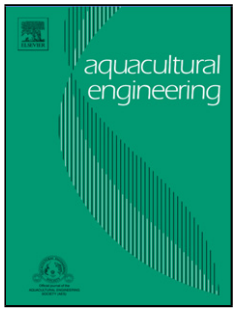

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Observations of the loading and motion of a submerged mussel longline at an open ocean site

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Highlights

- The loading and motions of a submerged mussel longline with legs was monitored during 40 days at an open ocean site.
- Current velocity did not exceed 24 cm/s and waves alternated between sea states 1 and 5.
- The tension in the mooring lines and the acceleration of the mussel droppers were much smaller than for surface longlines monitored in milder conditions.
- The recorded forces were two orders of magnitude smaller than the rope breaking strength and the anchor holding capacity. There was no mussel fall-off (sloughing).
- The drag force on the longline was limited by current shielding between the droppers and flow blocage by surrounding longlines. The resistance of the legs further reduced the force transmitted to the anchors (maximum of 600 N).
- Vertical dropper acceleration was limited (<1/20g) due to the exponential reduction of wave loading with depth.

Abstract

The loading by currents and waves of a submerged mussel longline and the resulting motions of the structure were monitored during 40 days at an open ocean site. Current velocity did not exceed 24 cm/s and the wave field alternated between calm and moderate conditions (maximum wave height of 3.5 m). Legs on the longline maintained the mainline between 10 and 12.5 m above the seabed (around 10 m below the surface). The loading and motion of the longline were relatively small. Tension in the mooring lines (semi-hourly averaged maximum of 580 N) was limited by the combined effect of a small pretension, current shielding between mussel droppers, flow blockage by surrounding longlines and leg resistance. Significant longline displacement occurred only during short periods of time when the predicted drag force transmitted to the legs exceeded their predicted holding capacity. Mussel dropper vertical acceleration (maximum of 1/20g) was limited by the exponential attenuation of wave loading with depth.