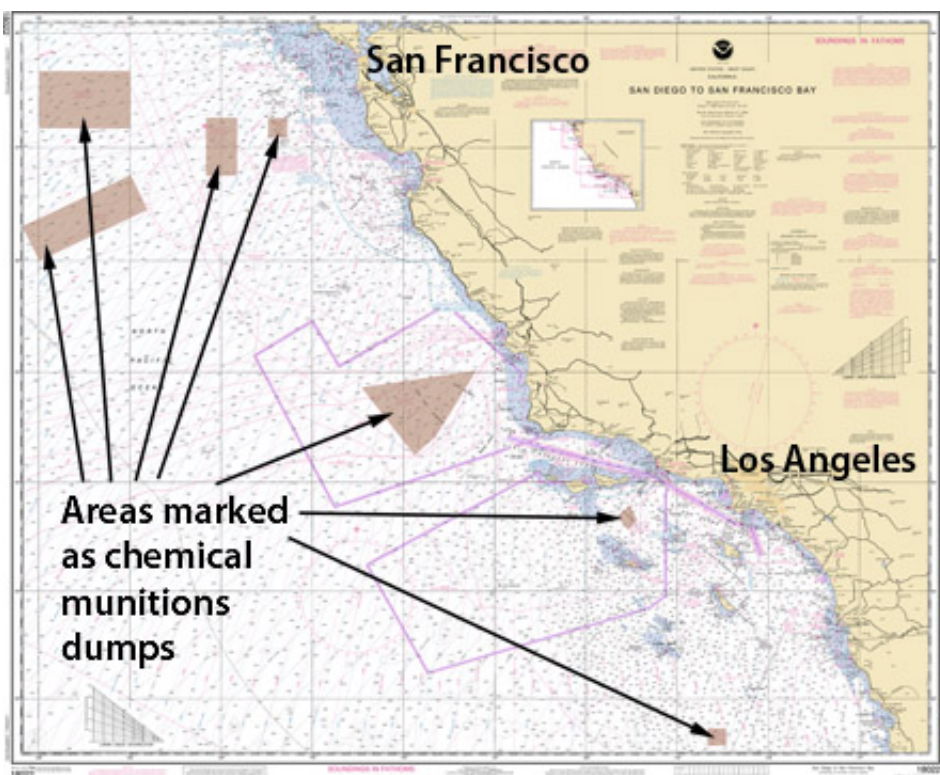


Survey of supposed deep-sea chemical munitions dump off Southern California reveals trash and 55-gallon drums

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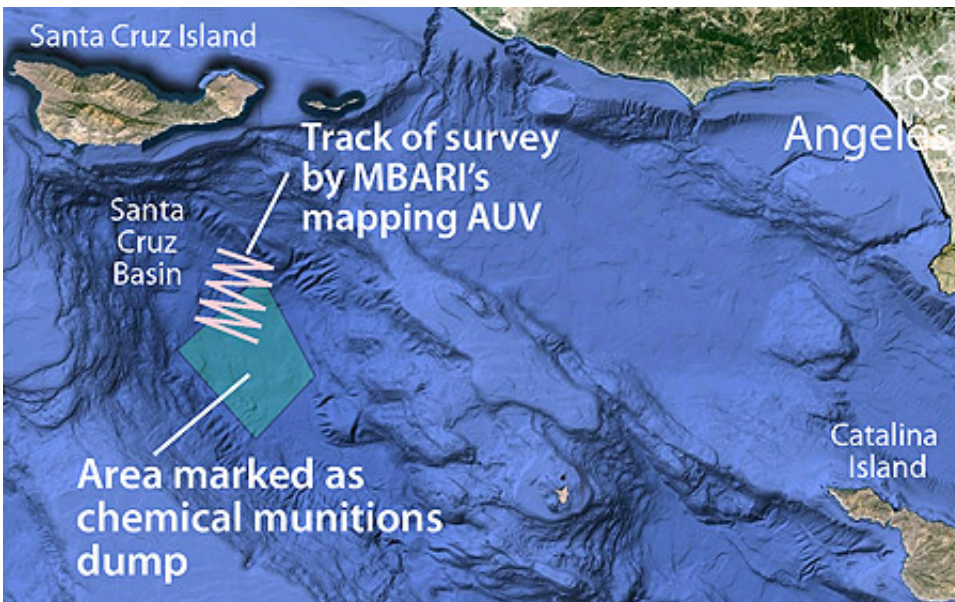
Nautical chart of the Southern California borderland showing areas marked as chemical munitions dumps. Credit: Monterey Bay Aquarium Research Institute

A total of 32 chemical munitions dumping areas are shown on nautical charts of United States waters. Seven of these lie off the California coast, between San Francisco and the Mexican border. Some of the

marked areas off California are huge, encompassing almost 4,000 square kilometers of seafloor. Of the seven California sites, only the area off San Francisco has been studied in any detail.

This concerns MBARI chemical oceanographer Peter Brewer. If chemical munitions were dumped at these sites, they could pose a hazard to fishers and researchers studying the [seafloor](#). Over the last 50 years, hundreds of fishermen in Japan, the Baltic Sea, and off the east coast of the United States have been injured by chemical munitions caught in their nets. On the other hand, Brewer suspects that some of the marked sites off California may not contain munitions at all. Other sites might contain munitions, but the areas of affected seafloor are likely to be much smaller than the areas shown on the charts.

With this in mind, Brewer used two different types of underwater robots to perform a preliminary survey of a marked dump site in the Santa Cruz Basin, about 110 kilometers (70 miles) southwest of Los Angeles, in water about 1,900 meters (6,300 feet) deep.



This illustration shows the location of the area in the Santa Cruz Basin marked as

a chemical waste dump. The pink zig-zag line shows the path that MBARI's mapping AVU took as it performed a preliminary survey of the seafloor inside and outside of the dump area. Base map: Google Earth

In March 2013, MBARI's seafloor-mapping AUV (autonomous underwater vehicle) spent 18 hours surveying a portion of the Santa Cruz Basin using side-scan sonar. Following a preprogrammed zig-zag path about 25 meters above the ocean bottom, the AUV surveyed almost 26 square kilometers of seafloor, including areas inside and outside the marked dump site. Within the surveyed areas, researchers counted 754 "targets" (objects sticking up from the seafloor).

Although the AUV sonar surveys allowed the researchers to locate hard objects on the seafloor, they did not provide enough detail so that these objects could be positively identified. To find out what was actually on the seafloor, Brewer's team returned to the Santa Cruz Basin in May 2013 and videotaped the seafloor using one of MBARI's remotely operated vehicles, the ROV Doc Ricketts.



This still image from video shows one of many 55-gallon drums that were lying on the seafloor in a part of the Santa Cruz Basin, offshore of Southern California, that is marked as a chemical munitions dump. Credit: (c) 2013 MBARI

Video from the ROV showed numerous 55-gallon drums in and on the muddy seafloor. Many of these rusting barrels were covered with anemones, sponges, crabs, and other animals. Other targets from the AUV survey turned out to be garbage such as canned goods and cases of bottled water. The researchers also found two small, unarmed drones used by the military for target practice, and a 30-meter-long steel mast from a ship. In short, the ROV survey turned up all sorts of marine debris, but no chemical weapons.

Based on the results of this partial survey, Brewer and his fellow researchers suggest that not all sites marked as chemical munitions dumps may actually have been used for this purpose. However, their work demonstrates that modern undersea robots, such as MBARI's seafloor-mapping AUV, are capable of surveying such marked dump areas relatively quickly. Such surveys will help cartographers redraw the lines around these areas, to more accurately reflect what's on the seafloor.

Provided by Monterey Bay Aquarium Research Institute

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