FISH AGGREGATION DEVICES (FADs)
RISKS TO SUBMARINE CABLE DEPLOYMENT AND OPERATIONS

An Annex to Government Best Practices for Protecting and Promoting Resilience of Submarine Telecommunications Cables

With this Best Practices Annex, the International Cable Protection Committee (ICPC) identifies recommended actions for governments to protect submarine telecommunications cables from interactions with Fish Aggregation Devices (FADs) that are known to pose risk to marine vessel operations and damage cables during and after their installation. In presenting these Best Practices, the ICPC encourages government and industry discussions on this topic to ensure appropriate steps can be taken at a national and regional level to maintain continuity of critical telecommunications infrastructure.

1. Summary

An increasing number of submarine cables, both existing cables and newly installed cables, are being damaged by FADs. This damage can occur when cables are being installed and/or repaired due to abrasion of the cable with FAD mooring lines, or when FAD anchors are placed on or drift over a cable. Sometimes the initial cable damage does not cause a cable fault until months or years after these types of interactions.

As a result of the increase in cable damage, the ICPC recommends the following general approach for FAD management and submarine cable protection:

- Adoption, implementation, and enforcement of a FAD management plan;
- Designation of submarine cables as critical infrastructure, as a state should have an interest in protecting this infrastructure from the risk of damage and interruption to regional, national and international communications, and;
- Engagement of a state with the submarine cable industry through the local telecom operator or through ICPC, recognising that measures are currently being taken by the industry to mitigate the risk of cable damage from FADs.

2. Risks to Submarine Cables

The risk FADs pose to submarine cables is predominantly from anchored FADs which can be placed in shallow water as well as in water depths as great as 5,000m or more. These FADs pose the following risks which are categorised as risk to vessel operations and risks to the actual submarine cable:

2a. Risks to Vessel Operations

- Marine Route Survey: in shallow waters, typically down to 1,000m water depth, anchored FADs pose a risk to vessel navigation as well as entanglement of towed survey gear.
- Cable Installation, Maintenance and Repair: during cable installation, FADs pose a risk to vessel navigation as well as entanglement of the deployed cable.

2b. Risks to the Submarine Cable

- Cable Installation (deployment): cable can be damaged from mooring line abrasion as the cable descends through the water column to the seafloor. This abrasion can cause a shunt/insulation fault in which the power conductor is exposed to seawater. This damage necessitates repair once the fault occurs.
- Post Cable Installation: faults from abrasion can occur months or years after initial damage. Additionally, in other instances clump weights can crush or drag over existing cables, causing faults.
- During Cable Repair and Maintenance: where the cable is recovered from the seabed to replace optical units or repair damage, there is a chance of FAD interactions causing further defects to the cable.

See Figure 1 on the following page.

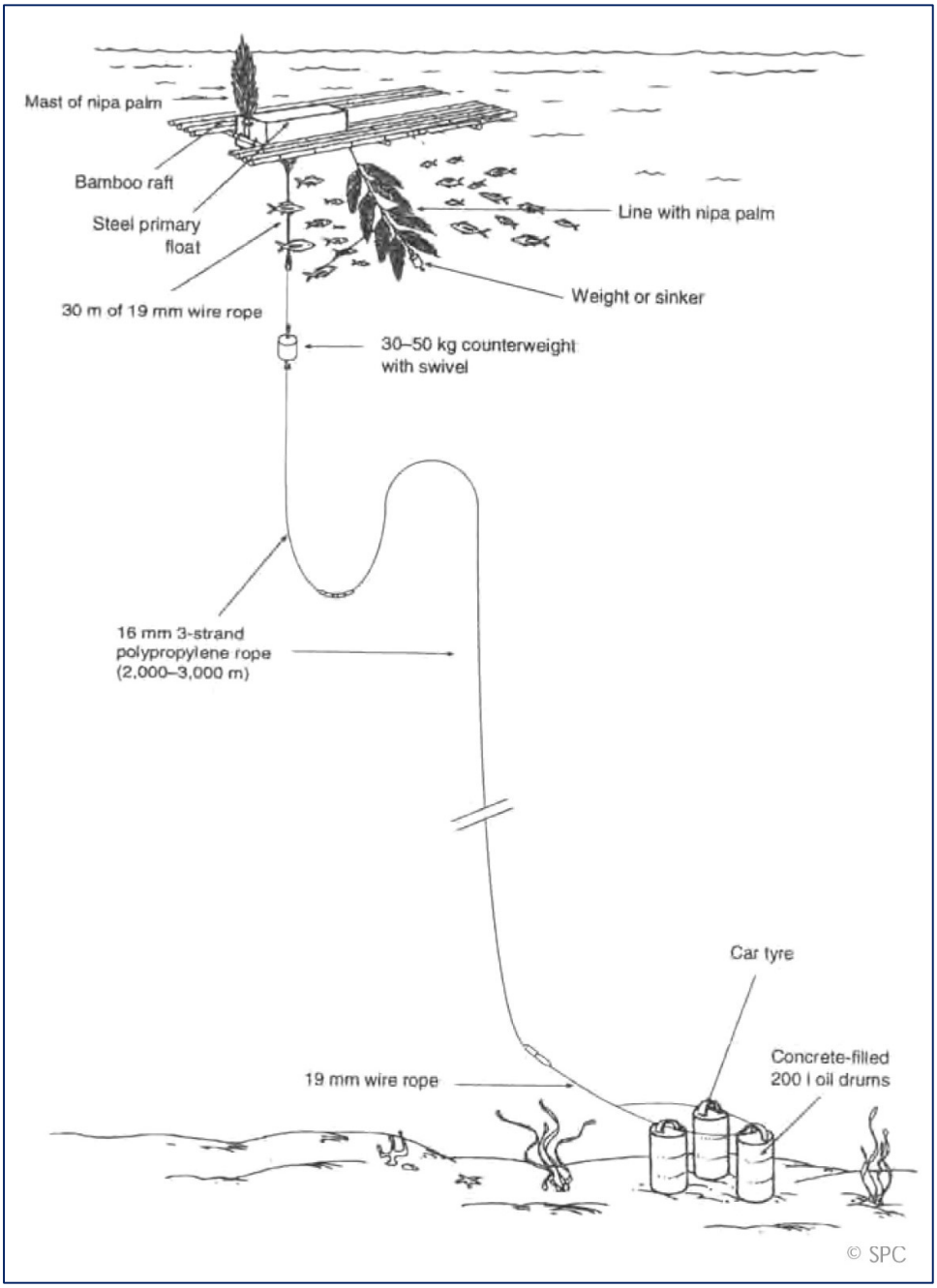

Figure 1: *Schematic illustration of a FAD (http://www.fao.org/3/i3087e/i3087e.pdf)*

3. Recent FAD-Related Cable Damage

Figure 2 below shows an example of cable damage caused by entanglement with FAD mooring lines in the deep ocean.

Figure 2: *Photograph of lightweight cable damage caused by entanglement with a FAD mooring near the Philippines in 4,000m water depth. Note that the polyethylene insulation has been stripped by the FAD mooring exposing the copper conductor.*

The cable is constructed with optical fibres in a central tube surrounded by high tensile steel wires and a copper power conductor, with polyethylene insulation on the outside. The abrasion by FAD moorings typically causes the power conductor which feeds the optical amplifiers to short-circuit with the seawater. A cable ship is then required to recover the cable and perform a repair.

4. Mitigation Recommendations

4a. Government Actions

Governments can adopt the following recommended actions to help mitigate the risk of FADs to submarine cables:

- Establish and enforce national regulations on FAD management to include registration, design, marking, and placement that is maintained in a national database. Make this available to telecom operators planning cable routes.
- Governments to engage fisheries to provide guidance in operating away from submarine cable infrastructure.
- Require a sustainable FAD design to prevent lost or discarded gear remaining in the ocean, (i.e., biodegradable or recoverable mooring lines).
- Require deployment of new FADs to be sufficiently far away from existing cables.

- Require or encourage that FADs be recovered or that mooring lines be weighted to sink to the seabed at the end of their useful life.

4b. Government Support for Industry Activities

The submarine cable industry already engages in mitigation efforts to prevent damage to cables from FADs. Additionally, the ICPC through its FAD Working Group, is developing technical guidance on the protection of submarine cables from FADs. Some mitigation efforts already being implemented include:

- Government and fisheries liaison and outreach
- Submarine cable route design to avoid, (as best as possible), areas of FAD operations
- FAD mapping/locating during pre-cable installation activities such as the marine route survey
- Relocation of FADs at the time of cable installation or maintenance to ensure a FAD-free installation corridor
- Enhanced cable armouring in areas of FAD risk
- Promoting cable awareness by engaging governments, fisheries, and FAD owners/operators (i.e., infographics, etc.)
- Compensating FAD owners for cost of materials if a FAD is removed or damaged

5. FAD Management Measures

Other organisations such as WWF-UK recommend states implement a FAD Management Plan, where specific measures can be taken to manage FADs. While these recommendations do not specifically pertain to the protection of submarine cables, the ICPC supports these measures as they would help mitigate some of the risks faced by the submarine cable industry ***(see reference)***.

These sustainable fishing measures include:

- Governments implementing a FAD management plan consisting of the following:
  - Required FAD marking
  - Required instrumentation of FADs for tracking and mapping
  - Capacity and/or fishing effort limitations on vessels setting FADs
  - Regulation of number of FADs/sets
  - Time and area closure for FADs
  - Require biodegradable or recoverable FADs

Such measures should be viewed as mutually beneficial because enhanced FAD management plans can support both sustainable fishing and also safeguarding of internet connections to often remote locations with limited bandwidth resilience. All of this does however rely on proactive enforcement to ensure compliance, particularly in regions where historically there has been little in the way of fisheries management.

6. Workshops

The interaction of FADs and submarine telecommunications cables is dynamic and growing. The ICPC promotes working collaboratively with governments and other stakeholders to mutually protect critical communications infrastructure.

The ICPC welcomes setting up a workshop with interested governments to discuss industry activity, these best practices that can be implemented by governments at a regional and national level, and the development or implementation of a FAD Management Plan.

