

German U-boat development during World War I

Tomas Termote

When we take a look at the current nautical charts of the Flemish Banks, we notice numerous depth figures, names of sandbanks, shipping routes and buoys. The most striking and perhaps the most intriguing features are the obstructions, foul areas and wrecks marked as navigational warnings to shipping. The Belgian territorial sea contains the remains of 277 shipwrecks, most of which have been identified. Nearly one third (32%) of these remains are military wrecks dating from both world wars. These mainly include small units such as *Vorpostenboote* (patrol boats), *Sperbrecher* (pathfinder vessels), *Kriegsfischkutter* (armed trawlers), *motor launches*, harbour tugboats, destroyers as well as submarines. A total of 8 wrecks, making up nearly 3% of all known wrecks, are sunken U-boats. The following article is a typological study of WWI German submarines by means of the archaeology of U-boat wrecks discovered in Belgian waters (see map p. 25).

The lifespan of a wreck

The influence of man and nature

Man-made materials such as sunken ships which have been scattered over the seabed decay over time. This process takes place under the influence of biofouling, the occurrence of tides and storms, and chemical processes such as corrosion ("rusting"). Human influences such as dredging, salvaging, fishing and sand extraction uncover wrecks and speed up their eventual disintegration. Each type of wreck has a certain lifespan, after which it collapses and the remains are buried. The remains of wooden ships and aircraft have suffered the most, especially in the period after World War II. Bottom trawling (i.e. towing a beam trawl along the sea floor) became popular in this period, which destroyed many wrecks. The lifespan of steel ships such as merchant ships is approximately half a century. This varies depending on the extent to which a wreck is covered by sand and the depth at which it is located. The deeper it lies, the more it is protected from the effects of swell and storms. The author's father, Dirk Termote, witnessed this decay process through many decades of diving on various



■ Sketch of the wreck of cross-channel ferry *MV Queen of the Channel* (Tomas Termote)

wrecks on the Flemish Banks. The wreck of cross-channel ferry *MV Queen of the Channel*, sunk at Middelkerkebank in 1940, was relatively intact when it was discovered in 1987. The bow was in an upright position, with secured anchors, winch and mast foot as identifiable parts. The author can confirm that nearly 20 years later, the sides of the bow of *MV Queen of the Channel* had collapsed and the winch, anchors and superstructure lay scattered and buried.

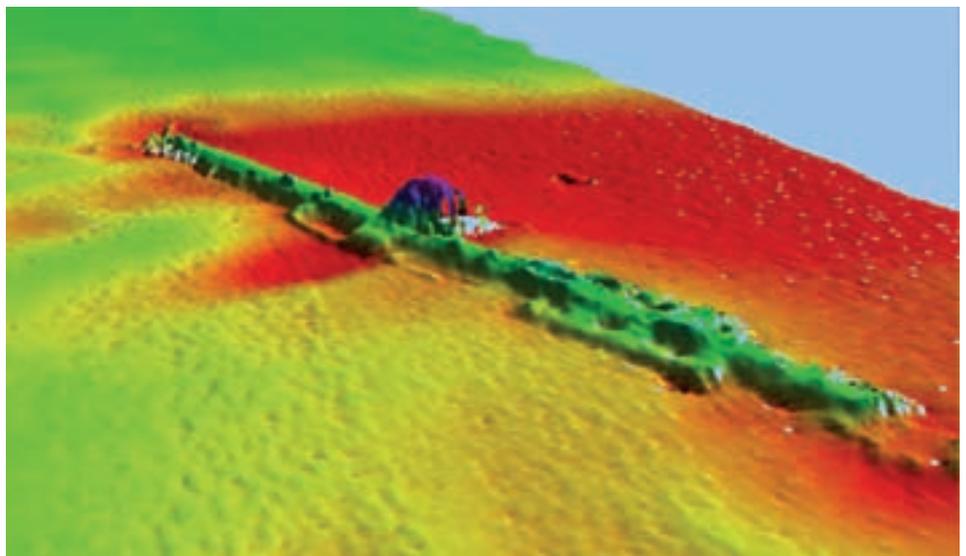
Submarine wrecks: strong but not invulnerable

Thanks to their tough construction, usually consisting of a double hull, U-boat

wrecks are among the most resistant to natural and human impacts. These wrecks can have a lifespan of 100 years or more. They are easily recognisable too. Even on acoustic images created by means of a side-scan sonar or multibeam echosounder, the prominent 'cigar shape' and the central conning tower are very striking (see below).

That U-boat wrecks are not invulnerable either was proven in the summer of 2005.

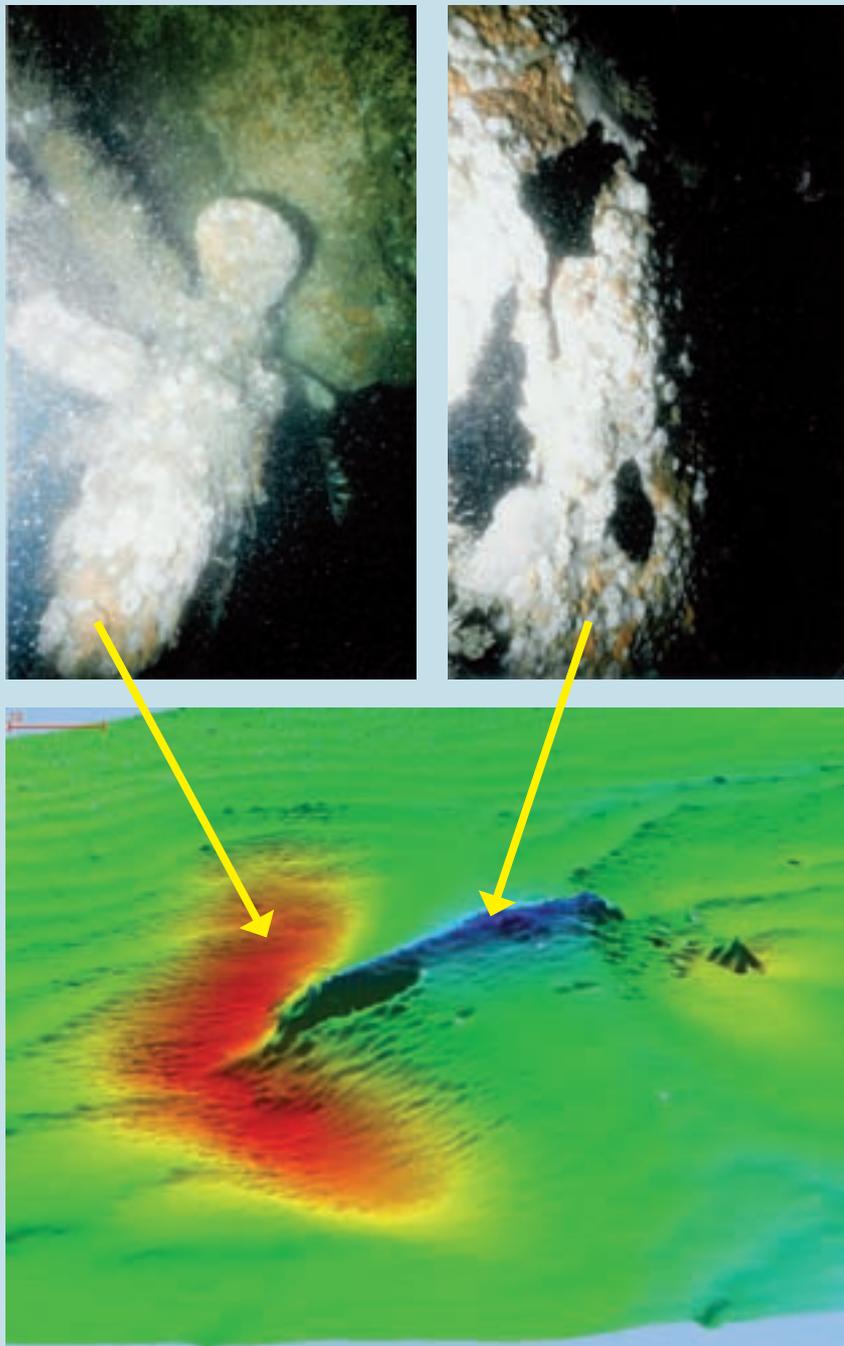
At that time, the net of a Eurokoter from IJmuiden got snagged onto the wreck of a UC-II type U-boat near Fairy Bank. The wreck became so entangled in the net that it took eight hours to disentangle it. With this in mind, the author got the unique



■ The typical 'cigar shape' and the central conning tower make a submarine wreck easily recognisable. This is the wreck of *UB-59* near Zeebrugge, visualised by means of acoustic (multibeam) techniques (MDK – Coastal Division)

Not every U-boat wreck dates from WWI

Various characteristics and distinguishing marks are used to identify submarine wrecks. These may help to determine the wreck's origin (period and nationality), since not all U-boat wrecks date from WWI. A few U-boats from the Second World War were sunk in the southern North Sea, and even possible post-war wrecks need to be taken into account. For instance, a Russian submarine headed to be scrapped was lost in stormy weather near Bruine Bank in 1998.



■ A multibeam image of the location of UC-62 (below). The red area indicates scouring as well as the deepest point of the wreck (below the stern). This is the location of the port propeller featuring the U-boat number. The elevated blue area in the middle is the remains of the conning tower. The picture (top right) clearly shows the three holes in the conning tower hull which indicate shell bursts. The fragment (top left) is the broken bow of UC-62
(Photographs: Tomas Termote; Multibeam image: MDK - Coastal Division - Flemish Hydrography)

U-boat numbers were painted or welded onto the hull and the conning tower, but these usually quickly disappear when the outer hull starts to decay. Information concerning the vessel type can be found on the propeller hubs. This information has to be treated critically as well, as available propellers were sometimes reused in shipyards in wartime, despite having a different vessel number. Submarine wrecks usually remain upright, or heel over to starboard or port. A site can also be linked to the First or Second World War on the basis of the nature of the decay. The actual identification can take place on the basis of the dimensions of the hull and conning tower as well as the presence or absence of torpedo tubes, deck guns or mine chutes. The eight U-boat wrecks in Belgian territorial waters include all five U-boat types deployed by Germany. In case of a typological identification of the site, a U-boat number can be looked up after checking the damage to the wreck. Was the U-boat mined, torpedoed, bombed or was she lost due to an internal explosion? The location of a wreck can be compared to historical sources so as to reach a final identification.

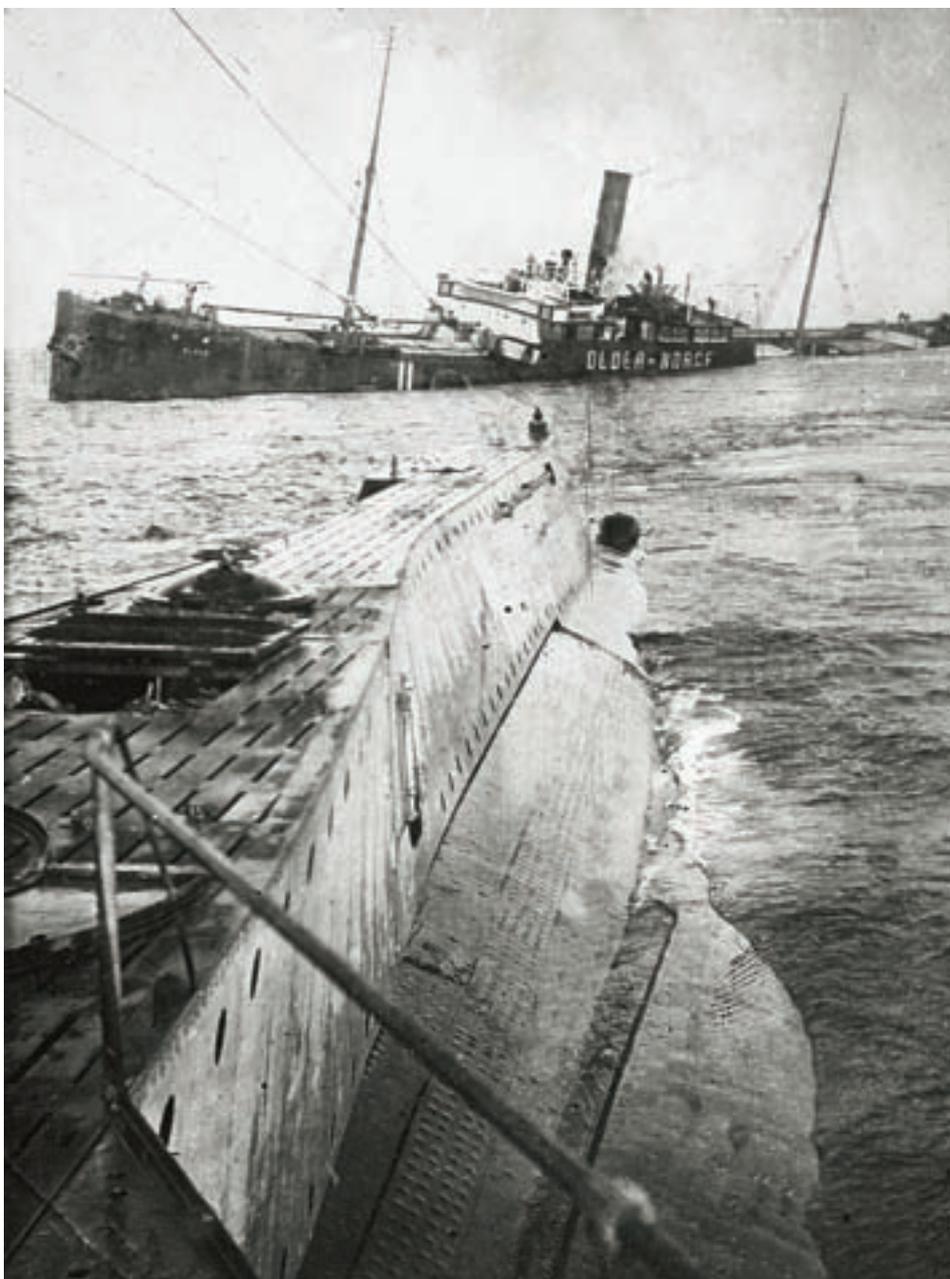
The case of the wreck of UC-62 on Thornton Bank proves that fieldwork can confirm but also refute the historical facts. In 1993 the remnants of a large mine-laying submarine were found in deeper waters north of Thornton Bank, approximately 1 mile from Dutch territorial waters. The wreck showed heavy damage at the mine chutes; the bow had been ripped off and was lying some distance away. It was clear that the damage had been caused by a torpedo impact. The most intriguing aspect was the presence of three irregular holes in the pressure hull of the conning tower. When the hubs of the three-bladed propellers were cleared, the U-boat number turned out to be UC-62. Both German and British historical sources state that UC-62 disappeared around Portland – St Albans Head during her ninth mission in mid-October 1917. The U-boat was supposedly sunk by an enemy mine. During the time of the disappearance of UC-62, British submarine HMS E-45 was able to hit a surface-running enemy U-boat near Thornton Bank. In the log of HMS E-45, the captain mentioned firing two torpedoes from a distance of 400 m and hitting the U-boat in front of the conning tower, after which she sank immediately. The three irregular holes in the conning tower hull were probably caused by gunfire impacts incurred earlier on. As a result, UC-62 was unable to submerge and fell victim to HMS E-45.

opportunity to closely investigate the impact of 3000 HP of traction on a wreck. The net had clearly been stuck on the stern area near the U-boat's engine room. As only few protruding parts were still present on the hull, the net and the trawl chains got stuck on the back torpedo loading hatch. This hatch weighs 300 kg, measures 2m by 1m, and is fitted with two heavy hinges and eight double fastening bolts (diameter: 4 cm) to ensure watertight sealing. However, this did not prevent the oval steel hatch from being pulled loose; it was found in the scour pit behind the wreck near the propellers. Inside an untouched world could be glimpsed at, including two diesel engines, a stowed torpedo in the central compartment and a workbench with all sorts of tools. Nature quickly preserved the vessel and after just three months the engine room was filled with sand to the brim of the hatch.

U-boat types during WWI

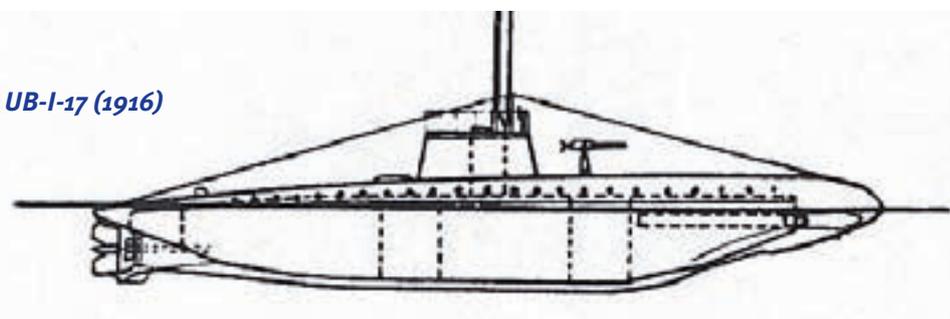
In August 1914, on the eve of the Great War, the Imperial German Navy only had a small fleet of 28 U-boats. These were large, double-hulled vessels that spent most of their time at sea on the surface and only submerged in case of danger or when an attack had to be carried out. Technically they were torpedo boats that could submerge.

When the Flemish coast fell in German hands in October 1914, this resulted in the development of a new kind of submarine. It had to be easily manoeuvrable so that it could be operated between the treacherous shallows and sandbanks, and be able to approach an enemy port without being noticed. It also had to be produced faster than pre-war U-boats, which took a full year to build. This way the UB-I type or *Küstenpatrouille* U-boat was developed, afterwards replaced by the medium-sized UB-II and the large UB-III types.



■ A German submarine sinks a ship at the beginning of WWI (Tomas Termote)

UB-I-17 (1916)



The UB-type

UB-I

The first UB-I was laid down in Kiel in February 1915 as the first of a series of 17 similar U-boats. The boat had a length of 28.10 m and a beam of 3.15 m, and displaced 127 metric tons. Because of her size, this U-boat was fitted with a single pressure hull and a single propeller. The vessel could attain a speed of 6.5 knots surfaced and 5.5 knots submerged. Even with single propulsion, the submerged speed was

remarkable: 22 seconds to reach a test depth of 50m. The armament was limited to two 45-centimetre bow torpedo tubes and one 8-millimetre machine gun. Living and working conditions on board UB-I vessels were very basic; there was one berth for every two members of the crew, which consisted of 1 officer and 13 men. These small U-boats became well-known not just because they were the smallest U-boats produced during the First World War, but also because they were transported to the front by rail. After finishing at a German shipyard, UB-I submarines were dismantled

and their fifteen components were loaded onto different flat wagons. The four biggest components were the bow section, the mid section, the conning tower and the stern section. After a five-day journey they arrived at the Hoboken naval dockyard, where they were reassembled.

Their limited horsepower, limited range and supply of only two torpedoes also limited their operational capacity. The UB-I submarines attacked vessels in an area stretching from Noordhinder Bank to the British east coast, from the mouth of the Thames to the region of Calais. Despite a patrol time of maximum three days, high demands were made on the crew. A UB-I submarine spent an average of 150 days at sea during a service time of 7 months. A total of six vessels from the UB-I fleet were lost, two of which in Belgian waters. The best known and most successful one was *UB-10* under the command of *Kapitänleutnant Otto Steinbrinck*, who sank a total of 37 ships. *UB-10* was also the only submarine from the UB-I fleet that survived four years of war and was scuttled off Heist in October 1918 in the face of the German retreat. *UB-10* was rediscovered off Heist when dredging took place to expand the port of Zeebrugge in 1980. The association *Tijdelijke Vereniging voor Bergingswerken* managed to bring the nearly intact wreck to the surface by means of salvage vessel *Norma*. Only the conning tower and the outer hull were missing from the wreck, but otherwise *UB-10* was remarkably intact. Due to time constraints and lack of interest, the wreck had to be disposed of as quickly as possible and was buried under 15m of sand outside the old Zeebrugge seawall. At present a project is under way to relocate *UB-10* and salvage and conserve her as soon as possible.

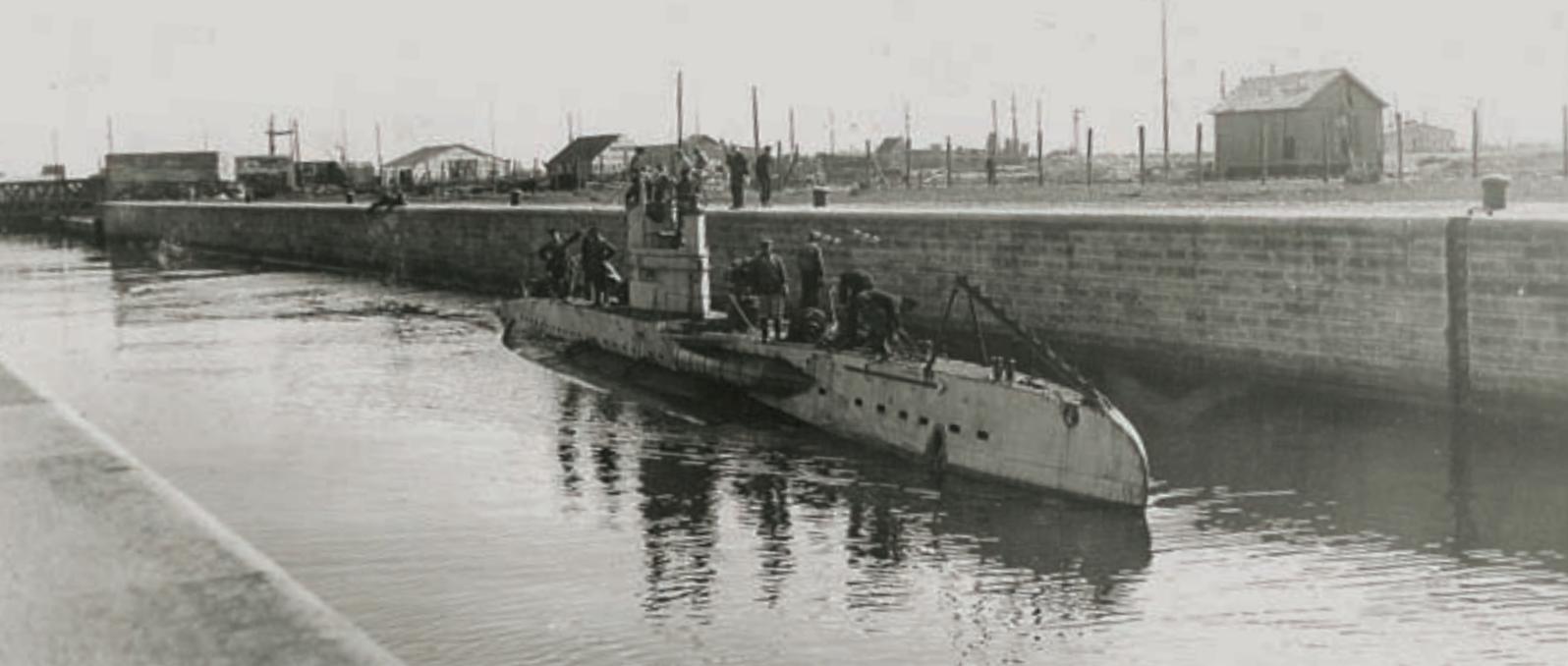
UB-I submarines were rather vulnerable, often suffered engine and compass problems, and had a tendency to break



■ A UB-I type submarine at the Hoboken naval dockyard in 1915 (Dirk Termote)



■ Left: Salvage of the wreck of *UB-10* by salvage vessel *Norma* (Piet Lagast). Right: *UB-13* and *UB-10* by the quay at Zeebrugge in 1915 (Tomas Termote)



■ A UB-II type submarine in a lock at Zeebrugge (Tomas Termote)

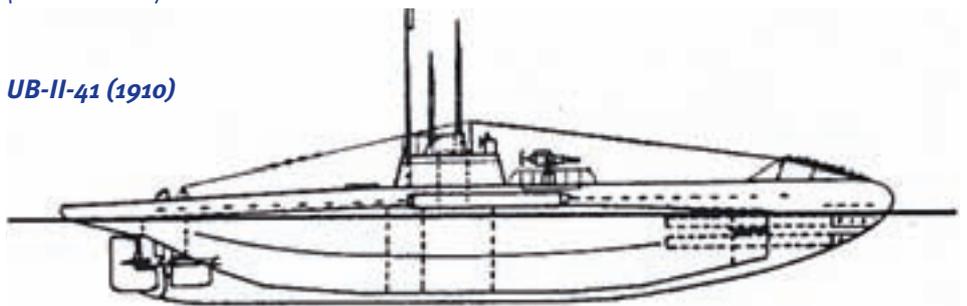
trim after the firing of torpedoes. They were usually equipped with a compensating system to offset the loss of the torpedo's 770kg weight after firing, but this system did not always function properly. As a result, the bow could broach if the tube was filled too late, or plunge to the depths if too much water entered the tube. One commander compared the erratic behaviour of the UB-I submarine to a "sewing machine" when a "tin tadpole" (i.e. a torpedo) was fired.

Life on board must have been hell, especially in the unpredictable and turbulent weather on the North Sea. *Oberleutnant zur See* Werner Fürbringer, commander of UB-2, described the conditions when his U-boat ran into a north-westerly force 10 storm off Den Helder. The U-boat pitched and rolled violently, and at times the top of the conning tower broke the surface at an angle. Both compasses were out of order and Fürbringer had no other option than to take UB-2 to the bottom until the storm had blown itself out before he could continue his journey. Even at a depth of 28m the submarine still rolled due to the effect of the groundswell.

UB-II

The German admiralty realised the use of developing a larger UB type with better armament, more space and a bigger range. One year after the commissioning of the first UB-I submarine (on 16 February 1916), *UB-18* was the first UB-II type U-boat to enter the port of Zeebrugge. The arrival of this new type was a real boost for the Flanders Flotilla. *UB-18* had a length of 36 m and a beam of 4.36 m, and displaced 263 metric tons. Thanks to her double propulsion she could attain a speed of 9 knots surfaced and nearly 6 knots submerged. The main armament continued to consist of two bow torpedo tubes and an 8.8 cm deck gun mounted in front of the conning tower. Although this submarine was nearly twice as

UB-II-41 (1910)

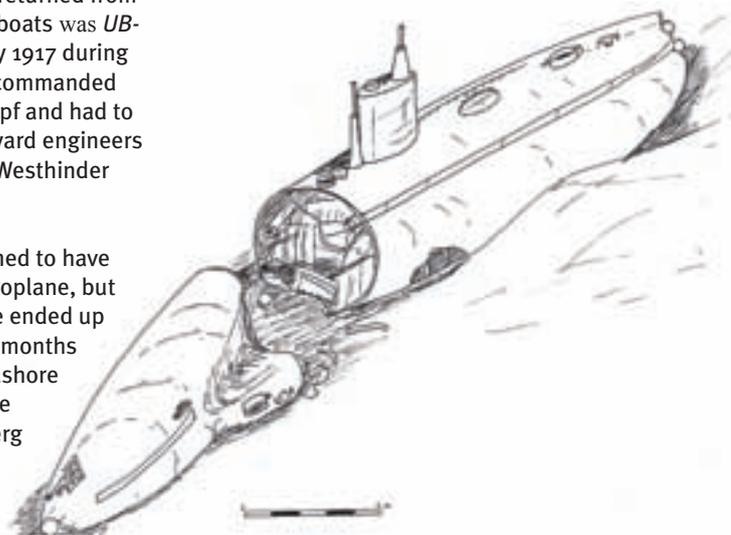


large as the UB-I type U-boat, it still had a 30 second diving time. The 23 crew members had a little more space and their own berth. Nearly 30 units of this U-boat type had been commissioned by the middle of the war. From their Flemish bases, the range of the U-boats now stretched to the Scottish coast and the western end of the Channel.

The UB-II type scored major successes, mostly against merchant ships and troopships sailing from Britain to France and vice versa. However, these U-boats also had their limitations in terms of distance and were hit hard by Allied countermeasures. Out of approx ten UB-II submarines stationed at Flemish ports, eight never returned from their patrols. One of these U-boats was *UB-20*, which was sunk on 28 July 1917 during trials off Ostend. *UB-20* was commanded by *Oberleutnant zur See* Glimpf and had to make 4-hour trials with dockyard engineers and a few army officers near Westhinder Bank.

Initially *UB-20* was presumed to have been bombed by a British aeroplane, but later on she appeared to have ended up in an enemy minefield. Three months later, Glimpf's body washed ashore on the coast of Jutland, and he was buried next to Loddensbjerg church (Denmark). In 1989 the wreck of *UB-20* was found north of Kwinte

Bank, near the "A-zuid" buoy; she was identified on the basis of the number on the starboard propeller. The wreck has been fairly well preserved, although the stern section was completely ripped off near the engine room as a result of the mine blast.



■ Sketch of the wreck of UB-20 at the "A-zuid" buoy (Tomas Termote)

UB-III

The U-boat inspectorate ordered the UB-III type submarine in the spring of 1916. This was a better and more manoeuvrable version of the pre-war U-type and displaced 300 metric tons. In comparison with the U-type, this type was more lightweight, it was constructed in six months and it had the same diving time as the UB-II type. It had a length of 55 m, a beam of 5.8 m and a complement of 34 men. *UB-III* also had double propulsion and was capable of attaining slightly faster speeds than the medium-sized *UB-II*. Its range had increased as well: it could easily reach the Irish Sea, the northern British Isles and the Bay of Biscay. The armament was remarkable: five torpedo tubes and one deck gun. *UB-54* was the first UB-III type U-boat to enter the port of Zeebrugge and was followed by nearly 30 other UB-III type submarines. *UB-57*, under the command of *Oberleutnant zur See* Johannes Lohs, was the most successful one and succeeded in destroying 17 ships over the course of five patrols. Eventually this fleet also suffered heavy losses: a total of 16 vessels never returned, including *UB-57* and *UB-54*.

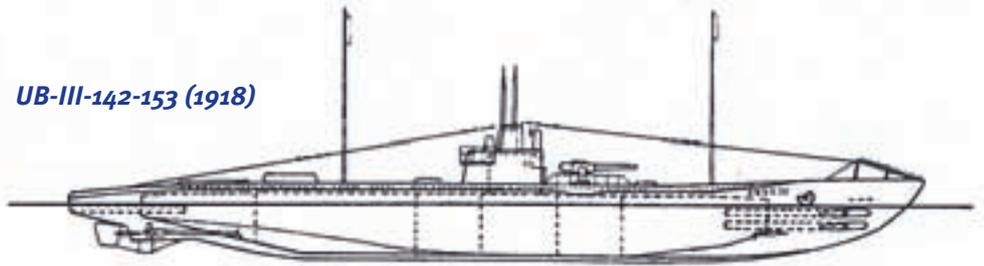
One of the most remarkable wrecks is located on top of Fairy Bank. The site itself is limited to a large conning tower protruding from the seabed and part of the upper hull as well as a few stowed bottles of compressed air. On top of the conning tower there are periscope standards with retracted periscopes and an open hatch. The site is remarkable because it contains a large UB-III type submarine, 90% of which has been covered by sand. The U-boat has not yet been identified with certainty, but possible candidates are *UB-54*, *UB-56* or *UB-58*.

The UC-type

U-boats were not just developed to carry conventional torpedo tubes. Since shallow waters along shipping routes and at the entrance of harbours saw most activity, the German admiralty thought mines would have the most effect. However, surface minelayers could not reach their targets in enemy territory without being noticed, which constituted a major problem. The only solution was the development of a mine-laying U-boat, the UC type.

UC-I type submarines had a length of 34 m and a beam of 3.15 m, and displaced 168 metric tons. They carried a complement of 14, and the conditions on board were comparable to those aboard UB-I type submarines. A total of 15 units were laid down. Their bow was equipped with six internal mine chutes with a carrying capacity of two mines each. *UC-11* was the first minelayer to enter the port of Zeebrugge on 26 May 1915. Another eleven U-boats of this type would operate from Flemish bases after being transported from Germany by rail. The impact of this small minelayer was significant: the Allies lost no fewer than 284

UB-III-142-153 (1918)



■ *UB-III type U-boats at Heligoland (Tomas Termote)*



■ *A diver explores the conning tower of a UB-III type U-boat on Fairy Bank (Harry Klerks)*

ships due to their mines. All twelve UC-I type submarines were eventually lost: five in Dutch waters, six in British waters and one was scuttled off Zeebrugge: UC-4.

The UC-I type proved its value in 1915, but these U-boats did not have any secondary armament, much to the frustration of their commanders. As a result, a more effective U-boat type was developed which combined all elements of the previous designs: the UC-II type. These submarines had a length of 53 m and a beam of 5.2 m, and displaced 417 metric tons. They were able to dive to a depth of 50 m in 40 seconds. Moreover, the bow

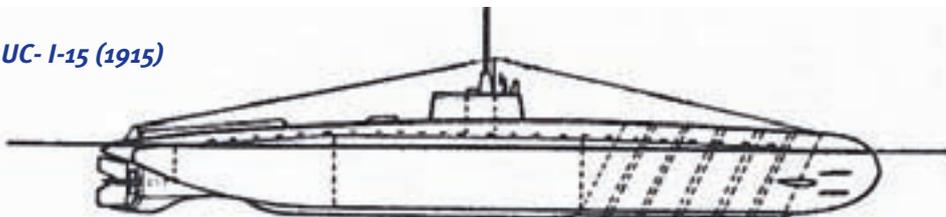
featured an elevation fitted with six vertical mine chutes with a total carrying capacity of 18 mines. This had the advantage that the mines were stored dry, contrary to the UC-I type submarines, where mines were located outside the pressure hull. The UC-I type required the depth to be set in the harbour prior to departure and this setting could not be adjusted afterwards. In case of the UC-II type, it was possible to adjust the depth setting during the voyage so as to determine where and at what depth a minefield should be laid on site. UC-II type submarines were also equipped with three torpedo tubes and

an 8.8 cm deck gun. The first UC-II U-boats were deployed in Flanders in 1916 and about twenty would eventually operate from Flemish bases by the end of the war. Losses were heavy with 17 UC-II boats lost in the last two years of the war. Most were mined or sunk by British warships, e.g. UC-62 on Thornton Bank.

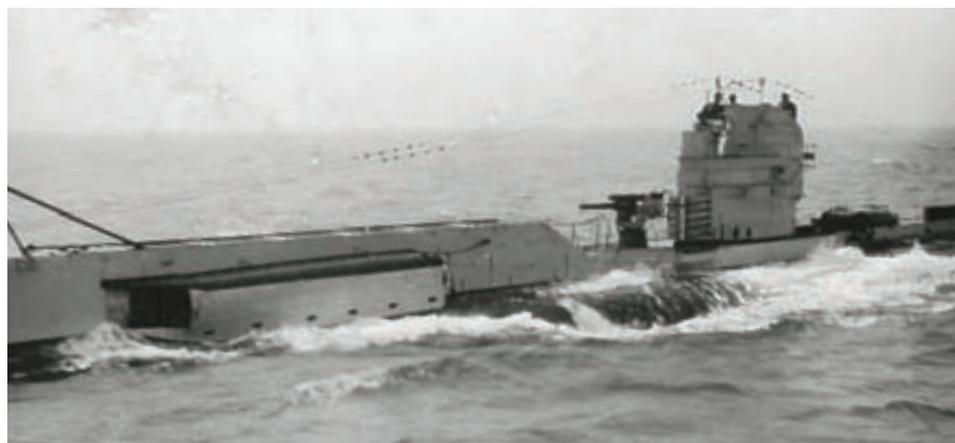
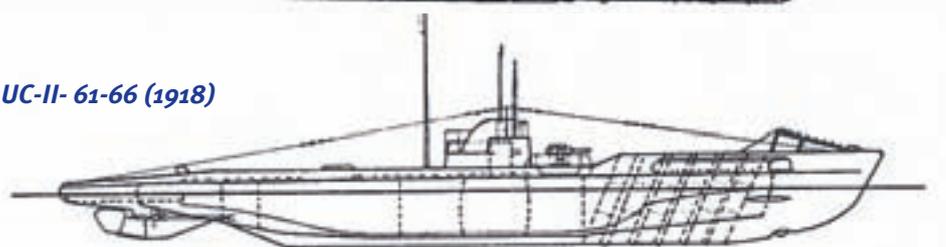
Conclusion

During the First World War, U-boats evolved from insignificant vessels to fearsome weapons which nearly brought Britain to its knees. They very quickly evolved from experimental vessels into effective weapons equipped with torpedo and mine chutes as well as deck guns of various calibres. The occupation of the Flemish coast and the development of a large base played a crucial part in this. Wartime actions left many U-boats wrecked in Belgian waters. These sites still provide us with a unique insight into the different types of submarines. The combination of research at sea and the study of numerous reference works has confirmed, refuted and refined several theories. Maritime archaeology will enable us to solve new mysteries concerning lost U-boats in the future. This is possible thanks to a joint effort on the part of private individuals, such as divers, and public services (Flanders Heritage Agency, Flemish Hydrography).

UC-I-15 (1915)



UC-II- 61-66 (1918)



■ A UC-II type submarine at sea. This type of U-boat carried 18 mines in 6 internal chutes as well as a gun in front of the conning tower (Tomas Termote)



■ A torpedo boat passes a few moored UB-I type submarines in the Bruges inner harbour. They were somewhat protected against possible air raids by means of concrete and wooden lean-to constructions (Tomas Termote)

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