Wreck of an Unknown Armed Three-Masted Sailing Ship, Gulf of Finland

Badewanne Research Reports 1-2021

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Finland

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WHO'S BADEWANNE

Badewanne is a non-profit organization representing a group of voluntary divers that have been documenting shipwrecks in the Gulf of Finland (known during WW II as 'Badewanne') for almost 30 years.

The unmapped rocky waterways in the era of sailing ships, evacuations of Hanko and Tallinn, submarine warfare and more than 60.000 mines laid during WWII have all left their marks to the history of Gulf of Finland, creating an underwater time capsule that tells its story of the past. As a result of our work we have a large amount of high quality material available from various projects ranging from 17th century sailing ships to marvels of industrial age.

OUR MISSION

Our mission is to publish our research findings and documentary material to make the general public aware of the unseen maritime history. Our projects vary from pristine 17th century merchant vessels to large WW II era fighting ships that were lost in action.

COLLABORATION

We are working in close collaboration with the Finnish Heritage Agency, Military Museum of Finland, as well as archives and researchers in many other countries.

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General Information

Kasuunihylky/Kasuuni Wreck

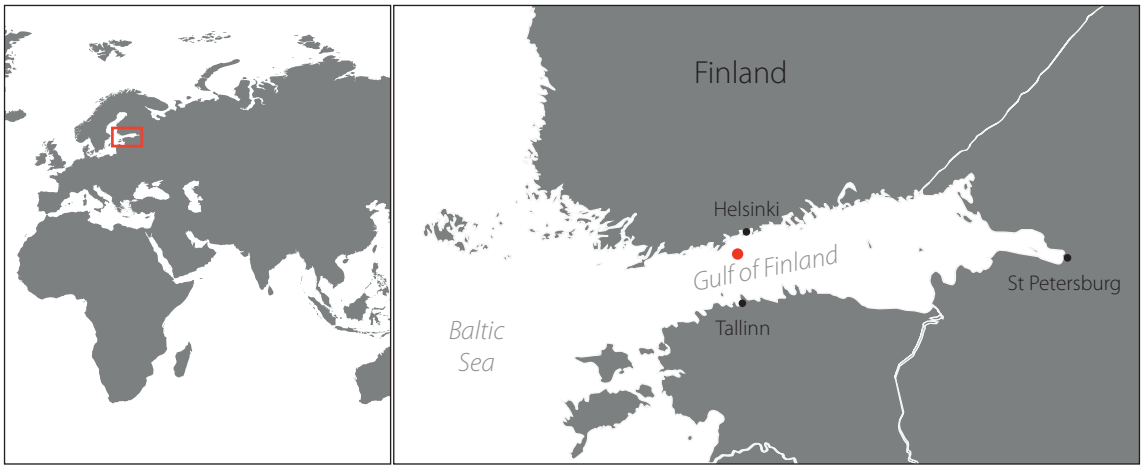
Figure 1: *A 3D Photogrammetric model of the wreck (orthometric view).*

National Heritage ID: 2490 (The Finnish Heritage Agency) The wreck is protected by the Finnish law (Antiquities act 295/1963)

Depth: 60 metres. The Gun deck is in ca 56.6 metres, poop deck at stern in 54 metres and the forcastle in the bow in 54.8 metres (measured with a diver held wrist depth gauge).

Length: 29.5 metres measured by tape in 2003 from the upper edge of the transom to the stem post. The same length measured using the 3D photogrammetric model is 30.2 metres. Maximum width at the main wale is 8.0 m (3D photogrammetric model). Maximum width at the gunwale is 6.85 m (outer width, 3D photogrammetric model)

Location: WGS84 Lat: 59° 54,2' Lon: 24° 47,6' / 17 NM south-west from Helsinki



1. Introduction

This report describes the current state of a wreck of an unknown, armed three-masted wooden ship, located in excess of 60 metres in the Finnish coastal waters in the Gulf of Finland. The number of the wreck in the national wreck database and ancient relics register is #2490, where the is called "Kasuunihylky".The Wreck is located approximately 17 NM south-west from Helsinki.

This report is a follow up to the first report of the wreck, published in 2006 by *Raasakka, Kaasinen et al*. The report further expands the observations at the wreck site with new up-to-date photographic material, including some new findings and fine details. New high resolution photo and video material have been used to illustrate the current state of earlier known details. New digital videomaterial was used to create a photogrammetric 3D model of the wreck.

The focus of report is to visualise the wreck site in a manner, that would help maritime archaeologists and historians to identify the wreck and its' origin. This report also documents the changes observed at the site during the past ten years, and illustrates possible reasons for these changes.

This report is mostly based on 16 dives made at the site in 2011 and during 2018-2020. Some material and observations are based on earlier dives, organized by Badewanne diving team and it's predecessors in 2003, 2005 and 2007.

The wreck was detected during a routine seabed survey conducted by the hydrographic survey vessel Suunta in 2002. Survey chief, captain Jukka Mikkola noticed a wreck-like figure in the survey data, and wrote a report about the finding for the Finnish Maritime Administration, and contacted also the Maritime Museum of Finland (currently part of the Finnish Heritage Agency).

The wreck is lying on the seabed in an upright position on it's keel. The over-all-length of the shipwreck is 30.2m based on the 3D photogrammetric model from the upper edge of the transom to the stempost. The same lenght measured by tape in 2003 was 29.5m. Maximum external breadth at the main wale is 8.0 m (based on the 3D photogrammetric model). Maximum breadth on the gunwale is 6.85 m (outer width, 3D photogrammetric model).

Seabottom around the wreck is 60 metres. The gun deck is at 56.6 m in the middle, poop deck at stern around 54 metres and the forecastle in the bow around 54.8 m (measured by wrist depth gauges).

The ship has 12 gunports on a single deck. 6 guns are still present in their original locations. The structure, size, rigging, materials, guns and fittings of the ship would suggest that the ship is most likely a ship rigged sloop-of-war type vessel from 18th century. By some navies, these kind of ships were also called small frigates or corvettes.

This report would not have been possible without the generous help and support from the following: the Finnish Heritage Agency, the Finnish Transport Agency, The Finnish Environmental Institute, The Finnish Coast Guard, Sanoma Oy, Suunto Oy, Ursuk Oy, Northern Lights Scuba Oy, Metropolia Ammattikorkeakoulu, Jyri Paulaharju, Lauri Löfman and many others. Thank you!

2. Divers and general information about the dives

The following divers have participated the diving operations at the site during the expeditions in 2011, 2018, 2019 and 2020 (16 dives, listed in chapter 8): *Jouni Polkko, Tommi Toivonen, Harri Laakso, Jani Tattari, Ville Peltokorpi, Lauri Näreneva, Juho Lappalainen, Liisa Itkonen, Mikko Koskinen, Esa Tuominen, Pasi Reisto, Mauro Sacchi, Jouni Leppäkases, Kai Vorma, Aleksi Kinnunen, Tuire Tommila, Joonas Arponen and Tuukka Lahtinen.* All dives were organized and led by Jouni Polkko.

Helium mixtures have been used on all the dives in order to avoid nitrogen narcosis. Bottom times have varied between 20 to 50 minutes, total diving times having been between 60 to 150 minutes. From 2019 and onwards all but one diver in two dives used closed circuit re-breathers.

A shotline with lightweigth led weight was lowered carefully close to the wreck onto the sea floor using chart plotter and echo sounder. Direction for the shotline relative the wreck was selected according to current and weather conditions. Diving boat was never moored, but remained free and circulated the shotline and bouy during the dives.

The first diving team located the wreck using a reel line if needed. The reel was never tied or connected to the wreck. The locked reel was left at the bottom beside the wreck in a harmless position. A strobe was clipped to the shotline for visual reference. Decompression was mostly done on the shotline. On few occasions the divers finished the last 15-30 minutes of their decompression using DSMBs, since it became impossible to stay within shotline due to a strong current.

3. General information about the collected photo and video material

Several hours of high quality 4K video material was recorded during the dives, as well as substantial amount of still photos. The primary aim of the video material was to produce a comprehensive recording of the wreck, which could be used for a 3D photogrammetric model. Still photography was used to record fine details and some general shots.

Still photographs and videomaterial used in this document were taken by Jouni Polkko unless otherwise noted. Photogrammetric 3D model of the wreck was made by Jouni Polkko with Metashape software.

The visibility at the site has varied from poor (less than 2m) to reasonable (approximately 5 to 6 m). Ultrawideangle and fisheye lenses have been used.

Cameras used during 2018-2020 were:

4K video and stills: Sony a7 s mkII, lens Sony 28mm/2.8 + Sony Fisheye converter, Aquatica 9.25” mineral glass dome

4K video:GoPro 8

2K video and stills: GoPro 4

Lights used during 2018-2020 were:

- Northern Lights Scuba 100 W LED lights mounted on Sony camera package
- Northern Lights Scuba 300 W LED lights carried by diver
- Northern Lights Scuba 1000 W LED light carried by diver
- Keldane Video 8X 15000 lm CRI 95 lights for GoPro 8
- Scaleo Infinity for GoPro 4

During 2011 Canon EOS7D with a Tokina 10-17 Fisheye lens was used for still photos. During 2007 photos were taken with a Canon EOS30D with a 10-22 wideangle lens. During 2003 and 2005 a Nikonos V with 15mm/f2.8 was used with a Fujichrome 400 diafilm, and a Canon EOS20D with 10-22mm/F3.5-4.5 in 2005. Ikelite 400 and 200 Substrobes and Hartenberger 625TTL strobe models were used for still photography between 2003 and 2011.

4. General appearance of the wreck

The following images based on the 3D photogrammetric model show the shipwreck in its current condition in 2020:

Figure 2: *an ortographic view of the wreck from the port side.*

Figure 3: *an ortographic view from the port side.*

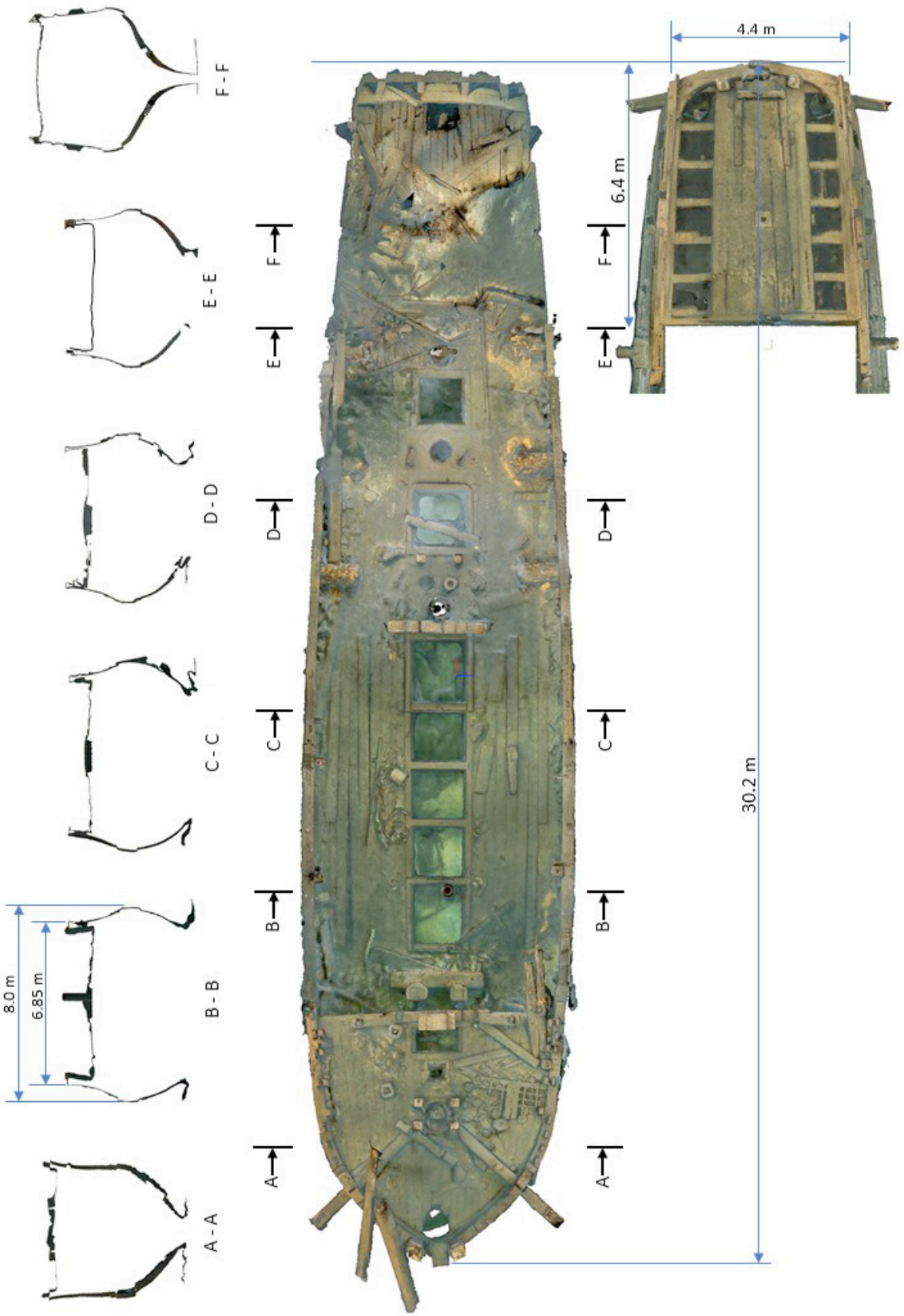


Figure 4: *The deck plan including the rear cabin floor (shown without the wales bulging outwards), poop deck (above the rear cabin) and the cross-sections/frames with dimensions. Port sides of the cross-sections are on the right side, that is view is towards the stern. Some loose planks in the port side hull interfere little bit the cross-section images in the right sides. Generally the starboard side of the hull is slightly in a better condition, with less loose planks.*

5. Some detailed observations

This chapter describes some of the most important observations and features concerning each area on the shipwreck. The terminology used in this report is based on *Dods & Moore* (2005), *Goodwin* (1987, 1988), *Lee* (1984) and *Levery* (1987). The structure of this chapter follows *Raasakka et. al.* (2006) for the purpose of comparison.

Figure 5: *A perspective view of the wreck from the port-stern sector. 3D Photogrammetriv model.*

Figure 6: *A perspective view of the bow from the starboard side. 3D Photogrammetric model.*

5.1. Forecastle and bow

The deck of the forecastle is on an uniform level and does not contain any steps or stairs. The deck planking is completely intact. The 3D photogrammetric image below shows the bow of the ship, and the forecastle as it is today.

Figure 7: *Orthometric view capture from the 3D photogrammetric model shows the bow and forecastle area.*

5.1.1 Forecastle gunwale

The forecastle gunwale is on a uniform level from the aft end of the forecastle up to the catheads. There is a snatch block on the gunwale on top of each cathead on both sides. Between the catheads and the bow, the gunwale is slightly lower, and it has a low sawtooth-like shape.

The photograph (figure 8) shows the sawtooth-like shape in the gunwale between catheads and the bow. The cathead is visible on the right side.

Figure 8: *The sawtooth-like shape on the gunwale. Videocapture, 26th Jul. 2018.*

On top of the forecastle gunwale, between the cathead and the aft end of the forecastle, there are seven timberheads on the starboard side, and eight on the port side. These are visible in the 3D photogrammetric model.

Figure 9: *Some of the timberheads on the starboard side gunwale. Videocapture 13th Nov. 2020.*

At the break of the gunwale there is a carved round ornament on the port side. The break of the gunwale has been protected on the topside with a metal lining. On the gun deck the gunwale is lower than in the forecastle.

Figure 10 shows the carved round ornament on the port side in the break between forecastle and gun deck gunwales. Originally there has been a similar ornament on the starboard side, as can be seen in the photo taken in 2006 (see Figure 11).

Figure 8: *A carved round ornament on the port side in the break between the forecastle and gun deck gunwales. Videocapture 26th Jul. 2018.*

Figure 11 (left): *Photo from Raasakka, Kaasinen 2006 report: Starboard gunwale at the break of the forecastle, viewed from outside of the ship (forecastle on the right). Photo copyrights P. Raasakka & J. Kaasinen.*

Figure 12 (right): *Starboard gunwale at the break of the forecastle as it is today, viewed from the outside of the ship (forecastle on the right). The carved ornament and the metal lining, including the wooden block (on the right) seen in Figure 8, are missing. The current situation and the difference on both sides is visible in Figure 12. Videocapture 13th November 2020.*

5.1.2 Aft end of the forecastle deck

There is a wooden cross beam that has grooves on both ends in the aft end of the forecastle behind the belfry. This crossbeam is meant to support spare topmasts (one on each side). The other ends of the sparemasts have been laying on another crossbeam in front of the main mast. The port side groove on the crossbeam on the forecastle deck is rounded, and the starboard side groove is more rectangular. The spare topmasts are not in their places. The crossbeam in front of the main mast has rounded and angular stepwise grooves other way.

A loose beam used to lock the spare topmasts to the crossbeam is visible close to the cross-beam in the port side.

3D model captures below show the arrangements of the forecastle, forecastle break, the cross-beam for the spare mast tops, large ballards on the gun deck just after forecastle break and two spare anchors (note: both catheads are intact, starboard side is only missing from the images).

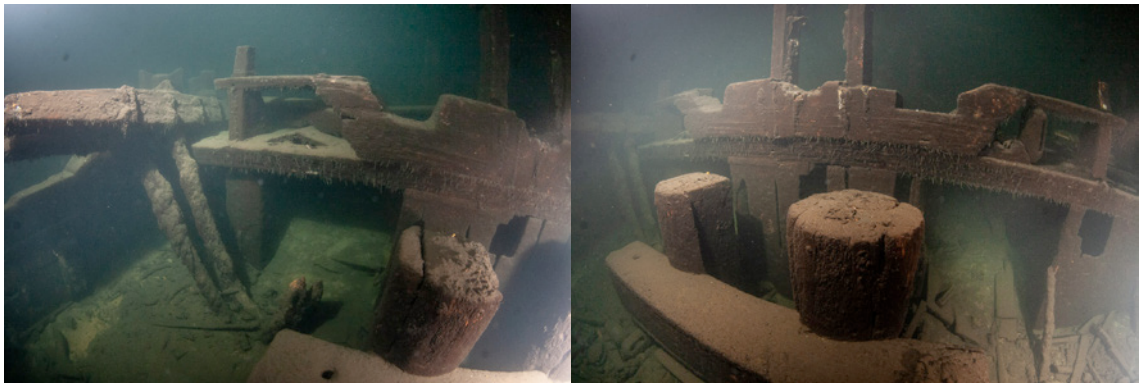


Figure 13: *The image on left shows the aft end of the forecastle and a break on the port side. There are two spare anchors on the left. The image on right shows the forecastle aft and a break in the starboard side. The crossbeam for supporting rigging spare parts like topmasts is visible. There is an open access below the forecastle in both sides. Photo 11th September 2011.*

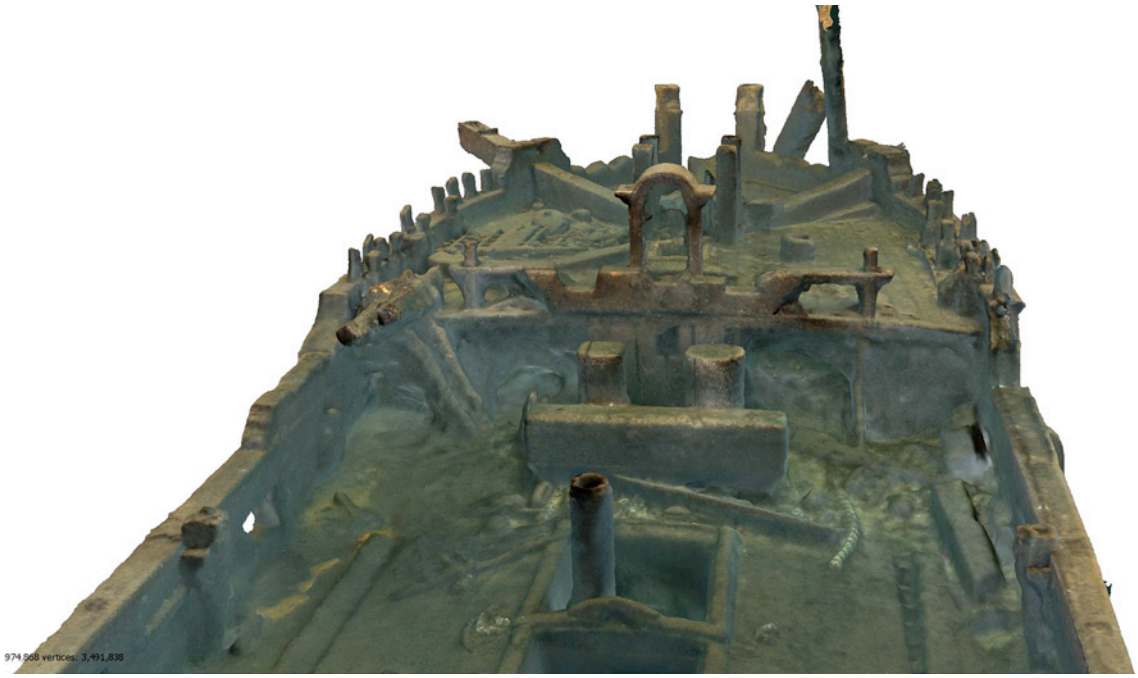


Figure 14: *This birds-eye-view shows the forecastle break (looking towards the bow). A crossbeam just behind the belfry has grooves for supporting spare topmasts laying horizontally.*

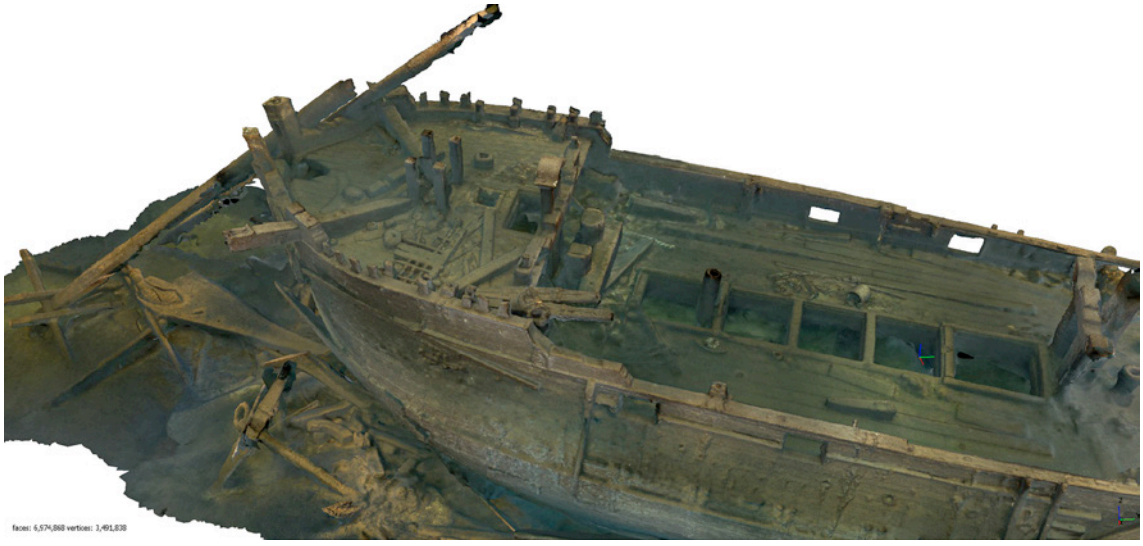


Figure 15: *This birds-eye-view shows the forecastle, break and part of the gun deck up to the main mast (which can be seen far right). In front of the main mast there is another cross beam supported by two bitts. This crossbeam has too non-symmetric grooves and has supported the other ends of the spare topmasts laying horizontally. Stocks of two spare anchors on the gun deck are visible in port side, the stocks are just above the forecastle.*

5.1.3 Belfry and the bell

The belfry is located on the break of the forecastle, in the middle of the bitt pins on the forecastle deck. The belfry was still intact with the ship's bell in place, when the wreck was discovered in 2003. Later in July 2011 it appeared, that the bell had fallen down inside a hatch in the front of the belfry. Soon after the Finnish Heritage Agency decided to recover the bell. The bell was recovered in 4th September 2011 by Coast Guard surface supplied-air-divers, supported by the Coast Guard ship Merikarhu. After the recovery, the bell was delivered for

the Finnish Heritage Agency for conservation. The conservation of the bell, and its current condition are described by *Löfman* (2018, in finnish). While the bell has decorative moulding wires, it doesn't have any other visible markings, text or clue what-so-ever about the identity or origin of the ship. The bell has been made out of bronze.

The belfry has a curved canopy with a metal lining. The photos below show the belfry and the bell as found in 2003.

Figure 16: *The ship's bell in the belfry in its original state on 22nd July 2003 and 24th August 2003, documented during the first dives.*

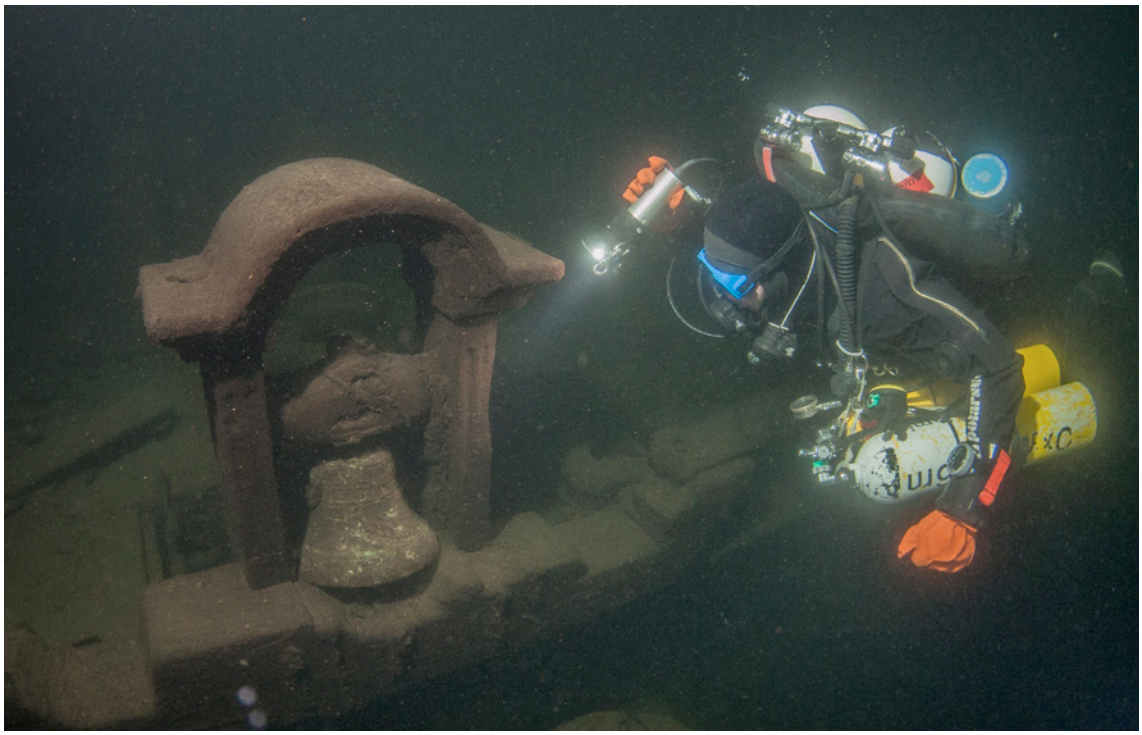


Figure 17: *The belfry with the bell in 11th August 2007 (view towards bow).*

The hatchway in front of the belfry is presumably for access and ventilating the galley. There is a large kettle below the deck, near the hatchway. A smaller hatchway visible in Figure 16 is possibly for ventilation, or for the galley stove chimney. Another purpose may be for feeding ropes below the foredeck, as there is a block visible just below the small hatchway.

Figure 18: *The belfry with the bell in 11th August 2007 (view towards starboard-stern). In July 2011 it was observed, that the bell had fallen into the hatchway, afore the belfry. Whether it fell due to natural causes, by accident, or in purpose, is unknown.*

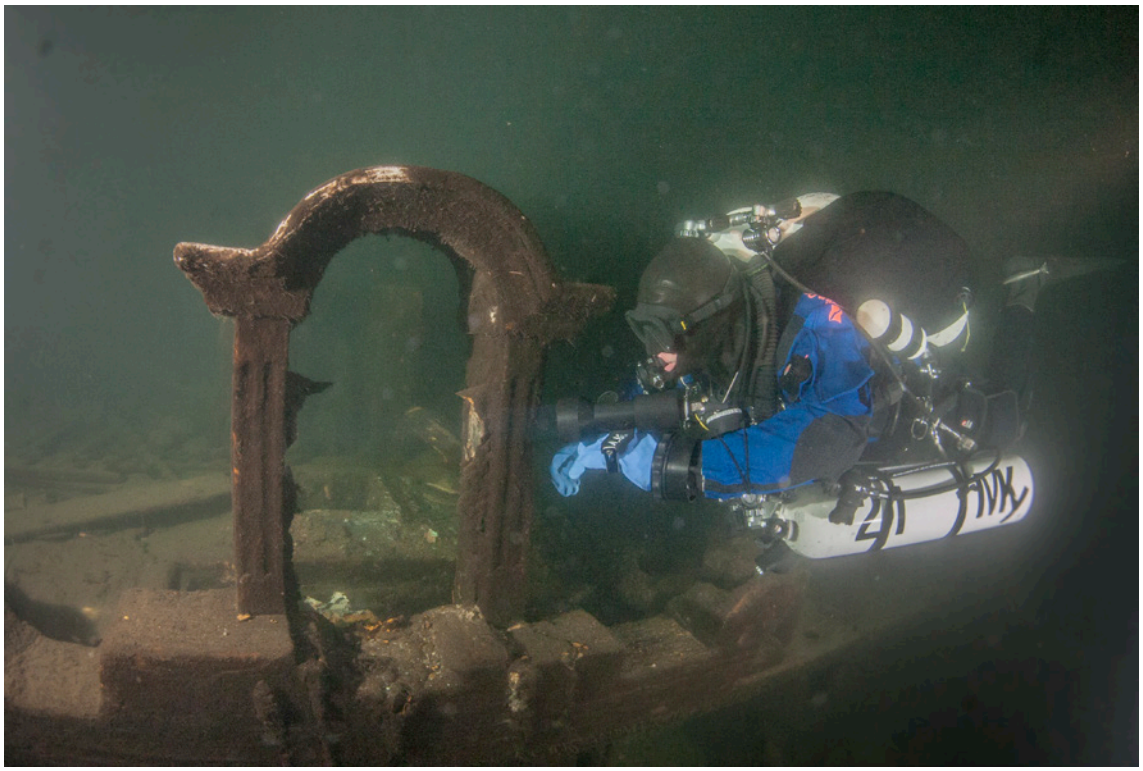


Figure 19: *The damaged and empty belfry in 11th September 2011.*

5.1.4 Foremast stub

The foremast stub is right in front of the hatchways of the forecastle deck. The foremast is broken on the deck level. The foremast stub is surrounded by four bitts. Each bitt has two sheave holes with sheaves close to the deck level. The bitts have no carvings, and their cross-section is square.

5.1.5 Catheads

Catheads were used to support and operating the anchors. Catheads of the ship are strong and massive beams, which extend inside the ship as cat-tails. Cat-tails are clearly visible in the 3D model. They are attached into the two bitts surrounding the foremast stub.

Both catheads are structurally intact. At least the cathead on the portside had originally a cat/lion-faced figure on the end. This figure has since then fallen down or disappeared from the site. It is possible that the figure lays now on the seafloor just below the cathead. A similarily shaped flat object was found on the port side during 2019. It is probably the missing figure that has turned upside down.

Figure 20: *The port side cathead with a wooden carving of a cat or a lion faced figure. Photos taken 10th September 2005.*

Figure 21 (left and center): *The port side cathead without the cat/lion faced figure. The end of the Catheads have two slots with embedded sheaves. Videocaptures 26th July 2018.*

Figure 22 (right): *An object on the port side found on the seafloor almost below the cathead. The measurements are approx. 30 cm x 30 cm. This is probably the missing cat/lion faced figure turned upside down. Video: Tommi Toivonen, videocapture 6th August 2019.*

5.1.6 Bowsprit

The bowsprit was originally in place when the wreck was discovered. The bowsprit rose from the peak of the bow (above the bow stem) in an angle of approx. 30 degrees (estimated, not measured). The length of the bowsprit was measured by tape, and it was 7.7 metres. The measurement was taken on 3rd September 2011, one day before the bell recovery operation.

On 11th Sep. 2011 the bowsprit was gone, and there was no sign of it on the site. Thus, the current location of the bowsprit is unknown. The bowsprit has not fallen down, since it has not been located anywhere near the bow on the seabed.

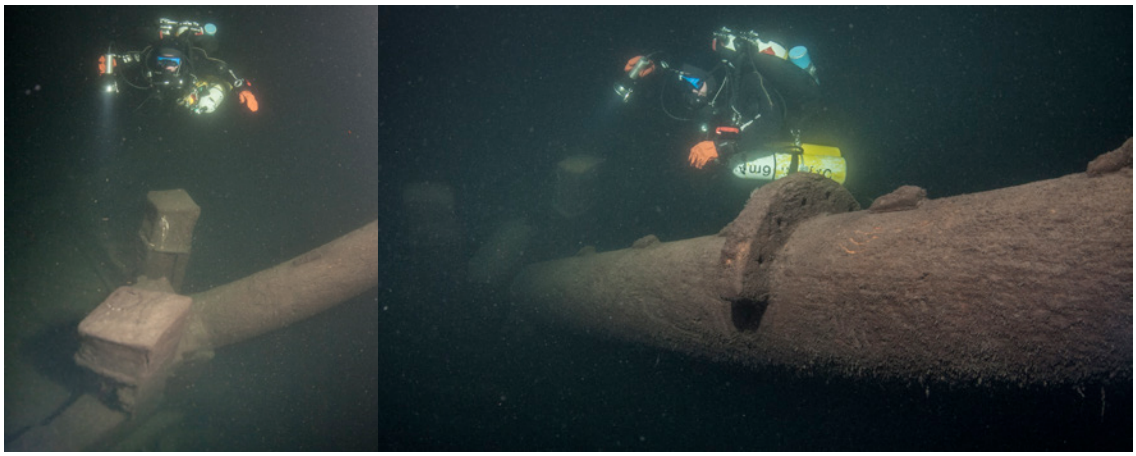


Figure 23: *The bowsprit still in its original place rising upwards from the bow between two metal-lined bitts. The bowsprit had six small "steps" on the top, and in between three steps an U-shaped wooden block with holes (on the right). There was also a metal semi-cylindrical lining, approx. 50 cm long after the steps, and a low cut-out neat the end of the bowsprit. Photos taken 11th August 2007.*

Figure 24: *Bitts in the bow, after the bowsprit had disappeared. The small crossbeam beside the bitt on left has fallen away after the picture was taken. Photo 11th September 2011.*

5.1.7 The yard and the fore mast

A yard was laying diagonally across the forecastle when the wreck was found. The fore mast had been broken at the deck level, and was hanging on the gunwale over the cathead on the starboard side. These were the location of the mast and booms at least until the 3rd September 2011 (see Figure 25). Observations made during the dive on 11th September 2011 are shown in the Figure 26. The bowsprit had disappeared and the yard and fore mast were relocated. The fore mast has also rotated 120 degrees along it's axis as can be seen from the -trees.

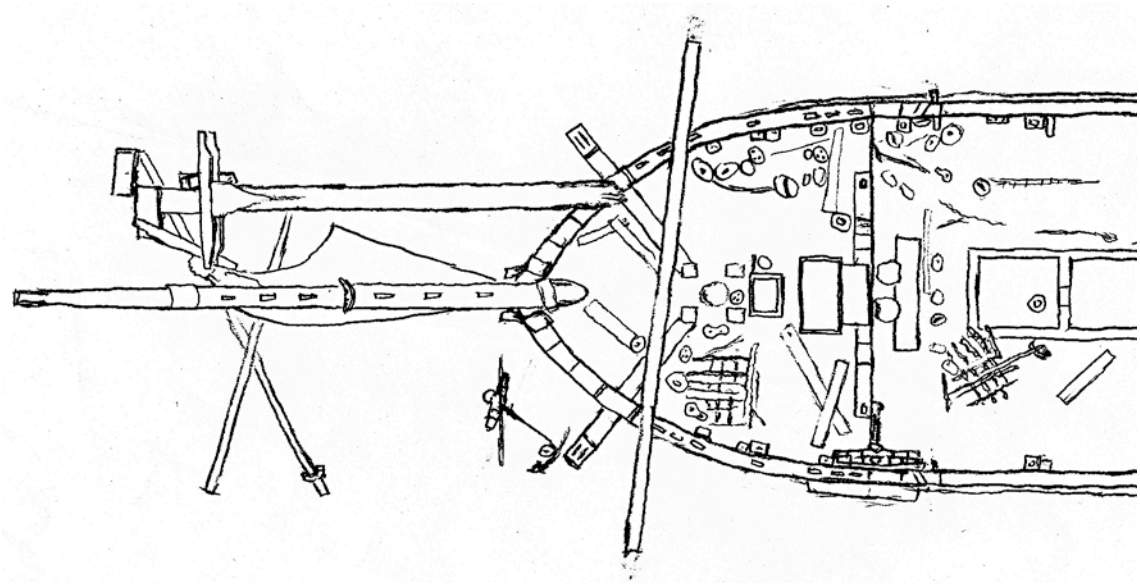


Figure 25: *This drawing shows how the bowsprit, yard and foremast were located still on the 3rd September 2011. The bowsprit was intact and in its place pointing up in an angle of 30 degrees. Drawing: courtesy of Pasi Raasakka (2006).*

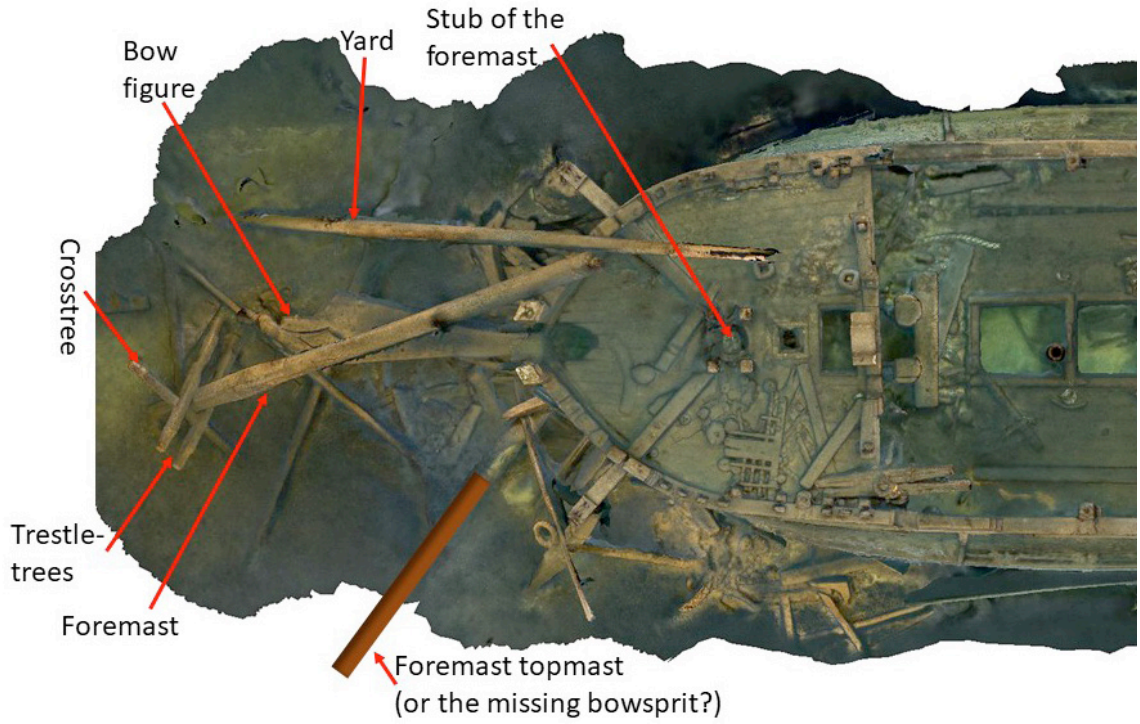


Figure 26: *An orthometric caption from the 3D photogrammetric model shows the changes in the bow area of the wreck as observed on the 11th September 2011. The current location of the bowsprit is still unknown.*

5.1.8 Objects in the forecastle area

There are plenty of loose objects in the forecastle area which can be seen in the 3D model. These objects include among others, wooden deadeyes and blocks. Remains of a wooden gratin is laying on the port side, just behind cat-tail. The gratin has been probably a hatchway cover, or possibly a part of the fore top.

Figure 27: *Some loose objects in the forecastle area abaft cat-tails. In the left image on the port side there are remains of a wooden gratin, blocks and deadeyes. In the right image there are blocks, deadeyes and remains of ropes. Photos 11th September 2011.*

5.2 Gun deck

The term "gun deck" here refers to the only deck on the wreck, where guns have been found. This deck is also the exposed 'weather deck'. The deck planking on the gun deck is intact with the exception that one plank has been displaced on the starboard side close to bow, and one plank is a little bit off on the port side.

5.2.1 Gunwale on the gun deck

There are no major differences in the elevation of the gunwale between the forecastle and the poop deck. However, there is a small longitunal shear.

Right abaft the forecastle break there is a wooden block – approximately 1 metre long and 20 cm high – on the port side on top of the gunwale. The same structure was previously present on the starboard side of the wreck, but today it has disappeared together with the ornament carving and metal lining.

The photogrammetric 3D model shows a small curvature in the gunwale, the lowest point being about in the middle of the gunwale and bit higher in the forecastle and poopdeck breaks.

5.2.2 Deck between the forecastle and the main mast

On the gun deck there are five hatchways in a row, separated by narrow crossbeams between the riding bitts and the main mast. The volume below is an integral space without any bulkheads. The first and the last hatchway are little bit longer than the ones in the middle, which are almost indentical (see Figure 28). The width of the second last hatchway is 135 cm ± 1 cm, and the length is 120 cm ± 1 cm (measured with a scale stick). The frame of the last hatchway (i.e. the fifth counted from the bow side) is little bit thicker than the frames of the other hatchways. A vertical pump tube can be seen in the first hatchway, closer to the port port side.

There are plenty of loose items on the deck. Deadeyes, blocks, ropes, a bucket and a fallen loose bitt. The bitt has originally been on the gunwale, beside a gunport. There are remains of a wooden grating on the port side, near the first hatchway.

There are a total of twelve gunport. The first three gunports starting from the bow on both sides are empty. Behind the main mast, the next three gunports on both sides have guns. The first empty gunport on the starboard side is closed, and the next two are open (hatches are missing). On the port side the two first gunports from the bow are open, and the third one is closed.

A small glass bottle was found in 2006 (See *Raasakka, Kaasinen et. al.*), located on the gun deck on the port side of the aft edge of the fifth hatchway. This glass bottle is now missing.

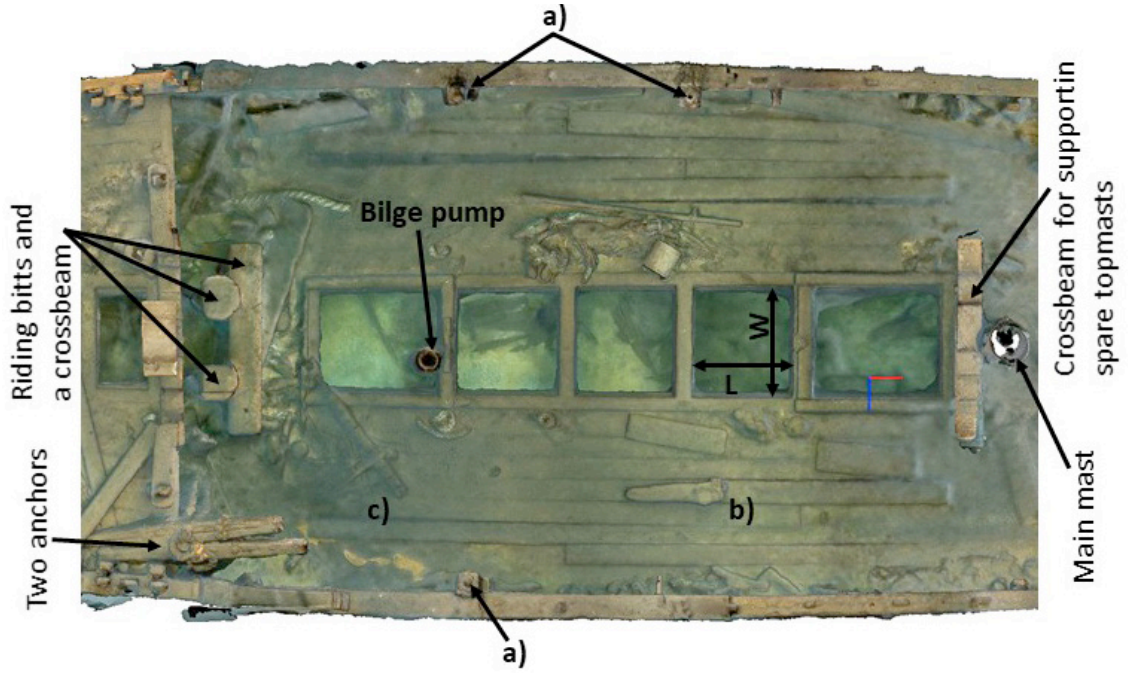


Figure 28: *Deckplan of the 'gun deck' between the forcastle and the main mast. The length of the fourth hatchway is 120 cm, and width 135 cm ±1 cm (measured). The gunwale has bitts (a) for operating the guns. One bitt has fallen off and lays loose on the port side on the deck (b). 3D model orthometric view.*

Figure 29: *The crossbeam abaft the riding bitts. Loose items on the deck; blocks, remains of ropes and remains of a wooden grating. Photo 11th September 2011.*

Figure 30: *A metal bucket or a pot, with two handles lays on the starboard side next to the third hatchway. The Stern is on the right side of the image. Some remains of piled ropes are visible next to the bucket on the left. 3D photogrammetric model caption, orthometric view.*

5.2.3 Fittings in front and abaft the main mast

In front of the main mast, there is a crossbeam supported by two bitts. This crossbeam is meant to support spare topmasts. Crossbeam has grooves in the ends, port side groove is rectangular and starboard side is rounded. The crossbeam abaft the belfry in the forecastle has the same grooves but in the opposite order. The spare topmasts have been lying horizontally between these two crossbeams.

Abaft the main mast there is a vertical bilge pump tube port from the center. Apparently there have been another pump tube in starboard as there is similar empty hole in the deck as for the existing pump tube in the port side. Just abaft the pump tube there are two vertical bitts. Bitts have embedded sheaves at their root close to the deck.

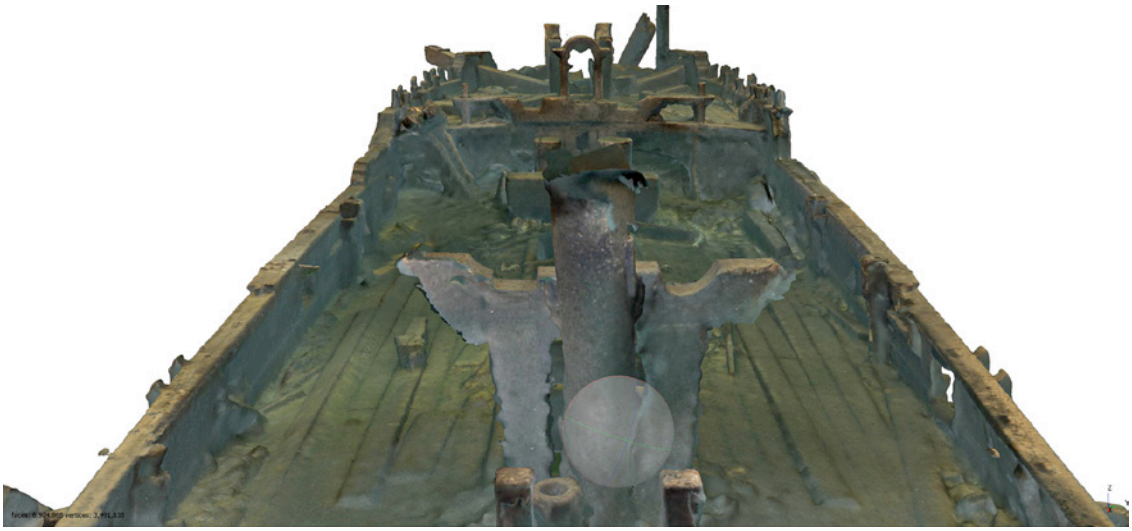


Figure 29: *View towards th bow. Just before the main mast there is a crossbeam for supporting spare topmasts. Abaft the main mast, there is visible a pump tube and two bitts. Perspective caption from 3D photogrammetric model.*

5.2.4 Gun deck abaft the main mast and stern cabin

The gun deck continues below the poop deck. There is a small angle on the deck, but the deck is continuos, as there are no steps nor breaks between the gun deck and the deck of the stern cabin. The stern cabin has been isolated by a wall, which has now collapsed. Today, some loose planks mark the place of the original wall.

The deckplan below shows some of the details on the gun deck, and inside the stern cabin.

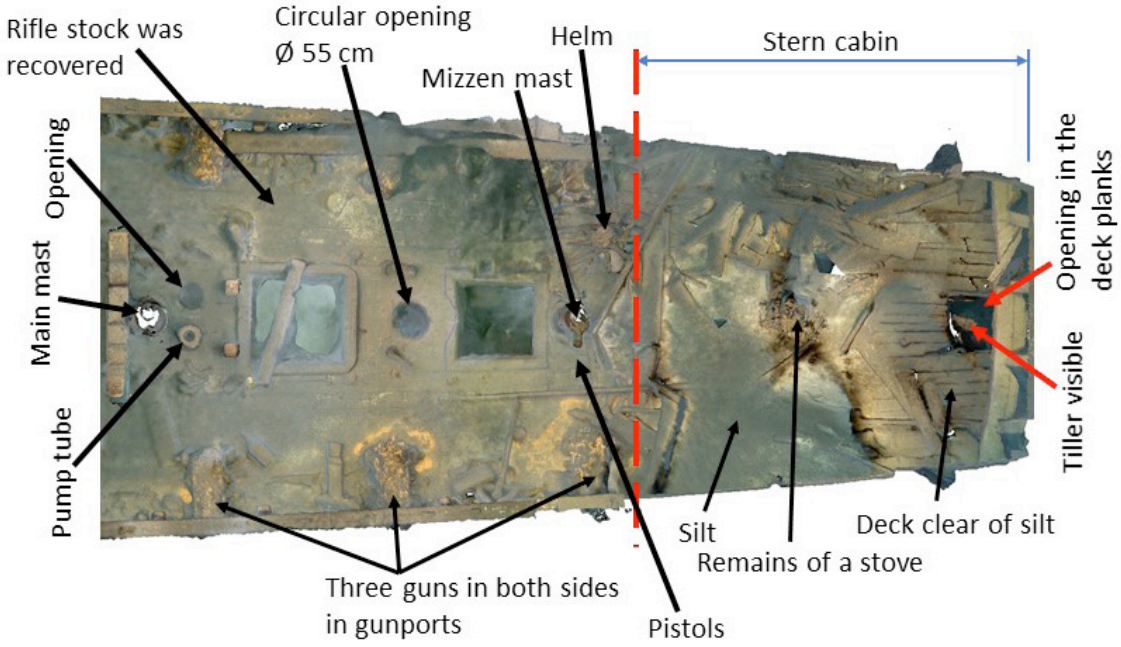


Figure 32: *The deckplan of the gun deck abaft the main mast including the stern cabin. The gun deck continues without any steps or a break below the poop deck as a part of the stern cabin. Orthometric caption from 3D photogrammetric model (wales are not shown for clarity).*

There are two hatchways abaft the main mast. In between them, there is a circular opening, approx. 55 cm ±1cm (diameter measured by tape). The purpose of this opening is currently not known. One possible theory is, that the hole is an opening for a capstan. Another possibility is, that the rigging of the ship has been rebuilt or changed, and that there might have been a mast in the previous configuration. Drawings and contemporary models of ships of similar age show a capstan in this location (Goodwin 1988). Thus, the theory of a capstan is feasible. Nevertheless, there are no signs of a capstan (which might have been lost during the ship sunk.

The helm of the ship rests on the deck, on the starboard side of mizzen mast, just outside the poop deck. The center of the helm has diameter of 32 cm. The length of each spokes is 44 cm, and the maximum diameter of the helm in its current condition is 120 cm.

When the wreck was discovered, there used to be a rifle stock on the deck between the starboard side foremost guns. This rifle stock was recovered by the Finnish Heritage Agency in July 2011. In addition two pistols were found on the port side of the mizzen mast. After July 2011 one pistol had disappeared. This missing pistol has not been found or seen during the surveys in 2018, 2019 and 2020.

There are six guns in the gunports, three on the both sides. These are the only guns that have been found at the site, and they are all placed in the stern of the ship.

5.2.5 The wheel (helm)

A broken, loose wheel of the ship is located on the gun deck, on the starboard side of the mizzen mast. The wheel has been located probably abaft the mizzen mast, in front of the stern cabin. The center part of the wheel has a diameter of 32 cm (measured by tape). It has 10 spokes, which are 44 cm long (measured by tape). The rim of the wheel has not survived.

Figure 33 (left): *The wheel of the ship. The root of the mizzen mast is visible on the right image. The loose planks behind the wheel are possibly the remains of the stern cabin wall. Videocapture 6th August 2019.*

Figure 34 (right): *Wheel barrel visible behind the spokes. There is a gun in the left. The gun is the first of the three guns on the starboard site counting from the stern. Carriage has lost rear wheels and axel. Gun is listing downwards. Videocapture 6th August 2019*

Figure 35: *Wheel viewed from the stern cabin side, view towards starboard side bow. Videocapture 13th October 2020, video: Mikko Koskinen.*

5.2.6 The rifle and pistols on the deck

There was a rifle stock on the gun deck in the starboard side between the two foremost guns. Rifle was recovered by Finnish Heritage Agency in July 2011.

Figure 36: *Left: rifle stock on the deck on 16th July 2011. Photo & copyright: Lauri Näreneva. Right: The recovered rifle during conservation in Finnish Heritage Agency. Photo & copyright: Lauri Löfgren/FHA.*

Figure 37 (left): *Two pistols on the deck just beside the mizzen mast on port side on 16th July 2011, Photo & copyright: Lauri Näreneva.*

Figure 38 (right): *Today, there is only one pistol left, videocapture 8th August 2020.*

Figure 39: *The mizzen mast is located in front of the poop deck on the gun deck. Mizzen mast has cut from ca 3 m from the deck (not measured). Just below the cut poin, there are these features. The left image is towards the stern and the other towards the bow. Videocapture 13th October 2020, Mikko Koskinen.*

5.3 Gunports and guns

There are a total of twelve gunports on the gun deck. The foremost gunports are located right after the break of the forecastle. The aftmost gunports are located close to the mizzen mast, just before the poop deck.

The gunport lids of the aftmost and second aftmost gunports have hinges on their upper edge. The gunport lid of the next gunport has hinges on the bow side, so that the lid opens

like a door. The rest of the gunports have hinges again on the upper edge. No carvings or other decorations can be seen on the gunport lids.

The length of one gun is approximately 2 m including cascable (measured & calculated from the 3D model). The lenght from the rear of the base ring to the face of the muzzle is 1.88 metres. The exact length is difficult to estimate, because all guns are seriously corroded. There is thick layer of crust around them, and especially the face of the muzzle is very difficult to see. The cascable is rather clear, but again, the base of the ring is difficult to see. An assumption is made, that the inaccuracy of the abovementioned lengths is about ± 0.1 m.

The carriage axel length is 69 cm ± 1 cm, and the track width measured from the wheels' outer surface is 74 cm ±1 cm. The axel length was measured from the second starboard side gun, and the track width from the third gun, counting from the stern. It is assumed, that all guns and carriages are identical. The size of the guns and carriages suggest a small calibre naval gun. Thus, the guns are probably 3 pounder or 4 pounder guns. The measured dimensions also comply with some 'finbanker' guns. However, to assess their origin is very difficult because of corrosion. As guns were sold, the designs were copied. Furthermore, guns were captures as prize of war, and used virtually by every navy. Current the limited data that has been gathered does not pointing to any precise origin, type or user, nor any manufacturer.

The center of gravity of the guns is close to the foremost wheels. This is conclusion is illustrated by the aftmost starboard side gun, which has almost slided out through the gunport. This gun is pointing downwards and the carriage has tilted together with the cannon so that only the foremost wheels are on the deck. The rear wheel axel has actually dropped off from the carriage.

There are some equipment and/or accessories near the guns, that are related to them. For example a large bottle is located close to the port side first gun. This bottle may have been used for gunpowder. On the starboard side, there is dish with a tip beside the first gun. Another more corroded dish can be found close to the middle gun.

Figure 40: *Diver inspects the first gun (counting from the bow) on the port side (4th gunport counted from the bow). On this gunport the lid hinges are on the bow side. Photo taken 11th September 2011.*

Figure 41: *The same gun today. A loose plank has appeared from somewhere, and it has been fallen over the gun. The origin of this plan, and how it was moved is unknown. Videocapture 23rd July 2019.*

Figure 42: *The second gun on the port side. The gunport lid has been missing since the discovery of the wreck. Photo taken 24th August 2019.*

Figure 43: *This on gun the starboard side closest the stern has almost slided out through the gunport. The gun points downwards in apporox. 35 degree angle. The lid on this gunport opens from above the gunport. This same gun is shown from the deckside in the figure 45. Note the ornament carving in the gunwale break. Three planks of the main wale are visible. 3D photogrammetric model.*

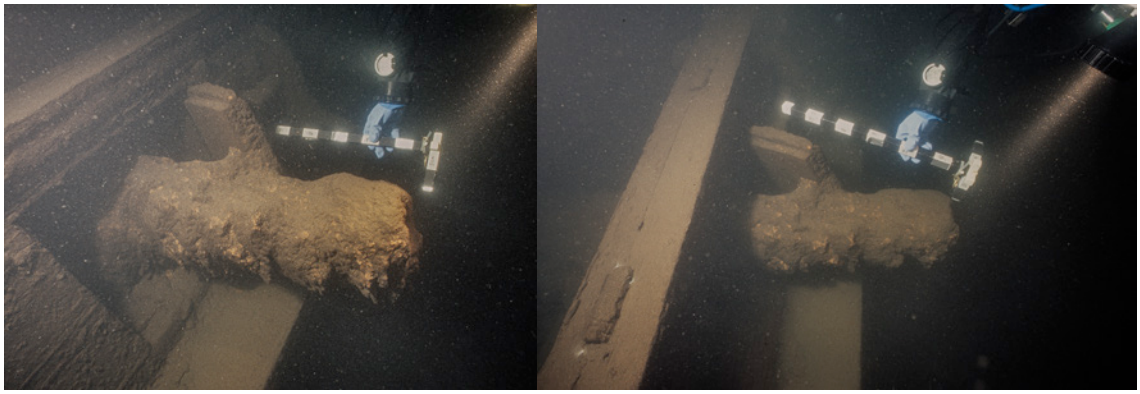


Figure 44: *The first starboard side gun (counting from the bow). The main channel is visible below the gunport and gun. Measurement scale is 60 cm. Photo 18th July 2005, photo Jouni Polkko.*

Figure 45: *The gun closest the stern in the starboard side has tilted and almost slided out through the gunport. Rear axel of the carriage has detached. Videocapture 13th October 2020, video Mikko Koskinen.*

Figure 46: *The first gun on the port side (counting from the bow). There is a large bottle beside the gun. Videocapture 23rd July 2018.*

Figure 47: *Two first guns on the port side counting from the bow. Photo 24th August.*

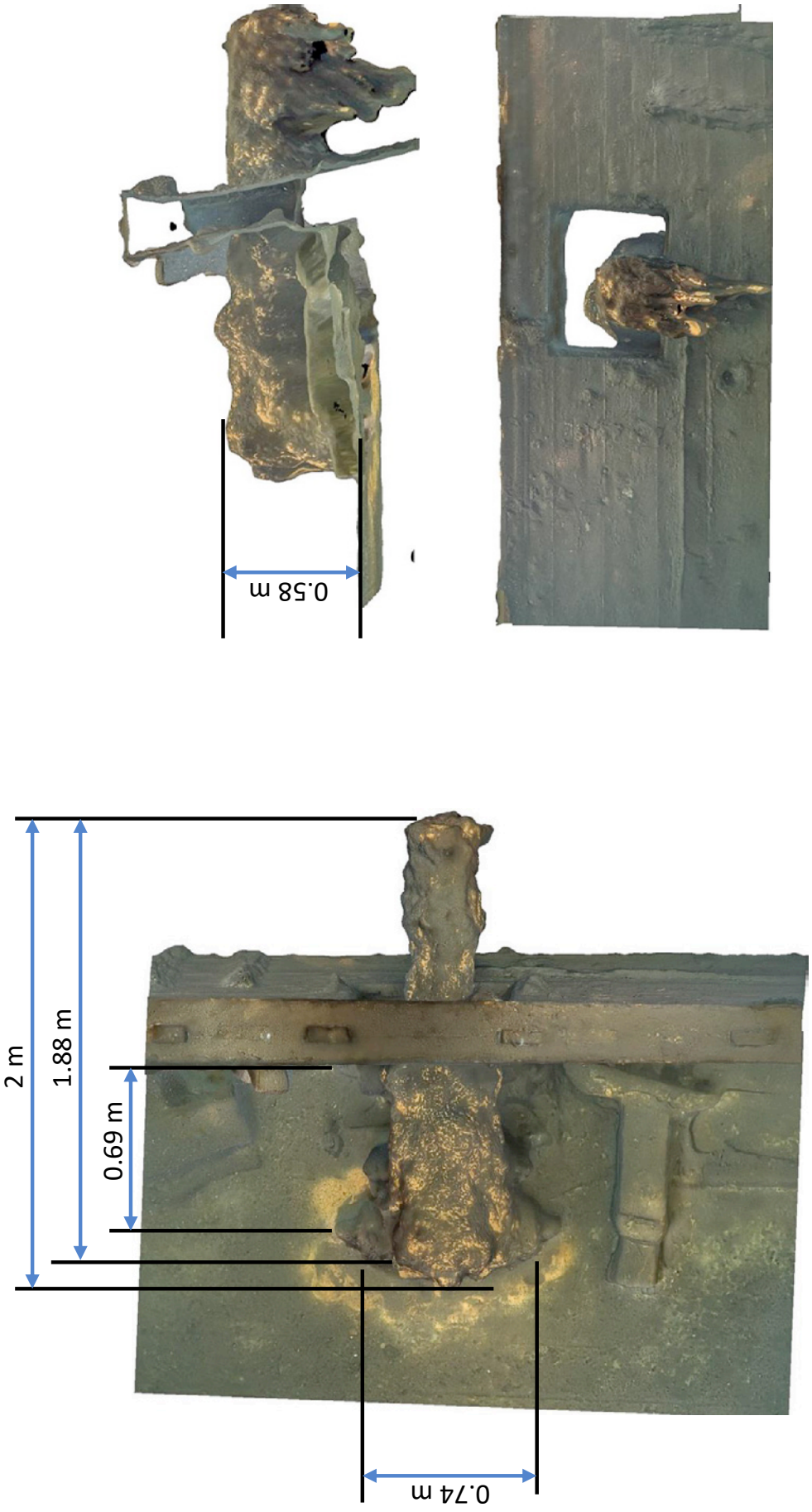


Figure 48: *3D photogrammetric model of the middle gun (2 nd from the stern) on the port side showing the axel length, track width (between the wheels' outer surface), height including the carriage and the length of the gun. Because of the corrosion especially on the muzzle face, the exact length of the barrel is difficult to judge. The accuracy of the lengths is approx. ±0.1 m, and thus the gun could be roughly 1.9 m long. The location of trunnions are difficult to see. Orthometric view.*

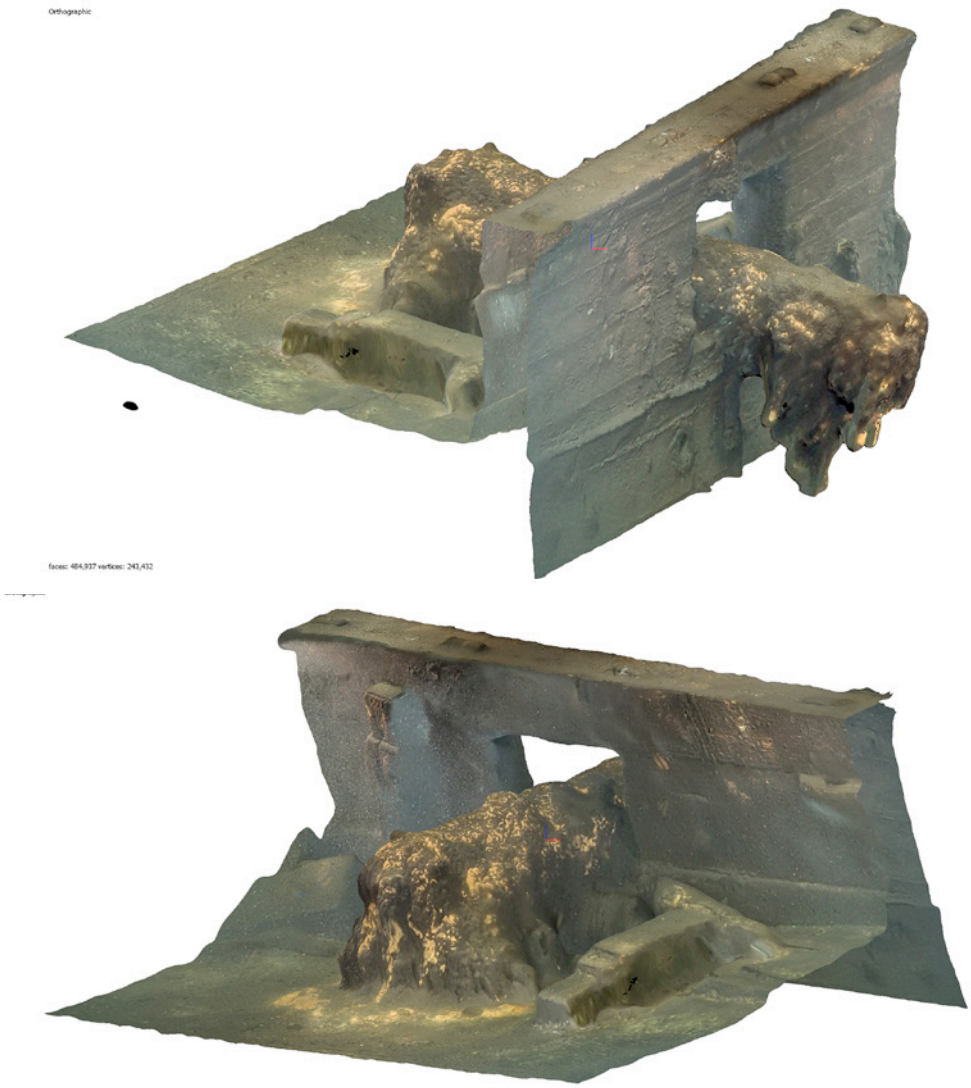


Figure 49: *The middle gun on the port side (2nd from the stern). 3D model imagecaptures. Orthometric view.*

Figure 50: *The two first guns on the starboard side counting from the bow (the bow is on the left). There are two round plates, possibly used for operating guns. It is also possible that the other plate is a lid for the other. The plank over the right gun is possibly from the poop deck. 3D model orthometric view.*

5.4 Stern cabin

The stern cabin is almost empty. There is a collapsed, badly corroded structure, which has probably been a stove. Above this 'stove', there is an opening to the poop deck. This opening has probably been for a chimney. Other than some collapsed structural parts, no personal objects or such belongings of officers, crew nor kitcheneries or bottles etc. have been found. In the stern there is an opening in the deck planks just in the centerline. The tiller is visible from this opening. Helm port has been located there.

There is layer of silt over the deck on the foreside part of the deck in the stern cabin. Aft part of the cabin is free of silt, and deck planks are visible.

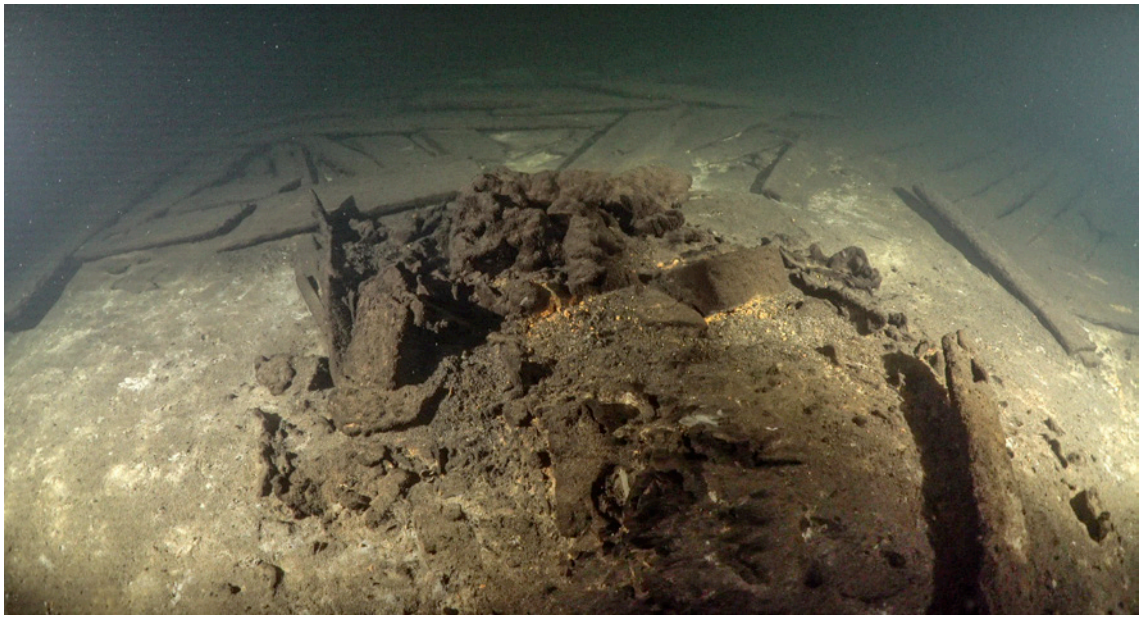


Figure 51: *Remains of something, possibly a stove inside the stern cabin. Videocapture 25th August 2019.*

Figure 52: *A view inside stern cabin. The access hatchway into the port side quarter gallery can be seen in the middle. Stern lights on the left. Videocapture 25th August 2019.*

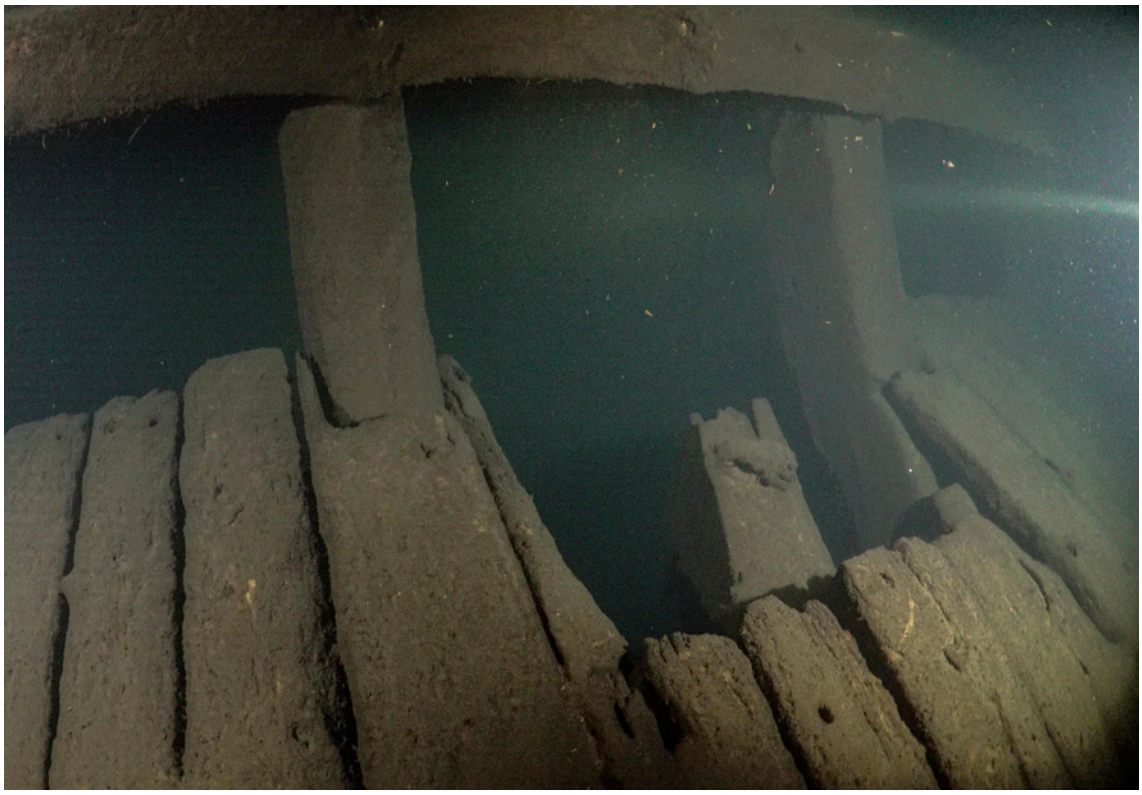


Figure 53: *Inside the stern cabin (view towards transom). The tiller is still visible inside the deck plank cutout. The helm port has been here.*

5.5 Stern and poop deck

The level of the poop deck is approx. 2 meters higher than the gun deck. The deck planking in the middle of the poop deck is intact but, three planks are missing from the starboard site. On the port side, the plank on the edge is there, but next two are missing. In the middle of the deck, there is metal-lined rectangular opening. It is just above the stove-like remains. Here it is assumed, that the opening in the poop deck is for the chimney of the assumed stove.

In the middle of the stern, there are two longitudinal beams connected by a crossbeam just afore the stern gunwale. The poop deck gunwales have fife rails. In the middle, below the rail there is a block with embedded sheaves on both sides. The end of both fife rails was closed by a curved rail piece, when the wreck was discovered. Now the ends are open, and these curved pieces are missing.

There has been a spacious quarter gallery on the sides of the stern. A crossbeam that used to support the quarter gallery is still in its position in the transom. The width of this crossbeam is 6.5 m (measured from the 3D model). The width of the stern at poop deck level is 4.4 m (measured by tape 3rd September 2011).

All counter plankings have fallen off, which gives an open view inside the compartment below the stern cabin, where the tiller has been operated. A heavy block, or a deadeye is located close to the end of tiller. It is has been probably related to ropes moving the tiller.

The hull in the lower parts of the stern is mostly intact. However, there are a couple of loose planks on both sides. There is no sign of a rudder, and no remains of a rudder have been observed anywhere at the bottom.

Figure 54 on the next page shows the details of the stern.

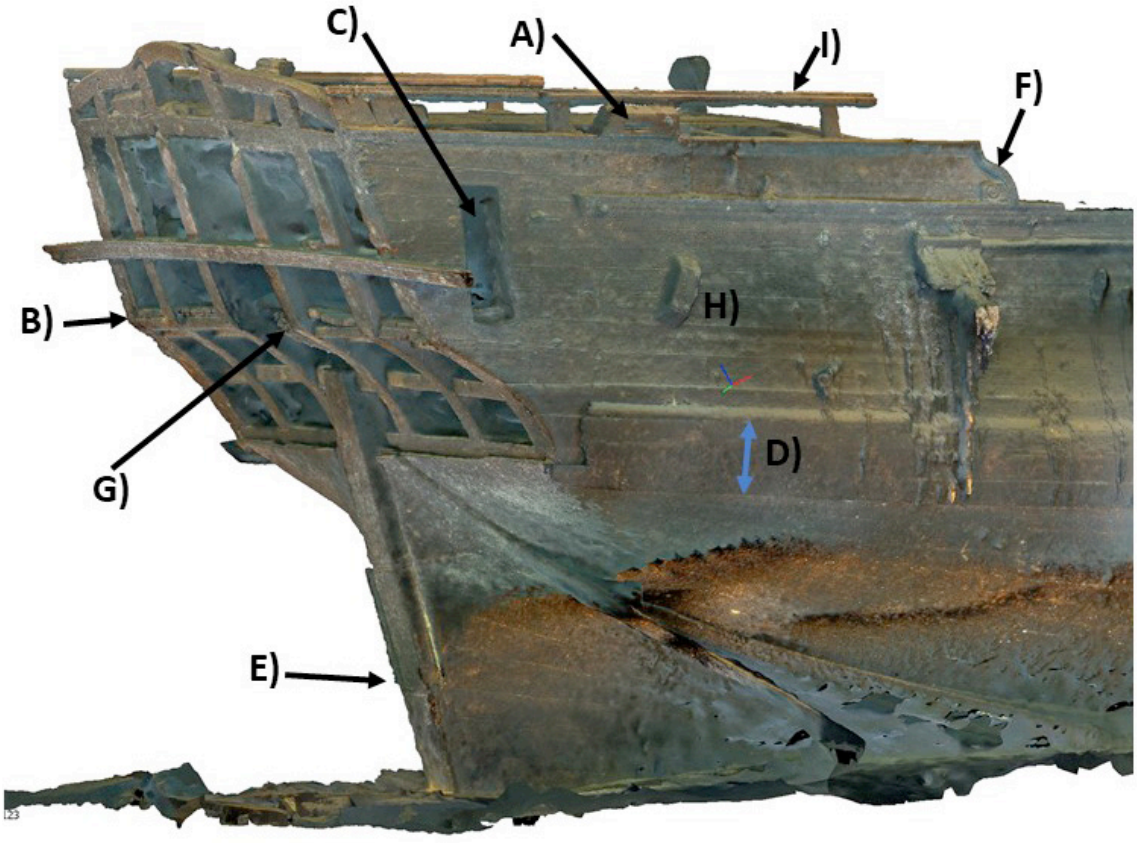


Figure 54: *The stern (3D model, orthometric view):*
A) A block with shieves
B) The level of the stern cabin deck
C) Entrance hatchway into the quarter gallery (quarter gallery has collapsed to the seabed)
D) Main wale
E) Stern post
F) The break of the gunwale is protected by metal lining
G) The tiller is visible.
H) A block with shieves
I) Fife rails.

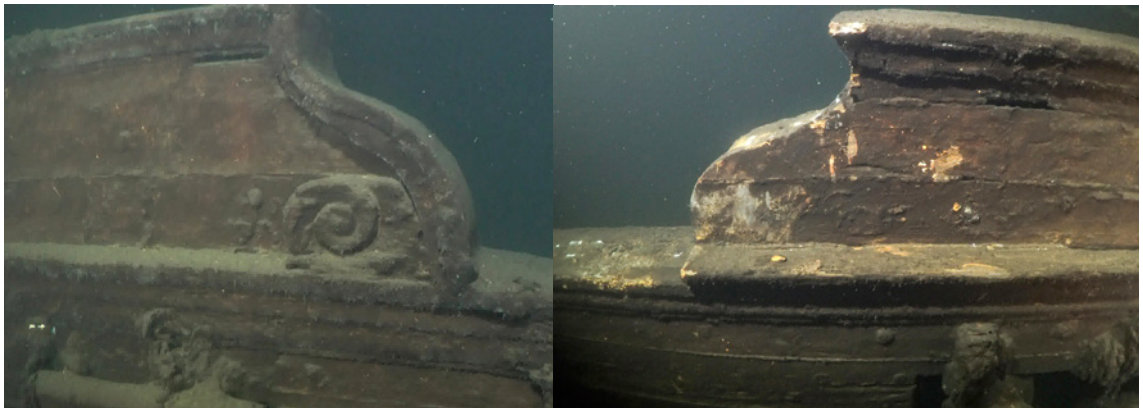


Figure 55: *The left image shows the break of the gunwale (on the starboard side) which is protected by a metal lining and an ornament carving. Videocaption 26th July 2018. The right image shows the port side., where the ornament and metal lining are missing. There is an ornament on the seabed on the port side just near/below this point., which is probably the missing ornament. Videocaption 23rd July 2019.*

Figure 56: *The port side gun closest to the stern. The marks on the right next to the upper edge of the gunport mark the location where the mizzen channel has been, and a deadeye is still hanging from it on a remains of a rope. The channel has fallen down and is probably on the bottom below. The channel has fallen before the discovery of the wreck. Videocaption 23rd July 2019.*

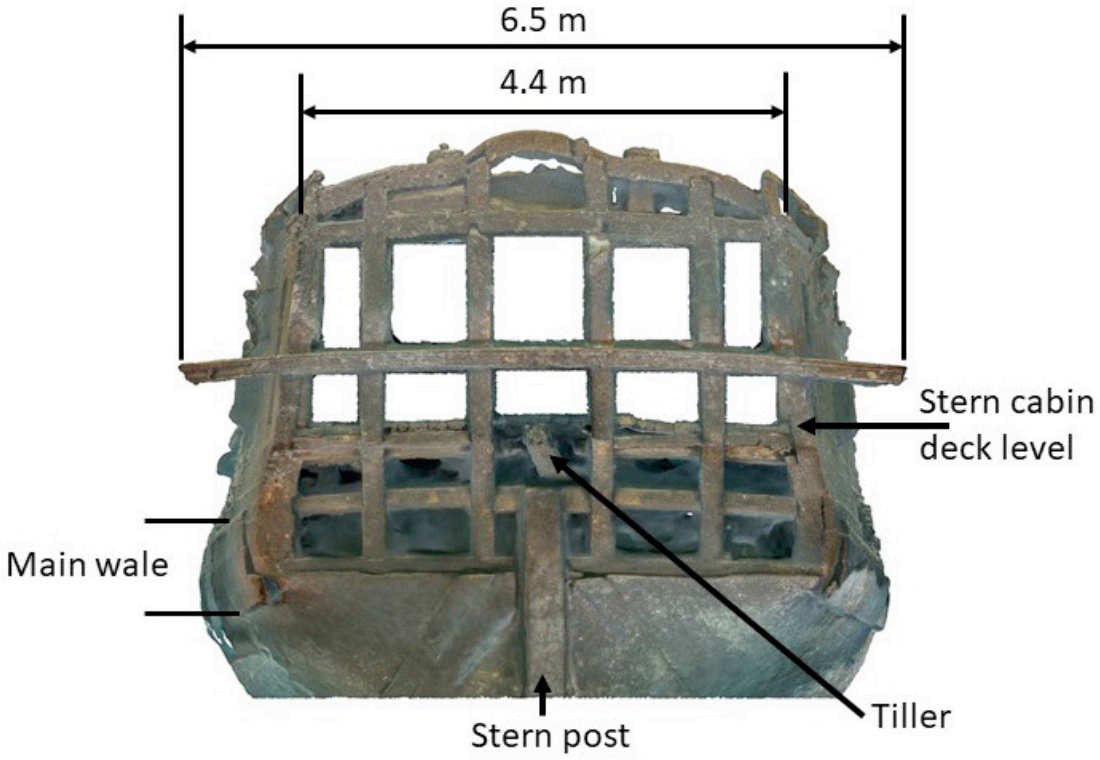


Figure 57: *Orthometric view (3D model) of the stern and the transom. A 6.5 m wide crossbeam has supported the quarter galleries. All wing transom (below the stern cabin deck level) planks have fallen away, giving a view into the space where the tiller has been operated.*

Figure 58: *A view upwards below wing transom, towards the tiller and and the tiller port. The tiller is in the middle and the stern post below. Videocapture 8th August 2020.*

Figure 59: *The views below the stern cabin through the wing transom. The left photo shows a view from the port side towards the starboard side. The tiller is visible in the middle. On the right, a view from the starboard side towards the bow. Tiller is visible here on the left. There are some fittings/hardware in the tiller, that are probably related to the turning mechanism. Videocapture 12th August 2020, video Jani Tattari.*

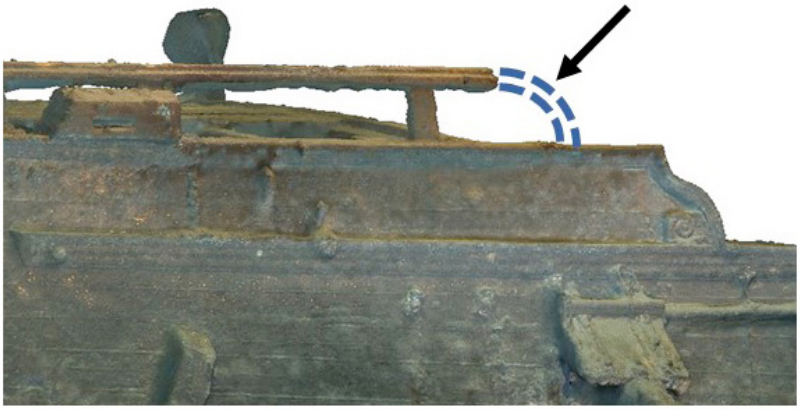


Figure 60: *Fife rails were closed from each end by a curved rail piece, when the wreck was discovered. Today, they are missing. Othometric 3D model viewcapture.*

5.6 Hull

5.6.1 The shape of the hull

Shape of the hull is illustrated in Figure 4, which shows the 2D cross-sections of the hull (cut outs from the 3D photogrammetric model). Figure 61 below shows a 3D cross section taken from the widest part of the hull.

Figure 61: *Orthometric 3D cross-sections close to the widest point of the hull. The starboard side is shown on the left, and the port side on the right. The hull is widest at the main wale. The main wale consists of three planks. There is a narrow strake above the main wale. The hull is practically intact around the mid-ship area on the starboard side. on the port side, there are some loose planks below the main wale.*

Figure 62: *An orthometric view from the bow (3D model). There is an anchor on the bottom below the port side cathead. The main wale planks have detached from the stem post. The lowest section of the broken foremast leans down from the gunwale, down to the seabed. Trestletrees and a crosstree are still attached to the foremast. The long boom on the left coming down from the gunwale is a yard. Originally (when the wreck was discovered) it was located diagonally over the forecastle. After the discovery, the fore mast has been relocated as well, as it used to be more on the left.*

Figure 63: *The stem post at the seabed. If there has been a gripe, it has fallen away, and is below the fallen parts in front of the stem post. A knee of a head, with the figurehead lies near at the seabed. The keel can't be very deep inside the seabed. Photo 30th August 2020.*

5.6.2 Details on the hull

At the bow there are hawse linings with two hawse holes on each sides. The main whale planks have partly detached close to bow, three on the starboard side and and two on the port side. In the midships close to the main mast, there are entry steps and two fenders on both sides. Between the fenders, there is an embedded sheave inside gunwale on both sides. One more fender is located close to break of the forecastle on both sides.

Above the main wale, there appears to be small hinged lids. These lids look like sweep ports. All hinges are badly corroded. These features could alternatively be attachements of the shrouds or chain plates. As these features seem to be located on almost constant level from water line, sweep ports are a feasible explanation. Some of these 'ports' are located below the existing guns and gun ports, which are technically impossible places for attachements for chain plates or shrouds. In total there are 11 of these 'ports' on both sides of the ship. These ports appear on an equal distance.

Figure 64 (left and center): *Hawse linings and hawse holes on the starboard side of the bow. Hair brackets below hawse holes and lining are still partly intact. Main wale planks have become loose close the bow and have detached from stem post. Videocaptures 12th August 2020.*

Figure 65 (right): *Port side hawse lining and hawse holes. Two of the main whale planks have become loose on the port side close to bow. Videocapture 10th August 2020*

Figure 66: *Details on the starboard side of the hull, a little bit forward from the main mast. Entry steps can be seen on the left. In the middle, there are two fenders. Between these fenders, the gunwale has two embedded sheaves for the fore sheet. Drain holes can be seen below the gunport there and between the fenders (for letting water out from the deck). The main wale is just under the entry steps. Above the main wale, there are two small lids with two corroded hinges. These features look like sweep ports. Videocapture 12th August 2020*

5.6.3 Sweep ports

There appears to be hinged lids along the hull, above the main wale. They are most probably sweep ports. There are 11 of these 'sweep ports' on both sides. These sweep ports seem to be located on a constant level above the waterline. Equal intervals and locations of the these features strongly points to sweep port function. As the main wale rises a bit towards the stern, the main wale below the last sweep ports have cutouts. It looks like the cutout is for both the lid, and for allowing the movement of an oar. It is possible that shorter oars were used in the stern, requiring a steeper angle to reach the water.

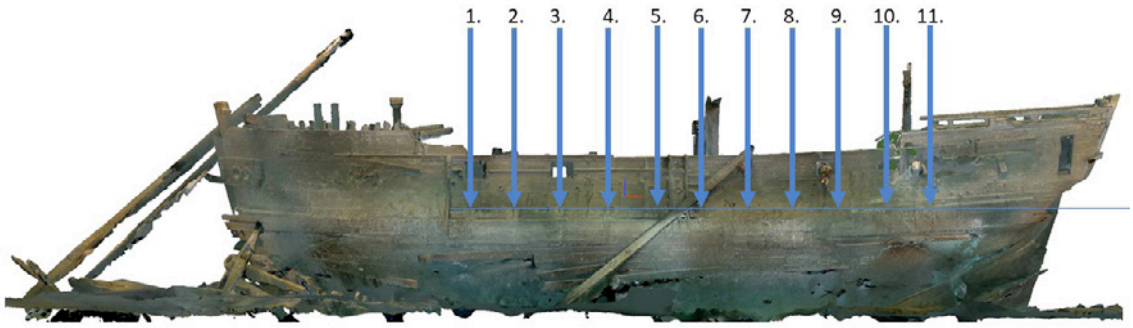


Figure 67: *Location of the sweep ports in the port side. There are 11 sweep ports in the same locations in the starboard side. Orthometric view, 3D model.*

Figure 68: *Presumed sweep ports closest to the stern on the starboard side. There are cutouts in the main wale, which could be for allowing the movement of the oars and the sweep port lid to open. It is also possible, that shorter oars were used in the stern, where the ship is narrower, requiring a steeper angle downwards for rowing. Videocapture 12th August 2020.*

Figure 69: *On the left, there is the first (recognized) sweep port from the bow on the starboard side. On the right, there is a single fender, located bit abaft the forecastle gunwale break. In the middle and on the right there is a sweep port below the first port side gun (counting from the bow), and on the right another sweep port beside the first of mid-ship double fender.*

5.7 Channels and attachements for chain plates and shrouds

There were two channels still in place when the wreck was discovered in 2003. The main channel was on the starboard side and fore channel on the port side. Today, they have fallen down probably because of aging.

Figure 70: *The first gun from the stern on the port side can be seen on the left. There are clear marks where the mizzen channel has been (on the level of the gunports' upper edge). It looks like the mizzen channel has had two separate channel plates. The small dark dots are probable attachement point for chain plates. There is a fixed rectangular block with shieves on the right corner. Videocapture 23rd July 2019.*

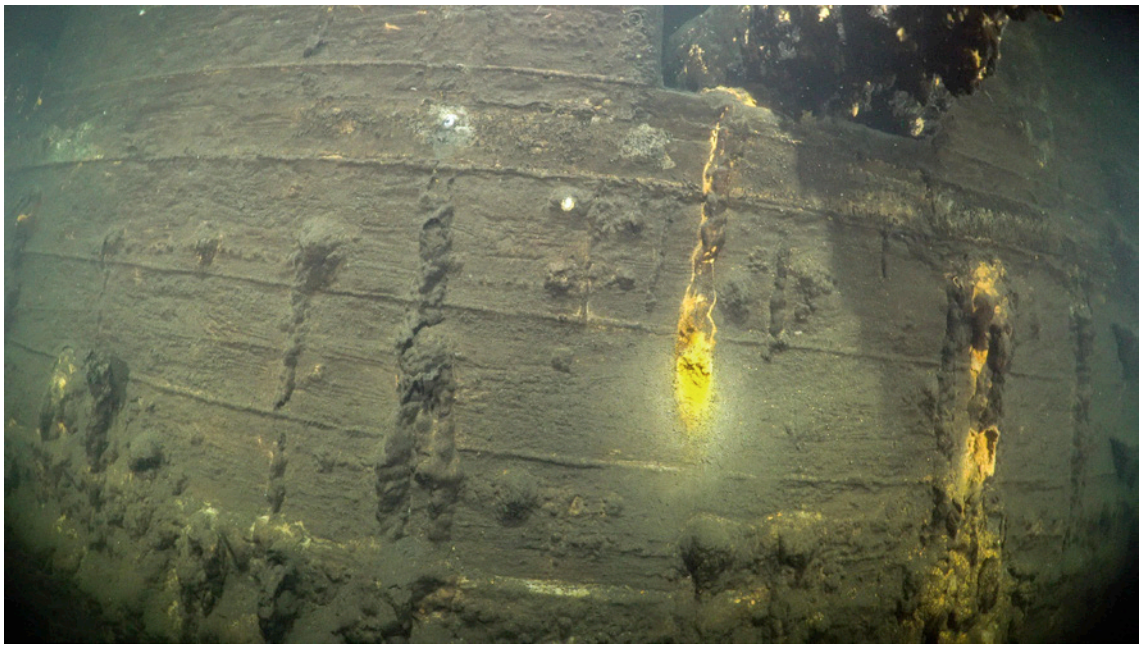


Figure 71: *The third gun from the stern on the starboard side is in the up right corner. The main channel has been below the gunport. There are various probable attachement points for the chain plates/ shrouds. Below the gun in the bottom of the picture there are corroded hinges of a sweep port lid.*

5.8 Objects on the seabed near the bow

The debris field near the bow can be observed in the following capture from the 3D model (the foremast and yard have been removed from the capture for illustrative purposes).

There are plenty of unidentified wooden objects and parts of the head assembly, laying in front of the stem post. There include objects such as head rails, head timbers and brackets. Some parts have matching marks on the hull planks above.

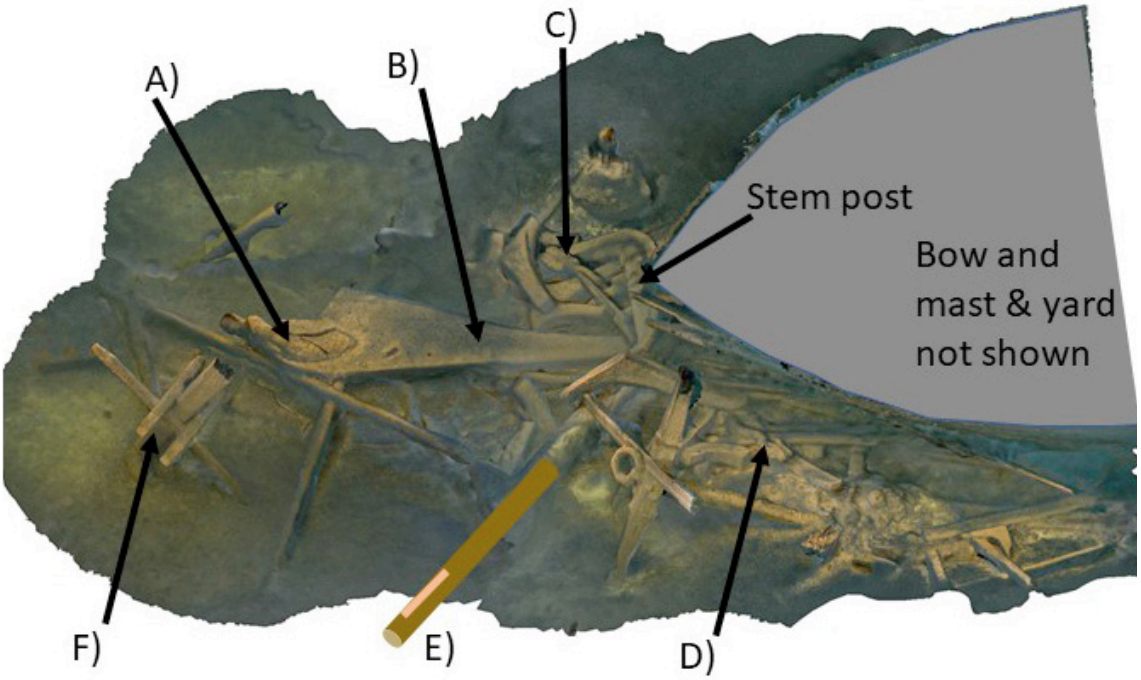


Figure 72: *The orthographic view of the 3D model shows the debris field below, and in front of the bow.*
A) The figure head
B) The knee of the head
C) The foot of the figure head
D) The foot of the figure head
E) An unidentifyed boom, possibly a part of the fore mast, or a jibboom
F) Trestletrees on the foremast (fore mast not shown in this view)

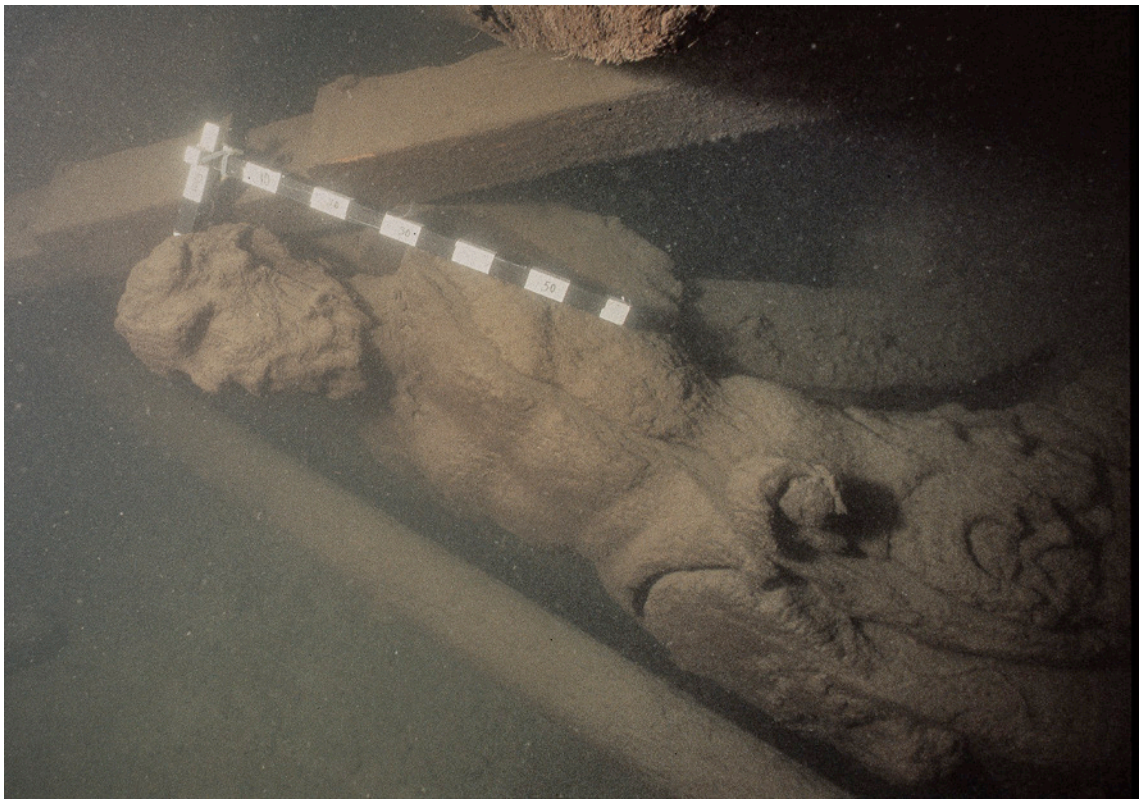


Figure 73: *The figure head as discovered (18th July 2005).*

Figure 74: *The figure head still in the condition it was found (11th August 2007, photo Jouni Polkko). The beam pointing towards the camera is one of the trestletrees of the fore mast. In front of the figure head is a loose crosstree from the fore mast. The fore mast is behind the head figure.*

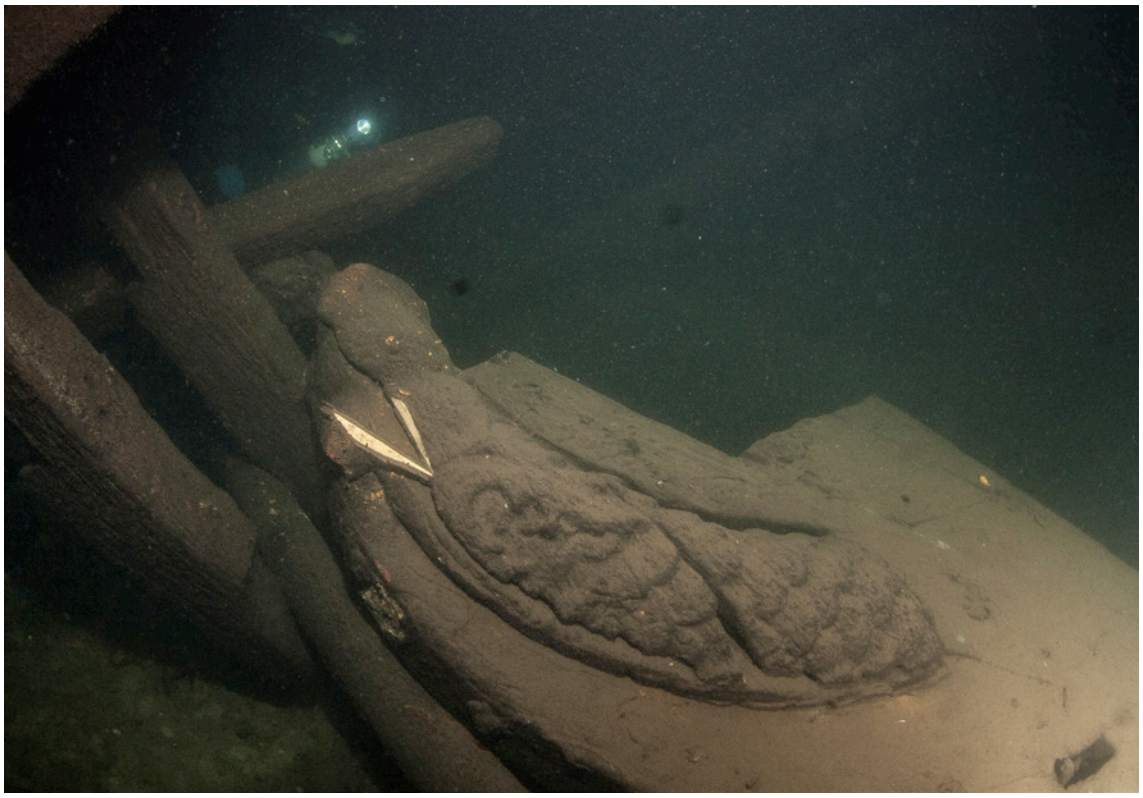


Figure 75: *A fresh damage in the figure head was observed on 11th September 2011. The fore mast has been relocated and the trestletrees are now in the left. Photo 11th September 2011.*

Figure 76: *The details on the trestletrees on the fore mast are visible. There is one crosstree in place. The back of the head figure is facing the camera on the bottom. A beam is over the figure head. Later it was removed by an unknown diver possibly to save the neck of the head figure from the weight. Photo 11th September 2011.*

Figure 77: *(A) The figure head (present day) Photo 30th November 2020.*

Figure 78: *B) The knee of the head. Photo 30th November 2020.*

Figure 79: *(C) A wooden carving in the middle is probably the starboard 'foot' of the head figure. Photo 30th November 2020.*

Figure 80: *(D) The possible the port-side-foot of the head figure. Photo 30th November 2020.*

Figure 81: *(E) The end of a boom. Whether this is part of fore mast, or something else, is not known. The missing bowsprit had a very similar cut cutout in the end. However it is unlikely that this object could be the bowsprit as it lacks some of the features of the bowsprit, and because the other end is below several objects in front of the stem post. It could be an extension of the bowsprit, i.e. a jibboom. Photo 30th August 2020.*

5.9 Objects on the seabed below and close to the stern

There are plenty of objects and parts on the seabed behind and below the stern. The stern has had quarter galleries, which have collapsed and fallen down onto the seabed. All counter plankings have fallen away from the stern. The stern has been decorated with different kind of carved planks and figures. Some of these are still visible on the seabed. There has been a toilet in the quarter gallery, which now lies now on seabed on the starboard side.

Some of the observed and found details in figure 82 (next page) are:

A) A wooden bust sculpture (possibly a woman)

B) A wooden sculpture head with a Roman or a Greek style looking helmet

C) Lots of carvings, including a half of a head and a torso figure in a carved frame, and a carving looking like mens' feet

D) Remains of the quarter gallery wood work, an object looking like a toilet

E) A possible floor or a ceiling piece of the the quarter gallery

F) A curved crossbeam with slots, matching with stern timbers

H) The stern post

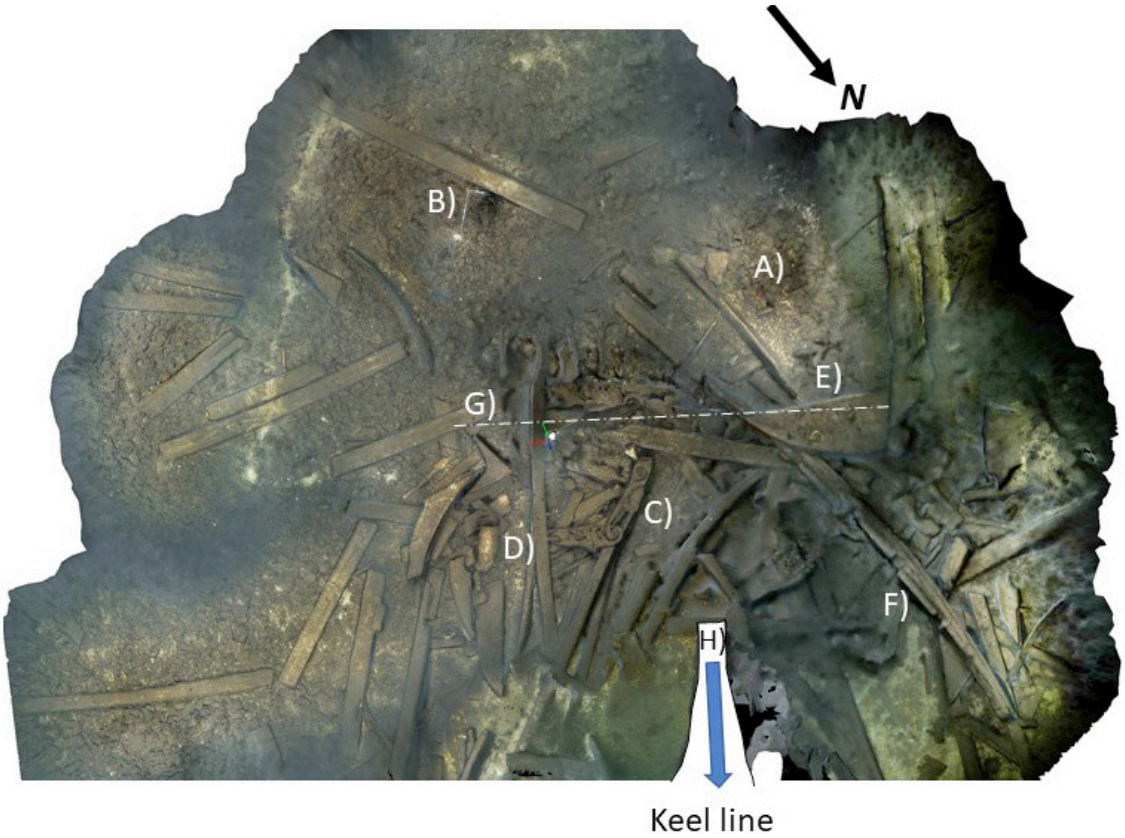


Figure 82: *Orthometric map from above of the debris field below and behind the stern. H) is the stern post at seabed level. G) marks about the level where the end of the poop deck extends. There are lot of carved woodwork around C, which is just below the stern lights. Details explained in the text.*

Figure 83: *On the left, a 3D model orthometric viewcapture, toilet bowl and remains of the starboard side quarter gallery. Wooden carvings can be seen in the left corner. On the right, a photo of the toilet bowl. Photo 4th August 2019.*

Figure 84: *(C) Carved woodwork decorations with human figures. Photos 4th August 2019.*

Figure 85: *(A) Wooden bust sculpture. Photos 4th August 2019.*

Figure 86: (*B) Wooden sculpture head figure with some kind decorated helmet. Photos 4th August 2020.*

Figure 87: *A small wooden bust sculpture in the debris field. Videocapture 4th August 2019.*

5.10 Summary of the observed changes in the wreck between 2003 and 2020

Some changes have been observed in the wreck during the past 17 years after the discovery.

The most visible alterations have been around the bow with the bowsprit, foremast and a yard, which have been relocated. As found, the bowsprit was in the bow in its place, between the bow bitts rising up in what seemed to be as-built-angle of about 30 degrees. The current location of the bowsprit is unknown, but it is probably somewhere on the seabed close to the bow. The current state of the bow is shown in the Figure 2 and 26.

Few objects have disappeared from the wreck. These objects are:

- A small glass bottle from the deck which was found from the port side afore the first gun (counting from the bow).
- A few deadeyes and blocks have disappeared from the starboard side forecastle deck between the cat-tail and forecastle break (see Figure 9 and Figure 27).
- One pistol close to mizzen mast has disappeared (see Figure 37 and Figure 38).

Other changes in the wreck include:

- The main channel on the starboard side has fallen (see Figure 44 and Figure 71).
- The fore channel on the port side has fallen.
- The curved ends from the poop deck fife rails have disappeared (see Figure 60).
- The decorated ornament piece from the starboard side gunwale break between the gun deck and the forecastle has fallen off (see Figure 11 and Figure 12).
- The port side lion head carving on the cathead has fallen down onto the seabed (see Figure 20 and Figure 21).
- The relocation of the the bowsprit, foremast and a yard (see Figure 25 and Figure 26).

6. Reconstruction of the wreck and further discussion

When searching for a candidate for the wreck from the archives and literature, dimensions should be translated to comparable ship dimensions of the time. This is difficult because:

> *"The practice of measuring the dimensions of a vessel varied, not only through time, but also from country to country and sometimes even from dockyard to dockyard"*
>
> *- Auer 2008*

Figure 89 shows the reconstruction of the wreck and one possible configuration for the decks. The cross section (Figure 88) and the side profile (Figure 89) of the hull are based on the 3D photogrammetric model. The sea bottom around the wreck is quite hard, and thus the hull can't be very deep inside the bottom (see Figures 62 and 63). Therefore, the speculative shape illustrated in Figures 88 and 89 can't be far from the truth. The existence and the level of the lower deck is speculative, but there has been quite certainly planking above the ballast.

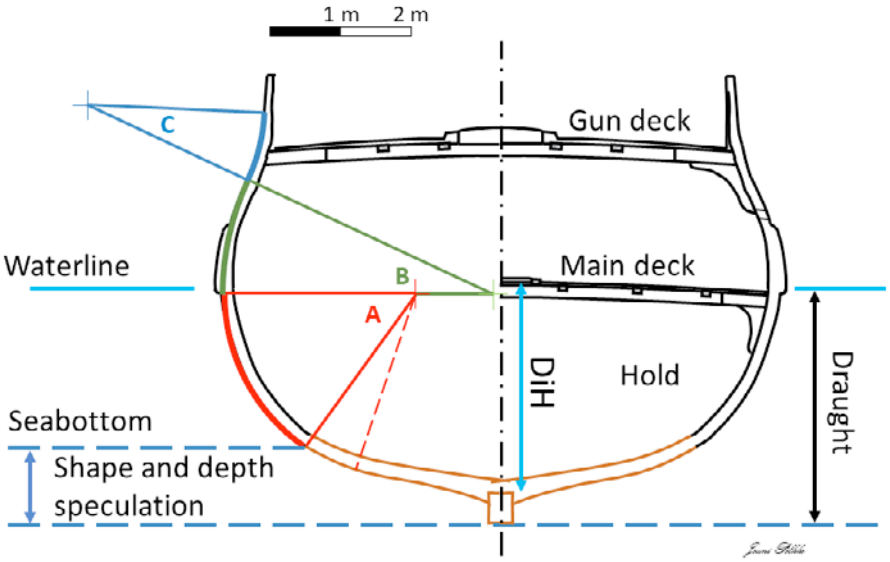


Figure 88: *The hull shape can be recreated by using simple circles A, B and C, and a deadrise at the bottom. While this may not have been the design method, it demonstrates the simple and smooth lines of the hull. DiH=Depth-in-Hold. Drawing Jouni Polkko.*

Historically, the length of a vessel was measured inside the ship, from the upper deck (what we have called the 'gun deck' in this report), or from the main deck level between the stem and stern posts, or from the perpendiculars (Auer 2008). This way we can interprete, that the wrecks' total over-all-length is about 30 metres, and roughly between 27 to 29 metres using the old dimensional definitions. The total breath could be translated to be something between the true maximum external breath or internal breath between clamps; it could be 'moulded breath' meaning internal breath up to the inner surfaces of planks; or external breath excluding wales. The equivalent breath could thus in this case be something between 7.2 to 8 metres using several definitions given by Auer (2008).

Estimating the dimensionless L / B ratio (length/breath), we get a number of 3.5 using the British dimension definitions (Auer 2008). However, this number has a large uncertainty – at least ±0.1 – if not more, because of the difficulties in estimating the equivalent dimensions of that time. Other dimensionsionless ratios, like L / DiH (Length/Depth-in-Hold), and L / D (Length/Draugth) are also difficult to estimate, because of an additional uncertainty of how much the keel and lower hull has sunk inside the sediment. The Depth-in-Hold is probably

between 2.75 and 3.25 metres, calculated from the top of the 'main deck', as illustrated in Figures 88 and 89. If the gun deck is used, approx. 2 metres could be added (definition of the Depth-in-Hold is bit unclear). Draught has been probably between 3 to 3.5 meters. There is no copper plating below the waterline.

Based on the current information, it seems that the ship is probably a ship rigged sloop-of-war, a small/light frigate, or a corvette/cruiser type of a vessel, built in the 18th century. The ship was probably lost during the 18th century.

Frigates had usually heavier armament and were little bit larger, such as the 6th rate 20-gun *Blandford* (Goodwin 1988). Nevertheless, the wreck has very much in common with ships such as the *HMS Blandford* (laid down in 1719). The wreck is only a few metres shorter, than the *Blandford*. All of the general arrangements comply with the *Blandford*, as well as the design and the frames, which are quite similar. What is said above, also applies to the *Falcon*. However, the wreck has a 'smoother' cross section below the main wale (see Figure 89).

The guns on the wreck are covered by rust and corrosion and thus, are difficult to measure exactly. Even the location of trunnions are difficult to see and judge. The guns are small, most probably 3 or 4 pounders. The size of the carriages falls between 3 and 4 pounder carriages according to *Caruana* (1997). Even though the origin of the ship is unknown, gun sizes didn't vary that much. Some of the smallest Danish cruisers, or 'small frigates', had about the equivalent armament in comparison to the wreck, but were a little bit smaller (Auer 2004, 2008). Some of these Danish small frigates had 12 three pounder guns. Three pounder guns found in the Danish frigate *Mynden*, are about the same size, as the guns found in the wreck (Auer 2004). Another example is *Amager*, which also carried three pounders, but was a bit smaller than the wreck, and had no space for rowers on the 'main deck'.

The cross section lines of the hull do not match exactly to any of the curves, or drawing methoda shown by *Auer* (2008). Figure 89 shows a reconstruction of the hull by three circles. While this may not have been the exact method for designing this ship, it demonstrates the smooth lines of the hull. The underwater part of the frame could be drawn by a single circle and a deadrise bottom element up to keel. af Chapman's *Architectura Navalis* doesn't include any good match with the wreck. Either the frame shapes do not match, or the drawings have other discrepancies.

The wreck also resembles some Russian 'imperial yachts' or 'courts yachts', which were built since 1702. Russians also built a serie of ships, which they called 'Snows' or 'Snauws'. While these ships didn't neccessarily have a snow-rig, they looked like three masted ship-rigged ships. These ships resembled small frigates, sloop-of-wars or corvettes in other navies. Russians also built a large number of imperial/court yachts, which had a similar appearance with the abovemention 'small frigates'. Most of these ships appear to have been too small in comparison to the wreck (*c.f.* Чернышев 2002, Знаменов et. al. 1997 and Sozaev 2010). One Russian court yacht which should be mentioned here by name is *Princess Anna,* designed by englishman *R. Brown.* While no drawings have been found and the size of the ship unknown, there's an old model of the vessel. Based on the model, the profile is almost identical with the wreck. Based on found literature, *Princess Anna* had 18 guns, while the model has 16 gunports. If we remove guns from the stern cabin and below the foredeck, the number of gunports and their positions in the gunwale match the wreck. Togerther with the number of guns, another difference is the location of the tiller. In the wreck the tiller is located below the stern cabin, and in the model it's on the poop deck. Based on the found sources, the fate of *Princess Anna* is unknown.

Found drawings, and other sources such as ship models, which resemble the wreck the most, are:

- Cat *V* and Cat *LVII* (af Chapman, 1768 / 2006, see also Winfield & Roberts 2017, p. 228). The LVII, a Flemish privateer, is also analysed in Auer (2008). However, it is too small to present the type of the wreck in question.
- The reconstruction of a small frigate by Vice-amiral Pâris (Winfield & Roberts 2017, p. 224, 228).
- The British sloop-of-war *Falcon*. Line drawing and measurements match, but the cross section is different (Winfield & Roberts 2017, p. 319).
- The 12-gun corvette *Perle* (Winfield & Roberts 2017, p. 317). The way how the guns have been positioned matches the wreck, but the cross sections and lenght differ. In 1747 the original armament of 3 pdrs were changed to 4 pdrs.
- The 12-gun corvette *Palme* (Winfield & Roberts 2017, p. 318). The way how the guns have been positioned, the side profile and measurements match the wreck, but the cross sections differ.
- The small Danish cruisers or 'small frigates' such as *Amager* (Auer 2004, 2008).
- Russian 'imperial/court yacht' *Princess Anna (*Знаменов et. al. 1997).

The ship has been built strong and well, and there have been plenty of decorations. The stern cabin is spacious, and there have been proper quarter galleries which, at least based on literature, seem to have been rare in the smaller ships of this size (McLaughlan, 2014). In the Royal Navy ships of this size were categorised as unrated sloops of war, or gun briggs. They had a more simple, or different stern cabin arrangements, and instead of quarter galleries, quarter badges were used, if at all.

There are possibly remains of a stove in the stern cabin. This would imply, that the stern cabin was heated. Whether this was a standard or a rare comfort in the captains'/stern cabins, is not known.

It should be kept in mind, that existing drawings and models may not comply with the real ships that were actually built. The the sloop-of-war *HMS Swift* (1763) serves an example. In the original drawings, the stern cabin deck was lower than the gun deck level. However, research done at the wreck site revealed, that the gun deck level was continuous up to stern post, and there were no steps betweenthe stern/captains' cabin, and the gun deck (Elkin 2007). In this case with our unknown wreck, the gun deck continues in a similar way up to stern post. Thus, the same level of the gun deck actually continues inside stern cabin as well. There is no step, or difference in the elevation between the gun deck and stern/captains' cabin.

Together with the origin of the ship, the question that has not been answered is, whether the ship was built as a warship, an armed merchant, or possibly used by privateers? The construction refers to a warship. It also seems, that the ship has was equipped for rowing, which would have required a lot of manpower. This complies with large hatches on the deck. A common feature in warships was a need for a big crew on the main deck, which required good ventilation. Rowing the ship would had required around 44 to 66 oar men alone (depending on whether 2 or 3 men have operated one oar). The guns and small arms on the deck refer to a readiness for combat. However, either half of the guns are missing, or they were never on board in the first place. For example, lighter armament was typical with the court yachts. Was the ship sailing with less firepower, or were the 'missing guns' dumped overboard or salvaged before sinking?

The stern cabin is empty. This suggests that captains and officers belongins were saved before the final sinking. Depeding on the cause of the sinking, there might have been time

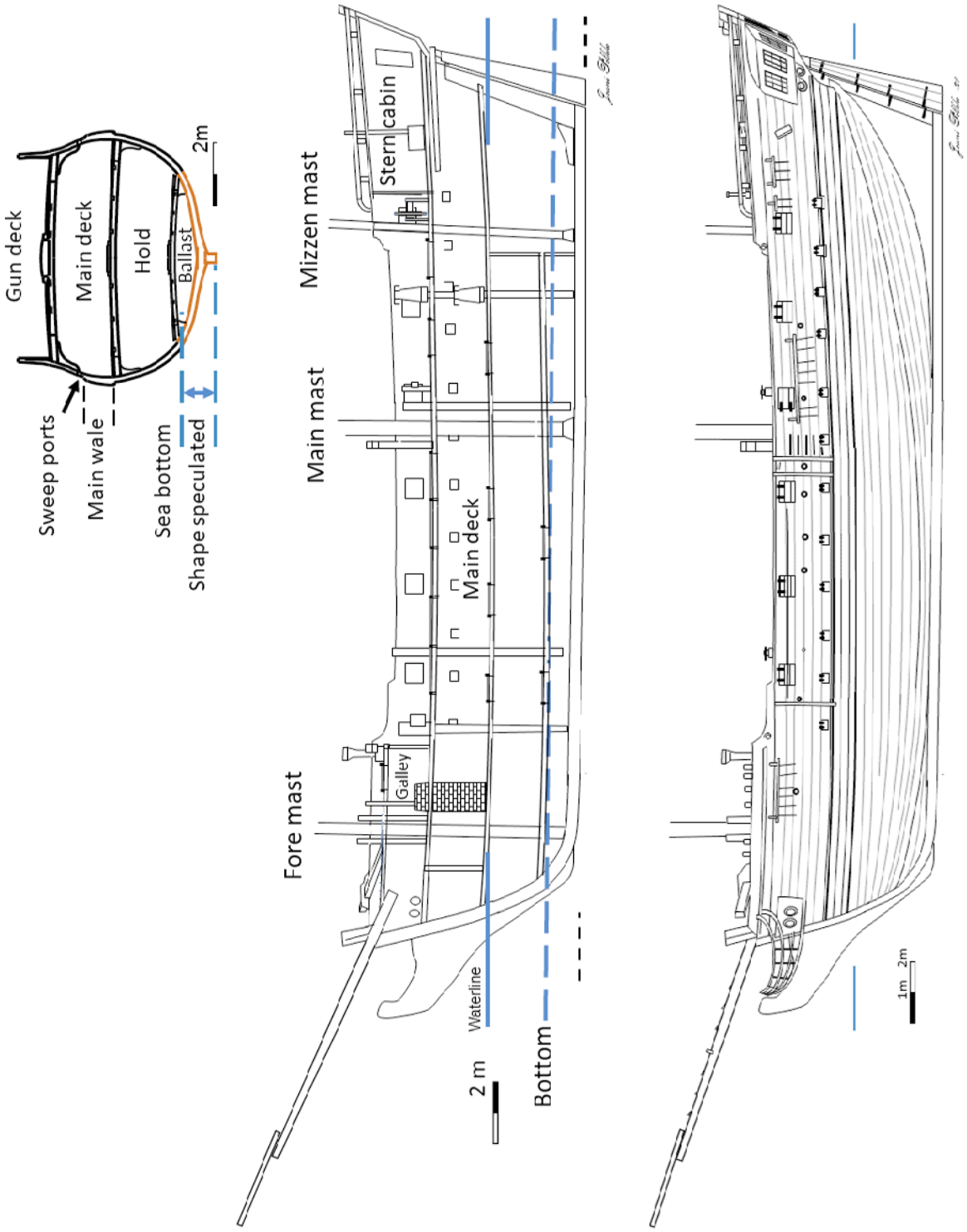
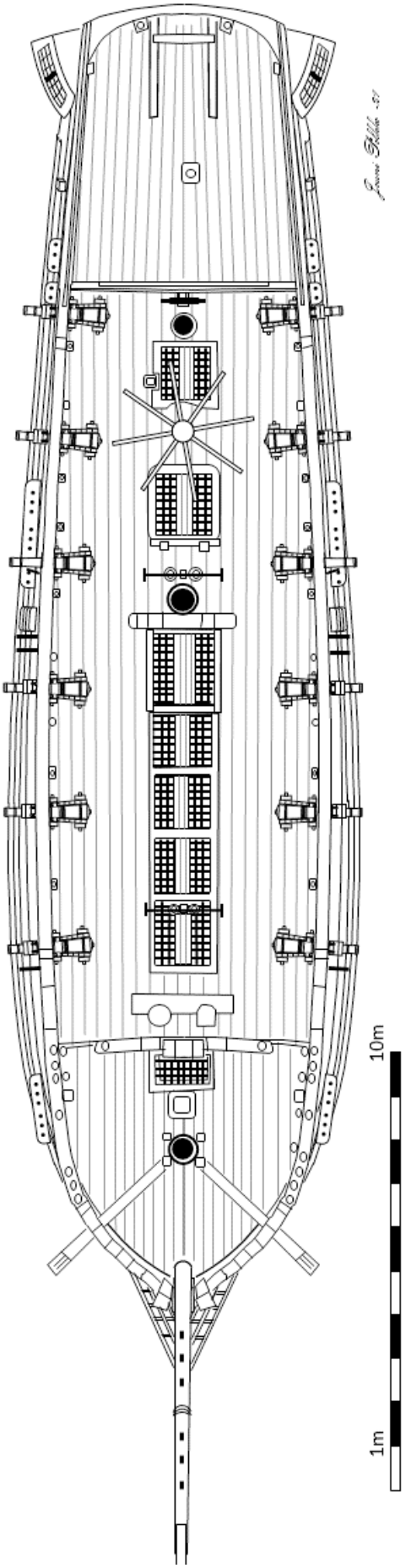


Figure 89: *Reconstruction of the wreck. The cross section, the deckview and the hull and the sideprofile are based on the 3D photogrammetric model. There has probably been an extension on the bowsprit, a jibboom. The lenght of the jibboom in this reconstucion is purely illustrative. The existence and shown location of the 'main deck' is based on the dimensions and structure of the wreck. The existence of the 'lower deck' is speculative. The owen, galley fireheart are probably located in the bow, because a kettle is visible from the hatchway afore the belfry. There has been a stove in the stern cabin too. The vertical capstan is missing from the wreck, but there is a hole in the deck where the capstan is shown. It's most propable, that the capstan has been there, as the foredeck is too low to accomode a capstan, or anchor windlass below it. The operation of anchor ropes with a capstan between the main and mizzen masts is shown and explained in White (2003), and complies with the arrangements in the wreck. The quarter galleries have fallen off from the wreck. A seat of ease (toilet) has been in the starboard side quarter gallery. Drawings: Jouni Polkko.*


10m
1m

for salvaging valuable guns. In distress they might have been dumped in order to to reduce weight. The small arms on the deck may suggest, that in the end, the ship was abandoned very quickly. The lack of any external damage on the hull suggests, that the ship was not sunk during battle.

So far no suitable candidate for the identity, nor the place of origin has been found from literature. There are not many such men-of-war missing, which would match the design and dimensions of the wreck, or could had been lost in the Gulf of Finland. Keeping this in mind, the story of the Dutch two-deck-frigate *Huis Te Warmelo* proves, that valuable ships could still hide in the archives, and be forgotten (*c.f.* **http://badewanne.fi/?page_id=559**). The wrecksite had been know in Finland for years, but the ship was only identified by accident, when the Dutch started to ask around after a loss of a ship, that was marked on a seachart found from the archives.

Ships of this kind were designed and built, sold, captured and copied in a similar manner around the world. Ships built even in the United States ended up in Europe. As a conclusion, the ship could be Swedish, Russian, Danish, English, Dutch, French or any other origin.

7. Further research and recommendations

The dives during the past years and the new discoveries have raised more questions. There are still much documentation needed to be done at the wrecksite. New camera & light technologies, as well as data processing technologies such as 3D photogrammetry offer new opportunities, which has been demostrated already in this report.

At least the following areas of the wreck and the wrecksite need further research:

- The debris field behind the stern on port sector and on the both sides around the stern
- The debris around the wreck on the seabed
- The debris field around the bow, including the location of the bowsprit
- Compartment below the stern cabin could be documented through the openings in the wing transom, using suitable camera and light set-up.
- Documenting what is below the gun deck, which is possible through the hatchways with suitable camera and light set-ups
- Documenting what is visible below the forecastle, using suitable camera and light set-up
- Improving the photogrammetric model of the wreck, which requires more footage on various parts of the wreck.

8. Summary of the dives 2011, 2018, 2019 and 2020

This document is mostly based on material collected on 16 dives presented below. All the dives have been led and organized by Jouni Polkko.

Year	Date	Divers	Task & comments
2011	03/09/2011	J. Polkko, A. Kinnunen, M. Koskinen	Still photos, measurements
		T. Tommila, J. Arponen	Measurements
	11/09/2011	M. Koskinen, T. Lahtinen	Measurements
	2 dives	J. Polkko, A. Kinnunen	Still photos
		M. Koskinen, T. Lahtinen	Measurements
		J. Polkko, A. Kinnunen	Still photos. Removing a boyo rope
2018	26/07/2018	L. Näreneva, L. Itkonen, J. Leppäkases	Locating the wreck, 4K video Sony
		J. Polkko, J. Lappalainen, K. Vorma	4K video, Sony
2019	23/07/2019	T. Toivonen, L. Itkonen	Locating the wreck & observations
		J. Polkko, H. Laakso	4K video, Sony
	24/07/2019	T. Toivonen, L. Itkonen	Locating the wreck & video, camera failure
		J. Polkko, H. Laakso	4K video, Sony
	04/08/2019	T. Toivonen, E. Tuominen, V. Peltokorpi	Locating the wreck & pt cathead video GP4
		J. Polkko, P. Reisto	4K video, Sony
	06/08/2019	T. Toivonen, E. Tuominen, V. Peltokorpi	Locating the wreck, observations
		J. Polkko, P. Reisto	4K video, Sony
	10/08/2019	T. Toivonen, E. Tuominen	Locating the wreck, GoPro 4 video
		J. Polkko, T. Toivonen	4K video, Sony
	24/08/2019	J. Lappalainen, E. Tuominen, L. Itkonen	Locating the wreck, PV video, measurements
		J. Polkko, H. Laakso, T. Toivonen	4K video, Sony, stills, 1kW + 300W lights
2020	08/08/2020	E. Tuominen, M. koskinen	Locating the wreck, measurements
		J. Polkko, J. Tattari	4K video, Sony
	10/08/2020	M. Koskinen, J. Tattari	Locating the wreck, measurements
		J. Polkko, T. Toivonen	4K video, Sony
	12/08/2020	T. Toivonen, J. Tattari	Locating the wreck, observations
		J. Polkko, H. Laakso	4K video, Sony
	13/10/2020	M. Koskinen, J. Tattari	Locating the wreck, GoPro 8 video
		J. Polkko, M. Sacchi	4K video, Sony
	25/10/2020	M. Koskinen, J. Tattari	Locating the wreck, GP 8 video, poor viz
		J. Polkko, L. Itkonen	4K video, Sony
	30/10/2020	M. Koskinen, J. Tattari	Locating the wreck, GP 8 video, poor viz
		J. Polkko, E. Tuominen	Stills, Sony. Video prevented by a housing failure

9. References and sources

Anderson, R.C.: Naval wars in the Baltic in the Sailing ship Epoch 1522–1850 (C. Gilbert Wood: 1910)

Auer, Jens: Fregat and Snau, Small Cruisers in the Danish Navy 1650-1750. Ph.D. thesis (University of Southern Denmark: 2008)

Auer, Jens: Fregatten Mynden: a 17th-century Danish Frigate Found in Northern Germany, The International Journal of Nautical Archaeology (2004) 33.2: 264–280, doi: 10.1111/j.1095-9270.2004.023.x

Caruana, Adrian B.: The History of English Sea Ordnance 1523–1875 Vol II: The Age of the System 1715-1815 (Jean Boudroit Publications: 1997)

af Chapman, Fredrik Henrik: Architectura Navalis Mercatoria, 1768: The Classic of Eighteenth-Century Naval Architecture (Dover Maritime: 2006)

Чернышев А.А., Российский парусный флот: Спра вочник в 2-х томах. Т. 2 (М.: Воениздат, 2002)

Franzen, Ole L.: Finbankers, Journal of the Ordnance Society, Volume 13, 5–24, 2001

Dodds, James; Moore, James: Building The Wooden Fighting Ship (Chatham Publishing: 2005)

Elkin, Dolores et. al.: Archaeological research on HMS Swift: a British Sloop-of-War lost off Patagonia, Southern Argentina, in 1770, The International Journal of Nautical Archaeology (2007) 36.1: 32–58 doi: 10.1111/j.1095-9270.2006.00117.x

Gardiner, Robert: Warships of the Napoleonic Era: Design, Development and Deployment (Naval Institute Press: 2011)

Goodwin, Peter: The 20 gun ship Blandford (Naval Institute Press: 1988)

Goodwin, Peter: Construction and Fitting of the English Man of War 1650–1850 (Naval Institute Press: 1987)

Harris, Daniel: F.H. Chapman: The First Naval Architect and His Work (Naval Institute Press: 1989)

Hepper, David J.: British Warship Losses in the Age of Sail, 1650–1859 (Jean Boudriot Publications: 1994)

Johnsson, Raoul; Grönroos, Maria; Karttunen, Ilkka: KUSTAA III JA SUURI MERISOTA : TAISTELUT SUOMENLAHDELLA 1788-1790 (John Nurmisen säätiö: 2011)

Lees, James: The Masting and Rigging of English Ships of War 1625–1860 (Naval Institute Press: 1984)

Levery, Brian: The Arming and Fitting of English Ships of War 1600–1815 (Naval Institute Press: 1987)

Lybeck, Otto et al.: Svenska Flottans Historia, Örlogsflottan i ord och bild från dess grundläggning under Gustav Vasa fram till våra dagar, del II 1680 - 1814 (A.-B. Allhems Förlag: 1943)

Löfman, Lauri, 1800-luvun hylyn pronssisen laivakellon stabilointi, Elektrolyyttisen käsittelyn määrittely. Metropolia Ammattikorkeakoulu Konservaattori (AMK), Esinekonservoinnin koulutusohjelma, opinnäytetyö 8.5.2012

McLaughlan, Ian: The Sloop of War: 1650–1763 (Pen & Sword Books Ltd: 2014)

Peters, Andrew: Ship Decoration 1630–1780 (Seaforth Publishing: 2013)

Raasakka, Pasi; Kaasinen, Jussi: Wreck of an Unknown Three-Masted Sailing Ship, Gulf of Finland, Report (2006)

Соколов, А. П.: Летопись крушений и пожаров судов Русского флота, от начала его по 1854 год (Императорской Академии Наук, СПб: 1855)

Sozaev, Eduard; Tredrea, John: Russian Warships in the Age of Sail, 1696–1860: Design, Construction, Careers and Fates (Naval Institute Press: 2010)

White, David: The Frigate Diana (Conway Maritime Press: 2003)

Winfield, Rif: British Warships in the Age of Sail, 1793–1817: Design, Construction, Careers and Fates (Seaforth Publishing: 2008)

Winfield, Rif: British Warships in the Age of Sail 1714–1792 - Design, Construction and Fates (Seaforth Publishing: 2007)

Winfield, Rif; Roberts, Stephen S.: French Warships in the Age of Sail, 1786–1862: Design, Construction, Careers and Fates (Naval Institute Press: 2015)

Winfield, Rif; Roberts, Stephen S.: French Warships in the Age of Sail, 1626–1786: Design, Construction, Careers and Fates (Seaforth Publishing: 2017)

Знаменов, Б. Б.; Ларионов, А. Л.; Носович, Т.: Русские Императорские Яхты Конец XVII - начало XX века, (Издательство "ЭГО": 1997)

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