



VANGUARD 100 DIVE TEAM

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SS Prudentia, Scapa Flow

Executive summary

- The SS Prudentia was a steamship carrying oil that sank in 1916
- The SS Prudentia features as an important component in the Orcadian heritage
- The wreck is proximal to the Flotta Oil Terminal and diving is prohibited
- A dive team secured special permission in November 2016 to record the site and their observations are offered here
- The wreck today offers a rare glimpse of an undisturbed steamship with a rich associated fauna
- Recommendations offered try to implement a framework to document preserve this unique and valuable site

Acknowledgments

The Vanguard 100 team would like to thank the following contributors:

- Orkney Harbours for granting permission to dive the wreck.
- Kevin Heath at Sula Diving for archive research and side scan image data
- Historic Environment Scotland for reference material
- Emily Turton & Ben Wade for research and logistics including the MV Huskya
- Dr Joanne Porter for environmental notes and observations
- The skipper/crew of the MV Huskya for surface support and dive logistics
- Karri Hyttinen for 3D photogrammetry
- Marjo Tynkkynen for photographs
- Bob Anderson for report compilation and photographs

Lastly, the team consider themselves highly honoured both to have had this opportunity to explore the wreck of the SS Prudentia. We had a rare glimpse into a life lived a century ago and would want others to value that unique experience.

Background

The tanker SS Prudentia was built by Palmers Co Ltd, Newcastle-upon-Tyne in 1889. She sank following a collision with SS Hermione between the islands of Fara and Flotta on 12 January 1916. The two ships were at anchor and secured together when the anchor started to drag; the crews tried to separate the ships but the Hermione's propeller struck and cut through the hull of the Prudentia in the operation, damaging the hull and she consequently sank.

She was owned at the time of loss by JM Lennard & Sons and was employed as an Admiralty oiler. Her dimensions are as follows:

LENGTH: 312.0ft (95m), BEAM: 40.2 (12.25m), DRAUGHT: 19.8ft (3.2m)

In 1975 she was reported to be leaking oil and the least depth to be 12 metres. She is lying on her port side in 28m of seawater at the following position.

Latitude = 58°50'.863 N Longitude = 003°07'.860 W

The wreck lies N/S with the bows at the southern end pointing toward Flotta. The site is marked with an East Cardinal Buoy near to the Flotta oil terminal. The wreck is subject to a diving prohibition enforced by the Orkney Harbour Authority.

Present location of wreck

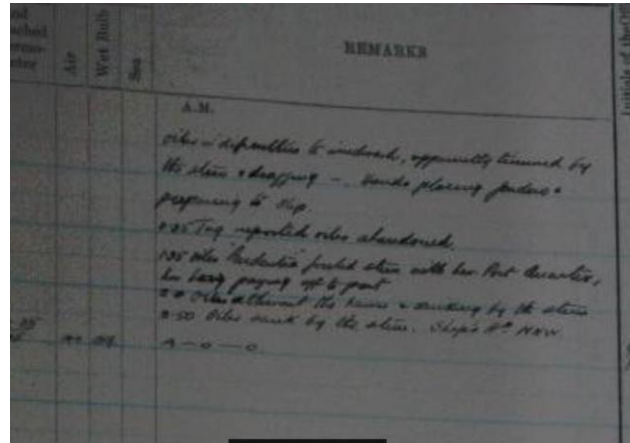


Prudentia location

The wreck is located just north of the Flotta jetties at the northern approach to West Weddell Sound and marked by an East Cardinal Buoy. She is clearly charted and her position is also listed with www.wrecksite.eu including a live Hydrographic Report.

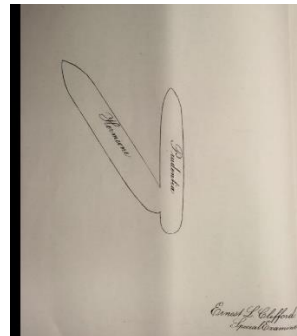
Archive research

The weather that day was miserable and the Prudentia made an appearance in the log of the Iron Duke.



The Collision Hearing into the sinking notes:

The "Hermione" instead of waiting until the "Prudentia" was clear worked her engines ahead and with her helm apparently hard-astarboard the after part of the port side of the "Prudentia" and with her propeller to cut into the plates of the "Prudentia" causing such damage that the "Prudentia" sank and was totally lost.



A diver was sent to investigate the wreck on the 16th and reported:

"The diver reports the vessel to be lying on her beam ends in fourteen fathoms of water at low water."

"The position of the vessel on her beam ends and the depth of water renders salvage operations difficult.."

Hydrographic report

The hydrographic report lists her circumstances of loss as follows:

BUILT IN 1889 BY PALMERS' CO, LTD, NEWCASTLE-UPON-TYNE. OWNED AT TIME OF LOSS BY J M LENNARD & SONS LENNARDS CARRYING CO LTD. EMPLOYED AS AN ADMIRALTY OILER. TWO BOILERS, TRIPLE EXPANSION ENGINE OF 269NHP, SINGLE SHAFT. PASSAGE SCAPA FOR FUELLING. SANK FOLLOWING COLLISION WITH SS HERMOINE (5000 GRT). (SIBI).

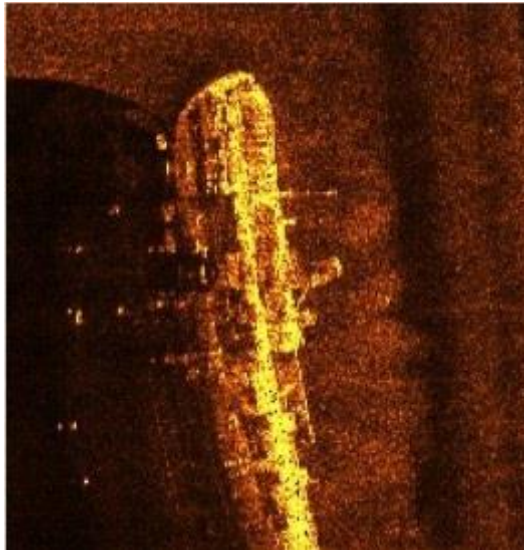
The hydrographic report lists her current reported situation as follows:

** 5.3.76 REPORTED LYING ON PORT SIDE ON HEADING 190DEGS WITH LEAST DEPTH 7FMS 1FT [LAT] BY CLOSE E/S. STILL LEAKING LIGHT OIL. (D HOOPER, DIVER REPORT, TELECON). AMEND TO WK 7FMS 2FT IN REVISED POSN. BR STD.

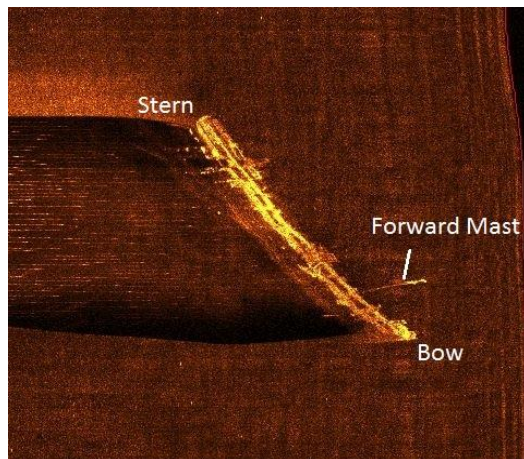
** 28.5.76 LOCATED 2.2.76 BY DCS3. WAS FOUND TO BE LYING ON PORT SIDE. LENGTH APPROX 315FT. DCS3 HT 46FT. HEADING 190DEGS [T] APPROX. LEAST E/S DEPTH 43FT [LAT]. MID POSN OF WK 585051.8N, 030751.6W. (D J HOOPER, ARICS).

Surface survey data

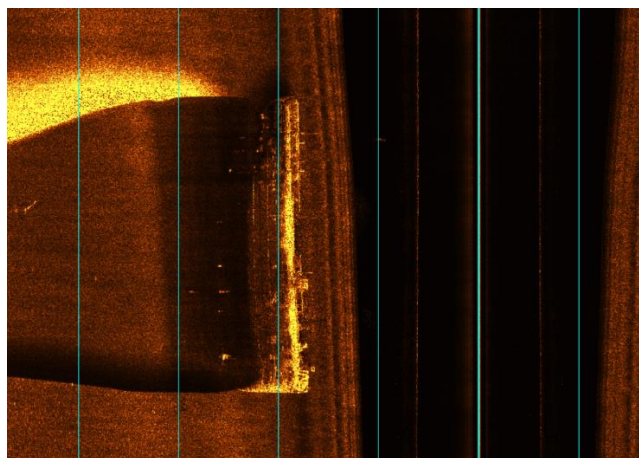
The wreck has been subject to a side scan survey, the results posted below:



Stern view



Overall view



Propeller and rudder view

Diver site survey 22nd November 2016

The site was dived by an expedition primarily formed to map and document the site of the Vanguard which lies nearby to the east. The dive team members had been assembled to collate a broad range of mapping skills and a site survey of the Prudentia was seen to be opportune whilst the Vanguard operation was in progress. Two dives were done on the Prudentia on the 22/11/16 of approximately 1 hour duration (a total of 18man hours underwater on the wreck) and the team's observations recorded and collected in a post dive debrief.

A number of sources of data were collected: the anecdotal and photographic stills records are presented below. A photogrammetric² map was recorded but due to the computer processing time required to realise the results the output are not offered here but they will be available when completed in a couple of months. The survey is not intended to be conclusive or comprehensive but rather collects a broad brush, descriptive representation of the wreck as she lies today.

The wreck lies on her port side in around 27m of water with a least depth of 12m. She lies on a coarse sandy seabed with a large debris field on her deck side comprising mainly of scattered coal. There is a distinct halo extending about 4m from the hull around the ship where wreck affects the habitat.

The ship is a classic steamship with a bluff, flat bow and swept cruiser stern with single screw and large rudder. Some thought was given that she looked shallow-drafted maybe allowing her to trade in river or estuary areas. Her spare propeller lies on the seabed just aft of the bows.

The Prudentia differs from the traditional three castle layout with a triple expansion steam engine located toward the stern rather than midships and the crew accommodation at the very stern. The engine was still in place and easily visible. Curiously, it looked as if there had been a steam boiler mounted above deck which has subsequently fallen from her cradle and lies on the seabed. The auxiliary steering helm was also evident with the central hub of the wheel and spokes still in place. The bridge had collapsed down onto the seabed and bridge wings with associated handrails etc resting on the sand.

There is obvious evidence of her role as an oiler: a large gantry lies off the bow, presumably hose handling gear. On the starboard side at the stern and running alongside the crew accommodation, an area of deck is dedicated to hose handling terminating in a dedicated cut-away in the stern to allow the hoses to run overboard.

On the hull side an iron 4 bladed propeller was missing one blade and sitting behind a single rudder still set to midships. The missing blade appears to sit on the seabed below the wreck.

There were no anecdotal reports of oil underwater. Several concrete bags were seen in situ on the upturned hull near the bow placed on prior operations to counteract oil release.

Many artefacts were seen scattered around the wreck including cutlery, crockery and other galley hardware, oil cans, a compass binnacle carcass and the makers plate itself. The wreck is in stunning condition with many features completely undisturbed and almost completely intact. The steam engine in particular was the best preserved example of a triple expansion steam engine that this author has seen in a 20yr diving career.

Points of interest from the biological side are that the community growing on the wreck of the Prudentia is probably not that different in species composition to something like the Kronprinz but because it is visited less, things have not been knocked off it so it actually looks more abundant with well developed sponges and hydroid clumps, rather than clumps that get damaged and then have to keep growing back. In turn these well developed clumps serve as a refuge for animals further up the food chain and so we were seeing a lot of territorial fish, crabs and molluscs living in amongst the animal turf. Generally the site is in a much better condition overall biologically compared to other well visited sites in the flow.

On the seabed close to the wreck the number of Scallops of both King and Queen was noticeably high and also there were a few areas of sparse live maerl close to the Bow section. It would be useful to look at that in more detail and in other areas of seabed close around the site.

Regarding the Scallop abundances, the Prudentia wreck site offers an unparalleled opportunity to do a comparison study between a 'fished' and 'non-fished' site, and to quantify the stock of scallops present at the location. It would show how this wreck site is now serving as a spawning reservoir for the Scallops. It would be important to compare the age and size composition between exploited and unexploited locations and would therefore allow us to quantify background levels of natural scallop mortality which are crucial for determining the productivity of a stock underlying sustainable management. There are very few places where a piece of work like this could be done nowadays because levels of exploitation are so high that it is difficult to find locations that can be considered as not exploited. To be able to conduct a piece of work in Orkney would be very useful.

Recommendations

1) This wreck is a pristine example of a 100yr old steam ship that has obviously and evidently benefited from lying undisturbed. Careful consideration should be given as to the next steps and a thoughtful roadmap put into place to ensure the wrecks continued preservation. (see Appendix A)

2) There is a unique opportunity presented in this site to research, document and implement a protective framework for the wreck. The Prudentia offers a single, unique example which illustrates the multifaceted influences impacting stakeholders within Scapa Flow. An investigation into the extent and role of these factors would allow an understanding of how best to consider the conflicting interests of different stakeholder groups.

3) The Prudentia is also indicative of a wider trend and could offer a model as to how best preserve the growing number of discoveries underwater. As imaging and searching technologies improve, so more pristine unknown sites will come to the fore. Already along the north Flotta shore the steam drifter Chance, the close protection pontoons and the Wildcat plane crash site have all been re discovered in the last couple of years and offer unique glimpses into Orcadian history. These are precious resources that if damaged are lost forever. By considering the Prudentia, we highlight the factors affecting all these sites and gain an insight in how best to look after these assets.

Appendix (A): Suggested Future Road Map

The following road map is offered as the prompt for discussion and so allow due consideration as to the best path forward. The following twin themes would seem important; firstly to pause and consider the assets and secondly to create a mechanism needed to move forward.

An initial working group could be created with the prime stakeholders involved tasked with formalising a working progression working towards researching the information needed to make informed decisions. Participants could include representatives from Orkney Harbours, Historic Environment Scotland, the dive boat community and Heriot Watt University.

The Prudentia wreck site at the moment is closed to any diving without specific permission. However, in this instance, specific permission could be granted to allow a scoping baseline study to be conducted to assess the situation.

The study would be collated from research from several sectors and would be undertaken over a full year of investigation. The components would include:

Historical, cultural legacy

The archive record would be fully researched to provide as full a historic record as possible. Kevin Heath at Sula Diving has already gone a long way down this road and is well qualified to complete the research. Historic information cements the importance of the context of the site whilst highlighting the human element and is often core to the reasons for a site to be valued. For example, the Vanguard is a protected site due to the loss of life and great respect accorded as a result.

Environmental impact

A study of the environmental considerations would cover a number of factors:

- A baseline record of the wreck including full MNCR (Marine Nature Conservation Review)¹ record
- An assessment of any hydrocarbon environmental impact
- A tidal study of the wreck using on-site tide recorders
- A study to assess the likely diver impact
- A framework implemented for ongoing environmental impact

The OIC employs Marine Scientist who has worked in close collaboration with the ICIT, Heriot Watt campus who themselves have several ongoing monitoring programs already in place within Scapa Flow. The expertise to

conduct this part of the report is active and could be easily engaged to focus on the Prudentia

Operation considerations

The wreck lies within the operation area of the Flotta Oil Terminal. An assessment of the factors arising from the terminal operations that could impact would be documented. Consultation with the Flotta Oil Terminal and associated tanker movements are critical to operation requirements over the site.

In addition, the wreck lies within the larger Scapa Flow Harbour area and hence within the Harbour Authorities jurisdiction: an assessment of these considerations would be included.

The expertise required to deliver the knowledge needed to illustrate these factors is operationally active within the Orkney Harbour framework and could be consulted without difficulty.

Wreck recorded

A baseline record of the wreck would be recorded on 3 levels.

- Sidescan/multibeam survey using surface survey techniques
- A 3D photogrammetry model of the wreck recorded using in water diving records
- A documentation of the wreck from visual observation to record fine scale detail

A team drawn from the local diving community have a well demonstrated pedigree to undertake this project and have both the HMS Hampshire and HMS Vanguard surveys as testament to their professional pedigree.

Output

The output would be a comprehensive report to allow the future of the wrecksite to be considered and could decide what positive future outcomes best represent the prime interests of this wreck.

In addition, the record would be added to the Scapa Flow Wrecks webpage and released for public view. Within all the individuals that form the Scapa Flow community is an abiding interest in the waters we work within and that curiosity is a powerful way to engage participation. Public outreach stimulates research and increases the collective knowledge so should be built in as a central tenet.

In short, a study commissioned into the Prudentia wreck site could be conducted with little cost by utilising teams of participants already active and knowledgeable in their individual fields.

The data gathered would

- inform the decision making process in how best to protect the Prudentia wrecksite
- create a forum to ensure close cooperation amongst stakeholders
- enrich the knowledge about Orkney cultural heritage
- demonstrate a positive, proactive and responsible approach to managing our local environment through wide collaboration

Appendix (B) Photographs



Bow, with hose gantry hanging down



Bow with anchor handling gear on fore deck



Stern showing through top of accommodation.



Stern showing rudder



Rudder and propeller



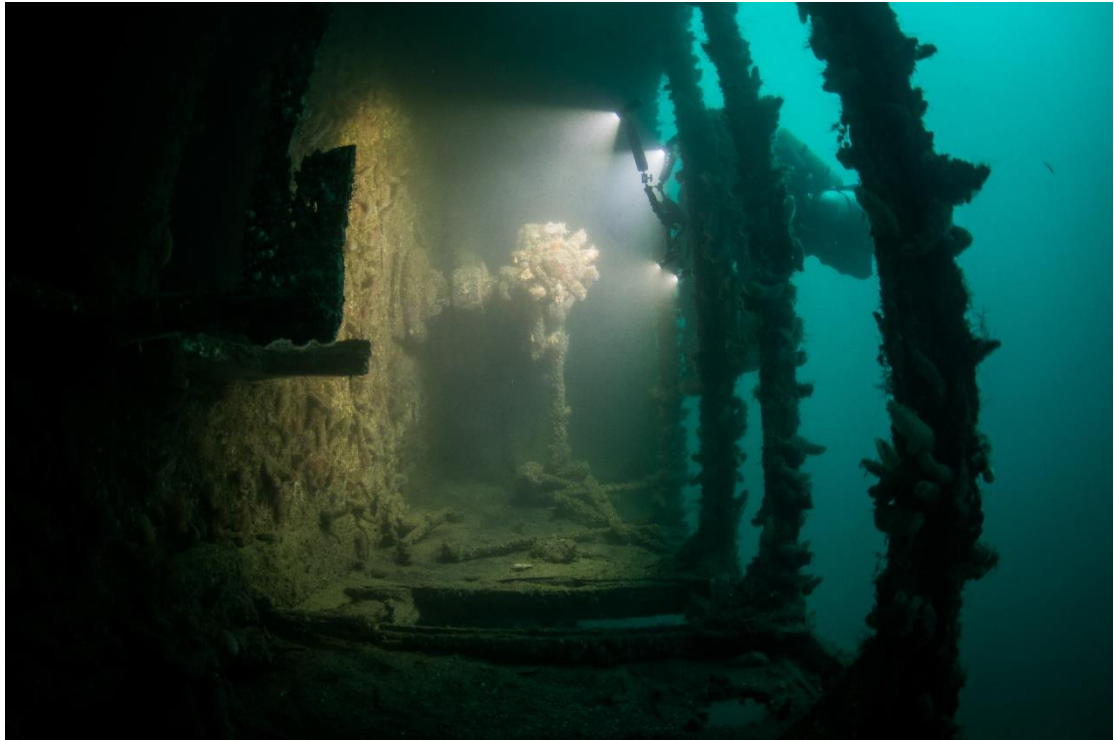
Boiler fallen from cradle



Top view of steam engine



Top view of steam engine showing low pressure piston



Auxiliary steering gear



Carcass of compass binnacle



Maker's plate



Cutlery and crockery



Cutlery on the seabed



Hose handling gear at stern



Hose handling gear

References

Scapa Flow 2013 Marine Archaeology Project
<http://www.scapaflowwrecks.com/cms-assets/documents/158613-94536.450scapa-project-reportfinal.pdf>
ADM_166_1507 Salvage of the oiler Prudentia
ADM_53/44969 Iron Duke Log
HCA_20_1494 Collision Hearing
BT 31/4500/29395 Company papers
Admiralty Chart: Scapa Flow and Approaches
www.wrecksite.eu
Kevin Heath, pers com and Sidescan data
Bob Anderson, photographs

Glossary

- **(1) MNCR:** Marine Nature Conservation Review

“The MNCR was initiated to provide a comprehensive baseline of information on marine habitats and species, to aid coastal zone and sea-use management and to contribute to the identification of areas of marine natural heritage importance throughout Great Britain.”

Ref: <http://jncc.defra.gov.uk/page-1596>

- **(2) Photogrammetry**

A technique to stitch together multiple photographs to create a 3D computer model manipulatable in real time.

Ref: <https://en.wikipedia.org/wiki/Photogrammetry>