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# PROJECT CATO

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A Southsea Sub-Aqua Club project

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Front cover image Auk class minesweeper USS Revenge courtesy US Archives

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## Summary

Project Cato has sought to clarify the remains of a wreck on the seabed that was listed as that of an Auk/Catherine class minesweeper. Through detailed investigation of the remains of the wreckage the team would attempt to conclude that the wreckage was that of an Auk/Catherine class minesweeper HMS Cato. Using tried and tested methodology, the team would dive all of the minesweeper wrecks in the area and gather information on them in order to establish base line information. From the information gathered the team would be able to determine facts about the sites and make informed conclusions.

The Project Cato team will investigate a number of wrecks associated with the WW2 Normandy Campaign which are believed to be associated with protection of shipping in the area. The task of minesweepers was extremely hazardous and the relentless efforts and bravery of the crews was rarely acknowledged in the constant battle to maintain clear shipping routes for valuable supplies to feed advancing armies in order to win the campaign.

## Acknowledgements

Our sincere gratitude goes to the many people and organizations who have assisted and supported us in during this challenging project and especially;

- Département des Recherches Archéologiques Subaquatiques et Sous-Marines (DRASSM) for the generous financial support and advice. In particular we wish to thank Cécile Sauvage;
- The British Sub-Aqua Jubilee Trust (BSAJT) for its generous financial support;
- Chris Howlett, Hydrographer and subject matter expert on the Normandy Campaign (formerly of UKHO);
- Danny Lovell, subject matter on WW2 and the Normandy Campaign.
- WW2 People's War is an online archive of wartime memories contributed by members of the public and gathered by the BBC. The archive can be found at <http://www.bbc.co.uk/history/ww2peopleswar/>.

## Copyright Statement

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# PROJECT CATO

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## 1. Background

### 1.1 Introduction

Since 1954 members of Southsea Sub-Aqua Club (SSAC) have enjoyed exploring our underwater world and the history that lays hidden by the depths. Over time our members have contributed much to the recreational diving world and the wider community through their determination, skills and hard work. From the invention of Octopush (underwater hockey) to the discovery of the historic Tudor flagship 'Mary Rose',<sup>1</sup> SSAC Branch<sup>2</sup> have been one of the most active and productive branches of the British Sub-Aqua Club. For the last ten years the club have been actively recording many of the wrecks in its home waters along the south coast of England and in particular the many wrecks associated with the largest ever maritime invasion; the WW2 wrecks of 1944 Operation NEPTUNE<sup>3</sup>. It is a natural progression to extend this work to learn more about the Normandy campaign through the investigation and recording of unidentified wrecks of the Baie de Seine believed to be lost during this historic endeavour.

This project centres on one of these ships, HMS CATO (pennant number J16), a British minesweeper. HMS CATO<sup>4</sup> was one of three Catherine Class minesweepers<sup>5</sup> reported to have been sunk by German 'human torpedo' submarines during the WW2 Allied Normandy Campaign. Her sister ships HMS MAGIC (pennant number J400)<sup>6</sup> and HMS PYLADES (pennant number J401)<sup>7</sup> have been identified but the wreck of CATO has yet to be located. This project's aim is to locate and identify the wreck of CATO.

The minesweepers were conducting mine clearance duties to protect the fleet on the Eastern beaches of JUNO and SWORD. On 6 July 1944 MAGIC sank following an explosion possibly from a mine or, more likely, from a human torpedo. Hours later CATO sank whilst searching for survivors of her sister ship MAGIC. Just two days later on 8 July, another sister ship PYLADES also sank as a result of enemy action.

There is conflicting information about the cause of all three ship losses, namely whether by mine or torpedo and in the case of a torpedo, whether the torpedo was launched from German

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<sup>1</sup> Led by Alexander McKee it was members of SSAC that found and identified the wreck of Henry VIII warship Mary Rose.

<sup>2</sup> Established in April 1954 as Branch 0009 of the British Sub Aqua Club

<sup>3</sup> Operation NEPTUNE was the maritime phase of Operation OVERLORD - The invasion of Normandy by sea and the liberation of France.

<sup>4</sup> Hereafter referred to simply as 'CATO'.

<sup>5</sup> US Auk class minesweeper which was loaned to Britain under the Lend-Lease Agreement and re-designated as Catherine Class minesweepers.

<sup>6</sup> Hereafter referred to simply as 'MAGIC'

<sup>7</sup> Hereafter referred to simply as 'PYLADES'

Neger<sup>8</sup> or Biber<sup>9</sup> craft. Whilst the wrecks of MAGIC and PYLADES are reportedly known, the primary aim of this project conducted was to locate and survey the wreck of CATO.

A wreck, identified as being CATO is located in the area. However, the dimensions and appearance of this wreck on sonar images cast some doubt as to its true identity and this project was established to confirm, the identity of the wreck.

## 1.2 Aims and Objectives

### Project Aim

The overall aim of the project was to investigate the wreck which may be that of CATO and verify that it is the wreck of an Auk/Catherine class minesweeper. The team also intend to dive the wrecks of PYLADES and MAGIC in order to familiarise themselves with the nature of the ship and to identify features that serve to corroborate the historical record of their loss.

### Project Objectives

**Objective 1:** To undertake diver visual recording of the wrecks using photographic, video and photogrammetry techniques to survey and record them. The resultant documentation will help to confirm the extent and preservation of the vessels. Information gathered will allow for the planning of future work and can be fed into historic asset management datasets and programmes which may inform future work and become a baseline for future condition surveys.

**Objective 2:** To undertake research of the historical documentation associated with the loss of CATO, PYLADES and MAGIC in order to corroborate, the findings of the wreck surveys.

**Objective 3:** To highlight the role of minesweepers in Operation Neptune and provide a source of information for professional archaeologists, avocational archaeologists, volunteers without archaeological training and recreational divers.

**Objective 4:** To promote and share the experiences of diving in France including knowledge gained in respect of French diving laws and regulations so that British recreational divers are aware of their obligations and can plan accordingly.

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<sup>8</sup> *Neger* was a torpedo-carrying craft generally described as a human torpedo which could not submerge

<sup>9</sup> The *Biber* was a German midget submarine of the Second World War.

## 2. Methodology

### 2.1 Project and Diving Management

We were aware that in order to record and document the wrecks we would require permission from the Département des Recherches Archéologiques Subaquatiques et Sous-Marines (DRASSM). This was a daunting task as communications and application forms were necessarily to be conducted in French. The use of Google translate site proved to be fairly reliable but we also were assisted by a club member (Alain Demairé) who kindly provided a much needed conduit for conversations and his support to our project was highly valued.

Cécile Sauvage at DRASSM advised that in order to conduct the project all divers were required to obtain certification by the Institut National Plongée Professionnelle (INPP) equivalence at Level 1B. This required medical endorsement from a Hyperbaric Doctor and CMAS 3\* or HSE commercial diver equivalence. All divers in the survey team had ascertained the necessary INPP qualification and were able to contribute to the project.

The official approval and authorisation to conduct Project CATO<sup>10</sup> was received on 28 March 2018 (copy at Appendix 1). Following approval by DRASSM the French Coastguard (Maritime Prefecture) were notified and a notice was issued to mariners to inform them that the survey was taking place.

The Project Leader was Martin Davies and the appointed Dive Operations Manager was Tom Templeton. The project team members and their roles are set out in the table below.

<b>Project CATO Team</b>	<b>Role</b>
Martin Davies	Project Team Leader/Diving Officer
Tom Templeton	Diving Supervisor
Alison Mayor	Survey diver/Photographer
Alain Demairé	Survey diver/advisor
Jim Fuller	Survey diver/Photographer
Jenny Watkins	Survey Diver/logistics
Robert Watkins	Survey Diver/logistics
Richard Rowley	Boat Coxswain

Figure 1 Project CATO team members.

### 2.2 Diving Methodology

A comprehensive dive plan, risk assessment and incident plan were produced as part of the approved project plan. All diving was conducted in accordance with French diving regulations and BSAC Safe Diving practices. All members had third party liability insurance (BSAC) plus travel and medical cover.

Two INPP certified divers were required during diving operations to provide surface / rescue cover.

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<sup>10</sup> Ministère de la Culture et de la Communication arrêté du 28/03/2018 No 2018 – 27 OA 3331. See Appendix 1.



Before the project began and prior to each dive a comprehensive briefing was given to all taking part. Relevant information was provided including;

- Diving team composition
- Boat details, including safety equipment
- Dive times to coincide with slackest possible water
- Pre-dive planning using French diving tables to back up computer calculations
- Risk assessment including a daily risk assessment
- Daily operations plan and weather check.

All boat and diving equipment used were certified as in test/service. Oxygen and first aid equipment, boat radios and navigation equipment were checked each day.

Diving operations began each day by launching from the slipway at Ouistreham. This large slipway was ideal for us to operate from on a daily basis. The two issues we encountered were at low water, as can be seen in the image below.



Figure 2 the slipway at Ouistreham ©Martin Davies

A large area of very slippery weed associated with the high water mark. The images shows the edge of the slipway marked by blocks of concrete to prevent trailers and launch vehicles from slipping into the sea when the water is below the edge of the slipway. This was the primary reason for not conducting a second dive each day. The slipway is not usable at all states of the tide. Observations suggested that a period two hours before and after high water gave good access to the water. Times outside of these limits would probably mean that the team could not launch or recover the boat successfully.

An alternative we discovered was to launch the boat two hours before high water and complete the first dive as planned. On our return there was a holding pontoon near to the slipway which

is usable at all states of the tide. This meant we could unload gear (especially diving cylinders) and get them ready for filling whilst making plans and readying ourselves for dive number two at low water.



Figure 3 the holding pontoon at Ouistreham ©Martin Davies

The dives were planned to take place during a good neap tide and this reduced movement of water and gave some extra time to aid our launching and recovery operations. Had we used a spring tide the large tidal range of water and lack of water on the lower tide would have made it even more challenging to launch and recover during the week of operations. The tidal range at Ouistreham can be in excess of 7m and this large volume of water movement not only creates strong currents but adds water to the depth of the dive on high water by a considerable amount. Operating out of Ouistreham in this way gave us the opportunity to complete two dives a day when timings allowed and this was far more productive than operating at other ports along the coast. This is possible when low water is at a reasonable hour of the day.

The members of SSAC are extremely aware of the ultimate sacrifice made by many in the Normandy campaign and throughout WW2. We are always respectful of the fact that many of these wrecks are the last resting place of brave soldiers and sailors from the Allied forces. Coming from the naval city of Portsmouth we are always sensitive to the fact that we are visiting a special place, one that few people are able to visit. We take the greatest care not to disturb or interfere with any wreck or artefacts. Indeed many of the project team have either served in or with the British Armed Forces and have family members who also have served.

No diving incidents or accidents were recorded during the period of the survey.

## 2.3 Survey Methodology

Survey methods used in this project included swim-over surveys to get a general impression of the wreck, and site recording using photography and video. The main reason for using photography was to be able to produce 3D images using photogrammetry<sup>11</sup>. Photogrammetry uses methods from many disciplines, including optics and projective geometry. Digital image capturing and photogrammetric processing includes several well defined stages, which allow the generation of 2D Orthographic projections or 3D digital models of the object as an end product. It is becoming the method of choice because of its ability to rapidly record an area and produce good accurate results.

Images were processed using AGISOFT PhotoScan software to produce 3D visualizations that can be converted to a pdf<sup>12</sup> image and viewed using ADOBE pdf reader or viewed in a web browser such as Google Chrome for example. Ultimately the models could be viewed using Virtual Reality (VR) technology for a fully 'immersive' experience.

Photogrammetry relies on a disciplined and methodical approach to the survey process and is particularly challenging when underwater visibility and light penetration is poor. A degree of overlap and recognizable points assists the photogrammetry software to process multiple points (pixels) in a geometric space. In the underwater environment marine growth, movement and current provide additional challenges to obtaining a series of images that are capable of generating a 2D or 3D image.

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<sup>11</sup> Photogrammetry has been defined by the [American Society for Photogrammetry and Remote Sensing](#) (ASPRS) as the art, science, and technology of obtaining reliable information about physical objects and the environment through processes of recording, measuring and interpreting photographic images and patterns of recorded radiant electromagnetic energy and other phenomena.

<sup>12</sup> Is a file format for capturing and sending electronic documents in exactly the intended format.

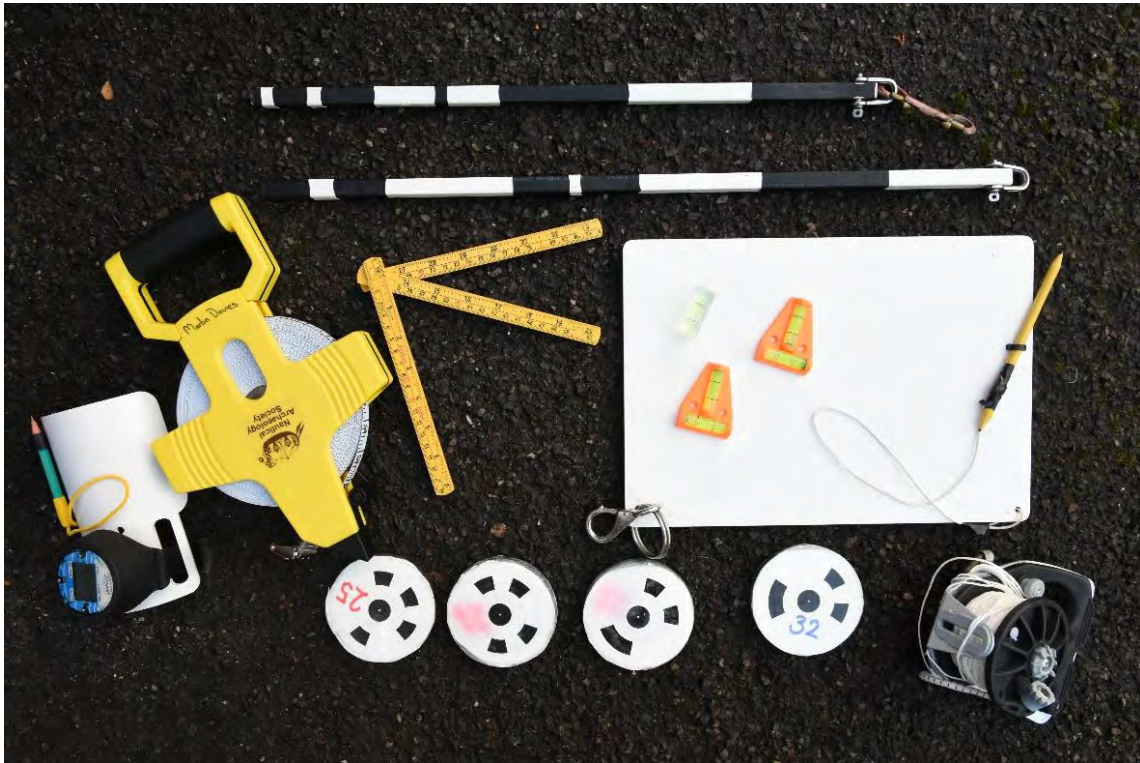


Figure 4 typical survey gear used by the team ©Martin Davies

When visibility was poor, the collecting of large amounts of imagery was not possible and so more traditional survey methods were used alongside the digital techniques. To assist the digital techniques the use of survey markers would be used if it was felt appropriate, these markers or targets would be placed around an object and then a normal series of images could be taken. The theory is to try to get at least two markers into each image with an overlap, this then allows the software to align the images more accurately.



Figure 5 use of photogrammetry targets and scale (©Martin Davies)

Before each dive a survey strategy was briefed detailing the objectives for each diving pair and each site. Where known the relevant information on the vessel's history and possible orientation/features were included. Other sources were used to expand the details of the vessels, most particularly results of earlier surveys and Wreck Site at [www.wrecksite.eu](http://www.wrecksite.eu). Some multi-beam data of the sites had also been gained from Cecile Sauvage and we thank her for the information provided.

Following the dive, log sheets were completed and archived. From the log sheets and reports from the dives it was possible to develop a plan for the following day and future work. Recording sheets were those recommended by DRASSM Survey record sheets.

As this project was a non-disturbance survey project a finds index was not appropriate.

## 2.4 Skills Developed

Most of the work done was by video and photography. However on some of the deeper sites the low visibility and poor light penetration proved challenging in obtaining photographs that could be used for the photogrammetry process. Numbered individual discs that assist with photograph alignment provided some benefit as did scale bars which also proved useful as a rough measurement guide underwater.

The use of tape measures still being an essential skill to be used underwater along with recording data onto log sheets on boards and this had been practised and refreshed in a training session in an inland quarry/lake in February when the water temperature was 3C.

At the end of the diving day the most important activity was a debriefing session and log a completing session followed by a discussion of results and this made sure that the record of the day's diving could be used to contribute to the outcomes of the project.

The collaborative feedback was really useful in helping people to understand what they had been recording and resulted in increased understanding of what had been observed and recorded. Images and video were viewed on a large screen monitor to help identify key features of the wrecks, there was much debate over many of the images, which were compared to ships plans and historic images of the class of ships.

## 2.5 Post Survey Tasks

There were many tasks to complete after each days diving, most centred around preparing the boat for the following days diving, re-fuelling, checking oil levels and inspecting the boat making sure that everything was as it should be for the following days diving. Other tasks involved refilling the cylinders from the portable compressor this was done at the slipway area to minimize disruption at the property due to the noise of the compressor.



Figure 6 recharging the diving cylinders ©Alison Mayor

Other key logistics were shopping for food, cooking the evening meal and washing equipment down.

The immediate processing of some of the photogrammetry images was vital to give an indication of the underwater conditions and whether there would be a successful model created.

A powerful Dell workstation was used to run the Photoscan software. This machine has a large amount of memory, twin Xeon processors and three graphics cards to give quick results of the

alignment process. This information is then used as a base line for the rest of the diving on the chosen site and it is generally included in the briefing for the following dive. Some of the conditions encountered over the week were very poor and so there were limited results on some of the sites where visibility was less than 2m.

In good conditions, photogrammetry and video allow the detailed capture of an object when time is limited due to depth or tidal conditions. This visual record can then be studied afterwards to identify any key features that may have been missed during the dive. Photogrammetry also provides the opportunity to accurately record to scale, this will require the use of a known scale being placed on the object or wreck and from that the software can then calculate measurements and distances.

## 3. The SHIPS - MAGIC, CATO and PYLADES

### 3.1. Catherine Class Minesweepers

The British Catherine Class of minesweeper as used in WW2 was an American-built *Auk* class minesweeper transferred to the British Royal Navy under a lend-lease agreement. A total of 22 ships were transferred and renamed under the 'Catherine Class'. HMS MAGIC, CATO and PYLADES were all British Catherine class minesweepers.



Figure 7 HMS Fairy, a British Catherine Class minesweeper. © IWM (A 30790)

### 3.2. Specification of the Auk/Catherine class minesweeper.

Type:	Minesweeper
Displacement:	• 890 tons • 1,100 tons (full load)
Length:	221 ft 2 in (67.41 m)
Beam:	32 ft 0 in (9.75 m)
Draft:	11 ft 0 in (3.35 m)



Propulsion:	Diesel electric drive, twin screws, 3,500 hp (2,600 kW)
Speed:	<ul style="list-style-type: none"> <li>› 9–12 knots (17–22 km/h; 10–14 mph) (cruising)</li> <li>› 18 knots (33 km/h; 21 mph) (maximum)</li> </ul>
Complement:	Approximately 100
Armament:	<ul style="list-style-type: none"> <li>› 1 × 3 in (76 mm)/50 cal. gun</li> <li>› 2 × Bofors 40 mm guns</li> <li>› 8 × 20 mm Oerlikon cannons</li> <li>› 2 × depth charge tracks</li> </ul>

Figure 8 Specification of Auk class minesweepers. (Source Wikipedia)

### HMS Magic (J400)

Built by	Savannah Machinery and Foundry Co. (Savannah, Georgia, U.S.A.)
Laid down	15 Jan 1943
Launched	24 May 1943
Commissioned	22 Oct 1943

Figure 9 HMS MAGIC key dates. (Source uboat.net)

Commanding Officer		Date	
1	LCdr John Penri Davies, RNR	Feb 1944	6 Jul 1944

Figure 10 HMS MAGIC Commanding Officers (Source uboat.net)

### HMS CATO (J16)

Built by	Associated Shipbuilders (Seattle, Washington, U.S.A.)
Ordered	6 Dec 1941
Laid down	11 Apr 1942
Launched	7 Sep 1942
Commissioned	28 Jul 1943
Lost	6 Jul 1944

Figure 11 HMS CATO key dates. (Source uboat.net)

Commanding Officers		Date	
1	Lt. John Samuel Gordon-Christian, RNR	May 1943	27 Mar 1944
2	Lt. Robert William Edward Harris, RN	27 Mar 1944	6 Jul 1944

Figure 12 HMS CATO Commanding Officers. (Source uboat.net)

## HMS PYLADES (J401)



Figure 13 HMS PYLADES (J401)

Built by	Savannah Machinery and Foundry Co. (Savannah, Georgia, U.S.A.)
Ordered	2 Dec 1941
Laid down	30 Jan 1943
Launched	27 Jun 1943
Commissioned	24 Nov 1943
Lost	7 Jul 1944

Figure 14 HMS PYLADES key dates. (Source uboat.net)

Commanding Officers		Date	
1	T/Lt. Francis Hawkins, RNVR	24 Nov 1943	15 Dec 1943
2	Lt. Montague Harris, RN	15 Dec 1943	8 Jul 1944

Figure 15 HMS PYLADES Commanding Officers. (Source uboat.net)

### 3.3. The Role of Minesweepers in Operation Neptune

The German forces established a chain of mine field along the English Channel stretching from Boulogne to the Baie de Seine to protect occupied France from an Allied invasion.

Minesweepers and their attendant consorts were therefore at the forefront of the Allied Fleet responsible for leading the assault forces to the Normandy beaches. Their task of clearing mines and establishing safe channels of passage was crucial to the success, or otherwise, for the opening day of this amphibious opposed invasion to establish the second front.

The Minesweeping Operational Plan was drawn directly up by Admiral Bertram Ramsey and the Task Force Commanders (Eastern: Rear Adm. Sir Philip Vian RN; Western: Rear Adm. Alan G. Kirk USN).

By 0330 on 6 June 1944 ten channels to the French coast had been swept of mines by the Fleet Minesweeping Flotillas and shortly after the inshore areas parallel to the landing beaches had been swept.

In total, about 350 vessels of many types took part in the mine clearing operation of June 5-6. The success of the minesweeping fleet meant that there were very few losses from mines and Naval Commander of the Western Task Force, Rear Admiral Alan Kirk USN. (ADM 234/366 p. 49) commended their efforts as follows;

*"It can be said without fear of contradiction that minesweeping was the keystone in the arch of this operation. All of the waters were suitable for mining, and plans of unprecedented complexity were required. The performance of the minesweepers can only be described as magnificent."*

The 350 minesweeping vessels had engaged in the most meticulously planned and well executed minesweeping operation ever undertaken and all survived by the end of D-Day on June 6.

Catherine Class minesweepers including CATO, MAGIC and PYLADES were assigned to the British 40<sup>th</sup> Minesweeper Flotilla whose task was to clear mines for the bombarding 'S' force and associated assault craft to the eastern flank of the assault area (SWORD).

### 3.4. The 'Trout Line'

Having led the way for the Allied Assault Forces minesweepers were required to maintain the swept channels to ensure continued safe passage of men and equipment. However the 40<sup>th</sup> Minesweeper Flotilla was assigned to support the anchoring area in what was to become known as the 'Trout Line'. This was a defence barrier set up around the Normandy anchorage to protect the ships from the multiple threats of E-boats, R-boats, human 'Neger' torpedoes and Linsen explosive motor boats based in Le Havre and under the command of the Support Squadron Eastern Flank (SSEF).

The Trout Line itself was composed of LC(Guns) LCG, LC(Flak) LCF and LC(Supply) LCS set up in a continuous double line one cable apart.

LCG(L) – Mk 3 and Mk 4

LCF – Mk2, Mk3 and Mk 4

Landing Craft Support (L) Mk2

The minesweepers slotted in at 5-cables (half mile) intervals six miles seaward on each side and parallel to the beaches. Sword Beach, on the eastern flank, was particularly vulnerable to attack from the Le Havre area and enemy submarines and human torpedoes.

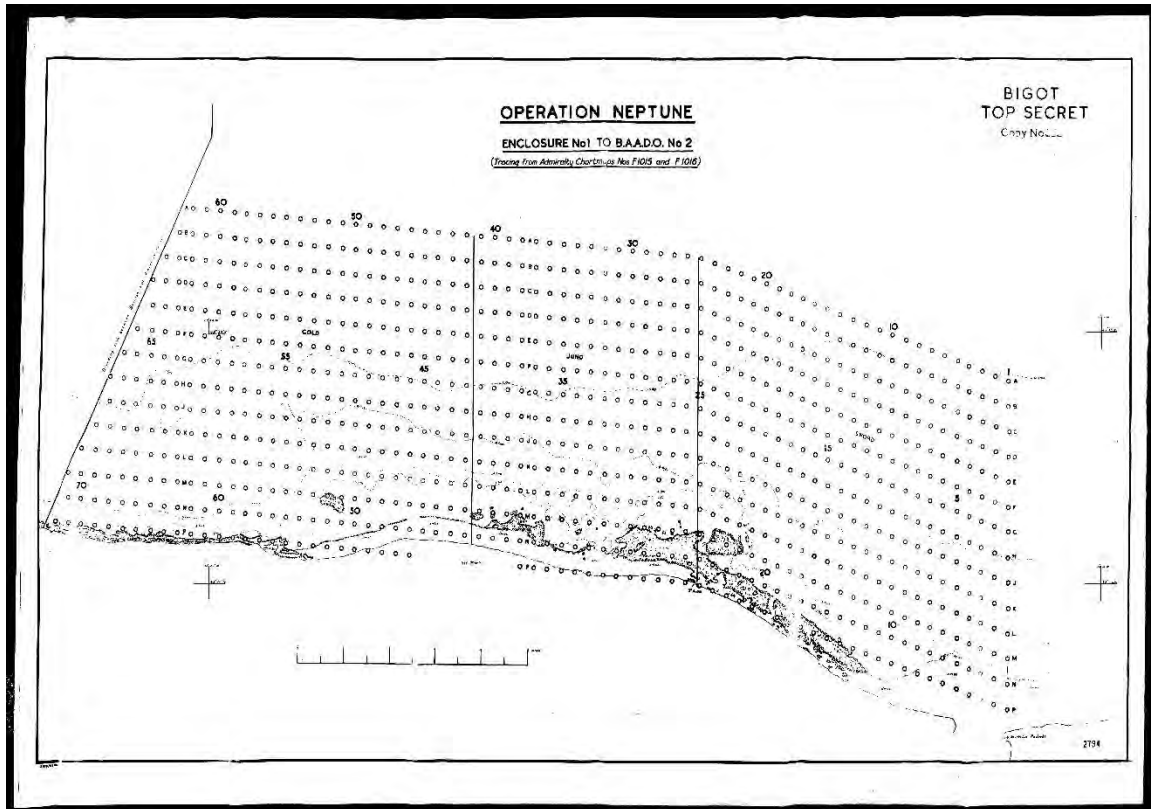


Figure 16 the Anchorage Plan for Gold, Juno and Sword Beaches.

The SWORD Anchorage Plan was used to assign positions for vessels assigned to the Trout Line.

HMS MAGIC, CATO and PYLADES were casualties of German attacks on ships of the Trout Line. Other losses include HMS Lord Austin, HMT Gairsay, LCG 764, LCG(L)(4) 764, 831, 1062, and LCF-1 were sunk while undertaking this duty.



### 3.5. The loss of HMS MAGIC (J400)

MAGIC was attacked at 03.53 on the 6 July 1944 whilst at anchor at the far eastern end of 'A Line' of the Anchorage plan. She was hit by a torpedo under the quarter deck on the port side. A total of 26 lives were lost as a result of the attack. It was reported that the vessel sank in 7 minutes.

The loss was recorded as the result of German Neger human torpedo.

### 3.6. The loss of HMS CATO (J16)

A little over an hour later at 05.11 on the 6 July 1944, CATO was attacked by another German human torpedo whilst she was at anchor in the vicinity of A9 berth. She was reported to have been struck amidships. Twenty five Royal Navy personnel were lost as a result. CATO was reported to have floated for some time and finally sank at 07.45.

The loss was recorded as the result of another German Neger human torpedo.

### 3.7. The Loss of HMS PYLADES (J401)

On the night of 7/8 July 1944 the Germans launched another attack on Royal Navy ships at anchor on the northern defence line. Twenty-one German Biber and Neger craft took part in the attack. On this occasion the craft were seen by the Allied forces as there was a full moon. The German craft were attacked by Allied aircraft and ships. However, PYLADES was sunk during the attack. She sank with the loss of 11 lives.

On this occasion the use of a German Biber human torpedo was given as the reason for the sinking.

This information above is probably incorrect as the first Biber operations from Fécamp harbour were on the 30 August 1944, over a month after PYLADES sank.

## 4. The German Neger, Biber and Marder craft

### 4.1. The Development of the 'Human Torpedo'

The concept of a tiny manned submarine carrying a bomb was developed and patented by a British naval officer in 1909, but was never used during the First World War. The Italian Navy experimented with a primitive tiny sub carrying two men and a limpet mine as early as 1918 and this craft did have some success.<sup>[13]</sup> The first truly practical human torpedo was the Italian *Maiale* (nicknamed the "pig" because it was difficult to steer) used in the Second World War.<sup>[14]</sup>

### 4.2. The 'Neger' Human Torpedo

During WW2 the German navy also developed a manned torpedo in 1943, the *Neger*, The name comes from the inventor, Richard Mohr (in German 'Mohr' is an old fashioned term for negro). The first of these 2.75 ton vessels entered service in March 1944 and about 200 of them were built during 1944.

A Neger was a simple design: two G7e torpedoes<sup>15</sup> were connected to one another. In the upper torpedo the load was removed and a Perspex dome added. The Neger was designed to be operated by one man, with a top speed of 4 knots and one torpedo the Neger had a range of 48 miles. Frequent technical problems often resulted in the death of the operator.

The Neger was first used in Italy in April 1944 and despite heavy losses it was subsequently used against the Normandy Landing bridgeheads.

Length:	7.0 m
Diameter	0.53 m
Armament:	1 torpedo 53.3 cm (G7e)
Performance:	12 HP (battery)
Speed:	4 knots (7.4 km/h)
Range	up to 48 miles
Displacement	2.7 tons

Figure 19 Specification of a Neger craft. (Source Wikipedia)

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<sup>13</sup> <https://www.telegraph.co.uk/news/obituaries/military-obituaries/naval-obituaries/11814603/Emilio-Bianchi-human-torpedo-obituary.html>

<sup>14</sup> "Manned Submarines: Italy's Daredevil Torpedo Riders". Warefare History. Sovereign Media. 26 August 2015.

<sup>15</sup> The G7e (wakeless) electric torpedo T III was the new torpedo used by the Germans at the beginning of the war. All G7e models shared standardized dimensions designed for use by all submarines during the Second World War.

Attacks by Neger craft had a 20% success rate. Often the live torpedo would not disengage and the torpedo propelled the craft and pilot to its target with the pilot being unable to escape the impact and explosion thereby killing the Neger pilot.



Figure 20 German Neger pilot preparing for launch ©unknown

As the Neger pilot approached the target, he would take aim on his target by aligning a spike at the front of the craft with some markings in the Perspex dome. Once his target was acquired he would arm the lower torpedo and launch it at the target before disengaging. The Neger "craft" was not able to dive, and as a result was very vulnerable to enemy attack. If the transparent dome was damaged, the pilot had almost no chance of escaping from the sinking craft.





Figure 21 washed ashore a Neger after a failed attack ©unknown

### 4.3. Neger Operations in Normandy

The Neger craft were used against the allied invasion fleet off Normandy during two occasions before the Allied breakout on land forced them to be relocated out of range of Normandy in early July 1944. The 40-strong Neger flotilla operated from Favrol Woods (west of Honfleur) and on 5 July 26 of them attacked the invasion fleet but of the 24 who attempted an attack only 9 survived, having sunk 2 small British minesweepers (MAGIC and CATO).

The second attack on the night of July 7/8 was carried out by 21 Neger craft. As the night was clear and moonlit and as the craft progressed through the water their wake was spotted and they were destroyed by aircraft and anti-submarine vessels. This attack resulted in the sinking of the minesweeper PYLADES and the damaging of the Free Polish cruiser Dragon which was later scuttled to form part of the Gooseberry breakwater off Arromanches, Normandy.

### 4.4. The Biber

The German Biber craft was hastily developed in February 1944 to help meet the threat of an Allied invasion of Europe. This resulted in basic technical flaws that, combined with the inadequate training of their operators, meant they never posed a real threat to Allied shipping. A total of 324 Biber craft were manufactured. One of the Biber's few successes was the sinking of the cargo ship *Alan A. Dale*.

Some reports credit the loss of the PYLADES to a Biber craft however it is more likely to have been the result of attack by a Neger.

### 4.5. The Marder

The Germans designed and built an improved, submersible version of the Neger, the Marder. Almost identical to the Neger, the Marder was able to dive underwater, making it easier to approach and clear potential targets.

Although it was a clear improvement over its predecessor, the machine had two disadvantages.

- 1) The diving and control of the Marder to dive was very complicated and took almost entirely the whole attention of the pilot.

- 2) It still had to navigate on the surface when it came to attacking a target because it was not equipped with a periscope.

The Marder was used unsuccessfully in the Mediterranean against American ships and in the Gulf of St. Tropez, where several were sunk during their attack.

Marder craft are not believed to have been engaged in the loss of MAGIC, CATO or PYLADES.

## 5. The German Attack

Both MAGIC and CATO were lost in the early hours of 6 July 1944 and PYLADES two days later on 8 July. This summary attempts to piece together from contemporaneous reports the events leading up to their loss.

By completing this exercise we sought to confirm the likely position of the wrecks and compare this and other information with the detailed observations during our survey of the wrecks.

### 5.1 The Anchorage plan

The loss of MAGIC, CATO and PYLADES took place in the anchoring area north of Ouistreham. The plan (below) was used to allocate anchorage positions to vessels in the Gold, Juno and Sword area. The coastal waters of the landing beaches were divided into sections and positions were identified using a grid system. Letters A to P (north to south) and numbers 1 to 70 east to west (Ouistreham to Arromanches) were used to identify the area a ship or vessel was to operate or station at anchor.

The events concerning the loss of MAGIC, CATO and PYLADES all took place in the north east corner of the Sword anchoring area to the north of Ouistreham.

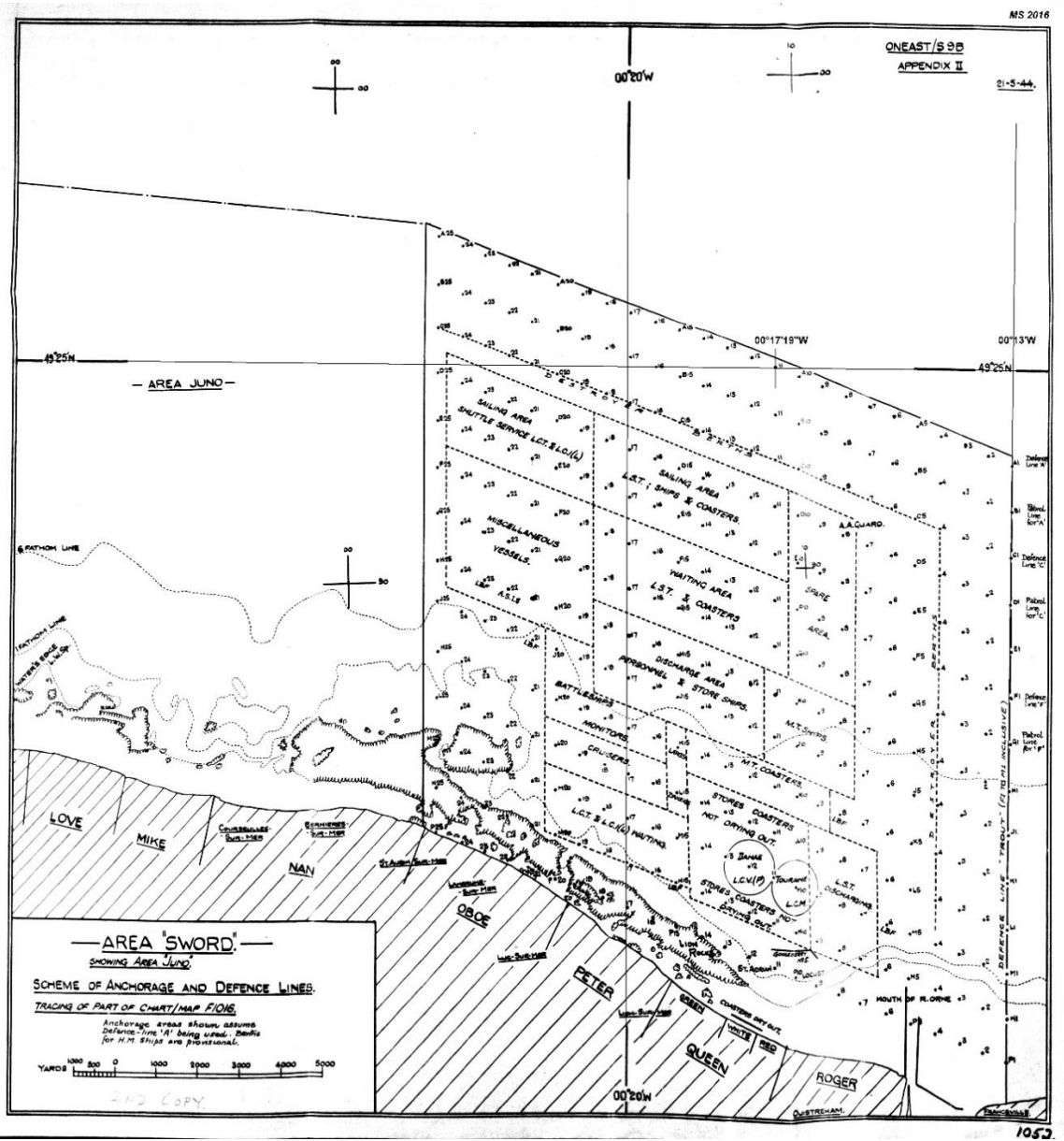


Figure 22 The Anchorage plan for SWORD area.

The following image shows the berthing plan overlaid on a current chart of the area. This illustrates the berthing in relation to the ports of Le Havre and Ouistreham.



Figure 23 plan of the general area, with the berthing plan overlaid. (Courtesy Jim Fuller)

## 5.2 The Ships at Anchor

In the early hours of the 6 July 1944, the following ships were at anchor in the north of Ouistreham;

HMS CATO	A4
HMS MAGIC	A5
HMS CATHERINE	A9
HMS GORGON	A12-A13

Figure 24 Location of Ships on the Northern Defence Line in the early hours of 6 July 1944.

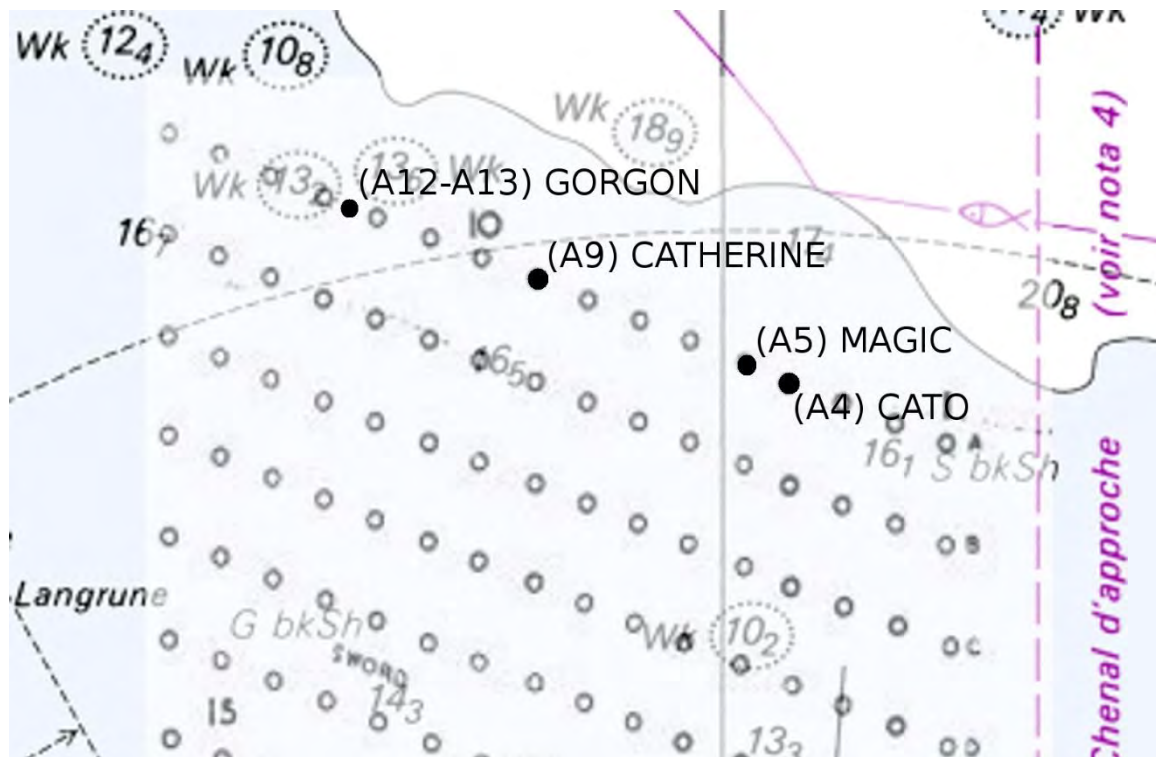


Figure 25 A diagram showing the position of the ships at anchor. (Courtesy Jim Fuller)

## 5.3 The Launch of the Human Torpedoes

At approximately 2230 hrs on the 5 July 1944 the first of twenty four German "Neger" torpedo carrying craft left their base at Houlgate.



Figure 26 Neger Human Torpedo. (Source Wikipedia ©unknown)

## 5.4 The German Plan of Attack

German Neger boats had orders to follow a course that would take them into the anchoring area with orders to attack any Allied ships at anchor in the area. Failing that they were to attack the harbour works at Ouistreham. The Neger pilots were given detailed instructions on how to get back to their base. The craft had the endurance for a return trip however of the twenty four launched that night only nine returned.

The approximate route taken by the human torpedoes is shown below.



Figure 27 the route taken by the Neger human torpedoes (Courtesy of Jim Fuller)

## 5.5 The Neger Pilot's Passage Plan

The Neger pilots were given the following instructions:-

- 15 minutes due North (travelling at 3.5 knots (this would cover a distance of 0.875Nm)
- Turn 90° to port due west for 40 minutes and look for flashing light from Franceville (travelling at 3.5 knots this would cover 2.33Nm)
- Turn 330° for 2.5 hours (travelling at 3.5 knots this would cover 8.75Nm)

For most of the journey the tide would have been reducing and at the same time the direction would have been taking the craft over toward the attack area. This would have been of great assistance to the craft which with the torpedo slung underneath would have given the craft a top speed of 3.5 knots. Once the torpedo had been deployed the craft would be able to increase speed to 5 knots and as the tide would have turned there would have been an improved chance of escape, and making it back to shore or a safe haven.



Whilst theoretically it would have been possible to navigate back to the base from which they launched the historical accounts suggest that most perished either during the attacks or drowned or died of carbon dioxide poisoning from the breathing apparatus they were wearing.

A historical German propaganda film made of the attacks, possibly on MAGIC, can be found at <http://www.archeosousmarine.net/mp4/magic.mp4>

## 5.6 Using the Tidal Currents

The Germans planned the attack to take advantage of the tidal conditions by using the power of the tide to assist the limited power and speed of the Neger.

A tidal prediction program<sup>16</sup> has been used to establish the tidal information for Ouistreham on the 6 July 1944 (see below). Times are based on GMT<sup>17</sup>.

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<sup>16</sup> (TotalTide)

<sup>17</sup> Greenwich Mean Time.

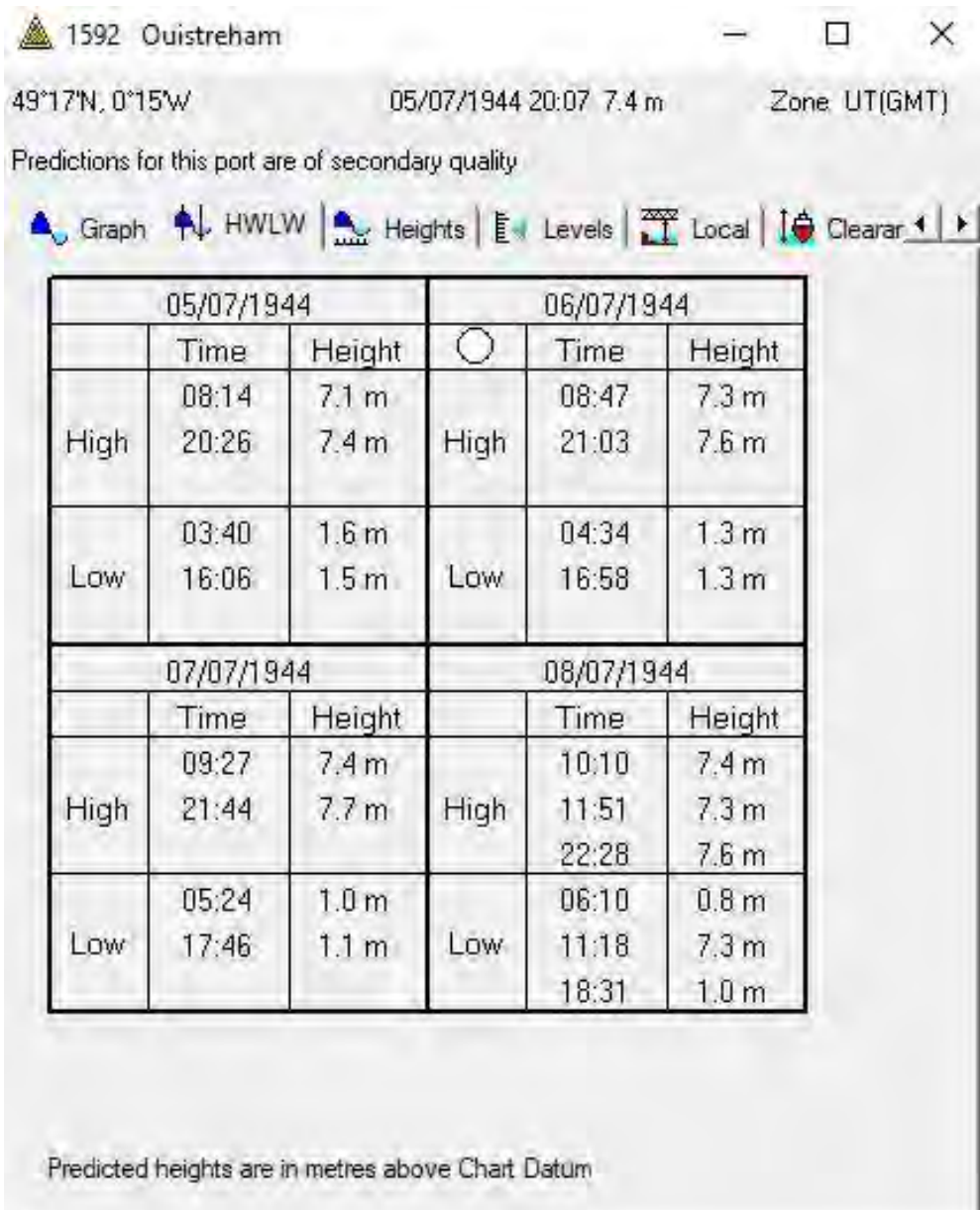


Figure 28 shown above are tide times for 5 to 8 July 1944. (Source Total Tide)

Low water was at 0434 hrs (GMT) and the tidal range of the day was 6m.

The following extract from Total Tide shows the direction of tide in the tide immediately before, during and after the attack. By launching a little after high water on the night of 5 July the direction of current would have taken them westwards towards the anchorage off Sword beach north of Ouistreham.

During the period of the attack the current would have slackened to allowing the Negers to manoeuvre more easily as they approached their targets.

After the attack, at 0530 the tide would have turned and the current would have assisted the Negers passage back to port.

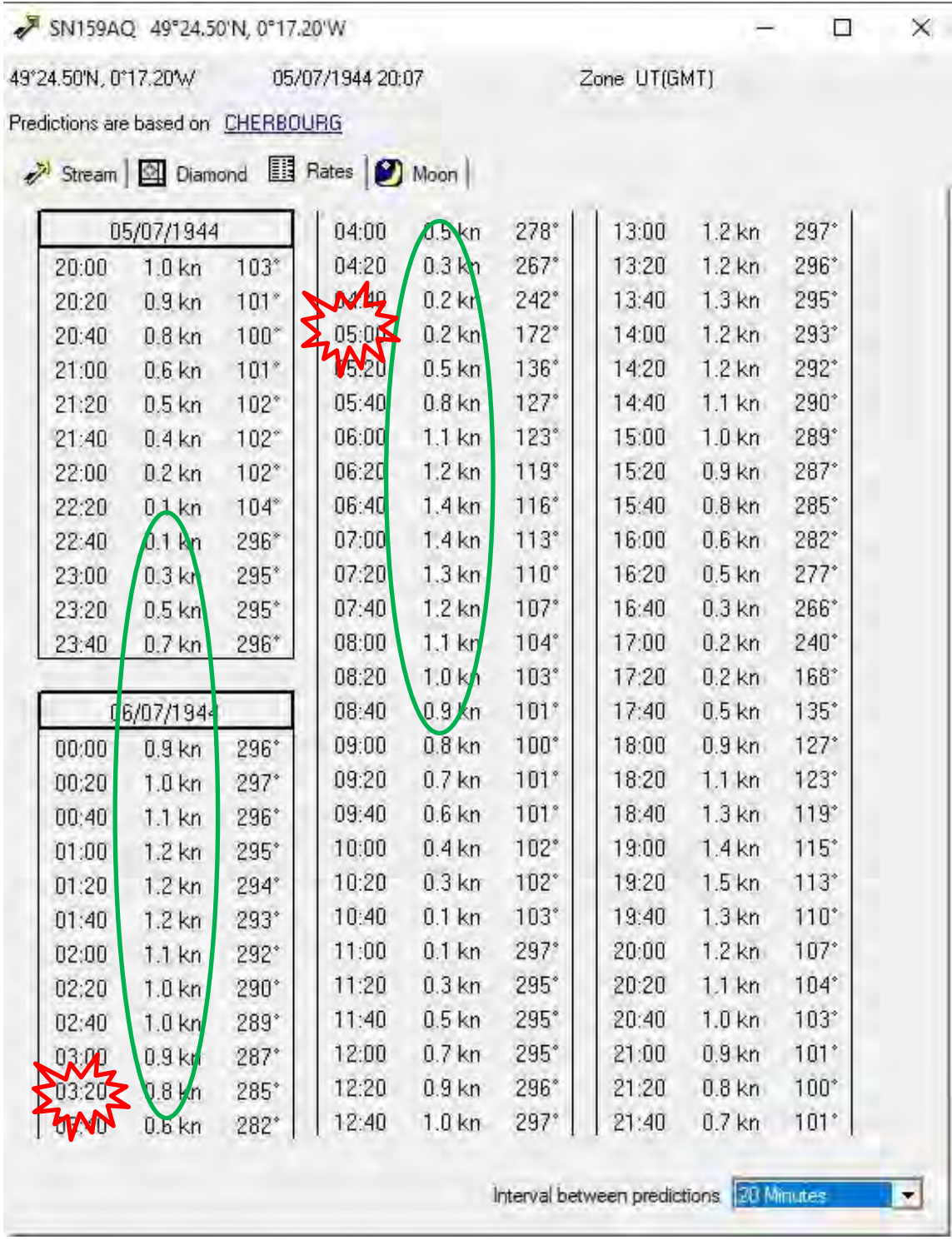


Figure 29 shown above was the rate and direction of the tide on the morning of 6 July 1944. (source Total Tide)

## 5.6 The Attack on HMS Magic

Prior to the first attack, the ships had been warned of possible German E-boat and Human Torpedo attacks. Consequently all the ships were maintaining a high level of watch with manned and radar lookouts.

In his report to the Senior Officer, 40<sup>th</sup> Minesweeper Flotilla, aboard HMS Grecian, the Commanding Officer of HMS Gorgon gives details of the loss of MAGIC and CATO.<sup>18</sup> Extracts of the report are reproduced below.

## 5.7 HMS MAGIC loss

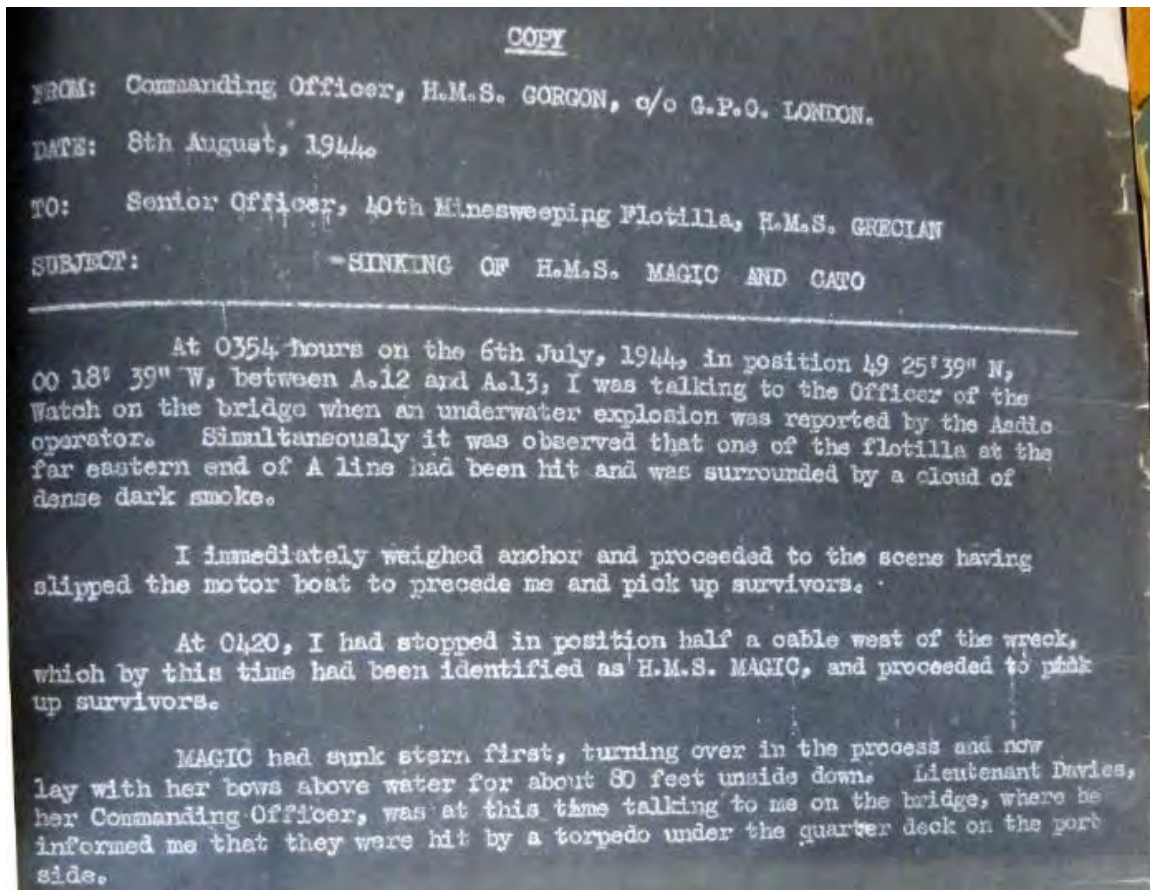


Figure 30 Extract from report of the loss of HMS MAGIC by C/O HMS Gorgon. (Courtesy Danny Lovell)

At 0352 MAGIC was at anchor at A5 and was hit just aft of amidships on the port side. She is said to have broken her back and sank just seven minutes later. Many of her crew had to jump into the water to escape.

CATO was anchored at A4 when MAGIC was attacked and quickly slipped her mooring and launched her motor boat to pick up survivors. CATO also provided a crew to man MAGIC's

<sup>18</sup> 'Sinking of HMS MAGIC and CATO' dated 8 August 1944.

motor boat. This rescue took about 30 minutes, by which time she had drifted westwards past where MAGIC had been anchored.

HMS Catherine (J12) was anchored at A9 and also launched her motor boat to pick up MAGIC's survivors. She also slipped her mooring and patrolled the waters between anchorages A9 and A11. She took all the survivors on board.

HMS Gorgon (J346) was anchored between A12 and A13. She launched her motor boats to pick up survivors.

MAGIC sank stern first turning over in the process.

Of the 98 men aboard MAGIC prior to the attack, 72 survived her attack. However 13 of MAGIC's survivors were believed to have been subsequently killed when CATO was sunk.

## 5.8 The Attack on HMS Cato

Following the attack on MAGIC, and after CATO and her motor boat had completed rescue operations, she moored up in position A9, occupying the anchorage originally occupied by HMS Catherine (who was now patrolling between A9 and A13).

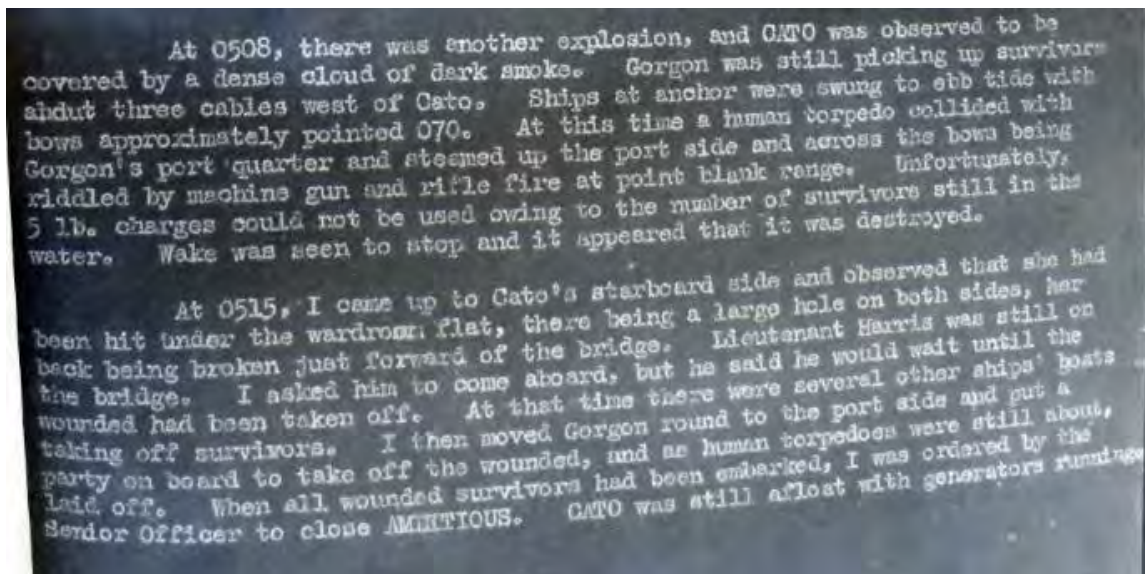


Figure 31 Extract from report of the loss of HMS CATO by C/O HMS Gorgon. (Courtesy Danny Lovell)

At 0508 on the 6 July 1944, CATO was hit amidships.

At 0525 HMS Duff<sup>19</sup> (K352) engaged one or more human torpedo craft that were spotted on the surface.

HMS Chamois<sup>20</sup> (J28) was close by and assisted with the rescue of survivors from CATO, many of whom had taken to the sea from her undamaged stern. After all the known survivors had been picked up at 0600 HMS Chamois then transferred the survivors to HMS Grecian who had come alongside, this taking place between 0635 and 0710.

<sup>19</sup> HMS Duff (K352) was a British Captain-class frigate of the Royal Navy

<sup>20</sup> Another Catherine Class minesweeper.

At 0725 HMS Chamois set sail for CATO to assist in the attempt to tow CATO.

At 0745 HMS Chamois was manoeuvring to take CATO under tow when water reached the main deck and CATO sank in two minutes.

At 0747 CATO finally sank.

HMS Gorgon's motor boat was still picking up survivors from MAGIC when CATO was hit, so her (and another unidentified) motor boats assisted in the rescue of survivors from CATO. At the same time as CATO was hit, a Human torpedo contacted with HMS Gorgon, steaming up its port side and across her bows. HMS Gorgon fired on it, assuming the torpedo was destroyed when the wake stopped.

HMS Catherine sent her motor boat to pick up survivors of CATO.

The loss of MAGIC and CATO were reported by SECRET Signal to the Royal Navy 1<sup>st</sup> Sea Lord by the Senior Officer of the 40<sup>th</sup> Mine Sweeper Flotilla at 1311 on 6 July 1944.

# SECRET

WARNING: This is an unparaphrased version of a secret cypher or confidential code message and the text must first be paraphrased\* if it is essential to communicate it to persons outside British or Allied Government Services.  
(\*Note: Messages shown as having been sent in a One-Time Pad: "O.T.P." are excepted from this rule.)

M/S. Cato

Portsmouth

061311Z/July

FROM S.O. M/S 40

Date 6.7.44  
Recd. 2051

NAVAL CODE (K) BY T/P

6/7/44

Addressed A.H.C.K.F.  
Repeated - F.O.D.A.A., Capt. M/S (K), Admiralty  
H.M.S. BOSCAWEN.

IMPORTANT

H.M.S. MAGIC sunk 060353. H.M.S. CATO  
sunk 060511. Both when on defence line. Midget  
submarine or human torpedo suspected.

061311B

Advance Copy - 1st Lord, 1st S.L.  
Ops, O.D., C.I.C., Plot,  
D.A/S.W.

1st Lord

RECEIVED IN  
7 JUL 1944

Figure 32 The signal to the Royal Navy 1 Sea Lord informing of the loss of MAGIC and CATO. (Courtesy Danny Lovell)

## 5.9 The Attack on PYLADES

According to the report by HMS Orestes <sup>21</sup> there were numerous attacks British ships on the night of the 7/8 July described as follows;

*"During the night of 7/8 July three ships of the 18<sup>th</sup> M/S Flotilla and one Danlayer were anchored on the A line as follows:*

<sup>21</sup> Report of attacks on Human Torpedoes dated 12 July 1944 by the Commanding Officer HMS ORESTES to the Flag Officer, British Assault Area. Ref 915/02.

ORESTES (Senior Officer)	A4
COCKATRICE	1 cable 110° from A8
GILSAY (Danlayer) (now renamed HARRIS	1 cable 290° from A11
PYLADES	A15

*At 0506, Captain Patrol's 08043 was received and at 0523 the Flotilla weighed (anchor) and proceeded to form an endless chain patrol between A1 and A25. Distance apart of ships 3 miles, speed of advance 7 knots. "GILSAY" was detached in order to make V/S Contact with "ELFREDA" at L8 buoy, where she had been ordered to rendezvous at 0630.*

*An underwater explosion was observed at 0650 in close proximity to "PYLADES" stern and at 0703 "COCKATRICE" (the nearest ship) was ordered to pick up survivors. "PYLADES" was estimated to be about 1 mile north of A8 and bearing 140° about two miles from "ORESTES".*

*Between 0652 and 0737, 4 Human Torpedoes were sighted by "ORESTES" and attacked as follows...."*

The remainder of the report describes the actions taken by ORESTES however the Human Torpedoes are described as follows;

*"The Human Torpedoes appeared to be about the same dimensions as a 21 inch torpedo or possibly smaller, and the pilot sat astride with his head and shoulders covered by a transparent dome. All torpedoes were travelling in an easterly direction at an estimated speed of not more than 5 knots."*

The crew reported two explosions astern, following which the ship sank. The captain's report stated that the damage was most likely caused by two mines.

A survey of the wreck as part of British TV Channel 4's programme 'Wreck Detectives' underwater archaeological TV series indicated that the damage was actually caused by torpedo attack. Given the date of the sinking these must have been launched from German Marder or Neger mini submarines, which were the only German torpedo capable units at sea at the time of the attack.

## 5.10 A Personal Account of the Loss of PYLADES.

The following is a personal account of Mr Stan Parker a Radio Operator and recorded on the 18 August 2005 for WW2 people's war gathered by the BBC. Stan Parker also recorded an oral history of his time in the Royal Navy available from the IWM Oral History Collection<sup>22</sup>.

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<sup>22</sup> <https://www.iwm.org.uk/collections/item/object/80024854>



*"My name is Stan Parker,*

*At the age of 18 (Feb 1943), I joined the 'Royal Navy' and after my training went to America to pick up a new minesweeper and returned to England as a Crew Member of 'PYLADES'.*

*We arrived off Normandy (France) on 14 June 1944. Our duty was to sweep for mines.*

*On Saturday the 8 July 1944 at 6.50am the ship was under weigh. I was ordered to the radar shack to prepare the set for use. It started operating but an explosion on the stern put it out of action.*

*The explosion stopped the ship and it listed badly to port and 10 minutes later, we were struck by a second explosion after which we started to sink rapidly. The bow's lifted sharply. The Captain then ordered 'Prepare to abandon ship', within minutes he ordered 'Abandon ship' and the crew that was left jumped into the sea.*

*We swam around for quite some time until we were picked out of the sea by the crew of HMS Cockatrice, another minesweeper. As we left HMS Cockatrice, a young seaman gave me a poem that he had put together in the short time we were on board. HMS Cockatrice then took us to another ship the 'Southern Prince' after feeding us they put us ashore so we could find a landing craft to take us back to Portsmouth. We arrived at Portsmouth at midnight Saturday 8 July 1944."*

*The divers who found the wreck of HMS Pylades, without any doubt confirmed that it was hit by 2 German 'Neger' Human Torpedoes. We lost eleven men.*

**In the poem (below) the 'Cato' and 'Magic' were sister ships to the Pylades.**

**No marble tombstone will mark the place  
No cross above their grave  
Three small dots on the pilots chart  
Three buoys to ride the waves**

**There down below in a watery grave  
Their going so sudden, so tragic  
But we that are left remember their name  
The Pylades, The Cato, The Magic**

**Mourn for those who in freedoms cause  
With their young lives have paid  
Weep not for pals below these marks  
That a hidden foe once made**

*For they are not dead whose spirit lives  
With their young lives have paid  
We will not forget they died for us  
We will remember them*

*When the day of judgement claims each soul  
And each stand before the throne  
There will be sinner, saint all standing there  
Each soul to stand alone*

*Our pals will march in pride  
For the greatest judge of all will know  
T'was for freedoms cause they dies  
En passant  
Pylades, Cato, magic we salute you as we pass  
As you your duty nobly done  
May we is all we ask.*

It is an observation that so many veterans have found poetry to be so important and a great solace at a time of great tragedy. Our other Normandy project for 2018 (No Roses on a Sailor's Grave) also features a poem about sailors lost at sea.

## 6 Project Results – Wreck Surveys

### 6.1 The Wreck Sites

From our base at Ouistreham we managed diving on every day of the six days allocated to the project. Despite the possibility of two dives a day the tides were not in our favour and so we were restricted to one dive on each of the sites. This was mainly due to the inability to launch the boat at low water due to there being no extended slipway into the outer harbour. The only other options were beach launch which required a tractor or use the lock system which again proved difficult to coordinate timings with diving operations.

Target	Latitude/Longitude	Depth	Comment
Contact 374	49 24.70782N : 0 15.464W	26m	HMS MAGIC Minesweeper
Contact 549	49 25.593N : 0 15.058W	27m	HMS PYLADES Minesweeper
Contact 362	49 24.528W : 0 17.226W	22m	Wreck possibly HMS CATO?
Contact 551	49 25.086N : 0 19.068W	21m	HMT Gairsay Trawler?
Contact 550	49 25.038W : 0 17.976W	23m	HMS Lord Austin (Possibly)

Figure 33 Wreck site position information.

Dives were successfully carried out on 4 of the 5 wrecks listed above. There was not an opportunity to dive Contact 551 (HMT Gairsay).

### 6.2 Charted Position of Wrecks

The following images illustrate the wreck positions on a modern SHOM navigation chart and also their positions on the WW2 Anchorage plan.

In figure 35 we can see the original anchoring plan overlaid on a modern GIS system, from this we can work out where ships are now relative to historical positions.

CATO is at B11

MAGIC is at A7

PYLADES off the grid –

HMT Lord Austin is at A13

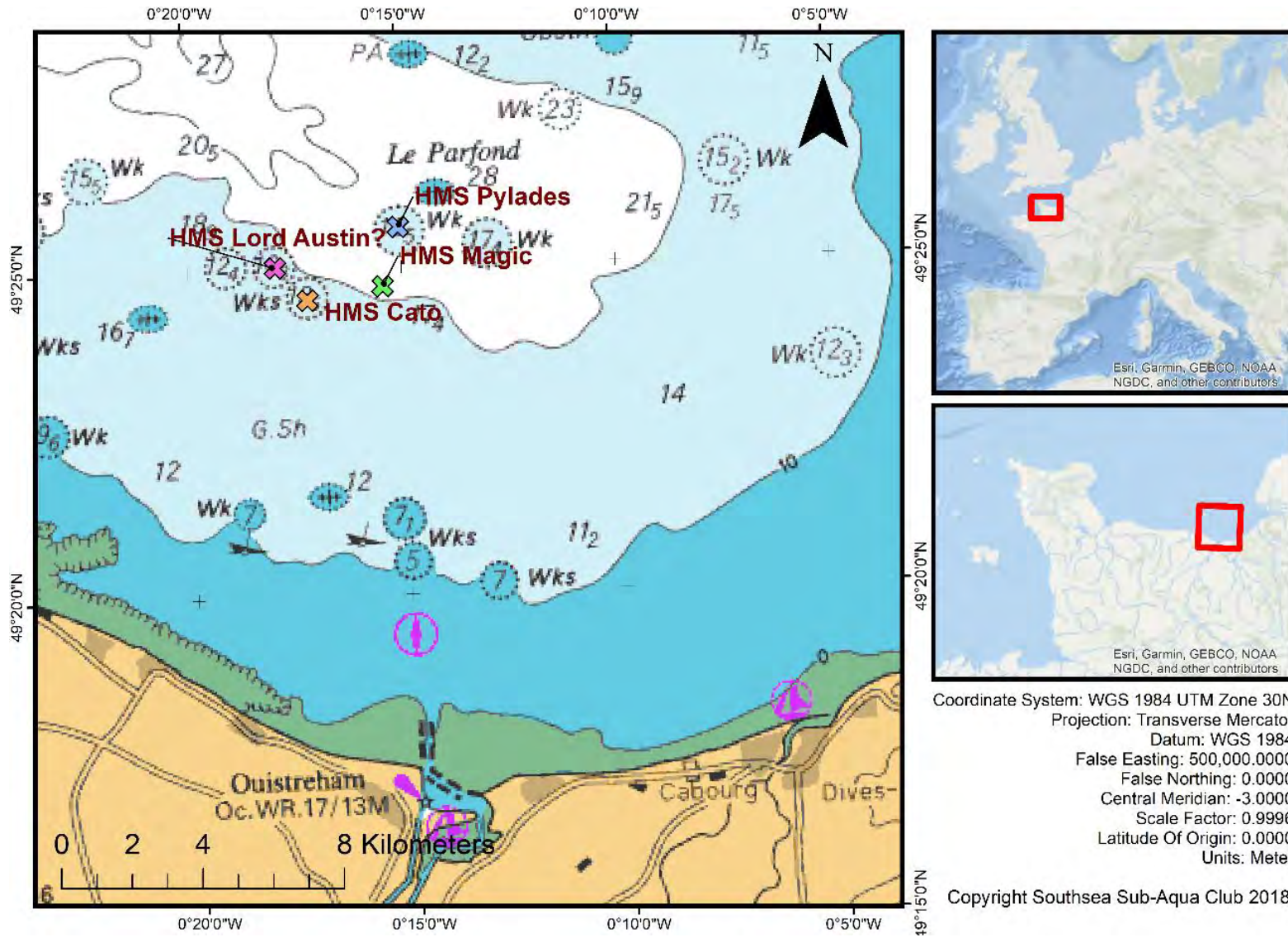


Figure 34 extract from Chart 7421 showing main positions of the minesweepers (courtesy Richard Rowley).

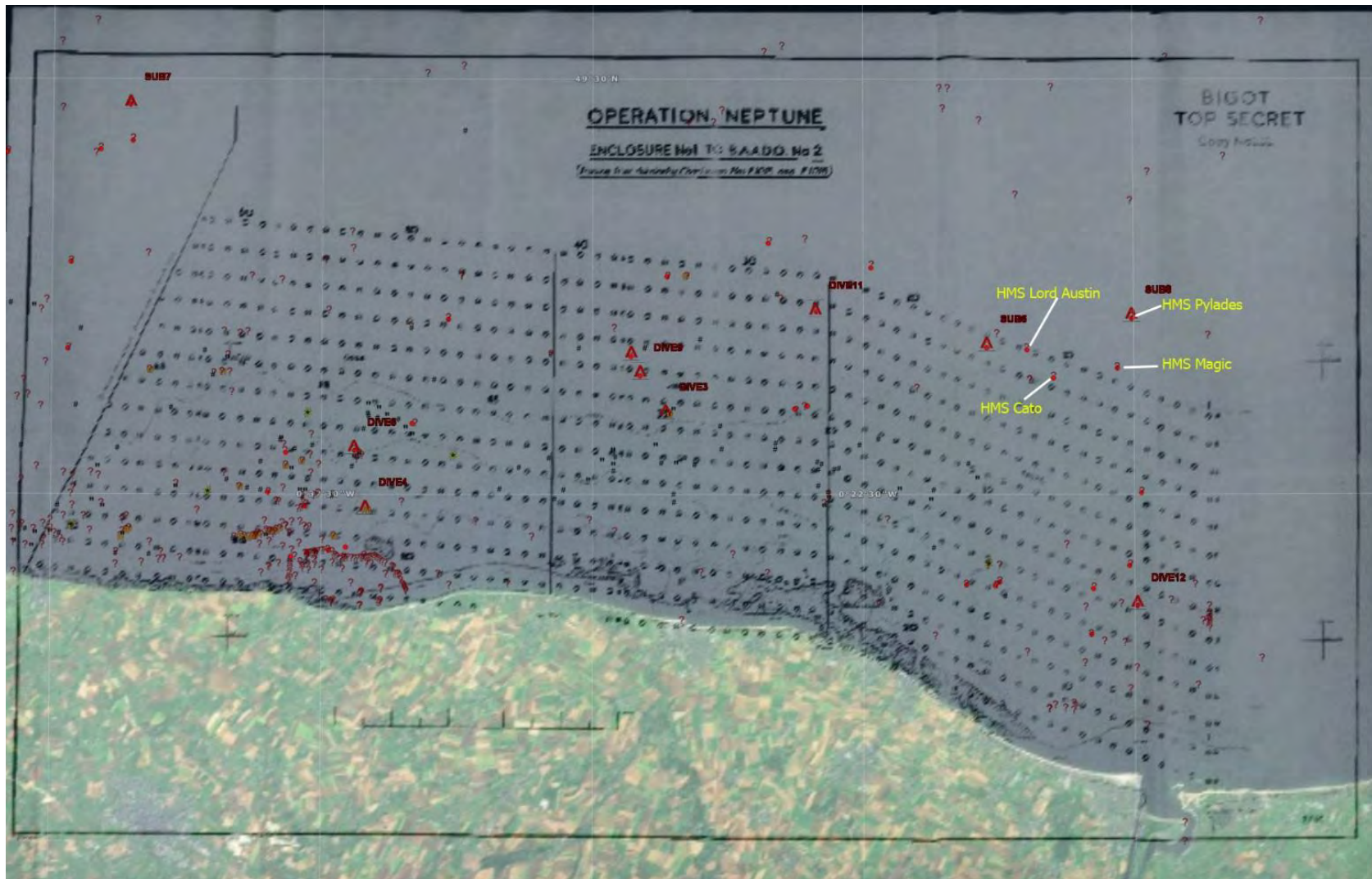


Figure 35 Anchorage plan 1944 overlaid showing where the wreck sites are in relation to the anchorage plan. (Courtesy Richard Rowley)

## 6.3 HMS PYLADES

Identified initially as Contact 549, this wreck of PYLADES was the first site visited as part of the project. The purpose of the dive was to familiarize ourselves with the class of ship and to identify distinguishing features that could be useful when visiting other wreck sites.

The wreck lies on its port side and the hull is relatively intact compared to most of the wrecks in the area. The hull plates have disintegrated in many places which gives an insight into the inside of the ship. Visibility on the dive was poor only 1-2m and very dark. The water had high turbidity and torches were required to see any detail of the wreck.

The charted depth of the wreck is based on a general seabed of 24m and least depth of 16.5m at the highest point.

We dived on high water. The maximum depth recorded on the dive was 31m (scour). The highest point recorded was 27m.

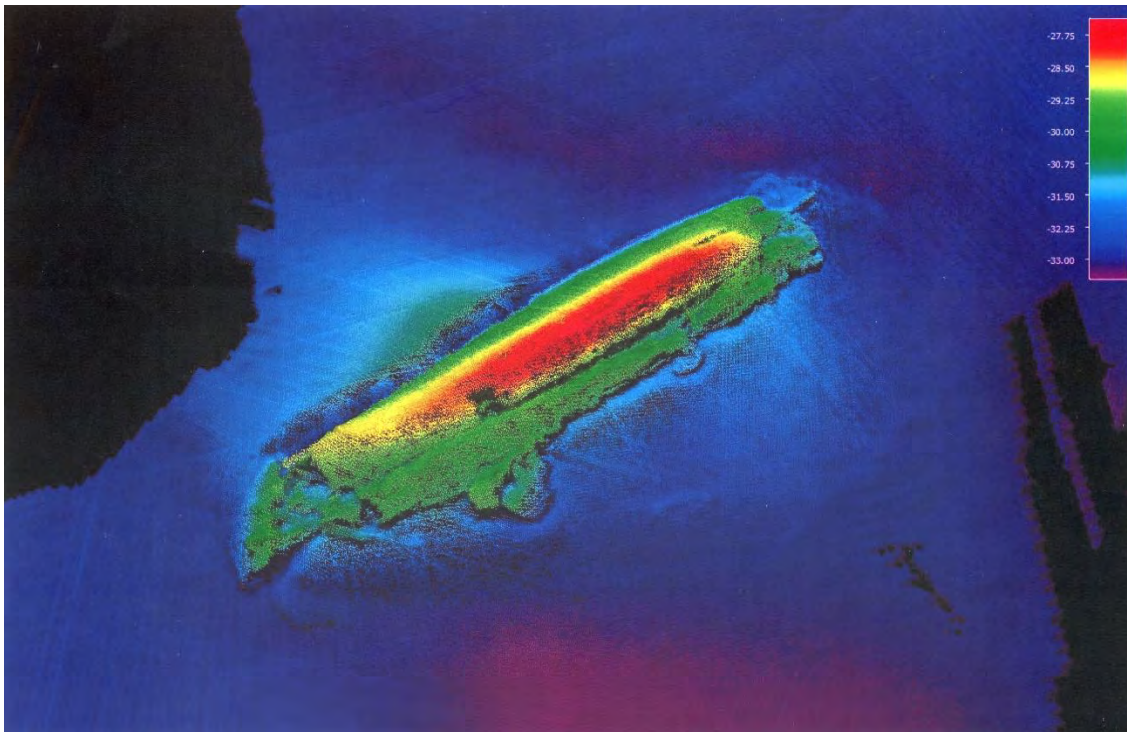


Figure 36 PYLADES multi-beam image courtesy of DRASSM (EA3118).

The wreck is orientated at 45°/ 315°. The wreck is recorded to be 67m long by 9.8m wide.



Figure 37 the outer hull plating has begun to erode away ©Martin Davies

The image above shows the extent of the weakening of the outer hull plates, a lot of the plating is very thin and dissolving quickly without the protection of being heavily concreted. The exposed red rusted steel is visible in many places.

One pair of divers did make it towards the bow area and there were two significant observations were made. The first was an unusual elliptical shape on the hull itself which would have been below the water line and can be seen in the image below. This object appears to be part of the electronics equipment and was probably part of the ASDIC acoustic sonar equipment that was fitted to more modern minesweepers. It is assumed that this would have been an American version fitted at the time the Auk minesweepers were built.

Measurements were taken it was 1.3m long and 0.58m at the widest point. The elliptical shape stood 0.45m high from the hull. See image below.



Figure 38 the elliptical metal shape on the hull (ASDIC) ©Martin Davies



Figure 39 measurement being taken of the ASDIC mount ©Martin Davies

The other notable observation was one of the ship's anchors which was still stowed in place on the starboard side of the hull as seen in the image below.





Figure 40 starboard anchor still in place ©Martin Davies



Figure 41 HMS PYLADES, degaussing cables. (Martin Davies)

Returning along the outer hull there were breaks in the fabric of the ship and some of the ship degaussing wire was observed, unsupported and hanging down (see above).

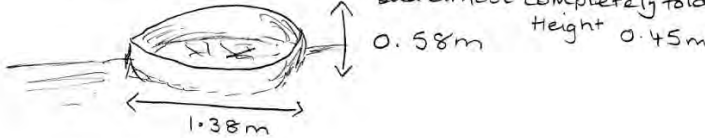
Whilst we had planned to spend time on the wreck and use it as a familiarization exercise, the poor conditions made it difficult for us to achieve our objective. We found some distinguishing features but not as many as we had wished for during the dive. Some basic notes were made and measurements taken and they can be seen below.

1/7/18 TARGET 549 (HMS PYLADES) SHOM 14590128.

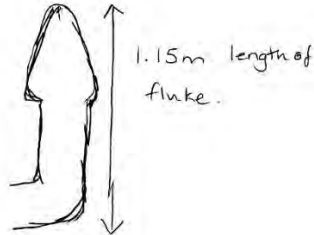
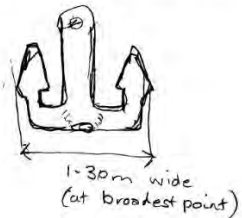
6° 49' 25.602 N 000° 15.04986 W DEPTH 31m

Visibility < 2m Water temp 17°C

Wreck hull was the highest point some 5m above sandy sea bed. The Asdic mounting was visible as we moved forward towards the bow. There was damage to the side of the ship just above the anchor which was consistent with an explosion from within, ie metal bent outwards and almost completely folded back.



ANCHOR - IN HAWSER



Alison Mayor  
Martin Davies  
1/7/18

Figure 42 Notes and sketches following the dive on HMS PYLADES. (Alison Mayor)

## 6.4 HMS MAGIC

The overall impression of the wreck of MAGIC can be seen from the multi-beam image below. The wreck is not as complete as that of PYLADES with significant damage to the stern area. The bow has broken from the main hull structure.

The wreck site is 66m long by 14m wide and lies east / west, with the bow to the east.

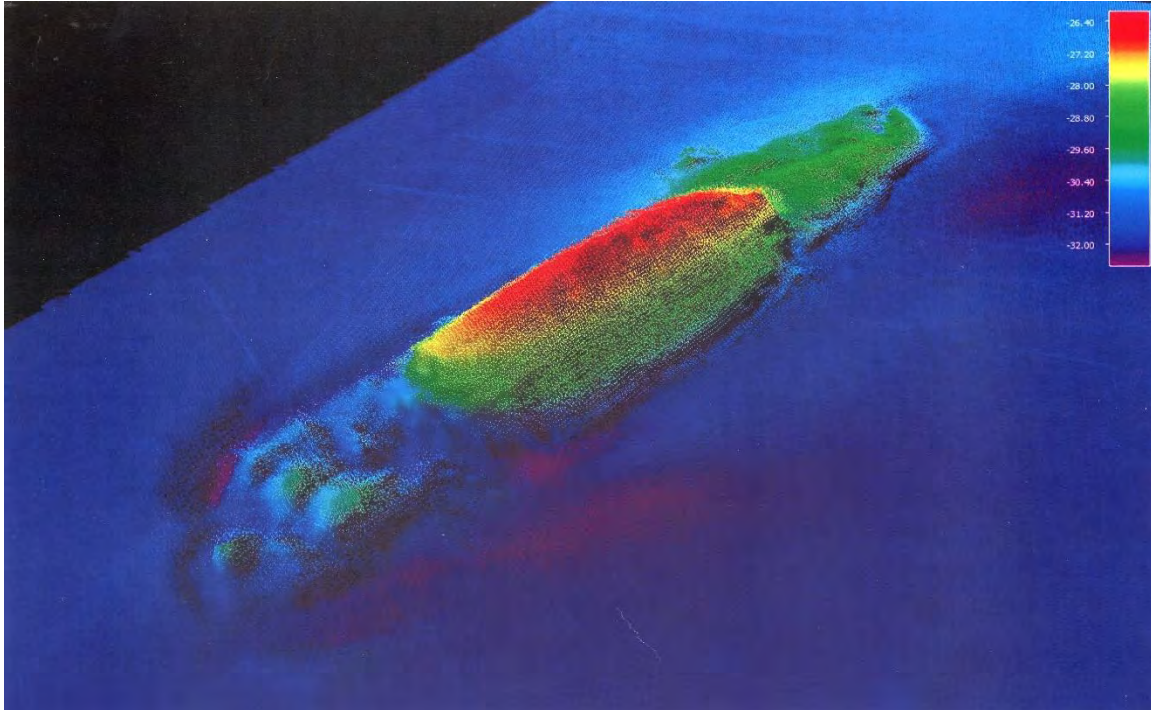


Figure 43 multi-beam image of MAGIC (EA3236). Courtesy of DRASSM

The wreck is mostly complete though upside down on the port side.

The top of the upturned hull being the highest point at 26m. The condition of the upturned hull is similar to that of PYLADES in that there are many access holes in the hull due to erosion of steel plating.

Visibility was again poor 1-2m and dark, torches were required to illuminate detail of the wreck.



Figure 44. Numerous holes in the plating are visible along the length of the upturned hull ©Martin Davies

There appears to be two distinct areas of damage, the bow is broken away from the main hull section and the other area of damage is at the stern. The main section of the ship is relatively intact.

The vessel according to historical records was only hit by one human torpedo 'just aft amidships' towards the stern. The wreck is broken in this area and this is consistent with the accounts of the torpedo hitting MAGIC towards the stern and of her sinking stern first. There were no obvious signs that significant commercial salvage had taken place and it is assumed the engines remain in the main hull structure.

There is some evidence of the propeller shafts or part of them in this area and the main recognizable feature at the end of the wreck is one of the rudder posts still upright with the remains of a rudder visible.



Figure 45 Possible a section of one of the propeller shafts ©Martin Davies

Moving forward over the hull some of the internal frames and bulkheads of the ship were still clearly recognizable. Some internal machinery was visible.



Figure 46 one of the internal frames now exposed ©Martin Davies



Figure 47 forward magazine with racks of 20mm ammunition ©Martin Davies

Moving forward towards the bow there is another area where there is a distinct break in the main hull and this area is exposed. It is unlikely the damage was caused by a torpedo as this would have triggered a large explosion and the damage would have been much worse. The fact that there are many boxes of 20mm ammunition neatly stacked suggests an alternate theory for the damage.

The ability to rapidly record this area during the last ten minutes of the dive has made it possible to create a photogrammetric model of the forward magazine, the ammunition type is 20mm and this would have been used to supply the 20mm Oerlikon anti-aircraft guns fitted to the ship. Auk and Catherine class ships were fitted with 8 x 20mm Oerlikon anti-aircraft guns, 2 x 40mm Bofors and a single 3" 50 caliber gun. It is estimated that there were around 30 boxes of the ammunition visible the actual metal boxes have long since dissolved and what is left is now concreted together in the shape of the box that they would have been stored in.

The photogrammetry image at figure 48 consists of 114 images capturing an area 5m x 3m and from this you can see many rounds of the 20mm ammunition in a concentrated area. An image taken when we arrived in the area (figure 49) looked to show that there was some kind of racking system and what looks like ammunition can be seen on three different shelves. A 3D model has been made of the area and this can be seen by following the link below: - Due to the limitations of the file size on the site much of the detail that can be seen in figure 48 has been lost.

<https://sketchfab.com/models/efc0e49e004c4961af3a5442515fe756>



©Martin Davies 2018

Figure 48 Photogrammetry of forward magazine



Figure 49 20mm ammunition shelf (©Martin Davies)



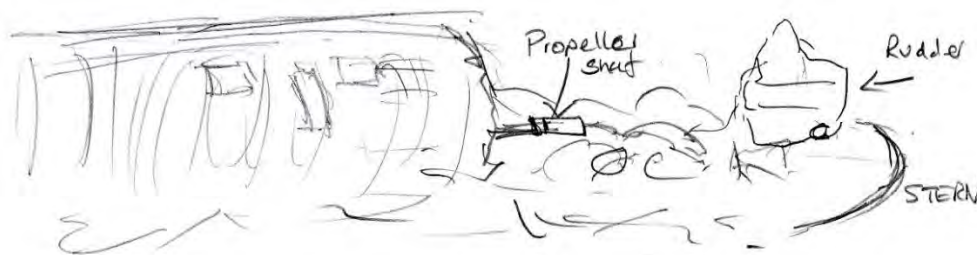
Figure 50 View of the rudder post standing upright (©Martin Davies)



2 JULY 2018 TARGET 374 (HMS MAGIC)

DEPTH 30M.

WRECK WAS AN UPTURNED HULL WITH BREAKS AHEAD OF THE STERN AND BOW. THROUGH THE GAPS IN THE HULL MACHINERY WAS EVIDENT. JUST AHEAD OF THE STERN THERE IS A GAP OF APPROX 6-7 METRES BEFORE THE RUDDER ASSEMBLY IS FOUND. IN THIS AREA WE FOUND WHAT LOOKED TO BE THE PROPELLER SHAFT.



TOWARDS THE BOW THERE WAS ANOTHER AREA WHERE THE HULL HAD COLLAPSED/WAS MISSING. IN THIS AREA WE OBSERVED A NUMBER OF RECTANGULAR BOXES. (? AMMUNITION?).

Figure 51 Notes and sketch from a dive on the wreck of HMS MAGIC. (Alison Mayor)

2 JUL 18 TARGET 374 (HMS MAGIC)

DEPTH 31 M

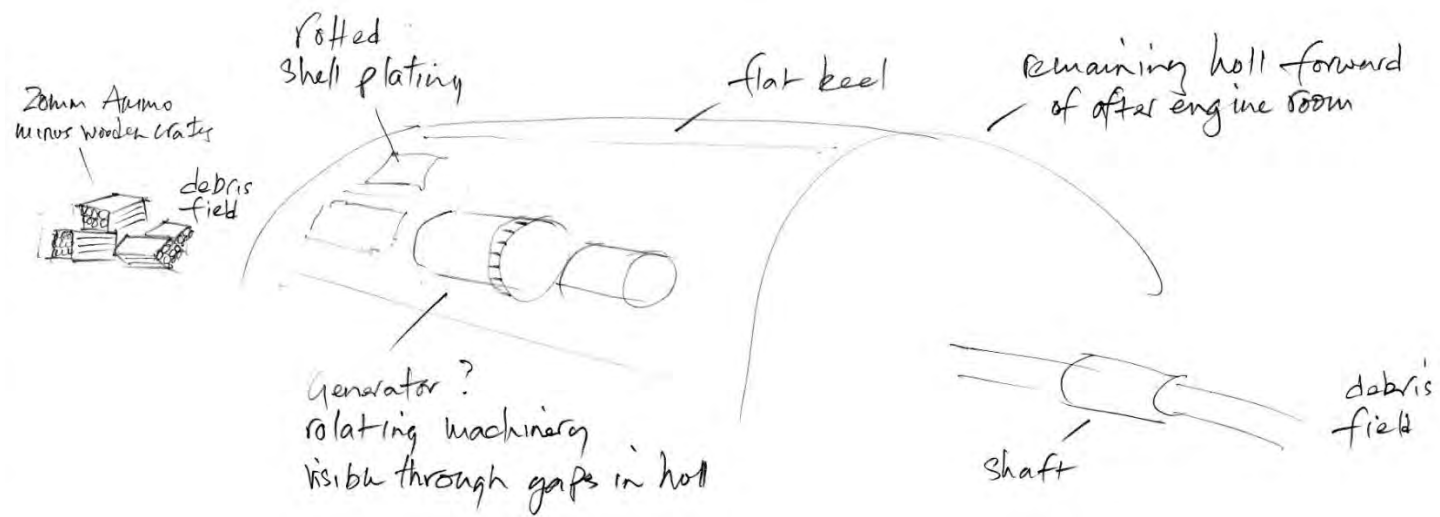


Figure 52 Sketch of the general lay out of the wreck of HMS MAGIC. (Tom Templeton)

## 6.5 HMS CATO

The wreck of CATO lies in a general seabed depth of 20m of water. The wreck is very degraded, possibly as a result of commercial salvage. Other than the distinctive bow, which rests on the port side, there was little to identify the wreck from the significant debris field.

The site is shallower than that of MAGIC and PYLADES which allowed slightly longer time on site.

The site was visited twice by the dive team. The wreck is very broken and the majority of the site is not recognizable. See below.

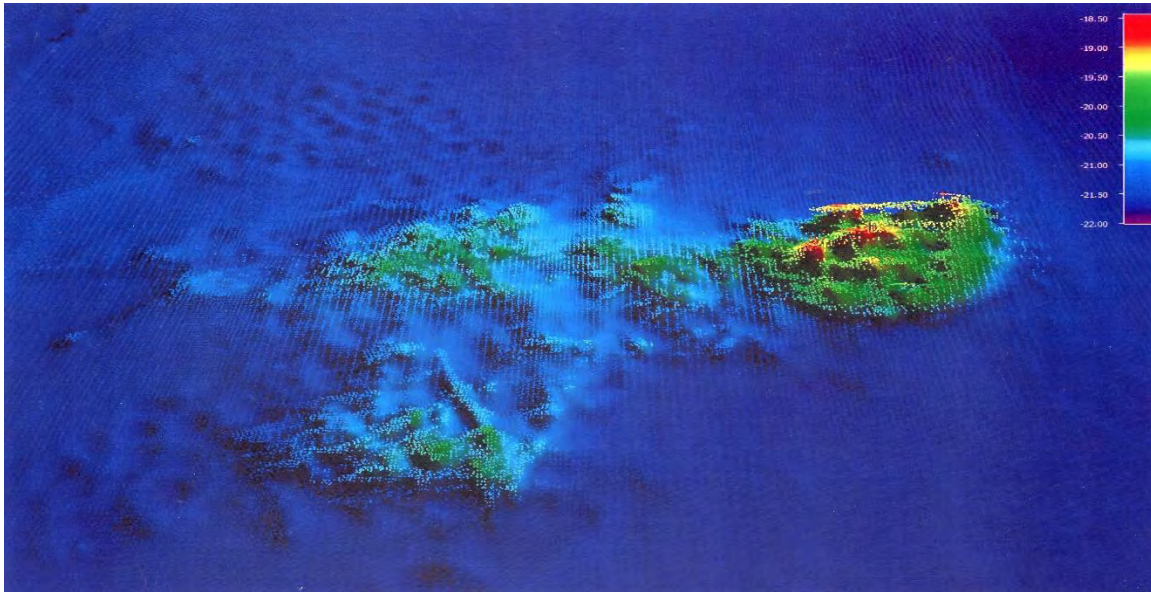


Figure 53 multi-beam image of CATO (EA3235) courtesy of DRASSM

Prior to diving there was no indication from the multi-beam of what parts of the ship's structure actually remained. The DRASSM multibeam image above clearly shows the extent of the debris field. Only one significant structure remains standing approximately 2m off the seabed.

We discovered that this highest point was the bow area and this was still relatively intact on its port side. From this piece alone we can conclude that this was an Auk/Catherine class minesweeper as it is very distinctive. The drawing below created from ship's plans was used to confirm this.

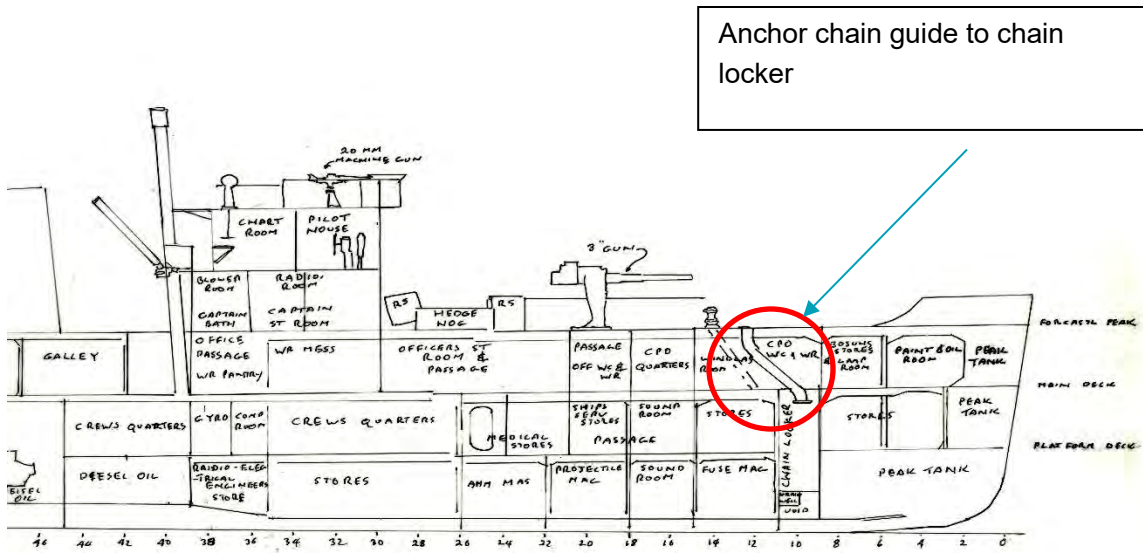


Figure 54 line drawing of the bow of an Auk class minesweeper (Robert Watkins)

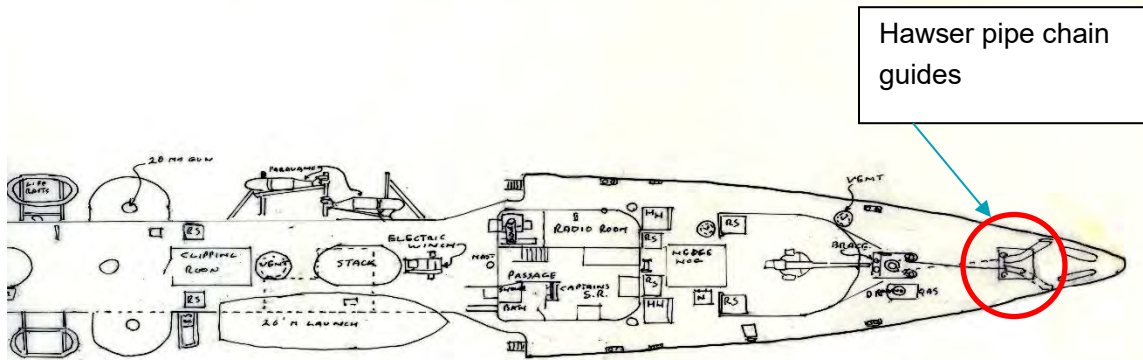


Figure 55 line drawing plan view of an Auk class minesweeper by Robert Watkins

Conditions were much better on the site than the two previous sites, the site was lighter and appeared to have better visibility 2-3m and 3-4m respectively. This has enabled the production of a photogrammetric model of the bow that can be seen in the image below.

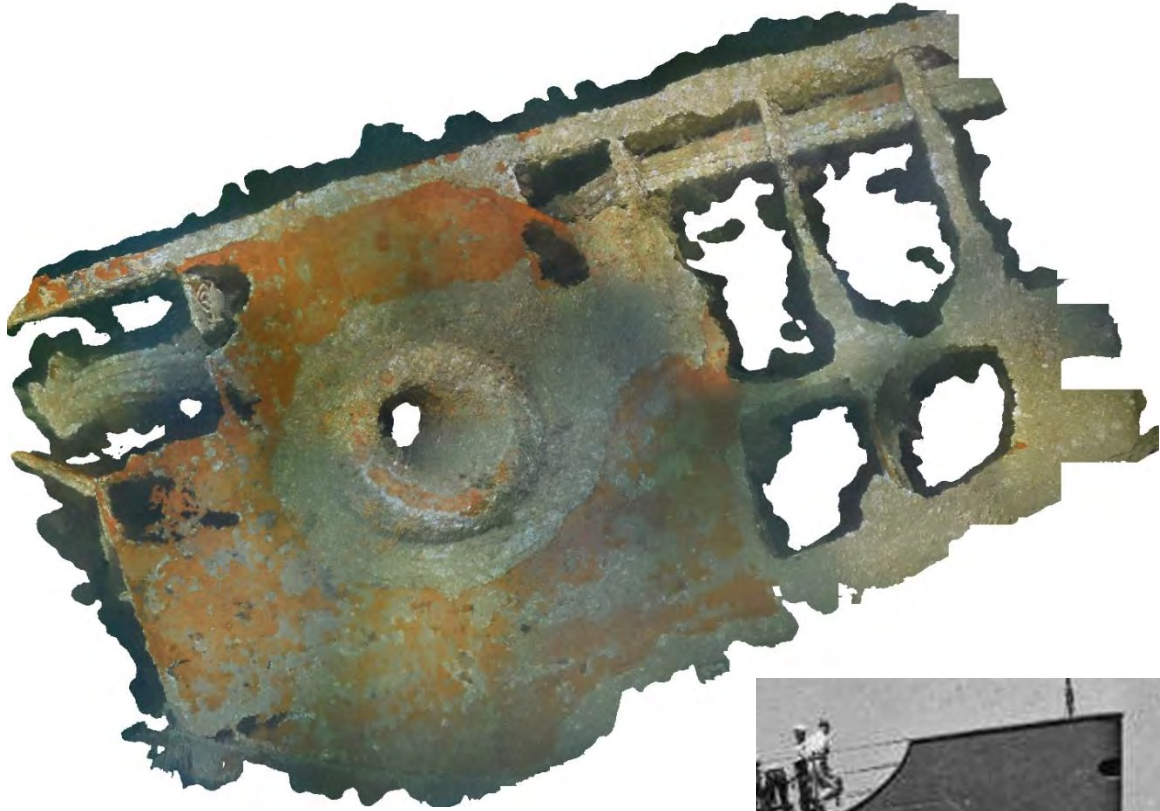


Figure 56 Photogrammetry - Starboard view of the bow ©Martin Davies Inset image of hawser and anchor at the bow of an Awk class minesweeper.

The above image clearly shows the remains and condition of the starboard side of the bow. Some exposed metal is red with rust where there is no concretion. Large holes have appeared in the hull plating where the hull material has degraded.

The hawser pipe and surrounding area are well preserved due to it being a strengthened part of the ship. No anchor was present though anchor chain was seen.

Along the top are a series of degaussing wires that ran around the top of the ship's hull the purpose was to reduce the ships magnetic signature and to offer a degree of protection against magnetic mines.

A second view of the bow can be seen below, this side view shows the true shape of the bow and many distinguishing features. A 3D model has been made of the remains and can be seen by following the link below.

<https://sketchfab.com/models/9ce50b2339c84393a38ace143fa04ded>



©Martin Davies 2018

Figure 57 Photogrammetry image showing bow, 'bull nose' and foredeck (©Martin Davies)

At the very front of the bow there is a large, distinctive oval shaped structure known as a 'Bullnose'. This would have been used as a guide for mooring ropes.



Figure 58 The Auk class 'Bullnose' - for mooring ropes.

In the images above the 'bullnose' of the ship can be clearly identified when compared to the historical image and also seen in the historical photograph of the bow of an Auk / Catherine class minesweeper.



Figure 59 main view of the remains of the bow ©Martin Davies

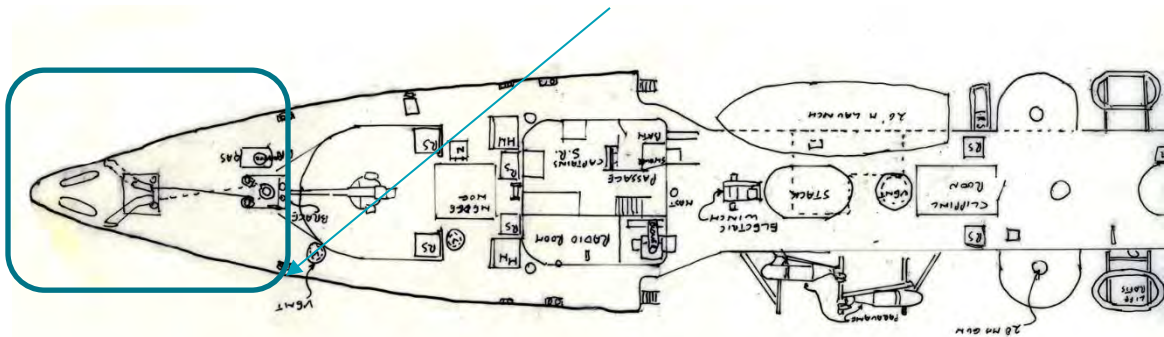


Figure 60 the marked area showing the area of the ship remaining (Robert Watkins)

In the images above you can see a comparison of the ships plans to the model and structure that remains of the ship today. Key areas noted are the bullnose, the top of the hawser pipes on the deck and only one anchor chain. Neither of the anchors were observed (though it was reported that CATO was at anchor). The anchor capstan winch was present. Also visible was the chain guide pipe through which the anchor chain would have passed to the chain locker.

We observed the starboard anchor chain coming out of the chain locker but there appears to be no anchor connected to it. The chain disappears into the seabed. This would suggest that the anchor may have been recovered at some point in time as the ship was at anchor when the sinking occurred.



Figure 61 the chain guide to and from the chain locker ©Martin Davies



Figure 62 starboard anchor chain from the chain locker ©Martin Davies





Figure 63 the anchor chain capstan winch ©Martin Davies



Figure 64 the bullnose of the ship ©Martin Davies



Figure 65 Photogrammetry image - side view of the bow of the wreck which rests on the port side. (©Martin Davies)

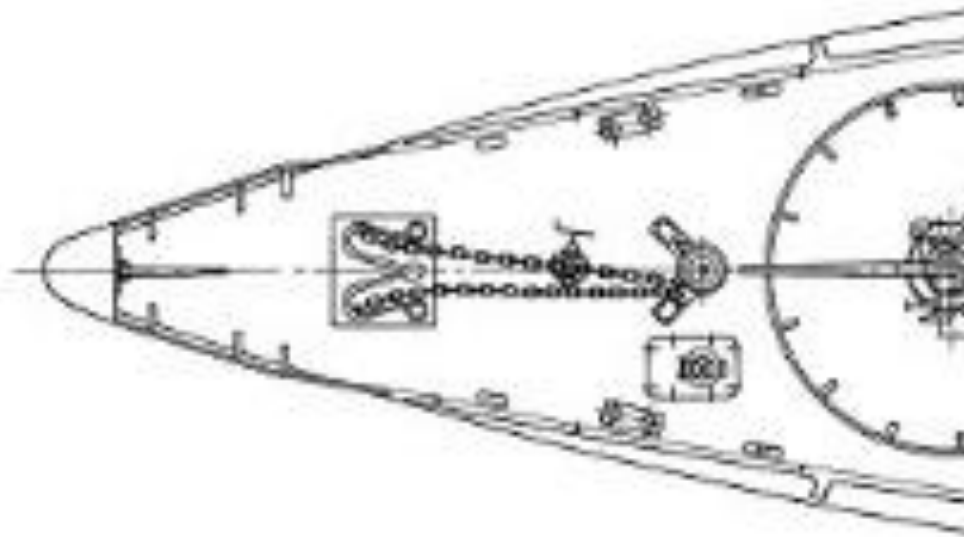


Figure 66 sketch of the upper deck at the bow. (Robert Watkins)

## 6.6 HMT Lord Austin

For our last dive we visited the wreck of HMT Lord Austin (FY220). This wreck was selected for the project in the event that the wreck thought to be CATO was found not to be an Auk/Catherine class minesweeper.

Built in 1937 by Cochrane and Sons in Selby HMT Lord Austin was a civilian fishing trawler that was requisitioned by the Royal Navy in 1939 to take part in WW2. She was officially an ASW (Anti-Submarine Warfare) trawler. She was steam powered and displaced 473 tons.

HMT Lord Austin was lost on 24 June 1944. A survivor account recalls at 0550 the ship was steaming at full speed engaged in duties associated with PLUTO when a mine went off which blew off the stern. The ship sank in under 10 minutes and 9 of the crew were lost.

A single dive was done on this site known as HMT Lord Austin, this consisted of a wreck site in 3 parts, as seen below.

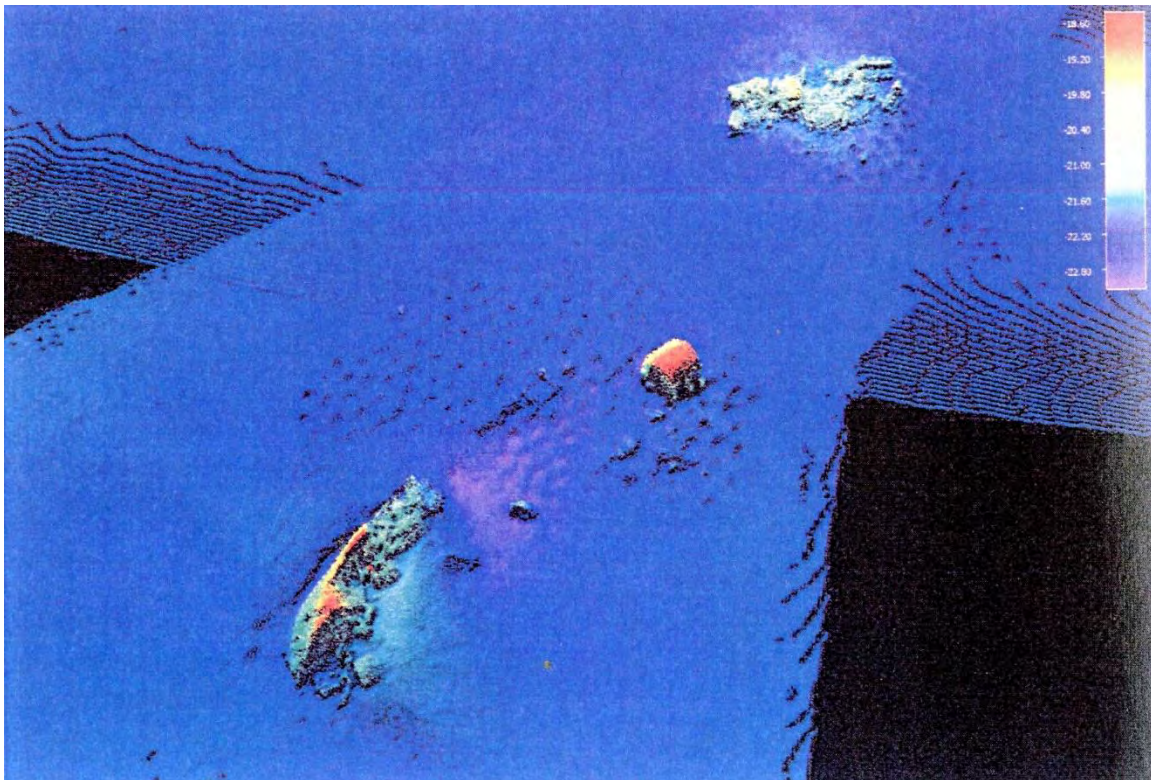


Figure 67 the wreck site known as Lord Austin, multi-beam courtesy DRASSM

The site is spread over a distance of around 85m by 15m, there are 3 distinct parts to the site; the bow, and then a gap followed by a single standalone boiler, another gap and then the stern area.

If this ship is the wreck of Lord Austin, then the ship has been broken in three parts by the mine explosion on the 24 June 1944, the wreck is devastated but there are some recognizable parts of the structure still in place, - see below. The images below represent dives on the boiler and the stern area where, visibility was poor 1-2m at best. Time was limited so no detailed investigation was done to confirm the site.

The site would warrant more time and more dives to investigate in greater detail. From the visit we can confirm that the vessel was engaged in Minesweeping activities due to the winch gear on the stern which precisely matches some of the archive pictures of the day as seen below.



Figure 68 detail of the boiler construction ©Martin Davies



Figure 69 Propellor shaft and propeller blade ©Martin Davies



Figure 70 Heavy trawl winch used for minesweeping activity ©Martin Davies



Figure 71 Detail of buoyant minesweeping electric cable ©Martin Davies



Figure 72 Archive image of buoyant electric minesweeping cable in use ©unknown

The image above shows a large diameter winch carrying the buoyant electric cable that was used in minesweeping operations by vessels such as Lord Austin. From the information we have so far this vessel looks more like a minesweeper than an ASW trawler. - Although research to date has shed little light on ASW and Anti-Submarine vessels so this could be the basis for a more detailed investigation and a future project.

## 7 Conclusion

The survey team enjoyed the challenge of this project very much. Despite limited time on site and difficult conditions the dives on the wrecks of PYLADES and MAGIC gave us a good understanding of the Catherine Class minesweeper and some key features. Our findings and conclusions are as follows;

- 7.1. Sadly, very little is left of the CATO wreck site structurally and the bow remains the only truly distinguishable and recognizable feature. We can confidently say that this is the bow of an Auk/Catherine class minesweeper as it accurately matches that of the plans of the ship in particular the bullnose, hawser, capstan winch and other deck fittings.
- 7.2. According to the historical record CATO was hit by a single German Human Torpedo (Neger) and took between 90 mins and 150 minutes to sink, implying that the damage was not catastrophic as was the case for MAGIC. Various eyewitness accounts state when the vessel lost stability and turned over, the hull from amidships the stern was undamaged and the vessel went down as a whole.
- 7.3. However the wreck of CATO is significantly degraded compared to the accounts of her loss. PYLADES and MAGIC were hit with a similar weapon and as can be seen from the multi beam imagery they are much more complete and intact. This indicates that the wreck has been extensively salvaged leaving only the bow section relatively intact.
- 7.4. The historical accounts suggests that the ship sank intact and sank slowly somewhere in the timeframe of 90 minutes to 150 minutes. The ship had re anchored in the vicinity of A9 berth after helping with the rescue of men from MAGIC.
- 7.5. Looking at the actual position of the wreck site and superimposing the anchorage plan over the position the wreck is closer to berth B11. This would indicate that the wreck site is over a mile from the historical recorded position. This position also questions whether CATO was at anchor (A9) when hit. If she had weighed anchor and drifted with the tide then she would be closer to A5/6 as the tide had turned and was running in an easterly direction after 05.00.
- 7.6. The case for salvage is also strengthened by the fact that the wreck is shallower and closer to the port of Ouistreham and therefore is more accessible to salvers.

Therefore our logical hypothesis is that the site is that of an Auk/Catherine class minesweeper, likely to be that of CATO. However without physical evidence of the wreck's identity there is a remote possibility that the wreck could be MAGIC, or even PYLADES.

To summarise the wreck site at the current position quoted to be CATO is an Auk class minesweeper bow. There is no doubt about that as it is a direct match to the ships plans. From a positional point of view it is not in the correct position and it does not tie in with the historical accounts of the day. As the ships had a mix of experienced and inexperienced Commanders and crew there is a possibility that the recorded positions are wrong. The positions quoted by

all Commanding Officers were based on paper charts and dead reckoning coupled with line of sight position fixing, and possibly even using transits.

We will never know for sure that this is the site of CATO, but we do know that the remains are of an Auk/Catherine class minesweeper.

Our project CATO has told the story of 3 sister ships lost to German human torpedo craft within hours of each other. They sought to defend the naval forces at the eastern end of the Northern Defence Line. Maintaining a clear route through the hazard of mines was key to the successful Allied invasion and subsequent sustainability of supply routes.

Some of the crew from HMS MAGIC survived the tragedy of her sinking only to be dealt the cruel fate of becoming a casualty of HMS CATO.

More than 60<sup>23</sup> men are believed to have lost their lives as a result of the 3 German human torpedo attacks. We are pleased to tell their story and honour their loss.

Southsea Sub-Aqua Club members are keen to receive any information about the loss of the CATO or her sister ships MAGIC and PYLADES. If you would like to share information or find out more about this project please contact Martin Davies as follows;

Southsea Sub-Aqua Club,  
Portsdown Hill Road,  
PORTSMOUTH,  
Hampshire  
PO6 3LS  
UK  
Or via email  
[Martin@indepthphotography.co.uk](mailto:Martin@indepthphotography.co.uk) .

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<sup>23</sup> 26 from MAGIC, 25 from CATO and 11 from PYLADES



## Appendix 1



Liberté . Egalité . Fraternité

RÉPUBLIQUE FRANÇAISE

## MINISTÈRE DE LA CULTURE

Arrêté du 28/03/2018 n° 2018 – 27

Relatif à une opération d'archéologie sous-marine

OA 3331

000392

Direction  
générale  
des Patrimoines

La Ministre de la Culture,

Département  
des Recherches  
Archéologiques  
Subaquatiques et  
Sous-Marines

Vu le Code du Patrimoine ;

Considérant la demande présentée par M. Martin DAVIES, le 27/11/2017 ;

Affaire suivie par  
Cécile SAUVAGE

Arrête

Poste

**Art. 1** – M. Martin DAVIES est autorisé à procéder, en qualité de responsable scientifique, à une opération archéologique d'identification de biens culturels maritimes, avec plongée humaine et utilisation de matériel spécialisé, à compter du 01/07/2018 jusqu'au 07/07/2018.

Références

DRASSM  
147, plage de l'Estaque  
13016 MARSEILLE  
(France)  
Tél. +33 (0)4 91 14 28 00  
Fax +33 (0)4 91 14 28 14  
le-drassm@culture.gouv.fr

- Façade maritime : Manche
- Département : Calvados (14)
- Commune : Ouistreham (14)
- Intitulé de l'opération : Projet Cato - 2018
- Coordonnées géographiques (rayon de 200 m autour de chaque point mentionné ci-dessous) :
  - 49° 24.5285' N / 00° 17.2246' O [EA 3235]
  - 49° 24.7078' N / 00° 15.4526' O [EA 3236]
  - 49° 25.6021' N / 00° 15.0498' O [EA 3118]
  - 49° 25.0388' N / 00° 17.9590' O [EA 4636]
  - 49° 25.0765' N / 00° 19.0743' O [EA 3107]
  - 49° 25.263' N / 00° 12.947' O [Shom 14590132]
  - 49° 24.467' N / 00° 17.888' O [Shom 14590582]
- Numéro de la carte marine : 7421 (SHOM)
- Profondeur : 30 m maximum

**Art. 2** – Conformément à l'article L. 532-8 du Code du Patrimoine, l'opération est exécutée sous la direction effective du titulaire de l'autorisation et placée sous sa responsabilité.

**Art. 3** – L'opération est effectuée sous le contrôle du Directeur du Département des recherches archéologiques subaquatiques et sous-marines, qui prescrit toutes mesures qu'il juge utiles pour assurer le bon déroulement scientifique de l'opération.

Le titulaire de l'autorisation doit présenter, à toute demande des autorités compétentes, une copie de ces documents.

Le titulaire de l'autorisation tient régulièrement informé le Directeur du Département des recherches archéologiques subaquatiques et sous-marines de ses travaux et découvertes. Il lui signale immédiatement toute découverte importante de caractère mobilier ou immobilier. Les mesures nécessaires à la conservation de ces vestiges doivent être prises après son accord.

A la fin de l'opération et **avant le 1<sup>er</sup> décembre**, le titulaire de l'autorisation adresse au Directeur du Département des recherches archéologiques subaquatiques et sous-marines, en double exemplaire plus une version numérique, **un rapport final d'opération** accompagné des plans précis, des photographies nécessaires à la compréhension du texte et d'un résumé illustré destiné au *Bilan scientifique du Drassm*. Le contenu de ce rapport devra être conforme au document de *Recommandations pour le rapport final d'opération dans le domaine public maritime* transmis au responsable de l'opération.

Les coordonnées géographiques mentionnées dans le rapport devront être exprimées en WGS 84 (degrés minutes décimales). Enfin, les archives éventuellement consultées seront indiquées et des copies des éléments pertinents seront jointes au dossier et indexées. Le rapport indiquera aussi les études complémentaires à envisager.

Il est attendu que le contenu et la présentation du rapport soient soignés, notamment dans le rendu des textes et illustrations.

L'ensemble des documents relatifs à l'opération (notes, photographies, relevés, correspondances, etc.) est remis au Directeur du Département des recherches archéologiques subaquatiques et sous-marines aussitôt que sont rédigés les rapports, notes ou publications scientifiques sur les recherches effectuées.

#### **Art. 4 – Prescriptions particulières à l'opération :**

Cette opération d'identification de biens culturels maritimes a pour but de poursuivre la documentation de quelques vestiges maritimes du Débarquement de Normandie. La même équipe a déjà conduit une opération similaire en 2017 sur des épaves du banc du Cardonnet (OA 3331). Il s'agit notamment de voir s'il est possible de confirmer ou d'infirmer les identifications respectives de trois épaves de dragueurs de mines jusqu'à présent inventoriés dans la carte archéologique nationale comme le HMS Cato [EA 3235], le HMS Magic [EA 3236] et le HMS Pylades [EA 3118]. La documentation de 4 autres sites est envisagée [EA 4636, EA 3107, Shom 14590132 et Shom 14590582].

Ces sites ont fait l'objet de recherches antérieures, dont les plus récentes sont celles menées en 2017 par le Drassm [OA 3136]. Les levés réalisés en 2017 sur ces sites au sonar multifaisceaux ont été transmis pour information au porteur de l'opération. Lors de la campagne 2018, l'équipe devra confirmer l'identification de ces sites (typologie des vestiges et, lorsque cela est possible, identification exacte du site) par le biais de plongées d'expertise et d'une confrontation entre les données de terrain et les données d'archives.

Par ailleurs, l'opération permettra d'assurer une documentation plus fine de ces sites. Ainsi, au cours des plongées, un maximum d'informations sera recueilli sur les sites : dimensions, nature des vestiges, enfouissement, degré de conservation, etc. **Chaque site fera a minima l'objet de la rédaction d'une fiche épave**, en vue de préciser l'inventaire (carte archéologique nationale). Le propos devra s'appuyer sur des prises de mesures ainsi que la réalisation de croquis et de photographies.

L'utilisation ponctuelle d'un sondeur ou d'un sonar à balayage latéral est autorisée sur ces sites afin de compléter l'imagerie qui pourra être acquise par photographie sous-marine.

Les photographies réalisées pourront également servir à la réalisation d'une photogrammétrie 3D des sites étudiés.

#### Concernant le mobilier archéologique :

**Aucun vestige archéologique mobilier ne sera prélevé lors de cette opération.**

#### Concernant les conditions d'intervention :

Les interventions s'effectueront conformément au *Manuel des procédures de sécurité en milieu hyperbare applicable aux activités placées sous le contrôle du Drassm* (manuel téléchargeable sur le site du ministère chargé de la Culture :

<http://www.culturecommunication.gouv.fr/Politiques-ministerielles/Archeologie/Archeologie-sous-les-eaux/Documentation-scientifique>).

Il est notamment rappelé que **seuls les participants disposant d'un certificat d'aptitude à l'hyperbarie (minimum classe I) valide et à jour de leur visite médicale**, sont habilités à participer à cette opération.

**Art. 5** – Le titulaire de la présente autorisation se conformera strictement aux prescriptions émises par le Préfet Maritime de la Manche et de la Mer du Nord, qui sont annexées au présent arrêté.

**Il est notamment tenu de signaler, sans délai, au Centre des Opérations Maritimes de Cherbourg toute découverte ou suspicion de munition ou d'élément explosif via le CROSS Jobourg (VHF 16 ou téléphone 196) ou le sémaphore de Villerville (VHF 71).**

**Art. 6** – Le Directeur du Département des recherches archéologiques subaquatiques et sous-marines est chargé de l'exécution du présent arrêté.

Pour la Ministre et par délégation,

**Le directeur du Département des Recherches  
Archéologiques Subaquatiques et Sous-Marines**  
  
**Michel L' HOUR**

*Copie :*  
*- Préfet maritime de la Manche et de la Mer du Nord*