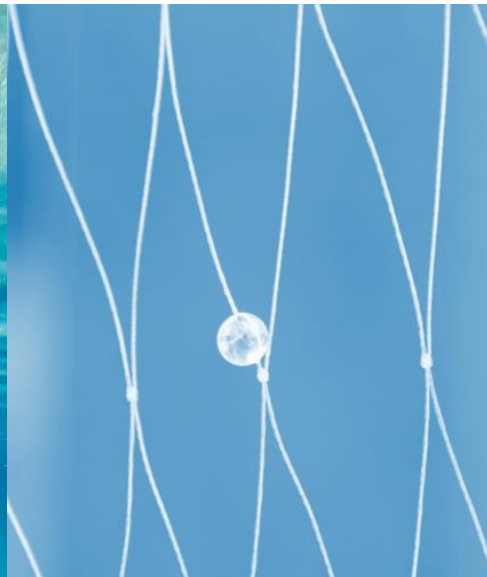
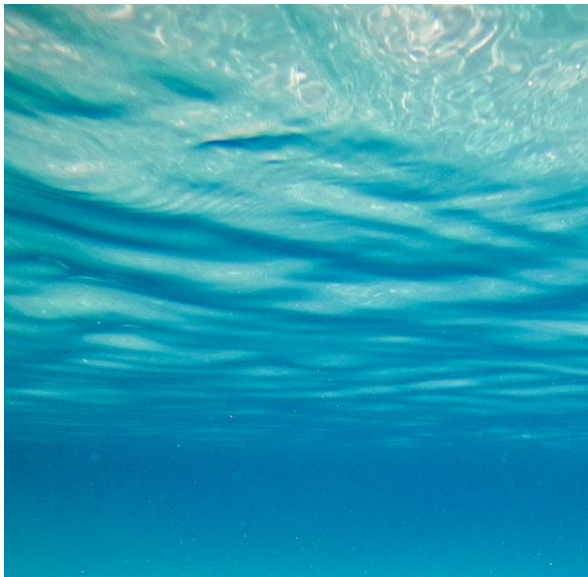


# The PearlNet: Progress and Perspectives

Application of acoustic reflectors in set nets to reduce bycatch of harbor porpoises and other odontocetes

**Andrea Milanelli**, Thomas Noack, Sara Berzosa, Hannah Schartmann, Juan Santos, Daniel Stepputtis

Thuenen Institute of Baltic Sea Fisheries

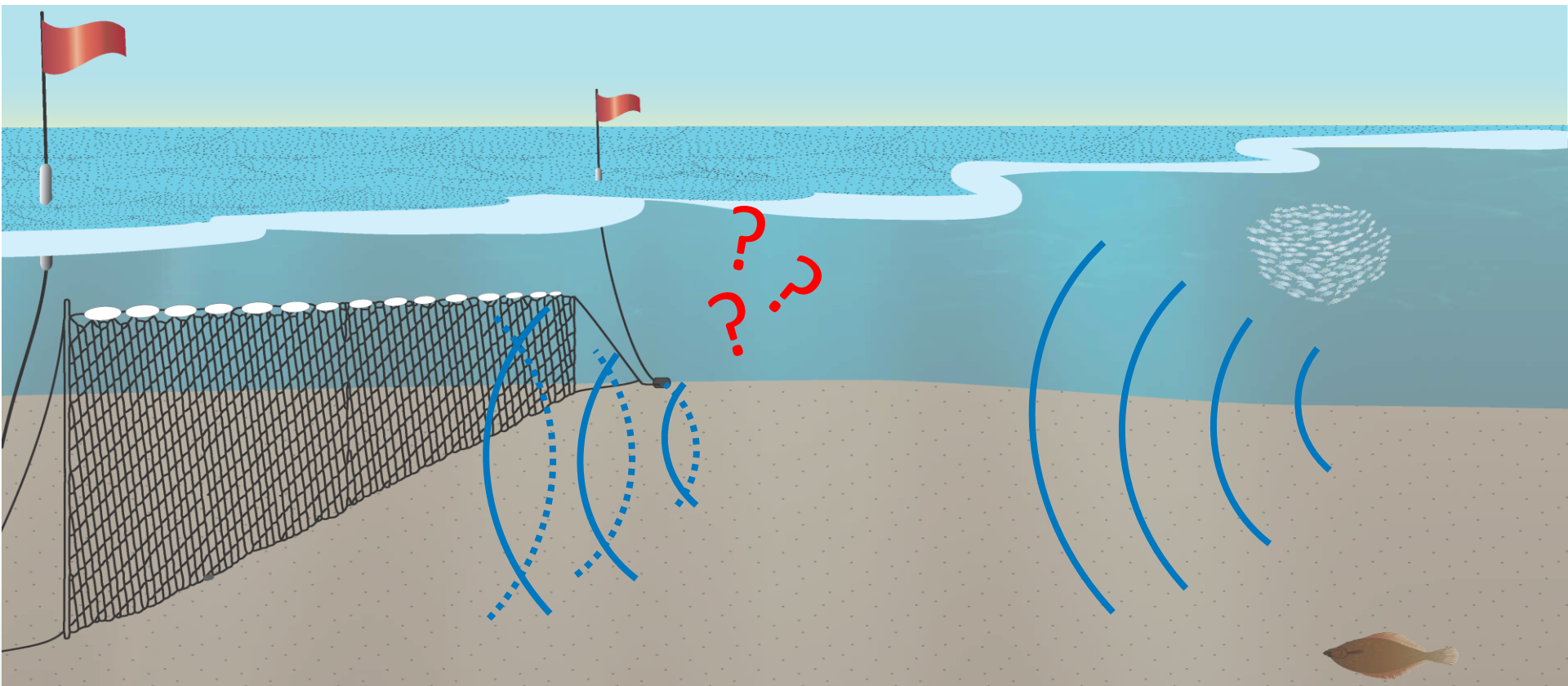


2nd Meeting of the Joint Bycatch Working  
Group of ASCOBANS and ACCOBAMS

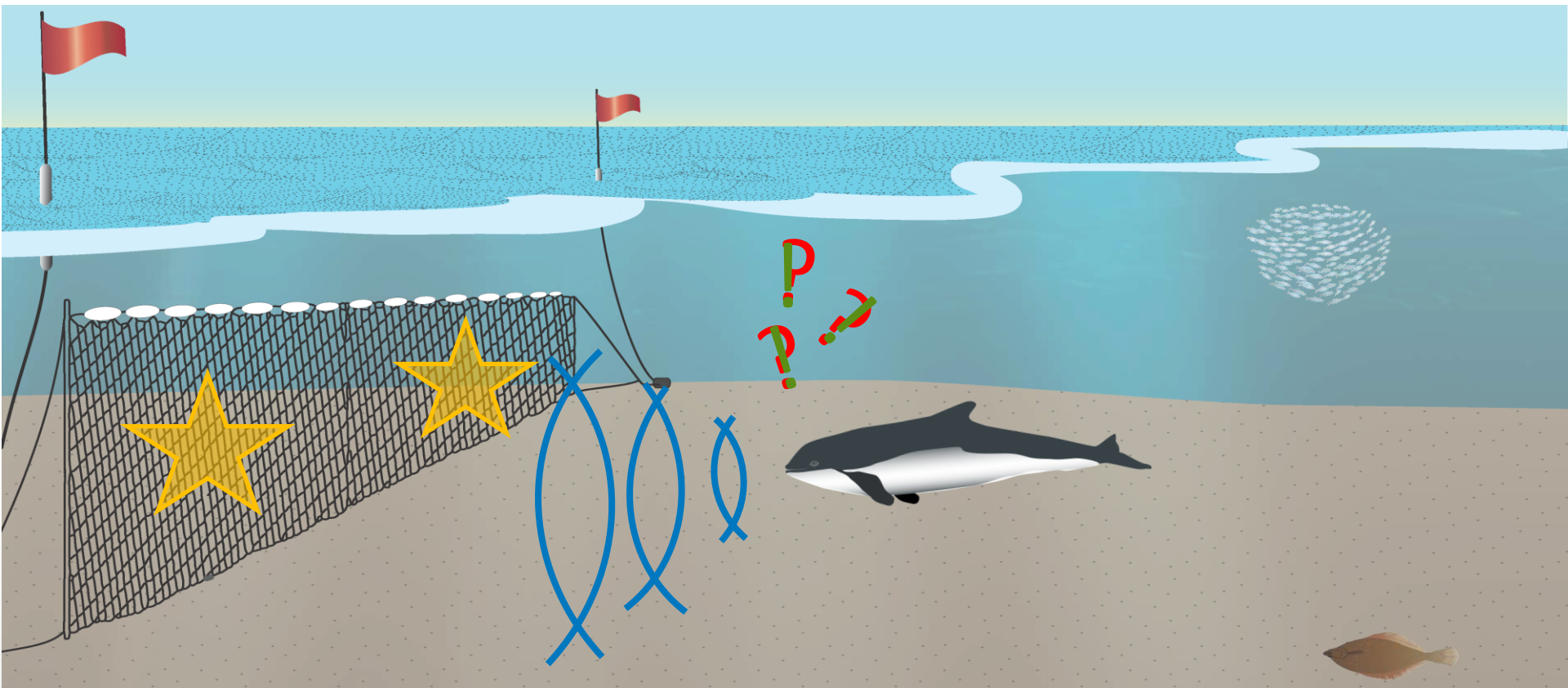
05.02.2025



# Context



# Context



# Development of the PearlNet

## Identification of optimal acoustic reflector

- Strong echo
- Omnidirectional
- Small
- Neutrally buoyant

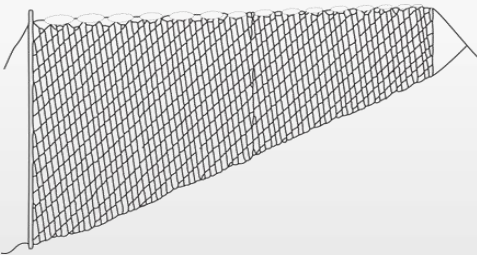


Table tennis ball



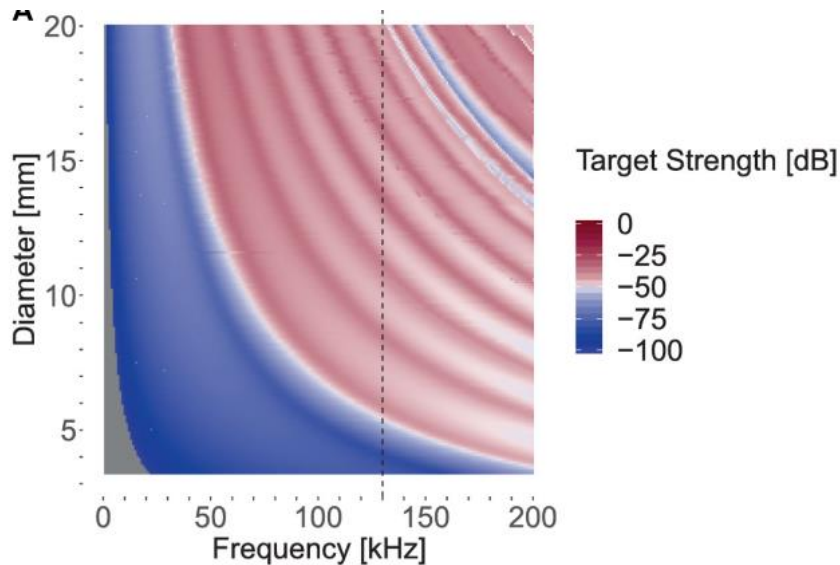
Steel



PMMA/acrylic glass,  $\varnothing$  8 mm

# Development of the PearlNet

## Identification of optimal acoustic reflector

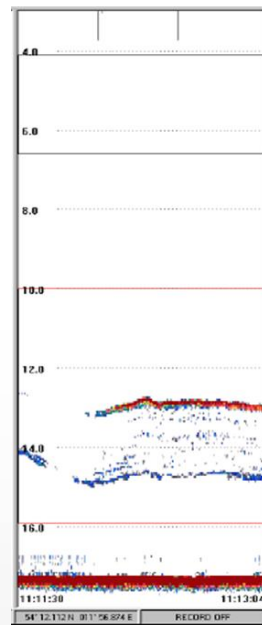


Species	Centroid frequency [kHz]	Sphere size [mm] $\leq 10$ mm (TS [dB])
<i>Lissodelphis borealis</i>	18.2	<b>10 (-75.65)</b>
<i>Delphinus delphis</i>	112	9.9 (-37.43)
<i>Phocoena phocoena</i>	130	<b>8.5 (-38.78)</b>
<i>Lagenorhynchus obliquidens</i>	94.6	8.1 (-37.78)
<i>Phocoenoides dalli</i>	133	8.3 (-38.97)
<i>Neophocaena phocaenoides</i>	125	8.9 (-38.47)
<i>Stenella coeruleoalba</i>	40	<b>10 (-67.60)</b>
<i>Pontoporia blainvillei</i>	130	8.5 (-38.78)
<i>Tursiops truncatus ponticus</i>	80	9.6 (-36.28)
<i>Lagenorhynchus obscurus</i>	73.8	10 (-38.04)
<i>Phocoena sinus</i>	132	8.4 (-38.86)
<i>Phocoena phocoena relicta</i>	presumably 130	8.5 (-38.78)
<i>Platanista gangetica</i>	64.4	<b>10 (-53.14)</b>
<i>Orcaella brevirostris</i>	94.6	8.1 (-37.78)
<i>Inia geoffrensis geoffrensis</i>	101.2	7.5 (-38.38)
<i>Cephalorhynchus hectori</i>	124	8.9 (-38.41)

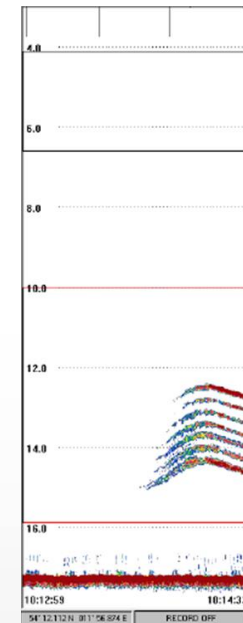
Kratzer et al. 2020

# Development of the PearlNet

## Identification of optimal acoustic reflector

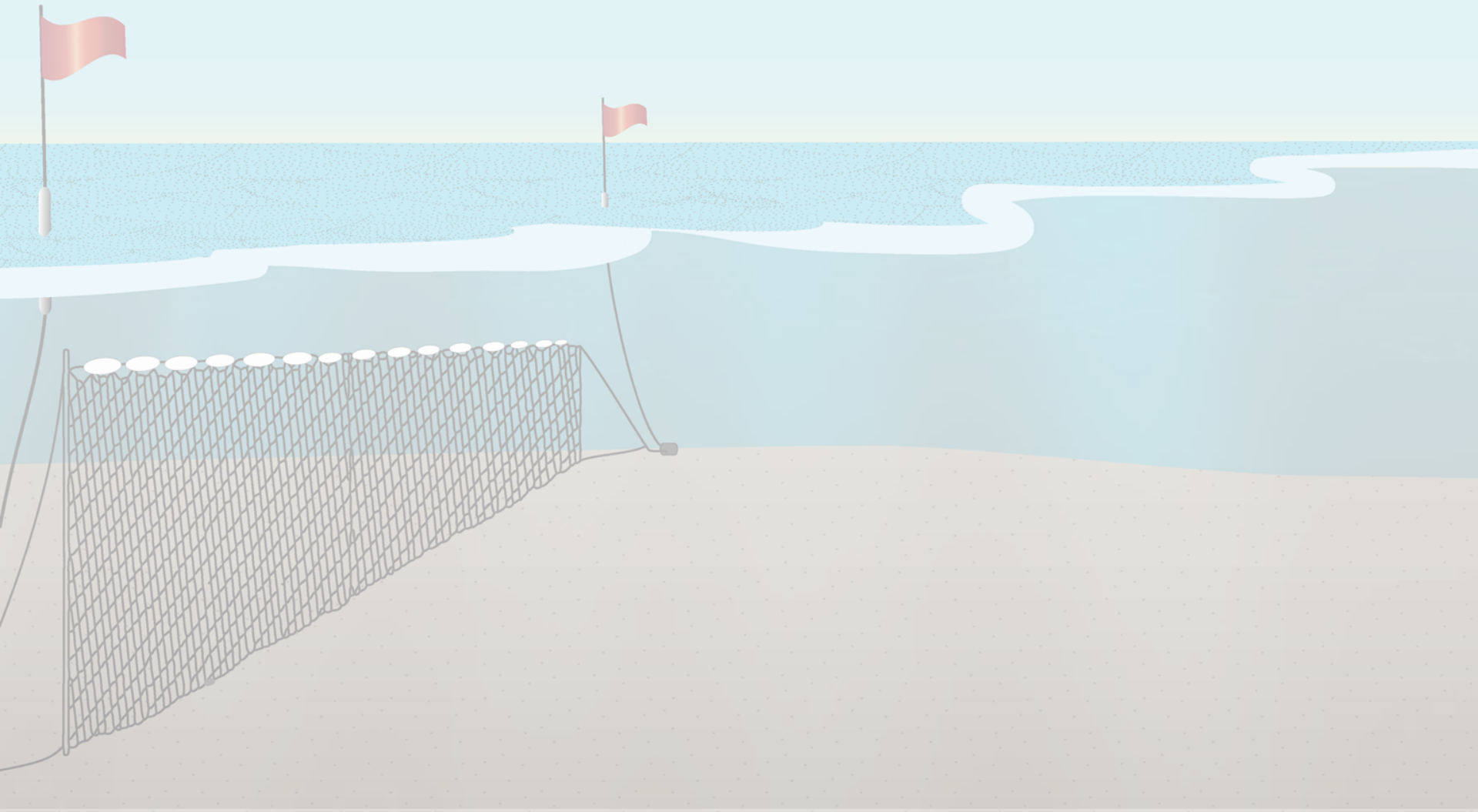


Standard gillnet

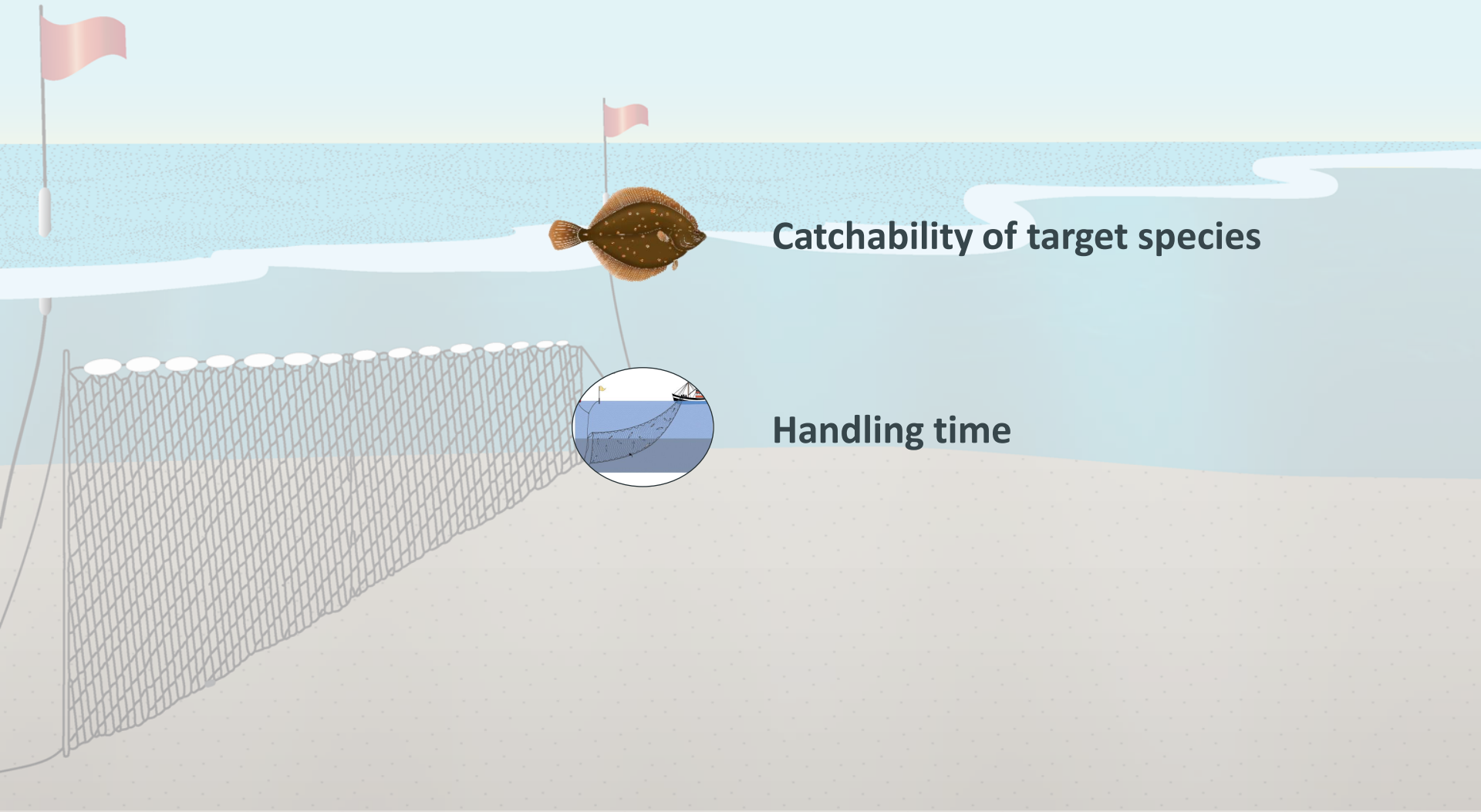


*PearlNet*

# Where do we go from here?

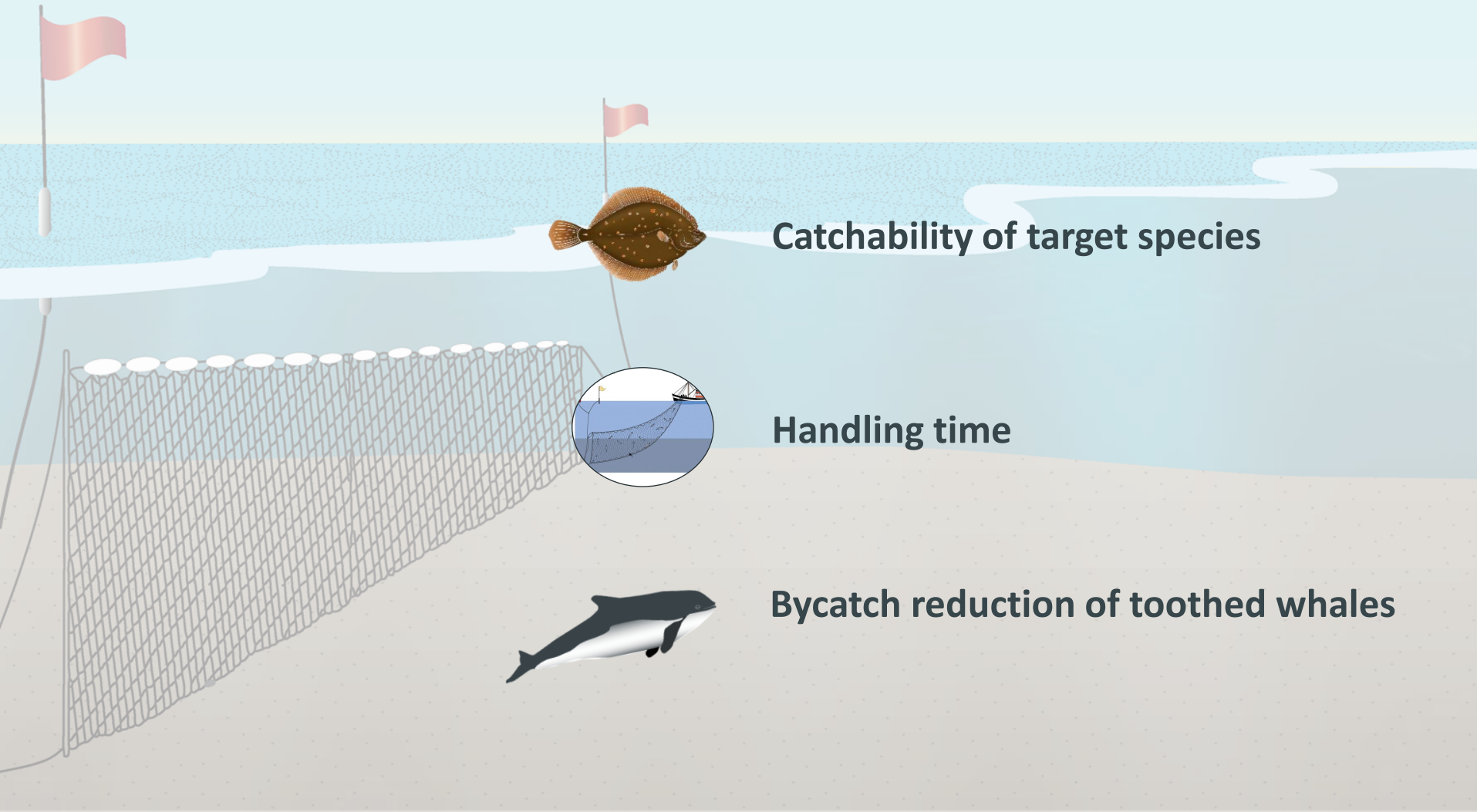


# Where do we go from here?

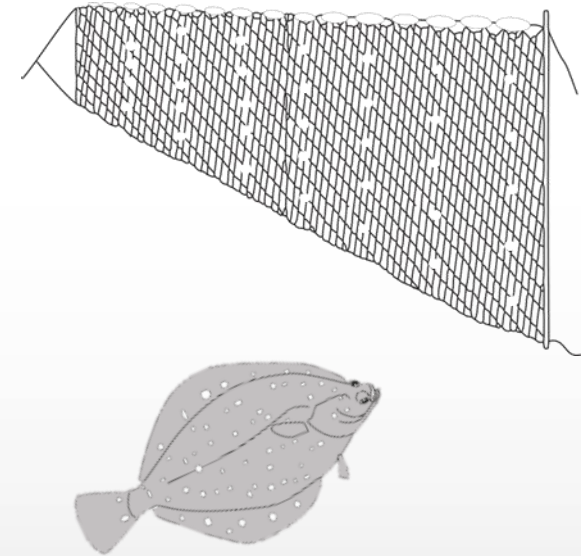




# Where do we go from here?



# Catchability / Handling time



# Catchability



Short communication

## Pearls are not just for girls: Plastic spheres do not interfere with target catches in a set net fishery

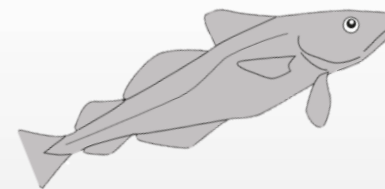
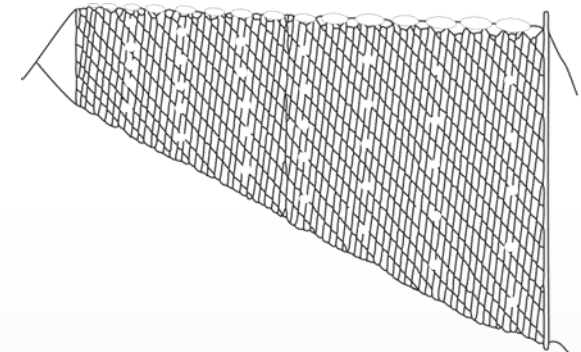
Lotte Kindt-Larsen<sup>a,\*</sup>, Thomas Noack<sup>b</sup>, Mollie Elizabeth Brooks<sup>a</sup>, Anne-Mette Kroner<sup>a</sup>, Gildas Glemarec<sup>a</sup>

<sup>a</sup> DTU Aqua, National Institute of Aquatic Resources, Technical University of Denmark, 2800 Kgs. Lyngby, Denmark

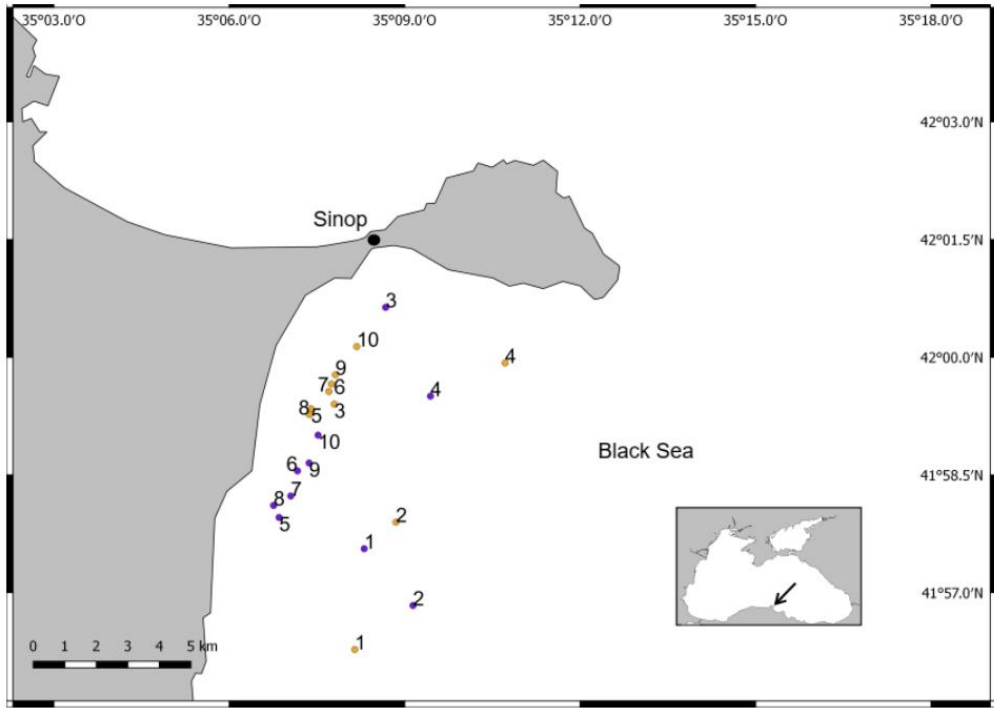
<sup>b</sup> Thünen Institute, Federal Research Institute for Rural Areas, Forestry and Fisheries, Braunschweig, Germany



The World Factbook 2024. Washington, DC: Central Intelligence Agency, 2024.



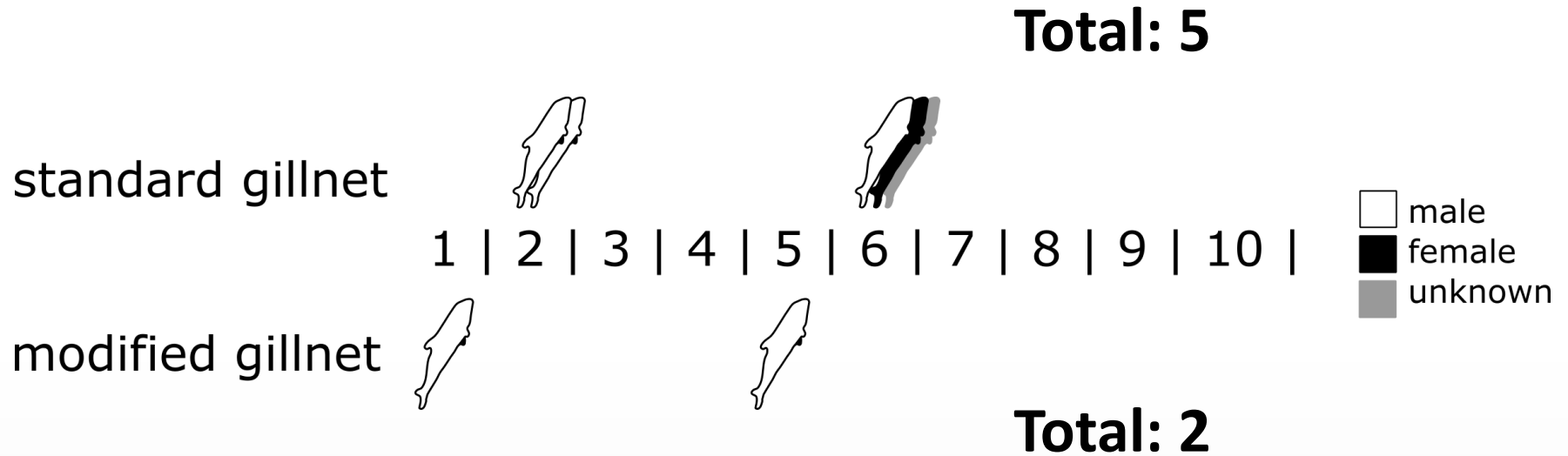
# Bycatch reduction of toothed whales



Kratzer et al. 2021



# Bycatch reduction of toothed whales



# Bycatch reduction of toothed whales



standard gillnet



1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

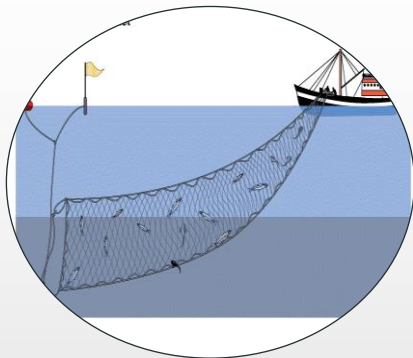
**Total: 5**

□ male  
■ female  
■ unknown

modified gillnet



**Total: 2**



Specific type of net (cotton)

© 2010 Encyclopædia Britannica, Inc.

# Bycatch reduction of toothed whales



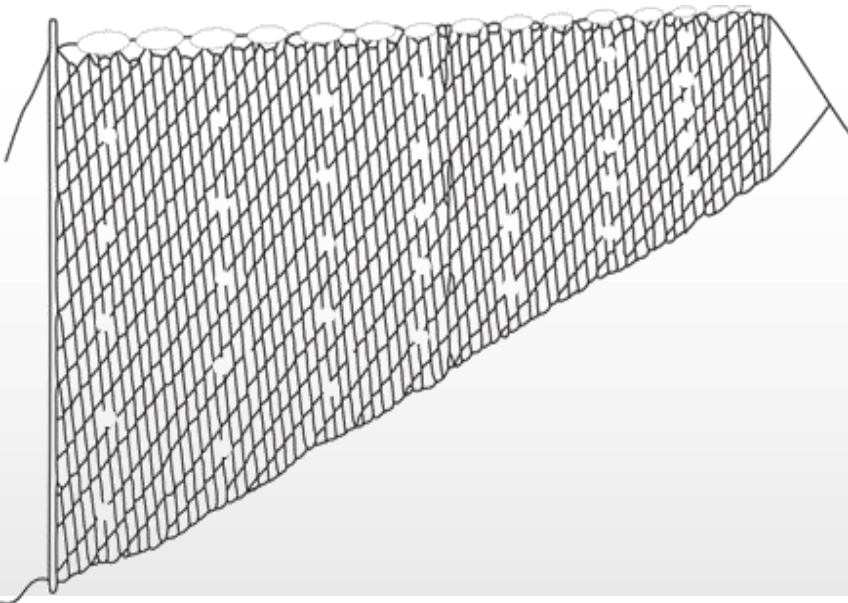
# Bycatch reduction of toothed whales



## Bycatch

PearlNet  
0

Control net  
0





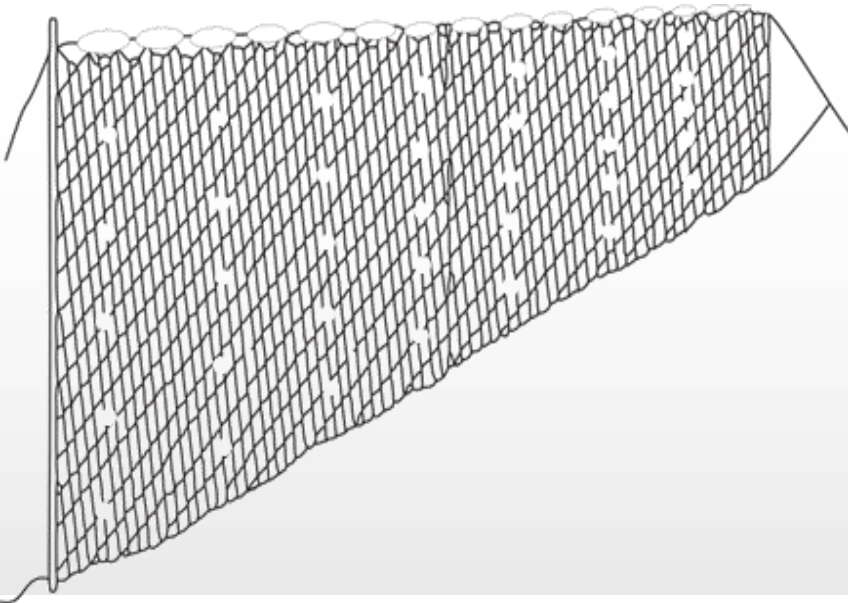
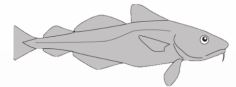
# Bycatch reduction of toothed whales



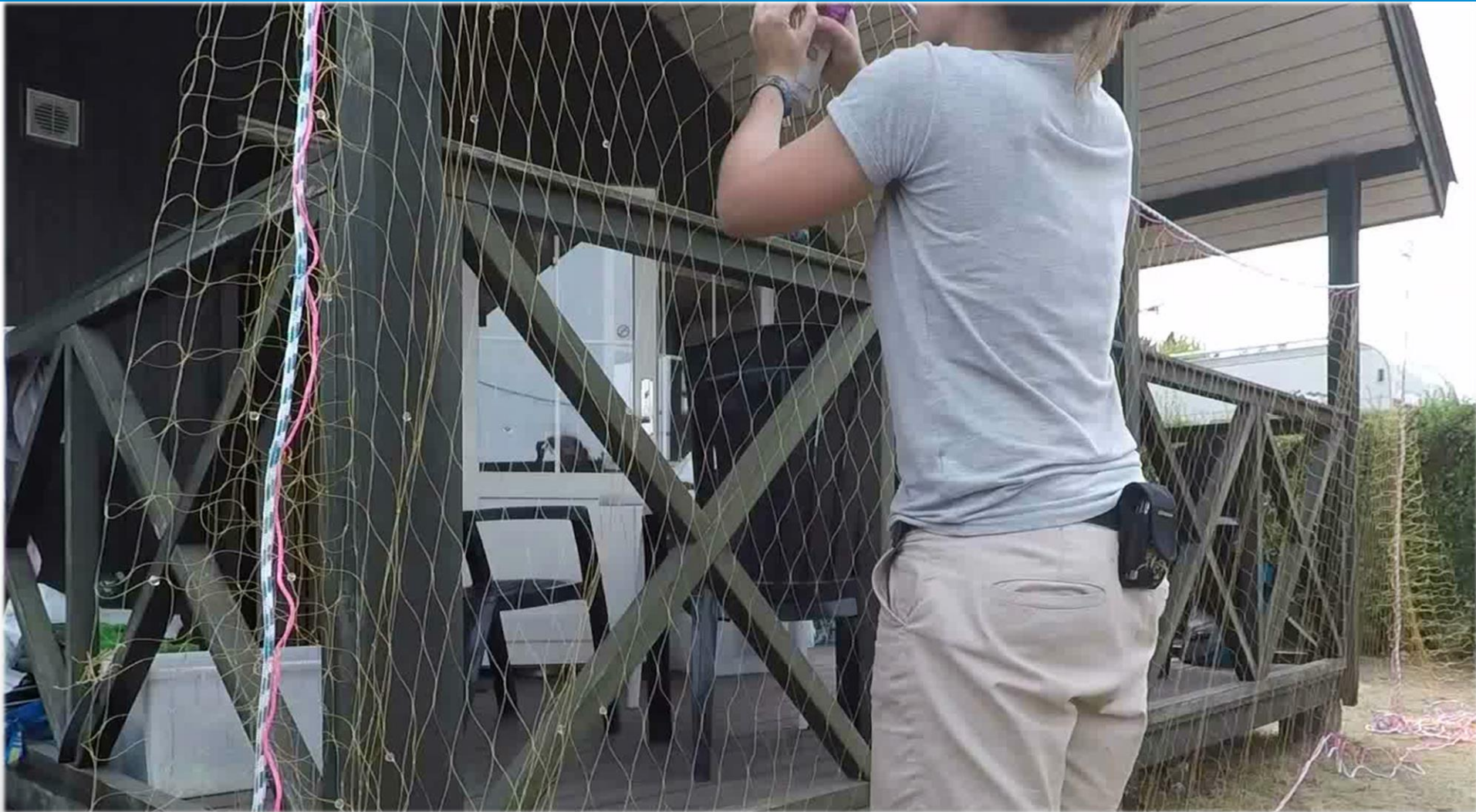
## Bycatch

PearlNet  
0

Control net  
0



# PearlNet Production



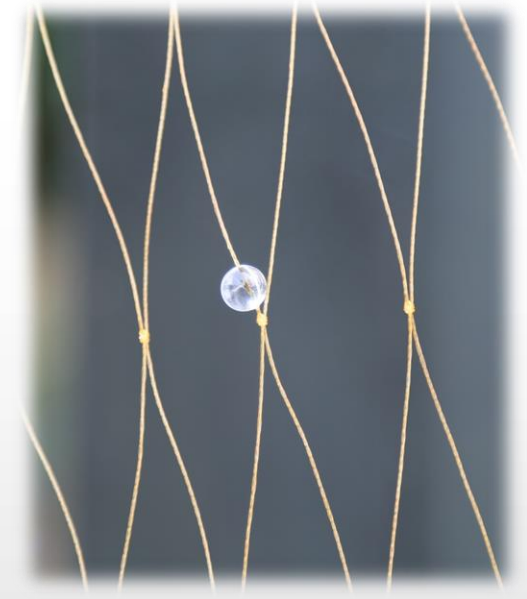
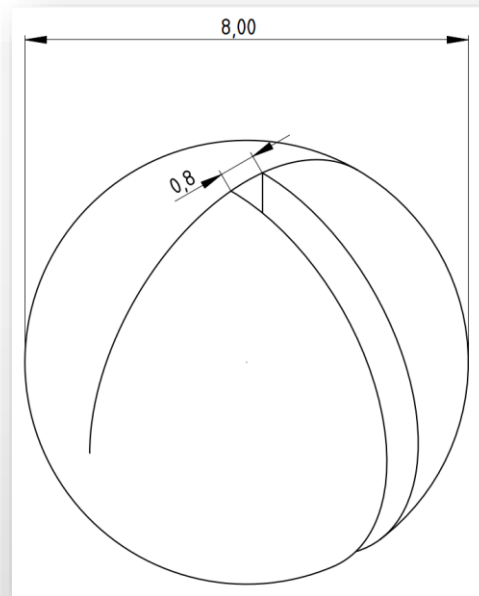
# PearlNet Production

## 8mm acrylic glass sphere

Material

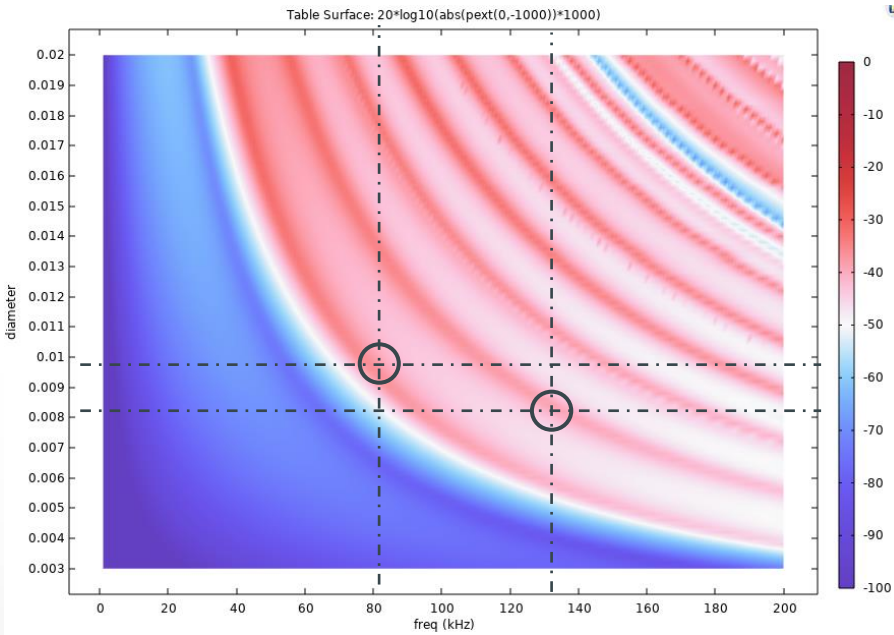


Production



# Material

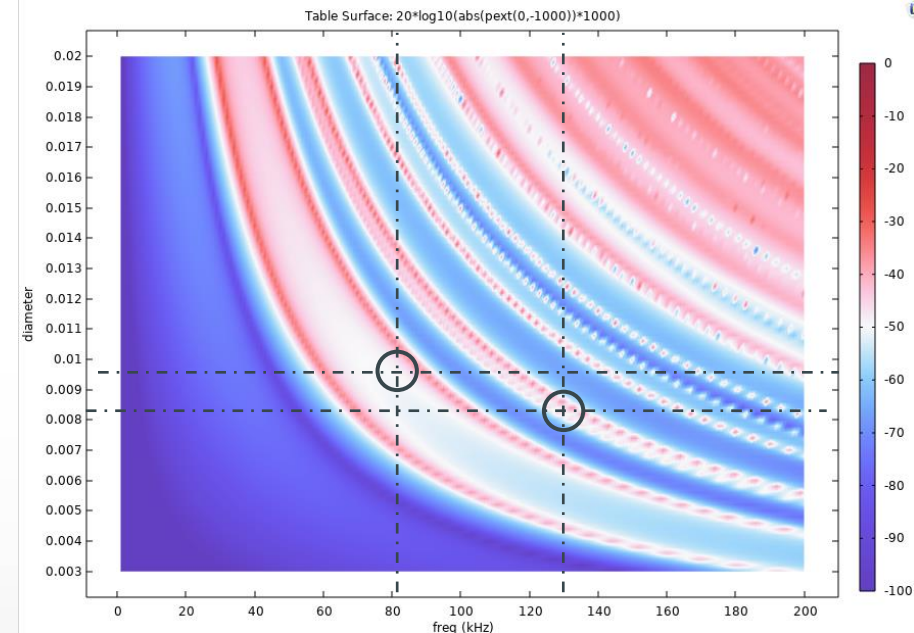
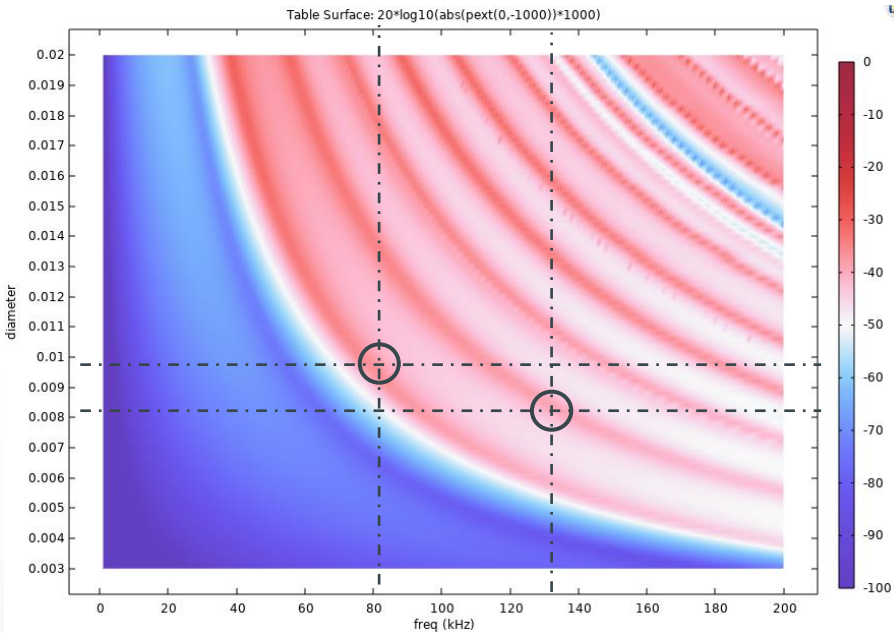
➔ PMMA / Acrylic



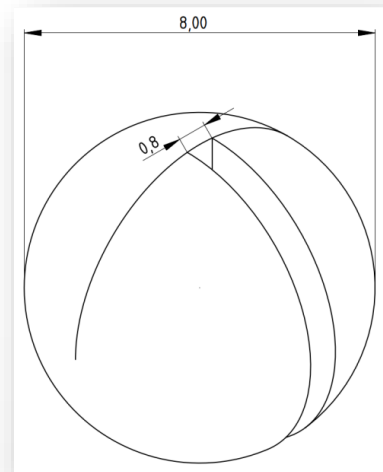
# Material

➔ PMMA / Acrylic

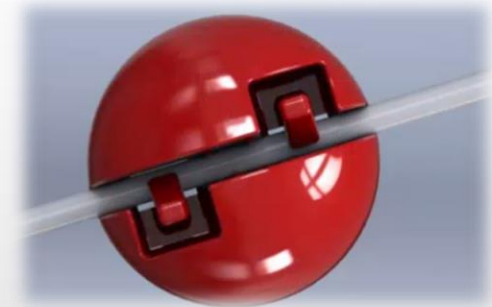
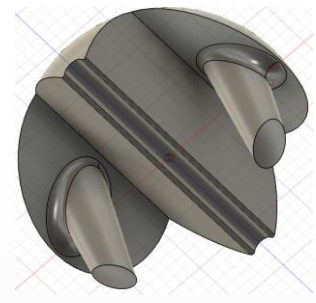
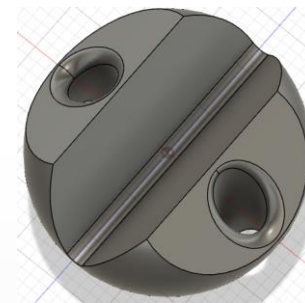
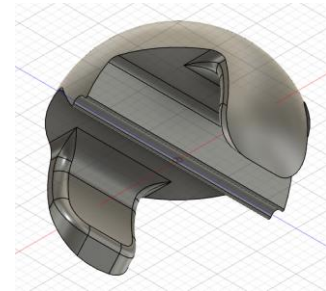
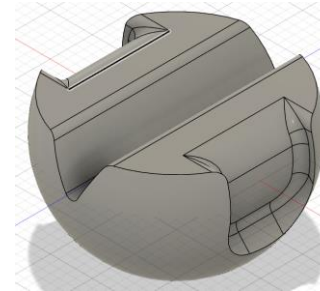
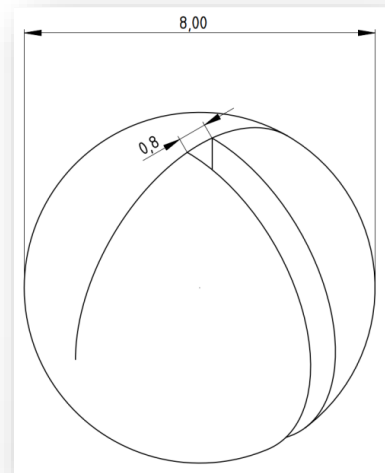
➔ PA6 / Nylon



# New design



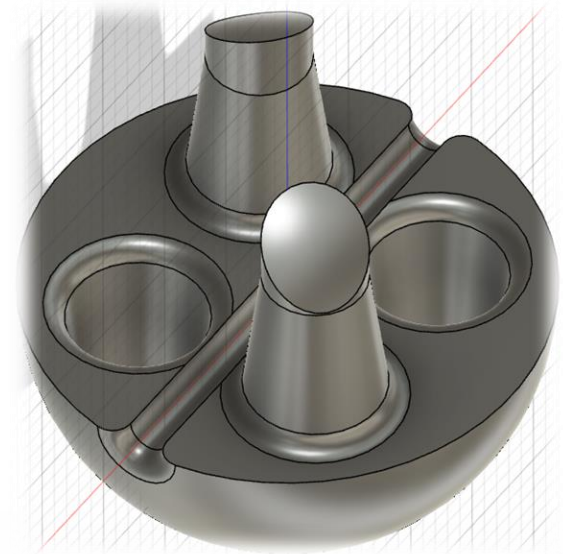
# New design



# New design



Gluing process



Pressing process

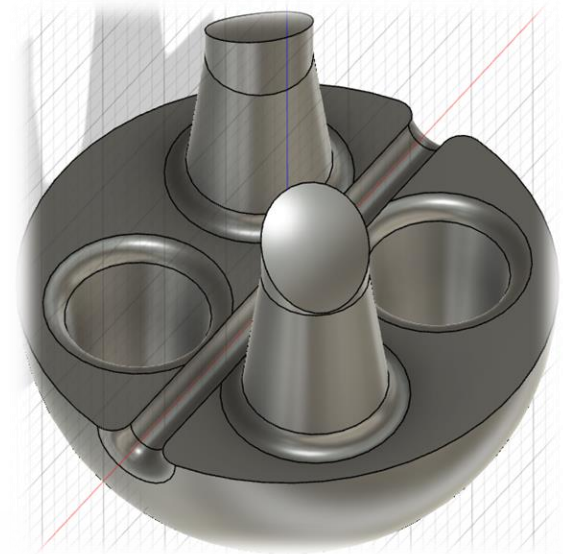


# New design



Gluing process

- Toxic
- Long production time



Pressing process

- Non-Toxic
- Faster to produce

# Perspectives



# Perspectives



*The month-long Bay of Biscay shutdown for all but the smallest fishing vessels last year paralysed the region's fisheries sector*

## Month-long Bay of Biscay shutdown

January 10, 2025 • Quentin

🕒 Dato: 10/01/2025 kl. 07:06

📁 Kategori: [Associations](#), [Fisheries Management](#)

🏷️ Tags: [Bay of Biscay](#), [CNPMEM](#)

🌐 Land: [France](#), [Spain](#)

338 vessels are prevented from fishing for a month due to cetacean bycatch conflicts

2024, 2025, 2026...

# Perspectives



● Harbor porpoise

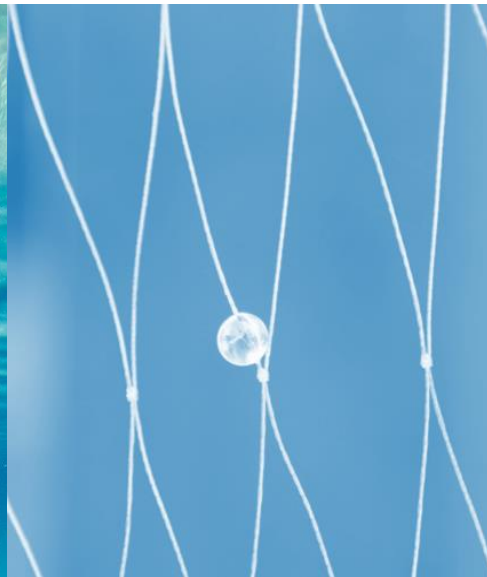
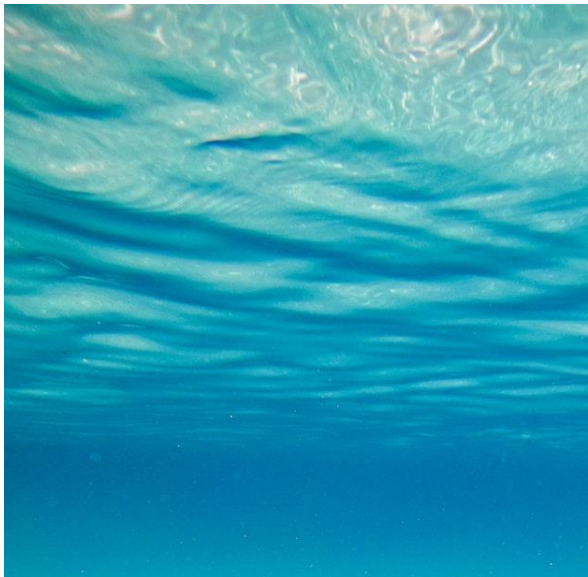
● Other spp.

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