Summary of Magnet Study

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Hypothesis

It has been shown that the magnet field surrounding underwater power cables from wind farms attracts brown crabs, causing them to linger and forego their normal migrations (https://www.iflscience.com/crabs-are-spellbound-by-electromagnetic-fields-emitted-by-underwater-power-cables-61235). This observation leads credence to the hypothesis proposed by some crab harvesters in Tillamook Bay, Oregon that cow magnets can be used to trap green crabs (Clair Thomas, pers. com.). Cow magnets are smooth, cylindrical rods ~8 cm long, and 1 cm inch in diameter (Figure 1), rated at 2200-2600 Gauss. Cow magnets are popular with dairy farmers and veterinarians to protect cattle from harmful ferrous materials such as bits of old fencing that they may inadvertently ingest while grazing. The magnets are inserted into the cow's second stomach and thus prevent metal bits from lodging in the crevices of the rumen and reticulum or puncturing the intestines.

Figure 1. Cow magnet

Method

We set up 30 Fukui traps parallel to the shore, along the causeway at Sally's Bend, Newport during low tide on June 18, 2023. Traps were set 10 paces apart, along the 6 ft tidal level on the mudflat, just below the rock riprap. Traps were randomly assigned to 3 treatments within each of the 10 blocks. Treatments consisted of empty trap controls, traps baited with catfish and traps with cow magnets. After 24 hours we returned and scored the organisms within each trap. Native species were returned to the shore while green crabs were taken to the lab and their sex, carapace width and molt condition recorded.

Results

For each of the 3 treatments we observed great variability in the number of green crabs and Staghorn Sculpins that entered traps (Table 1). This variability is not surprising as crabs and

sculpins are not evenly distributed in nature but interact with each other. There is a hint that baited traps may be attracting more large crabs and more sculpins than un-baited traps. The observation that crabs enter empty traps suggests that they are attracted to the shelter that the traps provide. From a previous trapping experiment with red rock crabs, we observed that females and smaller crabs avoid traps with larger crabs. This behavior is not surprising because crabs are cannibalistic. To test the hypothesis that magnets attract green crabs, we would need a sample size >> 10 traps per treatment. This could be achieved by running the trials multiple days. Also, we would only run two treatments: control and magnets to eliminate scent as a factor. Prior to that, we would set up lab trials with rectangular tanks (3.18 X 1.18 X 0.30 m) in which individual crabs are given the choice of moving to the side with or without magnets.

Table 1. Catch per trap per day of European green crabs and Staghorn sculpins entering Fukui traps deployed at Sally's Bend in Yaquina Bay. The treatments consisted of empty traps (Control), traps baited with catfish and traps containing one cow magnet each.

	Control		Catfish Bait		Cow Magnets	
Number of traps per treatment	10		10		10	
Average #/trap/day **Large Crabs** > 60 mm CW	2.0		**3.2**		1.0	
Average#/trap/day **Small Crabs** < 60 mm CW		5.7		5.5		8.0
Range # crabs/ trap/day	0-5	0-15	1-7	0-13	0-3	3-19
Average #/trap/day Large and small crabs	7.7		8.7		9.0	
Range #crabs/trap/day	5 - 17		2 - 15		4 - 20	
Average #/trap/day Staghorn Sculpin	9.7		**14.3**		7.2	
Range # sculpins/trap/day	0 - 17		7 - 30		0 - 13	