Fig. S1. An example of "stranding" of eelgrass on longlines

Text S1. Nekton supplemental methods

Nekton sampling in this project was done primarily with unbaited traps, set at low tide and collected at high tide. Two additional methods were used with less success Visibility was poor in many of the videos, making it difficult to have accurate counts and high taxonomic resolution. A custom beach seine was difficult to deploy in the longlines because of physical structure.

GoPro cameras were set out at each site, with two cameras at and in each spacing (n=2). Video analysis was carried out by looking at twenty two-minute videos per camera with ten occurring before slack tide, then slack tide and the next nine videos. If there was an obstruction, such as algae covering the camera, or camera had a failure that caused the videos to be shorter than two minutes, then additional videos were used so that the total run time was 40 minutes. Fish were counted using the max count (MaxN) method (Ferris et al.2021). Cameras were placed at Bay Center on 6/15/23 and 8/15/23 and at Stony Point on 6/16/23 and 8/14/23.

Seines were done with a custom beach seine deployed when the water was 40-70 cm above the sediment. The seine (3 mm mesh) had 6-m wings that were walked down aisles, and then two "chaser nets" were used to chase nekton into the cod end. The cod end was lifted into a tub of seawater, all individuals were identified and counted, and the first 10 of each species was measured for length, as they were removed and immediately released. Seines were replicated about 10 m apart at each site and spacing (2 per plot). Seines were deployed at Bay Center on 7/25/23 and Stony Point on 7/24/23.

Analyses were carried out on total counts of nekton summed by plot and date (i.e. two cameras or two seines per sample). Midsummer nekton abundance in seines was greater at Stony Point than Bay Center, increased with longline density, and did not differ by aisle width (Table S2). In video sampling, which occurred twice, nekton abundance was greater in August than June, in the aisle width analysis only, and otherwise did not differ by site or by longline spacing treatment.

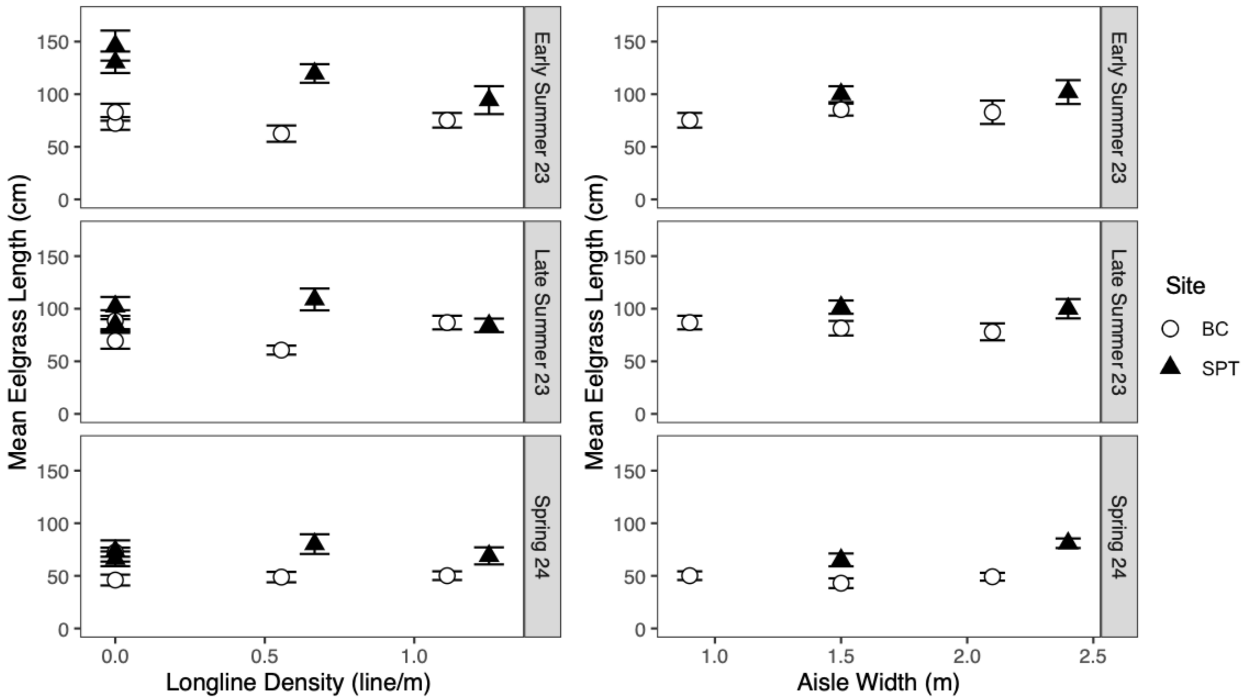

Fig. S2. Mean eelgrass length of longest blade (cm) across longline treatments. Symbols represent different sites. Error bars are one standard error of the mean (N = 6 subsamples).

Table S1. Results from PERMANOVA on the epifaunal and nekton communities. Both were sampled on three dates over two years. For epifauna there were two reference plots per site, but only one for nekton, contributing to lower residual df in the longline density analysis. Significant factors are bolded ($P<0.05$).

	Factor	Df	Sum of Sq	R^2	F	P value
Epifauna Community						
Line Density	**Site**	**1**	**0.7834**	**0.13969**	**5.0797**	**0.0001**
	Date	**2**	**1.6927**	**0.30166**	**5.4847**	**0.0001**
	Line Density	1	0.2027	0.03615	1.3146	0.2245
	Residual	19	2.9301	0.52250		
Aisle Width	**Site**	**1**	**0.6564**	**0.17358**	**4.5012**	**0.0001**
	Date	**2**	**1.4768**	**0.38817**	**5.0328**	**0.0001**
	Aisle Width	1	0.1990	0.05261	1.3643	0.2198
	Residual	10	3.7815	1.0000		
Nekton Community						
Line Density	**Site**	**1**	**0.7608**	**0.16798**	**4.1844**	**0.0001**
	Date	**2**	**1.1596**	**0.25602**	**3.1888**	**0.0001**
	Line Density	1	0.2452	0.05412	1.3483	0.2202
	Residual	13	2.3638	0.52187		
Aisle Width	**Site**	**1**	**0.8002**	**0.22451**	**4.549**	**0.0004**
	Date	**2**	**0.9103**	**0.2554**	**2.5874**	**0.0039**
	Aisle Width	1	0.0946	0.02654	0.5378	0.8352
	Residual	10	1.7591	0.49355		

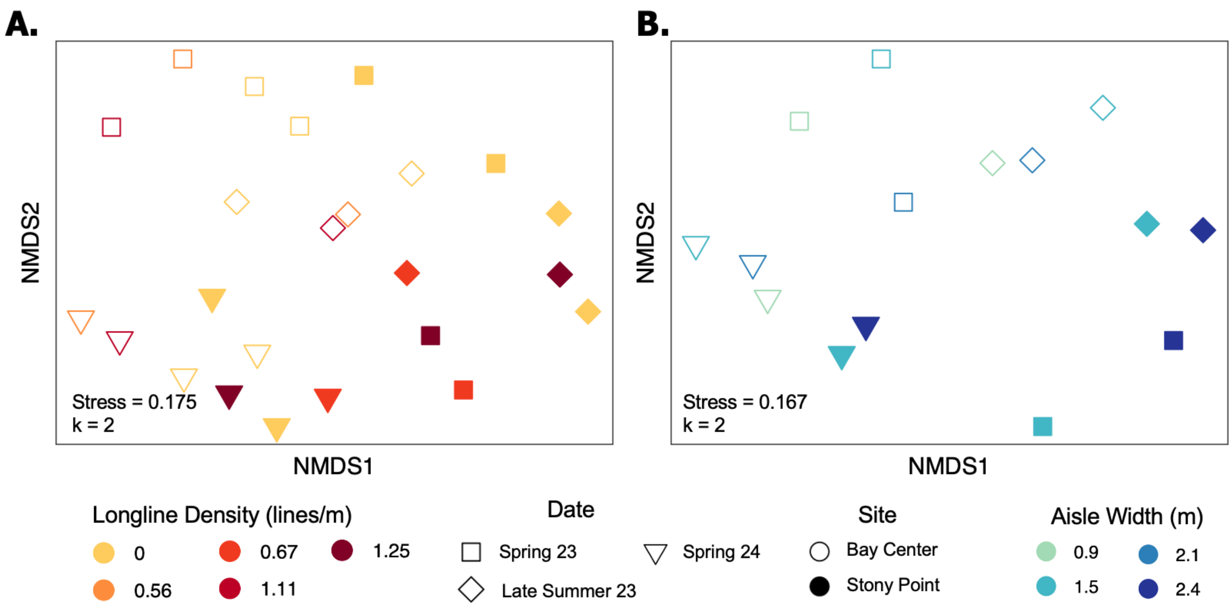

Figure S3. NMDS of epifaunal assemblages across oyster aquaculture plots across different experimental conditions. Non-metric multidimensional scaling was carried out on abundance of each taxon in each plot and date, averaged across six subsamples. NMDS was by the grouping of either (A) longline density or (B) wider aisles. Darker shades represent either denser longlines or wider aisles, symbols are the different dates. NMDS values for longline density and for aisle width were calculated separately so visualizations must be interpreted separately.

Table S2. Counts of nekton in three sampling methods across longline spacing treatments at Bay Center and Stony Point, Willapa Bay, Washington, USA in 2023-2024. Traps were deployed three times, seines were done once, and videos were deployed twice.

Common Names	Scientific Name	Count in traps	Count in seines	Count in videos
Total individuals		1376	374	661
Staghorn Sculpin	*Leptocottus armatus*	599	8	8
Saddleback gunnel	*Pholis ornata*	553	140	50
Shore Crab	*Hemigrapsus oregonensis*	80	8	21
Shiner perch	*Cymatogaster aggregata*	35	50	415
English sole	*Parophrys vetulus*	26	0	0
Dungeness Crab	*Metacarcinus magister*	25	26	41
Kelp Greenling	*Hexagrammos decagrammus*	23	0	1
Snake Prickleback	*Lumpenus sagitta*	11	0	0
Bay Pipefish	*Syngnathus leptorhynchus*	10	6	12
Starry flounder	*Platichthys stellatus*	4	0	0
Three-spine Stickleback	*Gasterosteus aculeatus*	4	1	1
Green Crab	*Carcinus maenus*	3	1	0
Crangon Shrimp	*Crangonidae*	2	66	0
Pacific Sand dab	*Citharichthys sordidus*	1	0	0
Hippolytid Shrimp	*Hippolytidae*	0	57	0
Arrow goby	*Clevelandia ios*	0	11	0
UnID Salmonid	Salmonidae	0	0	1
Chinook	*Oncorhynchus tshawytscha*	0	0	1
Unknown fish		0	0	65
Unknown crab		0	0	46

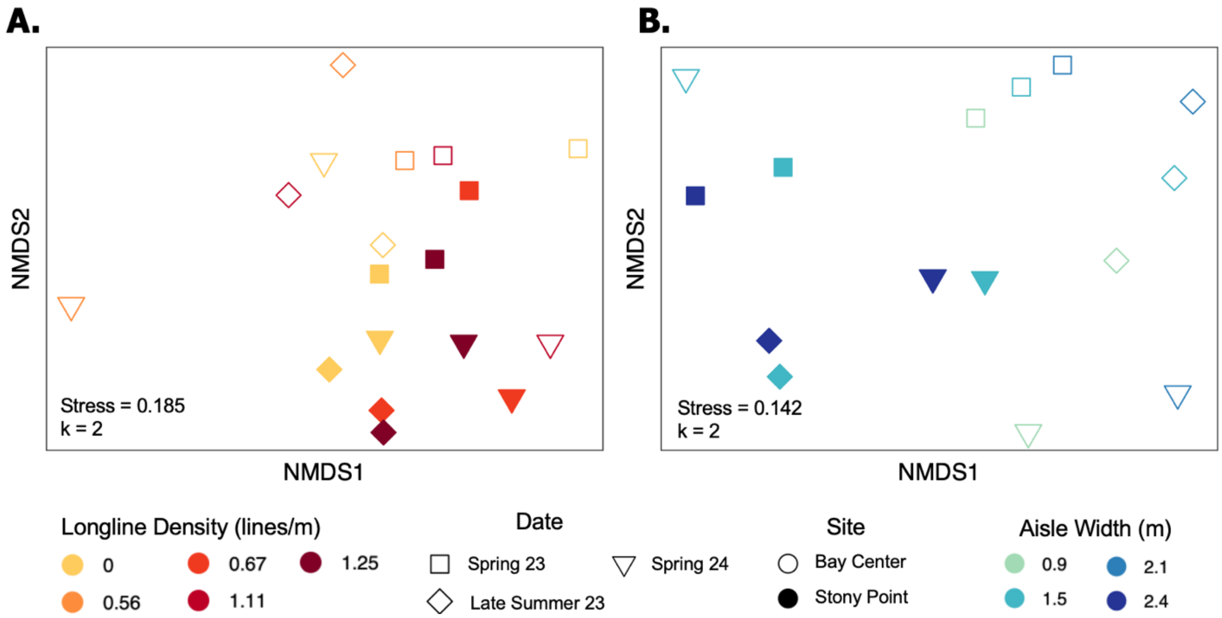

Fig. S4. NMDS of nekton assemblages across oyster aquaculture plots across different experimental conditions. Non-metric multidimensional scaling was carried out on abundance of each taxon in each plot and date, averaged across six subsamples. NMDS was by the grouping of either (A) longline density or (B) wider aisles. Darker shades represent either denser longlines or wider aisles, symbols are the different dates. NMDS values for longline density and for aisle width were calculated separately so visualizations must be interpreted separately.
set.

Table S3. Results testing nekton abundance response to longline spacing treatments in video and seine methods.

A)	Seine Nekton	Video Nekton
Distribution	Log transf	Log tranf
Number of plot-date samples	8	10
Site (SPT relative to BC)	**0.965 (0.106)**	-0.585
Early summer vs first sample	NA	NA
Late summer vs first sample	NA	0.205 (0.457)
Spring 2024 vs first sample	NA	NA
Longline density	**0.793 (0.108)**	0.292 (0.508)

B)	Seine Nekton	Video Nekton
Distribution	Log transf	Log 1p tranf
Number of plot-date samples	5	6
Site (SPT relative to BC)	**1.197 (0.305)**	0.023 (0.993)
Early summer vs first sample	NA	NA
Late summer vs first sample	NA	**1.671 (0.253)**
Spring 2024 vs first sample	NA	NA
Aisle width	-0.546 (0.285)	-0.840 (0.932)

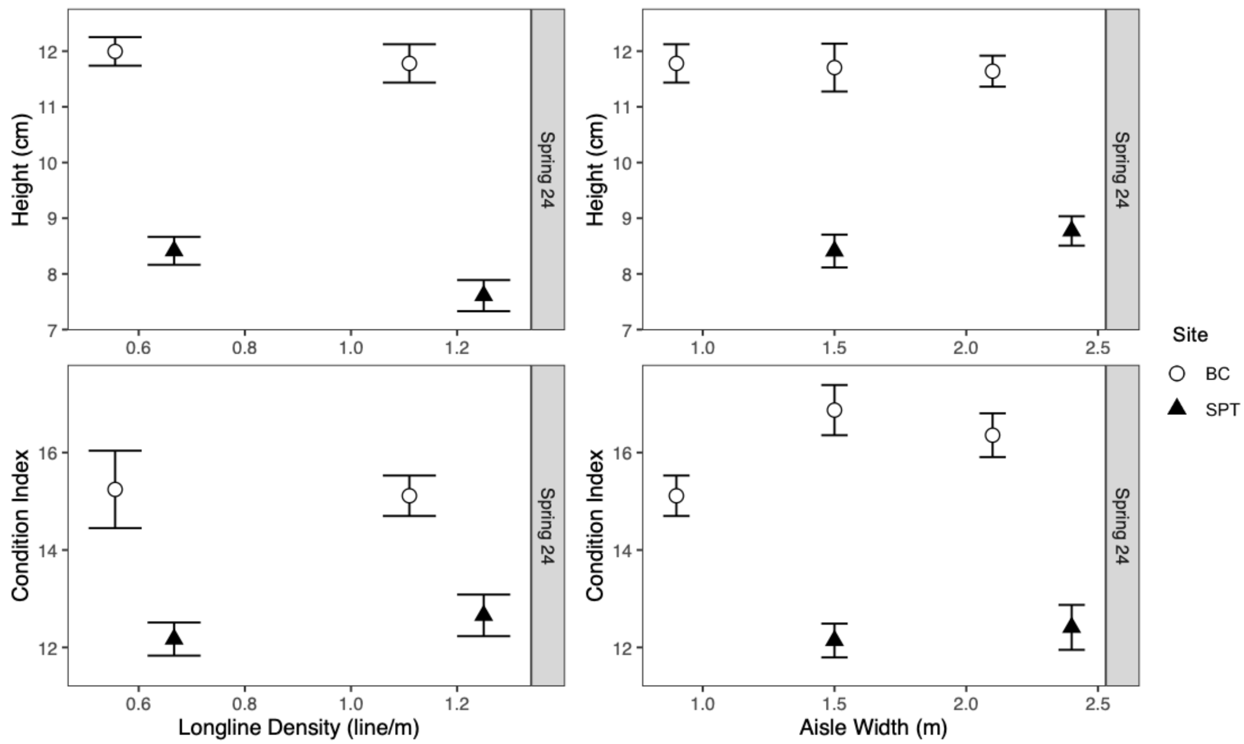

Figure S5. Oyster (*Crassostrea* (*Magallana) gigas*) response across aquaculture plots differing in longline spacing. The top two panels compare the height of the oyster shell across treatments, while the bottom two compare condition index ((dry meat weight / (wet oyster weight – dry shell weight)) * 100). Error bars represent one standard error of the mean (N=20).

References

Ferriss, B., Veggerby, K., Bogeberg, M., Conway-Cranos, L., Hoberecht, L., Kiffney, P., Litle, K., Toft, J. and Sanderson, B., 2021. Characterizing the habitat function of bivalve aquaculture using underwater video. *Aquaculture Environment Interactions*, 13, pp.439-454. https://doi.org/10.3354/aei00418