TO THOSE IN PERIL . . .

At a loss at sea

Deep-sea rescue techniques are no more help to the Scorpion than they were to the Thresher

The loss of the nuclear attack submarine Thresher in April 1963 showed that the U.S. Navy's search, rescue and recovery vessels were woefully behind the ability of its submarines to get into deep water.

Since then development of search and rescue techniques has been pushed. But they still lag behind submarine abilities, as the disappearance of the nuclear submarine Scorpion May 21 made clear.

In the Atlantic between the Azores and Norfolk the search for the missing and silent boat was continuing. Navy spokesmen speculate that one or more compartments may have flooded or that the submarine's power supply might be damaged.

The 21 vessels in the hunt include specially equipped scientific ships such as the USNS Mizar, which photographed the Thresher wreck.

Thresher went down in 8,400 feet of water off the New England coast. "We were unprepared to handle this situation in an effective manner, owing to our ignorance of the ocean environment and to the nonavailability of a system and techniques for locating, classifying and recovering objects from the deep sea floor," says Capt. Charles N. G. Hendrix, USN (Ret.), in the May issue of UNITED STATES NAVAL INSTITUTE PROCEEDINGS. Now an associate professor at the Naval Academy, Capt. Hendrix was a submarine officer involved in the search for Thresher.

Real deep submergence problems are of fairly recent date. "World War II," says Capt. William M. Nicholson, project manager of the Navy's Deep Submergence Systems Project, "was fought on the surface." Subs of that era stayed close under the surface and had to come up frequently. Today's submarines are true underwater craft.

Navigation at modern submarine depths—nobody will say exactly how deep, but Navy men talk of thousands of feet—requires extensive and detailed knowledge of the deep ocean; so do search and rescue operations. Capt. Hendrix decries the sketchiness of such information for the southern Pacific and calls for a revision and re-orientation of the Navy oceanographic program.

Knowledge of the more traveled North Atlantic is better, says Richard Perry of the Coast and Geodetic Survey, but still "reasonably imprecise."

Yet somewhere on this bottom, subject to drift by little known currents, a disabled submarine and its 99-man crew may lie. The first task is to find it.

At the beginning searchers assume that there are survivors. If the submarine comes to rest above the (classified) depth where water pressure would crush its hull, there are likely to be some. Capt. Hendrix estimates the endurance of a nuclear submarine crew at five days if the power plant is knocked out, up to 70 days if the power plant is fully operative.

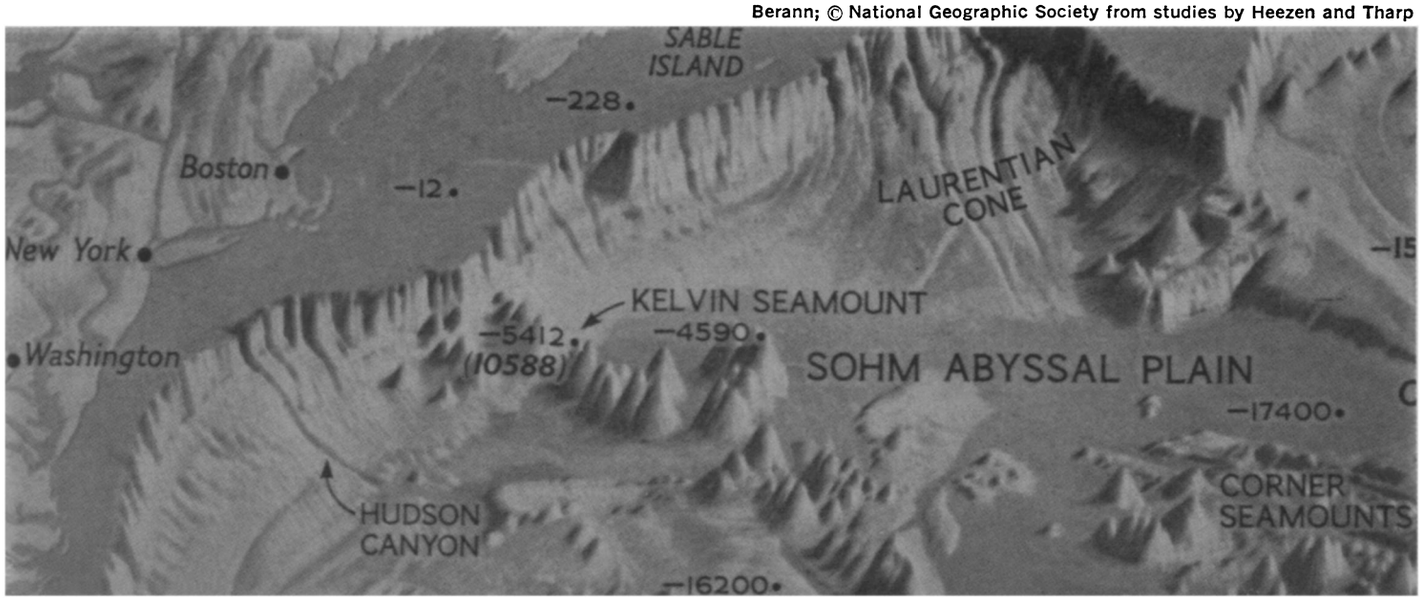
The captain of a disabled submarine has several means of making his presence known to surface ships. All submarines have marker buoys which can be released and sent to the surface. These bring up telephone lines that permit communication with any ship that finds them. There is also an ejectable radio transmitter that rises to the surface and broadcasts a message that can be received by passing planes or ships. Finally there are flares that can be sent to the surface and ignited.

But marker buoys may break loose, flares become exhausted and ejectable transmitters drift away. The submarine captain has then to rely on underwater communication methods, and these are "our greatest difficulty" according to Capt. Nicholson.

Acoustic waves are the only feasible

Two million square miles, some 17,400 feet down, hold the secret of the Scorpion's disappearance.

Berann; © National Geographic Society from studies by Heezen and Tharp



way of transmitting messages through seawater. Very low-frequency radio waves can penetrate a few tens of feet into the ocean and carry a message to a slightly submerged vessel, but neither transmission nor reception of radio is possible to a submarine in the deeps.

The so-called underwater telephone, for communication from submarine to submarine and from submarine to surface ships, uses an acoustical carrier wave, with an eight kiloHertz frequency, which is modulated to carry a spoken message the way a radio carrier wave is modulated to carry sound. These transmissions will carry a few miles under normal conditions when the submarine's full power is available to run them. An emergency underwater telephone that does not need the submarine's power system will carry a few hundred yards.

The submariners can also bang on their hull with hammers. Search ships can hear this noise several miles away, and it is still described as the best way of communicating under water.

If the submarine sends no active messages, surface ships can locate it with sonars or magnetometers that are carried either in their hulls or in small submersibles towed behind to avoid interference from the ship itself.

Once a submarine has been found, there are at present two ways of rescuing the crew. In fairly shallow water, inflatable lifebelts and perhaps breathing hoods allow individual crew members to pass through a pressure lock and rise to the surface along a buoy cable or similar guide. The technique, which goes back to early submarine days, has been successful in ascents from 350 feet. Capt. George F. Bond, assistant for medical effects in the Deep Submergence Systems Project, and his group, are trying to develop this classic technique for use down to 600 feet.

Although it will not be of use in very deep water, individual buoyant ascent is statistically a promising method since, Navy spokesmen say, the majority of submarine accidents happen in very shallow water—mostly near harbor entrances where traffic is heavy.

The other present rescue method is the McCann bell, a small captive submarine with a crew of two that travels up and down a buoy cable between a surface ship and the disabled submarine and brings the crew up eight men at a time. McCann bells are designed to go to 850 feet and may, with increasing danger of collapse, go as far as 1,200. Though McCann bells, like all the rest of the Navy's search and rescue equipment, are frequently tested, they have not been used in an actual rescue attempt since the Squalus sank off Portsmouth, N.H., in May 1939.

Since the Thresher disaster the Navy has been developing a system of Deep Submergence Rescue Vehicles. These will be miniature submarines that depart from a mother submarine, find the disabled vessel, take off her crew and return to the mother. The rescue vehicles are designed for a minimum operating depth of 3,500 feet and a collapse depth of 5,200 feet. The first one is due to be ready in summer 1969; by the end of 1970 the Navy expects to have six.

If a submarine falls below its collapse depth, as Thresher did, there is no further possibility of rescue. The Navy then sends for the ultradeep submersibles used in oceanographic research to go down and photograph and perhaps recover the wreckage. These submersibles include the Alvin, Aluminaut, Deep Star, Star III and Trieste. The Trieste holds the world's record for deep dives at 35,800 feet. It was she that found Thresher. The purpose of such a final operation is to gather information to prevent future disaster; but all the examination of the Thresher disaster apparently could not help the Scorpion and its 99 crewmen.

THE BITE AT HEW

Freeze before cuts

Health, Education, and Welfare Secretary Wilbur J. Cohen has estimated that $1 billion may be cut out of his department's budget for the fiscal year beginning July 1, if the proposed $6 billion spending cut is passed by Congress—a virtual certainty.

The House of Representatives was scheduled to act on the combined spending cut and tax increase this week; Senate action will follow. Both Houses have indicated they want the $6 billion cut, and President Johnson has given up hope of protecting agencies like HEW against it. Congressmen are demanding the cut as the price of a tax hike.

Such a reduction would have its greatest impact on research grants, but is likely to have a drastic effect on grants and contracts all down the line. Even if there were any prospects for passage of the $4 billion cut originally acceded to by the President (SN: 5/18, p. 472), severe cuts in HEW would be almost certain.

In order to be ready to make the sacrifice the department recently brought itself to a virtual standstill while it took stock of HEW programs. At first, spending for just about everything but paper clips was frozen. Later, grants and contracts to continue work being supported, as well as traineeships and fellowships for students beyond their first year, were awarded.

The situation now has thawed to the point where high- to middle-priority programs are being funded as usual. The freeze on low-priority items may continue a week or longer. By then it is expected that the Administration will make known the exact parts of the HEW anatomy where the cuts will be taken.

But the real bite is still to come: the spending slash.

Cohen notes that it is "reasonable to estimate for planning purposes that a $6 billion expenditure reduction might require a reduction of $700 million to $1 billion in HEW." This would mean a 21-to-31-percent cut in funds requested for the fiscal year starting July 1 for programs which, like research, he can control, unless some way were found to move against the $3.4 billion in funds Congress authorized in prior years. Such cuts, too, would lean heavily on biomedical research.

Cohen says the suspension of spending by HEW allows him to preserve his options for the expected cutback.

There appears to be little strain involved in complying with the freeze, at least for the short run. Noting that no existing commitments have been frozen under the order, one HEW spokesman says the only people likely to be hurt are those who have gone ahead, on their own, on projects for which they have received private, informal assurances of HEW support.

With the possibility that many proposed new programs will go from freeze to cutback to limbo for this year, the departmental money managers say that some of these programs will not be revivable next year. However, many such proposals would have died in the face of the massive cutback, freeze or no freeze.

At the National Institutes of Health an official of the Division of Regional Medical Programs says few of the unit's activities were caught in the freeze since it is so late in the fiscal year. Generally, NIH intramural research is not affected.

But a spokesman for the Division of Research Grants, which handles extramural programs, says grantees are worried more about the pending $6 billion cut than they are about a temporary freeze. Most of them qualify for continuation grants not affected by the freeze; but they have research projects growing or planned, and these are seriously threatened by long-term cutbacks.