Red King Crab

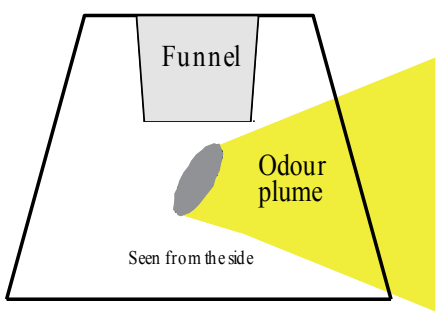
Vertical movements of crabs trapped in the odour plume explain differences in catch efficiency between square and conical pots

Stian Stiansen[1)], Anders Fernö[1,2)], Dag Furevik[1)],Terje Jørgensen[1)], Svein Løkkeborg[1)] and Hallvard Godøy[1)]

1) Institute of Marine Research, PO Box 1870 Nordnes, 5817 Bergen, Norway
2) Department of Biology, University of Bergen, PO Box 7800, 5020 Bergen, Norway

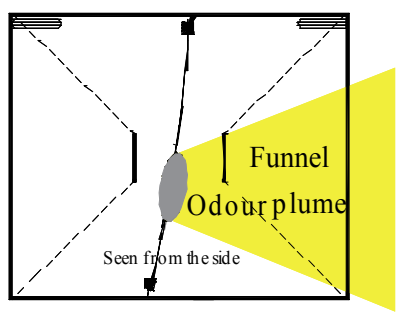
Introduction

Comparative fishing trials have demonstrated three times higher catch rates of red king crabs (*Paralithodes camtschaticus*) in square pots than in conical pots. This *in situ* study examines the interaction between food search behaviour and pot design in determining entry success.



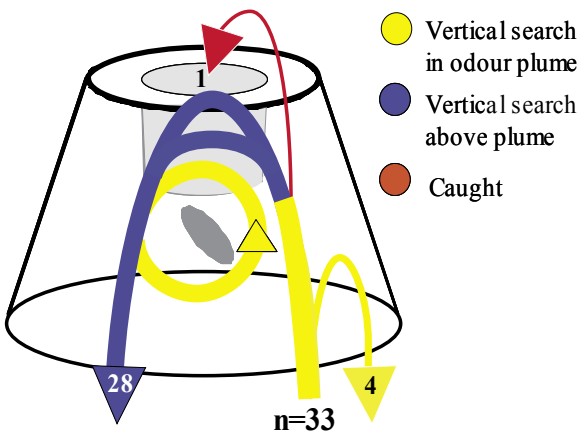
Material and Methods

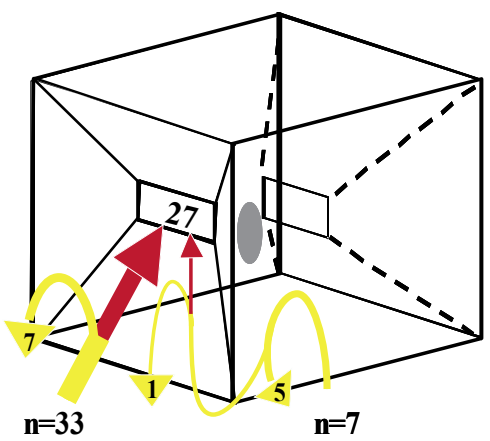
The conical pot is rigid with a vertical funnel on the top above the odour plume. The square pot is collapsible, unfolds in the sea by floats and has two opposed funnels at the height of the odour plume.



Results

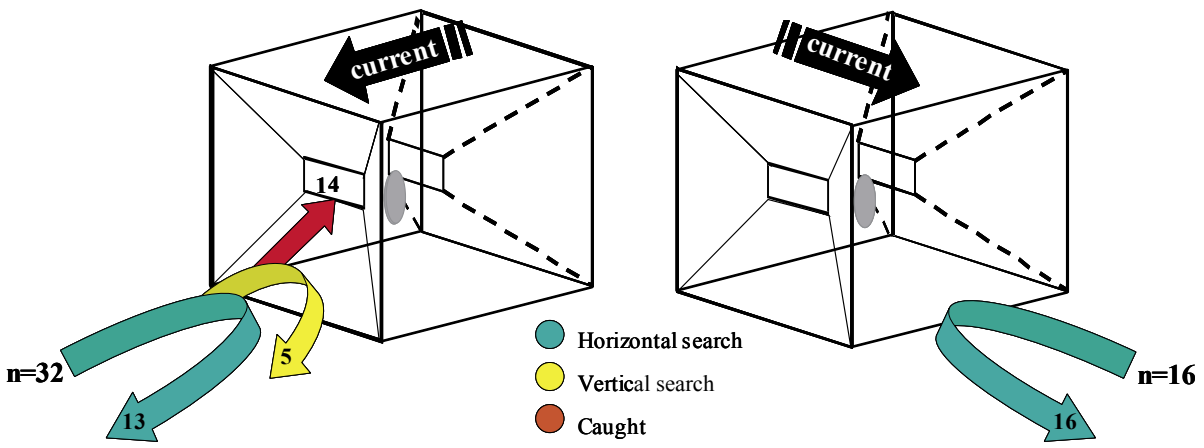
The majority of crabs approached the pots upstream, and about 80% of these crabs restricted their horizontal search sector to less than 90°. Overall, 60% of the crabs encountering the pots initiated vertical search with no difference between the pot types.





Crabs making vertical searches on the conical pot spent most of the time within the odour plume. Half of these crabs climbed to the roof but then descended back into the plume. Most of the crabs making vertical search on the square pot were caught and the probability of entry was 20 times higher.

Crabs approaching the square pot upstream when the current passed out of the funnel were often caught (44%). When the current did not pass out of the funnel, crabs in the odour plume never initiated a vertical search and none entered the pot.



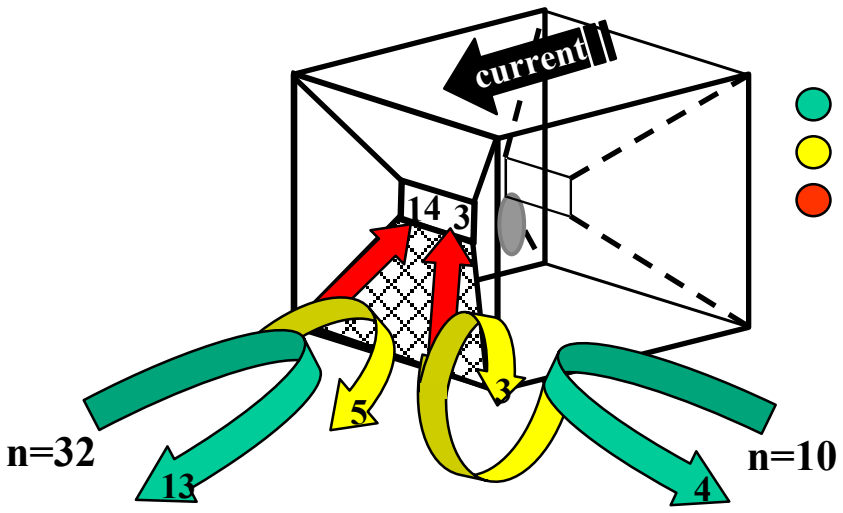
Conclusions

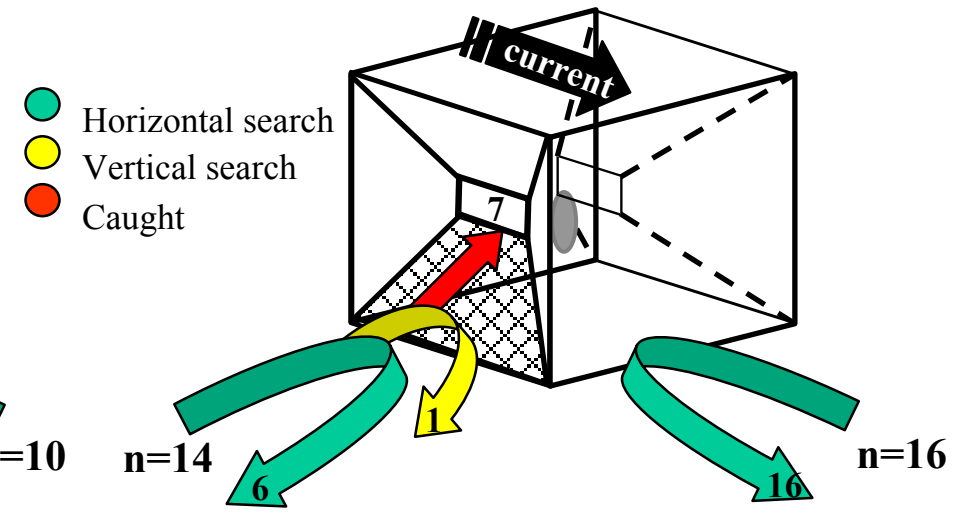
Chemically stimulated king crabs limited both their horizontal and vertical search to the odour plume. The position of the bait relative to the entrance is therefore crucial to capture success.

Interestingly, 40% of crabs approaching the square pot across the current and thus not chemically stimulated were captured. This suggests that visual or auditory stimuli may also attract crabs.

The whole story

A high proportion (40%) of the crabs approaching the square pot across the current were captured. Previous unsuccessful contacts with the pot explain why crabs more often approached the pot across the current when the current direction was perpendicular to the entrance than parallel to it.

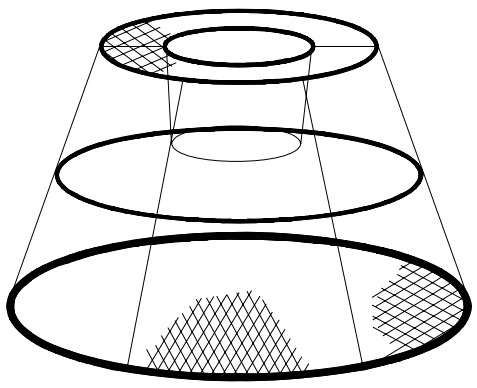


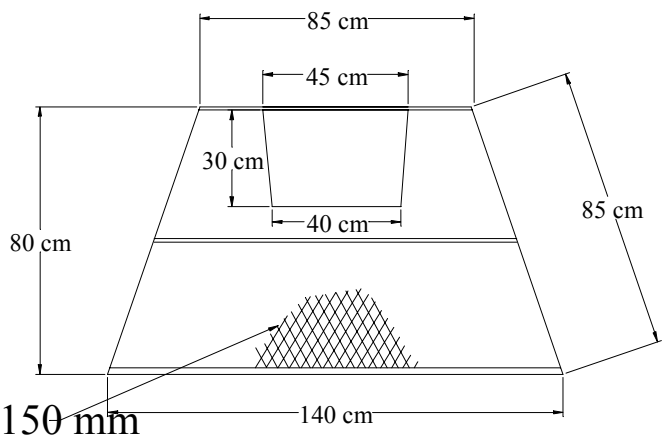


Not “trapped” in the odour plume, 50% of crabs moved outside a sector of 90° and then came into contact with the odour plume and funnel.

All crabs moving directly up the funnel and into the pot restricted their horizontal search sector to less than 45° and never entered the plume.

Conical pot





Net 150 mm

Square pot

1. Float (Rosendal 205/46 extra)
2. Entrance
3. Aluminium frame 12 mm (1500 mm x 1500 mm)
4. Steel frame 20 mm (1500 mm x 1500 mm)
5. Net 100 mm, diameter 3 mm braided PE
6. Opening, hinged 12 mm aluminium (150x75)
7. Rope with hook, 10-12 mm
8. Bait bag, length 300 mm
9. Hooks for bait bag
10. Lift rope with loope, 10-12 mm