Porkkala Wreck Park project

Confidential preliminary report on research permit MV/52/05.04.01.02/2019

By Markku Luoto, Kristin Ilves and Katja Hippeläinen dated 20.5.2020

What: Surveys for the potential new wrecks to be included to the Porkkala Wreck Park and maritime archaeological fieldworks focusing on acquisition of samples for e.g. dendrochronological dating

When: 29 June to 7 July 2019 and 17-18 August 2019

Who: Finnish Maritime Archaeological Society and University of Helsinki in co-operation with the following 16 diving clubs thereby accomplishing the citizen science and participation goals.

1. Sukellusseura Nousu ry
2. Scuba Libre ry
3. Tampereen Urheilusukeltajat ry
4. Sukellusseura Calypso ry
5. Sukellusseura H2O ry
6. Sukellusseura Gummiwihta ry
7. Sukellusseura Plutot pd
8. Sukeltajat ry
9. Sukellusseura Cetus ry
10. Rovaniemen urheilusukeltajat ry
11. Syvyys Helsinki ry
12. Teredo navalis ry
13. Partiosukeltajat ry
14. PSK Kupla ry
15. Jyväskylän Sukeltajat ry
16. Wärtsilä diving club ry

There were in total 31 registered participants in the camp, both divers and assisting ground personnel: [redacted] During the camp, 28 divers completed at least one dive. Total number of dives during the camp amounts in 309.

In addition to the registered participants, there were also about 20 camp-visitors – the definition being that they boarded the ships/boats for a trip to the park area and back. Also, during the camp, there were some smaller dive boats visiting the wreck park independently of the camp activities; some of these visitors came to meet with the expedition and discuss about the on-going activities. In the afternoon of the 4th of July, the camp was visited by media.

During the camp, in total 8 different vessels were used in the various tasks:

1. MS Stella
2. Zodiac dinghy from MS Stella
3. DSV Deeptech

4. DSV Maija
5. DSV Vuoksi
6. DSV Kulkuri
7. DB Faster
8. DB Buster

Funding: See separate balance sheet and report as attachment 4. In short, the funding was provided by Museovirasto (10 000€), participants (3159€), Meriarkeologinen seura (1187€) and SKR/Harry Hendusen rahasto (35 000€). The latter was for the dating related costs and for three years altogether.

Results: In total, 11 wrecks were dived on during the camp – these included the five wrecks mentioned in the permit (# 1-5), additional four wrecks (# 6-9) that are registered in the Finnish Heritage Agency and two unregistered wreck sites, new discoveries (# 10-11) (FIG 1):

1. Träskön tynnyrihylky, MV nro 1185
2. Träskön Segelkobben/tykkikylki, MV nro 1188
3. Rönnskärin tykkihylky, MV nro 1195
4. Linjatauluhylky, MV nro 1187
5. Ns. limisaumahylky, unregistered, N 59°57,506' | E 24°22,273' (WGS84)
6. Kuparihylky, MV nro 1214
7. Utterbottenin hylky, MV nro 1230
8. Truttkobbarnan hylky, MV nro 1210
9. Långörenin hylky 2, MV nro 1228
10. New wreck site (an anchor and part of mast), unregistered, N 59°57,204' | E 24°22,791' (WGS84)
11. Potentially new wreck site (an anchor), unregistered, N 59°57,465' | E 24°22,383' (WGS84)
12. The Kaljaasi Edmund wreck, MV nro 2382

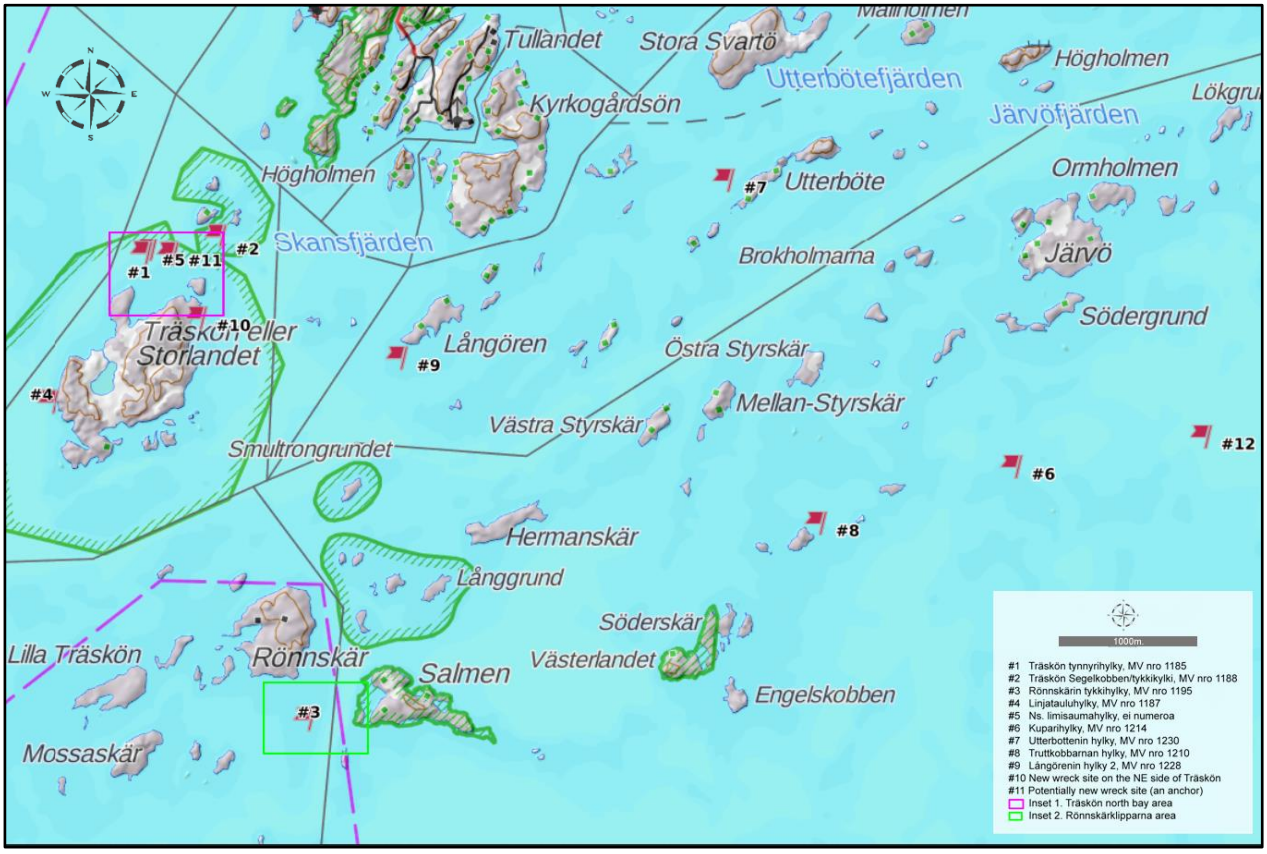
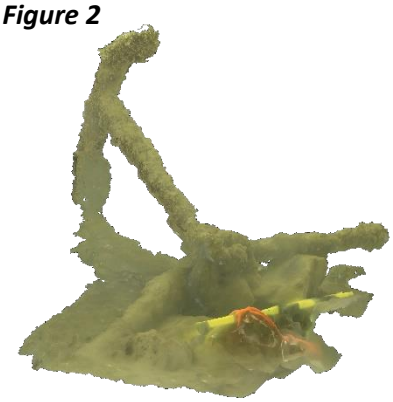


Figure 1 *- An overview of the wrecksites and enlarged map areas in figures 3 and 4.*

Figure 2



Both unregistered wrecks are new discoveries. Wreck on the NE side of Träskön (#10) is a potential 18th century vessel; part of mast, an anchor and some planking were discovered in approximately in 7m depth and about 100m from the shore of the north-eastern side of Träskön and recorded on HD video during the camp (FIG 2). Additional surveys on site are planned for the weekend-expeditions during the open water season 2020. Second potentially new shipwreck (#11) that is consisting of a very corroded anchor-shaped entity, was discovered in 7,5 m depth lying on the southern bank of the shallow in the middle of the Träskön northern bay's mouth as on the map (FIG 3). It is situated almost directly to the west and about 100 m from Tynnyrihylky. The extent of the corrosion on the anchor suggests a rather significant age. In the present state of knowledge, it is difficult to estimate if this find could be related to the any of the nearby wrecks.

In addition to the abovementioned, potentially new wreck sites, a potential deck gun (FIG 5) and previously undocumented hull parts were discovered when diving on Rönnskärin tykkihylky, MV nro 1195 – thereafter, additional search was conducted at the site (FIG 4), but yielded no further discoveries; parts of the wreck were photographed and filmed. A rudder and some new hull parts (a board) were observed on Kuparihylky, MV nro 1214. Furthermore, dives on Utterbottenin hylky, MV nro 1230, established that the outer planking and futtock of this wreck are made out of oak not of spruce or pine as previously suggested; also, it was confirmed that the bow of this wreck is pointing towards the shore.

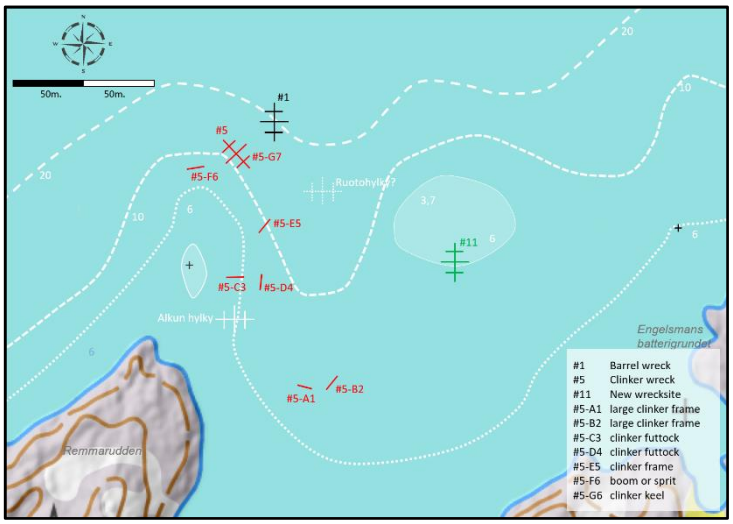


Figure 3 *– Enlarged map of the Träskön northern bay area*

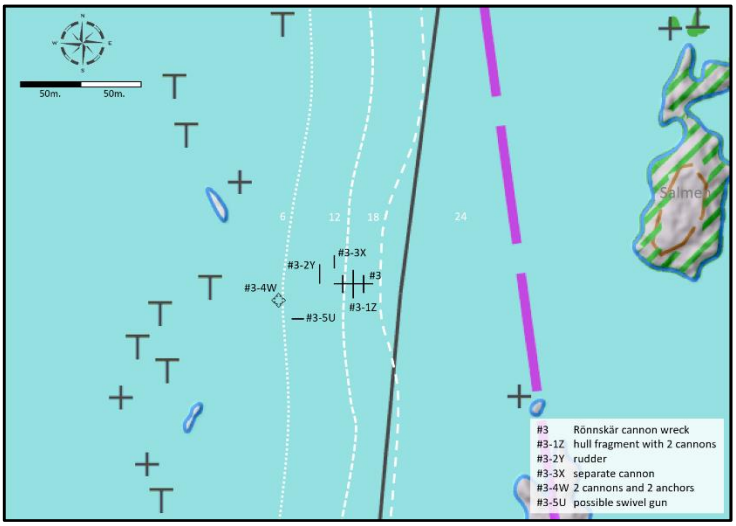


Figure 4 *– Enlarged map of the Rönnskärr wreksite*

Wrecks potentially to be added to the Porkkala Wreck Park: One of the aims with the camp was to conduct surveys for the potential new wrecks to be included to the Porkkala Wreck Park. This part of the set aims must be considered successful and following wrecks are planned to be added to the park:

- Rönnskärin tykkihylky, MV nro 1195, will be added to the park due to its accessibility for all divers (wreck parts are situated in both shallow and deeper waters, in the depths between 5-18 meters) as well as for the variety of wreck related items (cannons, anchors, hull parts, and rudder). Preliminary tour lines were installed during the camp

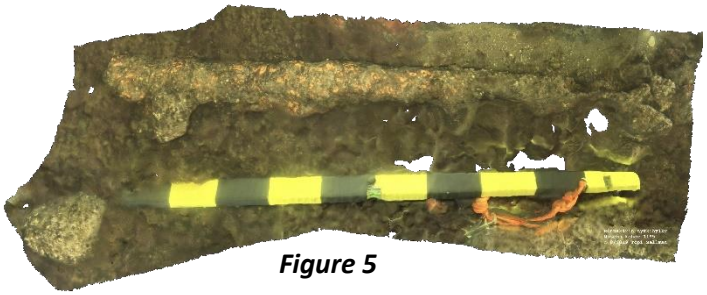


Figure 5

- Linjatauluhylky, MV nro 1187, situated in the depths of about 10-30 meters, will be added to the park for similar reasons as in case of Rönnskärin tykkihylky
- Although not dived on during the camp, Edmund, MV nro 2382, situated in the depth of 25m, will be added to the park for it is one of the most well-preserved wrecks in the area and already heavily dived on, therefore, this wreck will be added the to the park due to dire protection needs.

***Figure 6** - 1st drilling device*

Samples: During the camp, weather conditions with very strong winds were generally not suitable for diving for samples in the park and the initial goals as set and permitted for (MV/52/05.04.01.02/2019) were not met. However, five samples were still collected (see below) whereat drilling-based sampling method (as opposed to sawing-based method) was employed. Drilling device used during the camp (FIG 6) was constructed by Pekka Paanasalo, Subreering Oy.

Although drilling has been used for collecting samples for dendrochronological analyses for a long time, underwater drilling has been generally considered very difficult to execute and works conducted so far have often resulted in a negative evaluation (KI personal communication with Karl-Uwe Heussner, Deutsches Archäologisches Institut, Referat naturwissenschaften / Dendrochronologie). One of the main problems is connected to the fact that in case of bad preservation conditions that one cannot generally evaluate visually before the drilling, the wood does not have enough stability for the core of the drill and tends to get stuck in the core and/or break during the removal. Another major concern is the underwater environment itself and the energy needed in this environment to push the drill into the wood – when external power sources are used, the success rate is higher, but not always guaranteed. During our camp, we experienced the same problems.

1) <u>Sample #3-2Y-#5E from Rönnskärin tykkihylky, MV nro 1195</u>
   Collected 3.7.2019, exclusionary C14 dating 1570calAD*

   Due to unfavorable weather conditions not allowing underwater works in the park, it was decided to test the drilling device on the Rönnskärin tykkihylky's rudder (FIG 8) when the constructor of the device, Pekka Paanasalo (FIG 7), was visiting the camp and could himself participate and evaluate the first attempts.

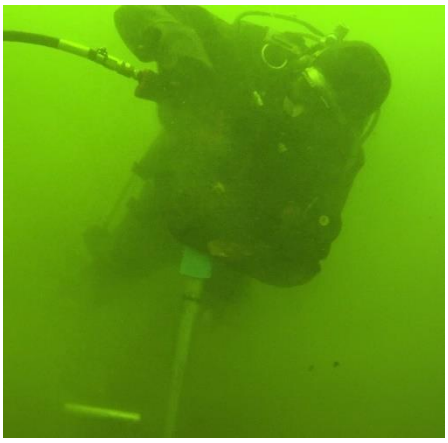


***Figure 7** - Pekka Paanasalo drilling*

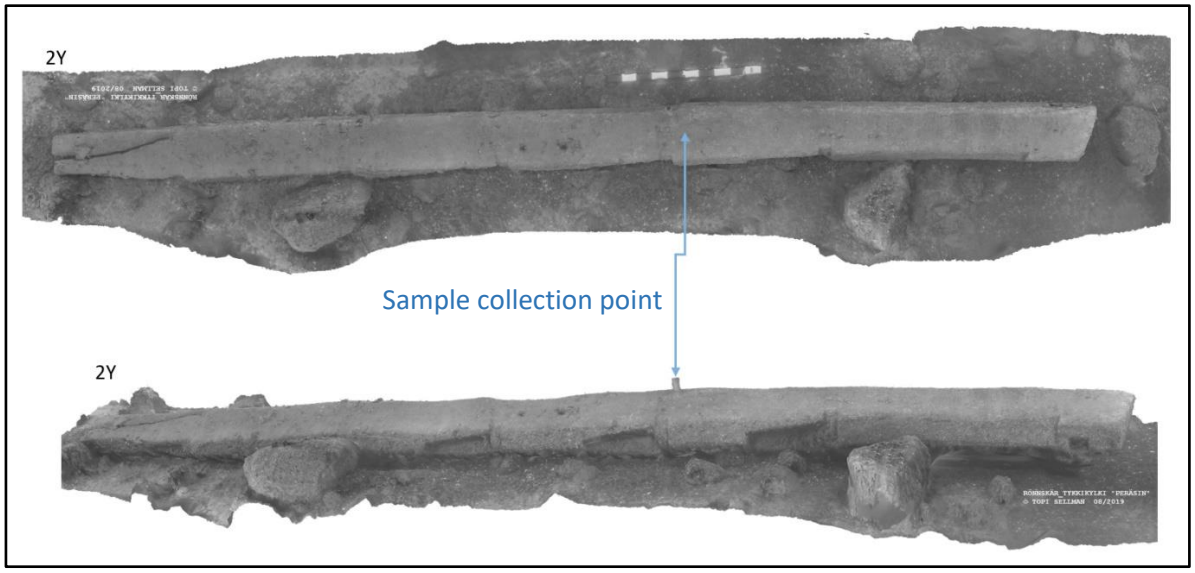


Figure 8 *– The "Rönnskär rudder"* (#3-2Y on maps) *of which the first dating sample was drilled from*

As a very first step, the device was tested by using a diver's auxiliary air tank as the power source for the drill. Although this was enabling non-restricted movement and working under water, it was soon discovered that even an 8l/300bar tank would only give enough air to drive the drill for the first 150-200 bars and the energy for getting out a sample was exhausted too quickly to be a prolific working method. Therefore, the idea to continue using divers' auxiliary air tanks for the drilling was discarded and the work was continued after re-positioning the research vessel on top of the wreck so that the surface air cable and, thus, on-surface power supply through a generator would reach the spot for sampling. After 90 minutes of drilling, the first sample was acquired. However, the sample did not penetrate the whole of the chosen wreck part, but broke off before reaching its entire length. A grey plastic tube was inserted into the drilling hole in order to mark the sampling point form other holes in the wood of the wreck. On surface, the sample consisting of 3 pieces (the sample was broken during the drilling process) was extracted from the core. The lack of winch or other means to apply more pressure to the drill was determined as a major weakness of the first tryout of the prototype drilling tool.

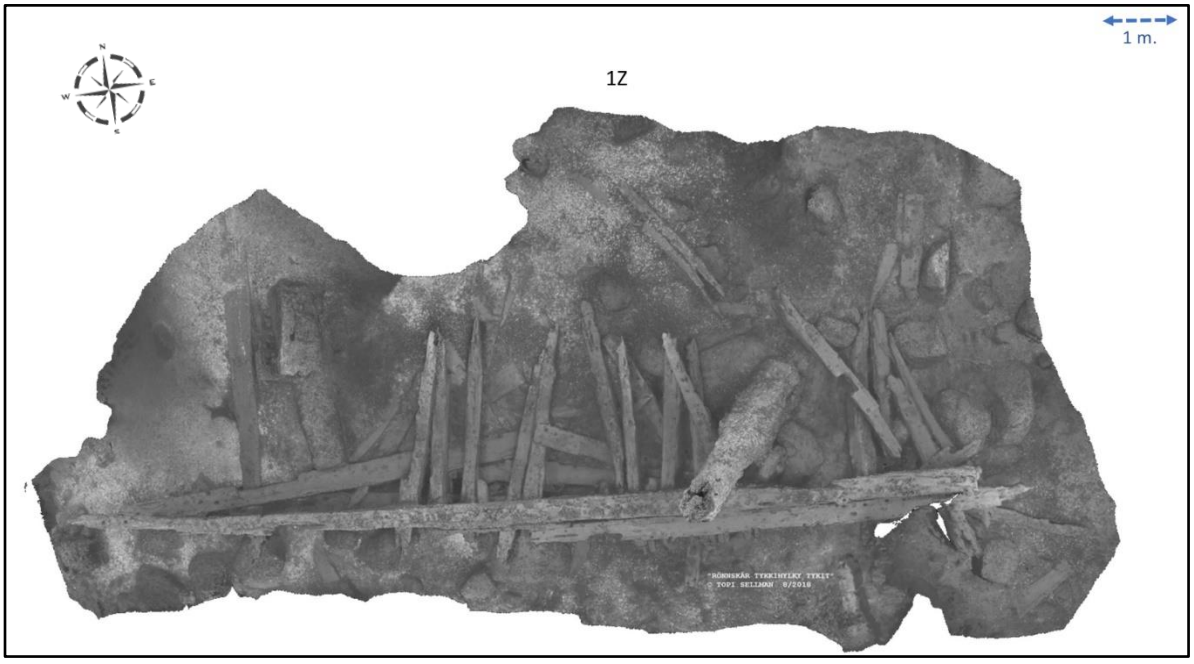


Figure 9 *– The "Rönnskärin tykkihylky"* (#3-1Z on maps) *hull fragment with two cannons*

2) <u>Sample #5-A1-#4D from the 1st "bay frame" that is potentially belonging to the "Limisaumahylky"</u>
FIG 10, collected 5.7.2019, exclus. C14 dating 1350calAD*, N 59°57,433' | E 24°22,342' (WGS84)

During the summer 2018 expeditions to the site in question, MAS divers had discovered two clinker built ship frames on the mouth of the Träskön northern bay (#5-A1 & #5-B2 on maps). Based on the stories of the divers involved in preliminary research of the Porkkala wrecks in 1970's and 1980's, it is very likely that these frames belong to the Ns. limisaumahylky some 200 meters north of the area with the frames. Allegedly, these frames were moved to shallower water for easier inspection sometime before 1987. Due to unfavorable weather conditions, it was decided to concentrate underwater sampling works to these, more easily accessible parts of the wreck.

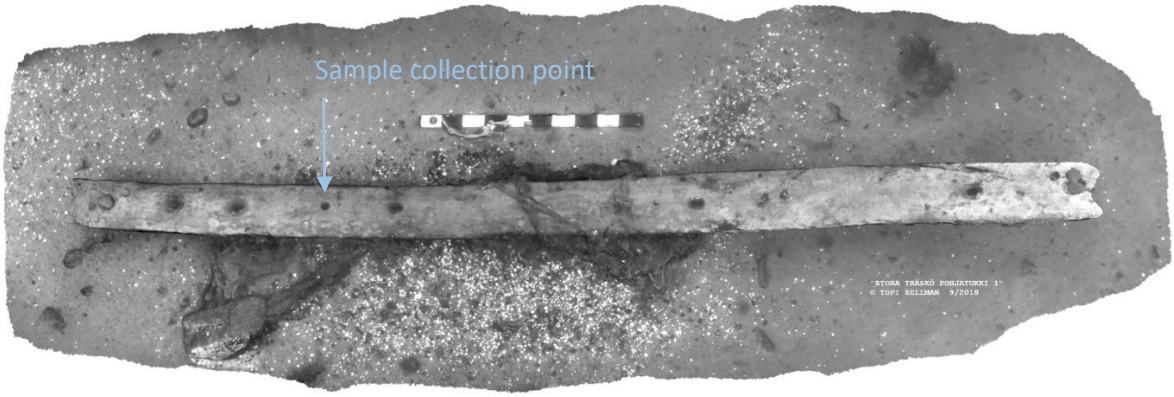


Figure 10 *– The 1st "bay frame" #5-A1 on the maps, where from the sample #5-A1-#4D was taken*

First sample from the frame possibly belonging to the Ns. limisaumahylky was drilled for 135 minutes under water and works were documented with the ROV video. The sample was collected close to the central parts of the frame. The drill's performance was somewhat improved compared to the previous drillings at Rönnskärin tykkihylky by using a cargo winch tied around the frame and drill that allowed to apply more pressure to the drill and, thereby, also the wood that was sampled. A grey plastic tube was inserted into the drilling hole in order to mark the sampling point form other holes in the wood of the wreck. The sample #5-A1-#4D extracted from the core was intact.

3) <u>Sample #5-B2-#A1 from the 2nd "bay frame" potentially belonging to the "Limisaumahylky"</u>
FIG 11, collected 5.7.2019, exclus. C14 dating 1500calAD*, N 59°57,433' | E 24°22,342' (WGS84)

This sample was taken in the same manner as the first sample from the same wreck (see above). Total underwater drilling time was about 110 minutes. A grey plastic tube was inserted into the drilling hole in order to mark the sampling point form other holes in the wood of the wreck. The sample #5-B2-#A1 extracted from the core was intact.

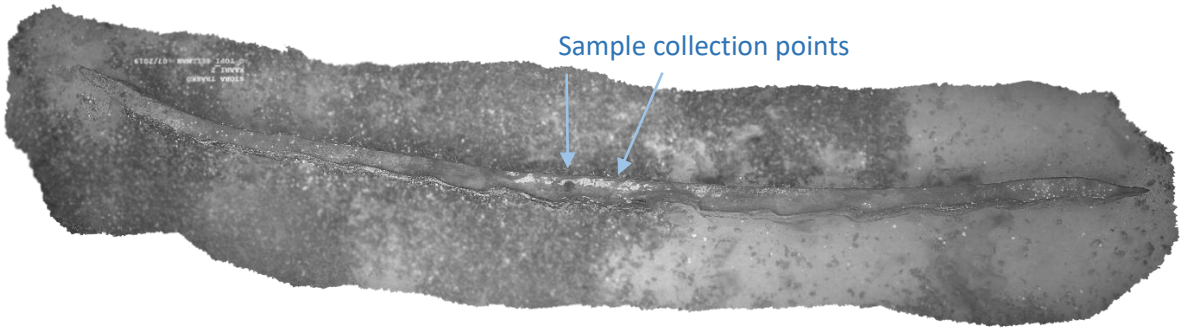


Figure 11 *- The 2nd "bay frame" #5-B2 on maps, where from samples #5-B2-#A1 & -#3C were taken*

4) Sample #5-B2-#3C from the 2nd "bay frame" potentially belonging to the "Limisaumahylky"
FIG 11&12, collected 5.7.2019, exclus. C14 dating 1510calAD*, N 59°57,433' | E 24°22,342' (WGS84)

Collecting this sample started out as with previous samples, but about 75% through the frame, the drill got stuck. After marking the underwater position of the frame with four steel marker sticks, the frame was lifted onto DSV Vuoksi's back deck in order to extract the drill and the sample. However, it was soon discovered that the drill cannot be just pulled out as a ring of metal had become loose from the drill's welding and got stuck on the sample (FIG 12).

Figure 12 *– The Sample #5-B2-#3C with metal ring still attached*

As a solution, the last 25% of the core were drilled onboard Vuoksi. During the drilling, it was noted that the drill performed worse on surface than it had under water, because on surface it heated up quickly and the residue from drilling tended to clog the sampling point creating too much friction of a drill to function properly. Once the sample consisting of 3 pieces (the sample was broken during the drilling process and had to be removed by force resulting in the scattering of the sample and the right order of the pieces belonging to the core was lost; one of the pieces has the broken off part of the drill still embedded into it) was acquired, the frame it was placed onto seabed in its original position and orientation. A grey plastic tube was inserted into the drilling hole in order to mark the sampling point form other holes in the wood of the wreck.
All collected samples were placed in plastic tubes and then in plastic containers filled with local sea water and stored in DSV Vuoksi's refrigerator.

Figure 13 *- 3rd version of the drill*

5) Sample #5-G2-#2B from the keel of the "Limisaumahylky"
FIG 13 & 14, sample collected 18.8.2019, exclusionary C14 dating 1560calAD*, N 59°57,506' | E 24°22,273' (WGS84)

As a result of the drillings conducted during the field work camp, especially considering the time needed for the drilling, it was decided that the drilling-device needs further improvements in order to continue its use for underwater sampling. To force more pressure to the bore, which would shorten the time needed for the drilling, a lever device was added (FIG 13). When tested for drilling during the 17th-18th of August expedition to take samples from Limisaumahylky's keel (FIG 14) it was found out, that even though the drill was initially penetrating the wood faster than before, soon after 10cm of drilling it became harder and harder to drill as the drill would get stuck often.

Figure 14 *– Limisaumahylky main site with keel, keelson and frames*

Drilling a single sample took more than 180 minutes. It was soon determined that the lever – albeit a good idea towards the right direction – was too light construction to hold the drill in original position, while penetrating the wood. Hence, when the drill started tilting in the bore due to the force applied by the lever, the friction between drill and bore soon became unbearable and the drill got stuck. Thus, it was determined that in order to succeed, some kind of a drill press is needed. Also, a more modest drill width might help. So, during the following winter, the 4th version of the drilling device was built (FIG 15)

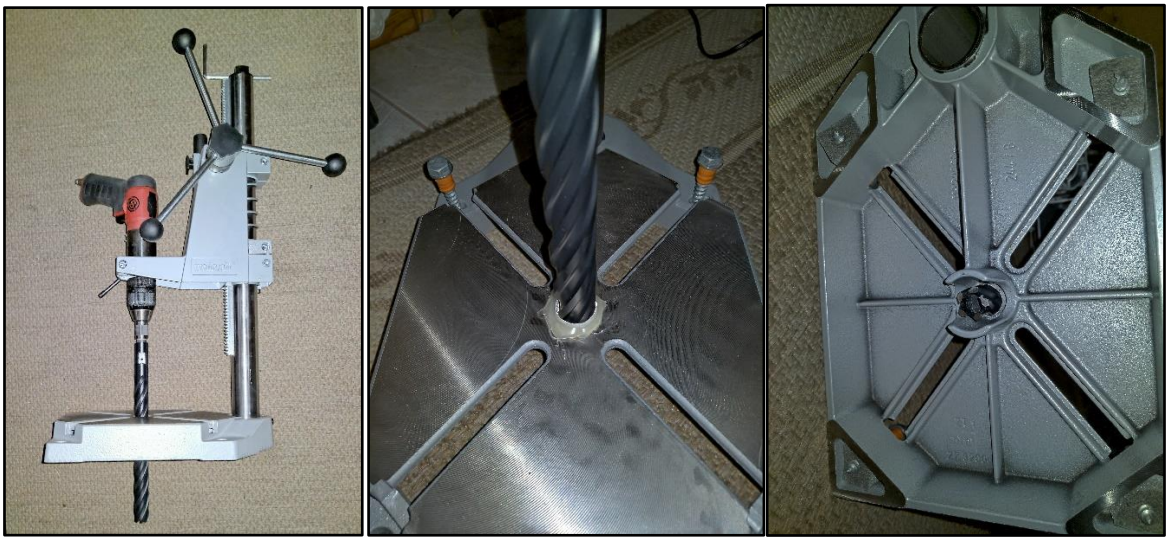


Figure 15 *-The 4th version of the drilling device. Only the pneumatic drill remains the same*

***Some notes about the exclusionary C14 datings**

The purpose of the C14 datings was to verify the historic status of the wrecksites i.e. not being "recent" timbers. Hence only basic C14 dating by using the "standard" OxCal v4.3.2 Bronk Ramsey (2017); r:5; IntCal13 atmospheric curve (Reimer et al 2013) calibration was performed. Thus, all the datings above were given as calibrated median dates as typical today. However, as the need for calibration and all common calibration methods thereto arise from the atmospheric phenomena of enhanced C14 build up, due to the nuclear tests conducted in the atmosphere, it presents a valid question regarding these finds. As all these samples have been residing at least 9 meters under water throughout the atomic age, are they affected by the nuclear blast based C14 build up at all? By the time of writing this report, no concise answer has yet been received from the physics department. Should it turn out, that no calibration is needed for these finds, then their original datings may be 70-90 years earlier than stated above. This would place all the Limisaumahylky datings on the first part of 15th century, except the *#5-A1-#4D,* which would remain on the early 14th century. Even the Rönnskär wreck would go to the late 15th or early 16th century.

Note about the keel line based extrapolation of the 2nd "bay frame" #5-B2

As the keel line is clearly observable from the #5-B2, it is evident that the ship bottom has been at least as wide as two times the longer half of the #5-B2 frame i.e. 5,6m. The maximum hull width has likely been at least 1-2 meters wider.

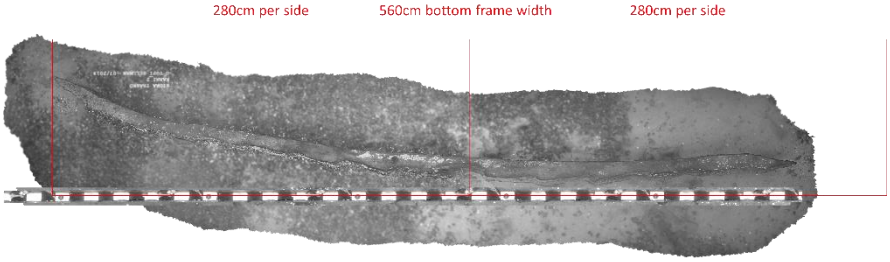


Figure 16 *– Keel line based extrapolation of the 2nd "bay frame" #5-B2*

Attachments:

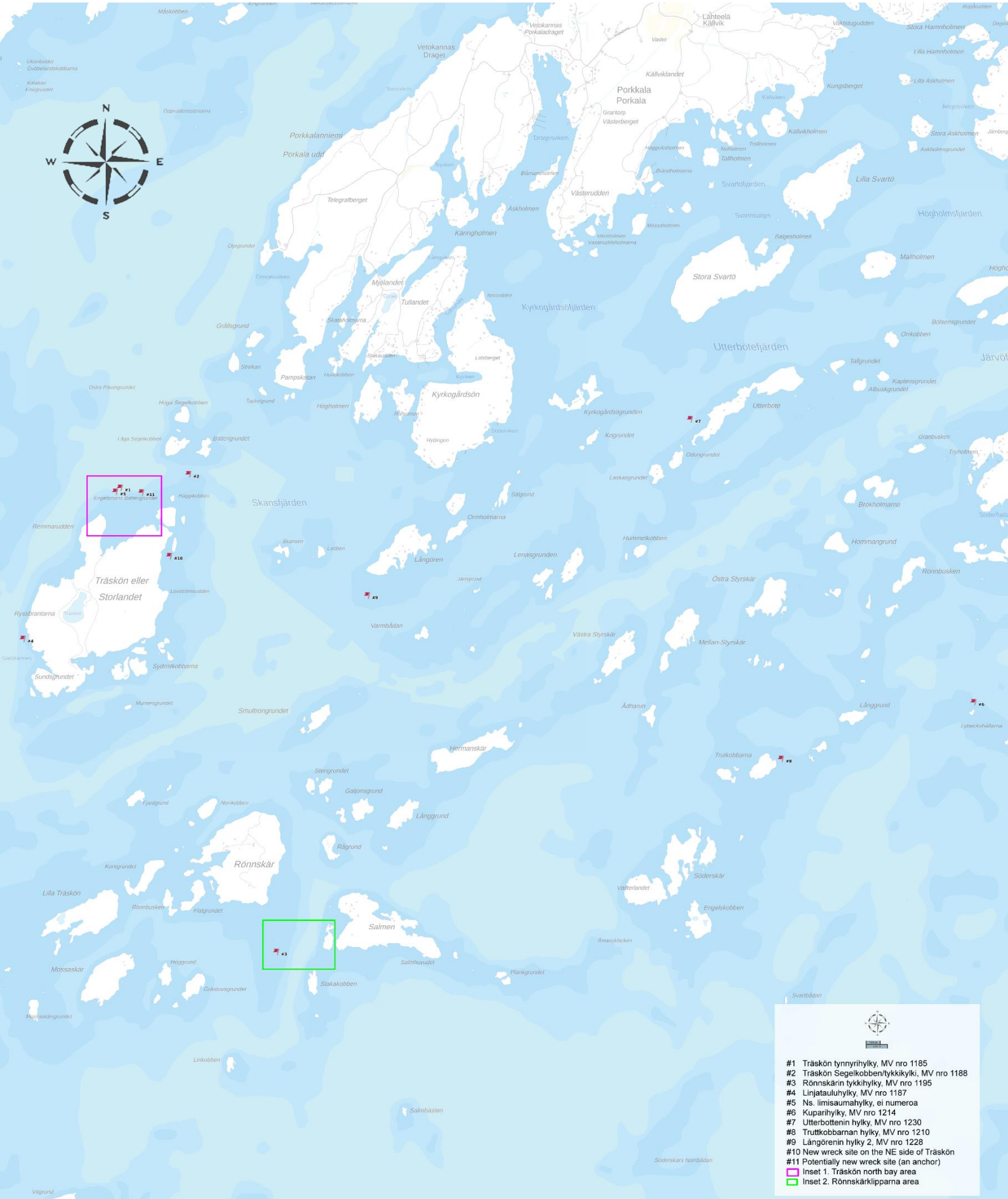
Attachment 1. “Overview map of the Porkkala archipelago”

Attachment 2. “The C14 datums & datings”

Attachment 3. “Tutkimuslupa (research permit) MV/52/05.04.01.02/2019”

Attachment 4. “Balance sheet and report”

Porkkala Wreck Park project report 2019, Attachment 1. “Overview map of the Porkkala archipelago”



Porkkala Wreck Park project report 2019, Attachment 2. “The C14 datums & datings”

Company Name: Finnish Maritime Archaeological Society
Address: % Markku Luoto, Ykkostie 2, 02820 Espoo, Finland
Date Received: January 21, 2020
Date Reported: January 29, 2020

ICA ID	Submitter ID	Material Type	Pretreatment	Conventional Age	Calibrated Age
20W/0128	#1A	Wood	AAA	380 +/- 30 BP	Cal 1440 - 1530 AD (61.6%) Cal 1550 - 1640 AD (33.8%)
20W/0129	#2B	Wood	AAA	340 +/- 30 BP	Cal 1460 - 1640 AD
20W/0130	#3C	Wood	AAA	370 +/- 30 BP	Cal 1440 - 1530 AD (55.0%) Cal 1550 - 1640 AD (40.4%)
20W/0131	#4D	Wood	AAA	570 +/- 30 BP	Cal 1300 - 1370 AD (57.8%) Cal 1380 - 1430 AD (37.6%)
20W/0132	#5E	Wood	AAA	290 +/- 30 BP	Cal 1490 - 1670 AD