**Consiglio Nazionale delle Ricerche (CNR) - Istituto per le Risorse Biologiche e le Biotecnologie Marine (IRBIM)**
**Sede di Mazara del Vallo**

# LA PESCA ITALIANA NEL MEDITERRANEO, CENTRALITÀ E POSSIBILI SVILUPPI

**SESSIONE 2 Tecniche di pesca sostenibili e criteri per la pesca responsabile:**

**presentazione di casi di successo regionali nel settore della pesca**

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# Technological solutions to minimize unwanted bycatch



**IS THE GUARDING NET A FEASIBLE SOLUTION FOR DISCARD REDUCTION IN TRAMMEL NET FISHERY? .**



Guarding net effects on landings and discards in Mediterranean trammel net fishery: Case analysis of Egadi Islands Marine Protected Area (Central Mediterranean Sea, Italy)

Giacomo Sardo[1], Luca Vecchioni[2], Giacomo Milisenda[3,4], Fabio Falsone[1], Michele Luca Geraci[1,5], Daniela Massi[1], Pietro Rizzo[1], Danilo Scannella[1] and Sergio Vitale[1,4]

**EXPLORING THE FEASIBILITY OF TECHNOLOGICAL TRANSFERS OF BY-CATCH REDUCTION DEVICES IN THE CENTRAL MEDITERRANEAN**



Exploring the feasibility of technological transfers of two by-catch reduction devices in the crustacean bottom trawling of the central Mediterranean

Michele Luca Geraci[1,2], Giacomo Sardo[3*], Danilo Scannella[2], Fabio Falsone[2], Federico Di Maio[1,2], Vita Gancitano[2], Fabio Fiorentino[2,3], Pierangela Chirco[2], Daniela Massi[2] and Sergio Vitale[2,4]

# IS THE GUARDING NET A FEASIBLE SOLUTION FOR DISCARD REDUCTION IN TRAMMEL NET FISHERY? .

**METHODS**

- 1000 m length
- 50 m per panel
- 20 alternate commercial/modified panels

180-mm mesh size

31-mm mesh size

50-mm mesh size
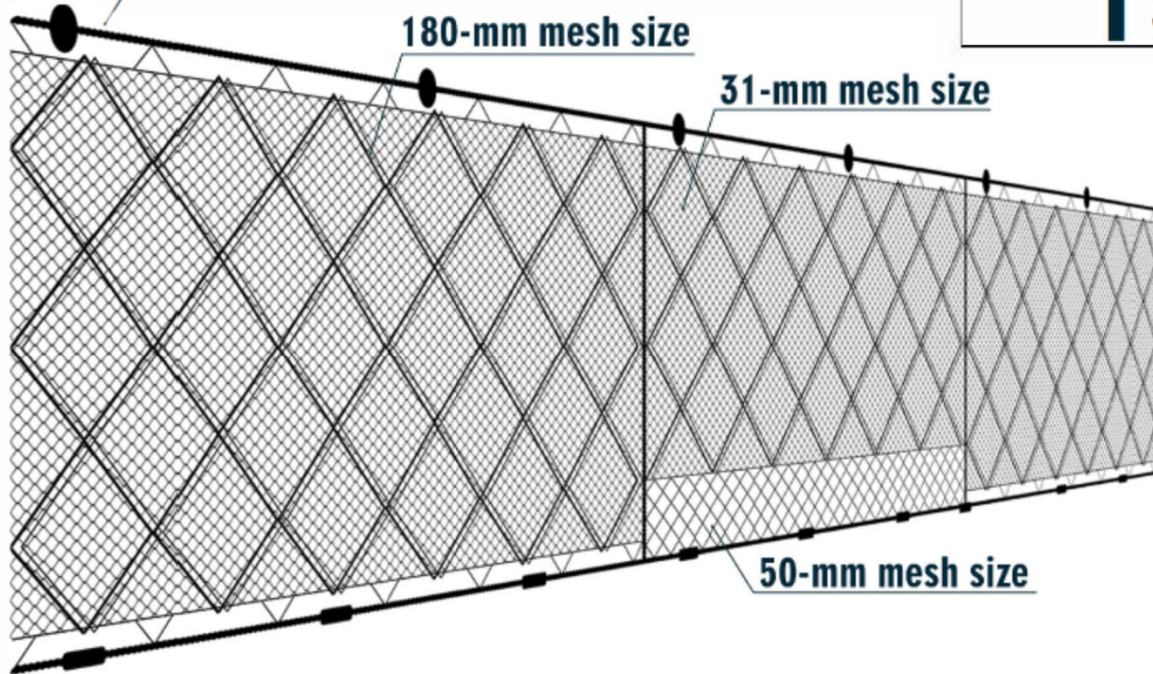
**Fishing Vessels**

**Trials**

**48** Fishing trials

**Depth**

**15-30** meters
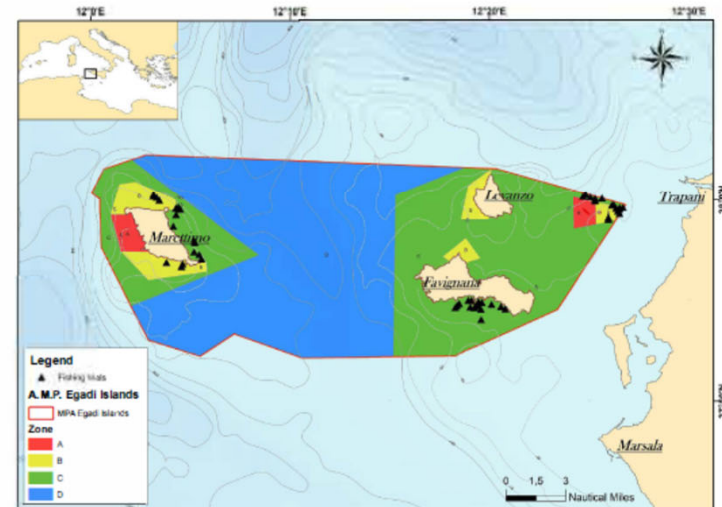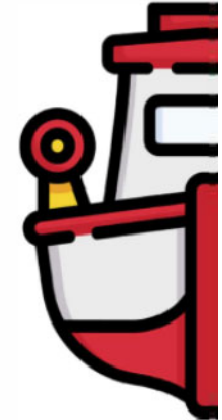
# IS THE GUARDING NET A FEASIBLE SOLUTION FOR DISCARD REDUCTION IN TRAMMEL NET FISHERY? .



Mean catch per unit effort for commercial and discarded catch per panel. GN panels showed a lower discard ratio (0.18) than the CN panels (0.23) ($p < 0.05$).
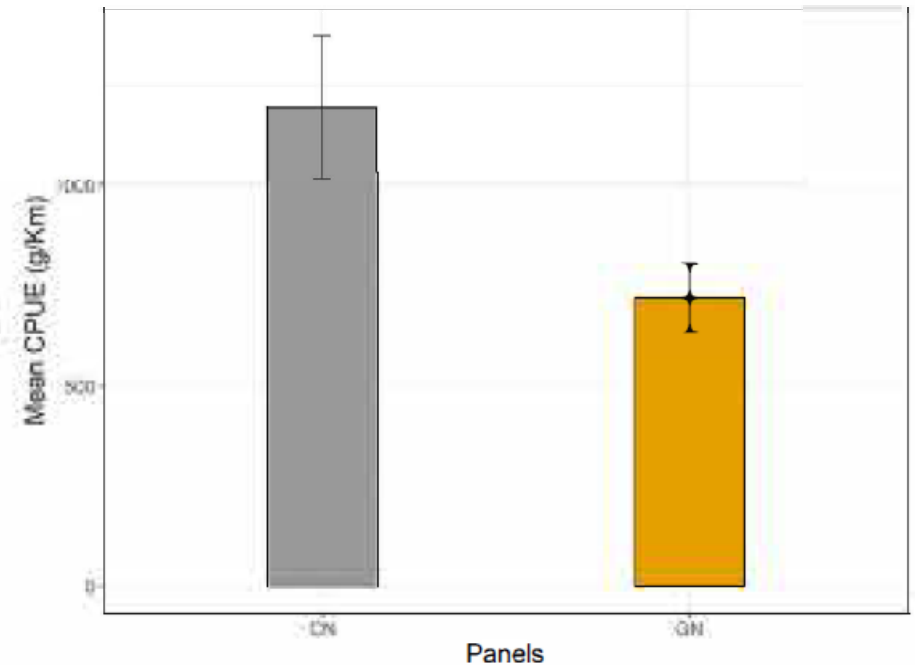


| Mean catch per unit effort of *Posidonia oceanica* per panel. The weight of catches was 9.7 and 6.1 kg for CN and GN panels, respectively.

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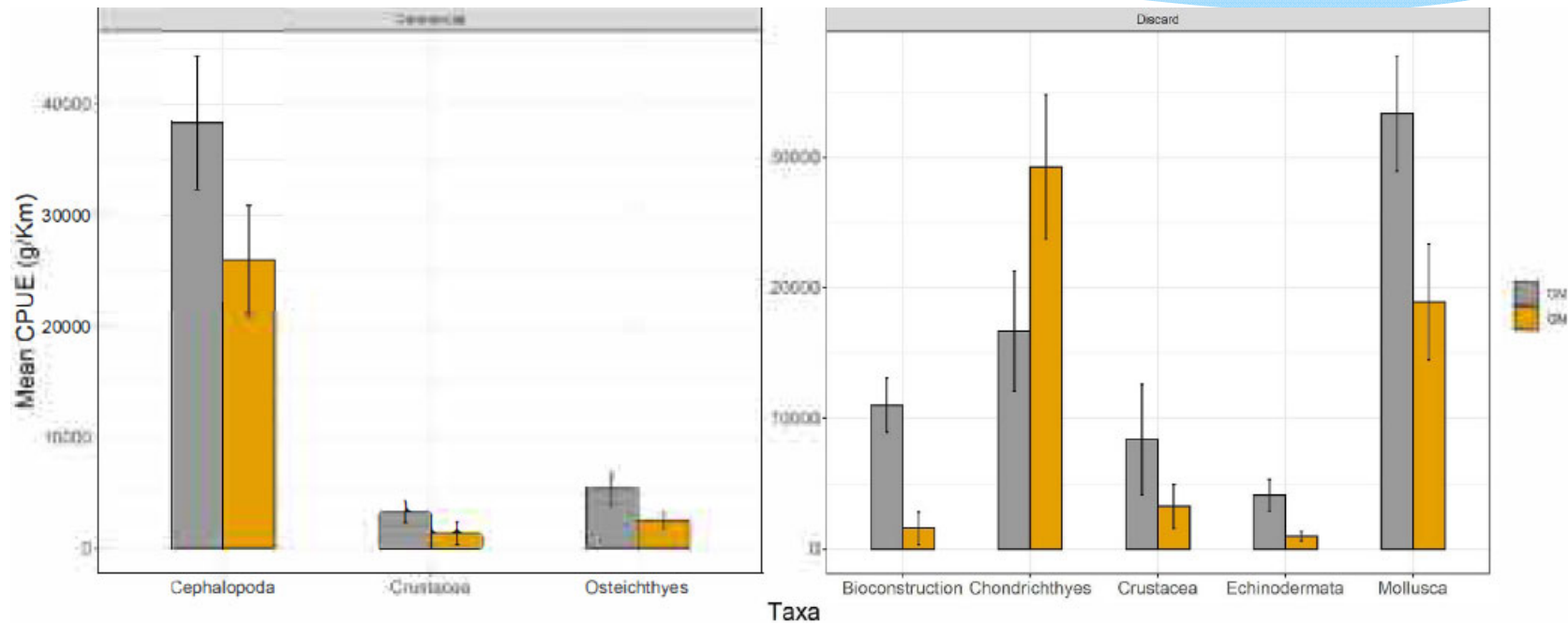


Mean catch per unit effort of most abundant taxa for commercial and discard catch per panel. The most discarded species at CN panels included *Torpedo marmorata* (8.4 kg), and *Aplysia spp.* (4.6 kg), while those at GN panels included *T. marmorata* (21.6 kg).
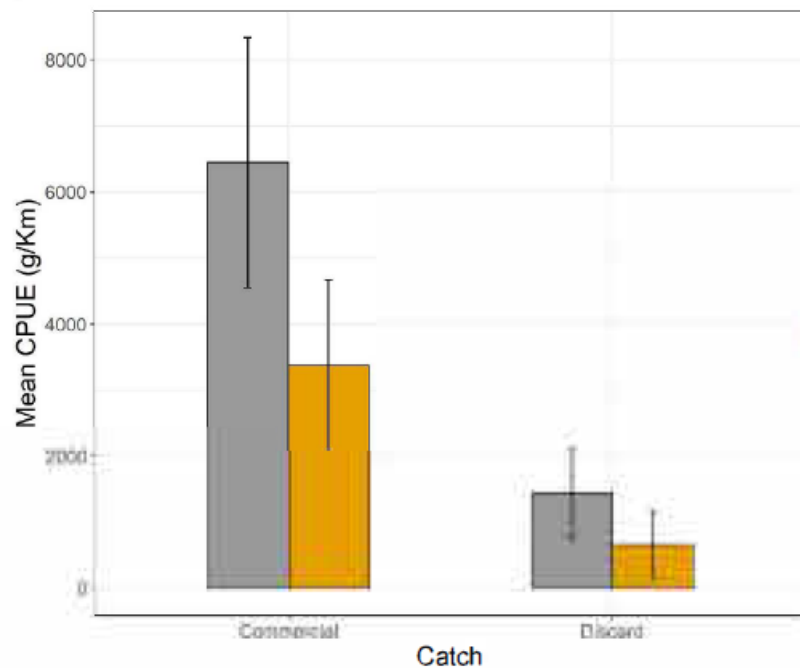
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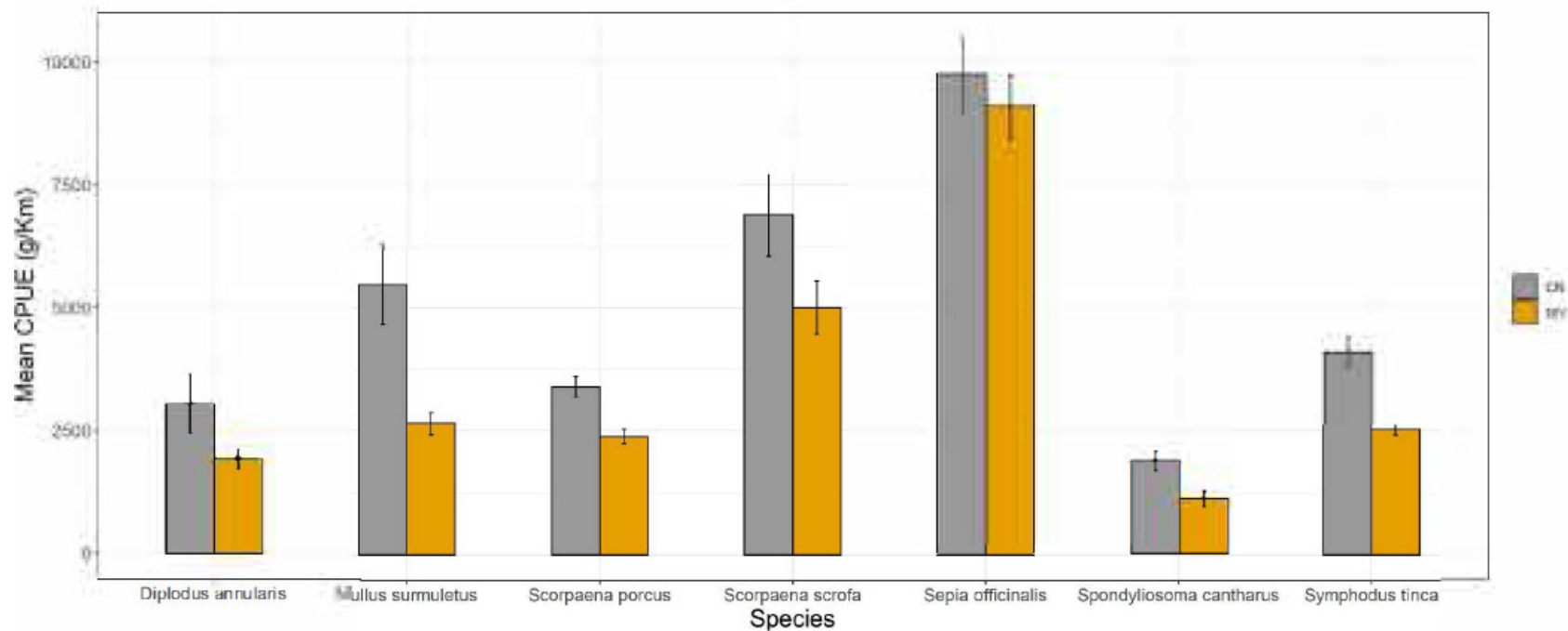


Mean CPUEs of commercial species per panels. The catch at CN panels (€ 3,366.90) was higher than the total income (€ 2,043.70) using the GN panels, which suggests a significant commercial loss of 40% ($p < 0.05$).

# IS THE GUARDING NET A FEASIBLE SOLUTION FOR DISCARD REDUCTION IN TRAMMEL NET FISHERY? .

*panels, respectively).*

**CONCLUSION**

- Guarding net significantly reduced the catch rate of discards (benthic invertebrate species) by 20% and is advisable in order to reduce the impact of the trammel net on *P. oceanica*.

- Catches of *T. marmorata* in the guarding net panels might be related to the size of the specimens.

- Target commercial species (*S. officinalis*) is unaffected by guarding net panels, whereas the loss of revenue is due to the lower catches of non-target marketable species that have been highly priced.

- Economic loss could be overcomed by the adoption of an eco-label marker for fishery products harvested with more sustainable fishing gears mounting the guarding net.

# Exploring the feasibility of technological transfers of by-catch reduction devices in the central Mediterranean
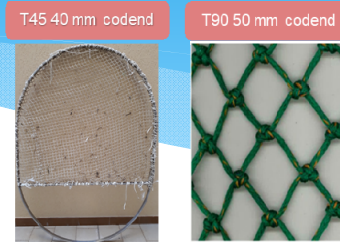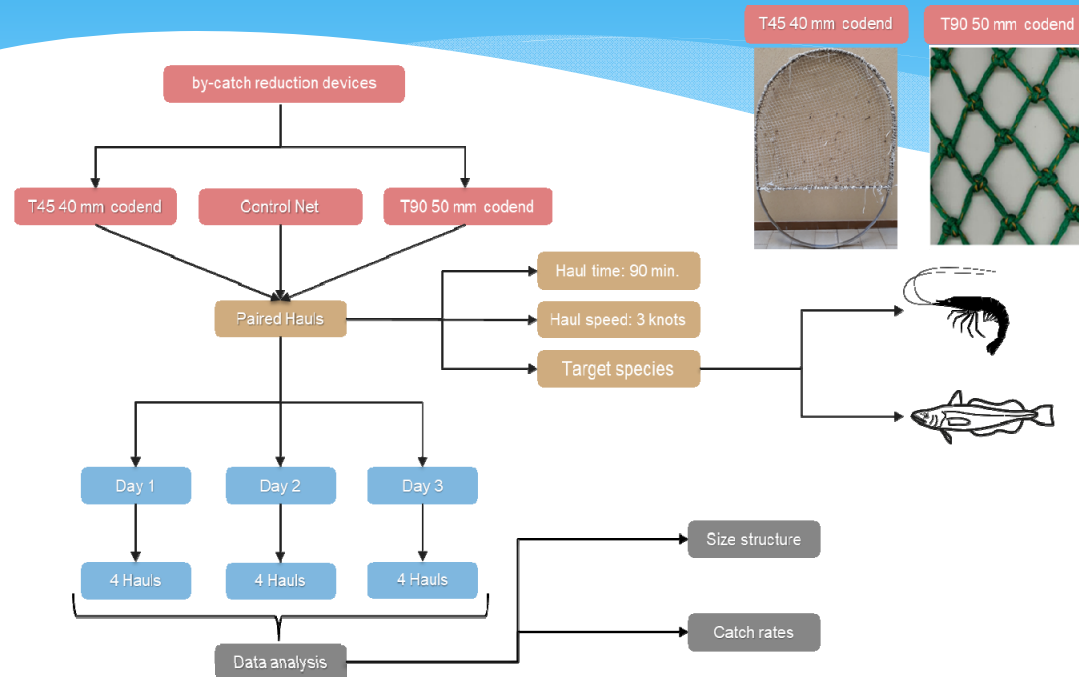


**Sampling design**

- December 2020, a 3-day selectivity campaign was conducted with three trawlers based at the Mazara del Vallo harbour.

- The fishing vessels operated simultaneously and in parallel according to a paired hauls design.

- A DPS fishing ground was identified where the main commercial by-catch is HKE
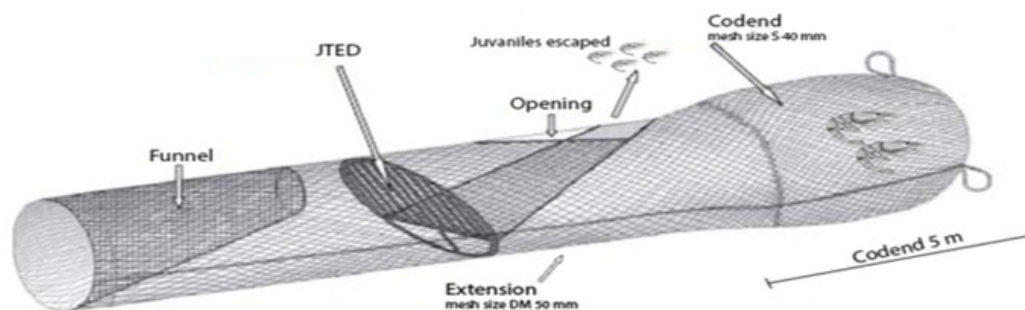
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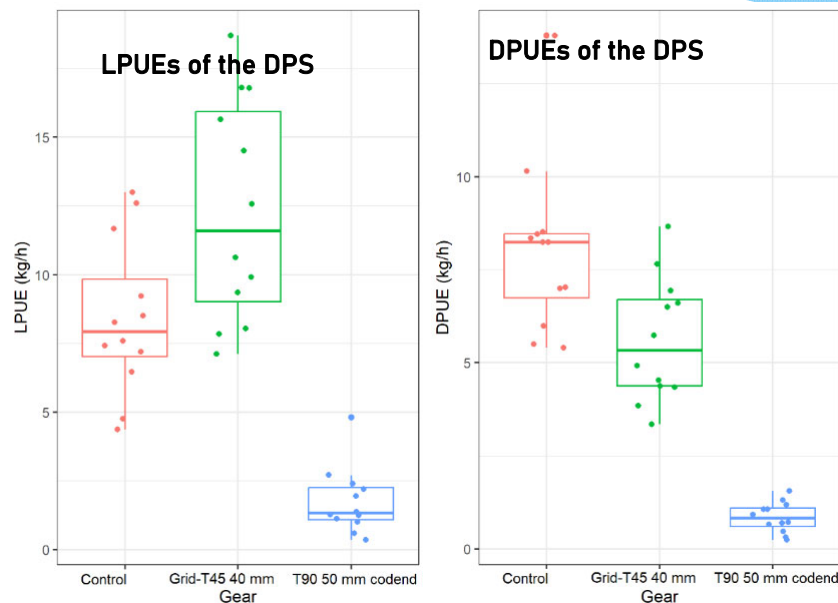


Boxplots of *Parapenaeus longirostris* (herein DPS) catch rates (kg/h) per gear caught during the campaign classified in landing per unit effort (LPUE; commercial) – left – and discard per unit effort (DPUE; discard) – right – according to the minimum conservation reference size (MCRS) established by the Reg. EU 1241/2019.

Boxplots of *Merluccius merluccius* (herein HKE) catch rates (kg/h) per gear caught during the campaign classified in landing per unit effort (LPUE; commercial) – left – and discard per unit effort (DPUE; discard) – right – according to the minimum conservation reference size (MCRS) established by the Reg. EU 1241/2019

# Exploring the feasibility of technological transfers of by-catch reduction devices in the central Mediterranean
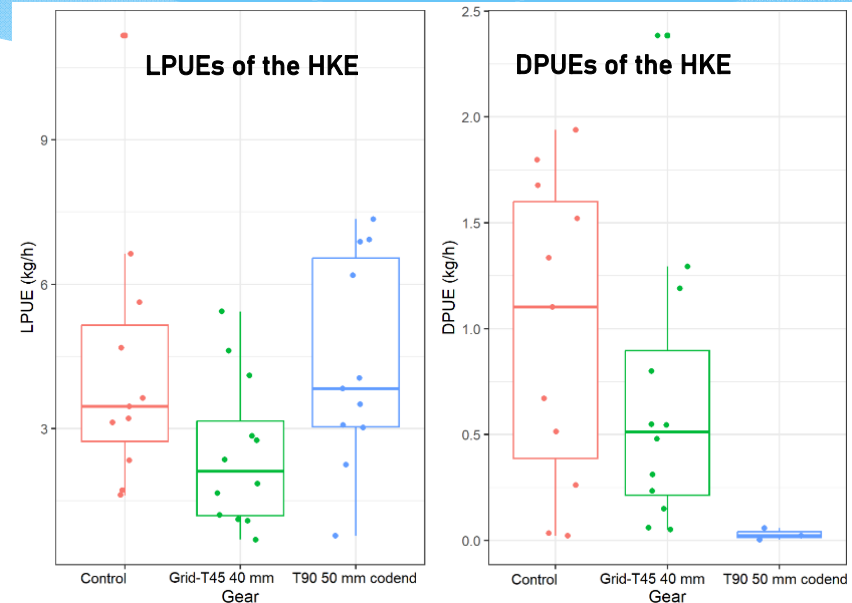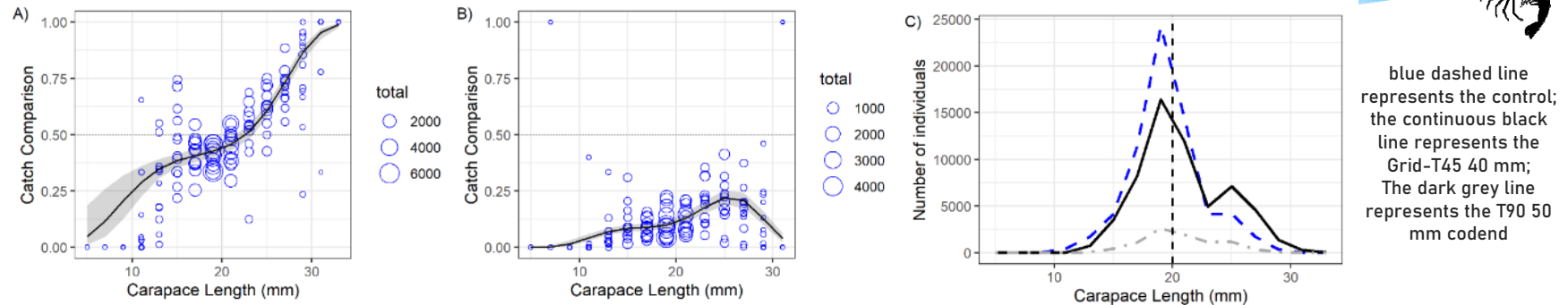
Catch comparison curves for DPS caught with the Grid-T45 40 mm (A) , with the T90 50 mm codend (B) and Length frequency distributions of DPS caught during the campaign (C) .
.



blue dashed line represents the control; the continuous black line represents the Grid-T45 40 mm; The dark grey line represents the T90 50 mm codend

- For DPS, the **Grid-T45 40 mm showed a lower probability of catching undersized specimens** (values were always < 0,5) and a **higher catch probability for adults** compared to the control (values were always > 0,5). [Figure A]

- The **probability of catching DPS was always lower for the T90 50 mm codend** configuration than for the control net. [Figure B]

- The **length-frequency distributions** of DPS **showed that the bulk of the catch of the control was mainly composed of undersized specimens,** indicating a potentially poor selectivity of the gear with legal mesh size in the codend. **The Grid-T45 40 mm caught more commercial DPS**. [Figure C]

# Exploring the feasibility of technological transfers of by-catch reduction devices in the central Mediterranean
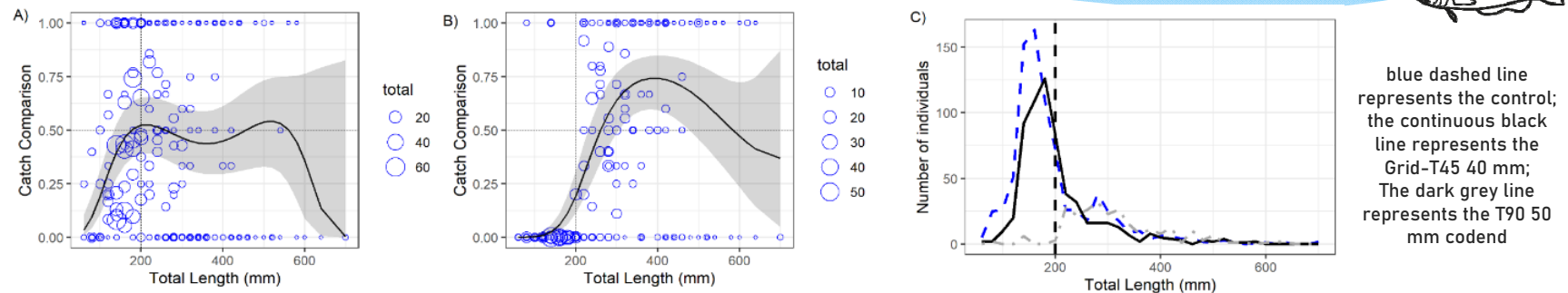
**Catch comparison curves for HKE caught with the Grid-T45 40 mm (A) , with the T90 50 mm codend (B) and Length frequency distributions of HKE caught during the campaign (C) .**
.



blue dashed line represents the control; the continuous black line represents the Grid-T45 40 mm; The dark grey line represents the T90 50 mm codend

For HKE, the **Grid-T45 40mm showed lower probability** than the control **in capturing undersized fish** (values were always < 0,5) **while the probability of catching adults was equal to that of the control** (values were ~ 0,5). [Figure A]

The **T90 50 mm codend showed a lower probability of catching undersized HKE specimens** (values were always < 0,5) and a **higher catch probability for adults** (values were > 0,5) compared to the control **except for a few individuals caught in the latest size classes**. [Figure B]

The **length-frequency distributions** of HKE **showed that the bulk of the catch was mainly composed of undersized specimens,** indicating a potentially poor selectivity of the gear with legal mesh size in the codend. The **T90 50 mm codend was more effective in catching adult HKE** [Figure C]

# Exploring the feasibility of technological transfers of by-catch reduction devices in the central Mediterranean

**DPS**

## *CONCLUSION*

- **Grid**–**T45 40 mm codend** provided a higher LPUE and a **significant reduction in undersized DPS** when compared to the other trawl net configurations, consequently, **seems to be a technological solution that could be capitalised on by commercial trawlers targeting DPS**.

- **T90** **50 mm codend, strongly reduced the catch of both legal and undersized DPS**, thus, **would not ensure the economic sustainability of the DPS fisheries**.

**HKE**

- The **most efficient gear was the T90** **50 mm codend**. It is worth noting that, **although this device excluded an "important fraction" of the undersized HKE, higher catch rates were recorded due to an elevated number of legal–sized specimens**.

*The adoption of both **BRDs in DPS fisheries** resulted in a reduction in the number **of undersized DPS and HKE** specimens in the catches, **suggesting** a potential **overall improvement in the exploitation pattern**;*

Thank you for your attention