Submarine Cables and Pipelines in the New England Region

Description of Activity and Potential Impacts to Fish Habitat

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The purpose of this document is to provide a succinct overview of current and potential future submarine cable and pipeline activities in the New England region, as well as a summary of the potential positive and negative effects on the species of fish and shellfish managed by NEFMC and their habitats. While there is the potential for effects on protected resources, these are not discussed here. This document briefly summarizes other human activities, including fishing, that may interact with cables and pipelines.

Activity Overview

Cables crisscross the seabed of the world's oceans and the area offshore New England is no exception. Major types of cables include those used to transmit electricity and those used for telecommunication. Pipelines are included here as well since their installation causes similar environmental effects and pipelines can have similar interactions with other activities occurring on or in the seabed.

A major use of cables is for carrying data: nearly all transoceanic communications occur via cables vs. with satellites. Coaxial telecommunication cables were installed from the 1950s until the late 1980s; modern versions employ fiber optic technology. In practice, fiber optic cables are generally powered as they require repeaters to transmit signals over longer distances. At present, globally, there are over a million kilometers of fiber optic telecommunication cables on and in the seabed.

Power transmission cables can be alternating or direct current (AC or DC). Direct current cables have fewer losses and can be used to transmit power over long distances; however conversion of electricity that is both generated and used in alternating current is required. Thus over shorter distances AC cables avoid the need for converters. For each type of cable there is an array of different configurations employed depending on the situation. Fiber optics can be bundled with power cables to allow for data transmission. Different types of insulation technology are used to protect the conductor from water infiltration, in the event the cable is damaged. Insulation may be achieved with fluids or gases.

Pipelines are designed to convey fluids from one location to another. In New England waters, these include liquefied natural gas pipelines. *MORE ON PIPELINES AND DIFFERENCES FROM CABLES*

The first step in cable or pipeline installation is route selection and survey. Initially, there is a desktop study, abbreviated DTS, generally done by marine geologists considering available hydrographic and geologic data as well as other uses of the route, including fishing and the presence of other cables. The results of the DTS are used to design in-depth surveys along the potential route. Data gathered during these surveys includes water depth and seabed topography, sediment type and thickness, biological communities, natural and human-made hazards, and measures of currents, tides and waves to estimate stability of the seafloor.

Cables and pipelines can be laid on the seabed or buried. Various methods are used to bury cables depending on the location (i.e. different approaches may be used adjacent to the shoreline, vs. in deeper waters) and the sediment type. Depth of burial depends on the sediment type as well as operational needs; for example in an area where bottom contact activities like fishing or dredging are likely, deeper depths may be preferred as a precautionary measure to protect the integrity of the cable. Cable laying may precede or coincide with burial.

Cables are generally armored in order to protect them from damage. Armoring materials include polyethylene and metal sheathings placed directly around the cable. Cables laid on the seabed can also be covered by armoring when burial is not possible, such as in hard bottom. Covers include articulated concrete mattresses, *MORE ON ARMORING APPROACHES*

If faults (i.e. structural damage) occur in fiber-optic cables (see section below on interactions), the cable must be repaired. This involves removing the damaged section followed by splicing of the replacement. *MORE ON REPAIR. INCLUDE A SUMMARY OF WHETHER/HOW MARINERS ARE NOTIFIED IF A REPAIR NEEDS TO OCCUR.*

EXPLAIN CABLE REMOVAL

In the U.S., the permitting and environmental review for a cable or pipeline project may be led by various federal agencies, depending on the type of cable or pipeline. NOAA Fisheries does EFH consultations on cable projects. The number of large projects consulted on in a given year is very small, perhaps 1-2, but many small projects involving utility cables and pipelines across streams and other bodies of water are considered annually.

- Telecommunication (fiber-optic) cables: Federal Communications Commission (FCC)
- Power transmission cables: Department of Energy (DOE)
- LNG pipelines: Federal Energy Regulatory Commission (FERC)
- Power offtake cables for offshore wind projects: Bureau of Ocean Energy Management (BOEM)

Current and potential extent of activity in New England*/SUMMARIZE SOME RECENT EXAMPLE PROJECTS.*

Potential Impacts to Habitat

Generally the effects of cables and pipelines, considering both installation and operations, include underwater noise, heat dissipation to the surrounding water or sediment, electromagnetic fields, contamination, and mechanical disturbance of seabed sediments and organisms. Cables and cable armoring structures can provide new substrates for benthic organisms that may not have existed previously, thus introducing artificial hard bottom into areas that may not have previously had this type of habitat. Spatial extent, timescale, and magnitude of the effect are important to consider when determining the severity of potential impacts. The potential for seabed recovery is also important, and will vary across different areas based on the organisms present.

Potential Impacts to NEFMC Species

SUMMARIZE POTENTIAL EFFECTS, BY SPECIES

Potential Interactions with Other Coastal/Marine Activities

Cable damage severe enough to affect transmission is referred to as a fault. Faults are typically detected by monitoring equipment onshore, although they may be reported at the site where the impact occurred.

Some faults are the result of human activities. Cables in waters shallower than 1,500 m are typically buried in order to avoid damage associated with bottom tending fishing gears and anchoring of fishing and other types of vessels. Combined, fishing gear and anchors are the greatest source of cable faults, contributing 65-70% of those in waters shallower than 200 m. Modern telecommunications cables are buried to depths of at least 60 cm which is generally sufficient to ensure that contact is unlikely even if fishing gear passes over the cable, given the typical penetration depth of trawl components. Fixed fishing gears are thought to cause fewer faults, particularly in shallow waters, but impacts may be greater at deeper depths, where static gears are heavier and telecommunications cables are generally less heavily armored than in shallow waters and are buried more shallowly. Dredging (for mineral mining or channel deepening purposes, vs. fishing) and drilling are other less frequent sources of human-caused impacts.

Natural disturbances can affect cables as well. In waters beyond 1,500 m, cables are generally installed on the surface of the seabed. In these locations, natural hazards such as submarine landslides caused by earthquakes, tsunamis, or severe storms can cause cable failures. Even on the abyssal plain, ocean currents scour and transport sediment to depths of at least 6,000 m. In deep waters, natural hazards are the largest source of faults (31%), although they only account for 10% of faults at all depths. In coastal areas, climate change may increase the risk of erosion, exposing cables nearshore, as well as increasing the flood risk of cable facilities.

References

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