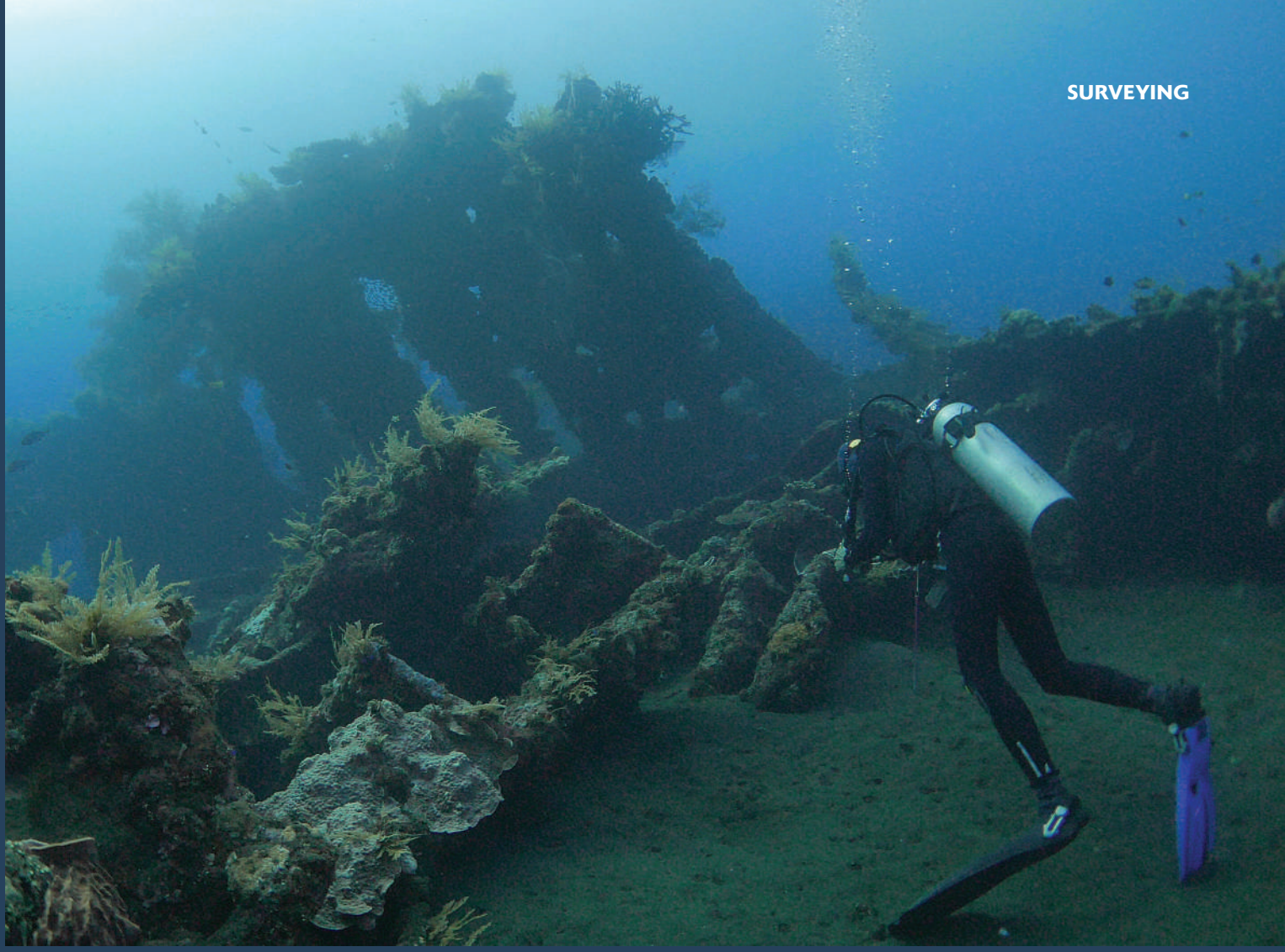

SEE UNDER THE SEA

IT'S HARD FOR DIVERS TO LOCATE OBJECTS – AND PEOPLE – UNDER WATER. HOWEVER, WITH THE ASSISTANCE OF SONAR AND MAPPING SOFTWARE IT'S POSSIBLE TO MAKE IT EASIER. BLAKELEE MILLS REPORTS

Searching for a missing entity, whether it's a person or an object, is difficult enough on dry land, but throw in a subaquatic search and the challenges increase exponentially. Henk de Vries of RemoSens BV has dedicated his life to the search for people and objects missing under water. These search and recover (SAR) missions can be fraught with dangers for the dive groups and salvage crews. To mitigate the dangers, de Vries and his team take great efforts to map out the subaquatic terrain to provide divers a better understanding of the surface below.

One such SAR mission occurred within De Nieuwe Meer in Amsterdam, Netherlands. This approximately 30m-deep lake is a popular destination for recreational divers. One such group of four well-equipped divers went searching for known wrecks.

Only three of them resurfaced.

After unsuccessful rescue attempts by the governing agencies, the search was opened to the public and de Vries was called in. The recreational dive group had been equipped with devices that took depth recordings every 30 seconds during the dive. Using this data, along with previously collected echo sounding data, de Vries created a 2D contour map and 3D depth map of the lake with the help of Golden Software's digitising program Didger and its contour, gridding and 3D surface mapping program Surfer. These maps were used to identify the dive path taken by the missing man, in an attempt to pinpoint the approximate location where he had gone missing.

A higher-resolution bathymetric map was then created. In this refined area, the team set up their side scan and echo sounder sonar equipment to collect further data. The bathymetric map was crucial during this part of the survey as the sonar towfish, an expensive tool used to collect sonar data, required the bathymetric information so it could be towed 6m above the bottom of the lake for optimal data collection. Without the bathymetric map, it would have been practically impossible to coordinate when the towfish should be raised or lowered depending on the lake's topography.

De Vries then overlaid his sonar and bathymetric data on a Google Earth image of the lake. This allowed the SAR divers to 'see' the bottom before even entering the water. They were able to safely plan their dive by using the given depths as detailed on the bathymetric maps and address any dangers, such as barbed wire, cables or other debris. Using the elevation information, they were also able to calculate their maximum bottom time and ensure decompression sickness didn't occur with drastic dive ascents or descents.

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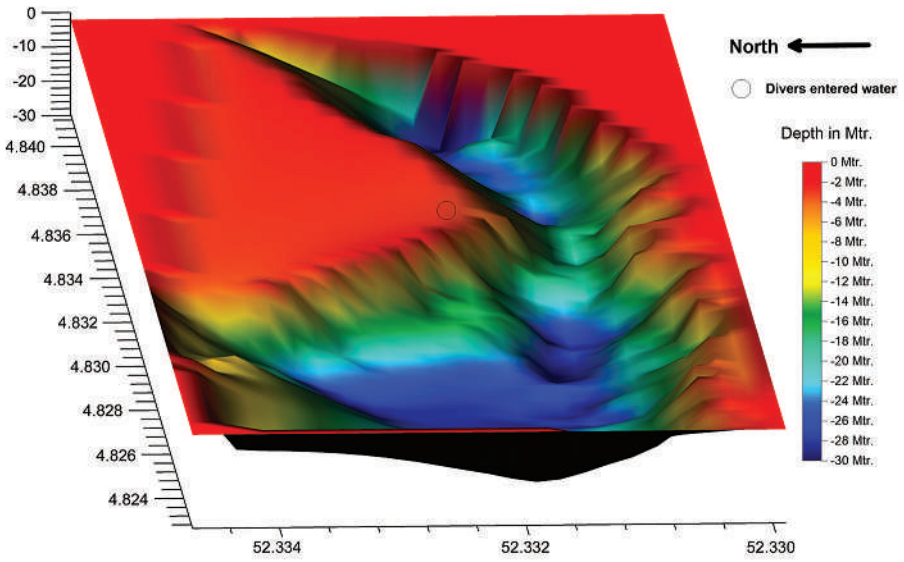
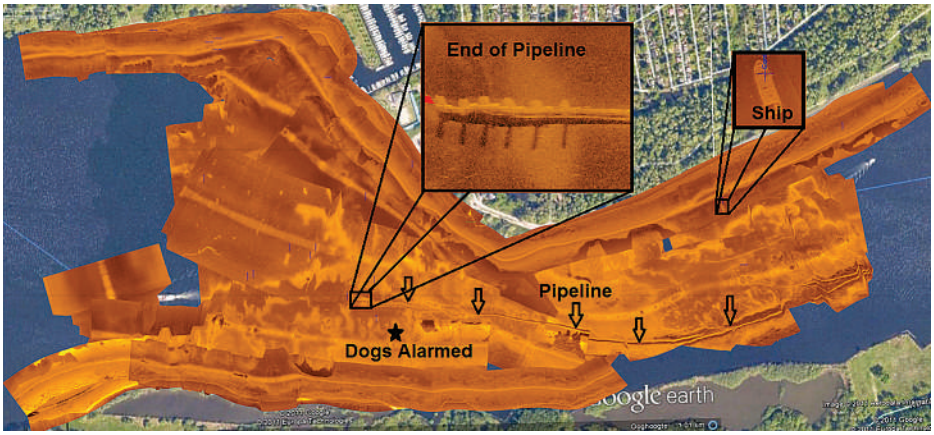
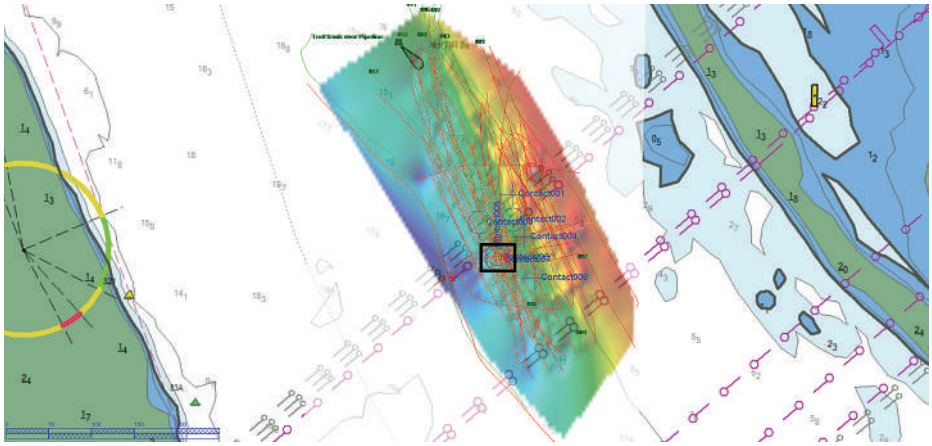


3D surface map of De Nieuwe Meer mapped in Golden Software's Surfer



Sonar images overlain on Google Earth image of De Nieuwe Meer



The Surfer project combining the bathymetric and nautical map, Google Earth, and survey tracks and contact point. The light green lines are the magnetometer survey tracks, blue points are the SSS contacts and red points are the magnetometer contacts. The anchor was located in the black square section, as predicted by de Vries

The body of the missing diver was eventually recovered. While an autopsy was unable to reveal the cause of death, the information on his dive computer pieced together the final moments of his life. He most likely died of a stroke or heart failure.

Anchor warning

Another SAR mission occurred within a Netherlands estuary. Due to an emergency, a ship was forced to drop anchor in a restricted area with electrical cables and pipelines transporting gasoline and chemicals. Because the probability of pipe or cable damage was high, the ship was not permitted to raise the anchor.

As such, the chain holding the multi-ton anchor was cut and left to reside at the bottom of the seabed. Due to the sheer mass of the anchor and discarded chain, it was critical to locate and retrieve the anchor to address any pipeline damages

Retrieval missions had been attempted by previous surveyors but were unsuccessful. Again, de Vries and his team were called in to locate the lost anchor. His first task was to narrow down the area in which they would conduct their survey. After consulting with third party resources, the surveying field was narrowed down to a 500m x 300m area.

While this area was larger than de Vries would have preferred, his team was able to complete the survey in a single day. The survey first began with a mounted side scan sonar (SSS) towfish. After a few hours, the team added a trailing magnetometer towfish to gather further detail on areas of interest and to complete the remaining survey area. The chance of locating the anchor was much greater by combining the abilities of both the SSS and magnetometer towfish.

After concluding the survey, the team analysed and post-processed the data. Eight different sonar contact points came up as possible anchor locations. The SSS data was mosaicked using Chesapeake Technology's SonarWiz.MAP software. Several basemaps were generated using Didger and then imported into SonarWiz.MAP and Surfer. All bathymetric data was then extracted for use in Surfer. A nautical chart, Google Earth base map, and SSS/magnetometer tracks and contacts were also imported into the Surfer project.

Upon further analysis, de Vries narrowed down the eight possible anchor locations to a single point. The Surfer bathymetric map was used by divers and salvage vessel crews to strategically position the salvage crane as they planned their anchor retrieval mission. This information allowed all groups to better understand what they would encounter beneath the water.

The anchor was successfully located in the area predicted by de Vries and his team.

While not all SAR missions are successful, the most important aspect of these undertakings is to ensure the safety of the men and women partaking in the search. Lives are saved when the subaquatic terrain is analysed before a single diver entering the water. Henk de Vries and the RemoSens team save lives and ensure those SAR divers don't result in another search and recovery mission.

THE MOST IMPORTANT ASPECT OF SAR MISSIONS IS TO ENSURE THE SAFETY OF THE MEN AND WOMEN IN THE SEARCH

Blakelee Mills is CEO of Golden Software (www.goldensoftware.com)