Damage and disturbance to coral and sponge habitat in the Aleutian Archipelago

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Introduction

A unique feature of the benthic environment of the Aleutian Archipelago is the presence of a highly diverse and abundant coral and sponge community. There is a high degree of endemism, and coral abundance far exceeds that reported for other high latitude areas of the world. In addition to the rich coral and sponge community the Aleutians support important fisheries for groundfish and crabs . Fishing gear used in these fisheries can disrupt coral and sponge habitat. Since many coral species are known to be extremely long lived, recovery from gear damage may be extremely slow. Although some protective measures have been implemented conservation of this unique habitat continues to be a challenging problem in the area's fisheries that use bottom contact gear.

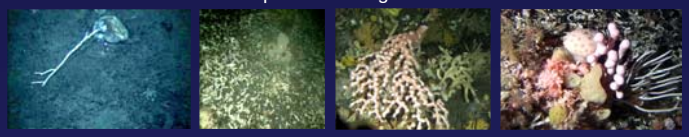
Many commercially valuable fish and crab species aggregate in habitat where corals and sponges are abundant, making these habitats at risk to fishing gear impacts.

Bamboo coral and hydrocoral snagged by longline gear.

Methods

Video footage of the seafloor collected via the *Delta* submarine *Jason II* ROV was used to assess damage and disturbance to coral and sponge habitat in relation to observed fishing intensity. Corals and sponges were classified as damaged if they consisted of broken skeletons, had missing or broken branches, were torn (i.e., for sponges) or had other evidence of injury, were detached from the seafloor, or were attached but overturned and lying in contact with the seafloor. Disturbance was defined as any alteration to the seafloor or biota caused by fishing gear or natural events.

Examples of damage to coral



Starting from left to right: bamboo coral attached but overturned and lying in contact with the seafloor; hydrocoral skeletons; bubblegum coral detached from the seafloor; a small patch of bubblegum coral, soft coral, stoloniferan coral, hydrocorals, demosponges, and a sea anemone reside at the edge of a path littered with damaged hydrocoral skeletons.

Examples of disturbance to coral and sponge habitat

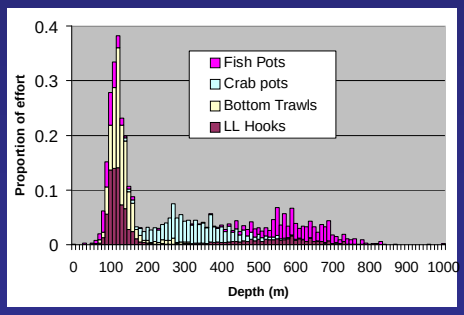
Trawl tracks on gravel substrate with sponges (left); longline gear on boulders with hydrocoral (right)

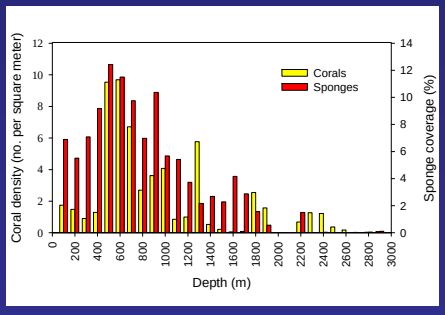
Damage was measured as a proportion of counted individuals with observed damage.

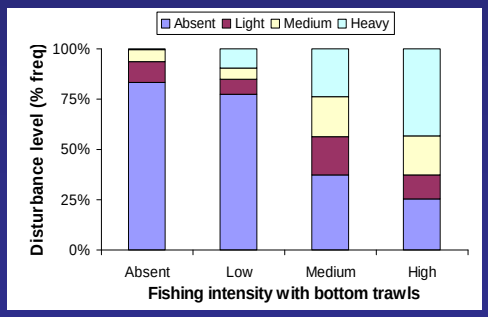
Categories used to assign disturbance codes to video transect data.

0 (Absent)	No evidence of disturbance
1 (Light)	>0 – 9% of biota and/or substrate showed evidence of disturbance
2 (Moderate)	10 - 50% of biota and/or substrate showed evidence of disturbance
3 (Heavy)	>50% of biota and/or substrate showed evidence disturbance

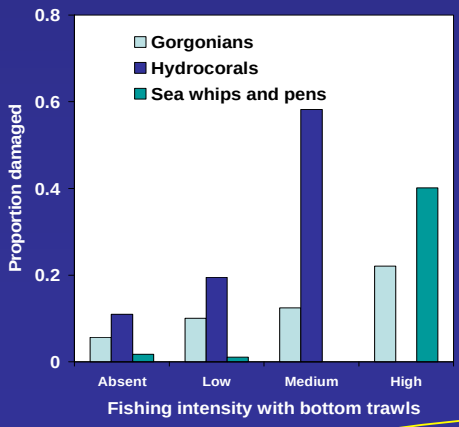
Results and Discussion





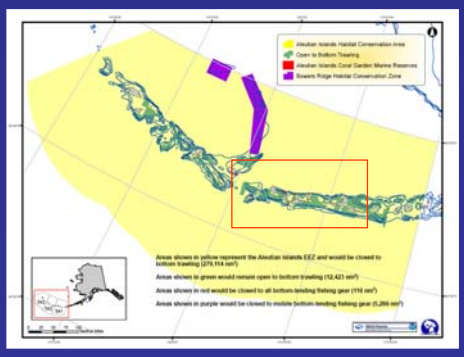


High densities of corals and sponges are found in the depth zone where most fishing occurs. The higher the level of bottom trawling the higher the level of seafloor disturbance. Results varied for other gear types.



There was a distinct relationship between bottom trawling intensity and coral damage. Note that hydrocorals were not present in areas with heavy bottom trawling intensity. Results varied for the other gear types.

Protective measures in the Aleutian Islands include restricting bottom trawling to historically fished areas. While this measure may halt the expansion of bottom trawling to areas not fished, the conservation of coral and sponge habitat in fished areas is still of primary concern.



We infer that consistency of the results for bottom trawling is partly because trawl gear tends to be in contact with the seafloor along a continuous path and the footprint can be extensive (tens of meters wide). Other gear types have a more irregular and narrower contact with the seafloor. For example, while longlined crab pots can sometimes cause extensive damage and disturbance, the level depends on whether the gear is retrieved in areas of steep bathymetry or whether retrieval occurs in strong winds and currents which can intensify the amount of dragging on the seafloor.