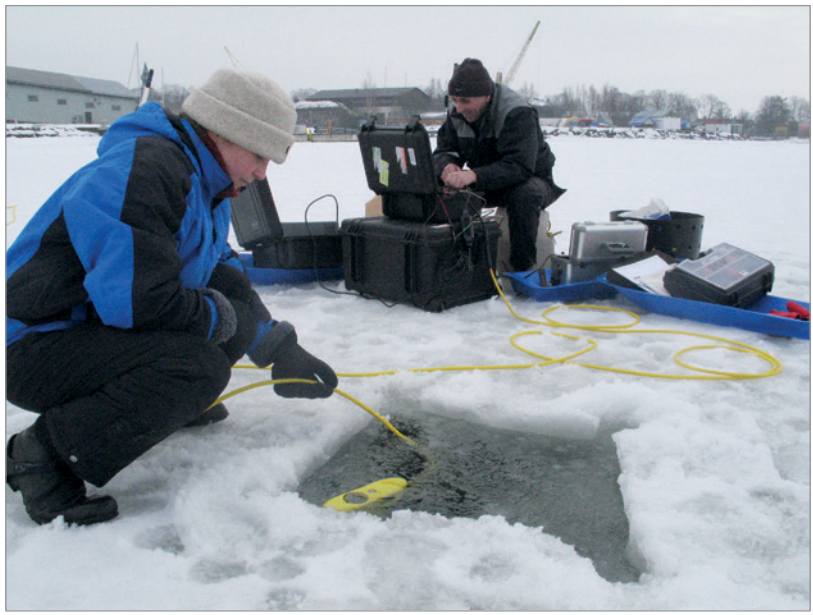


Fig 2.18. The wreck (ID 1312) is being checked with an ROV (Remotely Operated Vehicle) from the top of the ice. Pekka Paanasalo operates the equipment, and the author assists with the cable (Noora Hirvonen 2007, MA200706:10/National Board of Antiquities).

The third step was a recording survey, which concentrates on one site at a time, collecting information and creating documentation without disturbing the site. Visual inspections were made either by diving or with an ROV (Fig. 2.18). Diving operations involved sending a scientific diver to selected sea-floor anomalies to gain an understanding of the site, and to evaluate whether any objects located during the work could be of archaeological importance. Divers were mostly scientific divers (Fig. 2.19), but some additional volunteers participated during the project. The aim was to sort out the different geophysical signatures and categorize the targets as natural rock, anthropogenic features such as wrecks and other man-made historical objects, biological features, and even modern debris. Divers produced video footage, still photographs, and drawings as a visual record (Fig. 2.20 and Fig. 2.21), which could be combined with the multibeam data for interpretation and visualization.

In the final step, a monitoring phase will evaluate the sites regularly for natural degradation processes and human disturbance. This is a task for the future; this survey produced material for comparison with new data. Since this survey was conducted, there has been at least one site which has suffered from the repair of a modern jetty. During the construction, the working platform was anchored through a wooden skeleton wreck (ID 2126) with force, breaking up the elements and lifting them from their positions. This created a hole in the middle of the bottom part of the wreck remaining *in situ*. The site still needs further evaluation, and possibly an archaeological excavation.

Despite the two types of sonars used in the survey, it is still unknown what lies under the sediment. While side-scan and multibeam sonar are the most effective techniques for finding and outlining objects exposed on the seabed, many archaeological sites overlap with areas of high sedimentation. This can result in the partial or even complete burial of structures, and the only technique available so far for detecting buried wooden artefacts is sub-bottom profiling, another kind of acoustic pulse technology (Bowens 2011:109). There has been little experience with this type of equipment in Finland. However, recent EU-funded project SASMAP (see www.sasmap.eu) has produced promising results with the technology. New guidelines formed within SASMAP suggest that sub-bottom profilers and even magnetometers could be used for detecting archaeological potential in the seabed (Manders and Gregory 2015:30). Typically, buried sites are well protected within the anaerobic environment, with a slow degradation process, and accordingly there has been no urgent need to find these types of sites. However, they are as vulnerable as other remains to dredging.

In conclusion, archaeological sites of Suomenlinna that are visible on the seabed have been located, and buried sites still wait for the improvement of discovery methods. This survey project produced primary material for future comparison.

Fig 2.19. Scientific divers Ville Peltokorpi and Maija Huttunen film the cultural landscape of the fortress (Petri Puromies 2010, National Board of Antiquities).

Fig 2.20. The author is photographing remains in the shallow water (Ville Leino 2009).

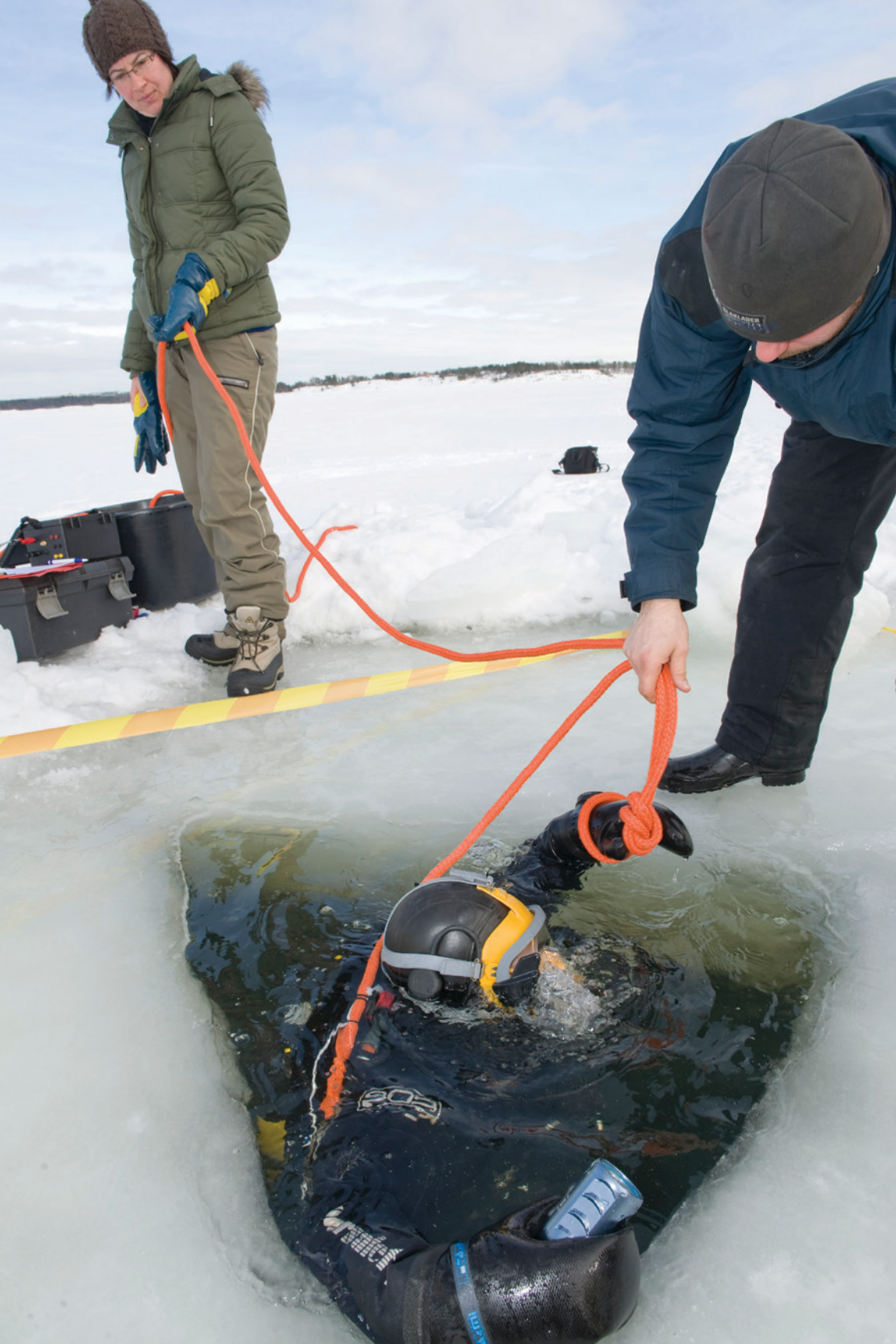
Fig. 2.21. Scientific diver Kalle Salonen drawing one of the sites (photo by the author 2009).

2.4.2 Gathering data in challenging conditions and site formation processes

Fieldwork conditions in the waters around Helsinki are very demanding for various reasons. Hard winds especially need to be avoided while working at sea, and they occur year-round without a definite pattern. On a broader scale, there are four different seasons: winter, spring, summer, and autumn are all very different in character. In spring, the clearness of the water column is affected by the natural yearly cycle of blooming algae. In a typical winter, the Baltic Sea has at least a partial ice cover. When the sea freezes over, it is high season for scientific diving because the water is clear, and there is no water transportation by smaller boats to create potential safety problems. However, wintry conditions place greater demands on the staff and research equipment, as well as the diving gear (see Figs. 2.22 and 2.23).

Fig 2.22. (last page) Diving under ice is an operation requiring hard work when the ice is thick. Pictured: Tero Tankka (left) and Mari Salminen removing an ice block (Petri Puromies 2010, National Board of Antiquities).

Fig 2.23. (right) For safety reasons, only one person at a time dives under the ice. Pictured: the author diving, Mari Salminen and Tero Tankka are assisting with the operation (Petri Puromies 2010, National Board of Antiquities).



One reason for limited visibility in the fortress water area is its location at the mouth of the Vantaa river. After a heavy rainfall, the river brings sediments into the sea. In extreme conditions, rain may even cause a sewage flood and communal wastewater enters the Baltic. This water has bypassed the proper cleaning processes and is filled with nutrients, boosting algal growth. Even these local changes are complicated, and there is also a connection with unpredictable global climate change (Leino and Vakkari 2010).

Heavy water traffic by ferries creates a problem for diving at the fortress. There are several daily connections with two other capitals, Tallinn in Estonia and Stockholm in Sweden.

Fig 2.24. The strait Kustaanmiekansalmi is still narrow for big vessels (Mika Karvonen 2017).

Several times a week there is also a route to a third capital, St Petersburg in Russia. All these big ships go through narrow channels next to Suomenlinna towards the city centre of Helsinki (Fig. 2.24). The water traffic causes strong currents, which affect the condition of the wreck sites and cause erosion along the shoreline. Traffic also decreases the clearness of the water, as it mixes up the water column. However, these circumstances have improved since the opening of the Vuosaari harbour in 2007. Located in the eastern part of Helsinki, this harbour

moved sea transport with ro-ro traffic from the city centre. Traffic conditions regarding diving safety were better during the survey project than previously.

In the introduction to this dissertation, natural and cultural processes were described as variables of site formation. Natural processes enable the preservation of old remains in the brackish and cold waters of the Gulf of Finland. However, the water around the fortress has been in active use since the establishment of the fortification. This activity means that remnants of human impact from various ages lie together at the bottom in perfect harmony — a diver can reach a human footprint spanning almost 300 years. Initially, it is hard to get a firm grasp on this type of complex horizontal strata (Fig. 2.25). After the sites originate, there is a long period for possible disturbances before archaeologists arrive to the scene. These disturbances can also be described as the cultural layers of the inhabitants of the area. It is practically impossible to achieve a complete view of the cultural formation process of the underwater landscape without thorough excavations.

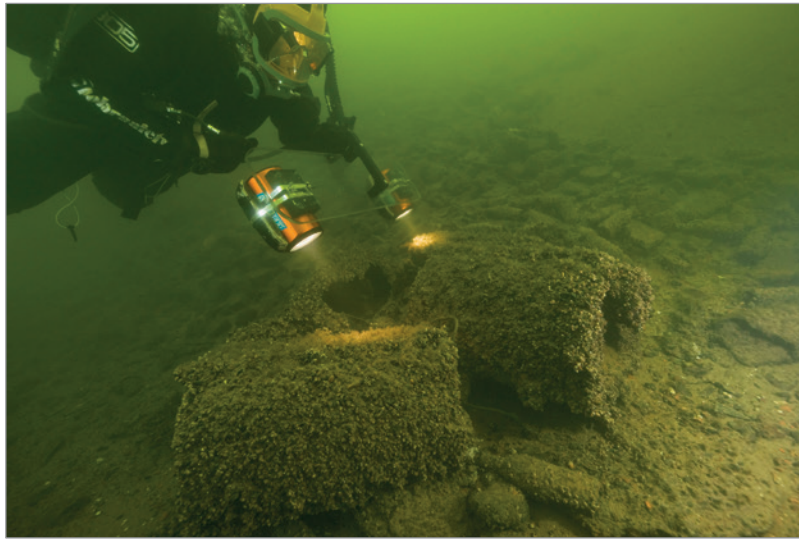


Fig 2.25. These old barrels are empty. Their original content is unknown (Petri Puromies 2010, National Board of Antiquities).

Nevertheless, attempts have been made to collect data on different activities that have radically changed the underwater landscape, for example, dredging operations at the time when the Governing Body of Suomenlinna managed the water area (Fig. 2.26). However, the

differences between the original plan and what actually happened, and how it influenced the underwater record, have not been documented. In addition, there has been several dredging projects, which have not left imprints in the archives of the GBS. The lack of documents addresses the importance of the archaeological approach to the underwater landscape. Very few inspection dives have been carried out at underwater sites before and after a dredging project in order to understand how dredging has affected the underwater environment. However, this type of knowledge would help us understand the cultural formation processes of sites.

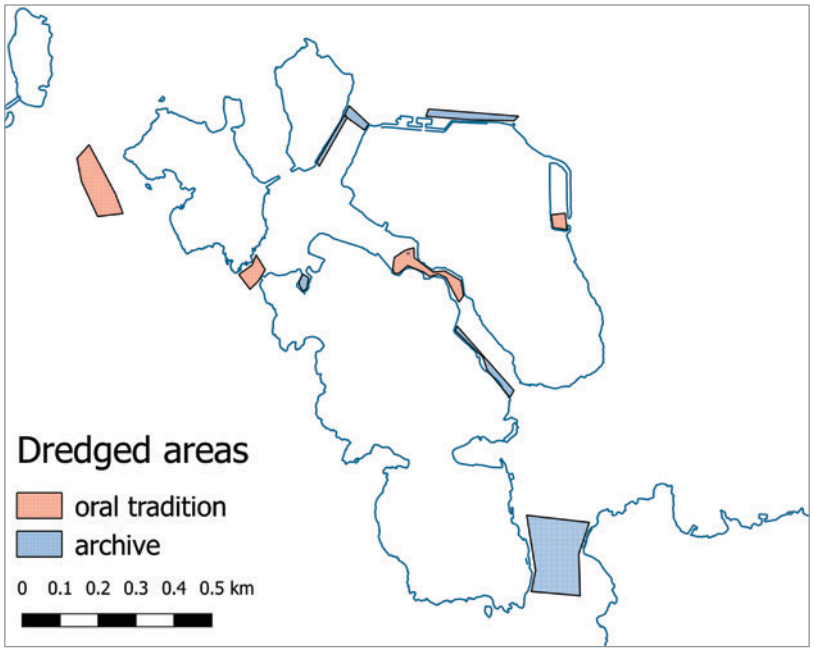


Fig 2.26. Operations intruding into the underwater landscape (the author and Niko Anttiroiko 2017 after Nevalainen, Governing Body of Suomenlinna).

Everyday life at the fortress during different periods had an impact on the underwater scenery. People have always lost and discarded things in water. Landing spots were special areas of activity. There were numerous small harbours and quays for different purposes around the fortress. The traffic was mainly to the city of Helsinki and to raw material sources along the southern coastline of Finland. During the Swedish period, transport also headed to Stockholm; later to the eastern cities and the Russian fortress of Kronstadt.

Everything had to be shipped to the islands, although during the winter months the ice routes were also in use. Shipments did not consist only of food supplies, but also of military equipment, including items like big cannons. All types of building material, such as bricks, chalk, stones, and wood had to be delivered to the islands. Even horses needed transportation (Fig. 2.27). When these activities went smoothly, they did not leave any imprints on the underwater archaeological record. Loose finds are anomalies of everyday life, as it was not common to lose a shipment or to drop something. More common reflections of daily life can be seen in landfills and refuse pits, which were sometimes located on the shoreline. One ancient global tradition was to throw things into the water as offerings; however, there are no indications of this type of behaviour at Suomenlinna.

Fig 2.27. Soldiers transporting horses to Sveaborg during WWI (Ivan Timiriasew, N2144/Helsinki City Museum).

After their use lives, even boats employed in everyday transportation ended up somewhere. Before the first bridges were constructed, traffic

between different islands of the fortress was managed with small rowing boats. The small number of boats in the underwater landscape does not represent the amount of rowing boats in use over time (ID 2100, ID 2101, ID 2102, ID 2103 and ID 2079). The main reason for this might be that they were easy to drag onto land at the end of their use lives, and in the active water line ice movement and wave action destroyed them completely. Other options are also possible, such as ending up as firewood. These remaining five wooden rowing boats have not been dated or studied in more detail; still, they are worth preserving as reflections of the everyday life of the previous inhabitants.

Fig 2.28. Map of Helsinki and Suomenlinna. The thin line presents the borders of the UNESCO World Heritage Site, which is the study area. Different place names of the city are mentioned in the text (Marja Leino 2014).

There are also more sudden events that could have left their marks in the underwater landscape. On 7 June 1808, a significant and devastating explosion took place at the fortress. A gunpowder shelter exploded, killing 60 people and injuring at least 100. The fire lasted for ten hours and destroyed the dockyard and several ships. Despite the danger, courageous men managed to save ten gun sloops, two rowing frigates, and a brig. These men moved the vessels quickly to Vallisaari (the neighbouring island to the east, see Fig. 2.28), out of reach of the fire (Halén 2003:10). Some of the wrecks known today could be related to this event. However, it is hard to say whether signs of burning in a wreck could indicate this type of event. A wooden vessel could also have been burned in the recycling process to collect its valuable metal parts.

These types of activities and events must be acknowledged in the study of the remains, together with the general development of the area. The author studied existing literature to obtain this contextual information, and learned oral history and local stories. It is interesting how most of these stories have a kernel of truth in them, although the details have been forgotten or changed over the decades. It must be kept in mind that the population of Suomenlinna has twice changed completely, creating a break in the human relationship with the sea and the environment, especially regarding oral history. For these reasons, the current living oral tradition was regarded as a reflection of the Finnish period from 1918 onwards. New people have moved in and, over time, they have formed their understanding of the surrounding seascape. Now that we have the possibility to visualize the underwater cultural landscape, it definitely has an impact on the relationship between the sea and people.

2.4.3 Results of the survey

The archaeological survey conducted for this study increased the number of ancient remains in the national register in the Suomenlinna area. Previously there were 72 known sites; after the survey, that increased to 79 sites. The sites include wooden and iron wrecks, log caissons as parts of jetties and breakwaters, a pole construction, log-barrier embankments, and cannons (Leino 2012b; 2010:205; 2008:101). This project also identified new types of sites, including various kinds of dumping areas and ships' graveyards (see Appendix 2). The fieldwork located only one new historical wreck. This small number of new discoveries indicates how efficient the previous diving studies have been. Nevertheless, the production of the visual material and interpretations of the sites have been more significant for this dissertation than increasing the number of known sites.

The underwater landscape of Suomenlinna contains a variety of remains. There are different kinds of wooden constructions both on the shoreline and completely underwater. This includes landing sites, sailing obstacles, basements for bridges, shoreline stonewalls, and even unfinished construction sites. There also seem to be wooden log frames used in landfill operations. Caissons can be small and simple, made to build a basement for a small quay, or massive enough to serve as an embankment, a sailing obstacle, or a seawall. Some of wooden frames

are clearly abandoned; others have been repaired and reused for a long period.

The exploration and recording of these kinds of structures have been an important part of underwater archaeology for almost a century (Gould 2011:319). Richard A. Gould describes how ships of all times and places operate within an infrastructure of harbours, canals, shipyards, coastal defences, ports, docks, and specialized cargo handling and processing facilities. All of this is as important as the ships themselves. Discoveries of the underwater landscape at Suomenlinna fully support these views: the research potential is vast.

It has always been technically and economically challenging to build constructions on the coastline. For that reason, coastline structures are often used and maintained for an extended period, and they contain interesting archaeological information today. Such information can be related to old building techniques and materials, or the way decisions were made in different times. However, different structures and constructions were outlined in this study mainly due to their apparent continuation of use at the same location and typically for the same function as people originally built them. The focus of this dissertation remains on wooden wrecks, with recycling aspects.

Sites are named according to the way they are established in the national register of the NBA. The author is responsible for the names in their particular format for this study. Typically, the site name begins with the name of the closest island, followed by the type of site. The ID code connects the sites with the register. For example, 'Iso Mustasaari wreck 9 (ID 2125)' tells that this is the ninth wreck found near the island Iso Mustasaari, and its national register ID is 2125. After the underwater register was combined with other archaeological sites, the ID numbers became longer.

3. Wrecks in the underwater landscape

Wooden wrecks in the underwater cultural landscape of Suomenlinna are typically preserved only in the lowest parts of the hull. These can be called skeleton wrecks (Fig. 3.1). Studies conducted by Harry Alopaeus in the 1980s and separate dendrochronological data provided ideas for the origin of some of these wrecks. However, not a single wreck has been identified in the 40 years since these studies — it is not an easy task to situate a wreck in its historical context. Is it even possible to obtain new information from these kinds of remains: undated, stripped, and without a past? Most of the wrecks around the islands of Suomenlinna have already been dredged and exploited; there is not much archaeological evidence left for fresh studies.

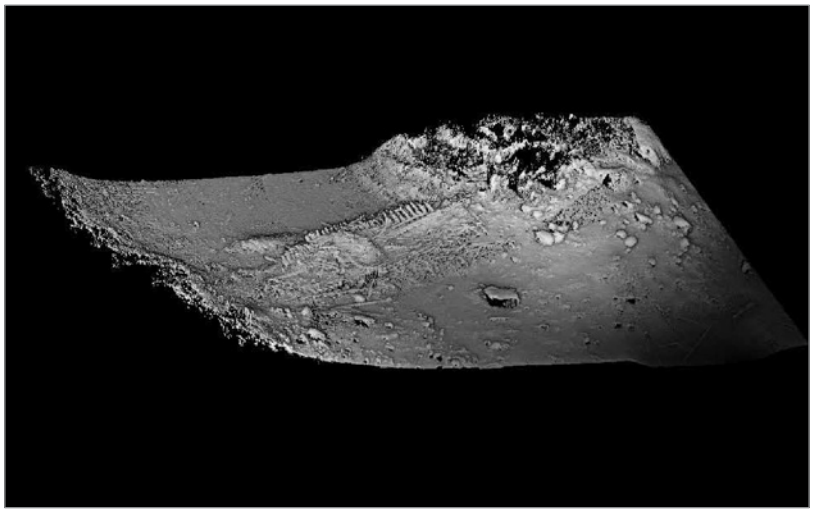


Fig 3.1. Wooden skeleton wreck (ID 2694) scanned with the multibeam sonar equipment of Meritaito Ltd (Ville Peltokorpi 2011, Meritaito Ltd, courtesy of the Governing Body of Suomenlinna).

3.1 Formulation of a new interpretation tool and way of presenting data

The level of archaeological information available on sites varies, but one attribute is always indisputable: the location of the wreck and the

way it is situated in the underwater landscape. In 2006, Johan Rönnby stated that interpretations of the cultural changes in the landscape could be supported and developed through geographical analysis. Geographical analysis can benefit from archive material, as well as from the archaeological remains (Rönnby 2006:32; see also Richards and Seeb 2013).

There is usually a relationship between an ancient site and its surrounding landscape. However, this connection is not commonly regarded as meaningful with shipwrecked vessels, as their final locations are the result of a random event. In contrast, abandoned and recycled ships were intentionally placed in their locations and should be approached from the geographical perspective.

The archaeological data on wooden wrecks in the underwater landscape of Suomenlinna seems to be sufficient for answering the questions posed within this dissertation, although it does not contain material from archaeological excavations. The challenge is to find new ways to use the existing survey data to identify the sites that offer the most potential for future research, or even specific wreck sites that could be excavated. For this study, a new interpretation tool was developed for the data analysis. The tool presents four variables to inspire the cognitive process of the archaeologist. The use of this tool is based on the assumption that the locations of wrecks reflect the decision-making process of the contemporary society.

The interpretation tool examines the following variables:

1) Topographical location of the wreck

The general hypothesis is that accidental shipwrecks take place in actively used water areas, whereas abandonment takes place in inactive water areas. This corresponds to Richards' concept of 'harm minimization': if a ship hull is abandoned, a location is chosen where it does not pose a risk to navigation, and the abandonment is conducted with minimum expense and labour (Richards 2008:147). Recycling occurs within straits and close to shorelines. For example, the need for a breakwater construction to create shelter from wave action can determine the location where a ship is recycled. Exploring this variable includes assessment of the historical development of the area and changes in water activity. When the date of the wreck is unknown and it cannot be fixed to a certain point in history, it is necessary to think generally and broadly about the area's development and changes.

2) Placement strategies

Additional stones (excluding ballast) or spikes through the hull can be placement strategies. These techniques were utilized to prevent the movement of a wreck following abandonment (Hunter 2013:302); they are also good indicators of possible recycling behaviour. If a wreck has different types of rubble inside the hull, it is more likely that the ship was deliberately abandoned from service as a floating vessel. It was quite typical to load a vessel with unwanted material to be removed from the visible landscape.

3) Orientation of the wreck compared to the shoreline

The wreck can be parallel with the shore or have its bow/aft pointing towards the shore. A parallel position could indicate that people used the ship as a retaining wall along the shoreline. A bow/aft towards the shore could suggest abandonment. However, vessels have 'a will of their own' when scuttled, and the final position might be unintentional.

4) Relationship of the wreck to other remains

Multiple wrecks close to each other might indicate a ships' graveyard, or a ships' trap. At the fortress, multiple wrecks are most likely to be a ships' graveyard, revealing abandonment practices. When an individual wreck is located in deep water, its origination mechanism can be interpreted as an accident or abandonment.

The examination of these variables results in an interpretation of how a ship became a wreck — in other words, whether the ship was:

1) Shipwrecked (the victim of an accident, or an accidental site; AC)
2) Deliberately abandoned (DAB)
3) Recycled (RE).

The outcome is only indicative, but nevertheless offers a basis for the continuation of archival, archaeological, and scientific research.

For this study, 26 sites in the Suomenlinna water area were examined using the interpretation tool. According to the results, sites are divided into the three categories listed above. Deliberately abandoned ships and accidental sites are presented in Appendix 4, and vessels indicating recycling behaviour are taken under closer study within this chapter. Wrecks excluded from further study are discussed below.

The first group of wrecks eliminated from further study consisted of smaller boats, since they are even harder to date than larger vessels, and

in the underwater landscape they seldom represent anything other than abandonment. Generally, when boats were recycled, they were typically used on dry land in a new capacity. One example from Suomenlinna is an old rescue boat from the ferry that has been placed in the yard of a local restaurant and serves as a table. At that point in their life cycle, boats are still in the systemic context and not in the archaeological context, and accordingly not in need of closer study.

Based on oral knowledge from the Suomenlinna inhabitants, dumping of unwanted small vessels in the water area around the fortress took place as late as the 1980s. The dumped vessels were usually privately-owned small pleasure boats. Their owners may have had various reasons to dispose of the boats, but the most common were the old age of the vessel and/or its poor condition. These deserted boats, visible in the multibeam data, include both sailboats and motorboats.

The second group excluded from further analysis consists of wrecks that were discovered earlier but could not be relocated in the field during this survey. Information on wrecks in the Suomenlinna area has been collected in the archives of the Maritime Museum of Finland since the 1960s. If the wrecks could not be found using side-scan sonar, multibeam sonar, and inspection dives, as carried out for this survey, they have most likely shattered completely. For example, the Iso Mustasaari wreck 9 (ID 2125) site consisted of the remains of a possibly exploded torpedo boat. The wreck had been recorded in the archives, but only some loose elements were found at the site. It is likely that the torpedo boat was intentionally removed, as it was in a problematic location for the use of the water area. There are no records or even recollections concerning the date of the removal operation. However, it seems likely to be relatively recent, perhaps dating to the 1950s–1970s, when the fortress was used by the Finnish Ministry of Defence.

In addition to intentional destruction, heavy ship traffic could have destroyed some of the sites. Currents caused by the traffic are strong, since large ships in narrow straits push and pull the water column on their way.

Wrecks located in earlier studies at the southern shoreline of Kustaanmiekka (ID 1322, ID 1323, ID 1324, ID 1361) were not detected in the remote sensing data. They could not even be located on inspection dives; only a rudder was found on the seabed, and according to the diver's description, the rudder seems to date to modern times. Consequently, these 'ghost' wrecks were excluded from the analysis.

Iso Mustasaari wreck 5 (ID 1321) was also excluded; it is not seen in the remote sensing data and its whereabouts remain unknown. The site could not be visited during the survey due to the challenging diving conditions at the busily trafficked strait of Kustaanmiekansalmi.

3.2 Data analysis: accidental sites, deliberately abandoned vessels, and recycled ships

Some of the wrecks at Suomenlinna could be located where they are with no intentional cultural selection, but as the result of an accident. History knows multiple cases where ships sunk unintentionally in the fortress area. In general, a ship breaking loose while anchored was a typical reason for a vessel to founder (Rönnby 2014b:110). However, the ships at Suomenlinna were not ordinary en-route vessels suffering from a sinking. They were a part of the everyday life of the fortification, or vessels of the fleet stationed at their home harbour when something unexpected happened. Descriptions of bigger accidents survive in written material, and the dating of these remains is important to connect particular wrecks to particular events.

Five wreck sites are located in actively used water areas, which leads to the interpretation that they cannot be recycled or rejected vessels, and could thus have suffered a shipwreck. These wrecks are discussed in Appendix 4. However, if the site date is unknown, the use of the water area might have changed over time; even the shoreline may have changed. In addition, the water depth must also be considered. No matter in what direction the bow might point, if the vessel is deep enough, it cannot be seen as indicating recycling practices, unless it is functioning as a blockship.

Abandoning a vessel usually takes place in a water area that is not actively used. The problem is that activity changes over time, and if the dating of the abandoned vessel is not known, it is difficult to identify a wreck as abandoned. Cultural selection precedes the decision to abandon a ship. An active decision of the contemporary society is needed to find a suitable location for the abandoned ship(s), to avoid causing problems for traffic and sometimes to keep the vessel(s) available for further reuse of parts. Three of the Suomenlinna wrecks can be considered as deliberately abandoned, and two sites are possible ships' graveyards, presented in detail in Appendix 4.

Recycling consists of reusing ships in the underwater landscape in a new form or function, but this is often problematic to determine based solely on the archaeological remains and the analysis of their location. The recycling classification cannot always be given with certainty, not even with the help of archival material. However, application of the interpretation tool and its variables indicated recycling practices at 16 wreck sites. Some of these wreck sites could even be identified, and biographies of specific ships could be completed and shared for the first time (see sections 3.3 and 3.4).

The analysis of the selected sites is now complete, and still contains a number of unidentified wrecks. However, the analysis results indicate how they entered the underwater landscape. It seems like the group of skeleton wrecks contains five shipwrecked vessels, three abandoned ships, two possible graveyards, and 16 recycled ships. The results form an important clue for searching for the forgotten past of these remains. Further studies beyond this dissertation are needed to create a biographical interpretation for abandoned and shipwrecked vessels. In the following sections, wooden wrecks indicating recycling behaviour are taken under closer study.

3.3 Lilla Varvet: recycling ships as the foundation of a breakwater

When this study began, the case study of Lilla Varvet was only a pile of old wreck elements at the Maritime Museum's maintenance area at Hylkysaari. These pieces of wood were lifted from the sea 30 years earlier from the site called Lilla Varvet (known in English as 'The Little Wharf'), located on the eastern coast of the island of Iso Mustasaari (in Swedish, *Stora Öster Svartsö*). Today the area is one of the largest small shipping harbours at Suomenlinna (Fig. 3.2), and houses motorboats belonging to a local yachting club. The Swedish name Lilla Varvet means 'minor dockyard', and the name dates to the late 18th century.[1]

Archaeological work in the area began in the early 1980s. The dockyard was not in use, and the decision was made to transform it into a modern small shipping harbour for local islanders. The construction work for the harbour took place in 1982, and the Maritime Museum

[1] Today the site has the Finnish name 'Venekerhon ranta', and is managed by the yachting club Suomenlinnan Venekerho.

of Finland had the opportunity to survey and record the site. The discovery included four wrecks and a timber caisson structure (Fig. 3.3). The old wooden caisson was acting as a breakwater, and was subsequently turned into a pier by adding bedrock boulders to the structure.

Fig 3.2. The modern small shipping harbour of the local yachting club Suomenlinnan Venekerho during the spring (Mika Karvonen 2017).

There was originally also a fifth wreck, which according to common belief was dredged away in 1978. However, the rumour does not appear to be accurate, and it seems that this wreck is the only one still visible in the seabed even today. This wreck (ID 2126) will be referred to later within this case study.

After completing the archaeological documentation, the wrecks discovered during the 1980s' construction work were partly dredged away (Fig. 3.4) and partly left *in situ* beneath the new pier. The project also lifted the most important structural parts of the wrecks. These lifted elements were stored at Hylkysaari in the outdoors maintenance area of the Maritime Museum of Finland.

A re-evaluation of these wreck elements became relevant in 2007, when the Maritime Museum was relocated to Kotka. The pieces of wood were going to be destroyed in a cleaning operation of the maintenance area, and the collection needed to be inventoried. At the time,

this study's archaeological survey of Suomenlinna was active, and the author was consulted on the future of these pieces. The original documentation, photographs and maps were recovered from the archives of the Maritime Museum, further archive studies were conducted, and all this data was combined with the preserved wreck elements. As a result, the mystery of these wrecks could finally be solved. The author recognized that these four wrecks were recycled to create a foundation for a timber caisson serving as a breakwater. The biographical approach proved that four galliots, namely *Prinz Wilhelm*, *Prinz von Preussen*, *Alte Treu*, and *Ancklam* from the original Swedish Army Fleet were scuttled at the wharf in 1764. The preserved wreck elements in the maintenance area did not end up being destroyed; instead, they were exhibited at the Suomenlinna Museum from 2011 to 2013.

Fig 3.4. After the archaeological recording, wreck elements were dredged from the site (Harry Alopaeus 1982, National Board of Antiquities).

Before the wrecks were identified, they were assigned the following codes, which are a combination of the national register and names given during the 1980s field studies:

- ID1362 Iso Mustasaari wreck 1A (Wreck 1A)
- ID1363 Iso Mustasaari wreck 1B (Wreck 1B)
- ID1364 Iso Mustasaari wreck 6 (Wreck 2)
- ID1365 Iso Mustasaari wreck 3 (Wreck 3)

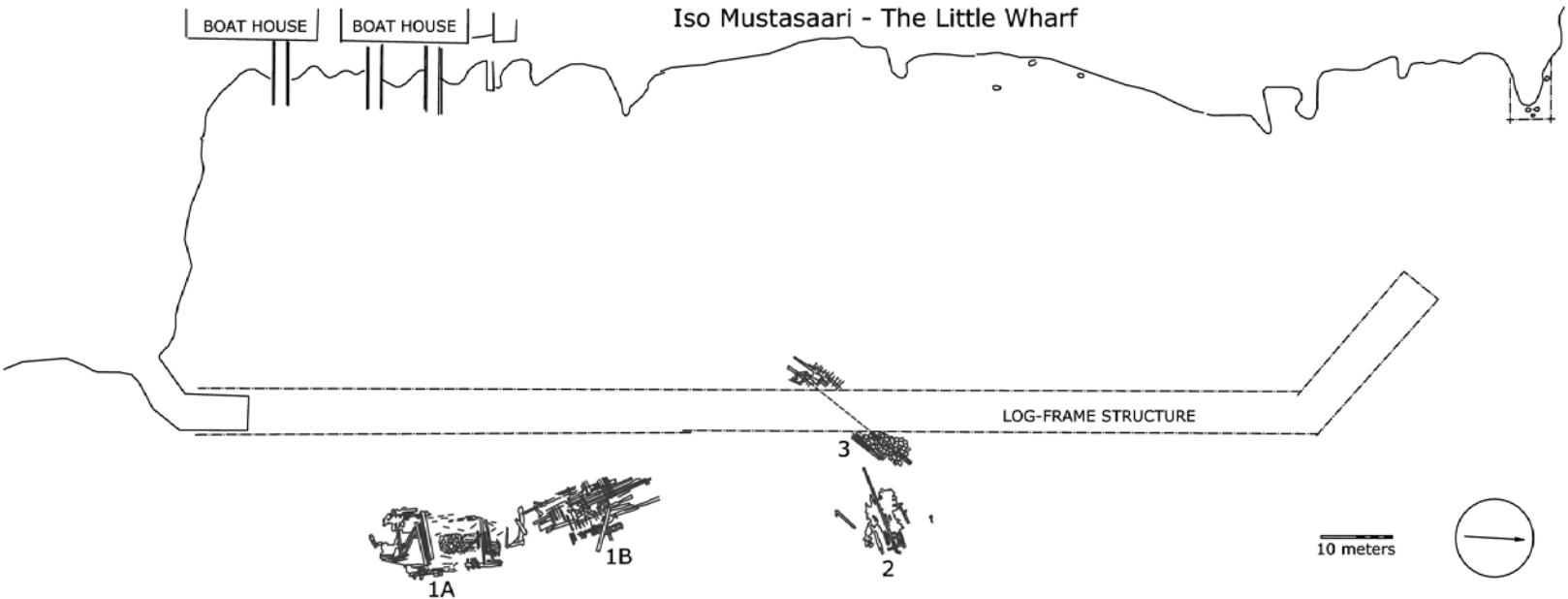


Fig. 3.3. Site map of the Little Wharf by Harry Alopaeus, 1982 (Ville Leino, 2013 after Alopeaus).

The study process for these wrecks is described in detail below to emphasize the way little clues helped to create a valid interpretation. The goal is not to give a complete biography of the wrecks; this would be impossible due to the lack of sources. However, these wooden elements have value when they can be seen in context of the past. Their extended biographies are also meaningful, as the actions carried out in our times express the development of maritime archaeology in Finland.

The case study presented here is based on the author's previously published article: 'Recycling Shipwrecks — examples from the 18th-century fortress island Suomenlinna' (Leino 2013). It was also presented to the audience at the Bubbling Under exhibition at the Suomenlinna museum. However, the biographical approach to the archaeological evidence has not been used or published before in the form in which it is described in this dissertation.

3.3.1 Recording the site, 1981–1982

The staff of the Maritime Museum documented the site in December 1981, and volunteers conducted additional work. Due to poor visibility, wintry conditions, and impending construction work, it was decided to raise the most important structural parts for documentation on land. The log frame construction of the breakwater was photographed and measured, but none of its components were removed from the site (Fig. 3.5). Before lifting, elements were measured and photographed *in situ* by Harry Alopaeus. These parts of shipwrecks were included in the museum collection, but stored unconserved outside in the maintenance area. Wooden parts were removed from four wrecks named 1A, 1B, 2, and 3 (see Table 1). Some of the wreck elements were relocated underwater to a safe place in front of the Coast Guard Station in Suomenlinna, where they probably still are.

In 1982, a summary of the archaeological fieldwork was published in the Annual Report of the Maritime Museum of Finland. At that time, the wrecked ships were assumed to have operated during the Crimean War (1853–1856) or earlier. The dating was based on the discovery of two shots (92 mm and 142 mm) from wreck 1A, and one shot (200 mm) from wreck 1B which had gone through the keelson (Suomenlinna [Sveaborg] 1982). One shot included a fuse, apparently dating to the Crimean War or later (Alopaeus pers. comm. 2009; see also Alopaeus 1984b). However, the shots could have ended up in the wood after the ships were already part of the underwater landscape,

during the massive bombing of Sveaborg during the Crimean war. The origin of these wrecks remained unsolved.

	Wreck 1A (ID 1362)	Wreck 1B (ID 1363)	Wreck 6 (or 2) (ID 1364)	Wreck 3 (ID 1365)
Building Material	Oak	Oak	Softwood/Pine?	Oak
Hull Structure	Clincker built	Clincker built	Clinker built	Clincker built
Estimated Length	25-26 m	22-23 m	18,5-20 m	25-27 m
Estimated Width	7,4 m	7 m	5,4-6,5 m	5,5-8 m
Location	Partly under the wreck 1B	Partly above the wreck 1A	-	Under waterbreak construction
Estimated amount of rocks inside the wreck	18 tons	60 tons	-	-

Table 1.

Fig 3.5. The old log-frame construction before the renovation (Harry Alopaeus 1982, National Board of Antiquities).

3.3.2 Archival studies and a new interpretation, 2009–2012

It is challenging to uncover a historical context for a group of skeleton wrecks thirty years after their removal. It is especially challenging in a place like Suomenlinna, where the archives are spread across three different countries and the wealth of information is vast. For an archaeologist, it was easiest to start by examining the geographical area through old maps. A new piece of information on Lilla Varvet came to light in a nautical map of the Finnish coast dating to 1794 and stored in the Military Archives (Krigsarkivet) in Stockholm (Laitinen 1999; Harju and Tiilikainen 2009:58–59). Against the waterfront of Lilla Varvet was written '*2ne nedsänkte Gallioter på hvilka är 6 fot djupt*' ('two submerged galliots at a depth of 6 feet') and beside this, '*vrak*' ('wreck') (Fig. 3.6).

Fig 3.6. The nautical map of Gustav af Klint revealed the ship type of the scuttled vessels as galliots (photo by the author 2010, original map: Krigsarkivet, Stockholm).

The term 'galliot' derives from the French *galiote*, Italian *galeotta* and Medieval Latin *galea* (Dictionary.com 2014). It refers to a class of small, useful, square-rigged cargo vessels typically with two masts. It was a sailing vessel similar to a ketch, used for trade along the coasts of Germany and nearby countries. Galliots were used for the transportation of cargo and, occasionally, troops, as well as for hydrographic work, exploration expeditions, and as avisos. They also served in military fleets, for example as part of the Russian fleet until the 1820s (Tredrea and Sozaev 2010: 362).

In the old map, the identification of the ship type as a galliot was an important piece of information that could then be combined with data provided by historian Oscar Nikula's (1933) list of the Swedish archipelago fleet. Nikula mentioned five galliots, named *König v. Preussen*, *Prinz Heinrich*, *Prinz Wilhelm*, *Prinz v. Preussen*, and *Alte Treu*. According to Nikula (1933:366–367), they had been captured by Swedes from the Prussians in 1758–1759 during the Pomeranian War, and added to the Swedish fleet. Later, these five galliots became part of a 33-vessel fleet forming the core of the Sveaborg squadron.

The Sveaborg squadron belonged to a new Army Fleet created during the Pomeranian War under the command of Augustin Ehrensvärd. In the autumn of 1756, the Army Fleet was separated from the Navy Fleet and combined with the Army. This fleet was divided into two: the Stockholm squadron and the Sveaborg squadron. The Stockholm fleet already existed, and accordingly the regiment of Finland was to be created from scratch. A young ship designer, Fredrik Henrik Chapman (ennobled as 'af Chapman' in 1772), was involved with the fleet; he later became famous and largely respected as the first naval architect (Harris 2001). Cooperation between Chapman and Ehrensvärd started in Stralsund and led to the building of new ship types. At the end of the war, the new fleet, including old and modified vessels and some genuinely new ships, settled in Sveaborg. During 1763–1764 the main focus was on developing dockyards and creating the Sveaborg squadron (Nikula 1933:126; Pettersson 1968:125; Matikka 2008:30).

After a brief period in Sveaborg, the galliots were removed from the naval fleet's ship list in 1766 and 1767 (Nikula 1933:366). The Helsinki Auction Rooms' minutes for 11 June 1766 record the sale of equipment from four galliots. Three of these were *Prinz Wilhelm*, *Prinz von Preussen* and *Alte Treu*, which Nikula mentioned in his list, and the fourth was *Ancklam* (Malinen 1997:37; HKA Ga:7). The state of the galliots is described in an inventory made two years earlier in 1764, and this was used to estimate the cost of the equipment for the auction. The auction minutes from 1766 describe how the value of the items had decreased because the rigging had suffered during stripping (in Swedish, *slopningen*) and scuttling (in Swedish, *försänkningen*). These actions indicate that the ships had been deliberately submerged rather than sunk accidentally or abandoned.

Maritime historian Ismo Malinen, who had been studying a famous merchant, Johan Sederholm from Helsinki, had found this information

while researching his master's thesis. Sederholm had made successful discoveries at public auctions of shipwrecked vessels. For example, he had bought all four tackles of the galliots for the price of 20,000 copper daler (in Finnish, *taaleri*), including some partly worn-out sails. At the time, the value of one galliot was approximately 50,000 copper daler (Ismo Malinen, pers. comm. 2009). This indicates the value of the rigging compared to the hull.

In 1767, the last two galliots, *König von Preussen* and *Prinz Heinrich*, were recorded as sold at the Helsinki Auction Rooms (HKA Ga:8), implying that the ships' hulls were also sold — though in poor condition. *König von Preussen* was rebuilt as a hospital ship (Nikula 1933:126). *Prinz Heinrich* was modified into a transport vessel, and later served as a merchant ship under private ownership (Hornborg 1950: 336). The vessel also took part in a famous operation where several vessels transported 992 troops from Finland to Stockholm during the revolution of Gustav III in 1772 (Nikula 1933:85).

In the 1950s, chief intendant of the NBA Lars Pettersson conducted a study of the history of the dry dock, which suggested that four merchant vessels were scuttled in the harbour area (Pettersson 1952:3). However, Pettersson's article does not include any references and his sources remain unclear. As a ship type, a galliot is better known as a trading ship; it can be assumed that Pettersson meant galliots when he mentioned these merchant vessels. In a fortress area, most abandoned vessels have a military origin. Combining the available data with the description of the two galliots on the old map led to a new conclusion: three of these four scuttled vessels are most likely galliots from the Army Fleet, the tackles of which had been sold in the auction, namely the *Ancklam*, *Prinz Wilhelm*, *Prinz von Preussen*, or *Alte Treu*. The ships' hulls were scuttled to create a breakwater before the inventory in 1764, as recorded in the minutes of the Helsinki Auction Rooms. Combined with archaeological evidence from 1981, they could be wrecks 1A, 1B, and 3.

The fourth wreck, built from pine in clinker technique, cannot be interpreted as the fourth galliot. In the 1980s, it was thought to represent a different building tradition and is described as 'a peasant vessel' (Suomenlinna [Sveaborg] 1982:16). However, there were also several smaller clinker-built vessels in the Army Fleet. There is no further evidence to tie this vessel to the fleet, but it is still a plausible interpretation. There is a correlation between the number of vessels mentioned

in the Helsinki Auction Rooms minutes and Pettersson's observations, but one galliot was still missing in the archaeological documentation. It could have been the fifth wreck, which was thought to have been dredged away completely in the 1970s. However, this assumption proved to be false: the remains of the fifth wreck (ID 2126) were rediscovered during the maintenance of a modern jetty in 2013 (see Appendix 4).

3.3.3 Re-evaluation of the wreck parts, 2009–2011

The re-evaluation of the pile of wreck elements stored in the maintenance area of the Maritime Museum was carried out in four different phases. The first phase involved the study of the wreck elements. The work was challenging, as the wood had not been conserved and the extended storage period outside had affected the condition of the wood. Furthermore, over the years the collection had grown with additional wreck elements from different sites. Sorting and comparing was carried out first in 2009 by opening up the pile and trying to find the original pieces (Fig. 3.7). The physical remains were compared to photographs and drawings from the 1981 documentation (Vakkari 2009). In addition, military archives in Sweden were visited to collect supplementary information, revealing inventories of the galliots *Ancklam*, *Alte Treu*, and *Prinz Wilhelm*.

Fig 3.7. Ship elements were piled outside, and maritime historian Ismo Malinen evaluated different pieces (photo by the author 2009).

The situation was made more difficult by information concerning the Russian fleet. According to a catalogue of Russian warships, the Russian fleet also had galliots, which were built at Kazan Admiralty in 1797 and transferred to the Baltic Sea. They were distributed between 1806 and 1812 to St Petersburg, Kronstadt, Sveaborg, and Turku. The Russians had also captured galliots from the Prussians in 1760 at Kolberg (Tredrea and Sozaev 2010:363–364). Could it be possible that these shipwrecks at Sveaborg came from that source? Still, the origin and the dating of the map pointed in the Swedish direction.

Fig 3.8. Dendrochronological specialist Pentti Zetterberg saws samples to date the wreck elements (photo by the author 2009).

The second phase of the re-evaluation was taking samples for tree-ring studies. The dating was carried out at the Laboratory of Dendrochronology at the University of Eastern Finland, under the direction of Pentti Zetterberg (Fig. 3.8). The sampling was successful (Table 2) for two of the wrecks: 1A and 3. All four samples from wreck 1A were oak (*Quercus robur L*), and the growing region indicated was the Pomeranian district of northern Germany. The last growth-rings of each sample were the years 1666, 1698, 1707, and 1721, dating the ship after the year 1721. From wreck 3, five samples of oak (*Quercus robur L*) were analysed, and they matched districts in northern Germany and Poland. The last year-rings of each sample were 1674, 1695, 1705,

n:o	Sample n:o/wreck	Species	Total	Mean	s.d.	a.c.	m.s.	Years	Pt.	Cut down after year
02	46/unknown	Quercus robur	109	184.8	72.1	.727	.211	1540-1648	4	1648
03	61/wreck 1A	Quercus robur	107	198.9	67.8	.651	.225	1560-1666	4	1666
04	52/ wreck 2	Pinus sylvestris	105	151.8	138.3	.943	.250	1537-1641	¾	1641
05	4/wreck 3	Quercus robur	82	134.0	66.7	.648	.272	1539-1674	4	1674
06	16/unknown	Quercus robur	86	78.5	44.9	.798	.248	1560-1645	4	1645
07	39/wreck 3	Quercus robur	139	148.7	63.8	.791	.209	1588-1726	4	1726
08	21/wreck 1A	Quercus robur	143	109.7	48.8	.803	.192	1565-1707	4	1707
09	40/wreck 3	Quercus robur	81	179.9	58.8	.815	.168	1615-1695	4	1695
10	44/wreck 2?	Alnus glutinosa/ incana	126	136.3	101.1	.629	.333	-	-	-
11	50/unknown*	Quercus robur	117	84.4	43.8	.737	.264	1592-1708	4	1708
12	38/wreck 1A	Quercus robur	79	377.6	108.6	.709	.167	1620-1698	4	1698
13	59/wreck 3	Quercus robur	93	200.2	122.7	.942	.160	-	4	-
14	48/wreck 3	Quercus robur	142	111.1	32.9	.649	.192	1564-1705	4	1705
15	1/unknown	Quercus robur	61	159.5	50.7	.778	.167	1540-1600	4	1600
16	43/ unknown**	Quercus robur	115	210.3	79.5	.736	.182	1607-1721	4	1721

*Table 2: * matches with other results of the wreck 3, ** matches with other results of the wreck 1A.*

Zetterberg, Pentti 2010. Museoviraston meriarkeologian yksikön Helsingin Suomenlinnan Venekerhon aallonmurtajan hylkyjen puunäytteiden iänmääritys, dendrokronologiset ajoitukset F56202-F5U6203, FIU 6204, F5U6205-F5U6209, F5&U6210 ja F5U6211-F5U6216. Joensuun yliopisto, Biotieteiden tiedekunta, Ekologian tutkimusinstituutti Dendrokronologian laboratorion ajoitusseloste 367:1-11

1708, and 1726, meaning that the ship dates after the year 1726. Wreck 2 yielded only one sample of pine (*Pinus sylvestris L*) and one of alder (*Alnus glutinosa/incana L*). The pine sample was dated to 1641, but no interpretation can be made based on this, since it is not representative (Zetterberg 2010). However, the dendrochronological dating results for wrecks 1A and 3 support the theory that the galliots were old Prussian merchant ships, used for military purposes in the Pomeranian War (1757–1762).

The third phase included new fieldwork at the Lilla Varvet site. During the winter of 2009, scientific diving was conducted as part of the survey at the wharf area. However, the ice and visibility conditions prevented successful results (Fig 3.9).

Fig 3.9. The diving operation took place from the top of the ice at Lilla Varvet (photo by the author 2009).

The fourth step of the re-evaluation was carried out in 2011, when wreck elements from Hylkysaari were photographed and drawn by maritime archaeology students from the University of Helsinki.[2] Several pieces were compared with the inventory lists from Swedish military archives. Combining information from ship inventories with preserved

[2] The author was the responsible teacher of the maritime archaeological group; ship specialist Hannu Matikka assisted with the interpretation of the individual wreck elements.

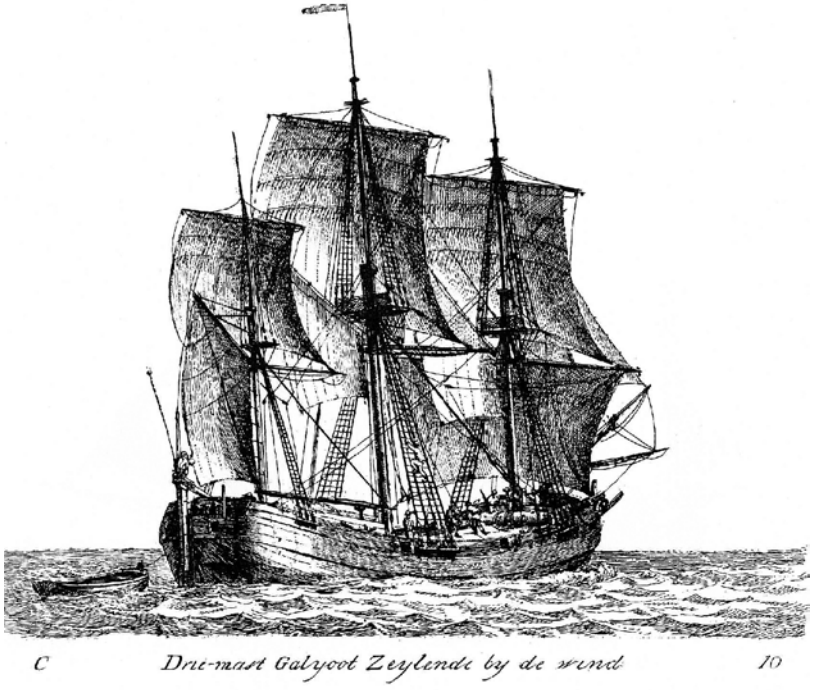


Fig 3.10. An 18th-century drawing of a galliot (Groenewegen 1790).

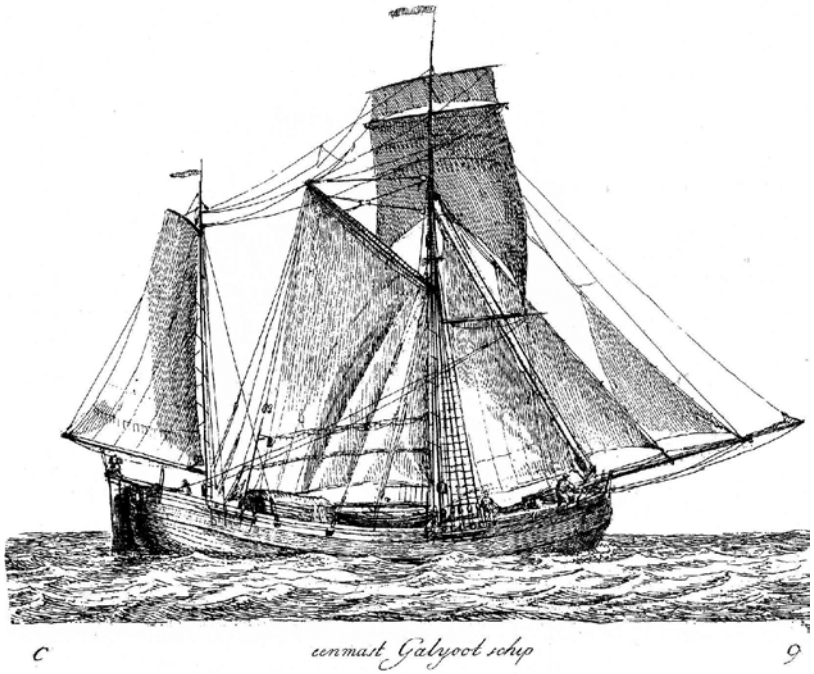


Fig 3.11. An 18th-century drawing of a galliot (Groenewegen 1790).

wreck elements to identify wrecks turned out to be a challenging task. According to the inventory list, at least the galliot *Prinz Wilhelm* was clinker-built from oak. Shipwrecks 1A, 1B, and 3 were built from oak with the clinker technique (Figs. 3.10 and 3.11).

The fifth wreck, assumed to have been dredged before the archaeological documentation in 1981, re-entered the story in 2013. During the renovation of a jetty, a wooden clinker-built wreck was found next to the poles of the modern pier. The wreck is now named Iso Mustasaari wreck 16 (ID 2126) and awaits future analysis. Until then, this wreck is preserved *in situ* as the remains of a possible galliot.

It can be concluded that galliots *Ancklam*, *Prinz Wilhelm*, *Prinz von Preussen*, and *Alte Treu* were scuttled in front of Lilla Varvet. At least three of them were used as a foundation for the breakwater (Fig. 3.12).

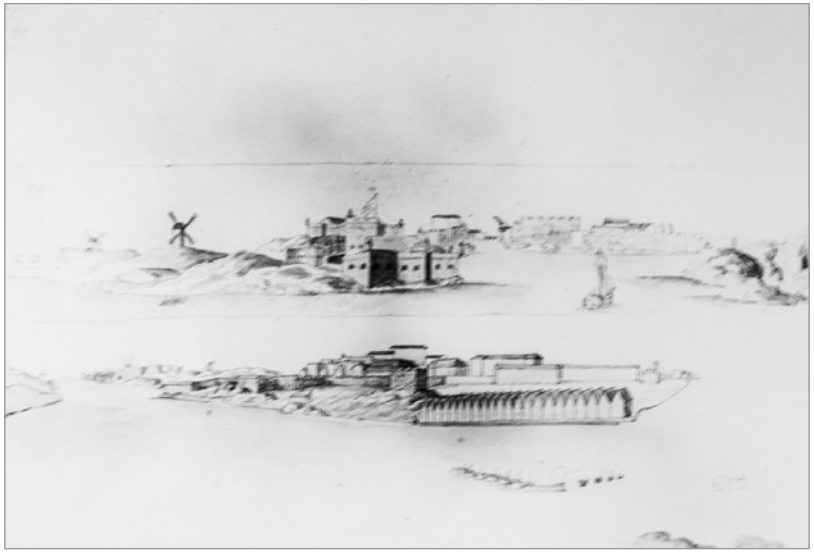


Fig. 3.12 Lilla Varvet viewed from the east during the 18th century. Vessels of the Army fleet stationed in front of Lilla Varvet (Sjöhistoriska Museet, Stockholm).

3.3.4 Forming the biography of the galliots

Constructing a biography for the four galliots requires examining the information about them in various sources and placing them in a general historical context. The exact place and time of the building of the galliots remain unknown. The place was somewhere in modern Germany, perhaps near Stralsund, as indicated by the results of the

dendrochronological analysis. They were built to be merchant vessels at the beginning of the 18th century, during the time of peace after the Great Northern War (1700–1721). These galliots were most likely purchased from their owners and modified into warships by the Prussians during the winter of 1758–1759.

These ships were anchored among other vessels in the Bay of Stettin, located east of Stralsund, and used to protect the mouth of the Oder river and the strait of Swina. The famous sea battle of the Bay of Stettin (also known as the battle of Frisches Haff, or battle of Neuwarp) took place on 10 September 1759. The four ships were armed with 14 guns, but they were soon taken over by the Swedes in battle (Norman 2000:21; Berg 2000:59). The Swedes took over the galliot *Prinz Wilhelm* in only twenty minutes. The rest of the Prussian fleet surrendered after the Swedish troops turned the guns of the *Prinz Wilhelm* on them (Nikula 2011:273–274). That these ships participated in the battle of the Bay of Stettin made them more visible over the course of history. In fact, they are probably the only modern 'survivors' among the vessels that took part in this conflict.

The everyday life of these galliots changed several times during their lifespan. They were built as merchant vessels, but turned into warships, which completely changed life on board. Then their ownership changed from Prussian to Swedish, bringing a different cultural setting for the maintenance of the vessels.

From this period, at least one piece of information concerning an everyday incident has been preserved in the archives: the report of an accident that took place between the galliots *König von Preussen* and *Prinz von Preussen* on 19 November 1762 (Krigsarkivet, Finska eskadern 1758–1792, Tyg- och militie 1762–64 Räkenskaper). In this incident, Hans Petter Stenberg fell off the plank between the two ships with a sack of dried fish in his hand. Before he could be helped, the sack sunk into the sea. Two witnesses could verify his story — they had not seen the event itself, but they could testify that Stenberg was sober when the incident took place at 10 in the morning.

Under Swedish ownership, the vessels went through modifications before they became part of the new Army Fleet that Ehrensvärd was building at Stralsund. At least one of the galliots was rebuilt into a bomb ketch under the leadership of Klundret, the building master, who was described by Ehrensvärd as 'stubborn as an old carriage horse' (Nikula 1933:122). *Prinz Heinrich* was turned into a transportation ship and

König von Preussen into a hospital ship. When the Army Fleet was ready, it sailed to Sveaborg at the end of July 1763 (Nikula 1933:126).

After the Pomeranian War, Sweden was in severe financial difficulties. The parliament was even called in to discuss the bankruptcy of the entire country (Nikula 2011:367). The whole political climate in Sweden changed, and building activities at Sveaborg were scaled back (Rosén 2008:17). Large projects, such as building a new dockyard or keeping a fleet at sea, were a substantial drain on resources. To cut maintenance costs, Augustin Ehrensvärd decided to give up ships that were in poor condition, and at least Göteborg's squadron scuttled some of the old galleons (Nikula 2011:404). The condition of the older vessels at Sveaborg was assessed, and this eventually led to the recycling of the galliots as a foundation for the breakwater. However, more typical ways of getting rid of old vessels were to sell them at public auctions or use them for spare parts (see, for example, Nikula 1933:130). Why were the old galliots not cannibalized and their elements reused? This decision might be related to technological development and the desire to create new types of ships for the fleet. Old hull elements could not be reused in new types of ships. However, even without the technological aspect, it is more typical to replace a rotten element with a new piece of wood than to recycle an old part of the hull on a new ship.

In the Swedish Navy, the use life of a vessel depended on the vessel type and its condition. Vessels were made of wood, and in military use they did not last long: the use life of galleys was between twelve and fifteen years. They had to be maintained with yearly repairs, and every three years they were taken on land for thorough maintenance operations on the hull (Nikula 2008:129). In the modern Finnish Navy, the life cycle of a ship is 30 years. The maintenance and equipment updates of the Finnish fleet requires considerable resources even when the fleet is small.

According to the list of vessels of the Swedish fleet between 1756 and 1791 (Nikula 1933), the average active service lasted approximately 25 years. Building and decommissioning years are given for 23 vessels, but this information is missing for 38 vessels. The analysis is not statistically very strong, but it can give a general idea of the length of a vessel's use life. Altogether these 23 ships served for 496 years. *Hämeenmaa Oden* had the longest use life, 44 years (1764–1808), and longboat (in Swedish, barkass) *Jehu* the shortest, five years (1784–1789). The exact ages of the four scuttled galliots are not known, but the building year

can be estimated based on the dendrochronological results. The last sample is dated from 1726, and the ships were built at some point after that. Their operational end and their scuttling took place sometime before 1764. The vessels were less than 38 years old. If the average use life was 25 years, the galliots could be considered as old ships.

Historical sources do not usually specify what happens to vessels after they are decommissioned. For example, the only thing the Army Fleet's ship list tells of the scuttled galliots is that they were taken from the Prussians in 1758 or 1759. Old ships were often sold at auction, and this happened to galliots *König von Preussen* and *Prinz Heinrich* in 1767.

What can be said, then, of the way the four galliots were treated after decommissioning? The recycling indicates economic thinking in a country facing bankruptcy. Decommissioning the vessels scaled back the costs of the fleet. It seems that Ehrensvärd made his decisions quickly, although it must have been hard to give up vessels of the fleet: it was common to try to keep ships in the active fleet as long as possible. It would have been more common to postpone the recycling to create the impression of a bigger fleet for political reasons. But for Ehrensvärd, old vessels were a drain on resources if they needed to be maintained in floating condition. Having a new function for the galliots as a breakwater foundation could have made the decision easier.

The galliots captured from the Prussians did not have a long life at Sveaborg, as they were scuttled after serving for only a few years in the Army Fleet. However, they were identified in their new location by ship type on a map drawn 28 years after they had been submerged. This may be because the person responsible for the cartographic work, Carl Nathanael Klerck, socialized with Augustin Ehrensvärd as a young officer. Ehrensvärd probably told Klerck about the scuttled Prussian galliots. It is also known that after the Pomeranian War, Prince Henry of Prussia visited Sveaborg in October 1770. Ehrensvärd took him around the islands in a sloop and they most probably passed the site of Lilla Varvet. What is left to our imagination is the conversation between these two men regarding the old galliot ships and their fate as the recycled foundation of a breakwater construction.

After the galliots had been scuttled, they remained in the underwater landscape for over 200 years. Discovering their life story has been a difficult task, and it is still not possible to distinguish between the individual wrecks. This is uncommon in the biographical approach,

which usually deals with individual ships — but these ships led very different lives than ordinary merchant vessels.

3.4 Blockships in the Suomenlinna straits

Recycling behaviour can be interpreted from the remains in the straits of Suomenlinna. When ships were used as defence structures to block traffic in the straits, they were made anonymous — stripped of their history and identity. The recycling of these vessels can be seen in at least two different stages: first when the old ships were scuttled as blockships, and second, when these ships were later salvaged. However, salvage as a concept is well established, and accordingly it is not considered recycling within this dissertation.

In the Russian era of the fortress, the waterways were closed to protect Helsinki during a restless period in the Crimean War. After the war, salvage operations of the wrecks were carried out to gather valuable raw material for further use. However, the necessity of opening waterways to traffic was perhaps an even stronger motivation for salvage, in addition to avoiding harm caused by floating elements detached from blockships.

Despite the salvage operations, there are remains of these wrecks in the underwater landscape. Some of the wrecks were removed in such a way that only some loose parts were left at the scene, and their historical connection was lost before this study. In general, these types of sites are difficult to study because of their multifaceted site formation processes and the historical removal of the ships' identities. However, through the life history approach, this study manages to succeed in their identification, and a biography of the vessels can now be formed.

Blocking objects were needed in the Helsinki and Suomenlinna area several times. Waterways were typically closed with wooden blockships and caissons. Some of the straits leading to Helsinki were permanently closed with landfills. Three of the blocked straits are geographically located within the study area, and here they are considered as cases of ships being recycled. The blocked straits are the Särkkä–Vanha-Räntty strait, Särkänsalmi, and Susisaarensalmi (Fig. 3.13). In this study, the straits show up in the light of previous knowledge, archaeological data, and recent discoveries in archives.

These three inlets of the fortress — Särkänsalmi, the Särkkä–Vanha-Räntty strait, and Susisaarensalmi — have been in active use for

hundreds of years. The Antiquities Act of Finland came into force in 1963, and only since then has underwater cultural heritage been protected. Nevertheless, protection has not always been very successful, and information has been lost due to dredging, new constructions, and landfills on top of old remains. This study is a description of historical sites in actively used water areas: despite very complex site formation processes, these historical sites still contain valuable information, and act as places of memory for the events that originally produced these remains.

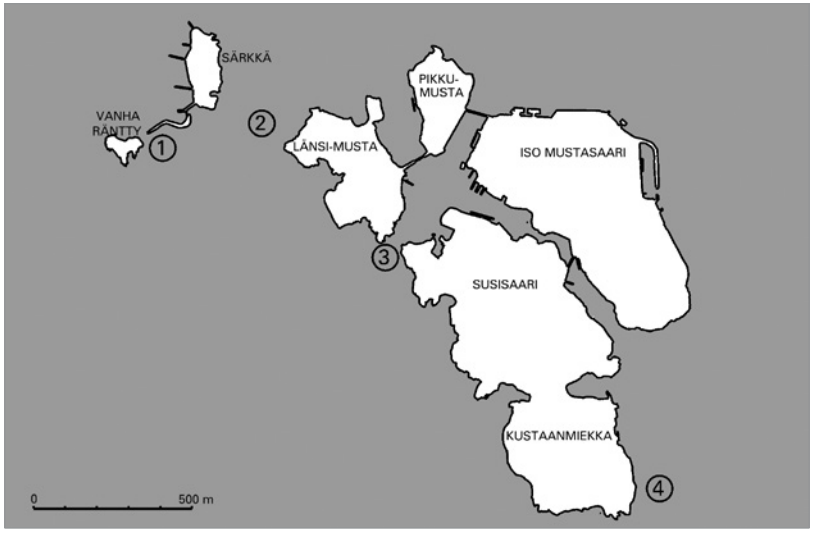


Fig 3.13. The locations of the Suomenlinna straits: 1. the Särkkä–Vanha-Räntty strait, 2. Särkänsalmi, 3. Susisaarensalmi and 4. Kustaanmiekansalmi (Marja Leino 2014).

Based on correspondence preserved in the VeSA Collection,[3] this study reveals how at least four Ezekiel-class sailing ships and at least eight cannon sloops were recycled as sailing obstacles in the Suomenlinna water area during the Crimean War.[4] The Ezekiel class represented

[3] Venäläiset sotilasasiakirjat VeSA, http://wiki.narc.fi/portti/index.php/Venäläiset_sotilasasiakirjat_VeSA.

[4] This was not all: for example, the Minutes of the City Administrative Court from 4 July 1855 contain an interesting piece of information. Men were sent to evaluate privately-owned vessels to determine whether they could be scuttled in straits to fulfil the need to block the waterways (Hornborg 1950:238). It is not known what eventually happened: did merchant ships end up as blockships? It must be acknowledged that there were plenty of old vessels in the fleet to be used for this purpose, as described by historian Eirik Hornborg.

the last wooden sailing ships of the Russian navy (Fig. 3.14). Within this research, Blockship no. 6 was identified as *Oryol* (variably seen as *Orel*); Blockship no. 9 was identified as *Retvizan*; and Blockship no. 10 was identified as *Arsis*. From the same sources, information was also found on a blockship that had been called *Leipzig* (variably seen as *Leiptsig)*. In addition, a ship called *Ostrolenka*, Blockship no. 7, was towed into the 'Admiral's channel'.

Fig 3.14. The fortress of Sveaborg before the bombardment 1855. Hesekiel is moored at Särkänsalmi (photo by the author, original print National Board of Antiquities).

3.4.1 Studies on the blockships at Suomenlinna

Sailing blockages have interested divers since the early phase of the diving history of Finland. From the 1950s onwards, different types of diving activities have been conducted in these straits. The first diver was probably Ora Patoharju in the 1950s (Harry Alopaeus, pers. comm. 28 August 2013). He was the best-known pioneer in the early days of Finnish maritime archaeology. Later, volunteer divers from different societies (for example, Teredo Navalis ry and Urheilusukeltajat ry) have recorded the remains in various channels. There are field reports of these activities in the archives of the NBA (Teredo Navalis 1987; 1987-1988; 1988-1989; Hacklin 1990; Paanasalo 1992).[5]

In a classic Finnish book on wrecks (Vaheri et al. 1996: *Hylkyjä Suomenlahdella ja Saaristomerellä*), these different blockships are

[5] Pekka Paanasalo has most *in situ* experience of these wrecks, and the author wishes to thank him for sharing his knowledge of the Särkkä sites.

believed to be of Swedish origin, trophies of the Finnish War (1808–1809). They are assumed to be vessels of the Army Fleet designed by the famous naval architect af Chapman (Vaheri et al. 1996:111). However, there is no substantial evidence to support this theory. The idea of a Swedish origin might be inspired by the 1950s discovery of a bronze ship nail with Swedish admiralty markings.

The history of Suomenlinna has always interested military historians and personnel. They were the first to write about the importance of the blocking of the waterways (for example, Lundenius 1938:43 and Ruusuvaara 1938:59),[6] and to describe the tactical significance of the blockages. Ruusuvaara writes that blocking the waterways was a key topic when the location of the fortress was chosen (Ruusuvaara 1938:59). However, these studies have been carried out without adequate references to archival sources or literature, and their sources are difficult to confirm. They should be taken into consideration due to the strategic competence of the authors, but need to be viewed with a certain care.

Scarcity of references is also a problem with one of the most important previous studies. Harry Alopaeus (1984a) wrote an extensive study of Suomenlinna's underwater fortifications in the 1980s. He summarizes over 15 years of fieldwork at different sites, particularly how most of the archaeological documentation was carried out in Haminansalmi, which is outside the current study area. He gives an overview of the other straits and encapsulates the general development of the area. His list of sources was reanalysed for this study.

This study continues the work started by Alopaeus. The three decades between have produced plenty of new information, available in publications and archives and on the internet. In addition, new methods based on technological development help to create an updated image of these underwater blockages around Suomenlinna. The archaeological data was collected from the Ancient Relics Register of the NBA (Muinaisjäännösrekisteri 2014). The archaeological remains were also studied by producing multibeam sonar 3D data that provided an idea of the preservation of the remains, as well as a visual image of their relationships in the underwater landscape. For the first time, the different remains could be seen in relation to the other sites and to the

[6] Both articles cited were published in 1938, when the structure of the Finnish defence system was once again reconsidered due to the pressure of the initial stages of WWII.

landscape in general. New images of the sites also allow comparison between the current situation and the original plans.

The archival material comes from the National Archives of Finland and its collection of Russian military documents. Two units, *VeSA Venäläiset sotilasasiakirjat* ('VeSA Russian military documents') and *VeSA linnoitus- ja rakennuspiirustukset* ('VeSA drawings of fortresses and buildings'), were particularly useful. The former collection included several letters and reports containing previously unpublished information related to the closing and opening of the various channels.[7] The latter collection, originally stored at the National Board of Antiquities, consists of 6,632 preserved maps and plans and was thoroughly analysed. The documents were written in Russian, but translated into Finnish in 1984 by Paula Niskanen. These translations have been available for this study.

3.4.2 The topography of the Suomenlinna straits: the Särkkä–Vanha-Räntty strait, Särkänsalmi, and Susisaarensalmi

The main channel to Helsinki goes through Kustaanmiekansalmi. However, it is not included in this case study and the topography is not explained in detail, as the blocking of the strait does not include any evidence of recycling ships. There is no archaeological evidence or historical knowledge of blocking this strait with scuttled ships. However, an oral story states that it had been closed with chains, but there is no further proof available for this study.

The Särkkä–Vanha-Räntty strait was originally a 200-metre-wide waterway between two rocky islands called Vanha-Räntty to the west and Särkkä to the east of the strait (Fig. 3.15). The island of Vanha-Räntty is a nature reserve, and is not part of the Suomenlinna fortress UNESCO World Heritage Site. The inlet has always been shallow, and its maximum depth was three metres. Today the lane is blocked from traffic, as a massive breakwater construction covers almost the whole width of the strait. Water can still move freely in the western part, but it is not in traffic use due to its shallowness. The strait features elements of old sailing obstacles that belong to the fortress system. All the historical

[7] Suggestions from Harry Halén, an expert in the Russian period of Suomenlinna, led to the discovery of certain documents. Heidi Pekander translated these documents especially for this study with additional translations by Alexey Kraykovskiy. The author acknowledges their cooperation and help with deep gratitude and takes full responsibility for possible misinterpretations.

remains, such as several wrecks and caissons, are located in the area nearby or underneath the modern breakwater.

Fig. 3.15. The straits of Särkkä–Vanha-Räntty and Särkänsalmi seen from the south-east (Mika Karvonen 2017).

Fig. 3.16. The strait of Särkänsalmi seen from the south (Mika Karvonen 2014).

The next strait to the east is called Särkänsalmi (Fig. 3.16). Today, it is the second-most important waterway to the city of Helsinki. Traffic is very busy, especially during the summer season. The waterway is located between two islands, Särkkä to the west and Länsi-Mustasaari

to the east. The islands can be described as treeless, bare and rocky, and bedrock is visible in most places. The strait between these islands is approximately 250 metres wide, and its deepest point is 21 metres deep. The underwater bedrock has a very steep profile. Due to the irregular and abrupt underwater topography, it has been difficult to close and block the area with a durable system. In addition, the prevailing winds from the southwest can blow from the open sea into this strait, which makes it a tough place for any floating blocking structure.

Fig. 3.17. The strait of Susisaarensalmi seen from the south (Mika Karvonen 2017).

Susisaarensalmi is located in the heart of the fortress between two islands, Länsi-Mustasaari and Susisaari, and it is 70 metres wide (Fig. 3.17). Susisaari is part of the main fortress, and Länsi-Mustasaari belongs to the outer fortress system. For a long time, this passage was one of the main routes into the Helsinki area. According to the original fortification plans, this channel was to be closed with an embankment. However, this was never accomplished. Today the strait is actively used for traffic: it provides entrance to, for example, the Helsinki Coast Guard Station and the Customs Station located on Iso Mustasaari. The official guest harbour of Suomenlinna can also be reached through this route. There are other significant sites that could be reached through

the strait, such as the gate to the historical dry dock basins and the sheltered bay of Satamalahti ('Harbour Bay'; see Alopaeus 1984a:32). Satamalahti is located between four different islands and provides options to continue in many directions. Today, the bay features bridges, limiting the vessel size, and only small boats can use these routes.[8]

3.4.3 Russian activity in the Suomenlinna straits during the Crimean War

The Crimean War — also called the Eastern War in Russia, and the Russian War in Britain — was a conflict between the Russian Empire and an alliance of the French Empire, the British Empire, the Ottoman Empire, and the Kingdom of Sardinia. It lasted from October 1853 until March 1856 and is sometimes referred to as one of the first modern wars, introducing technological changes, such as the first tactical use of railways and the telegraph. In naval warfare, this era has been called the machine age (Vänskä 2015:20). Although the main scene of war was far away from Finland, the Crimean War left severe scars on the Suomenlinna fortress and its maritime landscape.

The cause of the war was Russian Emperor Nikolai I's desire for control over Turkey and the declining Ottoman Empire — and consequently for a passage to the Mediterranean (Hirn 1956:7). Most of the conflict occurred on the Crimean Peninsula, but battles also took place in the Baltic region. The Baltic Sea served as a scene of war, and the Allied forces wanted to have Sweden on their side and to tie Russian troops to multiple frontiers. French and British fleets entered the Baltic, but they could not provoke a sea battle with the Russians. The Russian fleet was outdated and not inclined to take action, and remained sheltered in the fortresses of Kronstadt and Sveaborg.

The Russians decided to organize their troops in such a way that Sveaborg and Helsinki, a naval base and the capital of the border country, could be defended to the last (Luntinen 1997:85–88). Troops were sent to Finland, and an active period of restoration of the fortress began. Over one thousand men worked to make walls of the fortress more durable and to strengthen the bases of the gun stations. At the

[8] There had previously been a bridge connection between Susisaari and Länsi-Mustasaari. The bridge was probably built in 1811 and demolished before 1843. This can be interpreted from a plan dated to 21 June 1843 to establish new areas for fire pumps. One of the locations on the eastern shore of Länsi-Mustasaari is defined as the location of a destroyed bridge (YA72a).

beginning of the war, there were 7,000 men and 700 cannons together with a fleet of 14 vessels in the fortress. The old and outdated fortification could still be fixed to face the challenges, but there was too little time to do anything with the Navy and the outdated vessels. Ships were mainly old and unfit for service. During the evaluation of the needs of the war, a remarkable number of vessels were decommissioned due to being in bad shape. The cannons of ten different ships were taken into the fortress to be reused on land together with the ships' crews (Hornborg 1950:231–232). Only the ships *Rossija* (120 cannons) and *Hesekiel* (74 cannons, also recorded as *Iezekiel*) could be kept in service (Hornborg 1950:238).

At the time of the Crimean War, there were at least four ways to block a waterway with physical objects. One option was the modern solution, using mines. Another possibility was using floating fences or iron chains set across straits. The third possibility was building caissons, either as a continuous line across the channel or by leaving an opening for traffic in particular locations. In times of peace, the open section would be marked with beacons, but during a conflict, they were removed. The fourth option was to close a channel with blockships, especially scuttled vessels. It was also possible to use combinations of these different methods. According to Ruusuvaara, the blocking was planned by the general engineer Daehn, and only Helsinki was to be protected with mines instead of blockages.[9] There were altogether 994 different mines: 44 were of the Jacobi type and 950 of the Nobel type of electrical mines (Ruusuvaara 1938:60). Despite the original plan, the old tactic of blocking was used in front of Helsinki along with the mines.

Navigable channels were not blocked from traffic until it was necessary. The blockages not only prohibited enemy sailing, but also affected general transportation and trade. It was a question of timing: when was the most beneficial moment to stop traffic? Captain Ruusuvaara describes that it was the Russian Emperor who gave the command to block Särkänsalmi by scuttling vessels (Ruusuvaara 1938). This command also proves the importance of the decision — the Russian Emperor remained the supreme commander-in-chief, and significant orders had to be approved

[9] The fortress of Bomarsund on the Åland Islands was also to be protected by closing up the waterway. A force consisting of four steamships, 20 gun sloops from Helsinki, and 20 from Turku were sent to Bomarsund, but did not reach the area in time, and the plan was changed (Hirn 1956:81). Bomarsund was destroyed during the Crimean War and conquered by the Allied fleet.

by him (Luntinen 1997:102). The command to scuttle the vessels was given only about a month before the severe bombing of the fortress. Correspondence between the Navy Yard and the maritime personnel of one of the blockships shows that the Navy Yard did not want to release the ship until it was renovated and freshly painted (Homén 1936:120–121). Homén sees this as an act of bureaucracy displaying the unplanned nature of the scuttling operation — it was not sensible or economic to scuttle a renovated ship with fresh paint (cf. Alopaeus 1984). This correspondence was not available for reinterpretation.

There is an eyewitness to the scuttling events. In his memoirs, British captain Bartholomew Sulivan describes one scouting trip on 19 July 1855 on which he saw Russians sinking a two-decked ship into the western channel (interpreted as Särkänsalmi). He adds that a few days earlier, another ship had already been scuttled into this strait (Johnsson and Malmberg 2013:412).

The combined Anglo-French fleet bombarded Sveaborg for 48 hours in August 1855, causing severe damage to the fortress. The bombing was intended to destroy navy supplies (Hirn 1956:60). The massive Allied fleet consisted of 10 ships of the line, seven frigates, two corvettes, 16 bombards, 25 gun sloops, four swimming batteries, two yachts, five barges, and one brig (Hirn 1956:125). The fleet was placed in front of the line of mines in such a way that its vessels could not be reached by the old cannons of the fortress. Only smaller vessels could sail closer, as the mines were swimming at a depth which did not pose any real danger to these vessels. If enemy ships came too close to Sveaborg, the cannons of the fortress reacted fiercely; however, the old, poor quality gunpowder from the Swedish period hampered the use of cannons at Sveaborg (Ruusuvuori 1938:61).

The bombing stopped, and the Allied fleet left on 11 August, apparently having completed their task. The stone walls of Sveaborg withstood the bombardment rather well. Still, several buildings were destroyed, 55 lives were lost, and 203 people were wounded (Luntinen 1997:96). Not a single building was repaired to its former appearance; some of them were renovated and some demolished to give space to new constructions (Pettersson 1968: 219).

3.4.4 New details from the archives on the use of blockships

Russian correspondence preserved in the National Archives of Finland allows a deeper understanding into the process of blocking the straits

of Suomenlinna in 1855. The letters were written between the head of the harbour, Mikail N. Lermontov (1792–1866), and the head of the fortress, Aleksei F. Sorokin (1795–1869). Both were experienced soldiers obviously familiar with the bureaucracy involved in the decision-making process. Lermontov had joined the Russian navy at age fifteen and had been working at Sveaborg since 1848, when he was ranked as a vice-admiral (Halén 2003:33–34). Sorokin had great experience in various types of water-related construction operations, such as different types of bridges. At the time of their correspondence, Sorokin had just recently been ordered to take responsibility for equipping the fortress for the war as the commandant of Sveaborg (Halén 2003:14). Their correspondence has not been preserved completely, but nevertheless, based on these remaining letters, an understanding can be formed of the actions taken at the time.

The discussion of closing the straits started as early as 13 March 1854 (no. 14837), over a year before the blockings were finally constructed. In the first letter to Sorokin, Lermontov refers to a command from the Ministry of the Sea, dated to 11 March 1854 (no. 2997). The command described the preparation of Blockship no. 6, *Oryol*, for scuttling. The copper sheathing on the ship, which was used to protect against marine growth on the hull, was to be removed down to the waterline and openings were to be chopped or hewed into the hull under the waterline. The ship was to be scuttled between Susisaari and Länsi-Mustasaari, in Susisaarensalmi. It was to be done in such a way that the holes in the hull could be closed, the water could be pumped out and the ship could be lifted, if it were so ordered.

A letter (16/28.3.1854 no. 756) from Lermontov to the First Lord of the Admiralty discussed floating barriers and scuttling a blockship for safeguarding the fortress. The floating fences were supposed to be placed at two locations, Kustaanmiekansalmi and Susisaarensalmi. The blockship was to be scuttled into Susisaarensalmi, if possible without copper sheathing. Lermontov stated that all blockships were to have underwater re-enforcement and a copper coverage until the waterline. At this point, Blockship no. 6, *Oryol*, was still in the process of dismantling, and the copper was removed down to the waterline. The work was interrupted to find out whether the ship was needed as a blockship. At the same time, Blockship no. 7, *Ostrolenka*, was declared no longer suitable for accommodation — it could be scuttled.

The same letter contains thoughts on the differences between using blockships or caissons for closing Susisaarensalmi. Lermontov thought that caissons would be more cost-effective compared to ships. Caissons could be used to create a foundation for walls to protect wintering ships and to increase the protective capabilities of the fortress. Sorokin is said to agree with this and to believe that it is also a more economic option than using blockships.

Lermontov maintains that the earlier use of caissons in Kronstadt could easily be used as an example for calculating the costs of building them. He goes on to argue his opinion by listing the amounts and values of the different metals collected from the dismantled ship *Hesekiel*: copper (1,223.5 units), iron (2,226 units), and lead (98 units). The unit used here is called *puuta*, and it weighs 16.38 kg, resulting in a total of 20,041 kg of copper, 36,462 kg of iron, and 1,605 kg of lead.

Lermontov also explains how the fences face rough wave action caused by the western winds and that there is not enough chain to be installed into Susisaarensalmi — double chains would require as much as 342 metres of chain.[10] In comparison, the building of caissons would require logs, carpenters, and smiths. Sorokin had suggested that men needed to fill the caissons could be taken from the ongoing construction work at Vallisaari (an island to the east of Kustaanmiekansalmi, also called Skanslandet and Aleksandrovskij; Fig. 2.32).

Lermontov and Sorokin drew from their long experience and suggested an alternative to the original command. It appears that the value of the possible blockships would be higher if they were to be used as raw material than if they were dismantled and recycled to be scuttled. However, the First Lord of the Admiralty did not follow the advice from Sveaborg. Lermontov wrote to Sorokin (28.4.1854, no. 798/341) that a command had arrived to install fences into the main channel in such a way that they would be submerged. Lermontov asked Sorokin whether it was the appropriate time to start the installation.

In another letter from 2 June 1854 (no. 1300), Lermontov proposed that Blockship no. 7 (*Ostrolenka*) should be moved from Länsi-Mustasaari to the 'Admiral's channel'. The whereabouts of this location is unknown, although it might refer to the area called Varvilahti today. This suggestion is based on old maps indicating scuttled ships in the bay. Although the location remains unknown, the next letter confirms that the scuttling of a blockship did take place. It happened as originally

[10] The original unit in Finnish is 160 *Venäjän syliä*.

planned, despite the efforts of Sorokin and Lermontov to convince their superiors to use a caisson instead of a blockship.

Sorokin (6/18.10.1854 no. 3354) asked the rear admiral's advice on replacing an unreliable blockship in Susisaarensalmi. The blockship had lost elements, causing worry in the defenders of the fortress already in the autumn of 1854, soon after the scuttling. Sorokin received a reply (6.11.1854 no. 2548), explaining how his superiors were personally informed of the situation. Sorokin's frustration can be imagined, as he had anticipated these problems.

Old maps also provide valuable information on the events at Sveaborg. An evaluation of the war situation, the state of the fortress, and the state of the shoreline batteries on 8 July 1855 is presented in an old map (General map no. 278. Allied forces bombardment of Sveaborg 27–28 July 1855). The map contains locations of scuttled vessels and floating warships. For example, *Hesekiel* is set in its place in the middle of Särkänsalmi. *Rossija* was moored at Kustaanmiekansalmi. Between Kuninkaansaari and Santahamina, a ship called *Tsesarevits* (variably spelled as *Tsesarevich*) was placed at Haminansalmi.

Fig 3.18. Different symbols are given for scuttled (brown ship) and floating blockships (black ship) (Petri Järvinen 2008, The National Archives of Finland).

The ships mentioned by name were not scuttled, but were only moored at these locations to safeguard straits. These types of ships were

sometimes referred to as blockships, creating confusion as to whether they were scuttled or not. Floating blockships do not necessarily leave any signs in the archaeological record. Sometimes they sank during the war, as almost happened to *Rossija*. Bombs hit the vessel, but it was towed off before sinking (Silvast 1968:82). Compared to the total loss of lives during the bombardment, the fatalities of the crew were high. *Rossija* lost 11 men, and a further 41 men were wounded. Other floating blockships were luckier than *Rossija*: *Hesekiel* lost only one man, and *Tsesarevits* survived without losses (Silvast 1968:82). The amount of ammunition that ended up on the sea bottom must have been immense. At least one wreck in the underwater landscape was hit at the same time (see section 3.3.1), since there is a cannonball with a fuse which appears to date to the Crimean War, attached to a wreck dated to the 18th century.

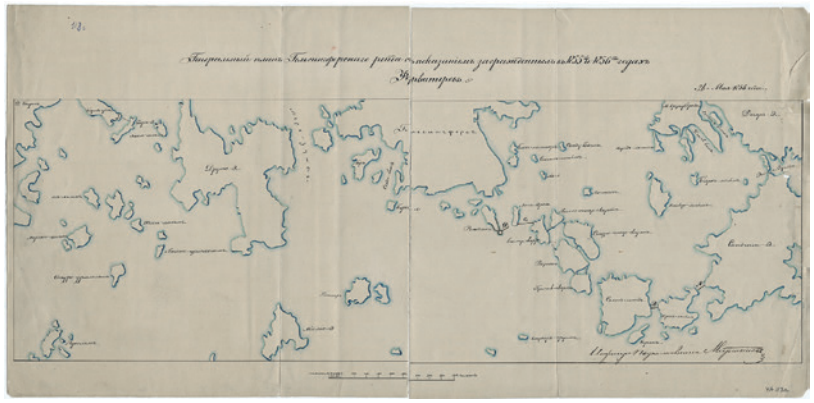


Fig 3.19. The map presents all closed channels between 1855 and 1856 (VIK collection YA113a/The National Archives of Finland).

The different symbols showing closed waterways are an interesting feature in the 1855 general map. There is only one symbol signifying a scuttled ship in Särkänsalmi and one symbol in the strait between Särkkä and Vanha-Räntty (Fig. 3.18). These symbols do not indicate the true amount of scuttled vessels. Susisaarensalmi features a red line between the islands, as do Kukisalmi (in Swedish, *Kuggsundet*) and Haminansalmi. Särkänsalmi has mines drawn in front of the ship symbol. Another map (YA113a), dated to 26 May 1856, represents all the channels closed during 1855 and 1856 (Fig. 3.19). These are (from the east): Haminansalmi, Kukisalmi, Susisaarensalmi, Särkänsalmi,

and Särkkä–Vanha-Räntty. In Susisaarensalmi, two symbols are ship-shaped, and in Särkänsalmi there are also two ship symbols, but otherwise blocking is depicted with a line. The information provided by these maps differs, and they cannot be regarded as reliable sources of how the straits were blocked, but they do indicate which of the straits were closed.

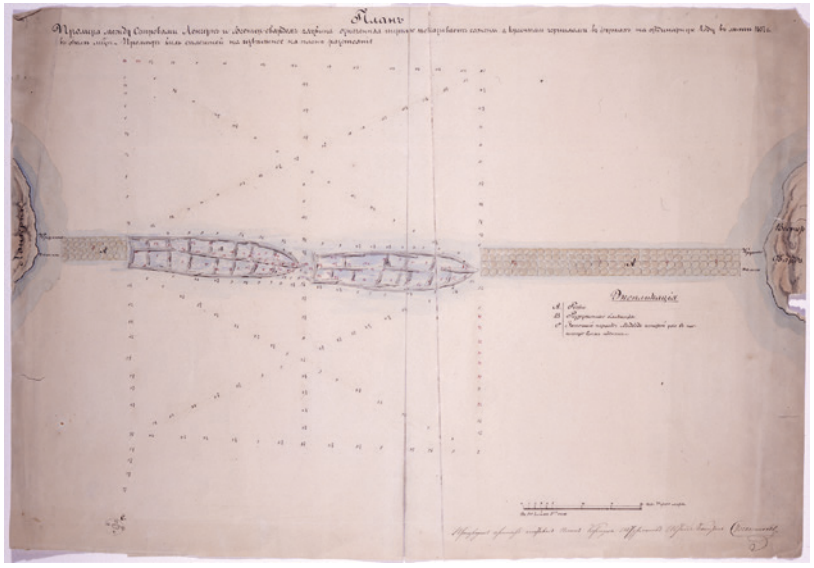


Fig 3.20. A plan to block the strait of Särkänsalmi after the Crimean War (MA200242:9/ National Board of Antiquities).

An additional map from this period was discovered from the archives of the Finnish Maritime Administration (Fig. 3.20).[11] This map is dated to July 1857 and features two ship symbols in the centre of Särkänsalmi. The ships are marked as destroyed. The map was made after the war, and it established the importance of building caissons starting from shorelines and leaving the centre of the channel open to be blocked only when necessary. Were these ships really already cleared, as stated on this specific map? The profile of Särkänsalmi is steep, and it is also deep. It is possible that the blockships no longer affected the waterway in 1857. Their upper parts could have been demolished already before the actual salvage operation took place after 1862 (see section 3.4.6).

[11] Translated from Russian by Alexey Kraykovskiy in July 2013. The photo of the map is available at the NBA.

After the Allied fleet bombarded Sveaborg in August 1855, Admiral Jakob A. Shihmanov reported to the Governor-General of Finland, Friedrich Wilhelm von Berg.[12] The report states that there were altogether 42 ships at Sveaborg when the bombardment began. Two ships burned, three were towed onto land as useless, and eight cannon sloops (in Russian, *kanonerka*) were scuttled between Särkkä and Vanha-Räntty.[13]

The surviving Russian fleet sailed behind the protective cannons of Krasnaya Gorka and Kronstad, and land troops took over Sveaborg. From this time on, the fortress served as barracks for a long period (Homén 1936:128).

3.4.5 Salvage of ships after the Crimean War

It was quite common for a military ship to serve in a secondary role after being decommissioned and before it was finally broken up. Many ships were decommissioned and hulked or broken up at the Sveaborg Navy Yard, located at Katajanokka in Helsinki. The conversion of ships for secondary roles started at the shipyard as early as 1831. The information regarding these ships is collected from a catalogue of Russian warships from the Age of Sail (spanning 1696–1860; Tredrea and Sozaev 2010), and the websites of the Russian Navy. However, the officers' correspondence in the archival material reveals a slightly different story compared to the catalogue, which is based on official records.

For example, in the official records only one ship (*Tvertsa*) was reported to have been scuttled as a blockship in July 1855 (Tredrea and Sozaev 2010:382).[14] However, the correspondence between the

[12] Translated from Russian by Heidi Pekander, 13 November 2011.

[13] One cannon boat had been scuttled in the strait between Harakka and Uunisaari. Further to the west, there were scuttles in straits between Lauttasaari (Drumsö) and Sveden (Svedö?), and one between Sveden and Leven (Levö?). The modern identities of Sveden and Leven are not known, but information suggests they were west of Sveaborg.

[14] *Tvertsa* was one of the Baltic fleet transport ships. It was laid down (construction began) on 30 August 1840 and launched on 24 May 1842. It sailed from Arkhangelsk to Kronstadt in 1842. The vessel carried cargo in the Baltic from 1843 until 1853. It was stationed at Sveaborg with the main fleet from 1854 to 1855 (Tredrea and Sozaev 2010:382). It is not known in which strait *Tvertsa* was eventually scuttled. It might be one of the unidentified wrecks of Haminansalmi. It might also be in the narrow inlet between Susisaari and Iso Mustasaari, between the bays of Tykistölahti and Varvilahti. However, there are other options too, and the question cannot be resolved within the scope of this study.

officers reveals the scuttling of at least five more ships. In the official records, these other ships were just marked as Broken Up (BU). That marking usually meant that all the materials of the ship were either reused or recycled in pieces. It is very surprising to find remains of these ships in the underwater landscape; BU ships were not necessarily demolished completely, but could also be converted into a secondary role less visible in historical records. Decommissioned ships could become fire watch ships to guard the area against fires. They could be converted into restaurants. Ships could also be used as accommodation vessels (in Russian, *plavkazarma*), as there were not enough barracks to house all the troops at Sveaborg. In times of war, they could become hospital ships. The ship *Tsesarevits* was moored to block Haminansalmi during the Crimean War, but afterwards it was retired and turned into floating storage (Tredrea and Sozaev 2010:402).

It is apparent that when a ship was converted into a blockship, its rigging was removed, in addition to cannons and, at least partly, the copper sheathing. The ship went through an involved process, and during this change from a floating weapon into a scuttled blockship, the name of the ship was changed to an impersonal number.

3.5.6 Salvaging of blockships in the 1860s

It is not known when the Suomenlinna straits were reopened for traffic, and it is unclear who was responsible for those actions. A typical time for the removal of obstacles was right after a conflict. However, after the Crimean War, there were other restless periods, such as the revolt in Poland (January Uprising 1863–1864). Sveaborg was to be prepared for new confrontations.

Within this study, newspaper articles[15] and other published contemporary texts, archival material, and archaeological data have all been used to draw a general picture of the salvage operations. Significant changes have occurred during the 160 years of activity at the fortress following the end of the Crimean War. These changes, as well as the fact that information about the closing of straits has been restricted

[15] The author found the newspaper clippings first in the archives related to the underwater finds of the NBA. The information had ended up in the archives through the activity of a volunteer diver, Juha Hakala, who found these news clippings in 2009 in the electronic archives of the National Library. With this information, the author could relocate these old newspapers in the National Library's Digital Collections (http://digi.lib.helsinki.fi/sanomalehti/).

as a security issue for the city of Helsinki, create challenges for the interpretation. These factors affect the way archival material has been created and preserved.

Salvage was a lucrative business in the 18th century, and a company called Norra Dykerikompaniet ('Northern Diving Company', founded in 1729) was granted salvage privileges for 20 years. This company was merged with another firm called Södra Dykerikompaniet ('Southern Diving Company') in 1802. The diving business became a free enterprise after 1831 (Hoving 1949:20–21).

After the Crimean War, a new company, Helsingfors Dyknings AB ('The Helsinki Diving Company') was founded in 1862 by a group of merchants from Helsinki, J.M. Tollander, T. Chechulin, Gädd, Sergejeff, and a shipbuilder called Jakobsen (also seen as Jakobbson). It was to become a company that could conduct large-scale diving operations in Finland, and initially it dealt especially with the scuttled ships of the Crimean War (Hoving 1949:24). None of the owners had any previous experience in the salvage business; however, they did have an understanding of shipbuilding and seafaring.

Tollander was a very prominent businessman, a merchant, and a consul. He was the co-owner of the Tollander & Klärich tobacco company. In addition, he owned an eighth of the shares in a sugar company in Töölö, Suomen Sokeri Oy. He was also involved in a light gas plant, a new field of industry. Chechulin was one of the many Russian merchants who settled in Helsinki in the 1850s and 1860s (Kovero 1950: 453–454 457, 510, 546, 560, 567). He is mentioned as one of the shareholders in the Valkosaari shipyard in Helsinki from 1854 onwards (Kovero 1950:546). In 1856, he owned the steamship *Tschajka*, which travelled between Helsinki and Porvoo. Immediately after the war, it was the only steamship in the ship register of Helsinki. Chechulin was also involved in a paint factory until its closure in 1861 (Kovero 1950:553). The shipbuilder Jakobsen had moved to Helsinki from Denmark. He brought with him new ideas for shipbuilding and was a highly-respected specialist. He started his business at the shipyard in Hylkysaari, but later moved to the shipyard in Ullanlinna (Kovero 1950:477, 553, 546).

The profits from the salvage operations could be considerable, as revealed by a report of one operation conducted by Helsingfors Dyknings AB. Zachris Topelius, a famous Finnish author, reported on the rescue of a British steamship with a cargo of talc. The ship ran

aground near Pellinki island, in front of Porvoo, east of Helsinki, and the salvage operation was worth 120,000 Finnish marks, which would be close to half a million euros in modern times.[16] It is not known how profitable the salvage operations of the scuttled vessels of the Crimean War were, but the company was able to order a special steamship from Britain, called *Neptun,*[17] for towing and salvage operations (Hoving 1949:24).

Newspapers in the 1860s reported on the cleaning of the straits by the new company. Helsingfors Dyknings AB made a contract with Russian authorities to clean up the sailing obstacles and gain 50% of the profits. They hired a diver and diving gear from St Petersburg, and thus a helmeted diver worked in Finnish waters for the first time.

The process begun at Haminansalmi in August 1862, and the idea was to clear all scuttles from the previous war around Sveaborg (*Folkwännen* no. 33, 13 August 1862). The merchants leading the project had the idea of bringing along two other divers from St Petersburg to teach Finns how to do this kind of work. An older method, a diving bell, was also used (*Sanomia Turusta* no. 34, 22 August 1862). The sailing obstacles could also be removed by blowing them up with gunpowder (*Suomen Julkisia Sanomia* no. 62, 18 August 1862).

The new diving method interested the newspapers, and reporters explained the process in a certain amount of detail: how the air was pumped into the diver's helmet and how the rope signals were used. The diver worked from three to four hours at a stretch (*Sanomia Turusta* no. 34, 22 August, 1862; *Mikkelin Ilmoituslehti* no. 35, 30 August 1862).

The diver worked at Haminansalmi removing stones and iron bars from the vessels, thus making it lighter (*Helsingfors Dagblad*, no. 183, 11 August 1862).[18] The task was to lift the hull back to the surface in one piece. The way in which the salvage operation proceeded is

[16] Converted into euros in 2006, this sum would be €508,620. The sum in 1860 is multiplied by 4.2385 (http://www.tilastokeskus.fi/til/eki/2006/eki_2006_2007-01-17_tau_001.html).

[17] The maiden voyage of *Neptun* from Britain to Finland was a genuine challenge. The crew ran out of coal and had to burn everything, including their own bunks. Luckily they also had a cargo of elm and ash tree planks. Eventually, they made it to the ship's new home harbour, Helsinki (Hoving 1949:24).

[18] Although there are two wrecks at Haminansalmi today, originally there appear to have been three of them. It cannot be stated for certain whether one of the wrecks was lifted, as described in the newspaper. At least salvors continued collecting material from the wrecks at Haminansalmi, and a storage cabin on the closest island was reserved for the process.

not known, since the news value for the media diminished when the process ran on without problems. In addition, these actions took place in a military area controlled by the Russians, and not all information was available to the public. Unfortunately, the project ended badly, as a diver was killed in a diving accident after becoming entangled with the rope (*Hämäläinen*, no. 47, 21 November 1862). At that time, a rope was the only channel of communication between the diver and the surface team.

Luckily, a file preserved in the National Archives of Finland (no. 15185) deals with the removal of the sailing obstacles. The 18 documents consist of correspondence between different authorities between November 1861 and October 1863. These papers reveal a great deal more of the operation than the newspapers.

The leaders of the engineering committee wrote the first letter (no. 2308) to the military engineer A. Krauzold, describing damage caused by a hard wind. One of the blockships in Susisaarensalmi has lost its aft part. It floated into the nearest bridge and caused enough damage to require costly repairs. The incident had occurred during daytime, and men were able to hold on to the bridge for reattachment. Parts of the same blockship also destroyed gangways of another bridge. The committee also expected that more parts of these ships could come loose and cause damage in the future. For this reason, removal of the remains was suggested.

This problem was discussed as early as 1854. As the scuttling had been a wartime event based on a command from the troop leader (no. 2286), the original order had to be withdrawn so that the blocking could be dismantled. On 10 January 1862, Colonel Bredov sent letters to his superiors asking for permission to remove the blockships. He received a positive response by letter on 17 February 1862 (no. 113), and he announced that permission to remove the sailing obstacles had been granted. On the same issue, there is a letter from the shipbuilding department to the commander of the fortification dated 2 March 1862 (no. 2670). They had received an application from a company called Hydrostat (in Russian, *Gidrostat*) to remove the sailing obstacles. It was recommended that Hydrostat or some other company remove the obstacles. More information on Hydrostat is not available, but it seems like there was competition for the salvage operation.

Several months passed until the problem became relevant again: a letter to Colonel Krauzold in the fortress from 23 June 1862 (no.

1065) described an agreement made with Tollander and Chechulin, of Helsingfors Dyknings AB, to remove the sailing obstacles. According to the application, Tollander would be in charge of Särkänsalmi and Chechulin in charge of Susisaarensalmi and Haminansalmi. Several letters and their copies to different officers describe the bureaucracy involved, but offer little information on the scuttled vessels.

Luckily, an application made by Tollander requesting storage space to keep the lifted material in good shape has been preserved. This specific document finally connects the new names of the blockships to the original vessels. Tollander's contract for lifting the blockships was signed on 14 June 1862, and he contemplated salvage of Blockships no. 9, originally a ship named *Retvizan,* and no. 10, originally named *Arsis*, from Särkänsalmi, and of one smaller vessel from Uunisaarensalmi.[19] The application reveals that Tollander would receive half of the material recovered from these vessels, such as wood, and various metals. Tollander promised to deliver half of the copper to the Sveaborg Navy Yard at Katajanokka.

Further correspondence (file no. 15202) describes the continuation of the salvage operation. Work began on 20 June 1862 and continued until July 1862. Scuttled vessels were lifted from Särkänsalmi, Susisaarensalmi, and Haminansalmi. The discussion involved many aspects of the work; for example, the head of the harbour wanted to set up clear working hours, which changed according to seasons. Sveaborg was, after all, a military area, and the contractors needed to be supervised.

Further correspondence in January 1864 enquired whether the salvage of blockships *Oryol* and *Leipzig* was already completed. The response is dated 13 January 1864 (no. 113), and it explained that the work was still going on. There is also a convincing description of how this salvage operation did not prevent the simultaneous building of new blockages. On 30 April 1864, an announcement is made by T. Chechulin and J.M. Tollander, explaining that they had accomplished the salvage operation of the blockship *Leipzig*. Later, it was confirmed that *Oryol* had also been salvaged.[20]

This correspondence reveals the origins of the blockships and enables applying the life history approach. The lives of these ships did not end

[19] Between Harakka and Uunisaari, one strait west of the strait of Särkkä–Vanha-Räntty.

[20] In one letter (no. 1187, 13 July 1862), Tollander is asked how long he will need the storage space. He replies that there is an agreement to salvage the material by the end of 1865, and drying the wood could last until 1866. In another letter, it is

with being broken up, as the official records maintain. Instead, they were converted into blockage vessels and scuttled at Sveaborg during the Crimean War. Furthermore, the ships were salvaged in the 1860s and were a significant part of the economy of Helsinki.

Details on the salvage process and its profits can also be gleaned from various sources. When Helsingfors Dyknings AB removed the ships from the straits, they had been lying in underwater surroundings for at least seven years. They were already old vessels when they were scuttled, which the salvors certainly knew. The aim of lifting the vessels was not to return them to seafaring; instead, the salvors were interested in the materials these ships contained. The copper sheathing of the hulls was probably regarded as their most valuable part. Other materials that could be expected to be lifted were iron, lead, and, most importantly, wood. The durability of black oak made it popular as a craft material in the 1860s, although the company must have known that the wood used in these vessels was pine. Still, the wood was an opportunity to make some profit.

A variety of methods could be used for lifting the scuttled blockships. No eyewitness descriptions of the operations are available, but evidence points to the practice of multiple methods. The newspaper reports mention that at least a diving bell and a diver were used to empty the heavy ballast used for scuttling and then to raise the ship to the surface. It has also been suggested that some of the blockships were demolished with explosives because they could not be lifted (Homén 1936:120–121).[21]

The faith of the salvaged materials can also be inferred by following their trail in the written sources. Helsingfors Dykeri AB ('Helsinki Diving Company') — formerly known as Helsingfors Dyknings AB — announced an auction in the newspaper *Hufvudstadsbladet* on 20 February 1873. The items were to be sold at the shipyard of Ullanlinna on 1 March 1873. The most prominent item was the steamship *Neptun*, in addition to 'other property, mostly salvaged equipment of vessels,

explained that contractors need space to build their storage rooms, in addition to storage space which they already have on different islands, at least on Kuninkaansaari (in Swedish, *Kungsholmen*; two cabins close to the battery no. 1), and on Särkkä (no. 11).

[21] Underwater explosives were already in use during the 18th century. Black powder was used despite the fact that it got wet easily, becoming unusable. A more efficient method was introduced when nitroglycerine was invented and dynamite could be used (Alopaeus, pers. comm. 2013).

for example, a large amount of chains, big cables, boats. Also shipyard tools, office furniture, like a strongbox in good shape, a table, and other materials'.[22] It cannot be determined whether these materials came from the blockships of Sveaborg. Several other announcements of the auction mention that diving equipment, pontoons, storm pumps, and a barge with a crane were to be sold (*Hufvudstadsbladet*, 2 February 1873). The company had sold materials in public auctions earlier. For example, in 1866 at an auction at the shipyard of Helsinki, the company sold '3,000 lispund of old ropes, 30.1 lispund of hemp, and 26 lispund of chains' (*Hufvudstadsbladet*, 8 August 1866).[23] The date of this auction perfectly matches the schedule presented in Tollander's letters — he needed to rent storage space until 1866, when the materials were expected to be dry. However, as the biggest sale item in 1866 is old rope, it is not certain whether this material came from the salvage of the blockships.

The owners of Helsingfors Dykeri AB were also involved in the shipyard of Ullanlinna, which could be another reason for them to be interested in waterlogged wood. However, Helsinki was regarded as a good location for shipbuilding because of good access to new wood material. This availability is confirmed through an advertisement by the Ullanlinna shipyard published in 1847 in *Helsingfors Tidningar*, maintaining that ships of all types can be built and repaired, no matter what kind of wood they are made of — oak, pine, or spruce. The advertisement also stated that the shipyard had enough wood in storage to build even larger vessels, and that their skilful workers were capable of building modern vessels. Although the advertisement is dated 15 years before the salvage operation, it seems likely that wood from the blockships was not really needed at the shipyard. It was probably dried and sold as firewood.

After the salvage operations in the 1860s, scuttled wrecks remained in many of the straits. In May 1918, the Finnish Maritime Administration contacted the salvage company Neptun to hire equipment. They wanted to lift scuttled vessels out of Finnish waters and to clean up the harbour areas. However, Neptun needed its vessels itself and did not

[22] '…försäljes derjemte annan, samma bolag tillhörig egendom, bestående förnämligast af inventarier för fartygsbergning, f.f. större partier ketting, stora trossar, båtar m.m, äfwenson warfswerktyg, kontors möbler, hwaribl. 1 kassaskåp i fullgodt skid, pulpet m.m., samt diverse annat.' Translation by the author.

[23] '3,000 lu gammalt tågwirke, 30,1 lu hampa och 26 lu ketting'. 1 lispund = 8.5 kg (Nordisk familjebok 1912:754).

hire them out (Hoving 1949:57). From the perspective of archaeological research and protection, it is fortunate that the cleaning process was slow and left many of the sites intact and preserved until modern times. Nevertheless, it is interesting to see how differently the general development of these sites can be interpreted based on historical records in comparison with the evidence observed in the underwater landscape during the archaeological survey.

3.4.7 The archaeology of the Suomenlinna straits

The archaeological sites of the three straits discussed here — Särkkä–Vanha-Räntty, Särkänsalmi, and Susisaarensalmi — have never been recorded thoroughly. The following descriptions combine previous studies with data from written sources and the multibeam sonar, to represent the underwater landscape and understand the relationships between the various remains.

The strait of Särkkä–Vanha-Räntty

The strait of Särkkä–Vanha-Räntty has a long and complex site formation history featuring many phases. There are only a few traces of the scuttled vessels remaining in the modern underwater landscape. Ships were used to block the waterway, but it is unknown whether the strait was ever cleared or salvaged. Remains from different time periods were later used as a foundation for a seawall, built between the two islands of Särkkä and Vanha-Räntty. It was a perfect spot for a breakwater to form a sheltered bay, and the waterway was not important for traffic; the next strait, Särkänsalmi, was more suitable for that purpose. The modern breakwater features an accumulation of almost 300 years of archaeological material, such as wooden wrecks and caissons. At least eight cannon sloops were scuttled in the area. After the Crimean War, two blockships were scuttled into Särkkä–Vanha-Räntty in 1863–1864, together with several wooden caissons to assist with the blocking (see SÄ128).

Many maps from the Swedish period are available, but their purpose seems to have been to record future plans and not the current situations. One structure, a wooden caisson filled with stones, has been marked in Särkkä–Vanha-Räntty to the period of Isoviha (1714–1721) ('the Great Wrath', a component of the Great Northern War). In the military archives of Sweden (KrA), there are several maps from Helsinki dating to the time before the fortress. A map made for seafaring

reveals a caisson (in Swedish, *stenkista*) in Särkkä–Vanha-Räntty, as well as in Haminansalmi and Kukisalmi, built by the Russians in 1720 (Hydrografiska kartor, Sjökarteverket). The map can be considered a reliable source because of its purpose — knowledge of correct water depths was important for navigating safely. However, these caissons have not been found in the archaeological fieldwork, and have most likely been covered by later structures. It was only at the time of the Crimean War when the waterways became a safety issue — the cannons of the fortress were already old-fashioned and protecting the fortress required new methods.

The need to build a breakwater arose in the 1950s. The Olympic Games were held in Helsinki in 1952, and the sailing competitions required a sheltered place for the vessels. This international event led to the building of a breakwater from concrete and stones. No documentation of any archaeological remains was made at that time.

In the 1970s, Särkkä–Vanha-Räntty was used as a landfill for the stone material produced in the widening of Kustaanmiekansalmi. This time, the underwater landscape was surveyed before the landfill was made. Alopaeus conducted a diving survey in 1975, found six wooden wrecks, and made a general map of the area (Alopaeus 1984:27).[24] These wrecks were filled with stones, suggesting that they might be six of the eight cannon sloops scuttled in the strait during the Crimean War.

However, at that time, Alopaeus could not identify the type of the vessels, as only the heads of the wooden frames were visible under the stones. The renovation of the breakwater may have covered the two missing cannon sloops. The intention was to preserve the wrecks discovered in 1975, but stones later covered at least three of them. New technology has also been used in studying Särkkä–Vanha-Räntty, but the area is too shallow for a successful side-scan sonar survey. It is also very difficult to detect wrecks if the only visible parts are the ends of the frame. The same problems also affected the multibeam sonar interpretation.

Based on all the data gathered, Särkkä wreck 1 (ID 1286) could be interpreted as one of the cannon sloops. The remains of the wreck contain beams, which could be interpreted as having supported the cannon. Särkkä wreck 2 (ID 1287) is not intact and seems to have a lighter structure than wreck 1. It is also partly under the breakwater

[24] More recently, Alopaeus has suggested that there might be a small peasant vessel among these wrecks. (Alopaeus 1984:27; Alopaeus pers. comm. 29 August 2013).

and difficult to interpret. Särkkä wreck 3 (ID 1288) is poorly preserved, and it cannot be determined whether it could be one of the cannon sloops. Särkkä wreck 5 (ID 1000019999) was discovered in 2011 with side-scan sonar. It could be only a large piece of a wooden vessel. The site Särkkä Caisson and Wreck (ID 2682) also contains a caisson in addition to a wreck. This could be interpreted as a blockship dating to the period after the Crimean War (Paanasalo, pers. comm., September 2013). The old drawings in the VeSA collection at the National Archives of Finland offer one illustration of Blockships no. 1 and no. 2 (SÄ128) (Fig. 3.21). It seems that these vessels were not recycled old vessels, but built especially for the purpose of blocking a waterway. At least two different plans in the same collection depict the way these two blockships should be located in relation to the shorelines and caissons (SÄ128b and YP155).

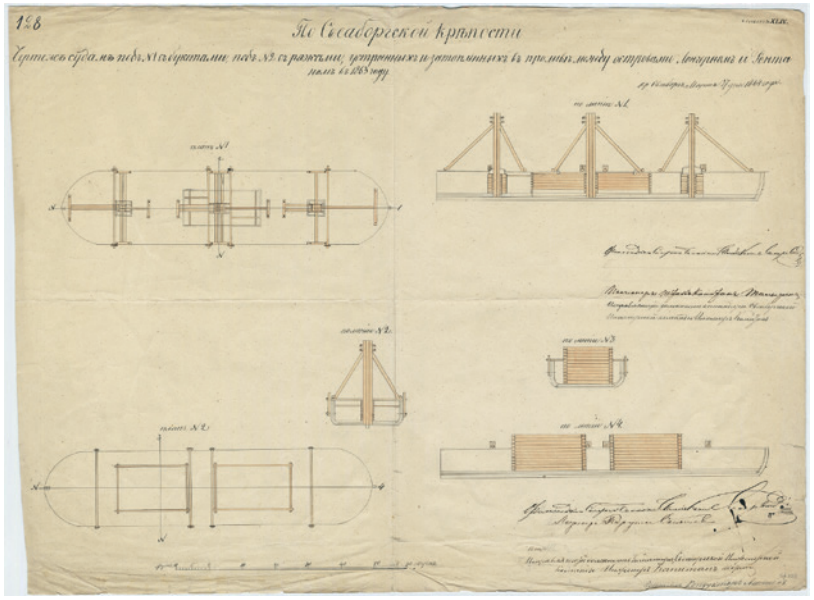


Fig 3.21. The drawing of a special type of a blockship (kasuuni), which was scuttled between the islands of Vanha-Räntty and Särkkä after the Crimean War (VIK collection SÄ128/The National Archives of Finland).

Blockships that were scuttled during the Crimean War were numbered from 6 to 10. However, ships numbered 1 and 2 were scuttled into the strait of Särkkä–Vanha-Räntty only after the war. This new numbering, starting again from the beginning, might point to the

interpretation that there was a difference to previous blockships. Nevertheless, they were scuttled at the time when previous blockships from other straits were removed and replaced with log caissons. Alopaeus mentions that another type of vessel was used for scuttling later, calling them *kasuuni*, which could be translated as a floating caisson, one version of a blockage ship. According to Alopaeus, these ships were anchored near their scuttling location, ready to be submerged if necessary (Alopaeus, pers. comm. 2013). It seems that the Blockships no. 1 and no. 2 were eventually scuttled.

Särkänsalmi

Särkänsalmi, with its steep and deep profile, busy water traffic, and poor visibility, has been a genuine challenge for maritime archaeology during the last 30 years (see Alopaeus 1984:31). Archaeological endeavours have been related to various kinds of water supply works and results depended on their locations. For example, the secondary water supply for Suomenlinna, established in 1929, runs through this channel (Silvast 1968:113). The pipeline is located 400 metres to the northeast of the sailing obstacles, and it was studied by diving in 1983 with no particular results (Alopaeus, pers. comm. 15 January 2014). A few years later, several wreck elements and a wooden caisson were found in the strait. Work was conducted by the Teredo Navalis society during the 1980s. The Särkänsalmi eastern caisson (ID 1307) is almost 100 metres long and four metres high and filled with stones. The Särkänsalmi western caisson (ID 1306) is a similar structure, but shorter than the eastern caisson (Paanasalo 1992).

In the late 1990s, the water lane through Särkänsalmi was to be dredged to meet the needs of modern water traffic. An archaeological survey took place in 1998, including side-scan sonar, inspection dives, and several dendrochronological dating samples of sites (Laitinen 1999). A group of experienced divers from Baltic Eye Ltd carried out a partial recording survey of the sites. Piles of wreck parts three to four metres high were found, but poor visibility made the documentation almost impossible with the technology available at that time. Some individual wreck elements could be measured, and the biggest knees were two metres long. The width of the deck planking was 16–17 cm, and its thickness varied from 8.5 to 10 cm (Laitinen 1999). In addition, elements indicating a ship with two decks could be observed. The piles reported

by the divers are likely connected with a salvage operation or perhaps even multiple operations. The method of salvage remains unclear.

The actual dredging operation of the 1990s resulted in a load of waterlogged wood on dry land (Länsi-Mustasaari shipwreck elements, ID 2105). These wreck elements were analysed in January 2000, and it seems likely that they were parts of a floating bridge construction made of coniferous trees. Not a single element of a wreck could be found in the pile (Alopaeus, pers. comm. 29 August 2013). There was a construction plan (E521) for this type of bridge, which means that the analysis seems to be correct.

Fig 3.22. The sailing obstacle was made of logs after the Crimean War. Scientific diver Ville Peltokorpi in front of the wooden construction (Maija Huttunen 2011, MA201102:97/National Board of Antiquities).

In 2010, the pipes were to be replaced due to old age. It was unknown what was left of the archaeological remains in the strait after the dredging in the 1990s, so a new archaeological survey was carried out. Side-scan sonar was used, but the results were not clear due to disturbing waves and the problematic underwater topography (Tevali 2010). At the same time, the maritime archaeological survey of the Suomenlinna water area was underway as part of this study, and multi-beam sonar could be used on the pipeline project. With a 3D image, it was very easy to see what was still preserved, and renovation of the pipes could be planned in such a way that the archaeological remains

were not harmed. Before the pipes were replaced, the eastern caisson was documented by video and photographs (Fig. 3.22).

Remains of at least two caissons at opposing shores of the strait and two different wrecks are preserved in Särkänsalmi, and they all seem to be related to the closing of the passage. Thanks to the multibeam sonar survey and the reports from previous fieldwork, the appearance of the landscape is known (Fig. 3.23). The wrecks have been demolished and ripped off with great force. Part of a deck structure positioned upside down has been recognized under several different types of wreck elements. At least three small admiralty anchors, which could have been used in the process of removing the wrecks, have been found. Dendrochronological analysis reveals that the two wrecks were of different origins. Särkänsalmi shipwreck 1 (ID 1308), which is located closer to Länsi-Mustasaari, is made of pine originating from northern Europe. This could be Blockship no. 9, which is identified as an Ezekiel-class ship called *Retvizan*, built in Arkhangelsk. Särkänsalmi shipwreck 4 (ID 1289) was built of wood from Eastern Karelia and the northern part of Lake Onega in Russia. It is probably Blockship no. 10, identified as a ship called *Arsis* built in St Petersburg. It is also an Ezekiel-class ship, like the other blockships at Särkänsalmi (see also section 3.4.8).

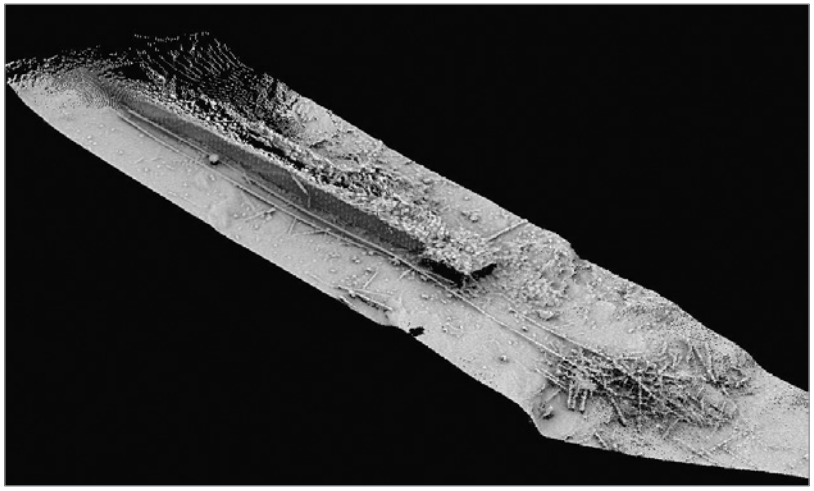


Fig 3.23. The multibeam data shows the wooden caisson, which is 100 metres long and some three metres high. In front of the caisson are the remains of one of the salvaged blockships (Ville Peltokorpi, Meritaito Ltd, courtesy of the Governing Body of Suomenlinna).

In addition, there is an interesting case of a stock anchor (Särkänsalmen ankkuri ID 1328). The anchor has been raised and set into a public place in the southern part of Helsinki, in Katajanokka (Fig. 3.24). It was found on the seafloor in Särkänsalmi in 1977 with one arm in the seabed. There was also a smaller anchor attached to its ring, indicating a previous unsuccessful salvage attempt. Diver Juhani Virkkunen lifted the anchor, and it was placed in its current location in front of a ferry terminal. The anchor has been linked to the *Hesekiel*, which was moored in the strait during the bombing of the Crimean War.

Fig 3.24. The anchor lifted from Särkänsalmi is placed in front of a ferry terminal at Katajanokka, in the city of Helsinki (photo by the author 2014).

Susisaarensalmi

Susisaarensalmi is a narrow channel with very active water traffic and, for that reason alone, it is difficult to approach by diving. Consequently, few underwater surveys have been conducted there. Some archaeological remains are known despite this. The Länsi-Mustasaari caisson (ID 2099) was found in the 1980s, but it has not been dated. The caisson is made of logs with an approximate diameter of 35 cm. It is six metres long, three metres wide, and three metres high, and located at a depth of five metres. Since its discovery, the caisson has suffered from dredging operations, and no inspection dive could be made at the site during this study's survey. This caisson most likely dates to the period after

the salvage operation in the 1860s. Plans to build this caisson have been preserved, and it is also referred to in Sorokin's correspondence, as the letters state that 'the ongoing salvage does not interfere with the building of caissons'. In addition, there are remains of wooden vessels, mainly different types of wreck elements, some of which were found and photographed in an inspection dive in 2011 by local diver and a boat specialist Tero Tankka. However, they were already observed by divers in 1989, but were considered uninteresting (Roth 1989). The remains may originate from salvaged blockships from the Crimean War, possibly parts of the Ezekiel-class ships *Oryol* and *Leipzig*, which were salvaged almost completely in the 1860s. It seems that only these few loose elements still exist.

3.4.8 Biographical approach to Ezekiel-class vessels

All four identified blockships — *Retvizan, Arsis, Oryol* and *Leipzig* — have interesting life histories. They belonged to the Ezekiel class, which consisted of 25 vessels. This class represented a traditional ship of the line with 74 guns and two decks, and it is regarded as the last class of wooden sailing warships (Fig. 3.25). While British, French, and American navies concentrated on building bigger vessels, Russians saw the benefits of this type of ship, especially in the shallow waters of the Baltic Sea (Tredrea and Sozaev 2010:225).

The building process of these frigates was faster than that of their predecessors due to technological developments. Starting from 1832, prepared moulds were used to harvest forests for suitable sections for a ship's hull. This method saved time at the shipyard, and the length of the construction period was reduced to an average of two years; previously it could range from one to seven years. In addition, instead of being slowly rafted down local rivers, wood was transported by cargo vessels or by roads. New ways of transportation also eliminated the problem of premature dry rot, caused by freshwater contamination of the floating logs (Tredrea and Sozaev 2010:225).

Innovations also meant that the lifespan of this class was 20 percent longer than those of its predecessors. The Ezekiel-class ships served long careers in a variety of roles, but despite the advanced building process, they were technologically too old-fashioned to be used successfully in naval encounters. In the 1850s, three of the Ezekiel-class ships were cut down to frigates and corvettes, but ended up serving as blockships in defence of Kronstadt in 1855 (Tredrea and Sozaev 2010:225). Four

of the Ezekiel-class vessels can now be identified as having been used as blockships at Sveaborg.

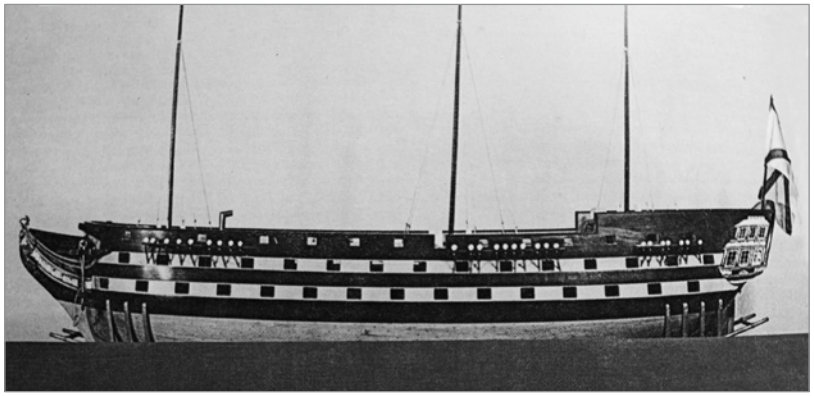


Fig 3.25. The Ezekiel class consisted of 25 vessels, and represented a traditional ship of the line with 74 guns and two decks. It is regarded as the last class of wooden sailing warships of the Russian Baltic Fleet. Model of Azov on exhibition at the Naval Museum of St. Petersburg (Tredrea and Sozaev 2010:226).

Retvizan was scuttled in Särkänsalmi in July 1855 as Blockship no. 9. It was built in Arkhangelsk under the supervision of shipwright V.A. Ershov. Its keel was laid down on 21 May 1837, and it was launched two years later. Its dimensions were 178 ft x 48 ft (54.2 m x 14.6 m), and it was armed with cannons. *Retvizan* sailed its maiden voyage from Arkhangelsk to Kronstadt in 1839. It sailed in the Baltic Sea and the North Sea in the 1840s and was used in the protection of Denmark against the Prussians during the First Schleswig War (1848–1851).

The ship was decommissioned in 1851 after 12 years of active service. It was hulked at Sveaborg in 1852. The name of the ship was recycled, and the next *Retvizan* was a steamship built in St Petersburg in 1854–1855 (Tredrea and Sozaev 2010:228).

After decommissioning, the ship disappears from the history books, but the end of its life history can now be reconstructed. *Retvizan* was taken to the Sveaborg Navy Yard, renamed and converted to its secondary role, as a sailing obstacle to protect Helsinki and Sveaborg from the invasion of the Anglo-French Fleet during the Crimean War. After the war, its remains were partly salvaged and probably sold at a public auction. Today, *Retvizan* is a protected wreck site, Särkkä wreck 1 (ID 1308).

The second ship, *Arsis*, was scuttled in Särkänsalmi in July 1855 as Blockship no. 10. It was built in St Petersburg under the supervision of shipwright V.F. Stoke. Its keel was laid down on 30 November 1827, and it was ready to be launched after only eleven months of construction. The dimensions of the ship were 179 ft x 47 ft (54.5 m x 14.3 m), and it was armed with cannons. The name of the ship celebrated a Russian victory of 1814 during the War of the Sixth Coalition against Napoleon. The ship cruised in the Baltic Sea on many occasions in the next two decades. It was grounded and repaired in Turku, Finland in 1833, as well as repaired again in 1837–1842. It also sailed in the North Sea in 1844 and 1847. Like *Retvizan*, *Arsis* participated in the First Schleswig War. It served as a floating battery in Sveaborg in 1854.

According to maritime historical records, the ship was broken up in 1857 at the age of 29 years (Tredrea and Sozaev 2010:228). However, this information is not correct: it now seems likely that instead of being broken up, *Arsis* was scuttled in Särkänsalmi. After the Crimean War, the remains were partly salvaged. Today, the ship is a protected wreck site, Särkänsalmi shipwreck 4 (ID 1289).

The third ship was called *Oryol*, which means 'eagle', and it was scuttled in Susisaarensalmi in 1854 as Blockship no. 6. The shipwright V.A. Ershov built the ship in Arkhangelsk. The keel was laid down on 21 December 1832, and the ship was launched on 21 May 1834. The dimensions of the ship were 178 ft x 48 ft (54.2 m x 14.6 m), and it was armed with cannons. Its name commemorates the 1831 victory over the Polish Rebellion. The maiden voyage was sailed from Arkhangelsk to Kronstadt in 1834. During its active career, the ship transported guard troops to Danzig in 1835 and cruised in the Baltic Sea in 1835–1842 and 1844–1846 (Tredrea and Sozaev 2010:230).

Oryol was decommissioned in 1846 and hulked at the Navy Yard in 1848. The ship was converted into a blockship, renamed Blockship no. 6, and scuttled as a sailing obstacle in Susisaarensalmi in 1854. In the 1860s, the ship was removed and salvaged. Its remains may have been sold at a public auction in 1866.

The last ship is *Leipzig*, which was scuttled in Susisaarensalmi during 1854. It was built in Arkhangelsk by the shipwright V.A. Ershov. The keel was laid down on 22 September 1834, and the ship was launched on 20 April 1836. Its dimensions were 178 ft x 48 ft (54.2 m x 14.6 m), and it was armed with cannons. The ship sailed its maiden voyage from Arkhangelsk to Kronstadt in 1836 and later cruised in the Baltic

in 1837–1838, 1840–1843, and 1845. It also cruised in the North Sea in 1844 and 1847. During the First Schleswig War, the ship sailed to Denmark to protect against the threat of Prussian invasion (Tredrea and Sozaev 2010:230).

Leipzig was decommissioned in 1849 and hulked at the Navy Yard in 1850. Instead of being completely broken up, it was converted into a blockship and scuttled as a sailing obstacle. In the 1860s, the ship was removed and salvaged. Its remains may have been sold at a public auction in 1866 together with the salvaged material of its sister vessel *Oryol*. However, there are some loose wreck elements in Susisaaren-salmi even today, and they could originate from these two ships, *Oryol* and *Leipzig*.

These ships of the Ezekiel class were decommissioned from active service and used in a secondary role for supportive tasks for several years. The correspondence of Sorokin and Lermontov reveals the value of dismantling and recovering different metals used in these ships: scuppers (a drainage hole on the deck) were made of copper, powder rooms were covered with lead, bread storage spaces were covered with zinc-coated iron, water barrels were made of iron, anchor cables were iron chains, and the wooden hulls were sheathed in copper.

Usually, the recycling and reuse took place in Kronstadt (Tredrea and Sozaev 2010). Some of the Ezekiel-class ships were broken up at Sveaborg, and ships called *Berezino*, *Krasnoi*, and *Ostrolenka* could also have been either dismantled and reused or recycled as a sailing obstacle there.

Ezekiel-class ships have not been reported as having been sold for demolition. It is now known that eight of the 25 ships were reused and recycled by being broken up (see Appendix 3). Four were scuttled as blockships at Sveaborg, and one, *Ingermanland*, suffered a shipwreck during its maiden voyage from Arkhangelsk to St Petersburg. The typical life cycle of an Ezekiel-class ship started by being built in Arkhangelsk, sailing in the Baltic Sea, and ending up recycled or reused in Kronstadt or as a scuttled blockship in one of the straits of Sveaborg.

3.5 Länsi-Mustasaari wreck 2 (ID 2694), a possible breakwater

Länsi-Mustasaari wreck 2 (ID 2694) is located on the eastern side of the island of Länsi-Mustasaari. It is located opposite to the island of Susisaari and the opening of the dry dock (Fig. 3.26). This site was

the only new wreck discovery of the survey conducted for this study, although at least one diver of the local coast guard station knew the location of the wreck beforehand. This study recorded the site, and the dendrochronological dating took place with funding from the Finnish Cultural Foundation (Figs. 3.27, 3.28, 3.29, 3.30 and 3.31). The site is in a sheltered bay. To the south, a narrow opening to the sea allows waves to enter the bay. Earlier, the area was called Satamalahti ('Harbour Bay').

Fig 3.26. The wreck (ID 2694) rests between the shoreline and the concrete beacon in Satamalahti ('Harbour Bay') (photo by the author 2014).

Fig 3.27. (right) Dendrochronological sampling of the wreck (ID 2694). The author is documenting the sampling spots (Maija Huttunen 2011, MA201223:15/National Board of Antiquities).

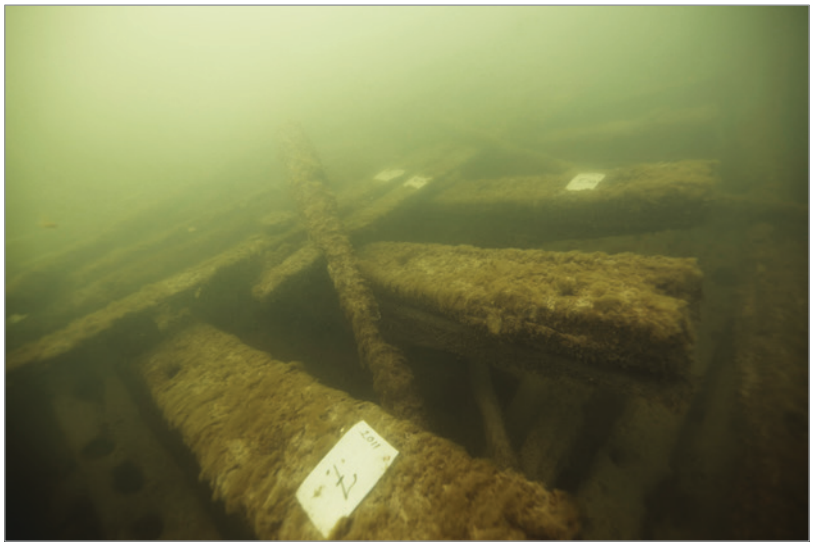


Fig 3.28. Dendrochronological sampling of the wreck (ID 2694). The frames and inner planking of the skeleton wreck (Maija Huttunen 2011, MA201223:16/National Board of Antiquities).

Fig 3.29. Dendrochronological sampling of the wreck (ID 2694). The author is documenting the wreck (Maija Huttunen 2011, MA201223:23/National Board of Antiquities).

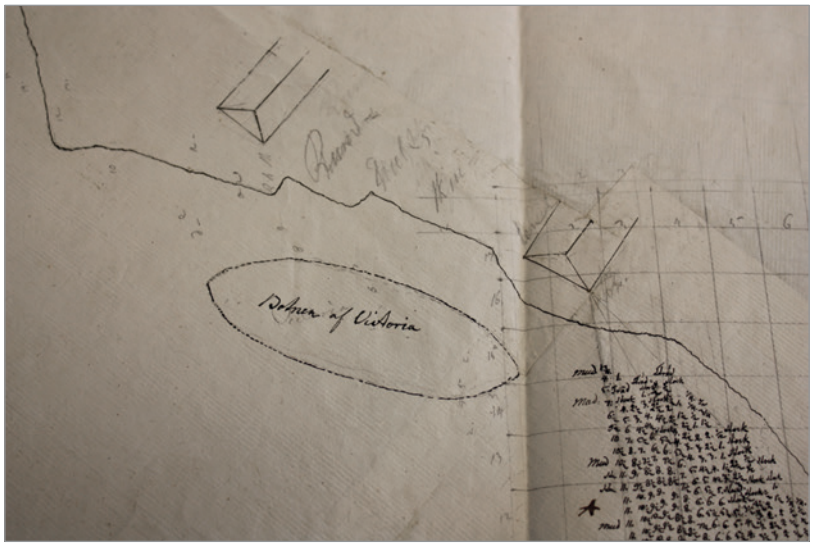


Fig 3.32. One of the possible identities for the wreck (ID 2694) is the barge Victoria (photo by the author 2010, original drawing Krigsarkivet, Stockholm: Nyland, no. 25, Kongl. Sjökarte arkivet).

The wreck stretches between a shallow bedrock skerry and the island of Länsi-Mustasaari. The stones inside the hull are too big and numerous to be ballast, and consequently could be interpreted as a placement strategy. The wreck points towards the island. Blocking up this location between the shore and the skerry could have created a sheltered area to the northern side of the wreck and is, therefore, an ideal place for a recycled vessel. This location seems to be a perfect spot for the foundation of a new jetty, which could have functioned as a seawall at the same time. If the scuttling was motivated by the idea of building such a structure, the jetty was never completed. However, the location, placement strategy, and position could indicate intentional scuttling.

The dendrochronological dating of the wreck started the search for its identification. The sampling of the wreck site took place during the winter of 2011. The author selected the sampling spots and marked them on the wreck. A team of volunteer divers[25] took the samples, and photographed and video recorded the sampling process. Senior specialist Pentti Zetterberg analysed the wood at the University of Eastern Finland. Preliminary dating results place the origin of the wood

[25] Maija Huttunen, Tero Tankka, Lena Avellan, and Ville Leino.

to the northern shorelines of the Baltic Sea. The last ring of growth is from the year 1780. This could indicate that the ship was part of the Swedish fleet and built for the needs of Gustav III's War (1788–1790). However, for the time being, this interpretation cannot be confirmed.

Fig 3.30. Divers Tero Tankka (left) and Maija Huttunen lifting up samples for dendrochronological dating (photo by the author 2011, MA201223:43/National Board of Antiquities).

Fig 3.31. (right) Dendrochronological sampling of the wreck (ID 2694). Some samples were lifted and sawed on top of the ice. Pictured: Lena Avellan (left) and Tero Tankka (photo by the author 2011, MA201223:48/ National Board of Antiquities).

The next question is, when was the ship recycled? If the Army Fleet was responsible for its recycling, there should be information on the auction of the rigging. With the dating results, the archival search could be limited to the time after the 1780s, and the archives of the Helsinki Auction Rooms were searched to find more information about the wreck. Students of maritime history at the University of Helsinki conducted the archival search.[26] Unfortunately, no new data regarding the wreck was discovered.

Another lead was a map, on which a ship called *Victoria* was marked in the water area close to the wreck site (Fig. 3.32). A 1795 newspaper clipping advertising the auction of 'lastdragare *Victoria*' ('barge

[26] The responsible teacher was Mikko Huhtamies.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Victoria') was discovered (*Inrikes Tidningar* 1795).[27] The ship was built in Pori (in Swedish, *Björneborg*), a coastal town in the municipality of Satakunta, Finland, within the region indicated by the dendrochronological results. Perhaps the ship never found a new owner and was consequently scuttled.

However, if the wreck at Länsi-Mustasaari were the remains of *Victoria*, it would have been less than 15 years old when it was put on sale. Barges usually had a longer use life. In addition, the list of ships of the fleet Army Fleet does not include a vessel by this name (Nikula 2008). There is one further lead that could help to solve the life history of this wreck: the Swedish fleet that surrendered in 1808 was kept at 'Harbour Bay' during the Russian period. However, this information comes from one source (Aaltonen 1968), which could not be confirmed within this study. If the information is correct, the ship could be one of the 110 vessels left for the Russians.

Evidence at the wreck site was gathered through intensive recording with new methods. The site was difficult to interpret and had poor visibility. An opportunity arose to test a modern technology in cooperation with VRT Finland and Meritaito. A scanning sonar device (by Kongsberg Mesotech) is typically used at different types of modern underwater construction sites, and during this test, it was used at a wreck site for the first time in Finland.[28] The operator lowered the scanning instrument down to the wreck site through small holes drilled in the ice. The technique aids in recording the wreck site more carefully (see Fig. 3.33). Kalle Salonen, a specialist in the documentation of wrecks, created a drawing based on the collected data. This information forms a basis for further analysis. The site is easily accessible from land and well suited for training future maritime archaeologists in the recording of wreck sites.

For the time being, this is a typical example of the research of a skeleton wreck whose identification is unknown. The future study of

[27] A warm thank you to Ph.D. Marcus Hjulhammar for finding this piece of information.

[28] Quite soon after this test, underwater scanning methods developed, and now an instrument called Teledyne-BlueView is available. It produces 3D point clouds with a better resolution than the multibeam method. This technique has been successfully used, for example, in Sweden with a wreck called *Mars* (sunk 1564) (Rönnby 2014a:45). In addition, photogrammetry took a huge step forward with a new computer program (Agisoft PhotoScan) during this study.

the site could lead to better understanding of the ship type, and that information could then be compared to archival material.

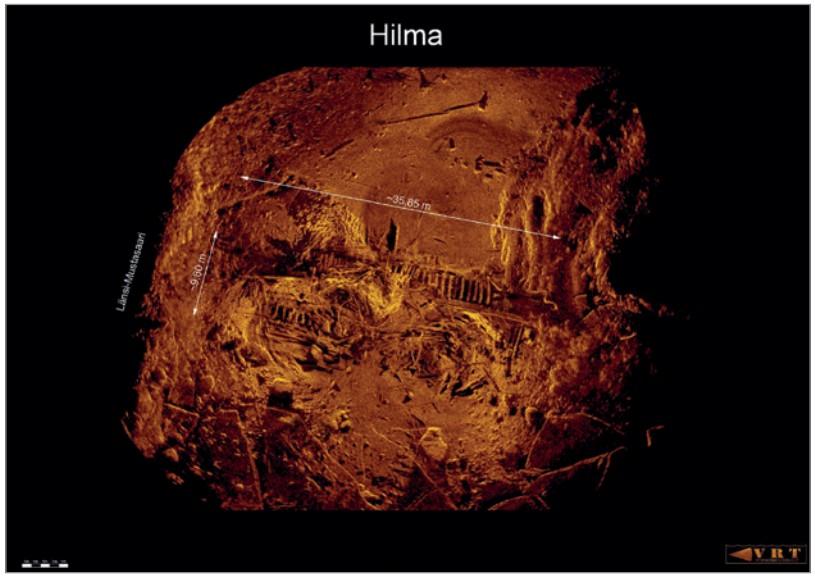

Fig 3.33. The wreck (ID 2694) was documented also with a scanning sonar (VRT Finland 2011).

4. Recycling practices in a maritime context

This chapter provides practical examples of recycling behaviour in a maritime context, presenting the long roots of these types of practices. The most typical way in which the recycling of ships is understood today is related to the International Maritime Organization (IMO) standard. In May 2009, the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships was adopted. The convention aims to ensure that ships do not pose any unnecessary risks to human health and safety or the environment at the time of recycling (IMO, Ship Recycling 2009).

This dissertation approaches the extensive field of maritime recycling through the various factors that motivate recycling practices. These motivating factors are divided into three categories: economic recycling, tactical recycling, and symbolic recycling. The aim is to give global examples of these types of activities. These categories can be regarded as reference material for the archaeological data from Suomenlinna; however, they do not explain everything. For example, the technological development of the maritime industry plays a role in making a decision to abandon a vessel. However, the technological aspect is a part of economic recycling behaviour. Today, the recycling of ship hulls can be connected to ecological reasons: for example, recycled hulls can be used to create artificial reefs to improve marine life.

4.1 Recycling as one phase in the life cycle of a vessel

Can a 'typical' life cycle of a ship at the fortress of Suomenlinna be defined? An answer to this question would assist in the interpretation of the archaeological material and describe recycling as one phase in the life of a vessel. The act of recycling may lead to the disappearance of the material, or at least to the loss of the original context — nevertheless, recycling is not the end of a vessel's life history. It is one part of the life cycle of a ship, as shown by the Australian ship HMVS *Cerberus* (Her Majesty's Victorian Ship) later within this section. Its story is included in this study, since at one phase of its life the ship was recycled as a breakwater.

A change in the function of a ship indicates a change in its value to society. It does not necessarily mean that the value is reduced, it is just different. This can be compared to the example of the life cycle of an African hut from the Suku of Zaire, presented by Kopytoff. In this example, he explains that the life expectancy of a hut is typically approximately ten years. In the beginning the new building houses a family with children. Later, the hut serves as a guesthouse or similar, until it turns into an animal shelter. Kopytoff points out that the physical state of the hut reflects the specific use. If there is an exception to this usage norm, it makes a statement; something can be interpreted from it (Kopytoff 1986:214).

One important aspect of studying the act of recycling is the age of the vessel, since typically old ships were recycled. There is no study available that compares the ages of vessels during different periods. Today, the estimation for the life span of a new warship in the Finnish Navy is 30 years. This number is a rough estimate, and it depends on the function of the vessel and the quality of its maintenance. World economy and political situations also influence the length of a vessel's life. For example, global trends affect every vessel in modern trade, but different ships may be treated in different ways. Fierce competition in global container traffic may lead a company to neglect ship maintenance, to save money and time in the short-term. In the same situation, another merchant shipping company might invest in modern technology and take proper care of its fleet for long-term savings. If these ships did end up in the archaeological record in the future, they would reflect the decline of the global economy in two opposite ways. Even the length of the vessels' use life would be very different.

Victoria's Ship Graveyard in Australia is a site where 44 different vessels have been abandoned between 1913 and 1999. This site provides an excellent example of the variety in ship ages. According to P.C. Taylor, the total operating age of these 44 ships was 1,974 years. He divided the numbers further based on the hull material: iron vessels had a median age of 57.40 years, ships made of steel had a median age of 31.82 years, and, surprisingly, wooden vessels had a median age of 71.3 years. However, he acknowledges that the study material contained only three wooden vessels (Taylor 2013:358). Despite this shortcoming, the sample clearly demonstrates the difficulty of estimating the use life of a vessel.

For comparison, Hjulhammar has studied the age of Swedish vessels from the period 1600–1850. According to this study, these vessels had an estimated age of 23.5 years (2010:336–339). Hjulhammar analysed 100 vessels, making this result statistically more valid than Taylor's study of Victoria's Ship Graveyard.

Why is the length of a ship's life important for archaeological research? The estimation of the life length is a significant lead for archaeologists trying to figure out the life cycle of a vessel. Dating results typically give the time origin of a ship. It can be compared with a coin: a coin discovered at an archaeological excavation tells what year the coin was minted, and the moment it ended up in the archaeological record can be estimated to have taken place after that (*terminus ante quem*).

Tree rings tell when the wood was harvested, and relatively soon after that, the wood was used to build the ship. The wood was usually carved and shaped in the building process, and some tree rings were removed. An exact dating can be given only if there is bark left. Nevertheless, in the study of recycling, the other end of the vessel's life is more interesting. When did the ship finally end up at the bottom of the sea? With recycled vessels, it would be at the end of their operational life. It would be simple to add thirty years to the dating results and look at what happened in society at that time. Political, economic, or even technological issues might provide an explanation for the location of the wreck. It is an entirely different task to search for clues from the archives as to when the timing of the scuttling event can be outlined in some way.

Unfortunately, a detailed universal norm for the life expectancy of a ship is impossible to establish. However, it is worth trying to grasp an idea of the subject at some level. Archaeologists need to be persistent — and lucky — in their attempts to combine archaeological and historical evidence. This evidence cannot always be combined for several different reasons, and the difficulty of predicting a ship's life cycle is only one of them.

In the context of Suomenlinna, the focus is on military vessels. The life cycle of a military ship can be harder to predict than that of a merchant vessel. Both are tied up with international politics and decision-making, which are closely connected to economic issues. From a global perspective, we know from historical sources that between 1855 and 1955, approximately 650 battleships were built by maritime nations.

Of these vessels, only 16 sunk as the result of ship-to-ship fleet actions at sea. The remaining vessels expired due to a wide variety of mishaps, including mines, torpedoes, internal explosions, gunfire from shore batteries, aerial bombing, and scuttling (Woodward 1982:143–146). The naval planners ordering the construction of these ships could not anticipate any of these outcomes (Gould 2011:283).

Military vessels have always interested historians, and there are many published studies on the subject. The problem is with the documentation. A vessel's active service life might be well documented, but information on the end of its life may be lacking in historical records.

Tredrea and Sozaev state that it should be acknowledged that the final fate of many Russian warships is uncertain. When ships were determined as unsuitable for active service, they were eased out in a gradual manner. Russians were more flexible in the matter of unseaworthy warships than European navies (Tredrea and Sozaev 2010:21). Ships typically remained on the list of active warships even though they were already in an unseaworthy condition. The way that things appeared on paper might be very different from real life; the Russian navy might have looked more convincing in statistics than it really was. This perspective was visualized in a multinational study of the colonial and early national navies of Australia and New Zealand, conducted by James W. Hunter. His study illustrates how warship abandonment differs significantly from disposal processes related to commercial watercraft. For example, military forces, with the backing of their government, can stockpile watercraft for potential future use. Richards sees this as a luxury not available to merchant traders (Richards 2013:13).

Even for a state, purchasing a new military vessel is an enormous investment. It is quite natural that the life cycles of these vessels are prolonged in peaceful times. This means that resources do not have to be tied up in new military equipment. On the contrary, during restless times, it is always easier to acquire financing for a new vessel with modern weapons by appealing to the needs of the defence of the nation.

When a military ship ages, it might be stripped of all or part of its armaments. The ship may still serve in secondary and supportive roles, for example as a transport or hospital ship. Other ships may keep their status as potential warships and be of use in reduced commission as 'fire watch ships'. In that role, the ship could retain some mobility and deal with fires and other harbour emergencies. In times of war, these ships could be brought back to active service. Other worn out

warships found themselves as hulks in a harbour. They were acting as stationary sheer hulks (floating cranes), hospital hulks, or prison hulks, but with no 'hope' of returning to service (Tredrea and Sozaev 2010:21). This approach clearly gives more value to a ship's first role as an active warship. However, for a successful war, all of these vessels in different stages of the life cycle are needed and play active roles.

The archaeological analysis of ships' remains is done in the spirit of equality. The whole biography of an object is equally significant and exciting. This egalitarianism also allows new perspectives for historical studies. For example, Michael McCarthy explains that in Australia, there was discussion of seeking a commitment from the government to never again allow a former serving ship to be sold offshore for scrap. Ships should be retained in service to the nation as dive sites, as fish attraction or aggregation sites, or as museum ships. This appreciation became a prevailing philosophy, and whenever serving Australian vessels are decommissioned, competition for them is intense (McCarthy 2013:32).

The same type of change in function also took place with merchant ships. Above-ground structures have benefitted from the reuse of ships for a long period. Old ships have served in many different functions from food stores to warehouses, barns, taverns, hotels, restaurants, offices, jails, churches, landing stages, and wharves (Richards 2008:22). According to Richards, merchant vessels serving in secondary roles were associated with negative emotions, such as disgust or even the feeling that the vessel had an undeserved 'fall from grace' (Richards 2013:6). There is no single path for an aging vessel; the reuse function depends highly on the need and the opportunities that the owner has for the vessel. However, one common feature of aging vessels could be that their mobility reduces with age and they serve as buildings more often than in transport.

The example of the biography of HMVS *Cerberus* shows how unpredictable the life of a vessel can become. Its keel was laid down in 1867, after the Victorian colonial government ordered the vessel from British shipwright Palmers Shipbuilding and Iron Company. It was launched in December 1870 and arrived in Melbourne the following year. HMVS *Cerberus* was one of the first vessels to enter the newly opened Suez Canal on its way to Australia.[1] The Victorian Government bought the

[1] More interesting details on the career of the ship can be found at http://www.cerberus.com.au/timeline.html. Accessed 11 February 2017.

ship under the Colonial Defence Act. The actual buyer was the Treasurer, Sir George Verdon, who stated: 'Now the people of Melbourne can sleep peacefully' (*The Herald (Melbourne)*, 20 May 1965).[2]

A newspaper article mentioned *Cerberus* in 1912. The story explained the fate of two old torpedo boats, which were going to be 'blown to pieces by the guns of the cruiser *Encounter*'. The journalist expected the same fate for the *Cerberus*, who had no guns or engines at that time. 'The *Cerberus* will probably be towed down the bay, and meet the honourable fate of a fighting ship, sinking as the result of a hail of shells' (Hunter III 2013:315). However, the political situation changed, and the *Cerberus* did not face its 'honourable end' at that time.

Jonathan Adams has dealt with the question of the honourable end of a ship. In some societies, boats are seen as possessing souls and are afforded mortuary rites at the end of their use lives (Adams 2003:20). Boats may have been methodically dismantled, burnt, or intentionally sunk as part of a decommissioning ceremony. The long roots of this tradition are still unstudied. However, there are 20th-century examples, such as the Royal Navy's 74-gun ship *Implacable*, which was captured from the French in 1805 at the Battle of Cape Ortegal, the final action of the Trafalgar Campaign. It was towed out into the channel to be scuttled in 1949. Explosive charges were detonated in the bilges, but after two and a half hours the ship had still failed to sink. Adams describes that the seeming reluctance of the ship to sink served to heighten the emotions of the spectators. Finally the ship went to the depths with a gunnery salute and a bugler playing the 'Last Post'. All these activities demonstrate the symbolic significance of the ship, the historical events in which it had been involved, and the ritual nature of its disposal (Adams 2003:21).

During World War I, *Cerberus* was used as a guard ship for Port Phillip Bay. In 1921 the ship was renamed HMAS *Platypus II*. In this last phase of its life, the vessel served as a submarine depot ship, a floating

[2] When the ship steamed up Port Phillip Bay, it was one of the first examples of the 'breastwork monitor'. The ship possessed the low freeboard and flat decks of the American monitors, but also had a central superstructure, containing fore- and aft-turrets of Coles design. Each circular armoured turret had two 10-inch, rifled muzzle- loading guns and could be rotated to keep on a target without having to turn the whole ship. The *Cerberus* operated primarily as a stationary gun platform, moored in different locations within Melbourne's Port Phillip Bay. The ship joined the Royal Australian Navy in 1911, at the time of its establishment (Hunter III 2013:315).

magazine, and a workshop until 1924 (Hunter III 2013:302–303; Gould 2011:295; Herd 1986:12).

The *Cerberus* was declared obsolete, decommissioned from the naval service, and put up for sale in April 1924. Its engines, boilers, and elements of the superstructure were removed. Interestingly, some of the hull's protective breastwork plating was sold to the Victorian Railways, together with some of the armouring of the aft turret. However, most of the armour plating was left as it was, because of the difficulty and cost of removal. There was still plenty of easily reusable and recyclable material left on the ship; however, this material was left untouched.

Fig 4.1. The pier and HMVS Cerberus as a breakwater (courtesy of Friends of the Cerberus).

Representatives of the Black Rock Yacht Club of Half Moon Bay purchased what remained of the *Cerberus* in 1926. According to historian Graeme Disney (pers. comm. 2014), it was a competition between two neighbouring clubs, since the Sandringham Yacht Club was collecting funding for the ship at the same time. However, Sandringham City Council paid the balance and is still the owner of the vessel today. The ship was scuttled in 4.6 m of water as a breakwater in the same

area where it had served the military during its active years (Fig. 4.1). It served in this function until a new breakwater was built from stones in the 1950s. The destiny of the remains of the *Cerberus* was under public discussion, but no action was taken regarding the vessel. After a severe storm, its hull collapsed partly in 1993. Due to its weakening condition, the site has been under archaeological recording over the years (Hunter III 2013:303; Anderson 2002:12; Gould 2011:278).

This case expresses mainly economic recycling behaviour. Building a new breakwater with an old ship's shell contributes to saving construction costs. However, it seems that the vessel has always been appreciated in its community, and its biography is well established. The case for archaeological documentation and evaluation of its condition became even more acute after the collapse in December 1993. Action had to be taken to preserve the ship, and funding for the upkeep of the remains was collected. The value of the ship was officially established after the ship was listed on the National Heritage List in 1995. Two years later, it was assigned to the Australia's Top Ten Heritage Places at Risk list.

Different organizations took action and made plans to preserve the site. For example, four cannons were removed from the deck and stored next to the hull. In their new location on the seabed, the guns are protected by a coating and with sacrificial anodes. These heavy cannons were removed to prevent their weight from crushing the hull (Disney, pers. comm. 28 October 2014). The site is currently closed to the public, since there is a considerable danger of personal injury from jagged metal (Save the Cerberus 2014).

Aspects of symbolic recycling have a stronger influence on the remains over time. For example, the naval base HMAS *Cerberus* in the district of Hastings, Victoria, has an HMVS *Cerberus* museum, where one of its old cannons is on display. An anchor was removed from the wreck site in the 1960s, and relocated to the entrance of the Sandringham Yacht Club. One of the people active in this operation was club member Ian Robertson, who expressed in a newspaper interview how his 'Grandpa would be very proud'. His grandfather George William Robertson had been an engineer on the *Cerberus* (*The Herald (Melbourne),* 20 May 1965). According to Disney, the anchor was relocated to the HMVS *Cerberus* museum when the clubhouse was rebuilt. In July 2011, interpretive signs were erected at Half Moon Bay, sharing the story of the *Cerberus*. It seems that the *Cerberus* in its current location is appreciated both locally and nationally. This

biography of the *Cerberus* expresses the diverse aspects of recycling an old warship, which is not a simple economic question. Symbolic values are strongly involved, and related to the whole biography of the ship. The birth of the *Cerberus* took place in 1867, when its keel was laid down. Recycling both the hull and the equipment extended its life. However, maintaining this wreck on top of the seabed, as a contact point for the past, creates a challenge for all parties involved in its maintenance.

In conclusion, recycling, as one phase of the life of the vessel, influences the remains and creates challenges for archaeological interpretation. The researcher should keep in mind the variability and complexibility of the ship's life cycle.

4.2 Economic recycling behaviour

Almost all recycling activities have an economic motivation; the basic idea of recycling is to save energy and raw materials. However, there are different aspects of economic recycling behaviour related to ships and the maritime past. The most obvious type of recycling is related to breaking up an old ship with the intention of using or selling parts of the ship as raw material.

The wide spectrum of recycling behaviour can be observed through an example in which the maritime history of an entire geographical area was recycled to boost the local economy. There is at least one example of this kind of thinking from Norway. There was a flourishing shipyard economy in southern Norway in the 19th century, with many small shipyards producing wooden sailing vessels for different purposes, such as trade and fishing. When the world economy changed at the beginning of the 20th century, sailing ships could no longer compete in maritime trade. This livelihood disappeared, leaving behind structures and buildings. People found new purposes for them, and their maritime background was valued and even exaggerated. Berit Eide Johnsen sees this new use of old things as recycling. For example, old lighthouses, which were essential for seafaring security for decades, have been recycled into nostalgic boarding houses, serving ecological tourism (Johnsen 2011:160).

Related to this type of behaviour, Johnsen asked: 'How were the maritime culture, history, and landscape recycled, reinterpreted or reinvented?' Objects can be signs that stand for something other

than their original function. In Sørlandet, 'the Norwegian Riviera', the picturesque towns and ports, the full-rigged sailing ships, and so on, all have something in common: they are signs of the maritime past, representing traditions and emphasizing continuity, collective memory, and culture. Maritime heritage tourism has increased. In a way, it is a response of the local community to economic deprivation, population decrease, and industrial decline (Johnsen 2009:113, 160). In this type of recycling, the symbolic aspects of the maritime landscape have economic value, and the maritime past is recycled into a new tourism economy for the area.

It is more common to call these types of acts reuse rather than recycling. Reusing the industrial past is common, since buildings related to this type of heritage are economically feasible, due to their adaptability and multi-functionality. According to the American Heritage Dictionary, 'reuse' means 'to use again, especially after salvaging or special treatment or processing'. This special treatment is often a transformation, 'a marked change, as in appearance or character'. The definition of recycling is 'the process of collecting and reprocessing materials that would typically be considered waste' (American Heritage Dictionary, 2013). Nevertheless, as Maria Leus states, 'reuse' is a broad term that can be implemented in theory and practice with different perspectives (Leus 2011:61), and the same type of widening of the scope can be useful for recycling as well, as presented by Johnsen.

A ship can be subjected to economic recycling for several reasons. Most commonly this takes place in the case of an old watercraft and, as Richards puts it, the simple explanation for it is that the ship 'has outlived its economic life' or 'was replaced by a more modern vessel'. He is right that these simple and obvious reasons do not necessarily explain the entire truth (2008:60–61).

Economic reasons for recycling can lead to dismantling and recycling in pieces, which is called cannibalizing in this dissertation. This may leave behind an archaeological record in the form of a ship graveyard. The same financial motivation may lead to recycling the whole hull into a foundation for a construction. These foundations are surprisingly durable, and typically they are discovered during the renovation of the structure, such as a breakwater, as with the case of the galliots at Lilla Varvet at Suomenlinna.

There is no archaeological evidence of recycling ship timbers into building material at Suomenlinna. In Laulumaa and Lagerstedt's

report of the archaeological potential of the islands, it is described how old buildings were most likely taken down to make space for new ones. All the old material was cannibalized in the new building, leaving little evidence of the previous phases. Accordingly, during restless times when buildings were destroyed in war, the old material was not reused as efficiently as during peaceful times (Laulumaa and Lagerstedt 2014:4).

However, there is evidence of a private house from the Russian period, where, for example, logs from an old caisson of a bridge are used. An agreement was discovered in archives detailing how private citizens were allowed to use construction materials left over from the use by the military organization. This agreement explained the variety of recycled materials used to build this specific house, which still stands (Linnanmäki 1990:63).

Fig 4.2. The city of Enkhuizen in the Netherlands recycled ship elements under new construction (Archeologie West-Friesland-Hoorn-Netherlands).

There are some similar archaeological discoveries from a coastal town called Enkhuizen in the Netherlands. The town is located some 60 km northeast of Amsterdam. Enkhuizen has roots dating back to the 13th century, and its main sources of livelihood have been strongly maritime, including shipbuilding. The city grew quickly during the late 16th century, and in addition to virgin building materials, recycled ship

elements like rudders were also used in construction. The recycled material is mainly oak (Fig. 4.2) (Michiel Bartels pers. comm. 2016; Duijn 2011).

4.2.1 Recycling by cannibalizing

Economic recycling can also be seen at the very fundamental and concrete level of ship components, related to the use value of different parts of the ship. During the era of wooden vessels, the ship's wood was the main reused item. As a process, the recycling of timber recovered from a vessel differs from recycling the whole hull. Shipbuilders choose timber from vessels for their shape, 'flat planking of a fairly constant width', but the need is also determined by what the shipbuilder removes from the hull. According to Richards: 'Wooden ship scantlings can only be used according to the soundness and suitability of their physical form in a compatible usage in a new structure or object' (Richards 2008:25–26).

Building up a new ship has always been a demanding process, and if reused material was available, it was cannibalized. In maritime archaeology, this type of recycling of ship elements is encountered in wooden wrecks. This should be kept in mind when interpretations related to the age of a vessel are made based on an insufficient number of dendrochronological dating samples. The samples may be from recycled wood and thus do not reflect the time of building of the new ship. Timber reuse has been noted at several sites, even classical sites such as the Kyrenia find (300 BC), a ship whose deck was built from previously used timbers (Richards 2008:24). Even more typical than the use of old wood is the replacing of rotten pieces of the vessel; this, too, needs to be addressed during the dating of a wreck.

One of the oldest examples of recycling vessels through cannibalization comes from a 1st-century boat found in the Sea of Galilee (also known as Lake Kinneret), Israel. The landscape is legendary for the biblical scene in which Jesus stepped out of a fishing boat and walked on water. The boat was found on the shore of the lake in 1986 and analysed by famous ship specialist J. Richard Steffy. The water level of the lake was lowered, exposing large areas of dry land and also revealing the boat, buried deeply in the mud. The frame of the boat looked crooked and crude, and some of the planks were narrower than others. It gave the impression of having been made by an unskilful shipwright (Steffy 2012: 124–127). However, on further examination

Steffy realised that quite the opposite was the case. The builder had only had access to inferior local materials in addition to recycled materials, such as the skinny planks originating from older vessels. A functioning boat was constructed by recycling planks of different widths.

Ismo Malinen discovered information on the reuse of ship elements while studying the famous Helsinki merchant, Johan Sederholm (1722–1805). Sederholm bought shipwrecked vessels and reused the material, either by fixing an old ship or by using all valuable or functional material again in some other ship (Malinen 1997). This latter behaviour can be called the demolition of ships. It is an act involving the systematic separation of vessel components and their innovative reuse. Typically this type of behaviour is related to building new ships at shipyards.

Sederholm was a co-owner of the Ullanlinna shipyard at Helsinki, which could partly explain his interest in shipwrecked vessels, as well as auctioned warships, as observed in the case of Lilla Varvet (section 3.3). Although auctioning the rigging of sailing vessels could hardly be seen as demolition or cannibalizing, it could be referred to as reuse. An old ship is a burden on resources, and as a scuttled object it can be recycled as a foundation; this was probably the most economical way to use these unseaworthy old ships.

An ongoing project — 'Help or business? Shipwrecks and salvage companies in the 18th century Gulf of Finland as early modern entrepreneurship' (Academy of Finland 2015–2019, Huhtamies) — focuses on the way tackles and cargoes were auctioned, and how this type of business affected the local economy in Helsinki during the 18th century.

According to maritime archaeologist James Delgado, ship breaking was a labour-intensive and unpleasant job with a low margin of return (Delgado 2013:122). A wooden vessel may have been recycled completely as firewood; the important thing was to dismantle the hull carefully and collect all wood material from the vessel. If the overheads of the operation were modest, then the value of the wood could cover the costs, and the business might even be profitable. P.C. Taylor presents one such case from Victoria, Australia, where the bark *Elizabeth Graham* (1869–1933) was sold to be broken up for firewood. The rent of the location for dismantling and breaking up the vessel was cheap, which made the effort economically successful. The process lasted for five months, and the firewood was eventually sold for 17 shillings and 6 pence per ton. According to Taylor's calculation, if the

overheads were kept low, the profit from breaking up a wooden hull was even higher than that of an iron or steel hull (Taylor 2013:360).

There is no such information available from Suomenlinna. The active dry dock built new vessels, and it is likely that innovative thinking was practised at the dockyard as well. The reasoning then comes around to the beginning: the basic idea of recycling is to save energy and raw materials. More knowledge of the shipbuilding process at the fortress is needed to understand the amount of recycling by cannibalizing.

4.2.2 Economic recycling connected to ship graveyards

The term 'ship graveyard' refers to specific geographic areas that have large concentrations of wrecks. Graveyards are places where ships are abandoned and scuttled, revealing several abandonment practices (see, for example, McCarthy 2013, LaRoche 2013; Moore 2013; Daniel 2013; Delgado 2013; Lydecker and James 2013; Pollock and Woodward 2013; Marcotte 2013; Seeb 2013; Smith 2013; Taylor 2013b). They can provide information about the working lives and operating environments of the vessels and serve as examples of continuing traditions (Richards 2008:10). Vessels can accumulate for various reasons, including armed conflicts and natural disasters, but the most common reason is related to abandonment (Lydecker and James 2013:138). Graveyards can also emerge in connection with a dockyard.

Typically these kinds of places have been experienced as eyesores. The value of these retired vessels as informants of the past first became established in Australia. Since this pioneering work, maritime archaeologists have worked globally to raise the value and importance of these places. In addition, ship graveyards have a certain attraction as diving sites and places of interest through their recreational value (Taylor 2013:355). Richards explains that it all started in 1996, when Mark Staniforth took his first group of undergraduates to a collection of rusting hulks in the North Arm of the Port Adelaide River in Australia. This introduction led to close collaboration between Staniforth and Richards, resulting so far in the Garden Island Ships' Graveyard Project (1996–1997) and the Abandoned Ships' Project (1998–2002).

In 2003, Richards took this research approach to the US and Bermuda, where, for example, Sami Kay Seeb completed her thesis on the Eagles Island Ships' Graveyard. There were two different conferences with sessions on ship abandonment during 2007–2008 (Sydney, Australia and Albuquerque, USA) (Richards and Seeb 2013:vii–viii).

Richards and Seeb collected the results of these conferences into a publication. *The Archaeology of Watercraft Abandonment* was published in 2013, finally establishing the importance of ship graveyards in the field of maritime archaeology.

Acts of abandonment leave behind large collections of discarded watercraft, thus creating archaeological sites. These sites are archaeological only after they are no longer consciously used to benefit living society. They can be seen in economic, social, political, or technological terms. For example, the abandoned watercraft peppering Lake Ontario in North America are a testament to over two centuries of Great Lakes commerce (Richards 2013:11; Moore 2013:59–78; see also Daniel 2013:79–98). Reuse is related to abandonment sites mainly before the ships entered the landscape; all valuable material is dismantled and cannibalized into another vessel before abandonment. However, the abandonment can also be carried out so that access to the shipwreck is possible. In formulating an interpretation, researchers should consider the context of the scuttled ship in its geographical location and the surrounding environment and other constructions.

A ship trap also has an accumulation of vessels, although in that case, the vessels have suffered a shipwreck. The difference between a ship graveyard and a ship trap should be easy to see from the remains. A ship trap is a location where ships have suffered a shipwreck due to natural phenomena such as storms, currents, and shoals. These sites have also been called 'loss traps' (Schiffer 1976). In the Baltic Sea, one famous ship trap is in the area of Suursaari (in Swedish, *Hogland*), due to heavy traffic into St Petersburg and very difficult navigational conditions. Suursaari is an island in the eastern part of the Gulf of Finland, which experienced at least one shipwreck each year before navigational technology improved (Kaukiainen 2005; Anttila 2003:105). The waters are very shallow, and the prevailing winds tended to take ships into rocky surroundings away from the safe waterway.

A ship graveyard can also be found in a lake environment and even on top of a ship trap. Maritime archaeologist Oscar Törnqvist has explained the site formation process of a graveyard in Lake Mälaren in Sweden. He draws the conclusion that the area was designated as a ship graveyard after a couple of wrecking accidents (Törnqvist 2013:32). Previous shipwrecks affected how the body of water could be used, and it simply made sense to dump unwanted watercraft in the same area. According to Törnqvist, this created an area where anchorage and

fishing became impossible, which is one feature that ship graveyards have in common.

Vessels found in a ship trap more closely resemble the traditional concept of a shipwreck, as they ended up underwater due to an accident. They provide a vast amount of valuable information on the time of the actual event. On the other hand, wrecks in a ship graveyard have typically been dismantled beforehand, and only the material with no further use value ends up in the graveyard. These wrecks could be seen as reflecting the values of the contemporary society — not the society that built them, but the society responsible for their scuttling.

There is one graveyard at Suomenlinna (Susisaari Vetotelakka ship graveyard ID 1000021160; see Appendix 4). A private dockyard for pleasure boats has used the area since 1968. Before that, it was in military use starting from the 19th century. It seems these wrecks have accumulated at the site over a long time span. The steep profile of the seabed was probably the reason that these dismantled hulls were dumped at the site. At 24 metres, this area is also the deepest point of the whole Suomenlinna water area, which also makes the place suitable for a graveyard. A minimum of energy has been required to dump these vessels right next to the dockyard with no need to drag them into a suitable position. In shallower waters, these vessels would have created a remarkable eyesore, but now they had been forgotten until the survey conducted for this study.

4.2.3 Recycling ships as foundations

The phenomenon of recycling ships as building material — for example, in city planning, in landfills, and as bases for piers, bridges, and breakwater constructions — seems to have a long history. This does not only apply to coastal towns; inland waterway systems have also practised the economic recycling of old vessels as foundations. Sometimes they can be observed in the plans and leave an imprint in the historical records. However, most of these structures have not been regarded as ancient sites or worth acknowledging in local histories. More typically, these types of wrecks are first encountered in the cultural landscape, and the historical connection can be established through archaeological work.

Archaeologists discovered an interesting example of recycling behaviour at Birka, the oldest known city in Sweden. Birka was an important marketplace during the Viking Age. During a 1970s survey of wooden poles in the water, a wooden element was discovered with a length of

4.75 metres, carved in the form of a T-shaped keel. It was suspected that the keel was even longer, since mud covered both ends (Ingelman-Sundberg 1972:131). Excavations in 2007 solved this question: the total length could have been as much as 9.6 metres. The keel seemed to be upside down, with no joints for frames. Dendrochronological (tree-ring) sampling dates the keel between the years 920 and 940 (Olsson 2013:48–49). The location of the keel among the poles allows for the interpretation that the shipwright somehow did not manage to build a proper keel, and the resulting structure was used for something else. It could thus have ended up as part of the pole construction (Lindström, pers. comm. 2014) — perhaps to support the entire construction in a horizontal position; the function is still unidentified.

There is a lot of research potential in these types of sites, where the origin of the foundation has already been forgotten. The case of Lilla Varvet (section 3.3) is a clear example of how a persistent archaeological mission can lead to valuable results. Oral knowledge can be a useful resource, but it disappears quickly: information should be gathered while it still lives within the oral traditions of local people. Written documents can create a connection between the remains and their identity. Sometimes old maps can contain information, such as the name of the ship; however, the name is not always correct. When an interpretation is based on maps, one needs to take a critical stance and understand the original purpose of the map. It is equally important to analyse who made the map and where the mapmaker gained knowledge of the landscape.

The economic benefits of recycling ships as foundations can also be seen in the case of Lilla Varvet. When the old galliots were recycled as breakwater constructions, material costs were saved and working hours were scaled back compared to building from virgin materials. In a bigger framework, it was a time of peace, and there was no need to have a large fleet to impress enemies. The emotional ties between these vessels and the fleet were weak; they were trophies of war, not built at Sveaborg, not even designed or built by Swedes. However, the motivation behind scuttling these old ships to form a new harbour was purely economic from two different perspectives: they were saving the costs of the raw materials; and saving the costs associated with maintenance of old vessels.

Maritime archaeologist Marcus Hjulhammar has demonstrated how old ships have played a vital part in the construction of the Stockholm

waterfront. Systematic landfills started in medieval times, and scuttled ships had a significant role in this process. In the late 17th century, port authorities purchased all abandoned vessels that were lying useless along shorelines (Hjulhammar 2010:47–49). Ships became basements for bridges and jetties, as well as reinforcements of the shoreline on the waterfront. Other examples include the Norwegian port of Bergen (Christensen 1985), the former harbour of Grønnegaard in Copenhagen, Denmark (Lemée 2006), and, beyond Scandinavia, London (Goodburn 1991), New York (Riess 1991), and San Francisco (Delgado 2009). In addition, in Quebec City, Canada in 1974 and 1984, archaeologists discovered 18th-century shallow-draft river vessels, which served as temporary dams (Richards 2008:33). Ontario province is the scene of many abandoning activities over a hundred years. People used ships as breakwaters and pier extensions, considerably altering the shape of the coastline (Richards 2008:33, 65).

San Francisco is a great example of a city where the history of a busy port is spread around in different abandonment areas, from the time of the Gold Rush through to the 20th century. James Delgado studied the San Francisco Bay area extensively and discovered how these ships were used, reused, and ultimately recycled within the economy. An archaeological excavation provided insight into the role of recycled ships in the economic and physical geographical study of San Francisco (Delgado 2013:119). A similar study covering an area of New York Harbor was conducted by A.D. Lydecker and S. Jr. James. According to Richards, the outcome of these studies is very clear: 'common' ships may illustrate everyday human nautical behaviour more clearly than famous shipwrecks (Richards 2013:11–12).

In Finland, there are other examples of using wrecks for foundations. During the 1940s, old barges used in lumber transport were scuttled as a breakwater at the coastal town of Pori. The location was at the northern edge of the Halssi Tukkiviiki area. The area is now under a landfill covered by vegetation. Barge remains could still be seen in the early 1960s (pers. comm. Petri Halinen 2016).

4.3 Tactical recycling behaviour

Tactical recycling motivations can override even economic reasons. There are different tactical uses for ships outside their typical tasks. This

usually involves military vessels, however, in exceptional circumstances, merchant ships may also be influenced by tactical recycling practices.

Tactical recycling typically occurs in restless periods: during and near times of war. Wars have probably changed the underwater landscape more than anything else. Unlucky ships stay at the bottom, and different types of remains become memories of war events — and the landscape is manipulated for tactical reasons. The underwater landscape becomes a landscape of power.

4.3.1 Conflict-inspired abandonment vs tactical recycling

Richards uses the term 'conflict-inspired abandonment' for the behaviour of abandoning ships for tactical reasons. This includes acts such as turning vessels into fire ships or target ships, or scuttling them to prevent them from falling into the hands of the enemy. Fire ships were filled with flammable materials and used to set fire to enemy vessels through physical contact during battle. This tactic can be dated back to at least the 7th century. As a target ship, the craft functions as a target for military drills (Richards 2008:29).

Conflict-inspired abandonment can include recycling behaviour if the ship has a new function. This was the case especially for ships used to control waterways. Ships were recycled as barriers — blockage ships or blockships — to prevent the enemy from proceeding along strategic shorelines or navigable waterways. These ships continue to serve the parent society through their recycling, to follow Schiffer's original idea. They enter the archaeological context when their remains are left at their locations after use.

Richards considers that the abandonment of a ship already creates an archaeological site. However, within this dissertation, a ship is not an archaeological site if it still serves the contemporary society; the act of scuttling as such does not create an archaeological site. The wreck becomes an archaeological site when it is rediscovered with an archaeological interest. The context of a wreck originating from a tactical motivation differs from a shipwrecked or abandoned vessel. Blockships are easy to discover with tactical thinking, since they close a waterway in a narrow place.

There are global examples of wrecks that were abandoned in conflict, and only seen as recycled later due to their symbolic value. For example, the *Kronprins Gustav Adolf* sank in 1788 in the war of King Gustav III. This ship of the line did not reach safety, but ran aground in front of

Sveaborg and was taken over by the Russians. The crew were taken as prisoners of war, and the ship was quickly emptied and burned. Eventually, the ship exploded and sank to a depth of 20 metres. The reason for destroying the vessel was tactical: it reduced the number of enemy ships at the time of the conflict. Still, the hull was not used for a new function, and the intention was to destroy the vessel. Considered as such, this case resembles deliberate abandonment more than recycling. However, it was not the end of the story of *Kronprins Gustav Adolf*. The case is explained in more detail in connection with symbolic recycling (section 4.4.1).

During conflict, it can be considered tactical to scuttle one's own ships to avoid capture. This type of deliberate ship destruction still occurred during WWI and WWII. The biggest 'suicide' took place after WWI, when the Kaiser's High Seas Fleet was scuttled in the Orkney Islands, Scotland. The Imperial German Navy damaged 74 of its own vessels to prevent British capture (van der Vat 2005:5). Later, some of these warships were salvaged and the metal was recycled. Today, the scuttling location is a famous site, which attracts recreational divers.

Ships are scuttled even after a war is over: 'It is typical for societies to discard the tools of war when the conflict has ended' (Lenihan 2002:213). The victorious party may demand the scuttling of a defeated fleet. In WWII, Allied forces scuttled or scrapped most of the surviving ships of the Japanese navy (Lenihan 2002:213). Later, many of them have been turned into recreational diving sites attracting tourists. These sites can reflect symbolic recycling practices, which also include economic reasons (such as to avoid maintenance costs).

4.3.2 Blockships

The term 'blockship' has had different meanings over time. Typically a blockship was scuttled as a wartime defensive measure, to prevent the passage of enemy vessels into a waterway, such as a channel, river, canal, or strait. The scuttling location was selected at the narrowest and shallowest points of the water area with a tactical approach. The ships were filled with stones, and poles were sometimes spiked through the hull, like in Foteviken, Sweden (Rönnby 2014b:85). Sometimes blockships were only anchored to close the lane. For example, during the trade wars between Hanseatic merchants and the king of Norway in 1284, cogs were used to blockade Norwegian ports (Gould 2011:190).

Sometimes place names were affected by blockship activities. Westerdahl describes how, in Scandinavian waters, place names with prefixes such as Stäk- and Steg- could be related to ship-route blockages dating as far back as the 1st century (Westerdahl 1992:9). 'Stäk' and 'steg' are old terms describing underwater 'fences' used to block passages for defence, trade, or fishing.

In the early and mid-19th century, the term 'blockship' applied to mobile batteries of ships. Robert Fulton first introduced this vessel type for the United States during the War of 1812 against the British Empire; Fulton's creation is acknowledged to be the first steam-powered man-of-war (Chapelle 2010:139). Old ships were also converted into floating batteries and, although they were meant for coastal defence, they were used offensively in the Baltic during the Crimean War in 1854 and 1855 as part of the British fleet. During the American Civil War (1861–1865), a group of vessels — mostly old whaling ships, which became known as the Stone Fleet — were scuttled with a stone load in various harbour entrances.

Scuttling blockships is one of the oldest naval tactics on record, dating at least to the pre-Roman Iron Age in Scandinavia (Richards 2008:29). Probably the oldest blockships have been found in Denmark, in Roskilde Fjord near the town of Skuldelev. The remains of these five Viking vessels were excavated within a large cofferdam in 1962. According to one interpretation, these ships were sunk in the shallow water as part of a barrier to prevent access to the channel (Gould 2011:179). The Skuldelev ships were studied in detail and are now on public display at the Viking Ship Museum in Roskilde (Crumlin-Pedersen and Olsen 2002).

The Skuldelev ships widened the scope of the cultural sample of Viking ships beyond mortuary collections. They were all scuttled at about the same time, and accordingly they represent a unit of contemporaneity from a period when Viking ship construction was well developed. The Skuldelev wrecks revealed a wider range of variability in ship construction than anything previously known from the Viking tradition. Whatever variability appears among these vessels, it cannot be explained by differences in ethnicity or changing cultures. Dendrochronological dating places these ships in 921 and 1025 (Gould 2011:180–182). The Skuldelev ships provide a good example of the information blockships can reveal from the past.

Typical blockships had a military origin. However, in critical times, private vessels have also been used. Maritime archaeologist Mike

Belasus describes merchant ships used during the Great Northern War as blockages to defend the city of Stralsund. The war was a fight for supremacy in the Baltic Sea during the years 1700–1721. Sweden controlled the island of Rügen and defended the waterways into the town of Stralsund on the mainland. Larger ships could only enter the area through a few waterways.

One of these passages was known as Mitteltief, meaning 'middle deep'. The land-based defence system could not cover the broad waterway. In 1715, the Swedes decided to block the waterway with an artificial obstacle, to force every ship to pass within range of the guns located on land. Several vessels were confiscated from the harbours in the area, and ship owners were compensated with a small amount of money. These ships were filled with rocks and positioned in a line across the Mitteltief passage together with several big anchors (Belasus 2011:95; 2013:231).

Interestingly, this is a method still used today. The latest example comes from Ukraine, on 5 March 2014. The Russian Navy's anti-submarine ship, *Ochakov*, was filled with water and scuttled in a suitable location, blocking Ukrainian warships (Almeida 2014). These actions are related to a period when Ukraine was on the brink of a civil war.

4.4 Symbolic recycling behaviour

Symbolic recycling emerges when economic or tactical reasons are not the primary motivations. Symbolic recycling can be very powerful, and it usually appeals to people's emotions in addition to offering different interpretations of the past. The question is then raised: for whom is this symbolic recycling? Who determines the meaning and value of these objects?

Typically, recycling for symbolic reasons takes place within extended object biographies. For example, all ships and wrecks serving as museums or in museum collections are evidence of symbolic recycling. The motivation is to share the history that the ship represents. This can be seen as Schiffer's fourth reuse mechanism, conservatory processes, a concept expanded by Hurcombe to include the current cultural context as part of an object's extended biography (see Fig. 1.8). Symbolic recycling can also involve parts of a ship or its equipment.

Anchors are commonly recycled maritime objects, and their use is an old and global phenomenon (Figs. 4.3 and 4.4). A ship's anchor

was perhaps the most prominent single piece of equipment on board. The safety of the vessel was highly dependent on the functionality of the anchor. It had to be not only easy to lay down, but also easy to collect from the seabed. Every ship had several anchors during its active service. Technological development could make old items unpractical, and old-fashioned anchors could be abandoned without reusing them in another vessel (Fig. 4.5). It seems that iron anchors were not usually recycled for their raw material, and it is possible that their symbolic value has been more important than the economic aspect.

Fig 4.3. Anchors are placed at the front of the Suomenlinna Museum (photo by the author 2014).

Fig 4.4. (next spread) Old anchors stored in the collection of the fortress (photo by the author 2008).

Anchors are usually large objects and can fill a space in a public spot. They cannot be easily vandalized, are easy to maintain and, most importantly, they are readily available. Sometimes setting them into a public place may have been the easiest way to handle an old and useless item. Anchors are also commonly used on the shoreline for mooring; they still have functional value, but it is different from the original use (Fig. 4.6).

The importance of anchors for the ship's crew, their common availability and suitability for public display, do not entirely explain their

global symbolic use. Why are anchors so popular and why do they fascinate people? It has been suggested that objects that challenge our senses or our comprehension have the most powerful effects on our imaginations (Hoskins 2006:82), and the popularity of anchors may be related to this. Anchors are also traditionally regarded as symbols of hope in maritime symbolism. For example, the combination of a heart, a cross, and an anchor are very common in sailors' tattoos.

Studies in India provide a fine example of how anchors may find another use beyond anchoring and mooring. Evidence suggests that stone anchors were reused and even worshipped. The worship of an iron anchor has come to light at a temple near Dabhol jetty, Maharashtra, on the west coast of India. The whole temple is dedicated to worshipping the anchor: its flukes are buried, but the shank is exposed and painted red, and it is worshipped as Lord Shiva. Oral legends confirm that this tradition is at least 200 years old. The anchor appears to be of a British admiralty type, and it is still respected even today. Fishermen offer worship before going to sea (Gaur et al. 2009:299; Tripati et al. 2014:70). Context is important in interpreting the meaning of an object: an anchor in a ship is totally different to an old British anchor in an Indian temple.

Another symbolic recycling use of ships is as coffins in burials. There are many famous examples of this from Scandinavia, typically found on dry land. The six sites that are extensively recorded and published are the Snape boat-grave (England), Sutton Hoo (England), the Oseberg ship (Norway), the Tune ship (Norway), the Ladby ship (Denmark), and the Gokstad ship (Norway). In Scandinavian burials, there are signs of repairs to the vessels, revealing that they had been in use and recycled as coffins. Was there a relationship between the recycled ship and the deceased? It is considered likely that the biographies of the ship and the person buried in the hull had a common path in life, which continued in the 'afterlife'.

Although these excavations were carried out in the 19th and early 20th centuries, similar finds can still be made. In Estonia, there was a remarkable discovery near Salme village, on a Baltic Sea island called Saaremaa. The Salme discoveries of 2008 are two clinker-built vessels used as ship graves around the year 750 (Curry 2013).

There are also numerous examples of recycling smaller vessels. There is no limit to creative recycling, where the function of the vessel changes completely and the new item shares the maritime symbolism.

When an item is in use in the parent society and used for a different purpose than originally intended, it provokes the viewer to think about things differently. The real character of an object does not derive from its physical properties, but from its ability to produce real effects (Criado 1995:194). Some artefacts on display in open and public areas challenge people to think beyond their everyday life. Old items can inspire people to think of the meaning of reuse and multiple ways of practising it. The purpose of this is to create awareness and inspire further research of and broader discussion on the topic. This is even more important for the invisible heritage, such as underwater cultural objects.

Fig 4.5. (right, top right) The local yachting club (Venekerho) has successfully conserved and placed one of the old anchors of the fortress (photo by the author 2014).

Fig 4.6. (right, top left) An old anchor has been cast into concrete to serve as a mooring spot (photo by the author 2014).

Fig 4.7. (right, bottom) The bay of Tykistölahti seen from the east. The dockyard and the submarine Vesikko are located in the left corner (Mika Karvonen 2017).

Symbolic recycling is a world of opportunities. There are numerous untold stories in the cultural landscape. To raise awareness, one world-class example is explained in more detail; this study is probably the first to describe the Bikini Atoll wrecks as symbolic recycling sites due to the diving tourism. In Finland, there is maritime symbolic recycling at Suomenlinna. When we define this part of the life cycle as 'symbolic recycling', we create transparency into the motivations and powers of conservatory processes. A historical item on display has a message in the background. This message should be open to discussion. The message may even change in the course of time.

4.4.1 Symbolic recycling of maritime objects at Suomenlinna

There is a lot of visible maritime symbolism on the fortress islands. The motivation for symbolic recycling here is sharing the history that the recycled objects represent; for example, the submarine *Vesikko* (1933) serves as a museum at Susisaari. Markku Melkko (1999:42) writes: 'The last surviving member of the Finnish submarine flotilla gives the visitor an unforgettable picture of the technical skill, and seamanship required of the crew of a submarine, and of the surroundings in which they carried out their duty.'

Fig 4.8. The submarine Vesikko is placed at the mouth of Tykistölahti ('Artillery Bay') (photo by the author 2014).

Vesikko is located on the shoreline of Susisaari, and it is currently part of the Finnish Military Museum (Figs. 4.7, 4.8 and 4.9). The museum is open only during the summer season, but it is very popular with approximately 34,000 visitors annually. The submarine was renovated in 2013 to celebrate its 80th anniversary.

Vesikko was built in the Crichton-Vulcan shipyard in Turku in 1933. The Finnish government bought the vessel in 1936, and it was part of the Finnish fleet during WWII, patrolling the Gulf of Finland. The Peace Treaty of Paris in 1947 banned submarines from Finland, and all other submarines of the fleet were demolished. They were sold as scrap metal to Belgium in 1953; this recycling was based on their material value. Just a few years later, in 1959, *Vesikko* was conveyed to the Finnish Military Museum to be renovated as a museum exhibit with the help of private donations. The vessel was taken to Suomenlinna in pieces and reassembled in its current location. *Vesikko* was opened to the public in 1973, on the National Day of the Navy, 9 July (Melkko 1999:40–42).

Museum ships can theoretically live forever — if the maintenance is well organized. However, their symbolic value may change over time, which may affect the financing of the museum. *Vesikko* is maintained with income from the entrance fees. This financing makes its final destiny depend on the public outreach and general interest of the

visitors. Old submarines are a rare sight even globally. What is *Vesikko*'s symbolic value for visitors to the fortress in the 2010s? No survey has been carried out to answer this question. For most of the visitors, it may be the interesting old technology and the possibility of imagining life as a crewmember in the narrow indoor spaces.

Fig 4.9. The submarine Vesikko with its new paint in June 2014 (Dorit Salutskij, The Governing Body of Suomenlinna, 2014).

Anchors have also been symbolically recycled at Suomenlinna. During the Swedish period of the fortress, anchors were made in Karlskrona in the Swedish navy dockyard. The main anchor type was designed by af Chapman and was called *stockankare* ('stock anchor'). Anchors were not an easy item to make, since they had to adhere to a severe standard. Anchors had to have strength and security in the design, be easy to clean, and they had to bear rust easily. Af Chapman published a study on the correct form of an anchor in 1796, and this anchor type was used for a long period. The weakest point in Chapman's design was the wooden stock. The anchor's English name was 'old plan long-shanked anchor', and this type became famous in Britain for being constantly at the dockyards for repair (Cotsell 1856:7). Nevertheless, it was only as late as 1846 that a transitional form between the stock anchor and the contemporary patent anchor was developed (Hartzell 1932:71). The technical development of ship anchors began in earnest in the last half of the 19th century,

spurred on by comprehensive rational design principles and improved production methods (Hartzell 1932:70–71).

Fig 4.10. Old anchors from the Swedish period were placed around Suomenlinna as decoration during the Russian period (VIK collection YA181a /The National Archives of Finland).

The changes of the late 19th century can also explain the first evidence for recycling anchors in the landscape of Sveaborg. It is not known whether anchors were made or repaired at Sveaborg during the Swedish and Russian periods. When the fortress became part of Russia in 1808, a lot of Swedish ship equipment became available to the Russians. Before the 1850s, dismantling and recycling of old vessels took place at the Sveaborg Navy Yard at Katajanokka, but it is not known whether old anchors could be reused or melted to produce modern anchor types. However, there must have been useless anchors waiting for a sensible purpose, and recycling was one solution. A map from 11 October 1875 (YA181a) features anchors placed in different locations around the fortress (Fig. 4.10). This might be connected to the availability of anchors and a need to maintain and decorate the landscape. Anchors may also have played a practical role as mooring spots. Unfortunately, the specific reasons for recycling cannot be

known completely. The locations of anchors presented on the map could support their symbolic meaning in the landscape rather than creating new mooring places.

Fig 4.11. An 18th century anchor in front of the Ehrensvärd Museum (photo by the author 2014).

The early phase of the Finnish period in the 1920s is another time when the symbolic recycling of anchors was of importance. An anchor was placed in front of the fortress commandant's house in the Great Courtyard at Susisaari (Fig 4.11). A new museum was established in the rooms that had been in use as the residence of Commander Ehrensvärd. The museum opened in 1930, and the anchor is right next to the front door of the museum. The anchor was moved from Pikku Mustasaari, where it had been placed on the shoreline. The relocation from the shoreline to the front of the museum was an operation involving at least ten men. The project was documented in three photographs (KM14887–14888, KM16985). The anchor is believed to be from a ship called *Lodbrok*, which took the deceased Ehrensvärd from Turku to Helsinki after he passed away in the Saari Residence. However, this study could not verify this information.

This anchor is the same kind of stock anchor that still lies at the bottom of the sea with the wreck of *Kronprins Gustav Adolf*. In that story, the anchor plays a critical role: the ship did not reach safety at Sveaborg in time because of the captain's decision to collect the anchor. The action

took too long, and the Russians were able to take over the ship. Nowadays the wreck is a famous underwater park where a diver can follow the ship's history from the shipyard at Karlskrona to the depths of the Baltic Sea along a trail with information signs. The anchor is visible on the seafloor and forms a part of the official tour around the wreck site.

Fig 4.12. The anchor of Gustav Adolfin matala ('The shallow of Gustaf Adolf') may be an anchor of Kronprins Gustav Adolf (photo by the author 2014).

Fig 4.13. The ring and the stock of an anchor relocated from 'The shallow of Gustaf Adolf' (photo by the author 2014).

The symbolic recycling of anchors was also common later in the 20th century, and interestingly one of the recycled anchors might be another anchor of the *Kronprins Gustav Adolf*. This anchor was lifted from the sea and relocated on the Halkolaituri pier, which is a place for traditional sailing ships (Figs. 4.12 and 4.13). The anchor reminds today's sailors to make wise decisions at sea. When an anchor has a historical context and a public story, it can share more than its intuitive symbolism.

4.4.2 The symbolic weight of warships and the exceptional case of a nuclear test site

In 1946, the United States conducted two atomic bomb tests at Bikini Atoll, in the middle of the Pacific Ocean. Operation Crossroads, as it was known, included almost 100 different types of wartime vessels recycled as target ships. The purpose of these two tests was said to be determining the effect of the atom bomb against various types of naval ships. In reality, it was more about sending a message that the US was the world leader. The whole operation was carried out as a demonstration of power (Lenihan 2013:280–281). Among the ships was the technologically advanced Japanese ship *Nagato* (1920–1946). Lenihan visited the wreck site during an evaluation of its suitability for an underwater trail to boost the local economy with diving tourism. He interpreted from the condition of the wreck that 'it was made sure that it was dead' (Lenihan 2002:213).

Most of the ships that were part of the Crossroads test were from the US Navy. They participated in the project to downsize the fleet from the wartime maximum. Only three of the vessels had a different origin: the battleship *Nagato*, the cruiser *Sakawa* (1944–1946) from Japan's Imperial Navy, and the German cruiser *Prinz Eugen* (1938–1946). Most of these ships remained afloat after two detonations of a type of bomb described as apocalyptic. However, a new concern emerged: the radioactivity of the remains. It has been said that this was the time when the dangers of radiation were truly understood. Reclaiming vessels that survived the tests was a difficult task. Cleaning operations on these ships were unsuccessful, and they were scuttled for safety reasons. All in all, 95 ships took part in the two tests. Five sank after the first blast, and 11 large vessels after the second blast. Still, 61 would eventually be judged unsuitable for further service, including active ships taking part in the test that were contaminated (Delgado 1996).

The use of these vessels as targets is conflict-inspired abandonment related to the Cold War. There was strong public opinion against this test. However, the resistance was silenced with the approach presented by congressional representative Louis Ludlow. He stated: 'If we go ahead with the Bikini Atoll demonstration, we will be saying… to every other nation: We are going to show you how many of you we can kill if you get ugly. So don't start anything' (Lenihan 2013:281). The actual result was a global competition of armament with nuclear weapons, which lasted for several decades.

The symbolic value of the target ships is connected to the way they were recycled as an underwater trail for recreational divers. UNESCO added the Bikini Atoll Nuclear Test Site to the World Heritage List in 2010.[3] Altogether 23 nuclear tests were carried out at the site from 1946 to 1958. According to UNESCO, the cumulative force of these tests was 7,000 times that of the Hiroshima bomb. The violence inflicted on natural, geophysical, and living elements in these tests illustrates the dark relationship that can develop between humans and the environment.

Citizens were removed from the Marshall archipelago before the first testing. Ongoing issues with radiation and clean-up prevented resettlement at Bikini Atoll, although other islands have been reinhabited. After the 1986 Compact of Free Association between the Republic of the Marshall Islands and the United States, the ownership of the submerged vessels was handed over to the people of Bikini. According to Lenihan, at this point Jonathan Weisgall, the attorney of the Bikinians, strongly favoured turning these ships into a historical resource. There was a danger that they would have been treated as waste material to be removed, which would have lost this piece of history. In 1988, a survey was commissioned of the wreck site to evaluate the potential of creating an underwater historical park. To create an economic base for possible future resettlement of Bikini Atoll, the ships were to become tourist attraction sites, and this process involved the most prominent maritime archaeologists of the time (Lenihan 2013:279). Lenihan states: 'Many old ships, abandoned or wrecked, have symbolic attributes that give them power as touchstones to the past — a point at which the relative values of history become tangled in the less yielding fabric of archaeology' (Lenihan 2013:288).

[3] See http://whc.unesco.org/en/list/1339

Lenihan and other US maritime archaeologists conducted test dives and a recording survey at several of the wrecks in a high-profile project in 1989–1990. The primary goal of the project was to learn enough about the ships to advise the Bikini Council on their archaeological significance, and on how these veteran ships could become recreational diving sites. One exceptional task was measuring the radioactivity of these wrecks and determining whether safe diving sites could be created for the general public (Lenihan 2013:285). The Bikini Atoll opened to divers in 1996.

Managers of tourist diving operations have since reported that the aircraft carrier *Saratoga*'s bridge has slumped severely, making it hazardous to visit the ship's command centre. Should any preventive measures be taken, or should it be accepted that these are active ruins, and the degradation is nature's way of 'burying' these vessels? In a way, they are gradually returning to the larger cycle of life.

4.4.3 Ship elements in buildings and vice versa

People also recycled ship timbers in buildings, typically for economic reasons and especially in areas that lack suitable natural forests to harvest building materials. For example, in the Baltic Sea, the outer archipelago is this kind of environment. In some places, recyclable ship material was plentiful, as in Key West, Florida USA: the whole city grew around the salvage business during the 19th century. However, people also used pieces of famous ships for symbolic reasons. Surprisingly, this kind of recycling works in both directions: remains of buildings can be recycled in new vessels as well. Global examples of both of these traditions are presented here.[4]

The oldest sign of recycling ship elements in buildings appears among the first written descriptions of ancient ship parts in the 11th century, when Abbot Ealdred of St Albans, England, sent his men to the nearby ruins of Roman Verulamium to collect stones for his new abbey. During this process of reusing stones from the old buildings, they found 'oak timbers with nails sticking inside and smeared with naval pitch'. The only evidence remaining of this event is a note in the abbot's biography (Muckelroy 1978:11). This story indicates old roots for recycling ships.

[4] An article called 'These buildings are made out of ships' shares photos of recycled vessels. See http://io9.com/these-buildings-are-made-out-of-ships-513082549/all (28 October 2014).

If a ship was famous, some elements could be used to commemorate the original vessel. Symbolic reasons would motivate this kind of behaviour. One such recycling case is known at Wickham in the United Kingdom, related to a sea battle in the war between the United States and the British Empire. HMS *Shannon* defeated USS *Chesapeake* off Boston in a 15-minute battle on 1 June 1813; the US frigate became a British ship. The *Chesapeake* resigned from service in 1819, and its timbers were sold. They were recycled to build Chesapeake Mill, which operated until 1976. It is now an antiques store and restaurant. The building is prestigious and unique because of this wood. Some beams and posts still hold damage from cannonballs and musket-shot. On the 200th anniversary of the battle, the building received a commemorative sign listing the 74 men who perished in the battle (BBC News, 2 June 2013).

Buildings recycled as ships or parts of ships are rare. One example is the USS *New York* (Fig. 4.14). The vessel was built partly of the steel from the World Trade Centre buildings, which collapsed due to the terrorist attack of 9/11 in 2001. The bow section of the ship contains 7.5 short tons (6803 kg) of steel from the demolished building. It has a strong symbolic meaning, as expressed by the mayor of Gretna, Ronnie Harris: 'That steel means a whole lot more than just metal. The entire country comes together in the form of that bow stem'. It is a floating tribute to the lives lost in the tragic event. The motto of the ship is: '*Strength forged through sacrifice. Never forget*' (Nolin 2014:3B).[5]

Close to Suomenlinna, there is an example of recycling ship elements in a sauna building. Between Suomenlinna and the Helsinki city centre, there is a small island called Ryssänsaari ('Russian Island'). On the island there is an old fishing cabin with some storage buildings and quays. A wreck, located next to the pier, was believed to be an old barge. At some point in the past, people collected wood from the wreck and built a sauna on the island. A local fisherman, Mr Lindroos, had oral knowledge of the history of the sauna, and he remembered bathing there as a little boy in 1916. This sauna no longer stands, but its memory is still shared. A new sauna building occupies the old location (Laitinen

[5] Two other ships called the *Arlington* and the *Somerset* are being built partly from recycled material, honouring the victims of the attacks on the Pentagon and United Flight 93. The *Arlington* will contain steel from the Pentagon building's structural girders, and the *Somerset* will use steel melted from a crane used to excavate the airliner wreckage (http://www.ussny.org/ship.php, accessed April 2017). In each of these cases, it is clearly symbolic recycling.

1998:6). The remaining elements of the wreck may be even older than the oral tradition suggests. Dendrochronological samples reveal that the pine dates to a time after 1765. The growing area is Pohjanmaa, between Oulu and Vaasa in the northern part of Finland (Zetterberg 1998:5, 10–11).

Fig 4.14. Photo of the USS New York, which contains recycled metal of the World Trade Center (Ville Leino 2014).

When material from a ship is recycled for symbolic reasons, it is important to remember the biography of the vessel: recycling is commemorating the original craft. This is typically achieved by placing a sign on a new building explaining the origin of the material. When there is no sign, the story of the ship and the apparent reason for the recycling behaviour disappear. In this case, only oral tradition holds the memory through generations. Sometimes the information can be found in newspapers: symbolic recycling provokes media interest, especially if the new construction involves public funding and is related to famous people.

4.4.4 Black oak and the waterlogged wood of wrecks

Old wrecks can also be recovered. In most of the world today, reusing old waterlogged elements would be against the laws for the protection of cultural heritage. Today the recovery of wreck elements is one method used in maritime archaeology to collect and spread information to the audience, and it is done according to modern scientific standards. However in the past, recycling of this material has occurred, for both economic and symbolic reasons. Typically, waterlogged elements were used for the distinctive look of the material, black oak.

Black oak is simply oak wood that has been submerged for a long period. According to Cederlund, the wood turned a dark shade after spending extended periods underwater and gained the nicknames 'black oak' and 'sea-drenched oak'. It had a durable quality, and was a highly desirable material for making furniture. No one has studied this business in Finland, and the closest historical examples come from Sweden. Cederlund describes in his dissertation that wooden wrecks did not have legal protection until the 1960s; accordingly, it is meaningless for modern scholars to criticize these events (Cederlund 1983:37).[6] They make up a part of the site formation processes and can be interpreted as representing the values of their time. This can be seen in the story of *Rikswasa* (built 1599), especially in the way authorities in the early 1960s allowed salvage with a commercial interest on a historically valuable shipwreck (Wiklund 2013:10–13).

The symbolic value is present in the recycling. In the 1920s, the new City Hall of Stockholm had doors made of wood collected from a wreck site. The wreck was originally a ship of the line called *Riksäpplet* (sunk 1676). According to maritime archaeologist Niklas Eriksson, this was done to add archaic ideological meaning to the building. In addition, some original medieval and early modern sculptures were relocated to the building (Niklas Eriksson, pers. comm. 2009). One famous example from Finland comes from a wreck called *St Nikolai*. The site is located in the former battle area of Ruotsinsalmi (in Swedish, *Svensksund*) in front of the town of Kotka on the northeastern coast of the Gulf of Finland. Before the establishment of the Antiquities Act, black oak was harvested during the archaeological excavation. For example, the chairman's gavel of the city council of Kotka is made of this material. It was a way of expressing that the town has a high appreciation of its maritime past.

[6] Cederlund refers to one example from the 1860s, the salvage of the East Indiaman *Götheborg*. The ship foundered in 1745 in its home harbour of Gothenburg, Sweden, as it was returning from China. From the salvage operation, 77 dozen porcelain pieces were sold to private individuals, as well as museums. The sea-drenched oak was salvaged and formed into fashionable furniture. In another example, in 1867, black oak from the warship *Nya Riga*, which foundered in Karlskrona in the 18th century, was recovered. This wood was used to make furniture, counter boxes, letter openers, and so on. King Karl XV of Sweden received an entire suite of furniture made of wood from these remains (Cederlund 1983:37).

4.5 Reflections on the maritime cultural landscape

The task of this dissertation is to intepret the underwater seascape through recycling activities, enabling us to understand the way people perceived the sea, i.e what was their maritime cultural landscape about? Was it a landscape of economy, or power or transportation, or perhaps all these three, or even something else? What was the relationship of the fortress inhabitants to their underwater seascape, and has the relationship changed over time? It seems that as a military area, the seascape did not offer the main livelihood for the inhabitants. There must have been small-scale household fishing, as there still is today. The scenery certainly was a communicative landscape through transport. However, the underwater seascape was an expansion of the power aspect for the maritime fortress.

The physical landscape is experienced through senses, like seeing, and hearing, and touch. The cultural landscape is shared through stories and information, which explain how and why things have happened or changed in the landscape. Stories make the landscape alive, and impart value to the scenery (Ingold 1993:153; Mikkonen-Hirvonen and Tiitinen 2003:105; Maaranen 2017). Stories create a deeper understanding of the maritime cultural landscape, as explained by Westerdahl. Prior to Westerdahl's classic survey of Norrlandsleden, the essence of the landscape was thought to be the physical sites themselves; the context of the underwater scenery and the connection of the local people was not taken into account. At Norrlandsleden, Westerdahl collected place names and oral stories related to, for example, harbours and shipwrecks, and the narratives of these material and immaterial remains revealed fragments of beliefs that contained a key to a deeper understanding (Westerdahl 2014:291).

Tilley (1994:59) has expressed the same: 'Events are anchored and given significance in terms of particular locales… Particular locales are of essential importance in fixing events and acting mnemonics, thus creating a sense of social identity and establishing linkages between past and present'. This thought is continued by Caftanzoglou (2001:31) as, conversely, a place comes to life through being narrated; individual stories told by residents construct the place and specific parts of it as lived-in, as existing through people's everyday bodily experience and intimate connection to them. For example, the memoirs of Ivan

V. Jegorov (1887–1971) from the Russian period of Sveaborg show a strong sense of place.

Landscape consists of space, time and culture, and all this is connected to the way people experience the landscape. This understanding of the landscape is strongly influenced by the actions taken to change the landscape, and the way previous parent societies affected the scenery. Maritime archaeologist Ben Ford (2011:3) writes:

> 'From a practical perspective, a landscape includes the space that a person can see or perceive; it includes smells or noises that are perceptible beyond the line of sight, as well as adjacent places that one can see in the mind's eye and connect to one's current viewscape … However, the current landscape is seen and perceived based on past experiences so that the landscape is constructed of all past personal encounters in this particular space, the stories about the space, the current status of the space, and the perceived possible future uses of the space. The landscape is thus constantly being constructured and altered. It is culturally dynamic and a force of cultural construction that coevolves with culture.'

The cultural landscape is a source of material for the study of human society in general. As explained by Westerdahl (2014:339), a human exploiting maritime resources of any kind, for transport, fishing, or hunting, must know the current underwater landscape. According to Westerdahl, a cultural landscape is always a social and societal landscape, where people and their knowledge form the prime resources. Aspects of the cultural landscape can be subdivided into:

- the landscape of sustenance (subsistence) or the economic landscape
- the transport (communicative) landscape (the main maritime factor for wrecks)
- the outer resource landscape (shipbuilding and equipment)
- the inner resource landscape (for production of surplus, for trade and for the maintenance of shipping and ship expeditions)
- the territorial landscape (defense and aggression)
- the power landscape (ownership, control and allegiance)
- the cognitive landscape (the remembered landscape, place names, mental maps)
- the ritual landscape (ritual aspects, including cultic activities)
- the leisure landscape.

At the fortress, knowledge of the underwater landscape has been disrupted by changes in the population. Within a military organisation, the changes were continuous: whole families had to react to

the relocation of the staff, and move to another place when ordered. However, this was a gradual change, and oral knowledge of the landscape could still be passed on. The situation is completely different when the whole population was changed during the conflicts.[7] The whole population of the fortress islands has changed at least twice, due to conflict. This creates a gap in transferring the knowledge of the landscape, and the way the oral tradition is passed on to others. New inhabitants had to form their relationship with the underwater seascape through their own experience, and through available historical documents.

The mind's eye is an important factor in underwater scenery. But how can we make an interpretation — through the archaeological remains on the seabed — from the imaginations of those who lived several hundred years ago? They could not see the underwater seascape, nor their influence on it at their time. Still, their operations have changed the landscape in a way that can still be studied, and create a connection into the past.

The focus of a landscape is typically determined by what is still visible in the underwater seascape — such as skeleton wrecks. These wrecks form the physical foundation of what can be studied and shared with the community. Ford explains this as 'the story and the landscape are nearly always larger than the artefact, but the artefact serves to focus the archaeologist's attention on particular aspect of a knowable past' (Ford 2011:3).

Sonar data, underwater photography and video, 3D-modelling etc., allow us to create documents that are milestones in a growing visual tradition about the seascape and cultural features there. These visual traditions all affect how people connect with water. People's interests can awaken through maritime archaeology, and the way it creates value and visibility to the underwater landscape with the help of new technology. Wrecks and other artefacts create important connections to the

[7] Twenty years ago, estimates suggest that 25 million people globally have been forced to leave their country, and another 75 million are on the move because of economic or environmental circumstances (Bender 2001). These numbers today are even greater. How people form a new relationship to their new home areas becomes an important question for landscape studies.

whole underwater seascape, affecting our mental maps and maritime cultural landscapes.

Social and societal life is analysed through studies of the cognitive lansdcape. The cognitive landscape may be surprisingly wide, as expressed by Duncan within his studies of fishermen of Queenscliffe in Australia. Insights into fish habitats, weather, and other phenomena generated new folklore and oral histories. The fishermen imbued meaning to apparently intangible and natural places, creating a social ordering mechanism. This mechanism included access to restricted knowledge, for example good fishing spots, and created a definition of one's membership within the fishing culture. Oral histories were important for transmitting local histories within the township: oral knowledge was passed on to younger generations, creating social status for community elders (Duncan 2012:284). Oral tradition often included information that was not available through other sources of historical documentation (Duncan 2012:274). Accordingly, when the chain in habitation was broken twice at Suomenlinna, important information has disappeared.

When we try to achieve an understanding of people in the past, and their experiences of the seascape, we have to acknowledge that experiences are contextual and biographical; they are always in process. The environmental factors are also in a constant process of change. For example, the seascape of Suomenlinna is affected by winter and ice coverage. Historically it created a totally different scene for transportation, fishing and exploring the landscape — these activities become possible over the ice by walking, skating, skiing or with a horse sledge. Remote places, too dangerous to approach by boat, can be accessed when the ice is thick enough to carry a person. This affects the mind's eye, and the way people experience the underwater landscape. Today, the fortress is surrounded with ship lanes, which are kept open during the whole winter, limiting access to the icefield.

During the summer the colour of the water is important, and especially the degree to which it is transparent. During 18th and 19th centuries, the visibility in the Baltic Sea was probably good for most of the year — people would be able to see at least several meters deep. Nearby fields were not so thoroughly cultivated, and the outflow of the Vantaa river would not have contained much mud and other run-off. Now, rainfall on fields runs down to the river, taking along sediment and nutrients with it: visibility is reduced by run-off particles and algal

bloom. It is credible that people have been able to see the seascape more clearly in the past than today.

With limited visibility, oral stories promote the underwater landscape. One story from Suomenlinna is from the beginning of the 1990s, about abandoning small boats. One of the abandonments was an emotional experience for the owner, giving up a beloved wooden boat that was beyond repair. An older story of the sea fortress explains how a large wooden embankment sank unexpectedly during the night in the middle of construction. This embankment (ID 2088 Tykistölahti log barrier embankment) still exists, and is probably the biggest and oldest underwater wooden embankment in the world. Another story relates to a monitor vessel in reuse as a barge, when it got loose on a stormy night and sank just in front of the quay. The wreck is still on the seabed. The stories that express an exceptional happening last for longer. These are different from the stories of abandonment, which are not shared commonly; there is something sad, shameful and even illegal about dumping unwanted vessels. Stories of recycled ship hulls must have been easier to share, since they were decisions made by the authorities.

Stories can be interpreted even from old maps. For example, the economic recycling case of building a breakwater (see section 3.3) was to safeguard the fleet at Lilla Varvet from the northeast winds. In turn, the fleet was connected with power, and it was important to take care of the vessels, by building shelter and port facilities for a wharf. There is another interesting point within this case. The vessels were scuttled during the 1760s, and the wooden log frame breakwater was built in the 1790s, at the same time a map was made of the area. Scuttled ships were marked on the map as galliots or wrecks. This could imply that there was an oral legend related to these wrecks, and perhaps the fact that they were confiscated from the enemy in the Pomeranian war, could made the story last for at least thirty years, until the knowledge was lost during the Russian period. It was not in the interest of the new inhabitants to share information of the success of the enemy in an old war scene.

Stories from memoirs can also be connected to recycling ships. The most obvious recycling case of the Russian period was blocking the waterways during the Crimean War. Three of the waterways were blocked with scuttled ships. Some of them were made even while the enemy, British and French fleets, were already patrolling in the area

— possibly they were demonstrating the power of their defence. The story of the scuttling was shared through the memoirs of a British captain, who witnessed it from the sea. It must have been an impactful scene, and made the underwater seascape look more dangerous from the intruders' point of view. Although, these scuttles were partly removed after the conflict, remains of these different vessels still exist. Through them, it is easy to see the maritime cultural landscape as a landscape of power. Now this story can be expanded with the information of the vessel type, the last wooden sailing warships of the Baltic Fleet of the Russians (see section 3.4).

During the Finnish period the role of the fortress was already changed, and there was no need to recycle vessels in the water. The defensive role was already old fashioned, and the value of the fortress as a historical monument became more prominent. The symbolic aspect of maritime items was more important, and this is seen in the creation of a museum from the old submarine *Vesikko*. In addition, anchors were set into public places. This tradition started already during the Russian period, perhaps indicating the change in the function of the maritime fortress.

To conclude, recycling activities at Suomenlinna were mostly bound to power and symbolism, and reflected the changes in the function of the fortress, from a prominent defensive construction to a UNESCO World Heritage Site.

5. Discussion

This study has been carried out at a time when archaeological excavations underwater are still rare in Finland. The law protects wrecks, so there is a need to find community planning solutions that avoid disturbing wrecks and leave them untouched *in situ*. This current practice differs from land-based archaeology, where excavations are typically conducted to release the land for construction. The UNESCO Convention on the Protection of the Underwater Cultural Heritage recommends that the right place for a wreck is its current location in the underwater landscape. The limited resources of maritime archaeological research have guided development of non-invasive, less time-consuming, and less expensive ways to analyse sites (Holland 2015:68). This dissertation can be regarded as subscribing to the same ideology. It is an attempt to analyse data gathered through an inexpensive and non-intrusive survey.

The character of the sea has played an important role in the development of Suomenlinna and the entire area. When the strong stone fortress was originally built in the Gulf of Finland, its primary function was not the protection of the city of Helsinki. In the early 18th century, Helsinki was a town of minor importance, and the main argument for building Sveaborg here was that the water area was suitable for the fortress. The number of straits and sheltered water areas, the depths of the shorelines, and so on, all affected the decision to select this particular spot for the fortress.

As a maritime fortress, the UNESCO World Heritage Site of Suomenlinna offers an exceptional location in which to conduct archaeological research. The archaeological material in the waters includes remains of ships, boats, sailing obstacles, breakwaters, jetties, and loose items such as rudders, cannons and anchors. Out of all this material, wrecks are the most prominent in terms of recycling practices. Through recycling, the underwater seascape has evolved as a cultural landscape, reflecting decisions made in the contemporary societies of various periods. The new archaeological evidence does not aim to challenge the condensed historical writings of the area, but rather to provide a new and exciting angle for understanding the past of the fortress. The sea is more than just a reflection of the sky or the stone walls. The surrounding seascape

is basically the messy backyard of our ancestors and gives us a truthful and direct picture of their relationship with the environment. The underwater archaeological record reflects how people lived and worked in the fortress at different moments in time.

The Kultakaleeri case study provides an example of the development of archaeological thought. This example makes it easier to understand the role of recycling in a wider context, and how protection of cultural heritage has changed over the years. At first, during the 18th century, work on the Kultakaleeri wreck was a contemporary salvage operation with an economic motivation. In the 1930s, a professional diver made a contract with the National Museum of Finland to share the 'profit', which was, from the museum's perspective, the possibility of acquiring objects for its collection. That project was an international effort, since the Swedish Maritime Museum was one of the partners. The project was referred to as 'research', and the Suomenlinna Museum was the active party from the National Museum of Finland. Nevertheless, objects raised from the Kultakaleeri wreck were recycled as scrap metal to serve the needs of the military in the 1950s. Unfortunately, the history of Finnish maritime archaeology has not been comprehensively studied, and for that reason, it is difficult to set this project into a broader contemporary framework. However, the Kultakaleeri objects had most likely not undergone proper conservation after they were lifted from the wreck. The symbolic value of the objects was lost, and only the value of the material was left. In this case, it was a simple decision to recycle the metal.

It was not until 1963 that the Antiquities Act started to protect the underwater cultural heritage in Finland as traces left by previous generations. Before legal protection, underwater remains were already appreciated, and there were efforts to carry out documentation *in situ*. A group of volunteers cooperated with the staff of the National Museum: in a way, this was already communal archaeology. State archaeologist Nils Cleve gave the Kultakaleeri study his blessing; he was impressed with the *Vasa* case and anticipated remarkable results with wrecks in Finland, too. The 1970s was a real pioneering phase in maritime archaeology in Finland. The waters around the old fortress were considered interesting, and several wreck announcements date to this period. Suomenlinna was also the first place where research interest included abandoned ships. Nevertheless, abandonment was not considered as recycling at that time. The idea that abandoned ships could represent

maritime recycling came to the author of this dissertation, and has been developing for the past ten years.

Recycled hulls are situated in the research field in between abandoned ships and shipwrecks, and therefore they should be addressed as a specific group of their own. This approach has not been introduced before this study. The recycling of the ship's equipment and the dismantling of the ship were different types of actions than the recycling of the entire hull. This study focuses on recycling the whole shell for new functional purposes.

Theoretical approaches to recycling, as well as recycling practices in maritime archaeology, have been addressed from different perspectives within this dissertation. The central idea emerged from the behavioural approach, which emphasizes the fact that people choose the way they behave, and their choices are reflected in the material remains. The impacts of these choices can be seen as cultural transformation processes. Typically, natural site formation has been acknowledged as more significant than other formation processes in maritime archaeology. However, the study site of an old fortress allows cultural processes to aid in the interpretation of ship recycling. Interpreting different site variables enabled recognizing wrecks that had entered the underwater landscape through an act of recycling.

One important aspect of behavioural archaeology is the way it concentrates on the relationship between people and things, such as a recycled ship. A ship is an exciting object to study: it has typically been essential and meaningful to its 'friends and family', its crew and owner. However, the ship often ends up showing no signs of this affection, leaving only a dismantled skeleton without a biography.

To make the underwater seascape more approachable, sites could be given a nickname and a story reflecting their physical appearance. Typically wrecks and wreck elements have only an ID number and a geographical tag; they receive the original name of the ship when their true identity is discovered. However, for many wrecks this stage is never achieved. Storytelling can bestow a different value and appreciation for the wrecks in modern society, which is, afterall, responsible of their preservation.

5.1 Identifying recycled wrecks on the basis of survey data

Different sources of information can be combined to identify a wreck, such as written documentation of the ship and the site where it ended up, archaeological observations, and knowledge of the underwater landscape and its natural formation processes. The geographical location of the recycling site is culturally selected, making it essential to take the landscape into account. The starting question is: why is the wreck located where it is?

A recycled vessel is not only a physical object that provides information on shipbuilding traditions. Remains like these are evidence of the active society's motivations and relationship with the underwater landscape. Human intentions, decision-making processes, and actions are reflected in the final position of recycled wrecks, through the intactness of the hull, and in the variation of the material remains.

An important aspect of this study is strengthening the cultural perspective of formation processes and widening the scope of the concept of recycling, which Michael B. Schiffer first introduced in the 1970s. The research question of this dissertation focuses on the way recycling practices could create an archaeological site. Recycling practices in the past consisted of meaningful behaviour leaving specific traces that could be interpreted in the archaeological record. The fortress is an ideal area for examining these types of cultural processes. There seems to be plenty of knowledge about the past of Suomenlinna, but the scuttling of a ship is an action that typically does not leave easily accessible imprints in archives.

A recycled hull, an abandoned ship, and a shipwrecked vessel in shallow water may look alike as archaeological sources. The parent society of the vessel has reused and salvaged everything valuable, leaving behind bare remains. In these cases, it is important to observe the wreck for signs of recycling: has the hull been repurposed for a new function, does it support a shoreline, or are there any signs of structures, such as a bridge or a breakwater? Are there any placement strategies? Or is the location distant and isolated? Is the wreck dangerous to water traffic? Could there be an accumulation of wrecks, indicating a graveyard? It is important to understand the general development of the area: has the hull been part of a larger building plan, a construction that was never finished? These different questions should be used to guide the interpretation, and ultimately identify the wreck.

The new interpretation tool developed within this study helped to interpret the wrecks. This tool is based on four different variables, which reflect cultural formation processes: the geographical location of the site; signs of possible placement strategies; the orientation of the wreck compared to the shoreline; and the relationship of the wreck to other remains. This would not have been possible without modern technology to visualise the underwater seascape.

The archaeological documentation of wrecks around Suomenlinna varies a great deal, so the goal was to set questions to which most of the sites can provide a reliable answer. The evaluation of the geographical location takes into account the use of the water area, the activities carried out on land close to the site, and the depth of the site. Ships were typically not abandoned in areas where they could cause trouble for traffic. Stones or rubble inside the wreck indicated placement strategy. The orientation of the remains revealed whether the wreck was meaningfully placed to support the shoreline. Other sites in the area could indicate whether the wreck was part of a ship graveyard.

The underwater archaeological survey conducted as part of this study collected data on 42 unidentified wrecks of different sizes and datings. Initially, these wrecks were divided into two groups depending on whether they could be interpreted further. All small boats were excluded from further interpretation, as well as wrecks from which no visual data could be collected (e.g., due to being covered in mud). Twenty-six wrecks were analysed further with the interpretation tool (Appendix 4). This group was commonly considered as skeleton wrecks with no great historical value. These wrecks were further divided into three groups: recycled, abandoned, and shipwrecked. Sixteen of these wrecks appear to indicate recycling practices. Five sites indicated deliberate abandonment, and five were accidental sites. The group of accidental sites indicates that some of the skeleton wrecks in the Suomenlinna waters ended up there due to an accident — conforming to the traditional concept of how wrecks originate. However, the results show that a significantly larger number of the wrecks were intentionally recycled.

The whole life cycle of a vessel should be used as a source. The development of a complete site biography is a key tool for site assessment, as stated by Holland. She also notes that by combining the life history with the outcomes from the rest of the research, the shipwreck biography becomes both tool and outcome (Holland 2015:107). This

is a new way of thinking about and sharing the stories of shipwrecks, in which the research history is accepted as one phase of the life of the wreck. This approach can easily cover recycled vessels, too. This study is still written in the traditional way, treating research history as a separate section. In the future, attempts should be made to write wreck biographies in more creative ways.

5.2 What can be learned from these recycled vessels?

Wrecks, in general, are a valuable historical resource that cannot be replaced. Sites are priceless for their historical content and context, which cannot be found in the historical record (Taylor 2013a:158). This idea lays the groundwork for this study; nevertheless, the value of recycled vessels has not been discussed earlier.

The ends of the operational lives of military vessels are typically poorly documented. At that phase of their life cycle, they served in secondary, supportive roles, or were demolished or stricken from the catalogues. These ships can still reappear in the archaeological record. However, their history and identity are typically stripped away, and the value of maritime archaeological methods for dealing with them becomes indisputable.

As stated by Hurcombe (2007:43), the way in which artefacts enter the archaeological record can reveal different value systems and perceptions of the past. This means that the way wrecks are located in the landscape tells more about the people behind the scuttling and the decision-making, and the values of the contemporary society. As people and objects live together, they are affected by time, movement, and change. Links between objects and people form a mutual process of value creation. How wrecks are located in the underwater landscape reflects the relationship between the society carrying out the scuttling — the parent culture — and the underwater environment.

It is possible to continue further and interpret the parent society's maritime cultural landscape. According to the data gathered within this study, it seems that society's awareness of the underwater seascape has changed during different times. It was sharpened during times of conflict; at other times the most important aspect has been safe transportation. Before the land connection was available between different islands, people were more aware of the underwater landscape for the safety of boating.

Is it then possible to find an 'ideal' life or typical biography for a ship in the waters around Suomenlinna based on the available evidence from different eras? The results are insights on this topic during the different periods of the fortress; the outcomes should not be generalized to cover any of the periods broadly. They are bound to the specific time when the scuttling decision was made, and to the political and financial situation at that moment in history. In other words, this study does not claim that recycling was practiced in the Swedish period only for economic reasons, in the Russian period only for tactical reasons, and in the Finnish period only for symbolic reasons. The point is that different types of recycling cases can be found in the history of the fortress, and their timing ties them to the accepted historical narrative. These case studies are not compared against each other and the different eras of the fortress: each case study is tied to its parent culture.

The motivation of societies to practice recycling at various periods in history could be related to different themes, such as the need to build something, to protect the area from foreign intruders, or to commemorate the past. Three case studies — Lilla Varvet, blockships and *Vesikko* — presented these motivations with ships, and in addition, there were other examples of smaller maritime items.

The important point in this study has been the way wrecks in the underwater landscape reflect the recycling practices of their parent societies. The motivation behind the recycling is site-specific, although some similarities occur. Many ships were built and repaired at various shipyards of the fortress, but only a small portion of the vessels whose use lives touched Suomenlinna found their final resting place in the waters of the fortress. Ships of the fortress were preserved for active use as long as possible. After this primary use was over, they were not immediately abandoned; owners did not lose their connection with their vessels. Ships were the property of the military organization, waiting for a decision on their secondary roles. For that reason, private citizens could not recycle them for their own needs. However, when the military system did not auction or reuse the old vessel, it could end up in the underwater landscape either rejected or recycled.

Recycling a ship's components, or whole hull, was never an easy task; it was very labour intensive. At the fortress, soldiers could always be ordered to do the unpleasant, dirty, and sometimes even dangerous work. In that way, labour was cheap and available, but still not every ship was dismantled. In the Swedish period of the fortification, the

norm was to sell the watercraft. It was a different standard than that of the city of Helsinki. For example, during the 18th century, it was a common habit to abandon a merchant ship after its last voyage into the homeport. These abandoned ships created a disordered landscape, causing complaints from the citizens of Helsinki already in the 1770s (Hornborg 1950). Accordingly, a wreck in the underwater landscape of a fortress can be seen in a different light than a wreck in the city harbour.

However, at a maritime fortress, not all vessels were treated according to the norm and sold. Outdated ships offered raw material for building new constructions underwater. It was very common, for example, in Karlskrona, one of the main naval bases for the Swedish fleets. Recycling a hull successfully for this kind of purpose required ownership of the vessel and the need and opportunity to create new structures. It was not usually possible for a merchant, but at a fortress, the military had control over the water area. They also had spare vessels and a continuous need for construction and different types of shoreline maintenance.[1]

During the time of the Russian Baltic Fleet, the norm was to recycle ships by demolishing them into pieces for further use as raw material in the shipyard. When the era of wooden warships came to an end, ships began to be constructed of valuable metal parts, which could be recycled usefully.

The majority of the recycled ships in the underwater landscape were identified during this research and connected to their historical contexts. Finally, most of the recycled vessels in the archaeological record were addressed with the biographical approach, revealing their life cycles.

5.2.1 Lilla Varvet and economic recycling

The oldest example of recycling behaviour observed at the fortress was linked to the Swedish period, and the motivation behind the behaviour was economic. The case of Lilla Varvet (Little Wharf) provided a group

[1] The latest discovery at Karlskrona was in the news on 1 February 2017, when Swedish maritime archaeologist Jim Hansson announced the discovery of the Blekinge ship, a historically significant warship. According to Hansson, the ship may have been scuttled so that its upper gundecks were above the water, and used as a cannon barge to defend the city of Karlskrona during Karl XII's campaign against Russia (Rogen 2017; Hansson pers. comm. 2017).

of wrecks with a personality. The galliots *Prinz Wilhelm*, *Ancklam*, *Alte Treu*, and *Prinz von Preussen* could be connected to this group of previously unidentified wrecks. We now have four wrecks and four ship identities, although it is still unclear which identity can be connected with which particular wreck. Without the recycling aspect, the biography of these vessels would still be hidden.

Three of these wrecks were studied at the beginning of the 1980s, and one was considered to have been dredged completely during the 1970s. Surprisingly, one additional possible galliot wreck in the underwater landscape came to light during the renovation of a modern jetty in 2013. This wreck has not yet been thoroughly documented.

The people involved in the planning, building, equipping, using, maintaining, repairing, and recycling of these ships changed completely over time, due to a complete change of ownership and to changes in the ships' roles from merchant ships to ships of war. The Prussian merchant vessels were recycled as military ships and used in war. After capture by the Swedes, they were added to the new Army Fleet based in Sveaborg, and a meaningful social status for the old vessels was created.

The Lilla Varvet case study has shown that new information can be gained from different sources even regarding skeleton wrecks, thus allowing these wrecks to be included within the historical context. The wrecks discussed here are in their locations for a reason and are sources of both archaeological and historical information.

How can we be sure that people scuttled the hulls for the breakwater construction? Could it simply be a ship graveyard, as there are so many wrecks in a small area? From the archaeological evidence alone, the interpretation as a breakwater is subject to criticism. However, analysis with the interpretation tool suggests that these wrecks were scuttled. This is indicated by their geographical location in front of Lilla Varvet, which needed protection from northeastern winds. Their placement strategies with scuttle stones and their alignment along the shoreline also support the breakwater interpretation. In addition, the fact that the log frame construction was eventually built on top of them could strengthen the interpretation. However, building the breakwater to shelter Lilla Varvet from northeastern winds took thirty years, from the 1760s to the 1790s. All these factors might well be coincidental. Nevertheless, until the evidence suggests something else, this case is seen as an example of economic recycling behaviour, supported by historical sources.

A warship was a big and expensive item to put to secondary use, so making this decision may well have taken a long time. It needed to be approved by higher administration, represented plausibly by Augustin Ehrensvärd. He expressed concern about the lack of financing for the maintenance of the fleet, and suggested giving up outdated vessels as a solution to this problem. The economic aspect can be seen in the maintenance costs of old vessels: costs needed to be cut, and this could be done by giving up ships. The norm would have been to sell them at a public auction. However, these old vessels were in poor condition, and the fleet sold only their tackles. There was also an investment aspect in using the ships as construction material, which resulted in savings in the building costs of expensive structures. The case suggests that the reuse and recycling of ships and their equipment was an innovative process at Sveaborg after the Pomeranian War. This indicates a flexible system where ships that could not be sold in a public auction were utilized in other ways for the benefit of the contemporary society.

Up until now, the harbour at Lilla Varvet in Suomenlinna has been considered as an uninteresting area containing a small harbour and 19th-century remains. Archaeological analysis has led to the identification of some of these wrecks, enabling the public to become familiar with real pieces of galliots and their story in a temporary exhibition at the Suomenlinna Museum.

5.2.2 Blockships and tactical recycling

During the Russian period, ships were reused and recycled for economic reasons, by demolishing them into components. However, not enough historical material is available to create an understanding of what was typical recycling behaviour during the entire Russian period of the fortress (1808–1918). Demolition was the usual way to handle old ships at the time of the Crimean War in the 1850s. At that time, tactical reasons overruled economic aspects, and old ships were now scuttled as blockships instead of being broken up and sold for their material. The scuttling commands came from as high as the Emperor of Russia, Alexander II, who was also the Grand Duke of Finland.

The Allied fleet did not proceed to Helsinki, as they were afraid of sailing aground in the shallow and unpredictable waters, and the blockships probably strengthened this reasoning. However, the topography of Särkänsalmi is deep and steep, and scuttling a ship of Ezekiel-class size did not block the whole waterway. The depth of Särkänsalmi was

measured in detail only after the Crimean War, and it became obvious that the scuttled ships were too small and lay too deep to block traffic in the strait.

The command of the Emperor to scuttle ships into Särkänsalmi came very late, when the enemy was already scouting the area. It was probably more of a scuttling performance and a way to send the message 'You shall not pass!'. Interestingly, this interpretation has led to the use of blockships being seen as reactive behaviour to the threat imposed by foreign fleets. This study enables us to understand that blocking the waterways as a whole was a long process, and the use of blockships was related to a long-standing Russian tradition.

Several Ezekiel-class ships were scuttled into different straits. This study uncovered information from the National Archives of Finland on corresponding salvage operations that could reveal the ships' identities. As they were converted into blockships, they were renamed with numbers, and at the same time stripped of their pasts. Only the biographical approach employed by this study could reconnect these piles of wood from the seabed with the original craft. They were the last wooden military sailing ships of the Russian Baltic Fleet. The remains of two previously anonymous blockships, numbers 9 and 10, are now known to be *Retvizan* and *Arsis*, and their biographies could be completed. The Ezekiel-class ships *Oryol* and *Leipzig* ended up being recycled twice: first they were scuttled as blockships, and then, after salvage, they may have been sold at auction as recycled raw material.

All these remains indicate that tensions in international relations also leave their marks in the underwater landscape, and some of these closed straits were permanently barred. In addition, this case showed how economic reasons are not as relevant in times of war, when decisions need to be made for protection and tactical advantage.

The archaeological evidence from this study's survey indicates that there is still physical evidence of these ships left. The appearance of these remains mainly suggests that the wrecks have faced salvage operations, and as a result, material has been returned to the systemic context, into use. However, there is no archaeological evidence of this recycling, as the salvaged metals have been melted and wood most likely burned. The only archaeological evidence remaining is located in the underwater landscape. To study these ships further, archaeological excavations are required.

The events during and after the Crimean War allow an interesting glimpse into the decisions made at Sveaborg during the Russian period. Planning the protection of the fortress was a longer process than has previously been thought. These vessels happened to be at the fortress at a time of need, and their use was planned with what appears to be little experience in scuttling vessels. The Russian naval command wanted to scuttle the ships in such a way that they could be lifted once the blocking was not needed. According to the plan, the scuttle holes in the hull should be able to be covered, and the water inside the vessel pumped out. This may have seemed like a simple process from the viewpoint of an official sitting at his desk, but in reality it was much more complicated.

The experienced soldiers at Sveaborg — Sorokin and Lermontov — tried to convince their superiors to build cheaper and more durable caissons instead of scuttling ships. They even demonstrated that ships were more valuable if their materials, such as metals, were recycled. Sorokin and Lermontov were proven right when the scuttled ships started to disintegrate and the loose parts caused damage to nearby bridges. Caissons were eventually built in all the straits in 1863–1864, and salvage operations were mounted to remove the blockships and stop them from causing problems.

One question related to tactical recycling is whether the scuttled ships were treated differently based on their origin. Were enemy ships handled differently compared to the country's own fleet? It appears that the ships were treated similarly despite their different origins, and any vessels available in times of need were scuttled regardless of whether they were confiscated merchant vessels or old warships, their own or the enemy's. At the time of the Crimean War, the Sveaborg Navy Yard had almost industrialized processes both for converting ships into secondary roles and for recycling them through demolition.

The scuttled ships were not necessarily strongly related to the geographical area of scuttling. The difference compared to abandoned merchant vessels found in harbours is clear, as merchant ships tended to take the very last trip to their homeports. This has been acknowledged for example by Westerdahl (1992:7): he explains that there is a strong local connection inherent in most stripped wrecks, suggesting that they have been abandoned at their home port.

The destiny of the Swedish fleet captured in 1808 remains unknown. Although this study has demonstrated that at least four of the scuttled

ships were of the Russian Ezekiel class, the other wrecks — for instance, the cannon sloops between Särkkä and Vanha-Räntty —remain unidentified. They could be of Swedish origin: to be able to prove this, they should be dated from dendrochronological samples, and recorded properly.

Anonymous blockships are difficult to study, but this case has shown that the recycling aspect directed the search for information and the interpretation towards a successful conclusion.

5.2.3 Vesikko *and symbolic recycling*

The submarine *Vesikko* has been repurposed as a museum, an action supported by its history as a member of the Finnish fleet. Without this specific value as a symbol of technological improvement of Finnish marine engineering, it would probably have shared the destiny of other Finnish U-boats: sold to Belgium as scrap metal. Reusing the metal of the submarines was the norm at the time. Bringing Vesikko 'back to life' did not mean that it continued serving as a submarine. Thanks to private citizens and their financing, this submarine ended up in the collection of the Military Museum of Finland, and is now permanently located on the shoreline of the island Susisaari, opening up to the bay Tykistölahti.

Recycling the vessel whole for symbolic meaning took place only as a conscious effort of active citizens and the staff of the museum, who reacted to save the submarine. This took place during the extended biography of the vessel, when the historic value of the submarine was acknowledged. However, symbolic value can change over time, making *Vesikko*'s final destiny depend on public outreach and the general interest of visitors.

5.2.4 Benefits of the biographical approach for interpretation

For an archaeologist making an interpretation, it is important to think of the entire life cycle of the ship: from the wood in the forest to the wreck at the bottom of the sea, and even beyond. In the case of Lilla Varvet and the galliots, the idea that old merchant vessels could have been recycled into military service created a problem for the archaeological interpretation. The wrecks of the galliots still contained details of merchant shipbuilding traditions, and their origin was sought among local merchant vessels. Their identity remained undiscovered

until this study revealed their transformation into galliots of the Army Fleet. The Swedes took these ships from the Prussians, who had already changed them from old merchant vessels into 'new' warships before the sea battle of the Bay of Stettin in 1759. The atypical biography of the vessels caused problems for archaeological interpretation when they were discovered, as their character as merchant vessels was clearly visible, but their military use was not at all obvious. At that point, the interpretation process concentrated on the physical remains and their technical details, not on the context created by the landscape. These recycled vessels were seen through 'shipwreck glasses', clearly affecting the result.

The recent change in archaeological thought sees a complicated wreck site as one object. This change has created space for new types of approaches in archaeological analysis and interpretation. This study combined the archaeological object's life history and the anthropologically-inspired biographical approach. Both traditions follow the full life cycle of objects, and go even beyond that. For example, only the discovery of the details of a salvage operation allowed combining the life history of Ezekiel-class ships and knowledge of blockships used in the Crimean War. The salvage had been so thorough in some of the straits that the archaeological evidence of the use of blockships was in danger of disappearing entirely.

Luckily the new archival material from the National Archives of Finland led to the discovery of the Ezekiel-class ships. Typically, the research would have concentrated only on the scuttling operation, where the identity of the vessels had already been removed. It was a lucky coincidence that the correspondence between the new salvage company, Helsingfors Dyknings AB, and Russian authorities also included the 'code' that allowed matching the blockships with their previous identities. With the discovery of their original names, the ships' previous careers could be revealed and their biographies completed. This find adds a little piece of information to the historical records as well: the lives of these ships did not end with being broken up, as the official records maintain. Instead, they were converted into blockage vessels and scuttled at Sveaborg during the Crimean War.

When there is enough information to reconstruct part of the life history, it should also be possible to re-evaluate the story taking a more impartial approach, giving equal importance to different periods of the biography. This means adjusting our traditional attitude towards

warships. Typically, when we think of warships, we tend to think of ships in active service. Recycled hulls and vessels in secondary, supportive roles are not as highly appreciated as new ships. However, all vessels at different stages of their careers could be equally valued in society, as they are all required and necessary for specific purposes.

The familiar narrative structure of birth, life, and death is applied to the biographical story of the vessel. However, ship biographies can also be incomplete, consisting of a series of connected jumps. The vessel becomes alive within various social relationships and is inactive at other points in time. The biographical approach gives the possibility of picking up on the biography at certain moments of the vessel's life cycle. With limited archaeological evidence for the life of the ship, this is merciful for the researcher. According to Joy, researchers should not feel that the biography is insufficient because we are unable to construct a neat and complete life story (Joy 2009). Even imperfect evidence can allow us to construct an interesting biography of a ship based on the available knowledge.

The biographical approach is highlighted in a recent doctoral dissertation, which introduced the concept of 'shipwreck biographies' in connection with accidental sites (Holland 2015). Should there be a separate method of explaining 'recycled ship biography'? This dissertation did not set out to implement such a concept, but this possibility is worth discussing in the future. There is a difference between abandoned, shipwrecked, and recycled vessels as archaeological study sites, as they enter the archaeological record through different paths. These paths are worth studying: in particular, from the perspective that abandoned and recycled hulls express the values of the society responsible for their scuttling.

A lack of evidence can be compensated for by studying a group of objects, as presented through different case studies in this dissertation. It was Kopytoff (1986: 66–68) who first suggested this idea. The examination of object groups enables identifying an ideal or typical life for a particular artefact type. From there it becomes possible to distinguish those objects that deviate from the norm (Joy 2009). This approach was used with the scuttled vessels around Suomenlinna. Scuttling an old ship was not the norm at the fortress during any period of history, but an exceptional decision.

Predicting the lifespan of a vessel is almost as difficult as predicting it for an individual human. For this reason, the life cycle of a ship is hard

to study; a ship might have had several owners and functional roles, and been used around the globe. Typical stories of ships are related to the last journey of the vessel, the dramatic events of the sinking, and action after the foundering. Many old vessels have had a use life at least as exciting as its final catastrophic event. The typical way of presenting the life story of a ship could be compared with the obituary of a person in which the only interesting thing to mention was the way she passed away. The whole life story, which should be the most thrilling thing, would be neglected for the drama at the end.

This study has paid attention to the way maritime historians place value on different phases of the life cycle of a military ship. The name of a vessel is recycled to a new vessel after the old vessel's primary career as an active member of the fleet is over. The old ship is given a secondary role until it is decommissioned. This creates a situation where these vessels disappear from written history. They might turn into the worksite of a maritime archaeologist, stripped of their past. Here 'she' becomes 'it' and an anthropomorphized vessel becomes an object. This study suggests that wrecks deserve the same dignity as the original ship had, and maritime archaeologists should approach these types of skeleton wrecks as veterans with memory loss. Our studies can help to connect these seniors with their identity. If wrecks are anthropomorphized in the same way as the original vessels, they will not be looted as easily; they retain value as individuals.

Mariners have typically referred to their ships as female, as *she*. Ships have been seen as having personal characters and even a will of their own. With this in mind, it is quite natural to extend the idea of a ship as an object with a personality even to skeleton wrecks that do not resemble the original ship as much as well-preserved shipwrecks do.

5.3 Can recycling bring material from the archaeological context into the current cultural context?

Material and ideas can generally be brought from the archaeological context into the current cultural context. Can this be called recycling? It seems possible, according to the example set by Norwegians and the way they recycled their maritime traditions to serve the community. In the Sørlandet region, the maritime heritage has been recycled to meet the needs of visitors, and recreational boating and cottage tourism support the local economy. The more people live in big cities, the more

they seek beautiful landscapes during their holidays. The maritime cultural history has not been recycled at Suomenlinna to the same level as in the reference case study of Norway. However, the potential for tourism connected with Baltic Sea wrecks has not yet been evaluated. Together with the fantastic archipelago, they could form a basis for sustainable tourism.

Archaeological material can be recycled into a cultural context when there is a symbolic motivation. For example, when an old ship becomes a museum. Symbolic recycling of objects from the underwater landscape is also present in the history of the fortress, such as the anchors of Särkänsalmi and *Kronprins Gustav Adolf*. These anchors were eventually placed in Helsinki, not at the fortress. Hurcombe (2007) called this phase of an object's life an 'extended object biography'. It creates value and meaning for the discovered item within modern society.

Fig 5.1. The dry dock at Susisaari is still in active use. In the picture icebreaker Tarmo is under renovation. Tarmo serves as a museum at coastal town Kotka (photo by the author 2017).

Although Suomenlinna is a sea fortress, symbols of the maritime past are not highly visible in the landscape. At Suomenlinna, the largest construction with a maritime background is the dry dock at Susisaari (Fig. 5.1). The long tradition of shipbuilding is present in the life of the dockyard. The active dry dock community of modern Suomenlinna has kept old working methods and seamanship alive. The long history

of shipbuilding has been continued in the form of a modern cannon sloop. It was built according to the original 18th-century drawings, which were adjusted for safe seafaring in the 2010s.

The sloop project was intended to raise awareness of maritime history. In the construction phase, traditional shipbuilding methods were taught to young professionals. The next stage was to take visitors out to sea, to experience life on a cannon sloop and give an alternative view of the fortress from the sea. The project began in the autumn of 2010, and the vessel was launched in June 2014. It was a big financial investment for the Ehrensvärd Society and the Sveaborg Shipyard Society (in Finnish, *Viaporin Telakka ry*). The ship set sail baptized as *Diana*, a name recycled from a previous ship of the Swedish navy. The original sloop *Diana* took Augustin Ehrensvärd around the Finnish archipelago while he was looking for a suitable location for the fortress in 1747. This example expresses the way history can be made alive by recycling the past.[2] *Diana* should be located where it is visible in the general landscape, for example in Tykistölahti ('Artillery Bay'), the traditional location of the fleet during the Swedish period.

The different examples presented above raise the question if they could, or should, be called recycling. There is no simple answer, but more important than naming and labelling things is to consider and acknowledge different types of material flows and object biographies. It is important to understand that everything is in a constant circle of life, and there is a cultural aspect to 'recycling'.

5.4 Visions for the future

The underwater cultural landscape was not intentionally outlined in the proposal to add Suomenlinna to the UNESCO World Heritage List. It was simply not a relevant topic at that time, and there were no maritime archaeologists to promote the idea. This study presented the Bikini Atoll case as an example of symbolic recycling, because it is one of the rare cases in which UNESCO has included underwater cultural heritage on its list. This occurred in 2010 and demonstrates that the same is not impossible for Suomenlinna, either. However, if the underwater landscape is filled with anonymous wrecks, there is little motivation to protect them. This raises a critical question: what stories

[2] The life cycle of this type of sloop was typically 20 years. *Diana*'s life expectancy is a bit higher, from 50 to 100 years.

of wrecks need to be heard by our own global contemporary society? Can the recycling aspect be significant, as presented within this study?

Fig 5.2. The way future generations connect with water is up to us. Pictured: Veikka and Veli Leino playing at the shoreline (photo by the author 2008).

One thing is certain: it is easy for a visitor to become familiar with the built landscape of the fortress. If we wish to disseminate information about the seabed, we need to use modern technology and land signs to share this information with pedestrians visiting the fortress, not only with divers, who are much less frequent visitors. How will underwater remains be made accessible to the public (Fig. 5.2)? This is obviously one of the future challenges for the Governing Body of Suomenlinna and the National Board of Antiquities. Promoting underwater cultural heritage is also within the spirit of the international Working Group for Underwater Heritage, which has produced a 'Code of good Practice for the management of the Underwater Cultural Heritage in the Baltic Sea Region' (COPUCH). In these guidelines, underwater heritage is considered something that should be made accessible to recreational divers and other users (Edgren and Varenius 2008). A place like Suomenlinna, as a UNESCO World Heritage Site, provides opportunities to combine research and public awareness. The public outreach should be anchored in research results and offer educational and entertaining perspectives.

When a visitor encounters information about the underwater cultural landscape while exploring the natural environment, the message feels more personalized. In a traditional museum, the temperature and climate are controlled, enabling the same kind of experience for all visitors; at Suomenlinna, an individual experience can be had outdoors in four different seasons. Walking is encouraged at the fortress by the Governing Body of Suomenlinna as the primary method of moving from one place to another. For humans, the pedestrian way of life has lasted hundreds of thousands of years and formed ideas of community, time and space, and our relationship with the environment. It helps us to set a scale for things in life and realize the human life cycle from birth to dissolution (Jackson 1994:198).

In the fortress area, this could be achieved by a self-guided tour with mobile applications. The underwater seascape should be possible to see while standing on a shoreline and holding a mobile, which can present the unseen landscape as augmented reality. A visitor could view images of the underwater remains and read or listen toinformation about the site. Similar paths have been created at ship abandonment locations in, for example, North Carolina in the United States. There, video mobile messages offer an exciting medium for disseminating information in the dynamic environment of the riverfront. This can be called a maritime trail. Raising the interest in and value of these retired ships is vital for the public to appreciate the area as a historically significant collection (Dermody et al. 2013:323).

If we think of communal archaeology, there are several ways in which archaeological excavations could be conducted to allow the audience to take part in the process. Visitors could be encouraged to visit the dig site; there are wreck sites close to shorelines, where public outreach would be easy to organize on the shore. Excavations could be organized in cooperation with different maritime archaeological societies of various countries, since Suomenlinna is not only a national site; its history involves at least all of Europe. There are still many uncovered biographies related to wrecks, and a high-profile public outreach programme might facilitate their discovery.

What could be the specific scientific questions related to this type of excavation? Firstly, the destiny of the Swedish Army Fleet from 1808 is still a mystery. For example, the wreck ID 2694 (Länsi-Mustasaari wreck 2) could shed light on this unknown part of history. Secondly, it would be a unique opportunity to excavate wrecks transformed from

merchant vessels into galliots, perhaps revealing technical decisions made by the stubborn shipmaster Klundret during the 1750s. There are many unanswered questions from the condensed history of the fortress. It is important to engage people who are not typical users of historical knowledge, such as young people. There is a specific charm to maritime archaeology, and it should be acknowledged and used while creating new projects.

In the future, a new type of recycling of ship hulls might be practiced in the Baltic Sea. It could be called ecological recycling, where the goal is to work for the well-being of the environment. This type of behaviour can include, for example, recovering a damaged landscape, or providing fish with a nurturing ground. New sites are often popular destinations for divers, snorkelers, and fishermen, even changing recreational diving and fishing patterns. Artificial reefs can be used for shoreline stabilization, coastal erosion improvement, and even enhancement of local surfing conditions (Broughton 2012:2).[3]

At the beginning of reef programmes, most artificial reefs in the USA were extensive, low-budget, and quickly built from scrap materials using volunteer labour. People made reefs for the needs of recreational fishermen. Meanwhile, Japan's artificial fields were designed and constructed by engineers. These reefs were made of durable and non-waste prefabricated materials, placed in scientifically selected

[3] For example, in Broward County of Florida, USA, there are 112 artificial reefs that were created by recycling old items such as ships, barges, and even washing machines. The imagination is unlimited when it comes to material sources for creating a new reef. Reefs are typically constructed by sinking dilapidated ships, airplanes, bridges, even old oil rigs and concrete (Bohnsack and Sutherland 1985; Baine 2001; Broughton 2012:2). There is a financial interest in this type of action too; sometimes it is cheaper to scuttle things than to remove them for disposal on land. Scuttling objects can also have an environmental impact in an indirect way. For example, in Finland there are three underwater trails built by Metsähallitus, a state-owned enterprise that administers state-owned land and water areas. The trails provide information about the Baltic Sea through information signs and pieces of art. The last established park opened in June 2014 in the Finnish Archipelago Sea, close to Dalskär island. High school students designed the park. They created artworks out of steel and concrete representing, for example, a mermaid. The idea was that marine organisms will form the final coating of the artwork, and the statues also create hiding places for fish. Not only can spectators achieve a new understanding of the Baltic Sea, but also students involved in the project explained how it changed their perceptions of the sea. After the project, they were able to comprehend eutrophic processes, and see how the Baltic Sea is worth preserving (Lehtinen 2014).

sites, and primarily used by commercial fishermen (Bohnsack and Sutherland 1985:11–39).

In Finland, there was a discussion in 2016 concerning the big flagship *Pohjanmaa* when it was decommissioned and removed from military service.[4] At that point, its future was uncertain, and the Finnish Navy was trying to find a new owner for it. A group of divers suggested that *Pohjanmaa* could be scuttled to serve as a diving site, which generated public discussion. However, the ship got a new owner, Meritaito Ltd, and was able to continue its life as a survey vessel before the question of its suitability as an artificial reef was thoroughly inspected.

Today, professional scientific divers monitor reefs, and a whole community of artificial reef specialists share their observations and discoveries. The history of artificial reefs is still short, and there is no clear understanding of their long-term structural integrity. Their appreciation could be improved. For example, over the past two decades there has been a dramatic increase in the planned sinking of prepared vessels for recreational diving and fishing communities around Florida, USA (Barnette 2003:1). Unfortunately, stories of these sites are not often shared. This is related to the end of the ship biography: these ships lack the drama of an unplanned sinking through war, weather, or chance.

However, these artificial sites and their wildlife attract visitors, and they become famous diving sites, boosting the local economy with diving tourism. These sites are photogenic, creating three-dimensional structures in an otherwise flat landscape.

When maritime archaeology and history increase appreciation of the whole biography of a vessel, the value of these ships will also rise. By opening the field to other kinds of biographical stories, academia within maritime archaeology could broaden the scope of research. It is vital that we see beyond treasure ships if we are interested in widening our understanding of human behaviour in a maritime context. The last ten years have witnessed the blossoming of maritime archaeological academia, and hopefully this global phenomena will continue.

One area for further research could be of seabound place names: whether names reflect activities at sea. One systematic search of Suomenlinna's place names from the Finnish period clearly demonstrates the way place names have a time horizon, with many of them dating back to Swedish period (Aho 1998). This research could be combined with a survey of the waterlines; they are known to contain

[4] See http://www.hs.fi/kotimaa/a1458012076148

many old rock carvings and attachment rings. There was a small survey in this spirit of the eastern part of Iso Mustasaari, conducted by maritime archaeological students and supervised by the author in 2010.

5.5 Conclusion, looking without seeing?

The general use of the term 'recycling' is rather narrow and easily tied up with industrial processes and waste management strategies motivated by economic interests. It has shortcomings in dealing with cultural and historical aspects. Luckily, this seems to be changing with new studies challenging the old concept, such as a publication titled *The Afterlife of Used Things: Recycling in the Long Eighteenth Century* (Fennetaux et al. 2014). The book clearly demonstrates the way written history can be challenged with the recycling approach.

Based on the examples presented within this study from the global context, as well as from Suomenlinna, it could be concluded that at least economic, tactical, and symbolic ideas can be seen in the decision-making processes connected with recycling vessels. Recycling was an important part of forming the maritime cultural landscape.

Recycling is a natural human behaviour, connected to our relationship with the material world. Mending, repairing, reusing, and recycling have been practiced in all societies, from the Palaeolithic Stone Age and continuing today. As for the fortress of Suomenlinna, it has suffered from a lack of funding, which has inspired the innovative use of old material.

This dissertation set out to understand how ships became wrecks around the old sea fortress, why they had lost their identities, and how they could be returned. The study succeeded in discovering different types of recycling behaviour related to the birth mechanisms of sites. Recycling behaviour varied according to the needs of the time, and the decisions made were highly dependent on the political and economic circumstances of a more extensive area, not only of the fortress itself. In a way, wreck sites around the fortress became windows to the wider history of Europe during the 18th to 20th centuries.

What motivates an archaeological interest in fortress islands in a period from which there are so many other sources of information? This study was inspired by the possibilities for maritime archaeology to shed light on the past from a new perspective and make people think beyond their everyday lives. This study's investigations have shown

that the entire marine area around the fortress should be treated as a cultural landscape. The wrecks on the seabed form a part of the built environment, containing archaeological clues on the recycling behaviour practiced in the fortress. This cultural landscape has not evolved through coincidence: it reflects the decision-making of the parent societies. It is a landscape of power, born with conscious construction, a true maritime cultural landscape.

The knowledge of the landscape has also become a reflection of power. The topography of the whole Baltic Sea has long been a strategic issue, and it still is. Without the ability to see the underwater seascape, one can only form a relationship with the surface. It is vital that we are able to visualize the bottom, to see what is preserved there. The scars of war should also be more visible and accessible for people without diving abilities. It is time to look beyond the surface of the Baltic, and see the past. It is time to hear her stories.

Appendices

Appendix 1: List of maritime archaeological projects at Suomenlinna

All field reports are in Finnish. The English translations of the titles are made for the current publication only, and are not suitable for database searches.

Museovirasto = National Board of Antiquities, Helsinki

Kulttuuriympäristön tutkimusraportit (Register of field reports)
https://www.kyppi.fi/palveluikkuna/mjreki/read/asp/r_default.aspx

Alopaeus 1975a = Kustaanmiekan tutkimus. (Research in Kustaanmiekka strait.) Harry Alopaeus, National Board of Antiquities. Report ID 145377.

Alopaeus 1975b = Sukellusraportti Särkän - Harakan aallonmurtajalta (Särkkä–Harakka breakwater. Diving report.) Harry Alopaeus, National Board of Antiquities. Report ID 145378.

Alopaeus 1975c = Tutkimusraportti Särkän saaren ja Harakan välinen salmi, Helsinki. (The strait between Särkkä and Harakka islands in Helsinki. Research report.) Harry Alopaeus, National Board of Antiquities. Report ID 145379.

Alopaeus 1980a = Suomenlinnan Susisaaren ja Ison Mustasaaren välisen sillan arkkujen tarkastussukellus syyskuussa 1980. (The caissons of the bridge between Susisaari and Iso Mustasaari. Report of an inspection dive, September 1980.) Harry Alopaeus, National Board of Antiquities. Report ID 146448.

Alopaeus 1980b = Suomenlin[n]an Tykistölahden laiturien VA-tutkimukset 26.8.1980 ja 2.9.1980. (Tykistölahti ('Artillery Bay') in Suomenlinna. Documentation of jetty structures 26 August and 2 September 1980.) Harry Alopaeus, National Board of Antiquities. Report ID 145376.

Tappola 1981 = Raportti pohjainventoinnista Suomenlinnan Länsi-Mustan ja Ison-Mustan välise[s]tä putkilinjasta. (Pipeline between

Länsi-Musta[saari] and Iso-Musta islands. Survey report). Olli Tappola, Teredo Navalis ry. Report ID 145374.

Lindfors 1982 = Tarkastuskertomus Suomenlinnassa Pikkumustasaaren ja Länsi-Mustasaaren välisen putkilinjan tarkastussukelluksesta. (Survey of a pipeline between Pikku Mustasaari and Länsi-Mustasaari islands.) Pekka Lindfors, National Board of Antiquities. Report ID 146447.

Alopaeus 1983 = Raportti Särkän - Länsi-Mustasaaren välisen painevesijohdon ja viemärilinjan sukelluksesta 23.7.1983. (Pipelines between Särkkä and Länsi-Mustasaari islands. Diving report, 23 July 1983.) Harry Alopaeus, National Board of Antiquities. Report ID 145373.

Hyttinen 1986 = Väliraportti Suomenlinnan pohjainventointi. [Varvinlahden proomu id 2084.] (Survey of the Suomenlinna water area. Interim report.) [Barge id 2084 in Varvilahti bay.] Heikki Hyttinen, Teredo Navalis ry. Report ID 145372.

Teredo Navalis 1987 = Raportti Suomenlinnan sukelluksista. [Tykistönlahti, Pienvenetelakan eteläpuoleisen lahden suu, Susiluodonlahden ja Susisaaren länsirannat).] (Diving report from Suomenlinna.) [Tykistönlahti bay, S of Lilla Varvet, W shores of Susiluodonlahti bay and Susisaari island.] Teredo Navalis ry. Report ID 145371.

Teredo Navalis 1987–1988 = Raportti Suomenlinnan sukelluksista talvella 1987-1988. [Kuninkaanportin edusta, Varvilahden ja Länsi-Mustasaaren lounaisrannat, Ison Mustasaaren pohjoisranta.] (Diving report from Suomenlinna, winter season 1987–1988.) [Front of Kuninkaanportti, SW shore of Varvilahti bay, SW shore of Länsi-Mustasaari island, N shore of Iso Mustasaari island.] Teredo Navalis ry. Report ID 145370.

Teredo Navalis 1988–1989 = Raportti Suomenlinnan sukelluksista talvella 1988-1989. [Pikku- ja Länsi-Mustan välinen salmi, Pikku-Mustan ja Ison Mustasaaren pohjoisrannat, Länsi-Mustan ja Susisaaren välinen salmi, Kustaanmiekan eteläkärki.] (Diving report from Suomenlinna, winter season 1988–1988.) [Between Pikku-Mustasaari and Länsi-Musta islands, N shores of Pikku-Musta and Länsi-Musta islands, between Länsi-Musta and Susisaari islands, S end of Kustaanmiekka.] Teredo Navalis ry. Report ID 145369.

Roth 1989 = Suomenlinnan alueella olevien Merisotakoulun raivattavaksi esittämien VA-kohteiden tarkastus 19.10.1989. [Underwater

remains in Suomenlinna to be removed by the request of the Navy. Diving report, 19 October 1989.] Harto Roth, National Board of Antiquities. Report ID 145367.

Hacklín 1990 = Raportti Suomenlinnan sukelluksista 1990. [Varvilahden pohjoisranta ja suun edusta, Länsimustan pohjoisranta, Särkänsalmen väyläeste.] (Diving report from Suomenlinna.) [N shore of Varvilahti bay, front of Varvilahti, N shore of Länsimusta island, sailing embankment in Särkänsalmi.] Jari Hacklín, Teredo Navalis ry. Report ID 145368.

Laitinen 1998 = Särkän salmen laivaväylän parantaminen Vedenalaisten muinaisjäännösten inventointi. (Sea lane in the Särkän salmi strait. Survey of underwater archaeological remains.) Matias Laitinen, Oy Baltic Eye Ltd. Report ID 126346.

Laitinen 1999 = Särkän salmen laivaväylän parantaminen, vedenalaisten muinaisjäännösten inventointi. (Survey of the Särkän salmi strait), 1999. Matias Laitinen, Oy Baltic Eye Ltd. Report ID 145384.

Tikkanen et al. 1999 [2005] = Helsinki, Kronprins Gustav Adolf. Kenttätyöraportti 1999 [1997–1999]. (The wreck site of the Kronprins Gustaf Adolf [1788] in Helsinki. Field reports of the 1997–1999 seasons.) Sallamaria Tikkanen and research team, National Board of Antiquities. [Project funding: Suomen Kulttuurirahasto.] Report ID 145398.

Virtanen & Luoto 2001 = Pikku Mustan ja Länsi-Mustan alueen vedenalaisinventointi. (Pikku Musta[saari] and Länsi-Musta[saari] islands. Survey of the water areas.) Kalle Virtanen and Markku Luoto, Subsurface Oy. Report ID 145385.

Leino 2006 = Helsinki Töölö, Suomenlinna Lonnan, Ison- ja Pikku Mustasaaren välinen vesialue. Vedenalaisten muinaisjäännösten inventointiraportti 2006. (Helsinki Töölö: Lonna, Iso-Mustasaari, and Pikku-Mustasaari islands. Survey of underwater archaeological remains.) Minna Leino, National Board of Antiquities. Report ID105104.

Leino 2009 = Helsinki Susisaari Varvilahti nk. Törnen laituri Historiallisen ajan patorakenteen tutkimus. (Varvilahti bay of Susisaari island in Helsinki. Documentation of the wooden embankment "Törne Pier".) Minna Leino, National Board of Antiquities. Report ID 141038.

Tevali 2010 = Helsinki Kaivopuisto, Harakka, Särkkä, ja Länsi-Mustasaari Vedenalaisinventointi 2010. (Helsinki: Kaivopuisto and the Harakka, Särkkä, and Länsi-Mustasaari islands. Survey report.) Riikka Tevali 2010, National Board of Antiquities. Report ID 141416.

Vakkari 2010 = Helsinki, Suomenlinna Töölö Ison Mustasaaren rantamuuri id 2696, hirsirakenteen arkeologinen dokumentointi 12.-14.10.2010. (Documentation of the foundations of the shoreline wall ID 2696 on Iso Mustasaari island in Suomenlinna, Helsinki. Archaeological documentation.) Eeva Vakkari, National Board of Antiquities. Report ID 141513.

Kalmari 2011 = Dokumentointi. Susisaari -1 hylky id 1292. (The wreck of Susisaari -1 id 1292.) Minna Leino, National Board of Antiquities, and students of scientific diving, Western Uusimaa Municipal Training and Education Consortium Luksia. Report ID 142141

Salo 2011 = Helsinki Susisaari Varvilahden patorakenne id. 2599. Vuoden 1917 patorakenteen kaivaus ja arkeologinen dokumentointi 31.10.-29.11.2011. (Wooden embankment ID 2599, built at Susisaari island, Helsinki, in 1917. Excavation report and archaeological documentation 31 October – 29 November 2011.) Eveliina Salo, National Board of Antiquities. Report ID 142535.

Tevali 2011 = Helsinki Länsi-Mustasaaren väyläesteen vedenalaisdokumentointi, Suomenlinna 7.-11.2.2011. (Documentation of the sailing obstacle at Länsi-Mustasaari island in Suomenlinna. Report of the underwater documentation, 7 to 11 February 2011.) Riikka Tevali, National Board of Antiquities. Report ID 145381.

Leino 2012a = Helsinki, Töölö, Suomenlinna. Suomenlinnan alueen arkeologinen vedenalaisinventointi 2007–2010. (Helsinki Töölö: Survey of the Suomenlinna water area 2007–2010.) Minna Leino, National Board of Antiquities. Report ID 142534.

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Other field documentation in the NBA archives

Alopaeus, H. 1975–: Various notes from underwater research at Suomenlinna.

Alopaeus, H. 1982: Fieldwork at the Little Warf site. Original drawings and photographs.

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Appendix 2: List of underwater remains at Suomenlinna

Recycled ships

1362 Iso Mustasaari, Wreck 1A (possible remains of *Prinz Wilhelm* or *Prinz von Preussen* or *Alte Treu* or *Ancklam*)
1363 Iso Mustasaari, Wreck 1B (possible remains of *Prinz Wilhelm* or *Prinz von Preussen* or *Alte Treu* or *Ancklam*)
1365 Iso Mustasaari, Wreck 3 (possible remains of *Prinz Wilhelm* or *Prinz von Preussen* or *Alte Treu* or *Ancklam*)
1364 Iso Mustasaari, Wreck 6
2694 Länsi-Mustasaari, Wreck 2
1308 Särkän salmi strait Wreck 1 (remains of *Retvizan*)
1289 Särkän salmi strait, Wreck 4 (remains of *Arsis*)
1286 Särkkä, Wreck 1
1287 Särkkä, Wreck 2
1288 Särkkä, Wreck 3
1000019999 Särkkä, Wreck 5
2682 Särkkä, Caisson and Wreck
2084 Susisaari, Wreck 4
Wreck Elements (remains of *Oryol* and *Arsis*)

Shipwrecked ships

1292 Susisaari, Shipwreck 1
1327 Pikku Mustasaari, Shipwreck 2
1370 Susisaari, Shipwreck 2
2098 Iso Mustasaari, Shipwreck 8
2090 Iso Mustasaari, Shipwreck 2

Abandoned ships

2126 Iso Mustasaari, Wreck 16 (possible remains of *Prinz Wilhelm* or *Prinz von Preussen* or *Alte Treu* or *Ancklam*)
1312 Pikku Mustasaari, Wreck 1
1320 Iso Mustasaari, Wreck 4
1326 Iso Mustasaari, Wreck 7
1371 Iso Mustasaari, Wreck 10
1000021160 Suomenlinna Small Dockyard Ship Graveyard

Excluded wrecks, small vessels, and boats

1366 Iso Mustasaari, Boat 17
1367 Iso Mustasaari, Boat 18
1321 Iso Mustasaari, Wreck 5
1322 Kustaanmiekka, Wreck 1A
1323 Kustaanmiekka, Wreck 1B
1324 Kustaanmiekka, Wreck 2
1361 Kustaanmiekka, Wreck 3
2125 Iso Mustasaari, Wreck 9
2105 Länsi-Mustasaari, Wreck Elements
2100 Iso Mustasaari wreck 11, Rowing Boat
2101 Iso Mustasaari wreck 12, Rowing Boat
2102 Iso Mustasaari wreck 13, Rowing Boat
2103 Iso Mustasaari wreck 14, Rowing Boat
1372 Iso Mustasaari 15, Sailing Boat
2079 Pikku Mustasaari, Rowing Boat
2093 Kustaanmiekka Wreck 4, Boat
2094 Kustaanmiekka Wreck 5, Boat
1000018682 Kustaanmiekka, Wreck
2104 Länsi-Mustasaari, Wreck
2085 Susisaari Wreck, Rowing Boat

Underwater constructions

10000210896 Iso Mustasaari, Breakwater Construction
2083 Pikku Mustasaari, Caisson
1306 Särkän salmi strait, Western Caisson
1307 Särkän salmi strait, Eastern Caisson
2099 Länsi-Mustasaari, Caisson
2088 Tykistölahti, Log Barrier Embankment
2599 Susisaari, Log Barrier Embankment
2092 Iso Mustasaari, Jetty Foundation
2546 Iso Mustasaari, Pole Construction
2106 Varvilahti, Caisson 1
2107 Varvilahti, Caisson 2
2108 Varvilahti, Caisson 3
2109 Varvilahti, Jetty Foundation
2097 Iso Mustasaari, Caisson
2222 Susisaari and Iso Mustasaari, Caissons of the Bridge
2086 Tykistölahti, Jetty Caisson 5

2696 Iso Mustasaari, Foundation of a Stone Wall
2087 Tykistölahti, Northern Caisson
2124 Tykistölahti, Southern Caisson 4
2533 Susisaari, Old Dockyard Gates

Loose objects

1369 Susisaari, Cannon
2188 Susisaari, Cannon 2
2089 Länsi-Mustasaari, Anchor
2091 Pikku Mustasaari, Anchor
2096 Pikku Mustasaari, Carriage
2127 Kustaanmiekka, Copper Vessels (Pots)
2198 Kustaanmiekka, Carriage Wheel
2128 Kustaanmiekka, Sledge
2295 Särkän salmi strait, Rudder
1000021161 Kustaanmiekka, Rudder
1328 Särkän salmi strait, Anchor

Other underwater sites

2095 Pikku Mustasaari, Dumping Ground
2081 Pikku Mustasaari, Bridge Remains and Dumping Ground
2695 Susisaari, Dumping Ground

Appendix 3: Ezekiel-class ships

Iezekiil' 80 ("Иезекииль", 1826, A) – Hulked in 1842, recycled and reused in Sveaborg in 1849

*Oryol 80 or Orel ("Орёл", 1833, A) – Decommissioned in 1846. Tranferred to Sveaborg in 1848. Recycled as a blockship in Sveaborg in 1854 (Susisaarensalmi).

*Leipzig 80 or Leiptsig ("Лейпциг", 1836, A) – Decommissioned in 1849. Hulked in 1850, recycled as a blockship in Sveaborg in 1854 (Susisaarensalmi).

*Retvizan 80 ("Ретвизан", 1839, A) – Hulked in 1852, recycled as a blockship in Sveaborg in 1855 (Särkän salmi strait, Blockship No. 9).

*Arsis 80 ("Арсис", 1828) – Hulked in 1854, recycled as a blockship in Sveaborg in 1855 (Särkän salmi strait, Blockship No. 10).

Ostrolenka 80 ("Остроленка", 1834, A) – Decommissioned in 1846, recycled and reused or used as a blockship at Sveaborg in 1854?

Krasnoi 80 ("Красной", 1830, A) – Decommissioned in 1843. Hulked at Sveaborg in 1844, recycled as a blockship?

Berezino 80 ("Березино"", 1830) – Stationed in Kronstadt Roads in 1854–5. Decommissioned in 1855. Towed to Sveaborg for breaking up in 1856. Recycled and reused in 1860 at Sveaborg?

Azov 74 ("Азов", 1826, A) – Russian flagship of admiral Login Geiden at the Battle of Navarino (1827) and during the Russo–Turkish War (1828–1829) in the Aegean Sea. Decommissioned in in 1830, recycled and reused in 1831 in Kronstadt.

Aleksandr Nevskii 74 ("Александр Невский", 1826) – Cut down as 64–gun frigate in 1832, hulked as depot in 1846, recycled and reused in 1847 in Kronstadt?

Katsbakh 80 ("Кацбах", 1828, A) – Served with two other 74s as a floating battery off Kotlin (in Finnish, Retusaari) in 1854. While serving

as a floating battery, fitted with an unprecedented main battery of 24 I–pood edinorogs. Recycled and reused in 1857 in Kronstadt?

Kul'm 90 ("Кульм", 1828, A) – Served with two other 74s as a floating battery off Kotlin (in Finnish, Retusaari) in 1854. While serving as a floating battery, fitted with an unprecedented main battery of 24 I–pood edinorogs. Recycled and reused in 1857 in Kronstadt?

Finland 80 ("Финланд", 1840, A) – Decommissioned in 1853, served with two other 74s as a floating battery off Kotlin (in Finnish, Retusaari) in 1854. While serving as a floating battery, fitted with an unprecedented main battery of 24 I–pood edinorogs. Recycled and reused in 1857 in Kronstadt?

Pamiat' Azova 86 ("Память Азова", 1831, A) – Hulked at Kronstadt in 1848, recycled and reused in 1854 in Kronstadt?

Brien 80 ("Бриен", 1829) – Sailed from Sveaborg to Kronstadt in 11.1854. Harbour service in 1855. Recycled and reused in 1860 in Kronstadt?

Velikii Kniaz' Mikhail 86 ("Великий Князь Михаил", 1827) – Stationed in Kronstadt Roads in 1854–5. Converted to floating crane (sheer hulk) in 1860, decommissioned in 1863, stricken on 11.9.1863 in Kronstadt?

Lesnoe 80 ("Лесное", 1829, A) – Hulked as depot; converted into a store hulk at Kronstadt in 1842.

Smolensk 80 ("Смоленск", 1830) – Stationed in Kronstadt Roads in 1854–5. Cut down to a 28 gun corvette, hulked in 1856 in Kronstadt?

Narva 80 ("Нарва", 1846, A) – Stationed in Kronstadt Roads in 1854. To Krasnaia Gorka with Vice-Admiral Zamytskiy´s squadron in 1854. Converted into a 58–gun frigate in 1855. Harbour service in 1856. Stricken on 11.9.1863 in Kronstadt?

Borodino 80 ("Бородино", 1830, A) – Decommissioned in 1845. Hulked at Kronstadt in 1847.

Ingermanland 74 ("Ингерманланд", 1842, A) – Wrecked in 1842 (lost 329 men, women, and children)

Ingermanland ("Ингерманланд") (1844, A) – Stationed in Kronstadt Roads in 1854–5. Decommissioned 1857. Stricken on 21.3.1860 in Kronstadt?

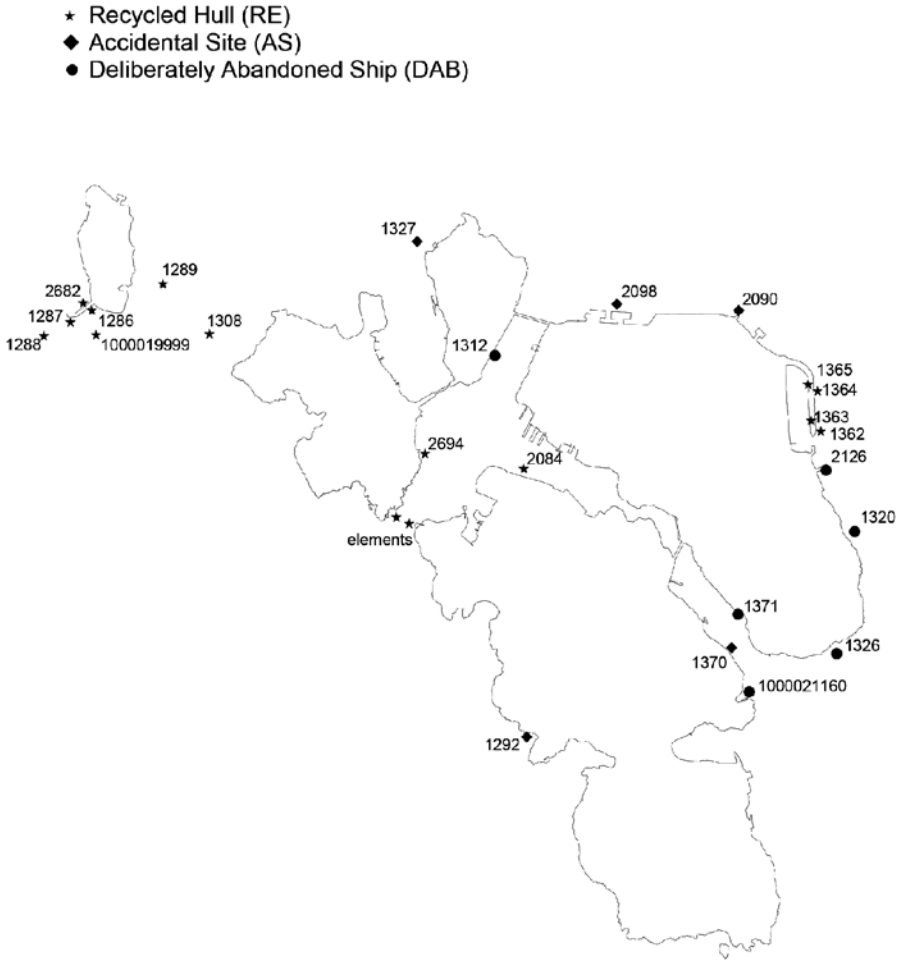
Pamiat' Azova 74 ("Память Азова", 1848, A) – Stationed in Kronstadt Roads in 1854–5. Carried cargo between Kronstadt and Revel in 1856–7. Decommissioned in 1857. Stricken on 5.1.1863 in Kronstadt?

Sysoi Velikiy or Sysoi Velikii 74 ("Сысой Великий", 1849, A) – Stationed in Kronstadt Roads in 1854. Converted into a 58–gun frigate in 1855. Harbour service in 1857–63. Stricken on 11.9.1863 in Kronstadt?

Scuttled in a different strait of Sveaborg during the Crimean war.

Information on this list is collected from Tredrea and Sozaev 2010: *Russian warships in the age of sail (1696–1860)* and http://en.wikipedia.org/wiki/List_of_ships_of_the_line_of_Russia#Iezekiil.E2.80.98-class_.2825_units.29 (read 12 February 2014), and, in addition, new information of the National Archives of Finland.

Appendix 4A: Analyzed wrecks in the landscape context



Map Minna Koivikko 2017

Appendix 4B: Analysed wrecks in the landscape context

ID n:o	Depth	Topographical description	AB	RE	AC	Shoreline orientation	AB	RE	AC	Connection with remains	AB	RE	AC	Placement assurance	AB	RE	AC	Dating	AB	RE	AC
2694	3	actively used water area	x	2	x	points to the shore	3	3	3	none	x	3	x	stones	3	3	x	after 1780	6	11	3
1312	8	off the shoreline retention wall	3	3	x	sideways	3	3	3	none	x	x	3	?	x	x	x	after 1639	6	9	6
2084	7	actively used water area	1	3	x	sideways	1	3	x	none	x	x	3	?	x	x	x	Russian period	2	6	3
1365	3	under a breakwater	3	3	x	sideways	x	3	x	ID 1364, ID 1363 and ID 1362	3	3	x	?	x	x	x	Swedish period	6	9	0
1364	3	under a breakwater	3	3	x	sideways	x	3	x	ID 1365, ID 1363 and ID 1362	3	3	x	?	x	x	x	Swedish period	6	9	0
1363	3	under a breakwater	3	3	x	sideways	x	3	x	ID 1365, ID 1364 and ID 1362	3	3	x	stones	3	3	x	Swedish period	9	12	0
1362	3	under a breakwater	3	3	x	sideways	x	3	x	ID 1365, ID 1364 and ID 1363	3	3	x	stones	3	3	x	Swedish period	9	12	0
1308	17	strait	x	3	1	between shores	x	3	1	ID 1289	1	3	x	?	x	x	x	Russian period	1	9	2
1289	7-15	strait	x	3	1	between shores	x	3	1	ID 1308	1	3	x	?	x	x	x	Russian period	1	9	2
1286	2-10	strait	x	3	1	between shores	x	3	1	ID 2682, ID 1287, ID 1288, ID 1000019999	1	3	x	?	x	x	x	Russian period	1	9	2
2682	2-10	strait	x	3	1	between shores	x	3	1	ID 1286, ID 1287, ID 1288, ID 1000019999	1	3	x	?	x	x	x	Russian period	1	9	2
1287	2-10	strait	x	3	1	between shores	x	3	1	ID 2682, ID 1286, ID 1288, ID 1000019999	1	3	x	?	x	x	x	Russian period	1	9	2
1288	2-10	strait	x	3	1	between shores	x	3	1	ID 2682, ID 1286, ID 1287, ID 1000019999	1	3	x	?	x	x	x	Russian period	1	9	2

ID n:o	Depth	Topographical description	AB	RE	AC	Shoreline orientation	AB	RE	AC	Connection with remains	AB	RE	AC	Placement assurance	AB	RE	AC	Dating	AB	RE	AC
1000019999	9	strait	x	3	1	between shores	x	3	1	ID 2682, ID 1286, ID 1287, ID 1288	1	3	x	?	x	x	x	Russian period	1	9	2
elements	3	strait	x	3	1	between shores	x	3	1		1	3	x	?				Russian period	1	9	2
elements	3	strait	x	3	1	between shores	x	3	1		1	3	x	?				Russian period	1	9	2
1370	5	actively used water area	x	x	3	points to the shore	1	x	3	none	x	x	3	none	x	x	1	Swedish period	1	0	10
1292	7	actively used water area	x	x	3	points to the shore	1	x	3	ID 1369 cannon?	1	x	3	none	1	x	3	Swedish period	3	0	12
2098	11	actively used water area	x	x	3	points to the shore	x	x	3	none	x	x	3	none	x	x	3	Swedish period	0	0	12
1327	11	actively used water area?	3	x	3	sideways	3	3	3	none	x	x	3	?	x	x	x	?	6	3	9
2090	10	actively used water area	x	x	3	points to the shore	x	x	3	none	x	x	3	none	x	x	3	Finnish period	0	0	12
1320	7	infrequently used water area	3	x	x	points to the shore	3	x	3	ID 2126, ID 1326	3	3	x	none	x	x	3	?	9	3	3
2126	7	infrequently used water area	3	3	x	sideways	3	3	x	ID 1320	3	3	x	stones	3	1	x	Swedish period	12	10	0
1326	5-12	infrequently used water area	3	3	x	points to the shore	3	x	x	ID 1320	3	3	x	?	x	x	x	?	9	6	0
1371	6	infrequently used water area	3	3	x	points to the shore	3	x	3	two smaller vessels	3	3	x	rubble	3	3	x	Finnish period	12	9	3
1000021160	6-21	infrequently used water area	3	3	x	different	3	x	x	several smaller vessels	3	3	x	rubble	3	3	x	Finnish period	12	9	0

Appendix 4C: Analysed wrecks in the landscape context

Susisaari wreck 2 (ID 1370)

Susisaari wreck 2 (ID 1370) could be related to one of the recorded incidents. It is an approximately 20-metre-long wooden wreck located on the southern shore of the island of Susisaari at the mouth of the Tykistölahti bay, at a depth of 5 metres. The site was not inspected by diving during the survey. However, previous observations revealed that there are some indications of burning inside the remains, which could connect the site with an old accident. The geographical location, the bay of Tykistölahti (Artillery Bay), is an area sheltered from the prevailing winds. It used to be a fleet anchorage, but today it is in active public use.

The observations did not indicate that stones or other materials were used to keep the wreck in place as a deliberate placement strategy. The orientation of the vessel is such that it points towards the shore. It seems that there are no other wrecks related to this site, although wooden debris do surround the site.

The wreck could be linked with a fire that took place on 7 June 1808, when several vessels were burned for an unknown reason during the Finnish War (1808–1809). The bay was a location commonly used by the fleet, and the burning marks in the wreck suggest that fire was involved in its destruction. However, a proper dating and documentation would be necessary to verify this connection. For the time being, the site can be interpreted as an accidental site, although the accident was not a typical shipwreck.

Susisaari wreck 1 (ID 1292)

No written records could be linked to Susisaari wreck 1 (ID 1292). It is an approximately 15.5–metre-long wooden wreck of a small clinker-built vessel, located on the south-western side of the island of Susisaari, at a depth of eight metres in front of steep bedrock cliffs (Fig. 1). A recording survey to document all the visible parts of the wreck was carried out in 2011, with the additional aim of collecting material for dendrochronological dating. The visible parts of the wreck

were measured and photographed as the final exam of scientific divers graduating from the Luksia school of adult education. However, the time available for the study was not sufficient to identify the type of ship or to take dendrochronological samples.

The location of the wreck is exposed to hard winds, and for that reason it is easy to imagine as a potential accident site. The steep topography of the shoreline excludes the possibility that the vessel could have been abandoned on the shore and later submerged. There is no indication of stones or anything else that could be interpreted as indicating a deliberate placement strategy. However, sand covers the remaining shell structure of the wreck. Only the tops of the frames, and bricks possibly originating either from the ship's stove or perhaps as the remains of cargo, are visible on the seabed. The direction of the bow (?) of the ship is towards the closest beach, some 30 metres south of the shore.

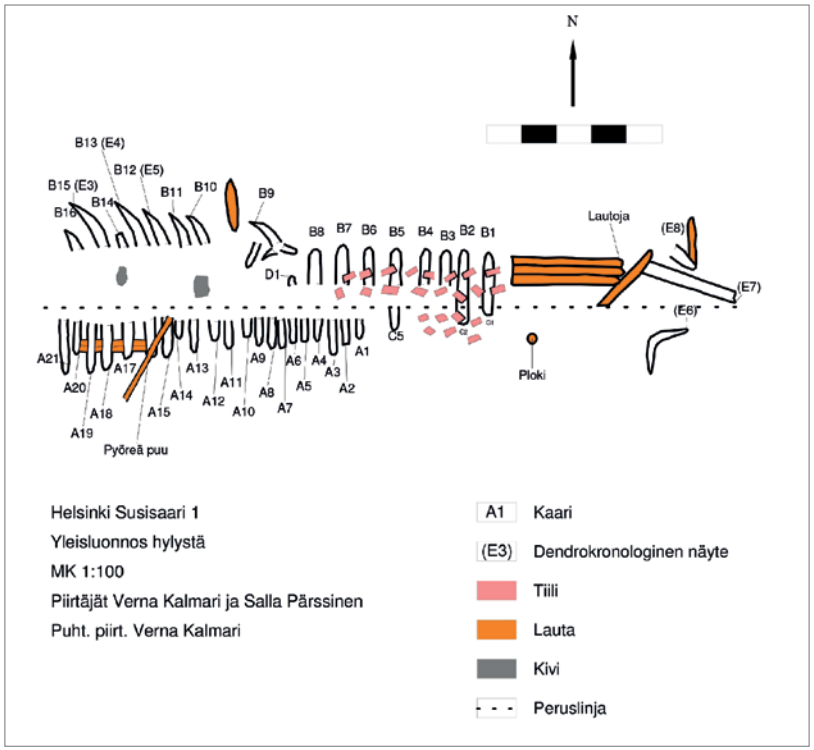


Fig.1. A general drawing of Susisaari wreck 1 (ID 1292). Translation of figure legend: (A1) a frame, a dendrochronological sampling spot, a brick, a plank, a stone, the base line for measuring (Verna Kalmari and Salla Pärssinen 2011).

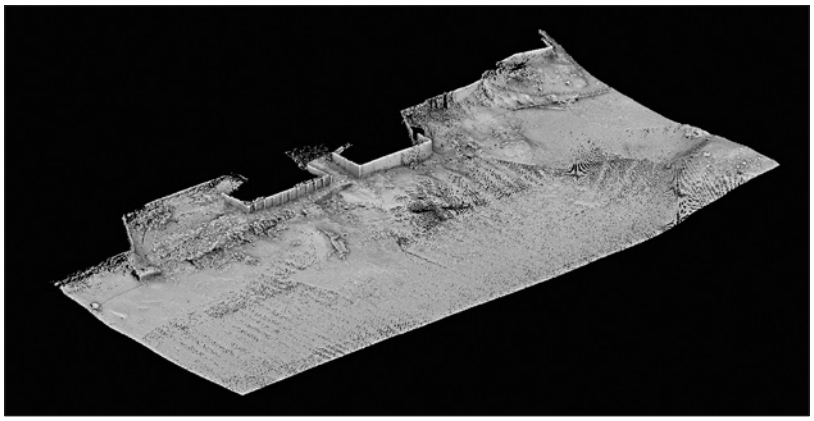
No other wrecks are located in the same area, but an old cannon (ID 1369) has been found. The cannon and gun carriage were measured and photographed as the final exam of scientific divers graduating from the Luksia school of adult education in 2009. The possible connection between the gun and the wreck has been discussed, however there is no clear conclusion at this time.

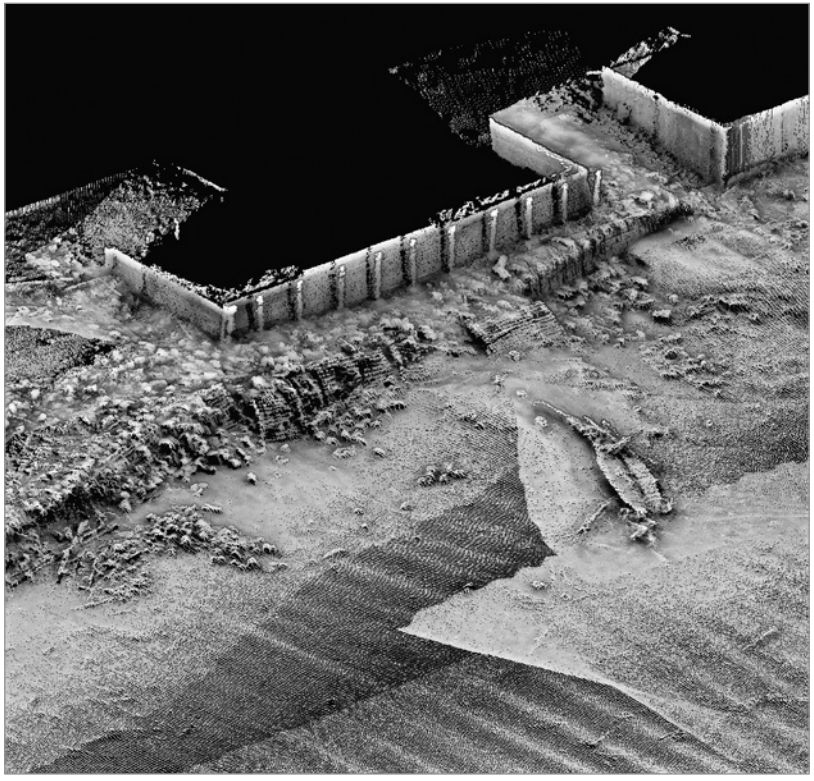
The ship may have foundered. It could have been trying to reach the shallow and protected bay through a narrow strait. However, reaching the bay was not an easy task: the location is subject to south-westerly winds blowing directly from the open sea. Waves and currents may have caused the initial sinking of the ship. The bay behind the inlet was used only at the beginning of the Swedish period. After that time, the area became a dead end, as there was no navigable through lane. If the hypothesis above is correct, the ship is thus likely to date to the early 18th century.

Iso Mustasaari wreck 8 (ID 2098)

Iso Mustasaari wreck 8 (ID 2098) has an uncertain date. This small wooden skeleton wreck lies on the northern shore of the island of Iso Mustasaari. The visible part is approximately 10 metres long, and was apparently built with the carvel technique (Figs. 2 and 3). According to previous observations, the frames are made of oak and planks of soft wood. The survey did not inspect the wreck site, but a group of scientific divers videotaped the site during the winter of 2012.

The geographical location is in front of an actively used water area, right in front of the main quay of the fortress. At the end of the Swedish period, a massive T-shaped pier was under construction, and the wreck is located right in front of a row of wooden caissons for the pier. The structure was not finished, and the jetty (which is still in use) dates back to the Russian period. The area became the main port of the fortress during that time. There are no indications of stones or anything else that could indicate a deliberate placement strategy. The bow of the ship is oriented towards the shore. There are no other wrecks in the area. It seems that this is an accidental shipwreck, probably dating to the time before the main quay was built. The case requires further study.





Figs. 2 and 3. The wooden skeleton wreck (ID 2098) in front of the main pier remains unidentified in this study. The pictures of the wreck were created with multibeam data (Ville Peltokorpi 2011, Meritaito ltd., Courtesy of the Governing Body of Suomenlinna).

Pikku Mustasaari wreck 2 (ID 1327)

Pikku Mustasaari wreck 2 (ID 1327) is the wooden skeleton wreck of a clinker-built vessel. The location is on the north-eastern side of the island of Pikku Mustasaari, approximately 15 metres from the shoreline. This 13-metre-long wreck was videotaped during the survey. A layer of mud buried the wreck, but even the bottom structure is partially visible on the seabed. The undulating landscape and steep profiles of the bedrock make the site difficult to identify in the multibeam data. The location is in front of an old gate to the fortress, which is not a suitable place for scuttling a vessel.

The depth of the site is 11 metres, and the wreck rests next to a steep bedrock formation. The depth of the wreck indicates that it has not been used as a foundation, or to support the shoreline. The area saw active water traffic before the building of bridges restricted the sizes of vessels that could pass through. There are no indications of stones or anything else that could be interpreted as a placement assurance strategy. However, the wreck is partly covered in mud, making reliable observation difficult. The direction of the vessel is sideways (parallel) to the steep bedrock. There are no other wrecks in the area. It seems possible that this vessel suffered a shipwreck before it sank. However, the site requires further study, and a dating could give more clues to the life history of this ship.

Iso Mustasaari wreck 2 (ID 2090), Monitor-type

Iso Mustasaari wreck 2 (ID 2090) features in an oral legend among the locals. According to the story, a coal barge with a full cargo was moored to the northern pier of Iso Mustasaari when it broke off on a stormy night. The time of the foundering was forgotten, but this wreck (Fig. 4) was recorded in the same spot already in the 1970s. The wreck is 48 metres long and 11.5 metres wide, and its size made it easy to find in the side-scan sonar and multibeam sonar surveys. It had sunk into a slope very near the shore and the pier from which it had come loose.

Military vessel specialist Juha Joutsi discovered the origin of the barge with the aid of the local legend (Juha Joutsi pers. comm. 2011). Some years earlier, he had found a drawing of the vessel type in the archives of the Maritime Museum of Finland (Fig. 5). The barge was a part of the Russian Navy, and it was left behind when the Russians deserted the fortress. Two barges named P 18 and P 17 were located at Sotasatama ('Navy Yard'), at least in 1931. From 1937 onwards, they

served as coal storage for the Coastal Artillery and were renamed P 27 and P 28. However, the detailed study of the fleets of the Baltic Sea (1914–1921) does not list these barges (Harjula 2010). Joutsi also found information on the later sale of the two vessels, which took place in 1953. One of them probably sank soon after that in the current location. Even though this accident was recent, the date of the event had been forgotten.

Later on, Joutsi discovered that the original function of the vessel was not as a barge; it was built for the Russians as a monitor.

Fig. 4. The monitor, as scanned with the multibeam sonar equipment of Meritaito Ltd. (Picture: Ville Peltokorpi. Courtesy of the Governing Body of Suomenlinna).

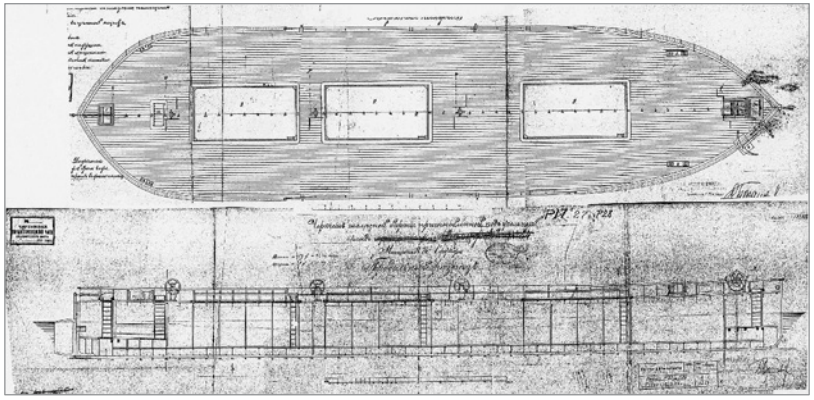


Fig. 5. Drawing of a monitor remodelled to a barge. Juha Joutsi discovered the drawing in the collection of the Maritime Museum of Finland. NBA.

The site formation analysis confirms the status of the barge as an accidental shipwreck. It is located on the northern shore of the island of Iso Mustasaari at a depth of 11 metres, in front of a pier that is still

in use. The area sees a high volume of water traffic, which means that it is not an ideal dumping site. No indication of possible placement assurance strategies could be found in the wreck. The bow of the wreck points towards the shore, indicating that the wreck has not been recycled to support the shore. The wreck stands alone on the seabed – the nearest wreck sites are several hundred metres away. There are no signs that this could be a ship graveyard or a ship trap. All of this suggests that this wreck was not abandoned or recycled. Although the location is not a typical place for a shipwreck, the oral legend explains the event that led to the sinking of the vessel.

Pikku Mustasaari wreck 1 (ID 1312)

Pikku Mustasaari wreck 1 (ID 1312) was dendrochronologically dated to the period after 1639, which makes it the oldest dated wreck in the whole fortress area (see Zetterberg 2002).[1] The wooden wreck is approximately 10 metres long and 3 metres wide. The frames of the wreck were oak, and it had a bowsprit made of pine. The source of the wood was in either northern Germany or southern Scandinavia. The site is currently completely covered in mud. The wreck is located on the eastern side of the island of Pikku Mustasaari. The location is off the shoreline retention wall. The wreck lies at a depth of 10 metres. The place has gone through several landfills.

It is uncertain whether the site contains any signs of placement assurance strategies. Mud conceals the wreck almost entirely; it might easily conceal some stones. The direction of the wreck is along the shoreline. There are no other wreck discoveries related to this site. However, there are some caissons, possibly related to 19th-century piers. Today, the shoreline is formed out of a wooden frame filled with stones. The position of the shoreline could indicate that the wreck has been recycled as a landfill, or to support the later coastline. However, there are no signs that the wreck was intentionally kept in place. It is possible that the vessel was abandoned on the shoreline and from there it slid further into the underwater landscape. Small vessels abandoned on the waterfront can be seen in a drawing dating to the Swedish period (Fig. 6), and the southern end of Pikku Mustasaari island was filled

[1] A survey project concentrating on the wreck was conducted in 2000, in order to record the site and obtain the dating samples. Kalle Virtanen was in charge of the survey project, with side-scan sonar carried out by Rauno Koivusaari. The wreck was also visited during the latest survey project.

and used as a 'New Shipyard' (Aaltonen 1968:289). However, no other sources could verify this hypothesis. The dendrochronological dating indicates that this vessel might be one of the original vessels of the Swedish Army Fleet of 1763.

Sometimes, the preparation for exhibitions can reveal significant details about objects. In 2012, the permanent exhibition of the Suomenlinna Museum was renovated, and an old boat from the collection was set on display. Its origin could not be identified by means of typology, but there was an oral tradition linking it to 'the time of Ehrensvärd'. Dendrochronological dates were acquired, and they suggest that the oral story might be correct: the boat could also be a part of the original Army Fleet, which Ehrensvärd brought from Stralsund in 1763.

Fig. 6. The straight between islands of Susisaari and Kustaanmiekka during the Swedish period. There are two abandoned vessels in the drawing, which could have ended up in the underwater landscape over time. (Drawing: Adolf Erik Geete (1730–1791) Kungliga Bibliotek, Stockholm).

Iso Mustasaari wreck 4 (ID 1320)

Iso Mustasaari wreck 4 (ID 1320) is a wooden skeleton wreck at the bottom of the eastern shore of the island of Iso Mustasaari. The site is located at an approximate depth of 6 metres. This wreck is probably one of the oldest reported sites: the notice to the National Board of Antiquities was made already in 1969. The site was visited in February of

2015, and documented by shooting a video. Local divers Jesse Jokinen and Tero Tankka carried out this preliminary inspection dive. The wreck site is visible in the multibeam sonar data. The water area of its location is open to north-easterly winds. An intensive analysis of old maps was conducted, and there seem to have been no landing site activities to the south of the site. However, approximately 200 metres to the north, Lilla Varvet has been a busy area for ship maintenance since the Swedish period.

A map from 1790 has a wreck marked at this location. Based on the multibeam image, the wreck does not contain any additional stones. The position of the wreck is with the bow (or aft) towards the shore – it is impossible to say whether it is the stem or the stern. One wreck (ID 2126) lies in its immediate vicinity. Lilla Varvet is to the north of the location, and to the south there is at least one other similar wreck site (ID 1326). The geographical location is an apparent place for abandonment. It is an unused water area right next to a dock. The orientation of the wreck supports the abandonment theory. Together with the neighbouring wreck (ID 2126), they form a very interesting study site for the future. There is a possibility that both of these vessels belong to the original Swedish Army Fleet.

Iso Mustasaari wreck 16 (ID 2126)

Iso Mustasaari wreck 16 (ID 2126) is a wooden skeleton wreck, which was rediscovered during the renovation of the modern quay in 2013. Until then, the author considered the wreck to have been dredged entirely in the 1970s. The site was inspected by maritime archaeologists Riikka Tevali and Aki Leinonen soon after the discovery, but the visibility was poor. The wreck is only partly visible on the seabed, and the previous dredging destroyed half of its length. However, local divers (Jokinen and Tankka) inspected the site in February of 2015, discovering that the recent renovation operation had destroyed the site even further. This destruction makes the site even more vulnerable to the effects of nature.

The location is open to the north-easterly winds. There are some additional stones inside the wreck. The wreck is positioned along the shore. There are several wrecks in the same water area: the closest is Iso Mustasaari wreck 4 (ID 1320) to the north, and to the south are Iso Mustasaari wrecks 1A (ID1362), 1B (ID1363), 3 (ID 1365), and 6 (ID 1364), as well as an old breakwater construction partly on top of these

wrecks. It seems likely that this wreck was scuttled intentionally in this particular location. There is a possibility that this wreck belongs to the original Army Fleet, but further study and dating would be needed to verify this hypothesis. This skeleton wreck has an obvious connection with Lilla Varvet (see Chapter 3.3).

Iso Mustasaari wreck 7 (ID 1326)

Iso Mustasaari wreck 7 (ID 1326) is the skeleton wreck of a large carvel-built wooden vessel, located at a depth of 5 to 12 metres. The site is on the southern shore of Iso Mustasaari. It was not visited during the latest survey, but the wreck is visible on the multibeam sonar data. The water area at the location is open to southerly and north-easterly winds. At the beginning of the Finnish period, there was a quay west of the wreck site. In an old map, it was named Halkolaituri ('Firewood Pier'). In addition, there are some attachment rings and poles in the bedrock, indicating that the area might have been used as an anchorage. According to the multibeam image, this wreck does not contain any additional stones, and there are no signs of any other methods to keep the wreck in place. The position of the wreck is with the bow (or stern) towards the shore. There are no other wrecks in the immediate landscape, and the remains of a quay from the beginning of the 20th century at the shoreline forms the closest site. The geographical location is an apparent place for scuttling in an inactive water area. The orientation of the wreck in relation to the shoreline supports the abandonment theory, despite the lack of evidence for a placement strategy.

Iso Mustasaari wreck 10 (ID 1371)

Iso Mustasaari wreck 10 (ID 1371) is located on the south-western shoreline of Iso Mustasaari, where three different remains can be seen (Fig. 7). One of them, the largest ship with an iron hull, is reported in the national database. Of the other wrecks, one is wooden, and the smallest one is of unknown material; it might even be only a part of a ship. Divers found the site in the 1970s. The discovery was followed by a discussion of the capstan on the deck of the largest vessel, and whether it could be lifted for the museum collection (pers. comm. Pekka Lindfors 2010). It is a manually operated device, indicating that even the heaviest tasks, such as raising and lowering the ship's anchors, were performed by hand. The merchant ships of the early 20th century

had steam-powered deck machinery, indicating that the unknown remains might be of military origin.

The latest survey could not visit the site, but the land area was inspected during a shoreline survey, and the remains of a quay and a landfill were observed. The wreck rests on the northern side of the Tykistölahti bay. Today, traffic in the area is heavy, but earlier this used to be the home port of the fleet. According to an old photo, this area was in use for mooring (N211004) in the Finnish period. According to the multibeam image, the largest wreck does not contain any additional stones, but the wooden wreck right next to it seems to have additional debris inside. The possible third wreck in deeper water seems to lack any placement assurance strategies.

The position of the iron-hulled wreck is with the bow (or stern) towards the shore, but slightly tilted towards the island. The wooden vessel is on top of the iron-hulled ship. These three remains may have ended up in the same location at different times. The iron-hulled vessel is most likely the oldest, since it is underneath the wooden vessel. Both of them are under the landfill. It is uncertain whether they were placed there as part of the filling process, or whether they happened to end up in the same location by chance. The area looks like a small ships' graveyard.

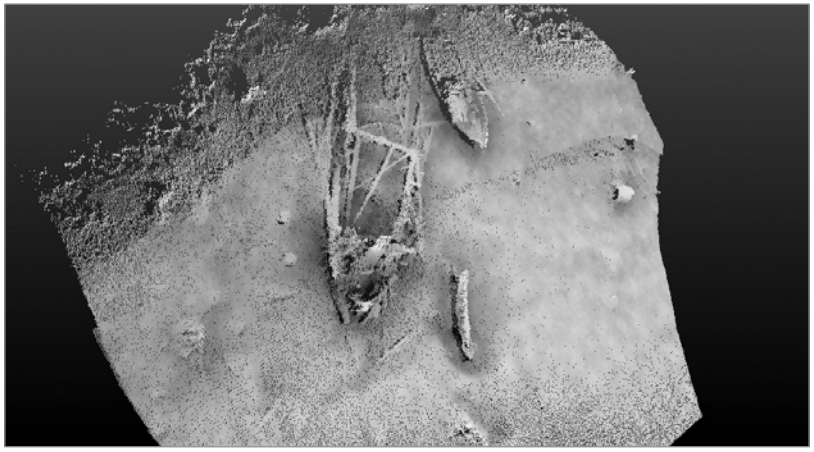


Fig 7. Possibly three different wrecks (ID 1371), scanned with the multibeam sonar equipment of Meritaito Ltd. (Picture: Minna Koivikko. Courtesy of the Governing Body of Suomenlinna).

Susisaari Vetotelakka ship graveyard (ID 1000021160)

Susisaari Vetotelakka ships' graveyard (ID 1000021160) is located in the water area at the mouth of the sheltered bay of Tykistölahti, in the south-eastern corner of the island of Susisaari. The site was visited several times after the survey, in connection with building the exhibition at the Suomenlinna Museum. Instruments measuring different parameters of the water (such as velocity, temperature, Ph, salinity, etc.) were implemented in this location. The maintenance operations of these underwater data loggers were mainly conducted by diving through the area featuring several smaller wrecks. These remains are also clearly visible in the multibeam data. A dockyard called Vetotelakka ('Drag slip') or Keijon telakka ('Keijo's dock', after to a long-term tenant since 1968) occupies the south-eastern corner of Susisaari. The dock appears on maps for the first time already in 1899 (Rosén 1997), and is still in active use.

The slope where the wrecks are located has a steep profile. The wrecks are either empty, or contain different kinds of rubble. The positions of the wrecks vary, but imply that the ships have been dumped rather than recycled, because they are randomly positioned in the underwater landscape. Several vessels are located on the same slope, indicating that it may have been a place for long-term deliberate abandonment. The wrecks found in the vicinity of the dockyard were all stripped of everything that could be recycled. All the parts of a rotten old vessel cannot be reused or recycled, and this type of activity creates plenty of waste material. After the removal of reusable materials, there are different options for dealing with what is left. One method is burning, which runs the risk of causing a fire in the dockyard. Another method is just leaving the remains where they are on land. However, this creates problems with available space in the long run. Consequently, the easiest way to deal with the remains is to dump them into the water, deep enough not to disturb the traffic or the operation of the whole dockyard. In the course of time, this kind of activity creates a ships' graveyard.

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VeSA venäläiset sotilasasiakirjat (= Русские военные документы = Ryska militära handlingar) (Russian military documents)

VeSA linnoitus- ja rakennuspiirustukset (Drawings of fortresses and buildings)

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1. Minna Koivikko: *Recycling Ships — Maritime archaeology of the UNESCO World Heritage Site, Suomenlinna. 2017*

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The underwater landscape of the Suomenlinna fortress islands, a UNESCO World Heritage Site in Finland, is full of untold stories. Through deliberate abandonment, shipwreck and recycling, once-essential ships of the fleet have ended up at the bottom of the sea, stripped of their original identities. These wrecks and remains reflect both the daily life and warfare of the 18th and 19th centuries. In this book, the first maritime archaeological dissertation in Finland, their identities, biographies and stories can be reconstructed from archival sources and archaeological material.

With a focus on recycling, especially of ships' hulls, the resourcefulness of past societies is revealed — for many vessels, their last service to their parent societies was to act as breakwaters, blockships and museums. These remains also provide insights into the relationships that people had with the sea, and how they changed over time.

The landscape is seen through the eyes of maritime archaeologist Minna Koivikko. She is a resident of the 18th century fortress islands, and fascinated by the underwater scenery and making the invisible visible. Her interest in the underwater world comes from her childhood, when children were frightened into keeping their distance from the water through scary stories of Näkki, the water spirit. Minna's mission was to tame the creature and make the underwater landscape visual, and easy to approach for all people.

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