Shark Bites and Cable Faults

A recent YouTube video of a shark biting a submarine cable attracted considerable media attention. The type of the featured cable, its depth and location are unknown. But on the basis of available data, the International Cable Protection Committee notes that cable damage from such attacks is historically rare.

Three independent studies of databases reveal a marked decline in the number of faults caused by fish bites including those of sharks.

1. For 1901 – 1957, a period dominated by submarine telegraphic cables, at least 28 cables were damaged[1].

2. During 1959 – 2006, when coaxial cables came to fore and were replaced by fibre-optic systems in 1988, around 11 cables needed repair[2]. This was 0.5% of all cable faults.

3. The latest analysis covering 2008 – 2013 recorded no cable faults attributable to sharks[3].

That reduction is consistent with improved cable design and other protection measures. This contrasts with anchoring and fishing activities, which are responsible for 65-75% of faults[2,4]. Remaining faults relate to natural phenomena such as subsea landslides and ocean currents (less than 10%), cable component failure (5%) and "cause unknown" (10-20%). It is unlikely that shark bites are masked in the "cause unknown" category because bites leave evidence in the form of teeth imprints or actual teeth embedded in a cable's sheathing.

The first recorded shark bites of a deep ocean fibre-optic cable occurred off the Canary Islands in 1985 to 1987[4,5]. The involved telecommunications cable connected two islands (Grand Canaria and Tenerife) and was the first operational deployment of a fibre-optic cable in the open ocean. The cable experienced faults whose cause was identified by shark teeth in the cable's polyethylene sheath. Testing by Bell Laboratory scientists showed the culprit was the deep-dwelling crocodile shark that was found to be swimming in water depths of 1060-1900m. Other sharks at other depths were not attracted to the cable. Those events led to design improvements of the cables' protective sheathing that effectively eliminated the problem.

Due to increased shipping and fishing activities on the continental shelf, fibre-optic cables are protected by the addition of steel wire "armour" to the cable's exterior, and/or burial up to 3m below the seabed[5]. Such measures are common for water depths less than 200m, but may extend into depths of 2000m in regions of deep-ocean fishing. In that context, cables are also provided with additional safeguards from shark bite in those water depths.

Sources

1. International Cable Protection Committee, 1988. Paper ICPC Plenary 1988.

2. Carter, L., Burnett, D., Drew, S., Hagadorn, L., Marle, G., Bartlett-McNeil, D., Irvine, N., 2009. Submarine Cables and the Oceans- connecting the world. UNEP-WCMC Biodiversity Series 31. ICPC/UNEP/UNEP-WCMC, 64pp. ISBN 978-0-9563387-2-3

3. Data from latest ICPC coordinated analysis.

4. Marra, L.J., 1989. Shark bite on the SL submarine light wave cable system: History, causes and resolution. IEEE Journal Oceanic Engineering 14: 230–237

5. Burnett D., Beckman R., and Davenport, T., 2014. Submarine Cables The Handbook of Law and Policy, Martinus Nijhoff Publishers at p.185 n.24, 194, and 257.

About the ICPC:

The ICPC was formed in 1958 and its primary goal is to promote the safeguarding of international submarine cables against man-made and natural hazards. The organisation provides a forum for the exchange of technical, legal and environmental information about submarine cables and, with 143 members from over 60 nations, is the World's premier submarine cable organization.

More information about the ICPC is available at www.iscpc.org

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