EVOLVING CABLE AWARENESS PROGRAMS IN RESPONSE TO DEVELOPING AND EXPERIMENTAL FISHERIES

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Abstract: According to the Tyco Telecommunications fault database, approximately 50% of known cable faults since 1960 have been attributed to commercial fishing practices. With the high cost of cable repair and potential lost revenue it is not a surprise that cable owners and maintenance companies are willing to invest in cable awareness services broadcasting information to the fishing industry. Efforts typically involve providing the routes of cables and an explanation of why it may be dangerous to fish near cables. Unfortunately, the concerns for submarine cables are not always reciprocated by all fishing fleets. Limited access to fisheries resources due to stock depletions, ecosystem based management, closures, and other industry regulations instill the concern that the livelihood of fishermen and their available fishing grounds are ever decreasing. To counter such situations, the fishing industry is constantly investing in new capture technologies. Therefore, it is in the best interest of the submarine cable industry to closely monitor developing fisheries and consider their prospective impacts on active cable systems. This investigation focuses on three fisheries sectors; exploratory deepwater fisheries, coastal aquaculture and open-ocean mariculture, and the use of area closures as a regulatory tool. Deep sea fisheries utilize extremely robust gear that can have damaging effects on cables. Aquaculture is growing at a rate of 13% per year and may soon compete with cables for seabed rights. The use of area closures for management is touted as being successful, but being a relatively new procedure, there is little evidence to support such claims. Cables routed through such areas are sometimes subject to additional fees and monetary penalties that lack precedent and so can vary between locations. Similarly to the modern approach to fishery management, the cable awareness community needs to implement proactive approaches for dealing with cable/fishing gear interactions. Understanding the long and short-term impacts of developing fisheries could lead to a reduction in faults as well as provide a lead into changing permitting regulations.

1 INTRODUCTION

Due to the high number of cable faults attributed to commercial fishing practices, it is not surprising that cable maintenance authorities are willing to heavily invest time and resources in understanding all elements of global fishing policy and regulations. Overall, global fisheries are in decline resulting from factors including overfished and depleted stock populations, long-term environmental impacts from invasive commercial-scale fishing techniques, high incidental bycatch rates, questionable stock assessment data sets, and management policies. As a result fishing regulations and enforcement are constantly becoming more complex, involved and strict. In response to the constricting management and in order to protect their livelihood, the fishing industry is continually investing heavily in new and experimental fishing gear, techniques and viable fishing grounds as well as using proactive and inventive management approaches to maximize catch and profits while minimizing impacts on fishery's resources. Some proposed and experimental fisheries don't prove to be fruitful, some are boom-and-bust in nature, and others become practicable fisheries that depend on constant fishing and regulatory modifications to ensure longevity. Regardless of the type of fishery, it is in the best interest of the submarine cable industry to stay apprised of experimentation, research and management developments throughout the fishing community as a means of improving cable protection.

Of specific concern to global cable protection are deepwater fisheries, emerging and growing maricuture farms and siting requirements and the use of marine protected areas or closed areas as a management tool. Deepwater fisheries are a direct risk to cables because fishing is taking place in areas of the ocean where threats previously did not exist, thus cables were not buried. Mariculture doesn't directly affect the safety of existing cables but has the potential to impact future cable route planning and installation as the aquaculture industry continues almost exponential growth on a global scale. Such explosive growth has created a situation in which proper management and regulations are lagging and struggling to keep up with aquaculture innovation. Marine protected areas were promoted as a new paradigm for sound fisheries management in the 1990s. Closed area management differs by country and by specific area, but all areas have the potential to ban commercial fishing, implement tariffs or penalties for submarine cable routing through the areas, or completely ban cable activities. A proper understanding of the developments pertaining to these subjects has the potential to improve cable protection awareness and possibly reduce cable faults caused by the commercial fishing industry.

2 DEEPWATER FISHERIES

The collapse of many traditional continental shelf fisheries and the advancement of fishing gear technology have combined to encourage fleets to travel to remote parts of the ocean in search of virgin fish stocks. With this global expansion of fishing effort, distant water fleets discovered highly productive deepwater habitats including seamounts and canyons (Stone *et al*, 2004). Species that have been identified at depths beyond traditional fishing depths and found in aggregate volumes high enough to support a commercial fishery include orange roughy, Chilean seabass and hoki. Commercial fishing gear capable of being modified to fish at depths greater than 3,000 meters includes otter trawls, longlines, and fish pots. Modifying gear for fishing in deepwater primarily includes making it more robust or durable, hence it tends to be heavier and create more of an impact on the marine environment (Stone *et al*, 2004).

Because deepwater fisheries exist as a means of taking pressure off of traditional capture fisheries, there tends to be little research dedicated to the longevity of the fishery. As a result, targeted deepwater species are investigated, targeted on an experimental basis, and then fully exploited before essential biological population benchmarks are identified and/or understood. Without a proper understanding of such information the majority of such fisheries have been boom-and-bust in nature. Unfortunately, in many cases the lessons of unsustainable deepwater fisheries are not appreciated and the solution to overfishing a deepwater species becomes locating other populations of the same species or trying deeper, hard to reach areas for similar species (FAO, 2004). Contrary to this approach, it has been suggested that it is unlikely that commercial exploitation of any deep sea species below 1,000 meters is sustainable because of their slow maturation to reproductive age (10-15 years) (Madin *et al*, 2003).

Deepwater fisheries and submarine cables clash because cables have not traditionally been buried at such water depths. Traditional burial depths for submarine cables is to a water depth of 1,000 meters, a depth that covers typical threats from ship anchors, marine mining, drilling, dredging and the vast majority of the fishing gears. Situations do exist in which cables are buried to depths of 1,500 m and deeper, but the effective limits of a modern plow are maximized at 1,500 m.

An example of a productive deepwater fishery that is of concern to unburied cables is the Antarctic longline fishery for Chilean sea bass. The fishery targets the species at a depth range of 500 m to 3,000 m. The vessels employ a unique methodology of baited hooks attached to a demersal longline that is affixed to the seabed by anchors that resemble fused railroad ties. The typical configuration is a 28-mm diameter synthetic 5-mile longline with approximately 130 pots evenly spaced along the length and weighted anchors attached to the ends and in between every 3-4 traps. A vessel will fish 2-3 lines at any given time to ensure that the vessel is continually working, albeit setting or hauling a line. This is an extremely specialized fishery that is believed to be responsible for at least 4 cable faults over the past 3 years. During the hauling of the gear, considering the length of gear in the water column being hauled, it is suspected that the anchors drag across or become entangled with the cable and fault the cable by abrasion with the line or the crushing force of the anchors and traps on the seabed. It is also not uncommon for fishermen to retrieve their strings of pots with grapnels, which can present major risks to cables. Fortunately, the range of Chilean sea bass dictates that they are almost fished in latitudes south of 33 degrees south, where communications cables are relatively sparse.

Constantly developing fishing gear technologies in addition to deep-sea fisheries occurring on the high seas combine to make the management of such fisheries extremely difficult. Fortunately for the submarine cable community, areas of the deep-sea environment have been identified within the past decade as being structurally complex and biologically diverse. As a result, a moratorium for high-seas fisheries is being considered by the United Nations Convention on the Law of the Sea (UNCLOS). Following the development of several deepsea fisheries, individual countries have begun deepsea observer and satellite monitoring programs (Uruguay, Argentina) and an independent management body has been established for the management of the new fishing grounds, the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR). It is believed that through coordination with such programs, cable routes can be provided to fishing vessels and their movements can be observed when actively fishing near cable routes. Intensive monitoring can also make more information available about specific fishing grounds to support cable routing which avoids high-risk areas.

3 MARICULTURE

Over the past two decades the production of capture fisheries reached an unsustainable plateau while aquaculture production has continually increased. According to the FAO (2006) aquaculture was responsible for the production of 59.4 million tons in 2004. Proponents of fish farming promote the industry as a long-term solution to the wild fish population problem because of the ability to produce volumes of seafood to meet the public demand and provide profitable opportunities for struggling members of the fishing industry and economic infrastructure for depressed communities (FAO, 2006).

Unlike freshwater aquaculture, competition within marine aquaculture, or mariculture, focuses on location and space versus other marine-based industries, rather than on water quality. Specifically, mariculture siting is constantly competing for space with capture fisheries, navigation, urban development, biodiversity conservation and terrestrial agriculture. In the past, opportune locations for aquaculture facilities were unique, but constant urbanization has created dispute over such areas that lack appropriate land-use zoning regulations. Several countries that rely heavily on aquaculture production to feed and employ their populations, such as Chile, Mexico, and China, have begun isolating coastal and marine areas through effective land use planning and zoning (FAO, 2006).

Similarly to capture fisheries, there are many types of aquaculture facilities including cages, tanks, raceways and net pens. Regarding potential threats to submarine cables, only net pen aquaculture is of concern, and specifically, only salmon farms are large enough to possibly impact cable routing. The average salmon farm is 30 acres in size and the regulations pertaining to siting and maintaining such farms are country-specific. Typically, regulations for aquaculture facilities are fairly elastic, except in countries where aquaculture is largely responsible for export infrastructure, such as Chile or China. In such cases the size and growth of a salmon farm is solely controlled by the carrying capacity of the surrounding ecosystem and the geographic confines of the appropriate temperate zone. This is relevant to the cable industry because it suggests that although it may be impossible to route a cable through a commercial fish farm, routing a cable around the farm may not be significant because the growth of a farm is minimal and dependent on surrounding environmental factors (Appleyard, 2007).

4 MARINE PROTECTED AREAS

The concept of marine protected areas (MPA) began with environmental activists seeking the conservation of unique and biologically diverse ecosystems such as atolls and seamounts (Stone *et al*, 2004). Today, MPAs exist for many different reasons and exist within management boundaries of countries possessing an EEZ. The USA manages the largest MPA programs with the most and largest protected areas in the world. According to the current legislation, MPAs are areas given special protection for natural or historic marine resources by state or federal authorities. The level of protection applied to a specific MPA can range from allowing uniform access to some interest groups, zoned multiple use access, zoned access with no-take areas, entire no take areas, no impact areas, and no access areas. Of interest to the cable and fishing industries are no impact and no access areas, in which activities that cause disturbances to the surrounding ecosystem are barred and all activities except transiting through the region are prohibited. Most MPAs do not prohibit commercial fishing because they employ an ecosystem approach to habitat conservation, although several no-take regions do exist.

Regarding the installation or presence of a submarine cable through an MPA, in recent years the National Oceanographic and Atmospheric Administration (NOAA) has interpreted the law to require that a special use permit for specific activities conducted within an MPA is required. NOAA has determined that it can assess and collect fees for such special use permits. The fees include actions such as having a NOAA observer onboard a cableship during an installation but also for the continued presence of commercial submarine cables beneath or on the seabed (NOAA Fisheries, 2006).

As for scientific substantiation supporting MPAs as management tools, empirical evidence has been collected by the National Academy of Sciences and at the state level in Virginia and Maryland showing ecosystem restoration and rehabilitation over time, as well as fishery targeted species rebuilding densities in closed locations.

5 CONCLUSIONS

The submarine cable and commercial fishing industries indirectly compete for resources in the marine environment. Although the factors that improve one industry are not shared by the other, many of the factors are intertwined and overlap, creating the opposition. Deep sea fisheries, either established or experimental, compete with the submarine cable industry for access to the seabed in regions where cables have not previously been buried. In order to mitigate the risks of continued exploration of greater depths and identification of unusual species, the cable industry will need to review deepsea routing techniques and cable protection. Mariculture may eventually compete with the submarine cable industry over siting regulations and permitting. It is in the best interest of the cable industry to investigate advances in net pen aquaculture and follow species-specific aquaculture as the farming of large pelagics, such as tuna, could prove to be problematic for cable installation. Additionally, it may be worthwhile to monitor the regional sources of aquaculture production as many 2nd and 3rd world nations with available water stand to profit greatly. At present there are no direct conflicts with mariculture operations, but the potential for competition does exist. The submarine cable industry competes with MPAs over restrictions for access to seabed in designated protected areas. As a management tool, MPAs strive to conserve marine ecosystems through a holistic approach that considers a many factors in assessing the health of an environment. As such, fishing may be considered harmful to an area and banned from the area, but the installation of a submarine cable may be considered detrimental as well and prohibited due to potential or perceived impacts on the surrounding environment. In each of the fisheries cases provided in this review future research and development will direct the industry into directions not readily foreseeable and the cable industry will gain from maintaining a vigilant understanding of developing technologies and regulatory management.

6 REFERENCES

Appleyard, C.L. 2007. Personal communications. Tropical Aquaculture Products, Inc. 02/19/2007.

Food and Agriculture Organization of the United Nations (FAO) Fisheries Department. 2006. The State of World Aquaculture. FAO fisheries technical paper No. 500. Rome, FAO-2006, 134 p.

Food and Agriculture Organization of the United Nations (FAO) Fisheries Department. 2004. The State of World Fisheries and Aquaculture.

Gianni, M. 2002. Protecting the biodiversity of seamount ecosystems in the deep sea – the case for a global agreement for marine reserves on the high seas. Discussion paper IUCN/WWF High Seas Marine Protected Areas Workshop, Malaga, Spain (15-17 January).

Madin, L.P., F. Grassle, F. Azam, D. Obura, M. Reaka-Kudla, M. Sibuet, G. Stone, K. Stocks, A. Walls, G. Allen. 2003. The Unknown Ocean. Case Study Paper for Defying Ocean's End conference, Cabo San Lucas, Mexico.

National Oceanographic and Atmospheric Administration, Federal register. 2006. Vol. 71, No. 19, pp. 4898-4903. 01/30/2006.

Stone, G., L. Madin, K. Stocks, G. Hovermale, P. Hoagland, M. Schumacher, C. Steve & H. Tausig. 2003. Seamount Biodiversity, Exploration and conservation. Case Study Paper for Defying Ocean's End conference, Cabo San Lucas, Mexico.

Tyco Telecommunications. 2006. Atlantis-II Cable Awareness Actvities. Madrid, Spain, 22 p.