Bottom Trawling and the Cascadia Initiative OBS Deployments

Andrew Barclay
LDEO
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Summary

Bottom trawling can destroy or displace ocean-bottom seismometers (OBSs), and trawl-resistant designs may not be immune. OBSs can also damage nets and disrupt trawling activities. Bottom trawling is extensive in the area of the planned Cascadia Initiative ocean-bottom seismometer (OBS) deployments to water depths of 1280 m, with the exception of a number of conservation areas that are closed to bottom trawling and a large number of known hangs (ranging in size from barrels to wrecks, and including rock outcrops and reefs). The fishing industry along the Cascadia coast is well organized and an effort to deploy OBSs close to known hangs will minimize interactions between OBSs and trawling gear.

1. Description of fishing

Commercial fishing methods can be classified as static (or fixed) and mobile. Examples of static gear include pots (*lobster, crabs*) and long lines (hooks on suspended lines; *tuna, swordfish*). Mobile gear includes trawls and dredges (*scallops, clams*): trawling is classified as pelagic (midwater; *whiting*) or bottom (benthic; *groundfish including perch, lingcod, rockfish*).

There is presently no significant dredging industry along the Cascadia coast, so (except for some offshore bottom long lines) the risk to OBSs comes from bottom trawling. Bottom trawling uses a ground line of heavy rubber rollers between two heavy steel trawl doors in front of a net that captures the groundfish that are herded by the sweeps or "mud gear" that leads to the wing ends of the net from the trawl doors . The sweeps and ground line are the most likely components to interact with any seafloor OBSs although the doors and the net itself are also dangers. The dangers to fishing include net damage from snagging on a seafloor obstruction and the time spent freeing an entangled OBS on deck.

2. Extent of bottom trawling

The Cascadia margin is extensively bottom-trawled and it's probably useful to assume that everywhere is likely to be bottom-trawled once per year. However, none of the seven COZLA instruments that were on the shelf for 2 years offshore Newport were trawled, although at least one of these was deployed in an EFH area. Trawl-free areas are:

Off-shelf region. Trawling is restricted to depths shallower than a management line that approximates 700 fathoms = 1280 m (1 fathom = 6'). This limit is monitored

with position transponders on board fishing vessels and is strictly enforced with fines. However, the trawl lines can be a mile long at the deeper limit and the nets may cross the boundary, even though the boat may be inside the legal area. Only a small number of the ships are equipped to trawl at depths deeper than 600 fms = 1100 m.

Washington State waters. For Oregon, Washington and California, the state jurisdiction extends 3 geographic miles from shore. Bottom trawling is prohibited in state waters in Washington State, but generally permitted in Oregon and California.

Rockfish Conservation Areas (RCAs). The extent of these areas varies with time, but in general the depth interval from ~100-150 fms (~180-280 m) is closed year-round to bottom trawling along the entire coast from Cape Mendocino to Cape Flattery. At other times of the year the RCA can extend from ~75-200 fms (~140-370 m). The precise limits can be found at http://www.nwr.noaa.gov/Groundfish-Halibut/Groundfish-Fishery-Management/Groundfish-Closed-Areas/Index.cfm#CP_JUMP_30292.

Essential Fish Habitat Areas (EFHs). There are a number of regions along the coast where trawling is prohibited. On the shelf these are typically bathymetric highs. The Olympic Coast National Marine Sanctuary (OCNMS) is not an EFH, and it is open to bottom trawling. http://www.nwr.noaa.gov/Groundfish-Halibut/Groundfish-Fishery-Management/Groundfish-Closed-Areas/Index.cfm#CP_JUMP_30292. However, the Olympic 2 EFH area is a closed area found within the boundaries of the OCMNS.

Hangs. These include areas fishermen tend to avoid because they snag nets: wrecks, individual logs, barrels, boulders; cable exposures (covered by an avoidance agreement with the cable companies); rocky bottoms, including carbonate shelves that may have a directional snag hazard. Many of the hangs are generally known; however each captain keeps details records of specific areas to avoid. Note that the deeper the water, the longer the trawl wires and the bigger the margin necessary to avoid hangs.

3. Recommendations for mitigating OBS/trawl conflicts

1. Use trawl-resistant instruments to 700 fms. The LDEO trawl-resistant OBSs area limited to water depths of less than 1000 m. The SIO Abalones should probably be used in the 1000 – 1300 m depth range.

2. Work with the fishing industry to situate instruments near hangs. The local fishing industry has considerable collective knowledge of where not to trawl. It appears that in most cases a hang can be found within a few km of any nominal instrument location. This may be harder for free-fall instruments near large

seafloor hazards and for any near-shore dense sub-arrays where the instrument spacing is less flexible.

3. Publicize OBS locations. It's never clear whether it's better to advertise or conceal OBS locations. The commercial industry along Cascadia appears to be relatively well organized and well connected, and locally-based. The OSU mooring group advertises their site locations, and it would be especially useful to advertise instruments deployed near hangs.

4. Work with the Oregon Fishermen's Cable Commission (OFCC; http://www.ofcc.com), This organization represents a large number of the commercial fishermen along the coast (~180 boats), they have worked with the cable companies, including OOI, and they are willing to cooperate with the Cascadia Initiative. They also have extensive local knowledge: their chairman, Scott McMullen (smcmullen@ofcc.com), is a former trawler captain. The OFCC is funded by the submarine cable companies to prevent damage to cables and trawling gear. Other organizations representing trawlers are the Oregon Trawl Commission, an Oregon State commodity commission for trawl products and the Fishermen's Marketing Association, a coast wide trawler organization.

4. Other considerations

Dropweights. The fishing industry hates trawling up discarded dropweights. Other groups (OSU) recover their mooring anchors (typically large railcar wheels) although the OBS dropweights are likely to be smaller. Possible mitigation efforts include: leaving a chain attached and offering a recovery bounty to the fishermen; using dissolvable anchors/sandbags; and making the dropweights themselves low-profile and trawl-resistant.

Using fishing boats to deploy/recover OBSs. The cable companies employ fishing vessels as guard boats during installation. Properly-equipped fishing vessels could be chartered to deploy or recover one or two OBSs. Although this is probably not ideal for large experiments, it does allow the possibility of trimming the contingency time for research ship cruises: if a small number of OBSs cannot be recovered, then a fishing boat may be chartered later on. Many fishing boats are tied up (hence available) once their monthly quota has been filled.

5. Acknowledgements

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