



# World War I Underwater Cultural Heritage in the Belgian part of the North Sea: A Preliminary Overview

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In the autumn of 1914, the western front of World War I came to a standstill. At the northwestern end of this frontline, the Belgian army and its allies relied on their defensive infrastructure formed by the river Yser, and the associated inundation of the adjacent coastal plain. This strategy prevented the German troops from crossing this river and reaching the French Channel harbours.

The occupied part of the Belgian coast, 30 km in length and squeezed between the western frontline reaching the coast at Nieuwpoort and the Dutch border, lay at the doorstep of Great Britain's harbours, supply routes and fleet, and it would not take long before the Germans established naval bases in Bruges, Zeebrugge and Ostend, from which they could efficiently attack the enemy at sea. In the meantime, the occupied part of the Belgian coast was strongly fortified with a special focus on the harbours. A very well preserved example of a coastal defensive battery (the battery 'Aachen') can still be visited at Raversijde (Ostend, Belgium).

This paper presents the most important information related to the underwater cultural heritage present in the Belgian part of the North Sea. The following topics are discussed: German U-boats, operations of minelaying, WWI aircraft remains and the British raids on Ostend and Zeebrugge. The paper concludes with a discussion of the overall picture related to WWI underwater cultural heritage present in Belgian waters and its significance to society.

## **U-boats of the so-called 'Flottille Flandern'**

At the onset of the war, Germany had only one type of submarine available, the so-called 'U-class-submarine', a large ocean-going submarine armed with torpedoes. When the Flemish coastline fell into German hands, there

was a necessity to develop different U-boat types which would be suited to the circumstances of shallow water operations, and a coastline riddled with sandbanks. As a result, the German Admiralty designed a 'coastal submarine'. the so-called 'UB-Boat'. This UB-type had three variants: UB-I, II and III. The UB had a shallow draught, and its compact features were ideal for operating in the shallow waters of the southern North Sea. The UB-I type submarine was the smallest U-boat designed by Germany during WWI. It displaced only 130 tons, measured 27 m in length and was armed with 2 bow torpedo tubes. The necessity to increase the offensive character and the operational range resulted in the further development of the UB-II and UB-III type submarines, which were fitted with more torpedo tubes and a deck gun. The large UB-III type U-boats almost tripled the size of the UB-I type, and had an operational range of 10,000 miles.

U-boats not only allowed for attacks from beneath the waves with torpedoes, but also with mines. Mine laying submarines (UC-class) were designed and built in Germany by the end of 1914, and saw their first action in the waters of the southern North Sea in the early part of 1915. The UC-class consisted of two types: UC-I and II. UC-I was similar in design to the UB-I , but instead of torpedo tubes it carried six vertical mineshafts in the bow section, with a total storage capacity of 12 mines. The Royal Navy was baffled to discover minefields in areas that no enemy surface craft could possibly have reached undetected. It was only six months after the start of the mine laying campaign, in July 1915, that the British discovered that U-boats were laying mines close to their harbours and shipping lanes. The UC-boat *UC-2* had accidentally struck one of its own mines and sank. This incident allowed Royal Navy divers to study the wreck and its mineshafts. Immediately, the order was issued to incorporate mineshafts in six British E-class submarines that were being built at that moment. Although the UC-I type U-boat wreaked havoc amongst Britain's merchant fleet, it had no other offensive armament than mines, and was limited in range to the Thames Estuary and the UK East coast sea areas. At the end of 1915, the UC-II type U-boat became operational. It was moderate in size, displacing almost 500 tons, and had a length of 50 m. It could stay longer at sea, and could reach many more enemy ports. Most important was its armament: 18 mines, 3 torpedo tubes and a deck gun.

For the North Sea, two submarines bases were in operation during WWI: Helgoland/Wilhelmshaven in Germany and Ostend/Zeebrugge/Bruges in Flanders. The bases in Flanders would prove to be the most important ones strategically due to the short distance to the western front. The harbours of Bruges, Zeebrugge and Ostend were adapted to accommodate a large fleet of U-boats. In Ostend and Zeebrugge, there were dry docks and wharf facilities, but the actual operational center was located in the harbour of Bruges. Here,

the Germans built the 'Kaiserliche Werft' (Imperial Wharf), which contained torpedo and engine repair workshops, storage facilities for ammunition and mines, wharfs, dry docks, bunkers and all kinds of accommodation for U-boat personnel. By 1918, a total of 5,000 people were employed in order to keep the U-boat fleet operational. Next to the Bruges docks and in the Bruges city center, many buildings were related to staff and crew of the U-boat fleet.

By the end of 1918, 93 U-boats had taken part in the activities of the 'Flottille Flandern'. 76 of these never returned to their base. A large number of U-boat wrecks thus lie scattered in waters around the British Isles, off the coasts of France, Holland and Belgium. In Belgian waters, 10 or 11 wreck sites of German WWI submarines have been identified, with at least one example from every U-Boat type present.

The U-Boat wreck on the Fairy Bank for example (Figure 1), in the western area of the Belgian continental shelf, seems to be well preserved, as only the conning tower and part of the former deck protrudes out of the sand. On the other hand, the identification of the wreck of *UC-62* situated on the Thornton bank is interesting as this U-Boat was reported in German as well as in British written sources as mined off Portland, but was actually torpedoed by HMS *E-45* only 20 miles off Zeebrugge.

The Flanders based U-boats had a large impact on the war, as they managed to sink 2,554 allied ships. U-boat losses were also very high, as almost 80 per cent of the U-boat fleet would fail to return to their base.



Figure 1. Conning tower of U-boat III type on the Fairy Bank on the Belgian continental shelf © Flanders Heritage Agency, photo: Dieter Decroos

Antwerp was important, as the place where the UB-I boats were reassembled after their transportation from Germany by rail. On the quaysides of Ostend and Zeebrugge, there were numerous protective shelters and in the Bruges docks there were lots of installations, such as a massive U-boat bunker, which could house eight large U-boats at a time. Today, very little material evidence is left of these important land facilities. The nearly complete destruction of the land facilities related to this part of our history raises the heritage value of the still existing relics at sea. In the following section, the story of the UB-10 will be briefly dealt with as an example showing

how, until the relatively recent past (1980s) this heritage was still completely neglected in Belgium.

## The Search for *UB-10*

During major construction works in the Zeebrugge harbour back in 1980, divers stumbled upon a big obstacle embedded in the sand. Because it had to be removed, it was lifted from the seabed and brought towards the historic mole (Figure 2). Soon, it became clear that a rather small submarine had been brought to the surface. Its single bronze propeller was sawn from the rear end – the name *UB-10* was inscribed on it.

The vessel was scuttled 62 years before, after an exceptional career in the



Figure 2. *UB-10* raised to the surface and brought towards the coast to be sunk again in 1980 © Dirk Van Mullem

*Unterseeboots Flottille Flandern*. *UB-10* was part of the *UB I*-class, rather tiny submarines, with just two torpedo tubes forward, carrying a single officer and 13 crew members. The development of this type of submarine was spurred by the need for a smaller submarine better adapted to the waters of the Belgian coast, and one that could be transported by rail and assembled nearby its naval base in Flanders, as explained above.

The wreckage found in 1980 clearly showed the characteristics of the *UB I*-type: the single pressure hull was riveted up from cylindrical and truncated conical boiler plate sections, giving the boat a distinctively angular shape below water. Unfortunately, both the narrow, free-flooding deck casing which ran the full length of the hull, and a relatively large conning tower were gone.

Construction of *UB-10* started in 1914 at AG Weser in Bremen. The submarine was transported in sections by rail to the Cockerill yards at Hoboken (Antwerp), where German technicians assembled and tested the boat for watertight integrity in the Scheldt river. *UB-10* was then towed via the Ghent-Bruges Canal to the base at Bruges, where it arrived in March 1915, as the first submarine of the *U-boot Flottille Flandern*.



A few weeks later, the ship was operational. During the night of 14 April the, the Dutch vessel *Katwijk* (2040 BRT) was sunk, the same fate struck the Belgian steamer *Menapiër* (1886 BRT) on 7 June. During the summer of the same year, tens of English fishermen's cotters were scuttled by the *UB-10* crew. The activities continued at a steady pace – in August 1916, HMS *Lassoo* was torpedoed, and by September of the following year, *UB-10* had already sunk 37 ships, a total of 23,614 BRT. Two of its commanders were Otto Steinbrinck and Reinhold Salzwedel, both awarded with the *Pour le Mérite* (aka the *Blue Max*). By then *UB-10* was considered obsolete, and during the remaining years of the war it was used as an instruction ship. When the British troops, leaving the mud of Passchendaele behind them, finally neared the Flemish coast, the officers of the *Marinekorps Flandern* decided to scuttle the, by then legendary, *UB-10* at the mouth of the harbour from where it started its raids, rather than to leave it in the hands of the allies.

Almost exactly 62 years later, diver Dirk Van Mullem, much to his regret, could only assist in sinking *UB-10* again, since due to a lack of time and interest, no one seemed to care about the historic vessel. With the upcoming centenary of WWI, a few enthusiasts started to study photographs and press releases of the failed recovery in 1980. Former harbour authorities and divers, who remembered vividly that unique historic encounter, were interviewed. Unfortunately, there is no unanimity as to where exactly *UB-10* might be found under the sand. However, the search site was reduced to the container terminal along the historic Zeebrugge mole.

The major challenge now is finding the 30 m long submarine again under a layer of 8 m of sand. Since 2012, the research group Brugge 14-18, started geophysical research on the site. The surface was scanned with a specific magnetometer (VET Vallon) and a Ground Penetrating Radar (Zond Python), both designed specifically for deep surveys.

A few zones were detected which have to be further investigated with bore hole magnetometry; the story remains to be continued.

## **British Seaborne Raids on Ostend and Zeebrugge and HMS *Vindictive***

In 1918, the British executed seaborne raids on the harbours of Zeebrugge and Ostend in an attempt to stop the U-boat attacks on shipping in the North Sea area and beyond. Several obsolete and heavily ballasted warships were sunk as blockships inside or just in front of the harbour entrances. Most of these ships were already salvaged or destroyed during or shortly after the war, although some of them, like HMS *Brilliant* and HMS *Sirius* are still partly in place

outside the Ostend harbour.

HMS *Vindictive*, which suffered heavy damage during the raid on Zeebrugge, was patched up and served again during the second raid on Ostend, where it was scuttled inside the harbour entrance. Since it was salvaged shortly after the war, the bow section has been preserved as a monument in honor of the fallen British seamen. Until recently, this monument stood somewhere in the inner harbour, completely out of sight. In 2013-2014 the preserved part of HMS *Vindictive* got a new location on the eastern part of the harbour entrance (Figure 3), a much better place for this valuable monument. In fact, the remains of the *Vindictive* constitute the only substantial part of a WWI battleship to be seen on land in Flanders. In this respect, besides its role as a monument to remember the victims of the war at sea, it can



Figure 3. Fragment of the bow of the HMS *Vindictive* preserved as a monument in honor of the soldiers died at sea © Flanders Heritage Agency, photo: Marnix Pieters

also draw attention to and raise the profile of the numerous other wreck sites related to WWI at sea, which are indeed frequently considered as ‘war graves’.

## Mine Laying

As already touched upon in the first section of this contribution, the sea mine also played a major role in the war at sea. The North Sea quickly became a place of great danger to all ships.

The North Sea, and more specifically the Belgian part of it, was subject to intensive sea mine laying activity during WWI. Both belligerent parties laid mines, and by the end of the war, the channel formed a dense, almost impenetrable web of minefields. Based on Swedish and German mine databases, historical maps from the United Kingdom Hydrographic Office and numerous documents from German and Belgian military archives, the ABNL Naval Mine Warfare Mission Support Centre from Ostend came to the interim conclusion that 8,759 mines were dropped in Belgian waters during WWI: 6,074 of them were

German, 2,075 British and 610 French. Figure 4 gives an overview of all mine fields in Belgian waters by the end of the war in 1918.

The mines were laid by purpose-built minelayers, but also by refitted ships. However, surface minelayers could not always reach their target areas in the enemy territory without being noticed, which presented a major problem. The only solution was the use of submarines. The French-British minefields in the Strait of Dover were considered such a threat that the German Admiralty ordered their large U-boats not to pass through the channel anymore in April 1915. Other types of vessels were required. Small UB and UC-type U-boats



Figure 4. Overview of all the minefields present in Belgian waters by the end of the war © Frank Janssens and Gino Deceuninck

were designed for this area. While UB-boats carried torpedoes, UC-boats were specialized in laying mines on enemy shipping routes. A large number of UC-type minelayers were commissioned. German Mine Laying submarines (UC-I and UC-II) operated from the Naval bases in Bruges, Zeebrugge and Ostend. The submarines could drop mines close to enemy harbours without being seen. Of course, the Allies used new techniques to defend themselves against the German submarines. The sonar and the depth charge would both turn out to be very powerful anti-submarine weapons. Numerous other measures also hindered German shipping, such as the anti-submarine nets with mines installed. U-boats in the English Channel were faced with the risk of getting entangled in mine nets. All 12 UC-I type submarines were lost. *UC-4* was scuttled off Zeebrugge. 17 UC-II boats were lost in the last two years of the

war. Most were mined or sunk by British warships.

The mines were employed as offensive or defensive weapons in rivers, harbours and seas, but they also had a big psychological impact. Offensive mines were placed in enemy waters, outside harbours and across important shipping routes, sinking both merchant and military vessels. Defensive minefields safeguarded key stretches of coast from enemy ships and submarines, forcing them into more easily defended areas, or keeping them away from sensitive ones. The best-known are the moored mines, spherical metal devices with characteristic protuberances (Hertz horns). Quite a few of these mines broke from their moorings and went adrift after a while. A lot of them washed ashore, which made the beaches very dangerous places. This was often the case with the British Mark 3 naval mine; hundreds of these mines washed up on the surrounding beaches. Other mines seemed to be more effective. A big amount of ships, both merchant and military, including ships from neutral countries, were sunk by mines. The allies lost no fewer than 284 ships due to German mines. The Belgian part of the North Sea still contains the remains of numerous shipwrecks, such as the German torpedo boats *Senator Holthusen* and *A58*, the French torpedo boat *P319* and the British Freighter *Ardmount*, all sunk by mines.

It took several months and a lot of minesweepers, either purpose-built military ships or converted trawlers, working around the clock, to clear the mine fields after the war. But, despite those post-war clearance operations, the sea bottom is still littered with unexploded ordnance (UXO) such as sea mines. Still today, mines are found by fishermen and dredging vessels. Due, however, to extensive trawling activities and seabed dynamics, such as moving sand ridges, there is, in most cases, no clear relation between the position of found mines and the location of historical minefields.

## World War I Aircraft Wrecks Underwater

Contrary to popular belief, WWI aviation was rather sophisticated and subject to a fast technical evolution.

Especially along the Flemish and Channel coast, the air war was fierce. In a pre-radar era, both the Royal Navy and the *Kaiserliches Marine* had to rely on information supplied by aerial reconnaissance. Fighter pilots had to protect the important harbours of Zeebrugge, Bruges, Ostend and Calais not only against these reconnaissance planes, but also against enemy bombing missions. By 1917, both the Germans and the allies were using multi-engine aircraft, crossing the Channel waters in order to drop aerial bombs up to 1000 kg.

Attentive visitors of war cemeteries along the coast might walk along the graves



of sailors and airmen – most of them washed ashore. The number of aircraft losses in coastal waters is yet unknown, but is to be estimated between several hundreds and a thousand.

Due to the fragile construction of aircraft – most of them are only made of wood and canvas, the chances of finding remains a century later, are very limited. The only identifiable remains might be the engines and the armament. Due to corrosion, the identification down to plane or crew seems virtually impossible.

Documented WWI aircraft crashes in water are very scarce. The best documented case dates back to 1963. In the mud of the then recently created Flevopolder near Dronten (the Netherlands), someone thought to have found the remains of an old bicycle. When a Parabellum machine gun was picked up near the wheels, the Dutch authorities realized it might have been an old airplane wreck. In autumn 1917, the bodies of a few German airmen washed ashore in what was then the Zuiderzee. The connection was made to a German Gotha twin engine bomber, which took off in September 1917 from its base near Ghent to bomb strategic targets in England. During their mission, they were lost and ran out of fuel, almost 300 km astray from their route.

There are indications that the remains of the wrecks of one or more German seaplanes are to be found in the mud of the Ostend water basin (the so-called ‘Spuikom’), where such units were stationed during WWI.

It is not known whether WWI aircraft wrecks exist in Belgian North Sea waters, but it is likely. Several allied air raids, for instance, were carried out on the harbours of Ostend, Bruges and Zeebrugge. The Germans did some bombing raids on England and there are some reports of airmen washed ashore. The chances of finding WWI Aircraft remains underwater are very slim due to their fragile construction and the impact of corrosion.

## **World War I Underwater Cultural Heritage in Belgian Waters: An Overview**

In the Belgian part of the North Sea, 292 positions of shipwrecks are registered in the database [www.maritieme-archeologie.be](http://www.maritieme-archeologie.be). This database has been accessible online in four languages since 2006. For 237 shipwrecks (corresponding to 80 per cent of the registered positions) an identification of the ship has been proposed based on survey data combined with published information and archival documentation. The remaining 55 positions have, to date, only been identified as a wreck site, probably a shipwreck site without any idea about the date nor the identity of the shipwreck in particular.

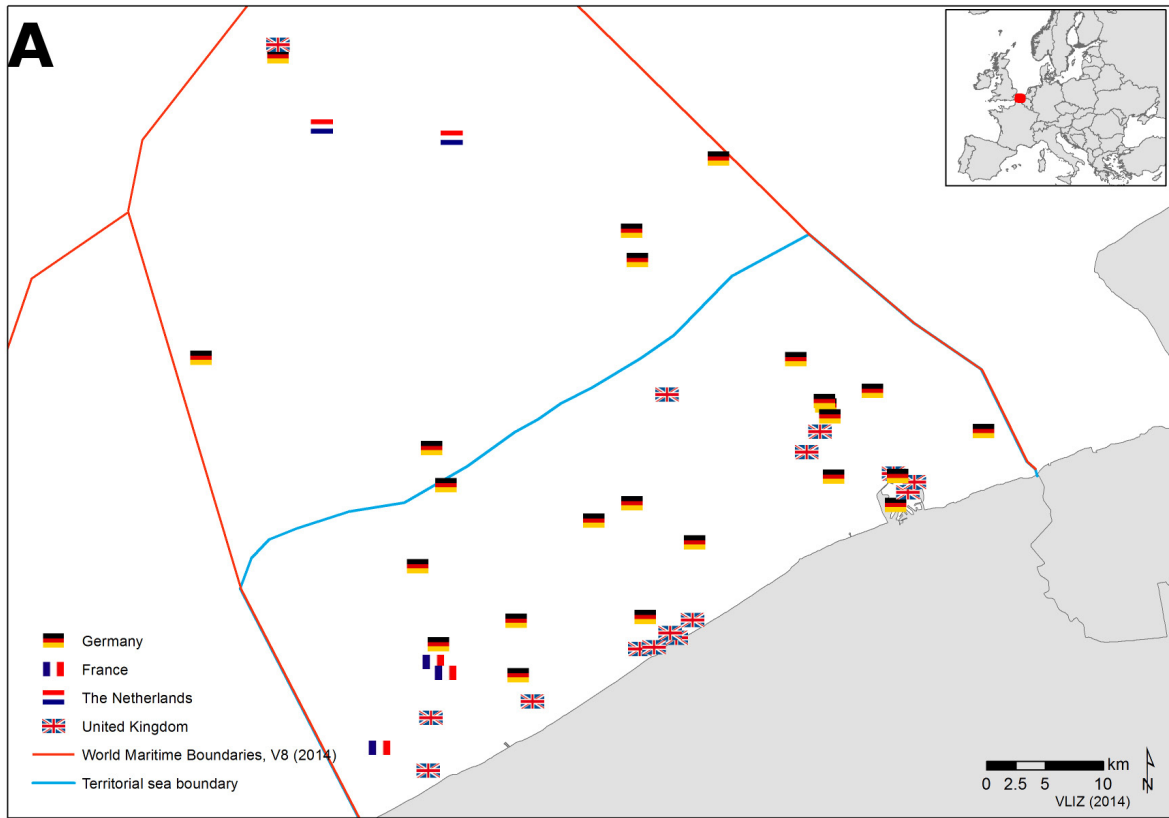


Figure 5 a. Location of all WWI wrecks in Belgian waters categorized by nationality © VLIZ, maps: Nathalie De Hauwere

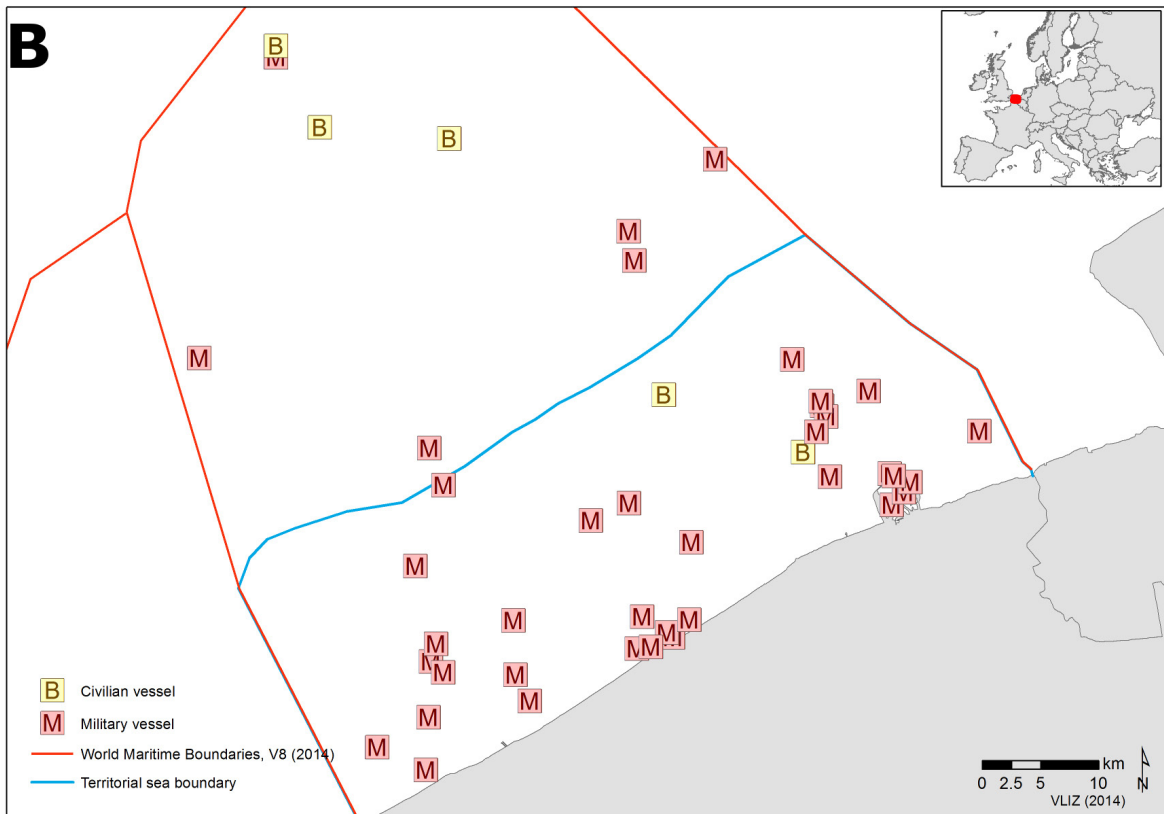


Figure 5 b. Location of all WWI wrecks in Belgian Waters categorized by military / civilian status © VLIZ, maps: Nathalie De Hauwere

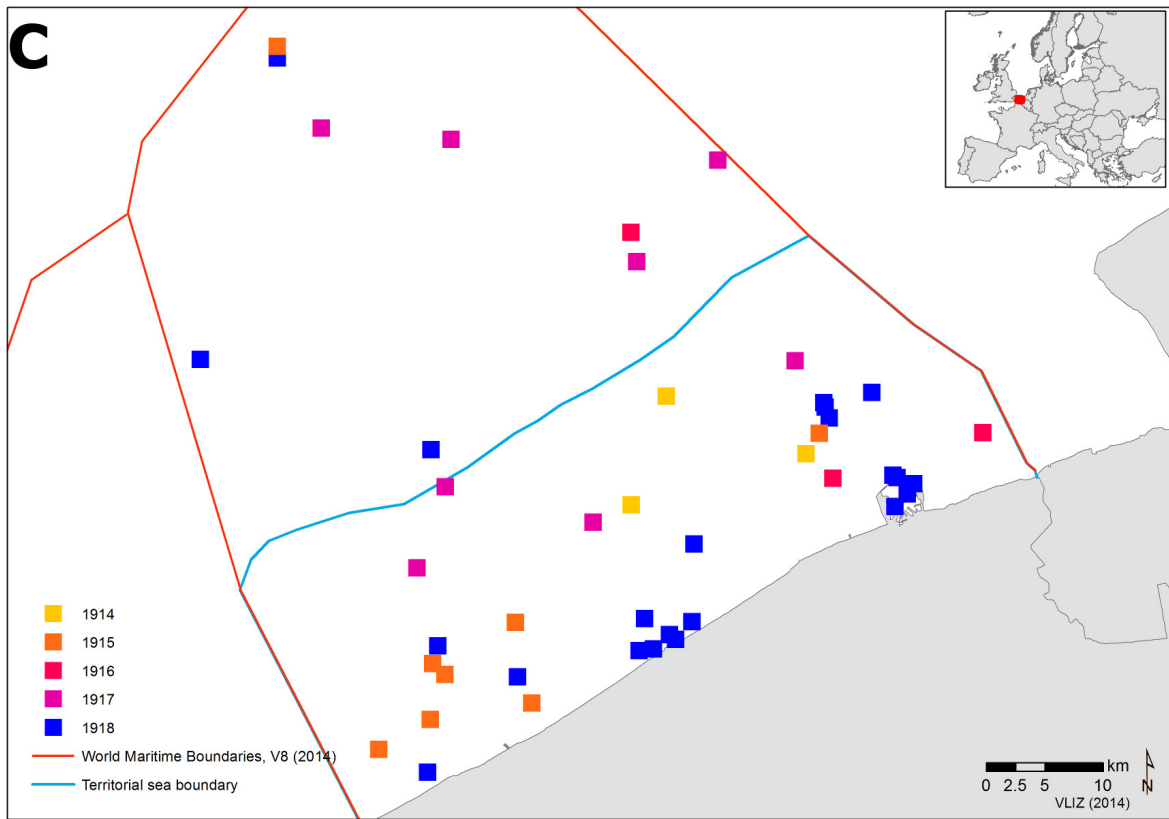


Figure 5 c. Location of all WWI wrecks in Belgian Waters categorized by year of sinking © VLIZ, maps: Nathalie De Hauwere

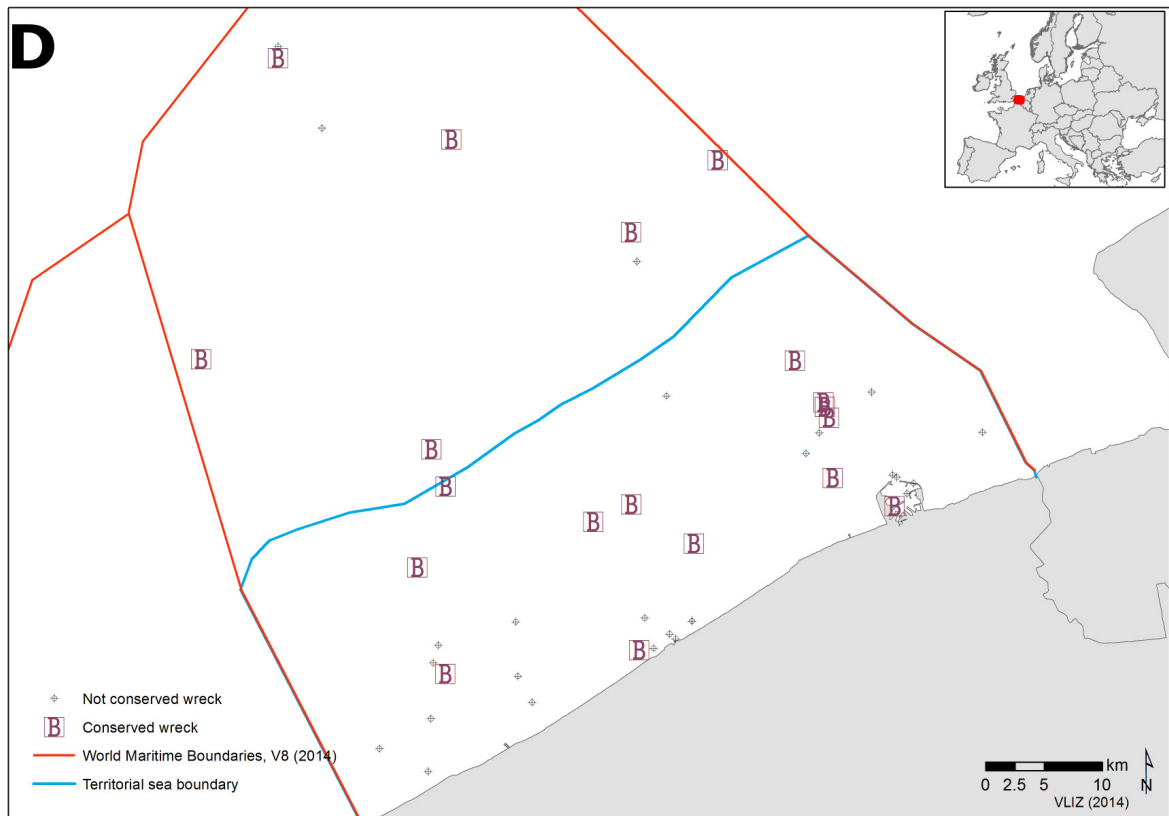


Figure 5 d. Location of all WWI wrecks in Belgian Waters categorized by state of preservation © VLIZ, maps: Nathalie De Hauwere

46, or about 20 per cent of the identified shipwrecks, are related to WWI. These 46 sites constitute, for Belgium, the core of the material archive of WWI at sea. This number of sites is quite low compared to the numerous heritage sites on land related to WWI, even by adding a similar percentage from the unidentified sites and arriving at the total hypothetical number of 59 sites assignable to WWI.

These 46 sites correspond to 44 shipwrecks, as 2 German torpedo boats broke into 2 halves during their sinking, with both parts settling in slightly different positions on the seafloor. These disastrous events produced four archaeological sites, but are to be related to only two shipwrecks. In the identified shipwrecks only four nationalities (Figure 5 a) are represented: German (23 sites), British (16 sites), French (3 sites) and Dutch (2 sites). Curiously, no Belgian wreck sites of WWI have been identified in Belgian waters to date. Belgian wreck sites of WWI are known to be present in French, British and Irish waters. Most of the wreck sites are identified as military vessels (Figure 5 b). Only five wreck sites belong to civilian vessels (3 British and two Dutch). This is in sharp contrast with the situation in UK waters related to WWI, where merchant vessels clearly dominate the material record. Looking at a map with the years of sinking of the ships (Figure 5 c) gives some interesting information: 1914: 3, 1915: 8, 1916: 2, 1917: 8 and 1918: 23. Years with low numbers of shipwrecks (1914 and 1916) seem to alternate with years with higher numbers (1915 and 1917) and 1918 is by far the most productive year in regards to shipwrecks. This is due to several factors: at the end of the war, several German U-boats were scuttled to keep these out of the hands of the enemy, and in 1918 the raids on Ostend and Zeebrugge took place. These two elements, together with the fact that some WWI shipwrecks could not be dated precisely, and were assigned December 1918 as a *terminus ante quem*, explain the higher number of sites assigned to 1918. On the location map, indisputable concentrations of 1918 wrecks occur near the harbours of Ostend and Zeebrugge (Figure 5 a-d).

It has already been stressed that the number of underwater cultural heritage sites related to WWI in Belgian waters is relatively small. This number decreases still more when one takes into account only the wrecks that are well or rather well preserved (Figure 5 d). Due to the postwar salvaging activities, merely 19 WWI sites remain more or less in a coherent state on or in the seabed. When looking to the better preserved wreck sites, German wrecks dominate even more, with 16 out of the 19 better preserved sites. This better situation for the German wrecks is mainly due to the 10 or 11 U-boat wrecks which are systematically better preserved, as they are mostly buried, and never constitute a hindrance for shipping. Besides these 16 German wrecks there are one French, one Dutch and one UK wreck dating from WWI which are rather well preserved: all in all a very manageable number of valuable sites. Action is needed now to be sure



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