



Case study results

3.1a – Trammel nets in Algarve, Portugal

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RESEARCH & INNOVATION

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SUMMARY

In the Algarve, in the South of Portugal, twenty experimental trammel net trials were carried out with standard monofilament trammel nets and trammel nets with a "guarding net" between the footrope and the trammel net. Catches were identified, measured, categorized and values of the landings with the different trammel nets estimated based on prices at auction per species. Significant reduction in by-catch and discards of finfish and invertebrates as well as decreases in handling time and net damage associated with removal of discards, was recorded. Modifying trammel nets by incorporating a guarding net between the footrope and the trammel net can significantly reduce by-catch, discards, handling time and net damage. However, in some fisheries targeting bottom associated species such as soles, modified nets will result in a loss of income due to reduced catch rates of target species such as soles.

CASE STUDY RESULTS

Type of intervention

"Selvedge" or "guarding net" or "greca".

Aim of the experiment

To evaluate reduction of by-catch and discards in monofilament trammel nets modified using a "selvedge" or "guarding net" or "greca" between the footrope and the trammel net.

Main activities carried out

Fishing trials were carried out with a standard trammel net and a modified trammel net with a single layer of netting (termed "selvedge" or "greca") 3 meshes high between the trammel net and the footrope. The experimental nets consisted of fifteen 45m nets per net type with three standard and three modified nets interchanging five times giving 10 sections with a 2 m gap between each section to reduce bias (guiding of fish), making up a total of approximately 1.5 km of net. The small mesh inner panel consisted of 12cm stretched mesh, 0.30 mm diameter (0.30 Ø) monofilament, 40 meshes high and 995 meshes long. The large mesh outer panels were 3 meshes high (60cm stretched mesh), of 0.60 mm diameter (0.60 Ø) monofilament, and 199 meshes long. The floatline was 52 m long and made of 7mm diameter PE while the leadline was 55.2m long and made of 7mm diameter PE (braided line with lead core). The vertical slack (height of the small mesh inner panel divided by the height of the large mesh panels was 2.7). The modified trammel net had a selvedge consisting of a single 3 meshes high panel of 140 mm stretched mesh (210/12 PA) between the footrope and the trammel net.

Fishing was conducted off the coast of the Algarve (southern Portugal) with a commercial fishing vessel (Alfonsinho) departing from the port of Quarteria, Portugal. Two researchers from the MINOUW project recorded data on board every fishing trip. Twenty fishing trips were conducted from October 2016 to February 2017, at depths from 10 to 30m. The nets were set at dawn and hauled the following morning, before sunrise (soak time of approximately 24 hours). Two GoPro cameras were set up on board to record hauling activities and to evaluate the time required to remove discard species from the two different types of nets. The net was hauled using a hydraulic hauler and each individual was removed manually by one of the fishermen. Each individual caught in the net was identified (to the species level if possible) and the net type it was caught in recorded (if caught in the modified net, it was recorded whether it was caught in the upper trammel net part or the “greca” part). Measurements were made using either an ichthyometer or a measuring tape if the individual was larger than the ichthyometer. The weight of each fish was calculated using weight-length relationships, in order to estimate value of the catch based on average auction price per kg per species for the day at the fish auction in Quarteira (data provided by Doca Pesca). The weight of each by-catch species was also recorded to compare the two net types. Each individual was registered as ‘by-catch’ or ‘commercial’; if considered a ‘commercial discard’, and the reason for discarding was noted (e.g. too small to sell, scavenged, ...).

The damage to the net was assessed by the number of holes in the nets along the length of the entire 1.5 km net at the end of the experimental trials. As the net was pulled onto the deck and onto a black tarp for easy visualization, four observers checked for damage and noted in which net type and part of the net the damage occurred. A ruler was used to measure the diameter and a picture was taken for later analysis.

Szynaka, M.J. 2017. Reduction of by-catch and discards in the Algarve small-scale coastal fishery using a modified monofilament trammel net. MSc thesis in Marine Biology, Universidade do Algarve.

Main results

- There were significantly fewer discards (45.3% and 31.8% less in numbers and in biomass, respectively) in the modified trammel nets.
- By-catch abundance and biomass were also less in the modified trammel net (57.7% and 80.4% less respectively).
- For the three main by-catch species, catches in number in the modified nets were 37.8% , 66.9% and 128.4% of those in standard nets for Longfin gurnards (*Chelidonichthys obscurus*), Greater weever (*Trachinus draco*) and Atlantic chub mackerel (*Scomber colias*) respectively.
- The modified net resulted in a decrease of 46.1% in numbers and 38.2% in value of the commercial catch due mainly to differences in catch rates of the target sole species.
- Timing the removal of the main by-catch and discards species from then nets revealed significant savings in time associated with use of modified nets.

Discussion of the results

The trammel net *métier* selected for this study was that of the cuttlefish (*Sepia officinalis*), which takes place in autumn and winter in the Algarve (Erzini et al. 2006; Gonçalves et al., 2008; Stergiou et al., 2006). However, 2017 was an unusually poor year for cuttlefish, probably due to higher than average water temperatures in the autumn and winter. Consequently, the cuttlefish season was delayed and catches were much smaller than expected. Most of the experimental fishing trips did not target cuttlefish but rather soles and other finfish species. In addition to seasonal differences in catch composition, depth was also an important factor, with clear differences in assemblage composition between sets at 10-20m and 20-30m depths.

By-catch and discards were significantly less in the modified nets, especially of bottom associated finfish species such as Longfin gurnards and Greater weever, and invertebrates such as sea urchins (*Sphaerechinus granularis*) and gastropods (*Cymbium olla*). Given the observed catch rates, the average times required to remove discard species from the net and the total lengths of trammel nets normally used by Portuguese commercial fishers, trammel nets modified with a selvedge (greca) represent significant savings in time for the fishers. Furthermore, as many of the discarded species are crushed or torn from the nets, a reduction in catches of these species also translates to reduced net damage.

Because the majority of the trammel net sets targeted soles rather than cuttlefish, the landed catches of the modified nets had lower total value per unit effort than the standard monofilament trammel nets. This is to be expected because soles (*Microchirus azevia*, *Pegusa lascaris*, *Solea senegalensis*) come into contact with the nets near the footrope. Thus the selvedge or greca panel, consisting of a thicker, more visible netting material is a barrier that reduces catch rates of these species. The difference in catch rates of soles was noted by the fishers. However, we believe that in years of normal to high abundance of cuttlefish, there would be no significant difference in the catch value per unit effort between modified and traditional trammel nets as most of the biomass caught would be cuttlefish and as the latter are caught higher up in the net catch rates would not be affected by the existence of a selvedge panel. Under these circumstances, there would be clear benefits associated with use of modified trammel nets in terms of savings in time and reduced damage to nets.

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- Stergiou, K.I., Moutopoulos, D.K., Soriguer, M.C., Puente, E., Lino, P.G., Zabala, C., Monteiro, P., Errazkin, L.A. and K. Erzini. 2006. Trammel net species composition, catch rates and métiers in southern European waters: a multivariate approach. *Fisheries Research* 79: 170-182

How practical is it for a fisherman to implement this improvement, technically and financially?

In Portugal fishers generally do not mount their own nets; there are companies which mount nets according to the specifications of the fishers. Based on the costs of the nets used in the Algarve fishing trials, the higher cost of modified nets (105 € vs. 58 € per 45m net) could be a limiting factor. However, large scale use of modified nets would probably result in lower costs in the future.

Is there sufficient evidence to support wider adoption of the method/technology?

Our experiments have shown that the use of a guarding net or selevedge between the footrope and the trammel net can significantly reduce by-catch and discards of certain species, thereby reducing handling time and net damage. However, the success of this modification will depend on the fishery and the target species. It is more likely to be adopted in a cuttlefish fishery or hake fishery rather than in a fishery targeting bottom associated species such as soles.

CONCLUSION

Use of a selvedge or greca between the footrope and the trammel net clearly does reduce discards significantly, thereby reducing net damage and saving time (removal of discard species from the trammel net). However, in these fishing trials, significant losses in earning were incurred because of lower catch rates of the main target species (soles and bastard soles), that in trammel nets are mainly caught near the footrope. Loss of earnings per unit effort is not expected to happen when cuttlefish is the main target species. Thus, use of modified trammel nets on a métier or seasonal basis could be a solution. Nevertheless, the higher cost of modified nets (105 € vs. 58 € per net) must also be taken into consideration.

ADDITIONAL RELEVANT RESOURCES OR LINKS

- EU Common Fisheries Policy (CFP) Reform: https://ec.europa.eu/fisheries/cfp_en
- International Guidelines on Bycatch Management and Reduction of Discards: <http://www.fao.org/fishery/nems/40157/en>

Pictures of the experimental fishing trials



Hauling the trammel net (note scavenging dolphin in the background)



Removal of the catches and cleaning of the nets on board the fishing vessel "Alfonsinho".



Large "trammed" or "pocketed" cuttlefish (*Sepia officinalis*)



Measuring a lobster (the highest valuable species per kg) caught in the trammel nets.



Assessment of net damage at the end of the experimental trials.

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