

Bridging the gap between the environment and history: archaeological fieldwork in the Jussarö archipelago, southern Finland

Ari O. Laine¹, Riikka Tevali², Lasse Kurvinen¹ and Ari Ruuskanen³



Jussarö lighthouse at Sundharun island (Photo: Riikka Tevali, The Finnish Heritage Agency)

Background for the study

The marine cultural heritage of the Baltic Sea is exceptionally versatile and well preserved even in a global comparison. Large numbers of wooden wrecks and other archaeological objects remain in the area, being supported by local conditions and lack of wood burrowing animals. To date, these cultural assets are barely included in Maritime Spatial Planning (MSP) in the Baltic Sea. To improve the situation, the EU Interreg Baltic Sea Region - programme has funded the project BalticRIM (Baltic Sea Region Integrated Maritime Cultural Heritage Management, 2017-2020), which aims to integrate cultural heritage resource management into MSP in the Baltic Sea, using the opportunity of the ongoing processes driven by the MSP Directive across all Baltic Sea Region countries.

Study area

In BalticRIM, the Finnish Heritage Agency and Metsähallitus Parks & Wildlife Finland conducted a maritime archaeological survey in a historically known hazard area for ships (Fig. 1). In the Jussarö Gaddarna archipelago, several shipwrecks are known and dated to the 18th and 19th centuries. The area was known for magnetic anomalies that disturbed the compasses due to the high iron content in the bedrock. This anomaly is first mentioned in Lucas Waghenaer's special map depicting the archipelago in the Gulf of Finland published in 1584 and has been marked in navigation maps since then. Modern archaeological research has designated the area as a so-called *ship trap*, a sea area where environmental and cultural factors work together to create a dangerous area for the passing ship traffic.

Field work to define the ship trap area

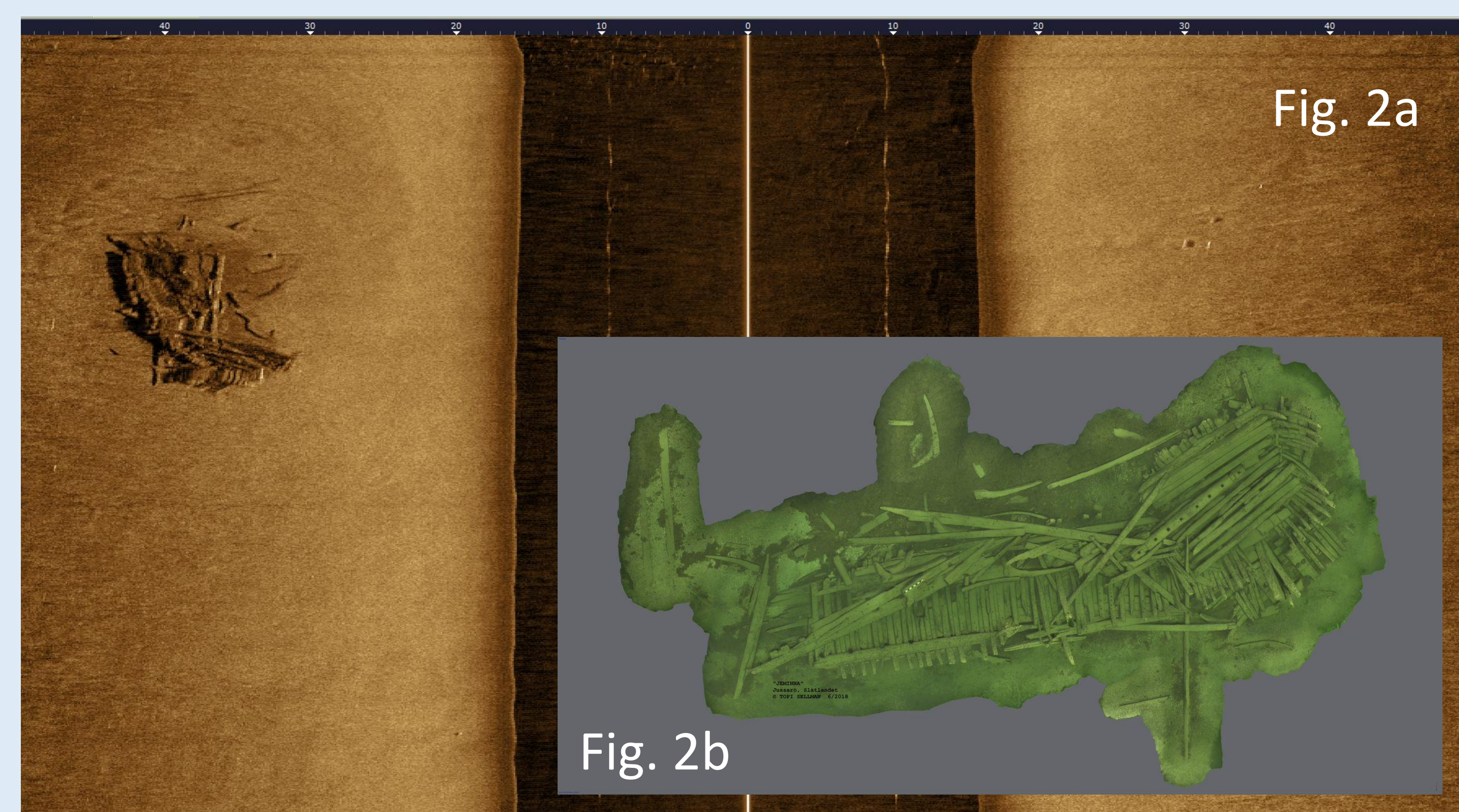
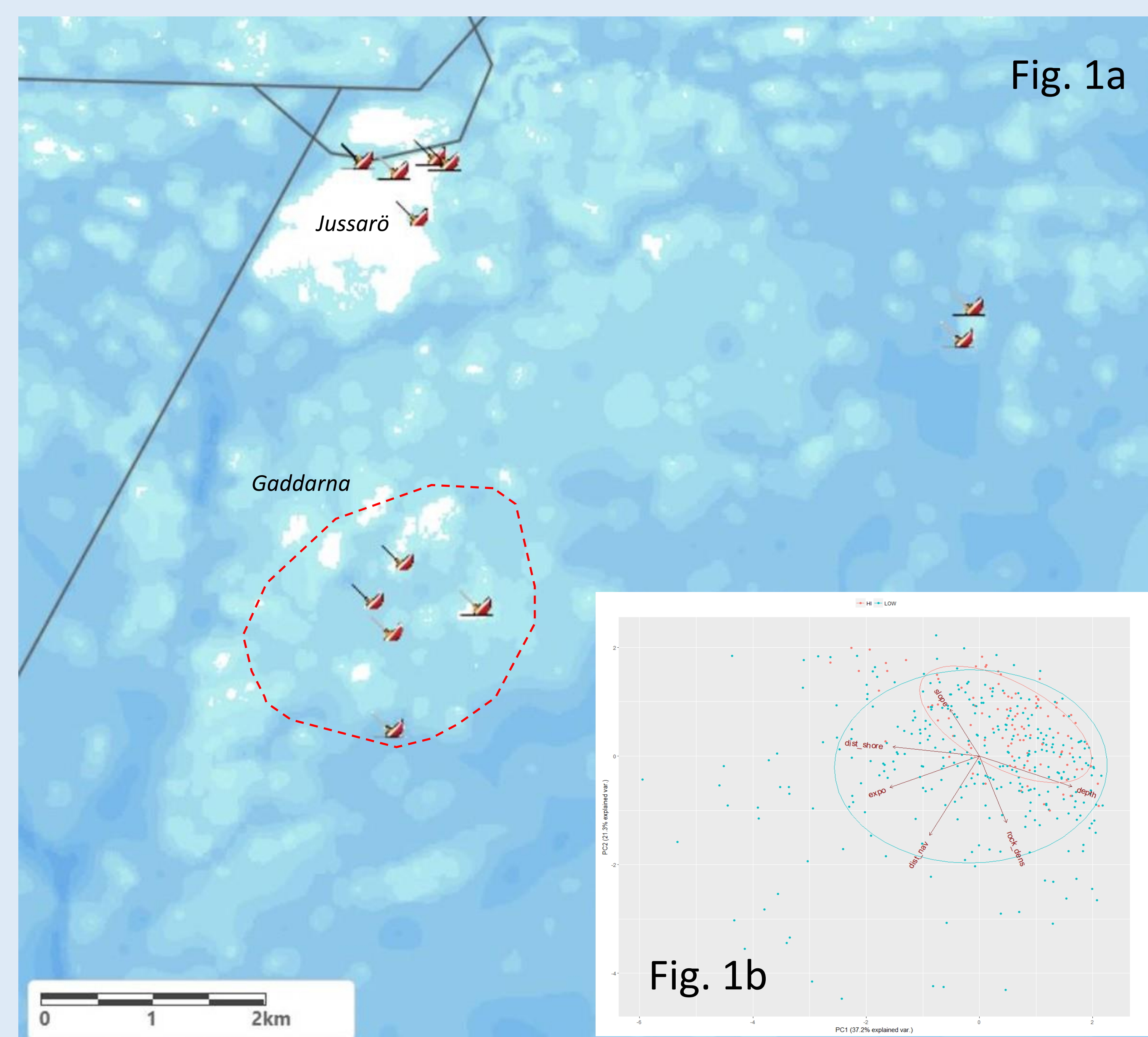
Mapping of the seabed was done with a DeepVision DE680D side scan sonar, optimized for high resolution surveys (680 kHz). In addition, the sites were visually inspected by scuba diving and documented with underwater photography. One new wreck was discovered during the fieldwork (Fig. 2a). Photogrammetry was used to model and visualize the wreck (Fig. 2b). The limits of the ship trap were determined and outlined to include the rocky area of the Gaddarna skerries, characterized by a highly variable bathymetry of the seabed. However, the survey area was limited to the Finnish territorial waters, so it is possible that wrecks could still be found due south from the Jussarö Gaddarna, where the new site was discovered.

Analysis of local conditions to explore formation of ship traps

Besides field mapping of the ship trap area, we started to explore possible patterns related to ship traps and the surrounding environment. For this analysis a larger data set was used, consisting of shipwreck density and environmental factors, which may have a role on wrecking accidents and geographical locations of the wrecks. Presented here is an exploratory Principal Component Analysis (PCA) of more than 400 wrecks (Fig 1b), looking at differences between sites with a high density of wrecks (HI) opposed to sites with a low density of wrecks (LOW), within the surrounding 2km radius. The variables used for the analysis were: distance to shore, distance to modern navigational lines, surface exposition, depth, underwater slope and density of rocks in the navigational charts. The results indicate, that most of the high-density sites are grouped quite closely, indicating similarities between the sites. But as there are also low-density sites among the high-density sites, the data used does not still separate these two classes. However, these results already provide an interesting basis for further exploration of the topic, and a ship trap index model is being further developed in a separate project in the University of Helsinki.

Online data sources

- Wrecks, see the Finnish Heritage Agency's Database at www.kyppi.fi
- Environmental data, see the Finnish Inventory Programme for the Underwater Marine Environment (VELMU) <https://paikkatieto.ymparisto.fi/velmu/VELMU%20mapservice.html>
- The BalticRIM project, see www.balticrim.eu



Wreck "Garpen 1" at Kemiönsaari (Photo: Riikka Tevali, The Finnish Heritage Agency)

Author addresses: ¹Metsähallitus Parks & Wildlife Finland, ²The Finnish Heritage Agency, ³The University of Helsinki