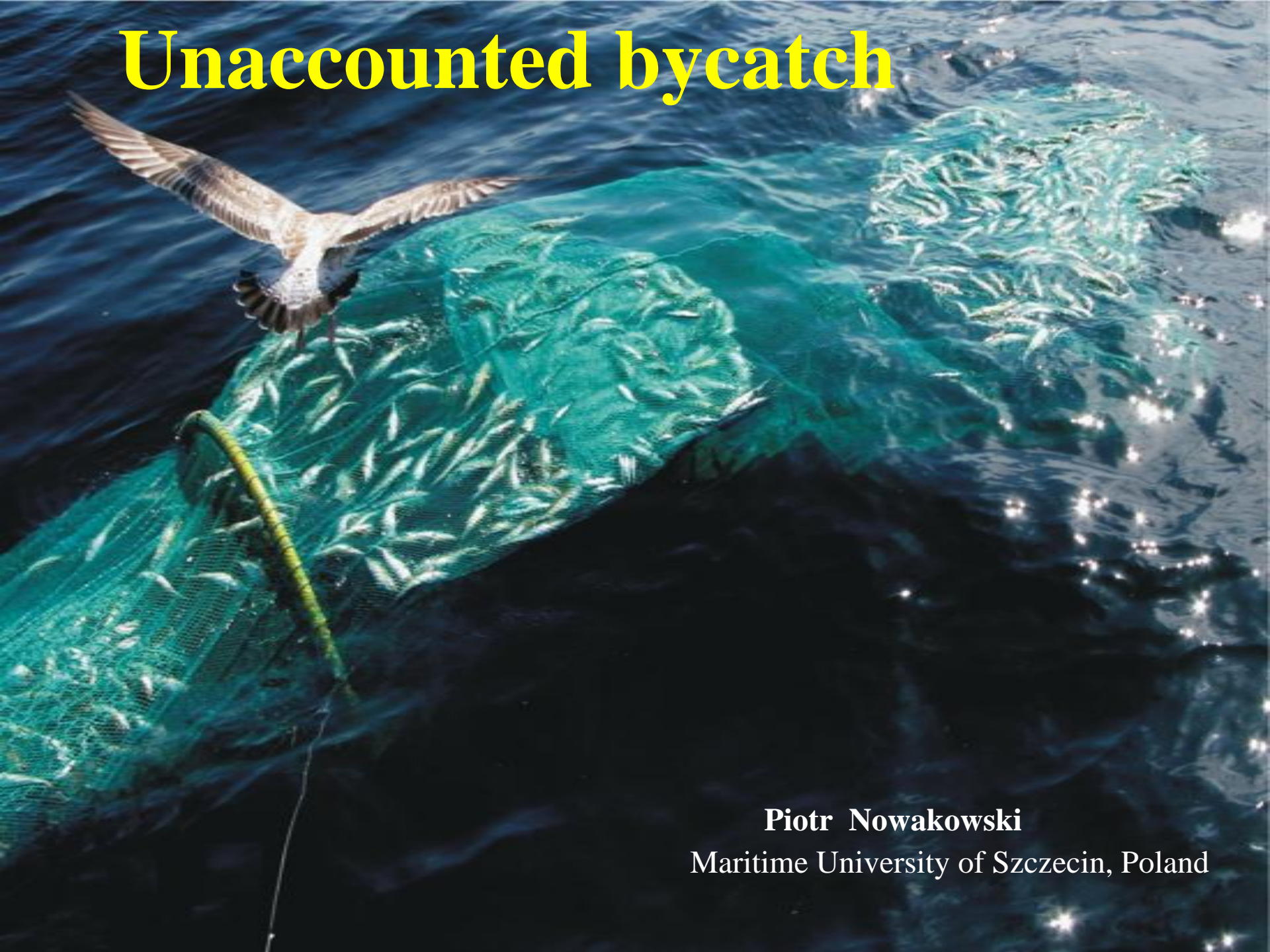


Unaccounted bycatch



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Unaccounted bycatch

in the light of the research carried out within the framework of
the EU-co-financed project entitled

DETERMINATION OF PHYSICAL AND SELECTIVITY PROPERTIES OF BACOMA AND T90 CODENDS AND OF THE WAYS FOR IMPROVING THEIR DESIGN

project no: **OR16-61535-OR1600012/07**

The most accurate possible determination of the fishing mortality rate for a given species is the fundament of rational management of fish resources in a given water body. The main elements of the fishing mortality rate include:

- landing of catch, **known value**
- illegal landings, **value known only to fishermen**
- discard mortality rate, **unknown value**
- mortality rate of fish escaping from fishing gear, **unknown value**

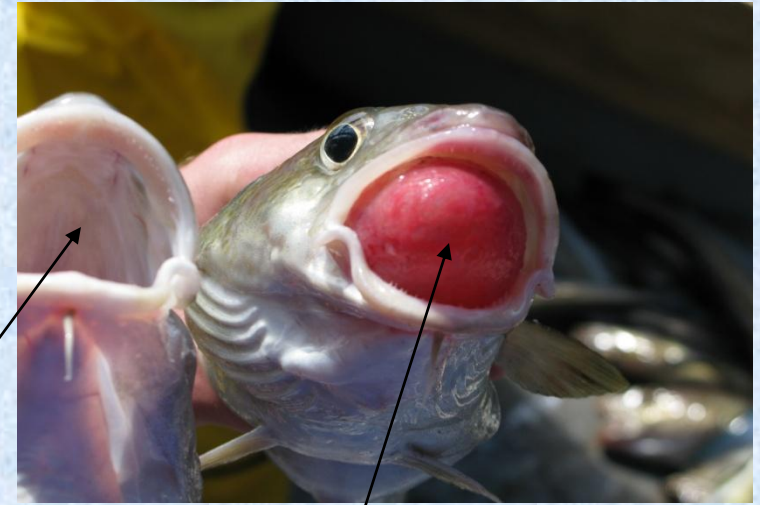
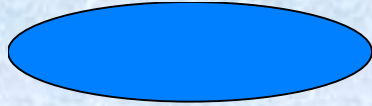
The selectivity of fishing gear is based on the assumption that the fish that escaped from fishing gear are not injured, are minimally stressed and are able to regain total vitality after the escape.

In reality, selectivity results in the escapes of smaller fish and their mortality.

If considerable amounts of fish die after escaping from fishing gear, the use of traditional measures of selectivity, such as the minimum mesh size, is insufficient.

Depth of 0 m (water surface)
swim bladder volume

900 ml = 900%



Cod with a ruptured
swim bladder

Cod with a distended
swim bladder

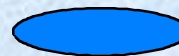
Depth of 40 m
swim bladder volume

180 ml = 180%



Depth of 80 m (at the bottom)
swim bladder volume

100 ml = 100%

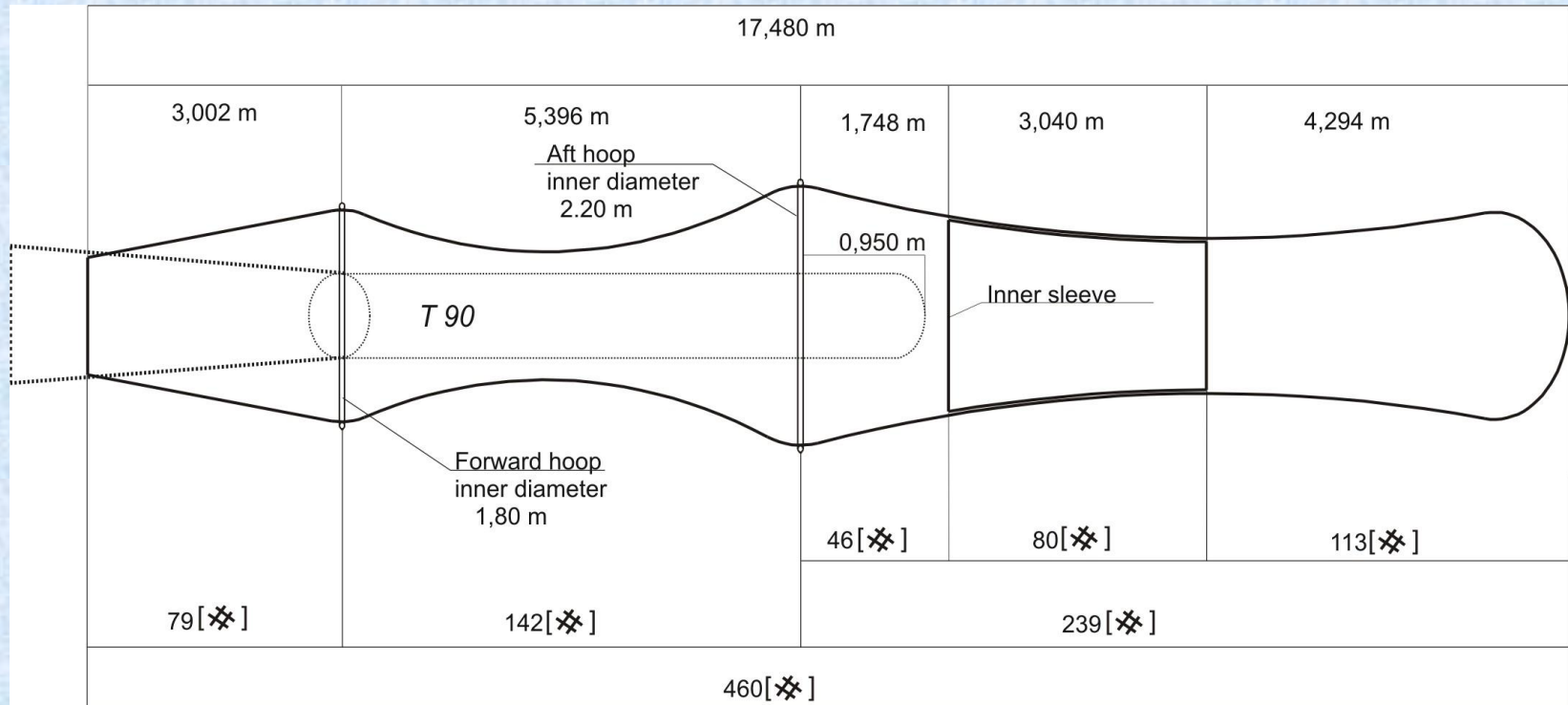


Council Regulation (WE) No 2187/2005 establishes technical measures designed to limit fishing mortality through appropriate selectivity in order to restrict large catches of juvenile cod in fishery with trawls. The Regulation introduces the requirement to use special towed codends as part of fishing gear: of T90 or BACOMA type.

The following tasks were planned:

- **Constructing a special innovative divided small-mesh coat for the codend** that will allow for determining the amount as well as the length and weight of cod escaping from the codend both while the trawling gear is towed and while it is hauled.
- **Determining the length and weight structure of the cod stock caught, which may be used when estimating its resources.**
- **Assessing the selectivity of T90 and BACOMA codends.**
- **Determining the number and weight of cod escaping from the codend while:**
 - trawling gear is being towed,
 - trawling gear is being hauled.

Special innovative divided cover



Mesh size of 38 mm

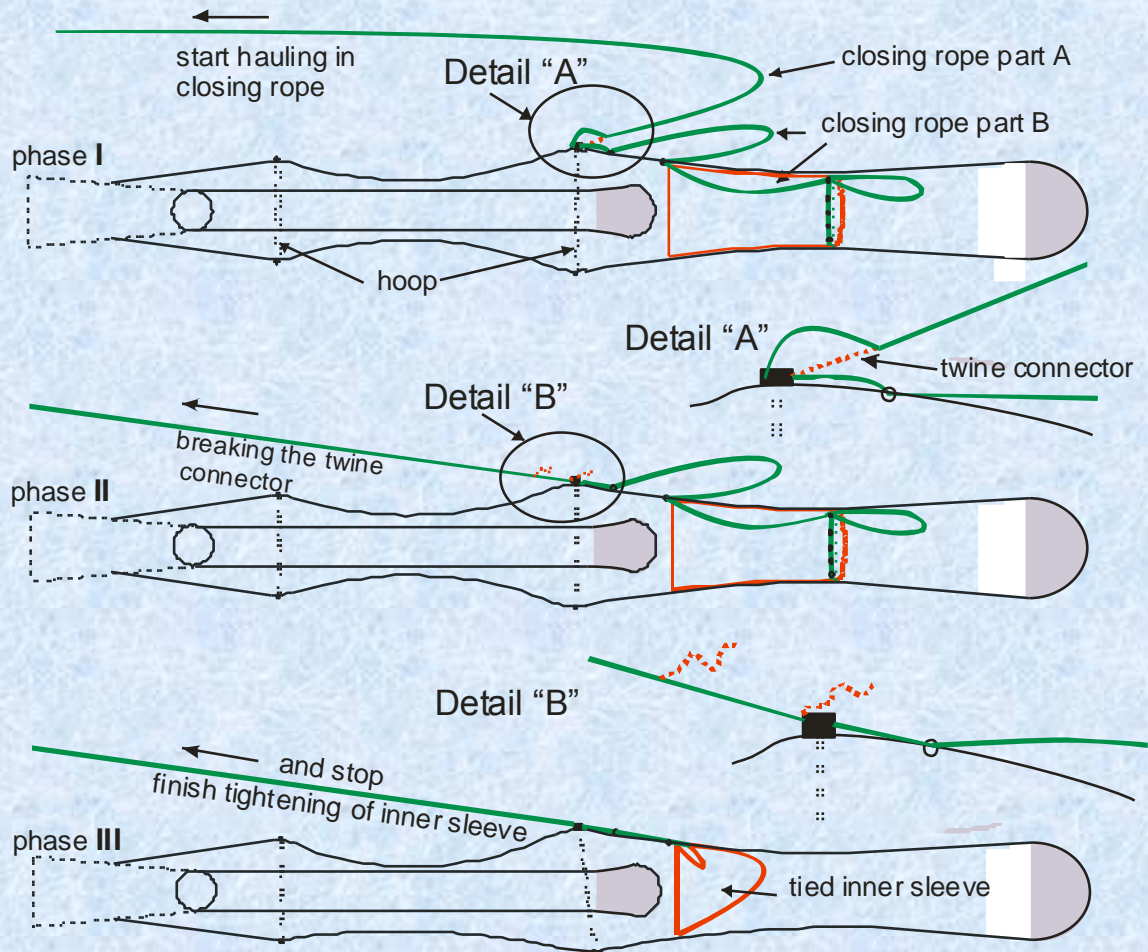
Length of 17.48 m

Perimeter of 2 x (5+207+5) meshes

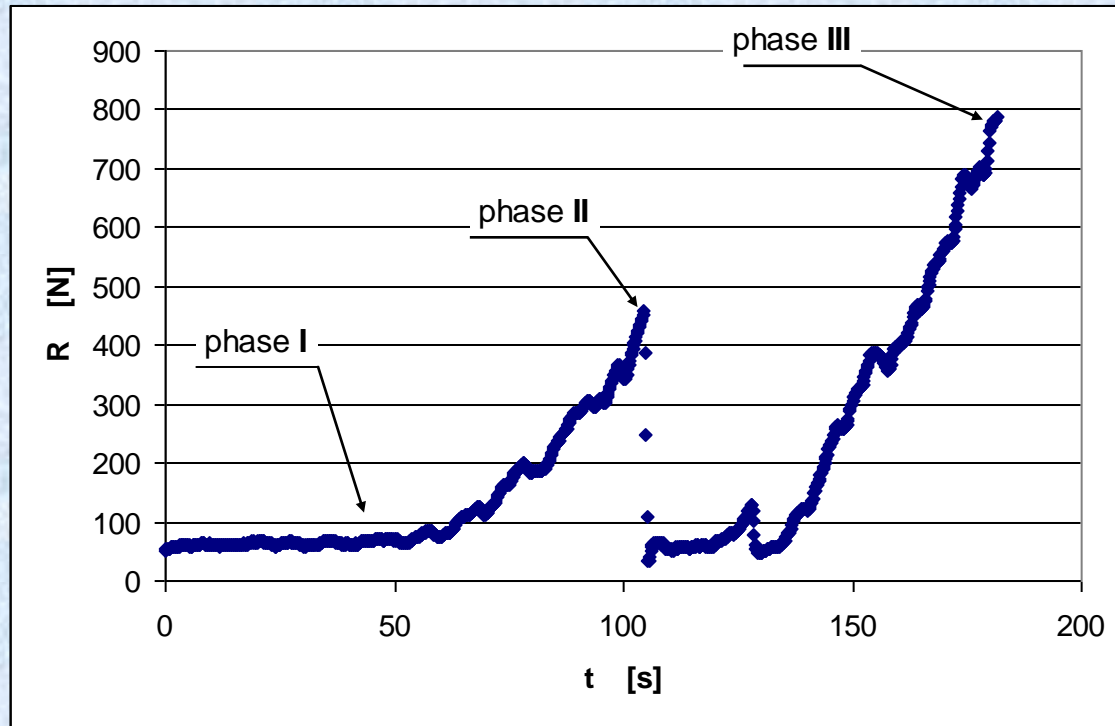
Zip of 5 m sewn on the top portion, opened in both directions

PCV hoops (Ø 60 mm) at the front of 1.8 m in diameter,

second ring of 2.2 m in diameter

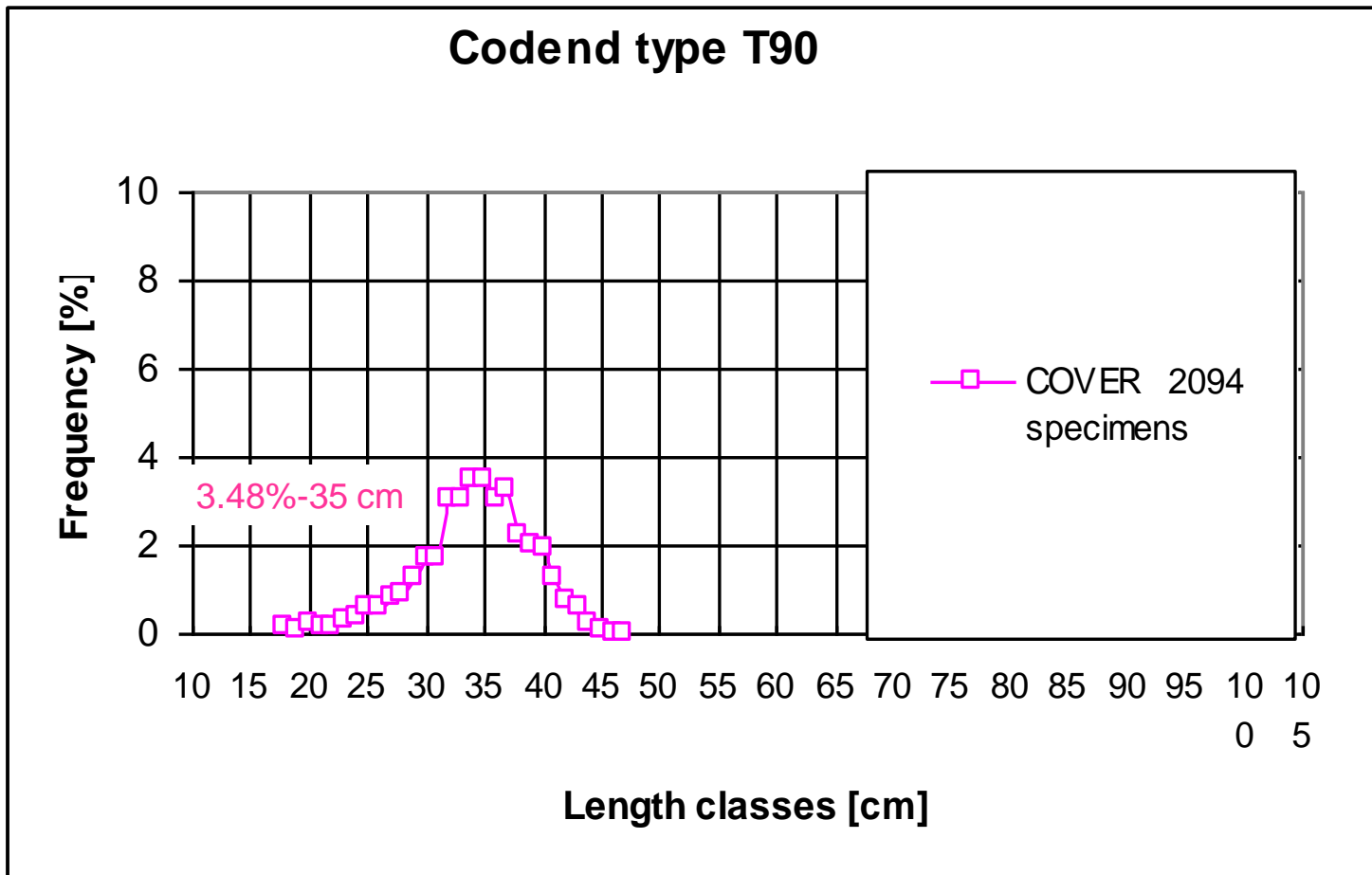


Phases of the inner sleeve tightening, where:
 phase I – hauling the rope away from the water
 phase II – breaking the twine connector
 phase III – tightening the inner sleeve



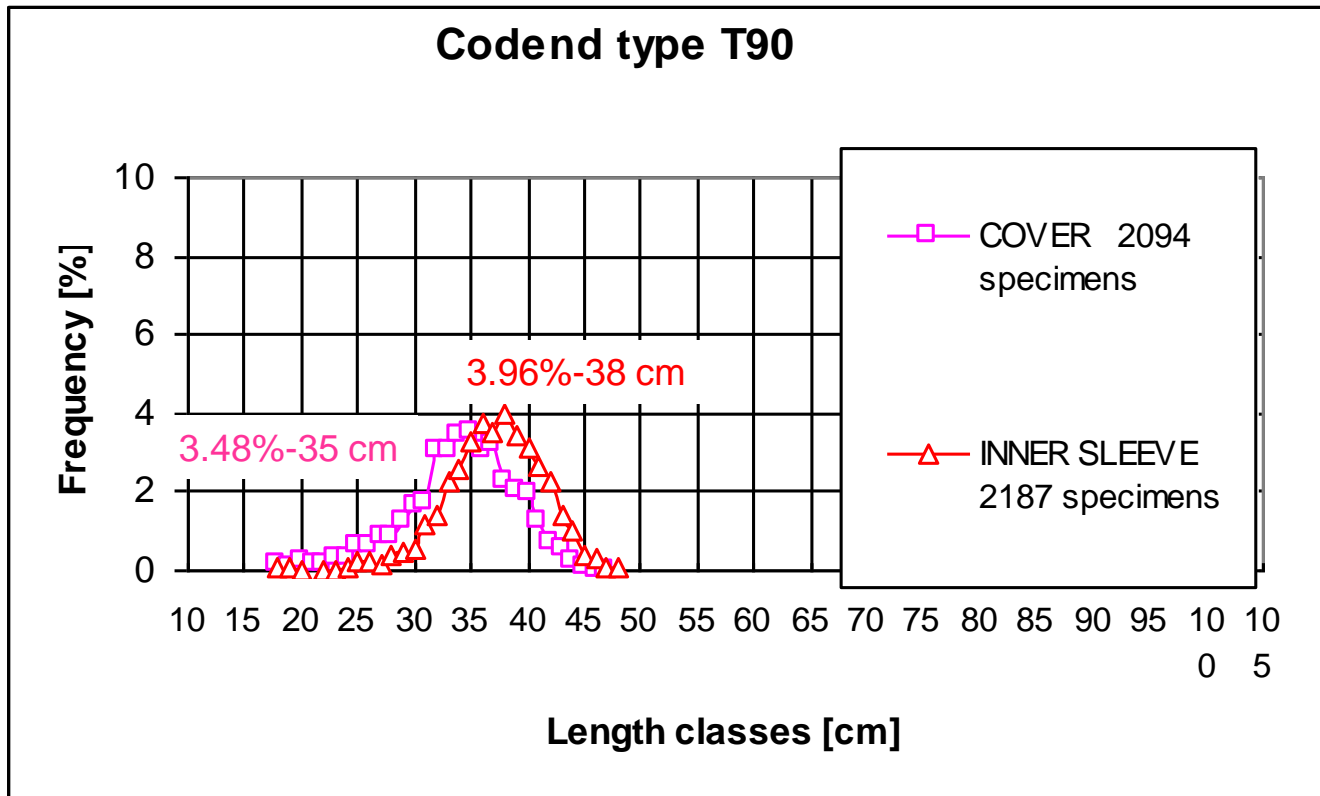
Changes of tensile force a rope closing an inner sleeve while hauling in the rope as a function of time, for towing velocity around 3 kts (measurements taken in Model Research Station at Insko)

- phase I – hauling the rope away from the water, time: 0 to 64 sec.,
- phase II – breaking the twine connector from 65 to 105 sec.,
- phase III – tightening the inner sleeve from 106 to 175 sec.



Proportional frequency in cod numbers due to 1 cm length classes for the cover (10 hauls)

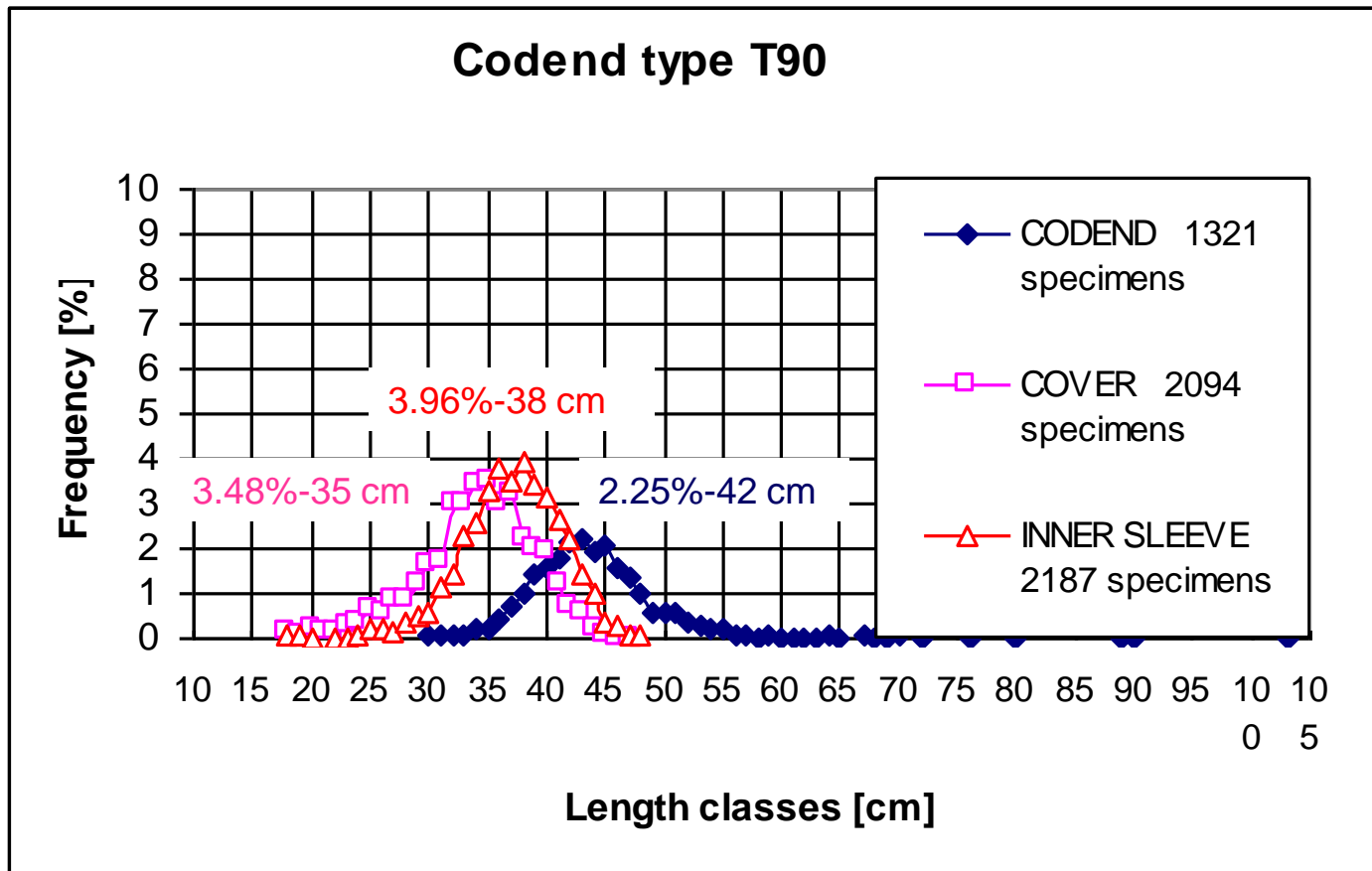
COVER - the cods that escaped from the codend while towing the trawl net



Proportional frequency in cod numbers due to 1 cm length classes for the cover and the inner sleeve (10 hauls)

COVER - the cods that escaped from the codend while towing the trawl net

INNER SLEEVE - the cods that escaped from the codend while BOARDING the trawl net

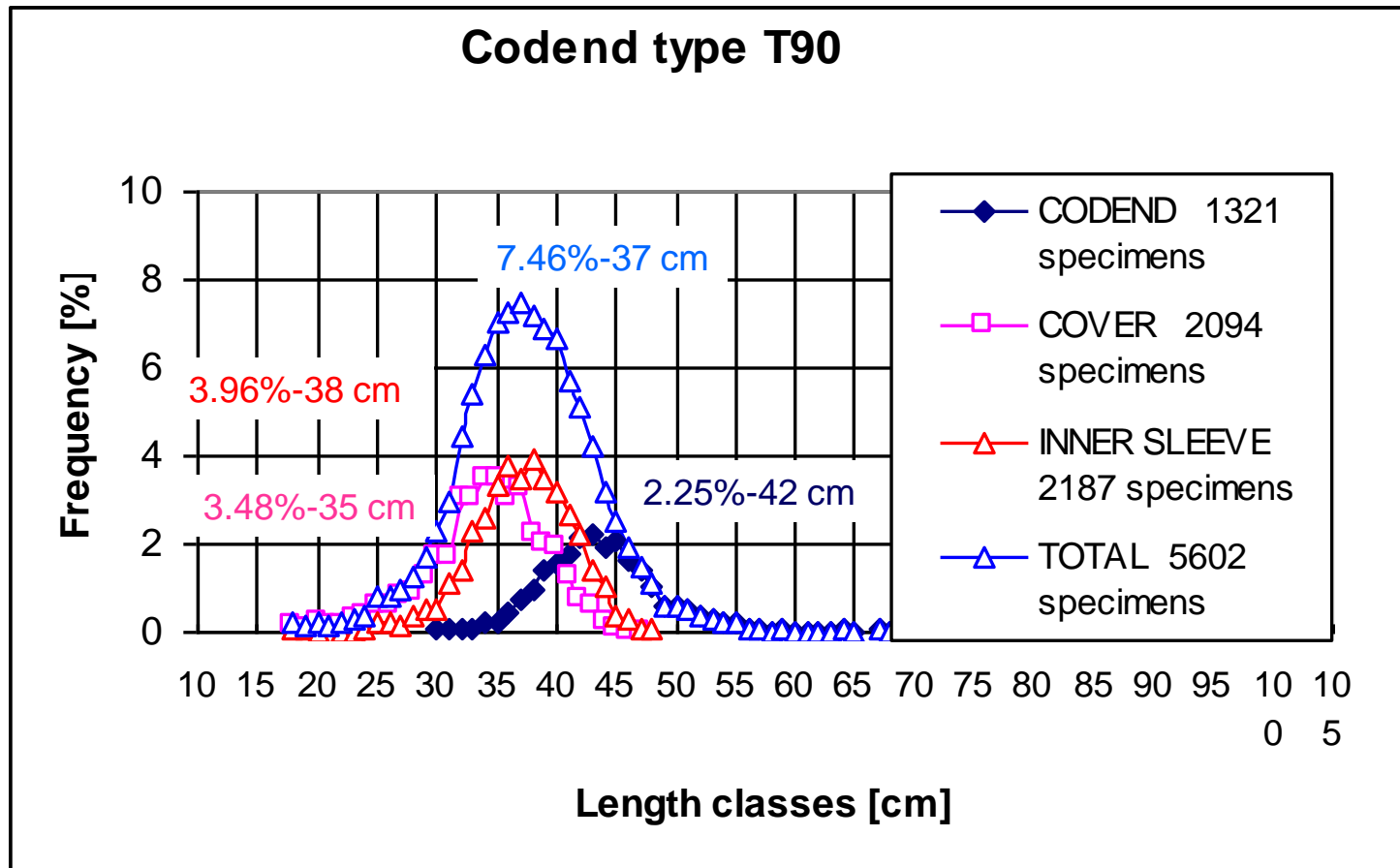


Proportional frequency in cod numbers due to 1 cm length classes for the T90 codend, the cover, the inner sleeve (10 hauls)

CODEND - the cods retained in the codend T90

COVER - the cods that escaped from the codend while towing the trawl net

INNER SLEEVE - the cods that escaped from the codend while boarding the trawl net

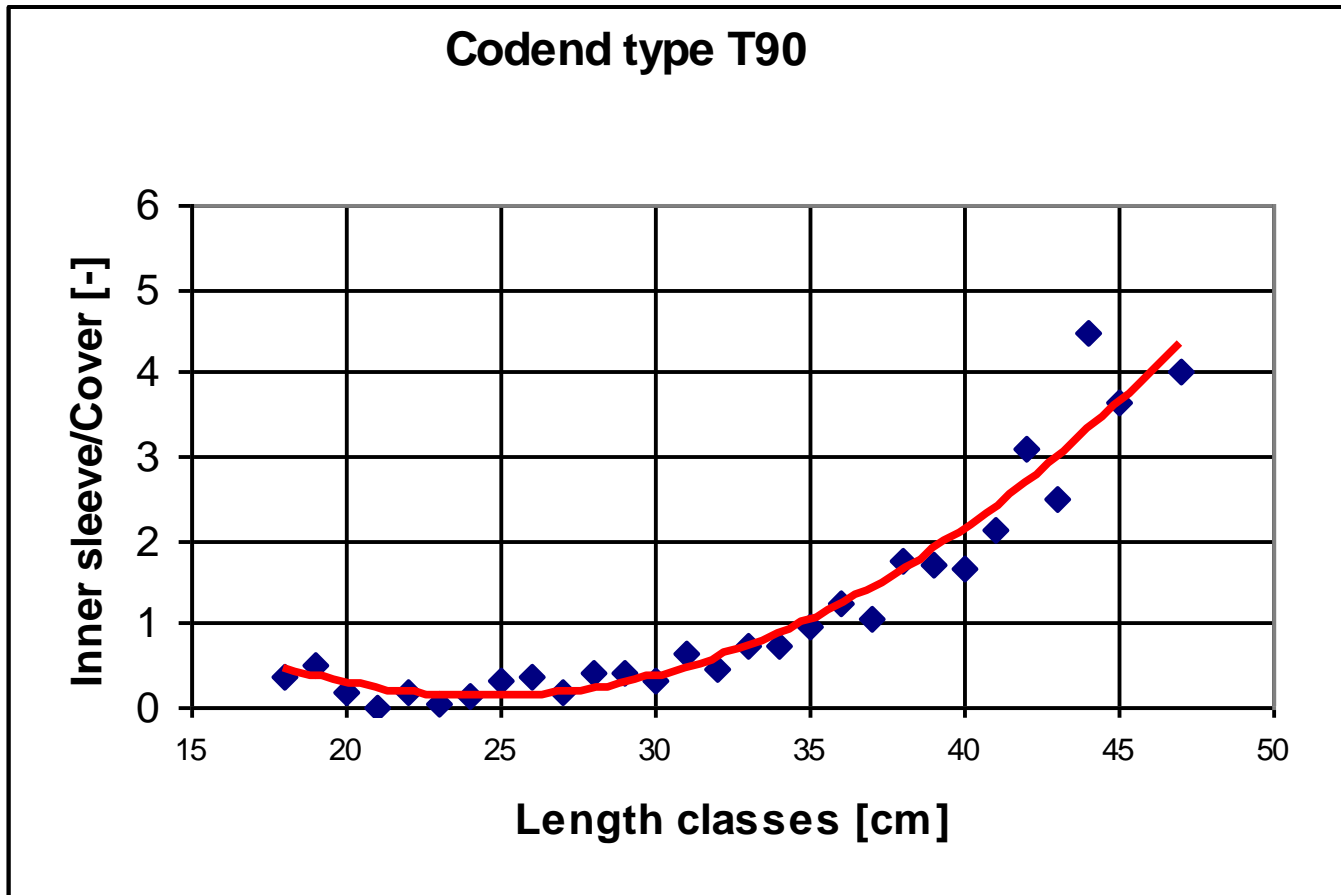


Proportional frequency in cod numbers due to 1 cm length classes for the T90 codend, the cover, the inner sleeve and the **total sample** (10 hauls)

CODEND - the cods retained in the codend T90

COVER - the cods that escaped from the codend while towing the trawl net

INNER SLEEVE - the cods that escaped from the codend while boarding the trawl net

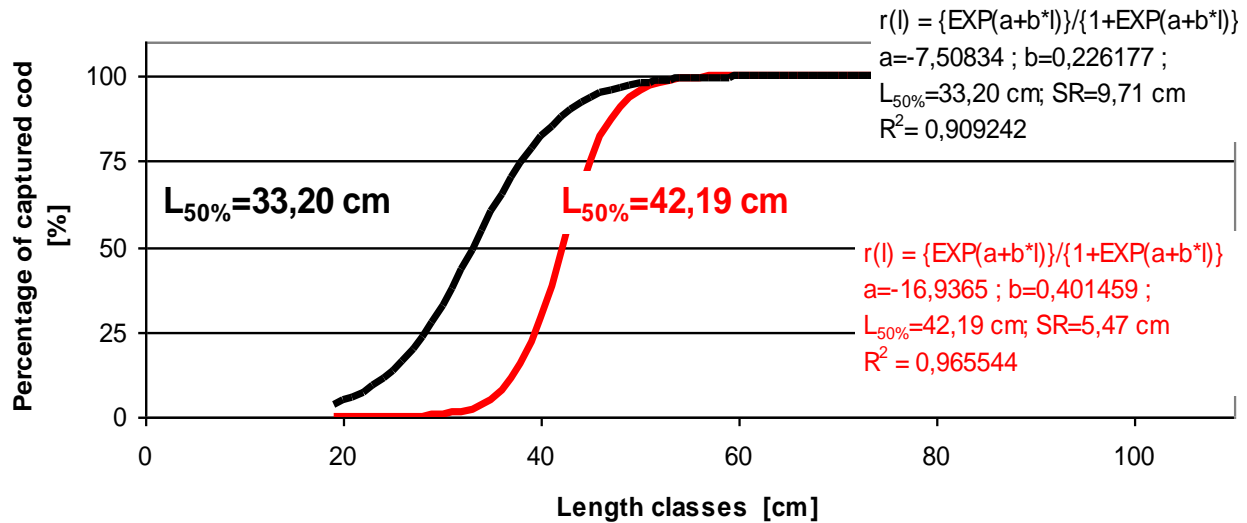


Comparison of number the cods **INNER SLEEVE/COVER**

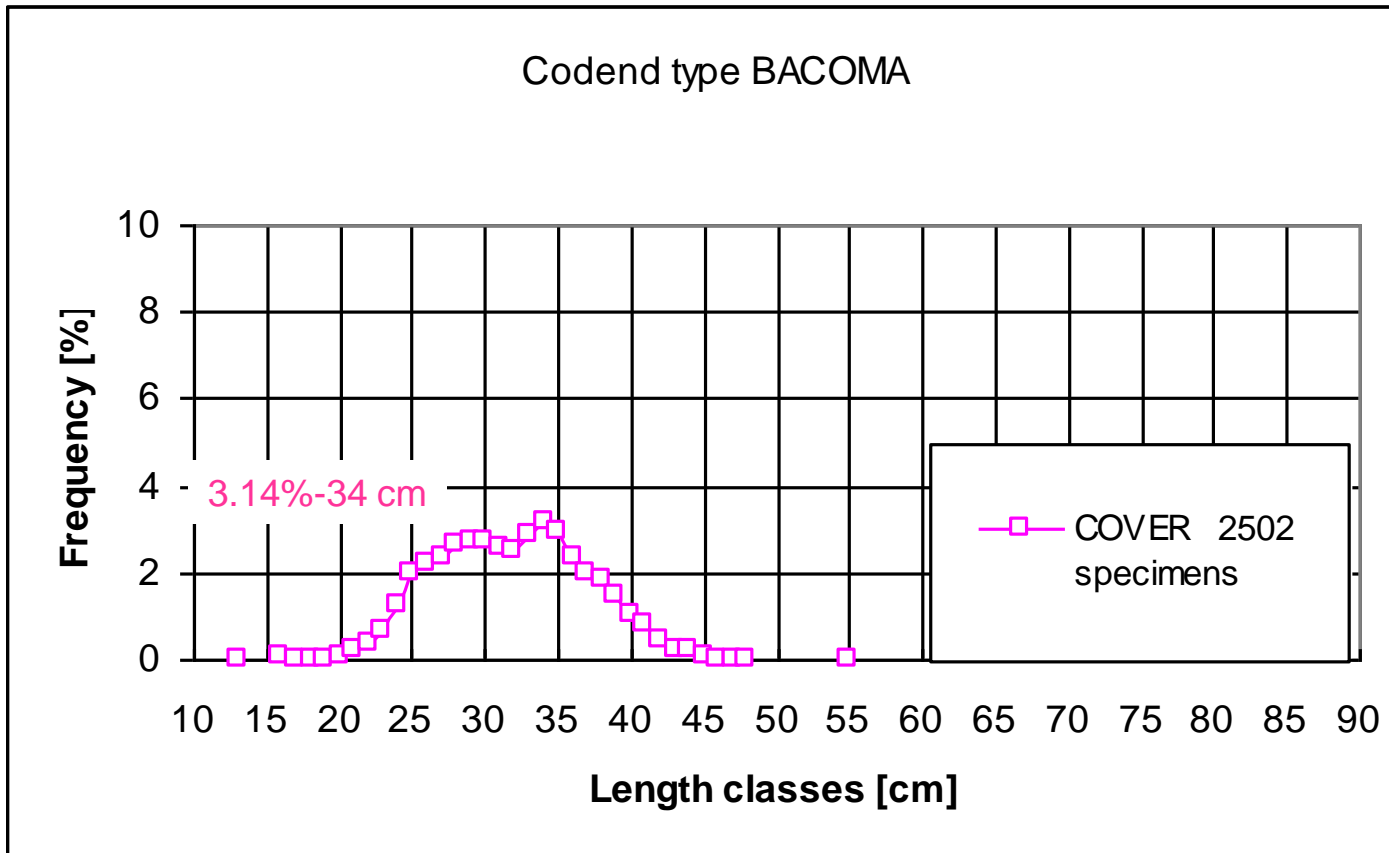
COVER - the cods that escaped from the codend while towing the trawl net

INNER SLEEVE - the cods that escaped from the codend while boarding the trawl net

Selectivity curves for T90 codend, 10 measurement hauls,
number of cod measured - 5602 specimens (red curve) and 3508
specimens (black curve, cods stopped within codend while trawling)

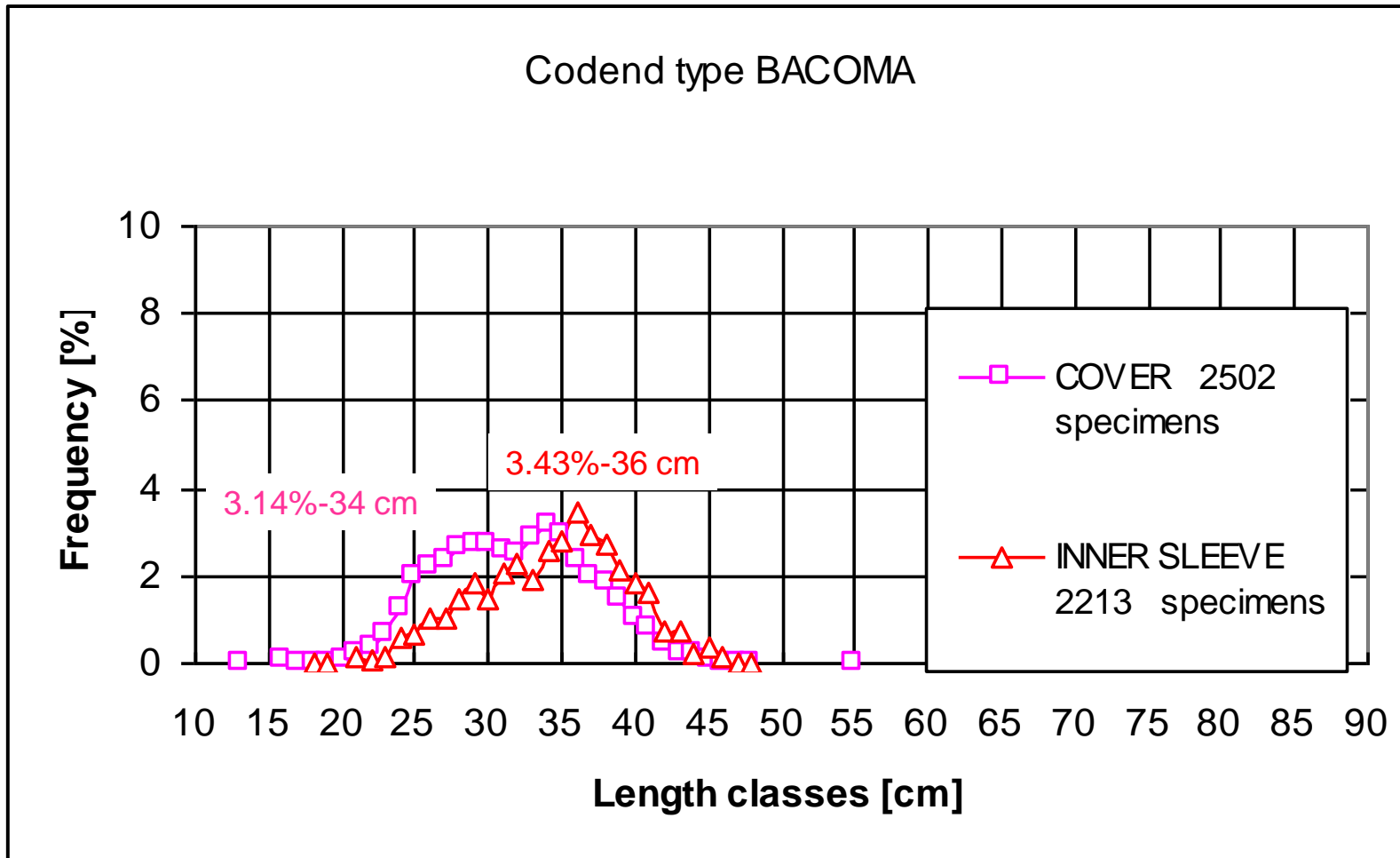


The selectivity curves for T90 codend



Proportional frequency in cod numbers due to 1 cm length classes for the cover (15 hauls)

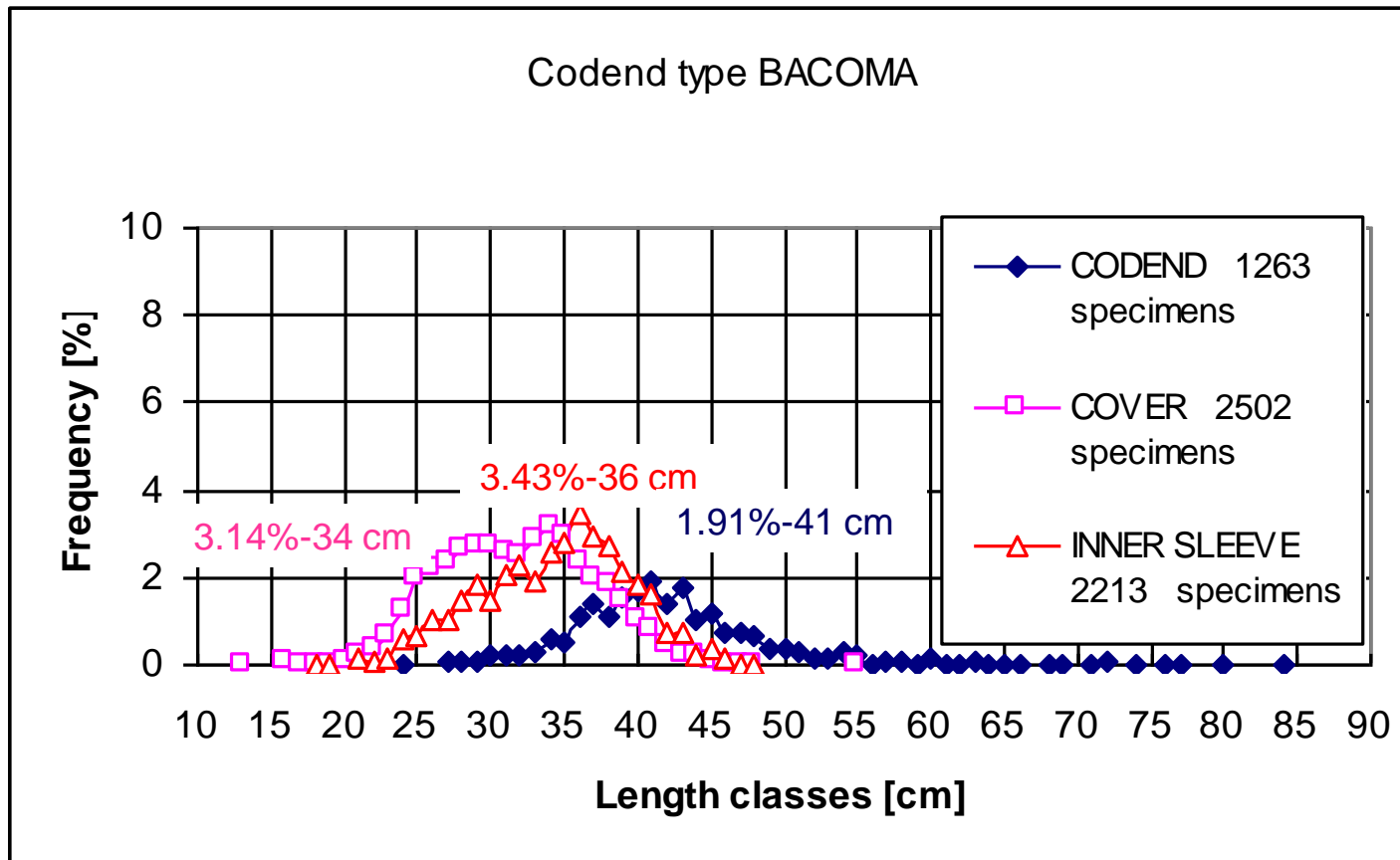
COVER - the cods that escaped from the codend while towing the trawl net



Proportional frequency in cod numbers due to 1 cm length classes for the cover and the inner sleeve (15 hauls)

COVER - the cods that escaped from the codend while towing the trawl net

INNER SLEEVE - the cods that escaped from the codend while boarding the trawl net

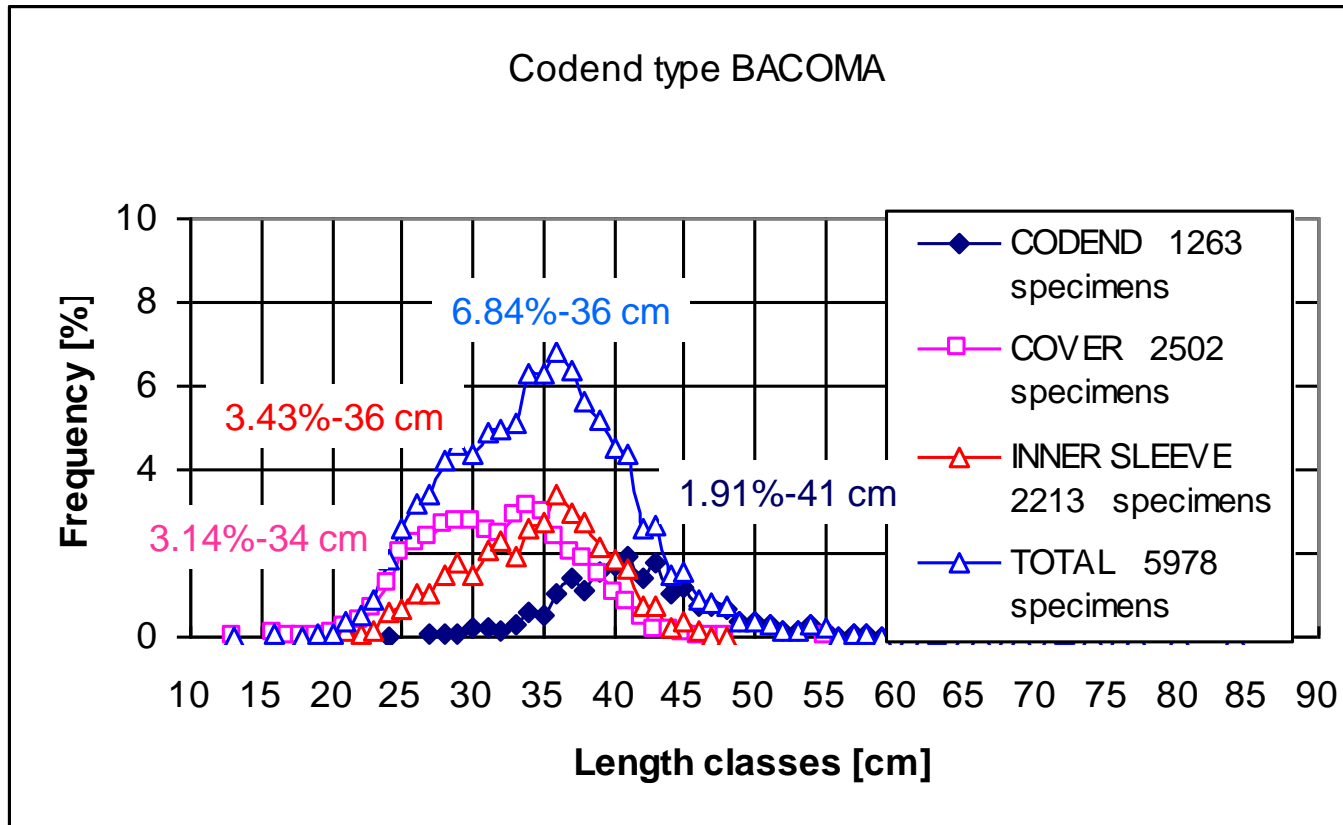


Proportional frequency in cod numbers due to 1 cm length classes for the BACOMA codend, the cover, the inner sleeve (15 hauls)

CODEND - the cods retained in the codend BACOMA

COVER - the cods that escaped from the codend while towing the trawl net

INNER SLEEVE - the cods that escaped from the codend while boarding the trawl net

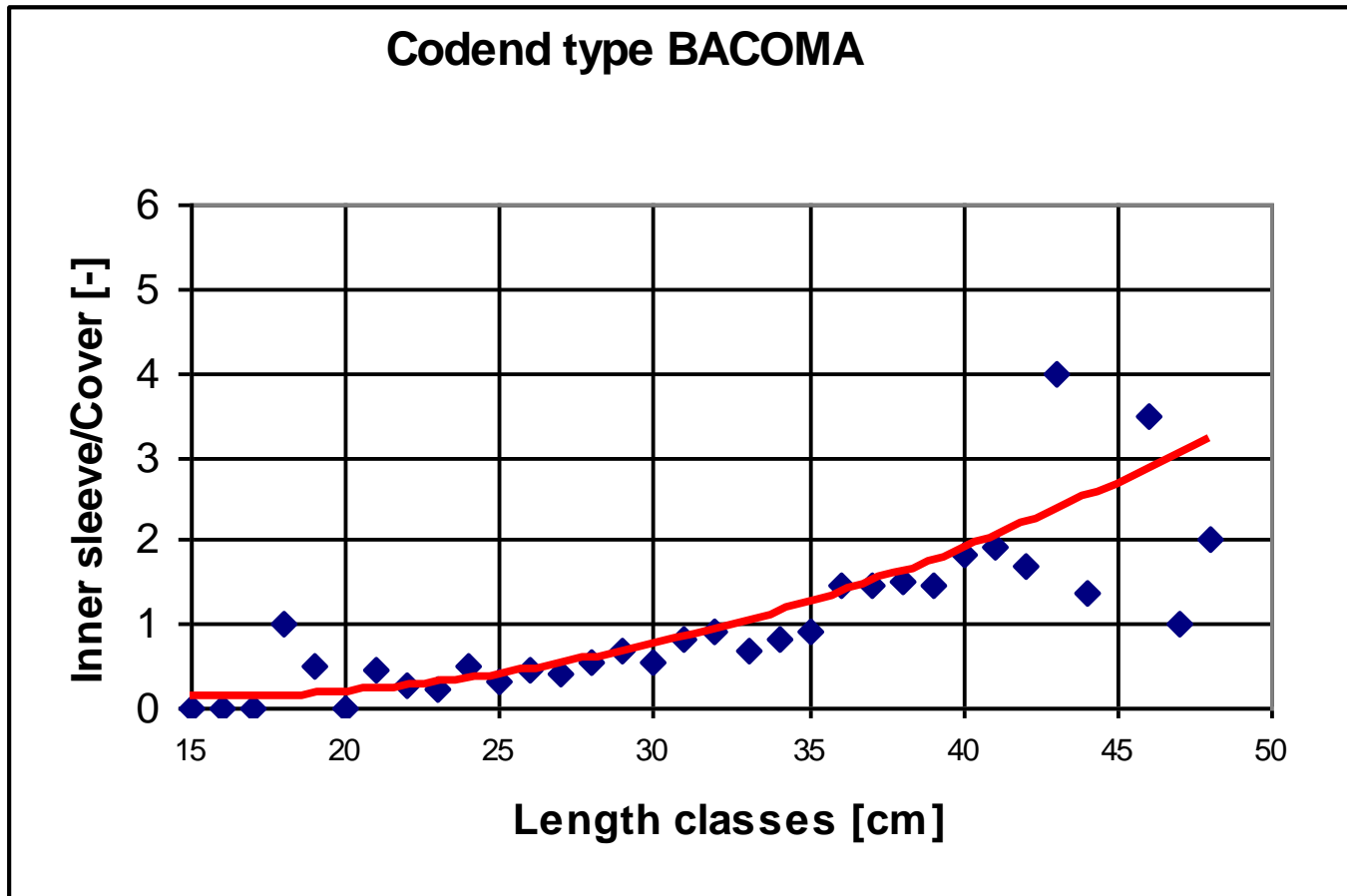


Proportional frequency in cod numbers due to 1 cm length classes for the BACOMA codend, the cover, the inner sleeve and the **total sample** (15 hauls)

CODEND - the cods retained in the codend BACOMA

COVER - the cods that escaped from the codend while towing the trawl net

INNER SLEEVE - the cods that escaped from the codend while boarding the trawl net

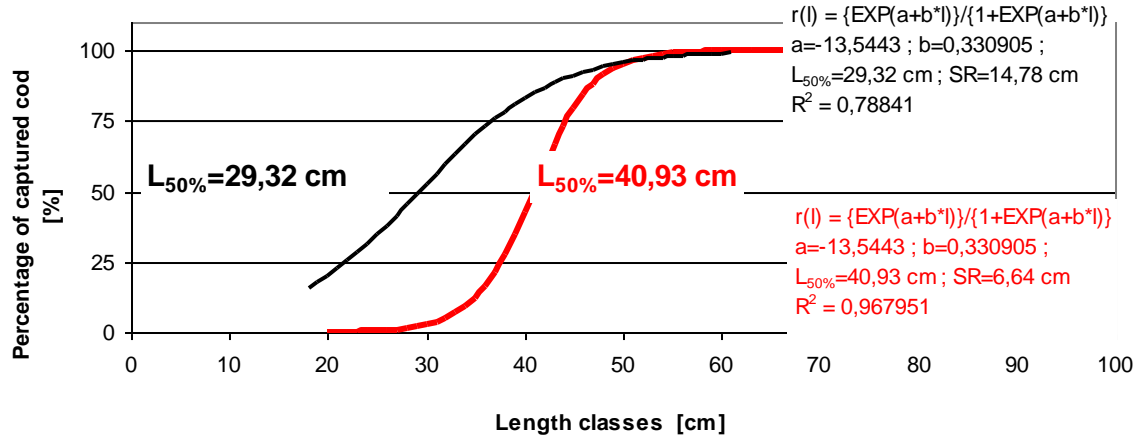


Comparison of number the cods **INNER SLEEVE/COVER**

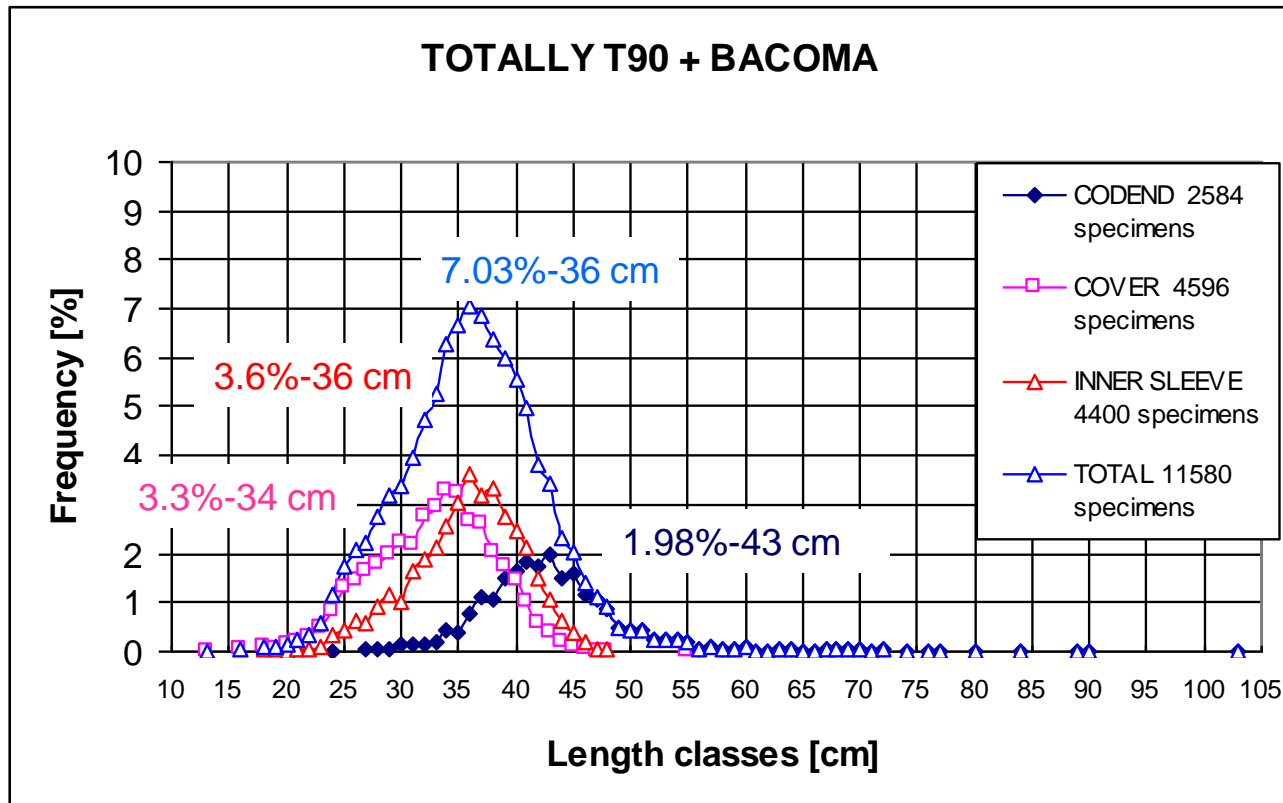
INNER SLEEVE - *the cods that escaped from the codend while boarding the trawl net*

COVER - *the cods that escaped from the codend while towing the trawl net*

Selectivity curves for BACOMA codend, 15 measurement hauls,
 number of cod measured - 5978 specimens (red curve) and 3476
 specimens (black curve, cods stopped within codend while trawling)



The selectivity curves for BACOMA codend



The BACOMA and T90 codends proportional frequency of cod numbers due to 1 cm length classes for the codends, the cover, the inner sleeve and the total sample

CODEND - the cods retained in the codends T90 and BACOMA

COVER - the cods that escaped from the codends while towing the trawl net

INNER SLEEVE - the cods that escaped from the codends while boarding the trawl net

UNACCOUNTED BYCATCH or **INVISIBLE DISCARD?**

The results obtained allow for determining a more precise fishing mortality ratio, and demonstrate an urgent ***need for a new approach to selectivity*** in trawl fisheries.

The actions aimed solely at limiting the discards that are ***visible*** (removed from the vessel) without taking into account the ***invisible discards*** resulting from the operation of fishing gear are seriously incomplete and may be labelled as

“creative selectivity.”

Cod that escaped during hauling



Figure 12. Cod with a swim bladder distended as a result of decompression

Figure 13. Cod at the surface; many are floating with the belly facing up – their belly layers are distended.

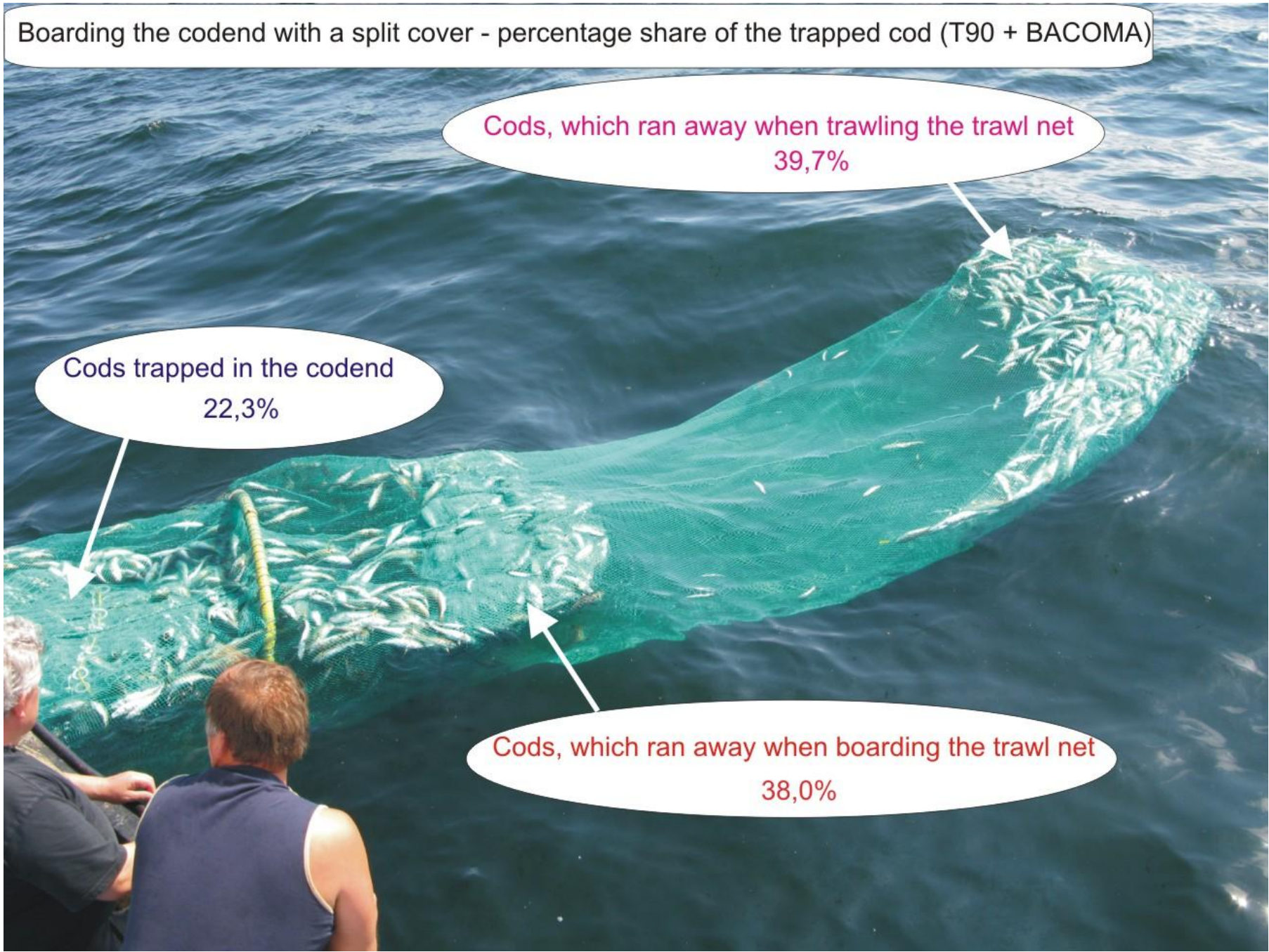


Boarding the codend with a split cover - percentage share of the trapped cod (T90 + BACOMA)

Cods, which ran away when trawling the trawl net
39,7%

Cods trapped in the codend
22,3%

Cods, which ran away when boarding the trawl net
38,0%



„As fishers and scientists know all too well, developing effective and commercially viable selective gear is a long process, fraught with disappointments and false hopes”*

Thank you for your attention

*The Common Fisheries Policy, a User's Guide

http://ec.europa.eu/fisheries/documentation/publications/pcp2008_en.pdf