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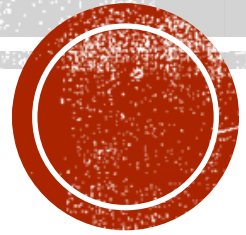
PILOT PROJECT TO TEST THE USE OF STEREOSCOPIC CAMERAS DURING THE FIRST TRANSFER AND THE AUTOMATION OF VIDEO FOOTAGE ANALYSIS

OBJECTIVE 1 - ICCAT CIRCULAR #02226/2024 OF 11 MARCH 2024



Pau Muñoz-Benavent, Joaquín Martínez-Peiró, Álvaro Blom-Dahl, Gabriela Andreu-García, Sergio Morell-Monzó, Vicente Puig-Pons, Víctor Espinosa.

Universitat Politècnica de València (UPV)

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OBJECTIVE

- Evaluate the use of stereoscopic cameras during the first transfers from purse seine vessels to transport cages for estimating weight at this stage.

CAMPAIGNS

2024

- First transfer from a purse seiner to a transport cage in the Mediterranean.
- First transfer from a purse seiner to a transport cage in the Adriatic.

2025

- First transfer from a trap to an associated farming cage.

MED: RECORDING SETUP

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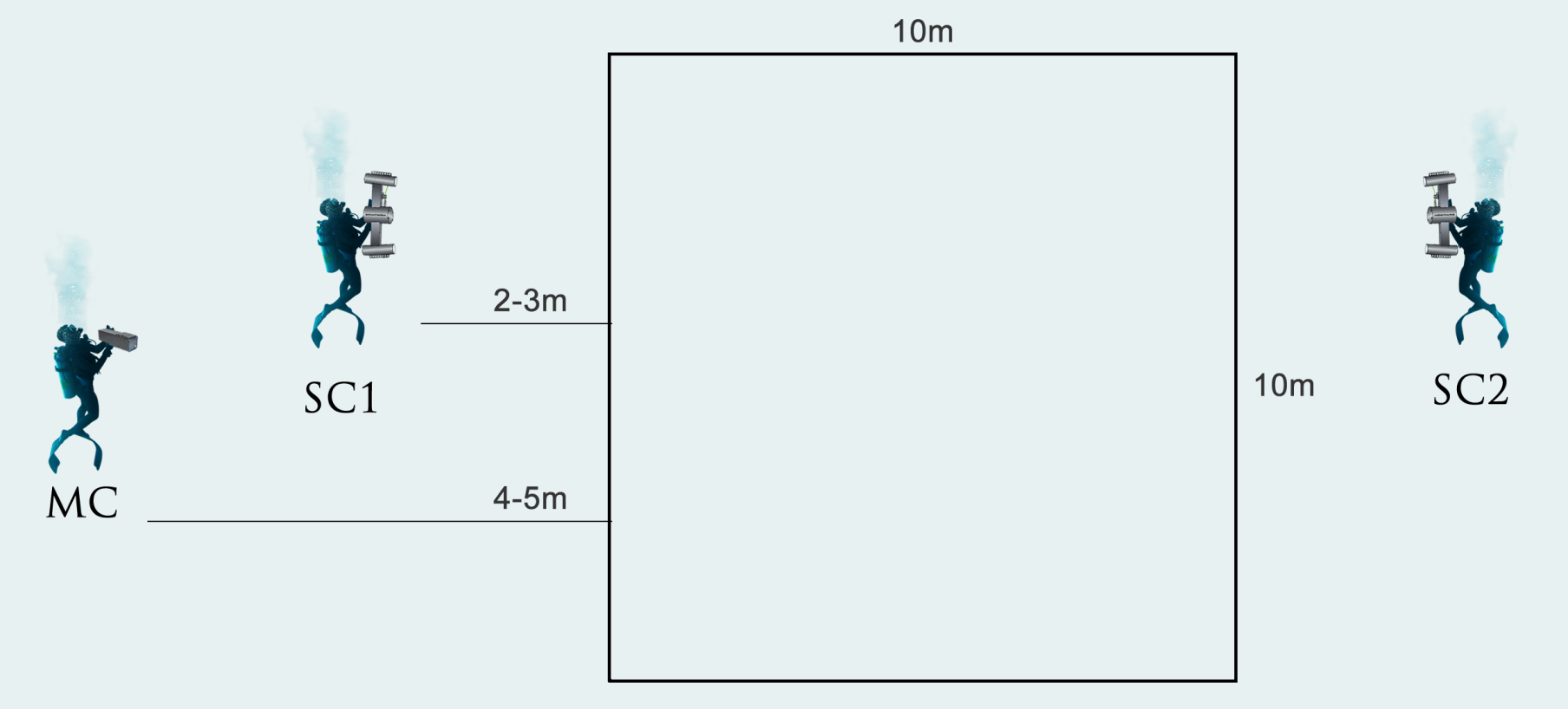
- Replicate the recording setup used in second transfers (from transport cages to farming cages): monocamera for counting and stereocamera for sizing



MED: RECORDING SETUP

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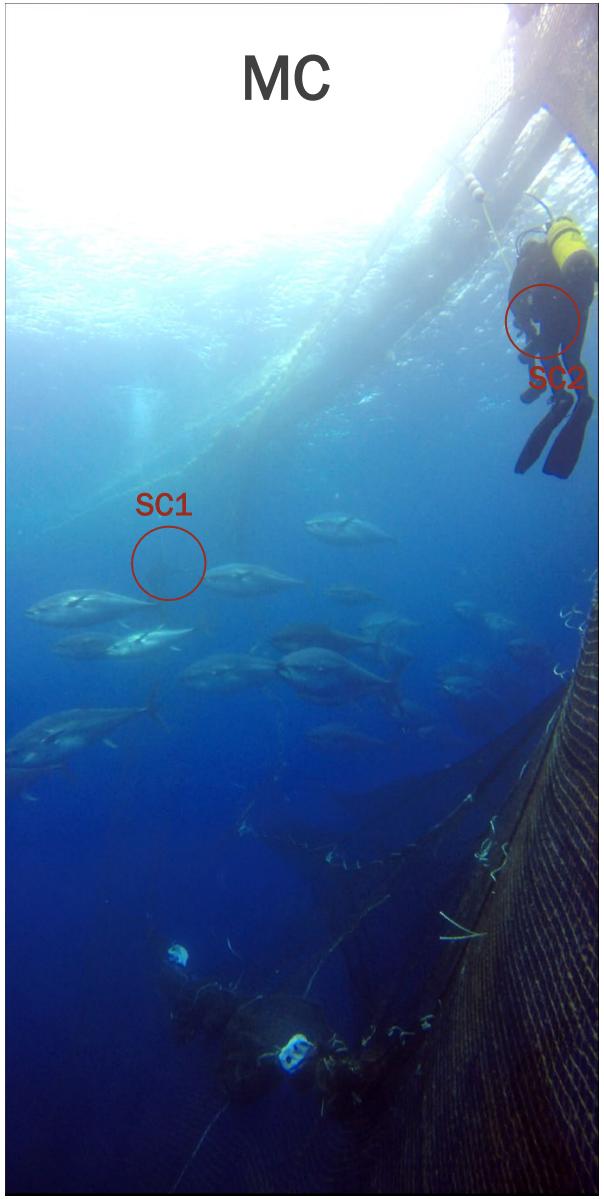

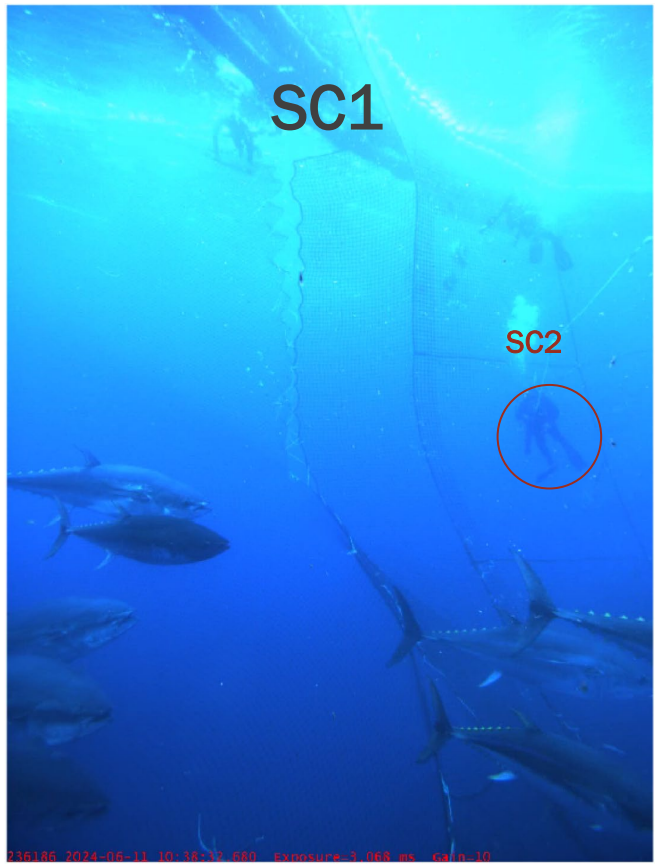

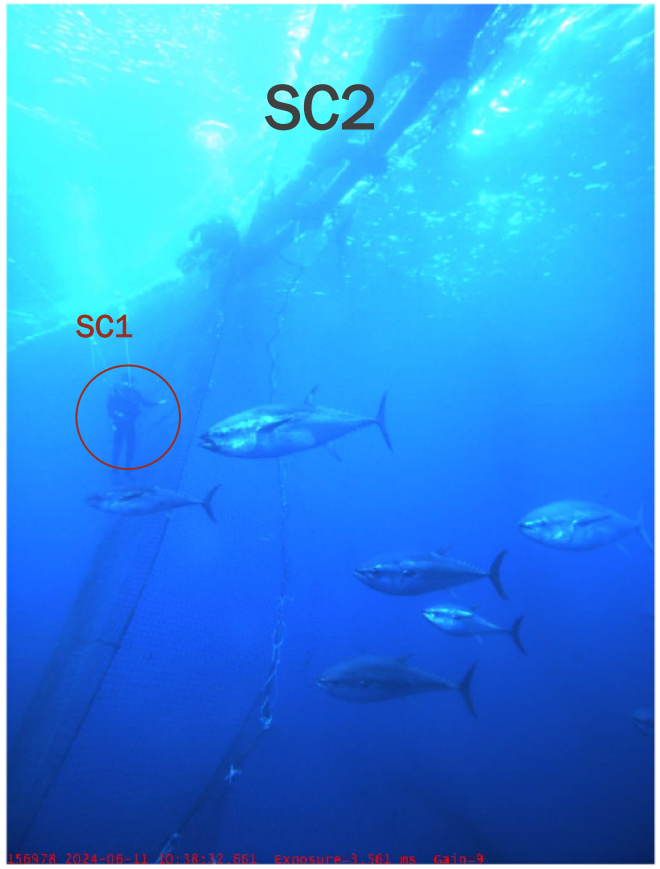

ADRIATIC: RECORDING SETUP

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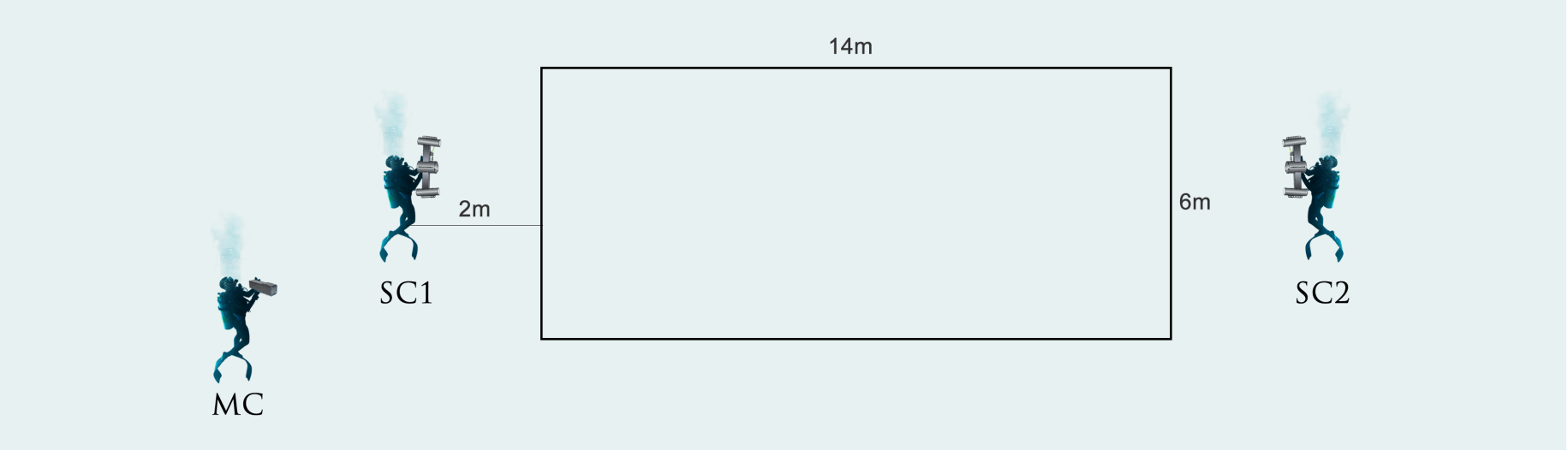
- Could not replicate the recording setup used in second transfers: very different gate sizes (4x3m vs 14x6m)
- Two alternative recording setups were agreed upon with the operators:
  - Use a 14x6 meter gate and record with two stereocameras, positioned on either side of the gate, to accommodate large catches.
  - Use a 7x6 meter gate and record with one stereocamera for small catches, up to 500 fish averaging 8-10 kg.
- The only transfer recorded was done with 2 SC separated 12m, what resulted in an approximate gate size of 10x6m.



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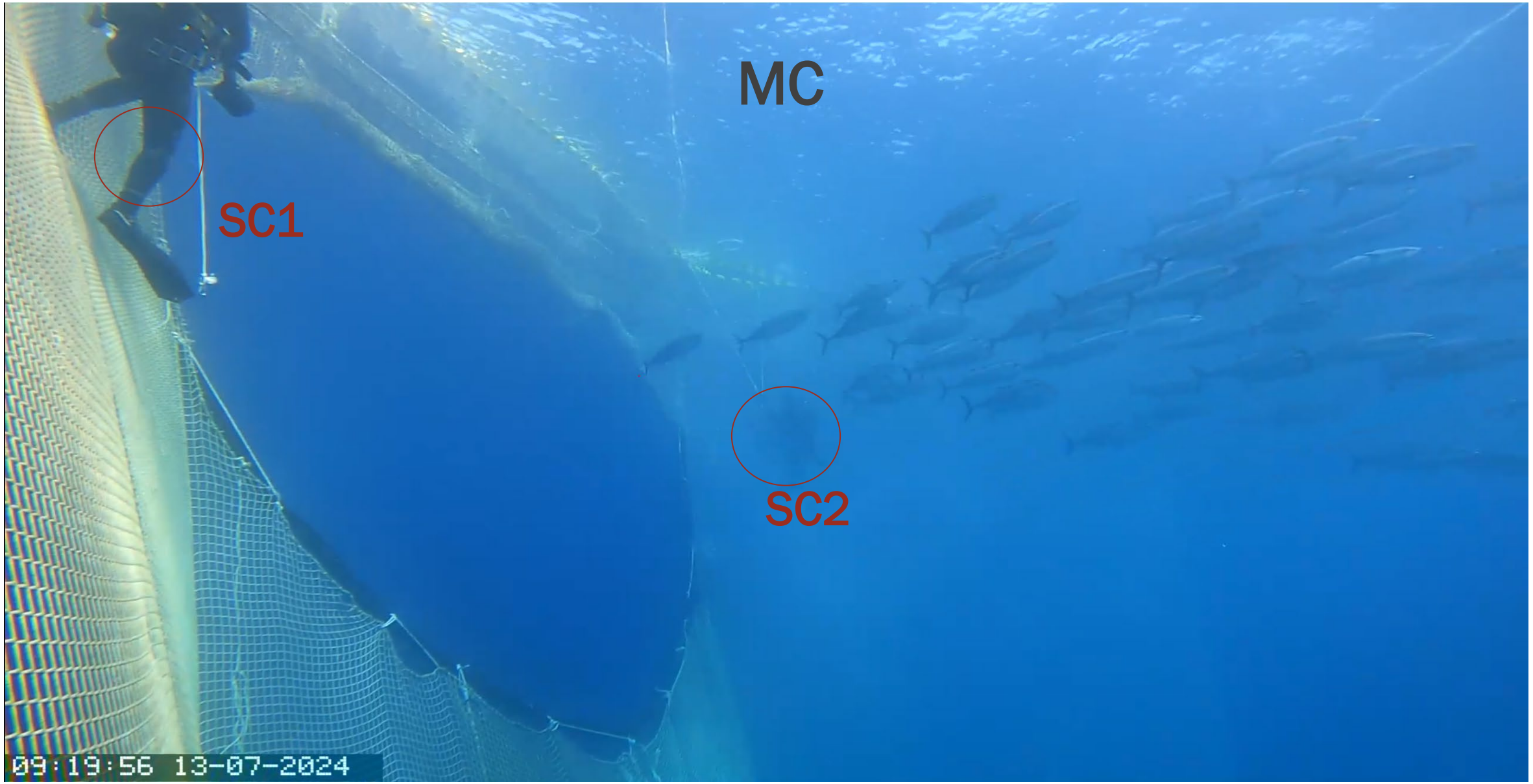

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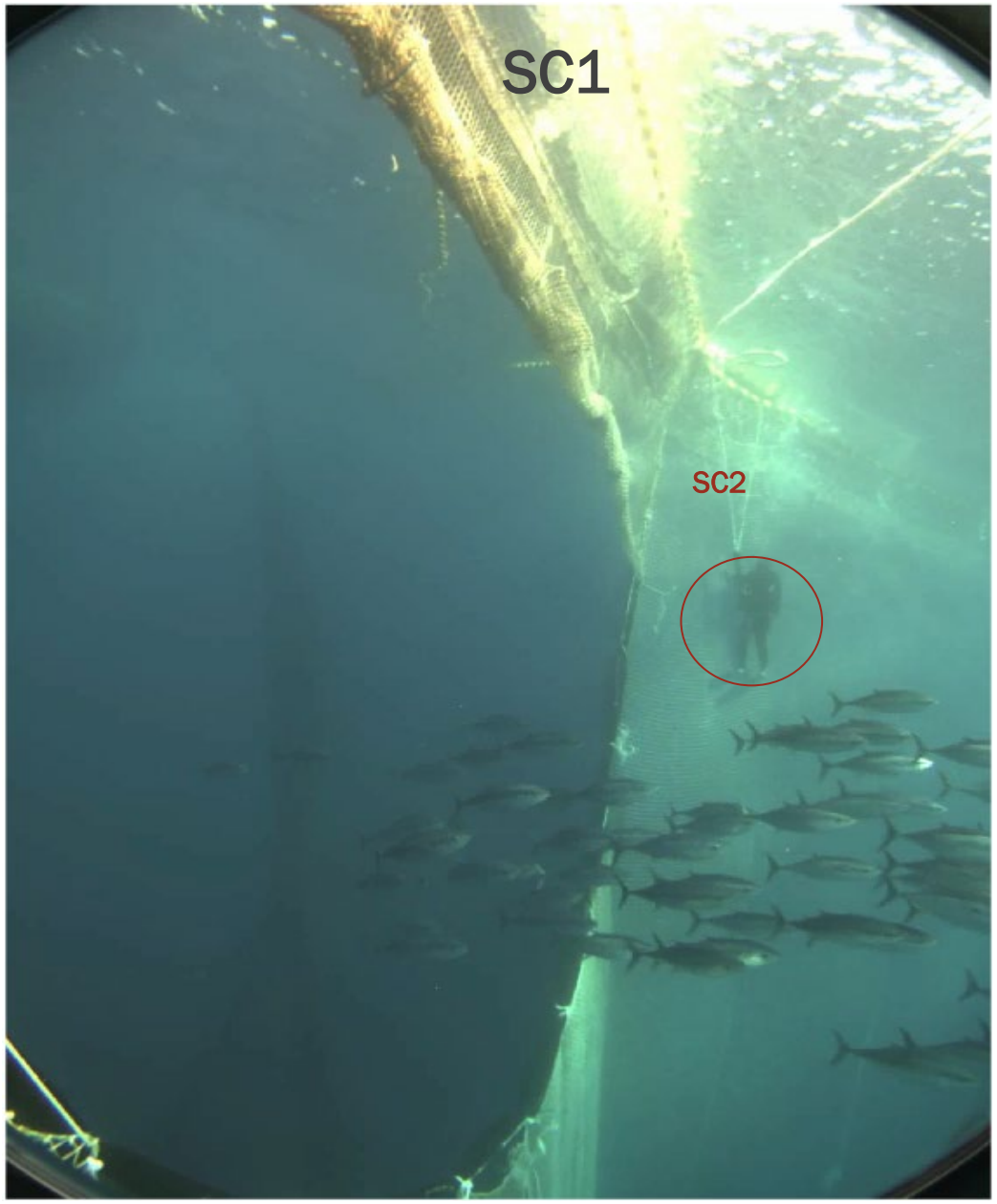

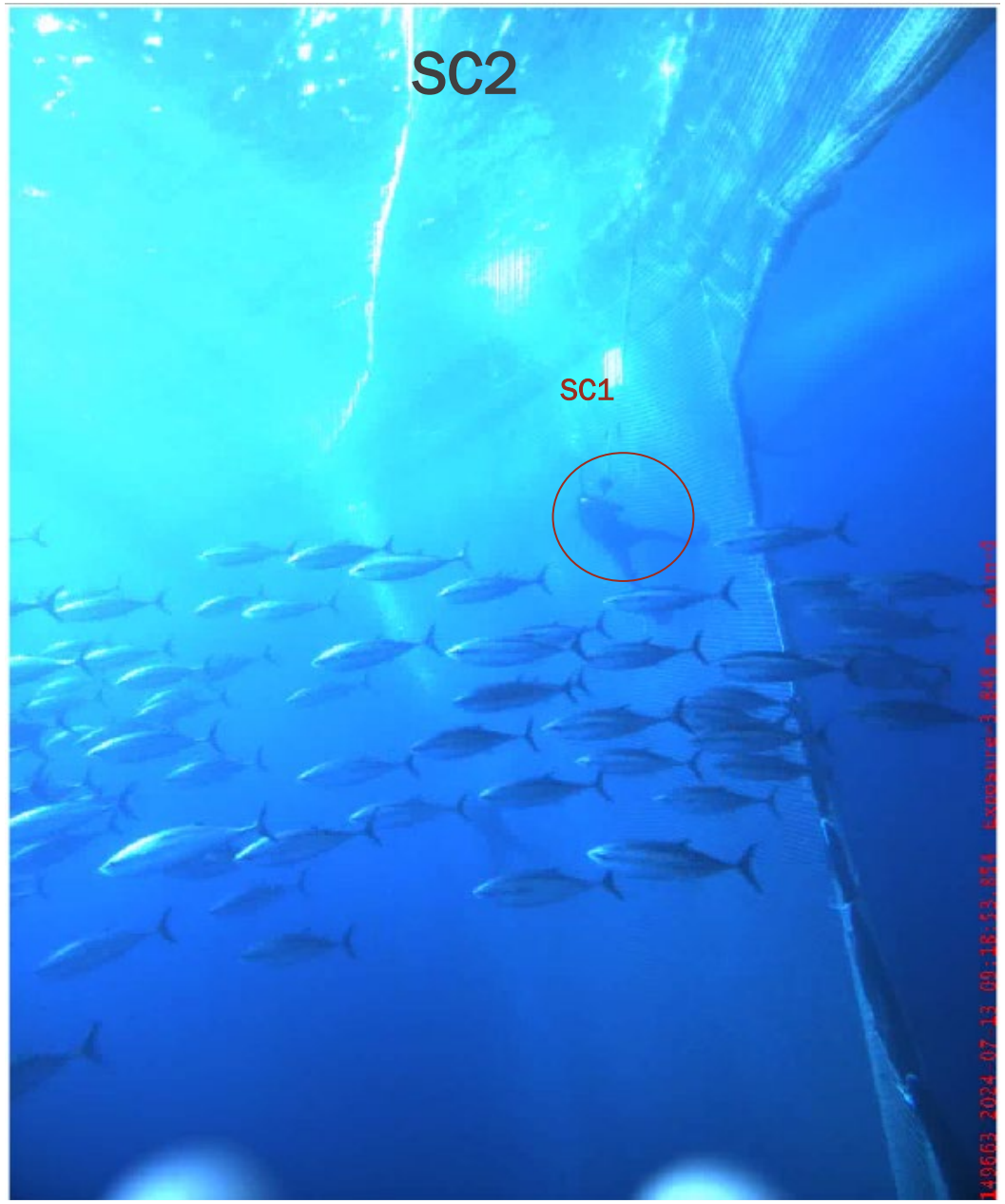

TRAP: RECORDING SETUP

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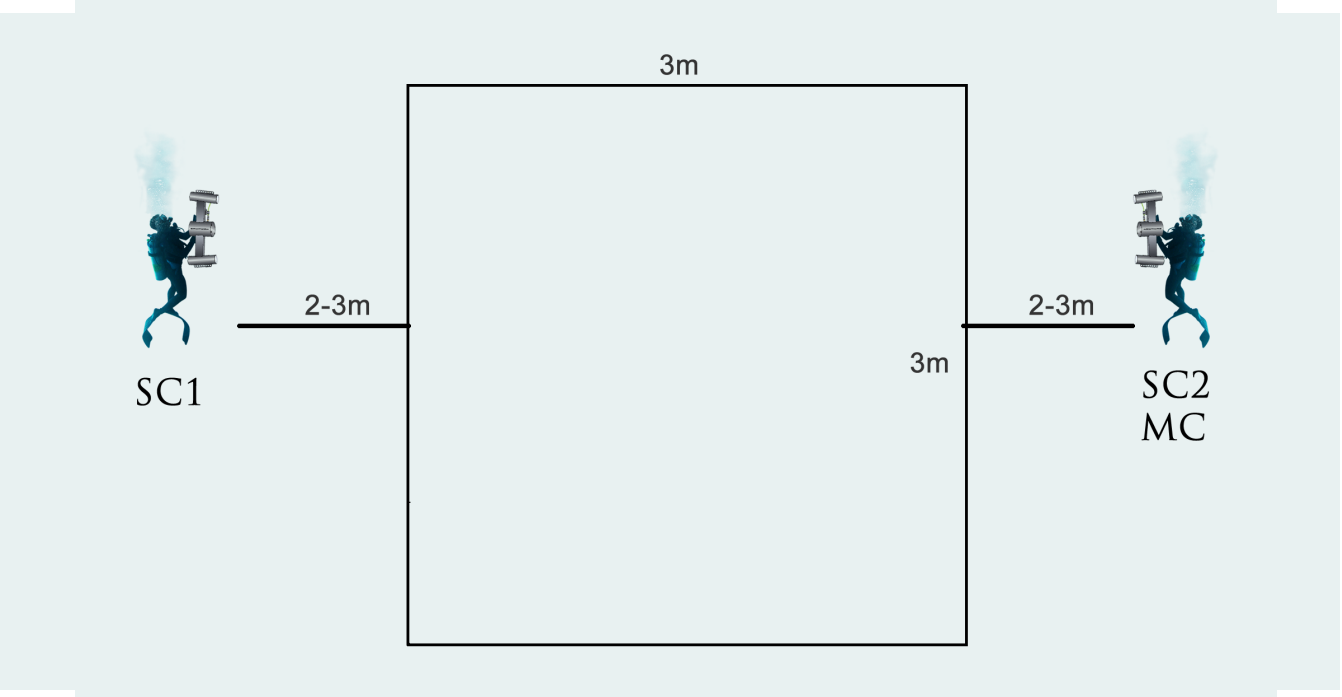
- The initial idea was to use the 3x3 meters frame normally used in transfers from trap to transport cages, adding a second stereocamera opposite to the first stereocamera at the other side of the gate. However, operational restrictions made it impossible.
- Divers were used to hold two stereocameras and one monocamera in a 3x3 meters gate



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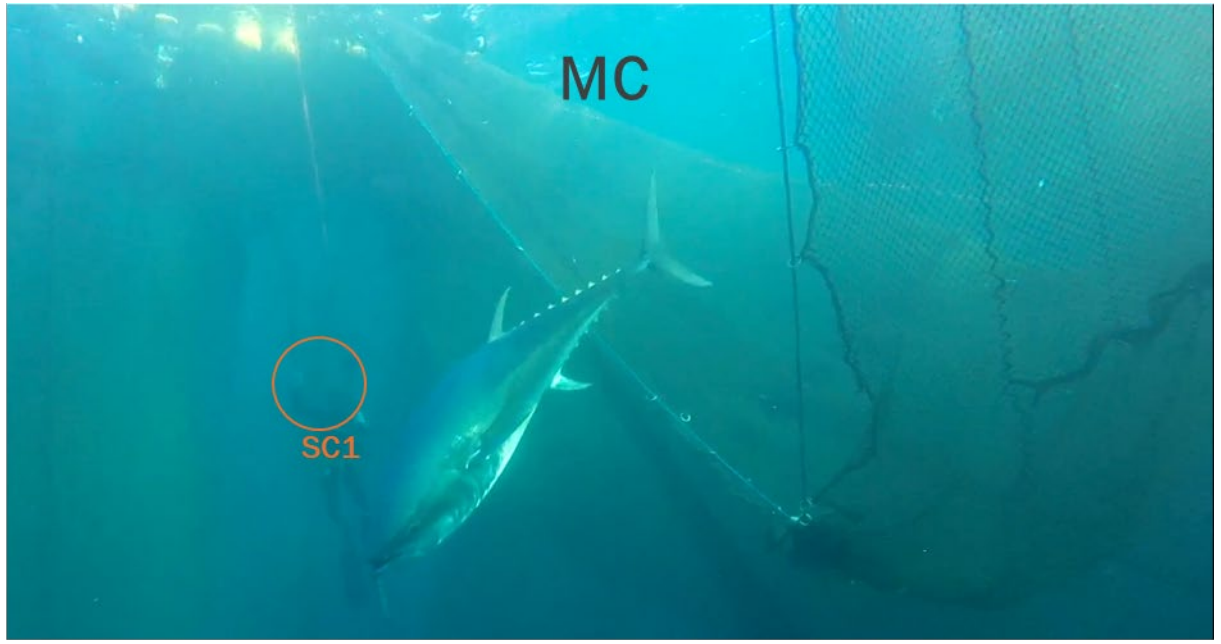

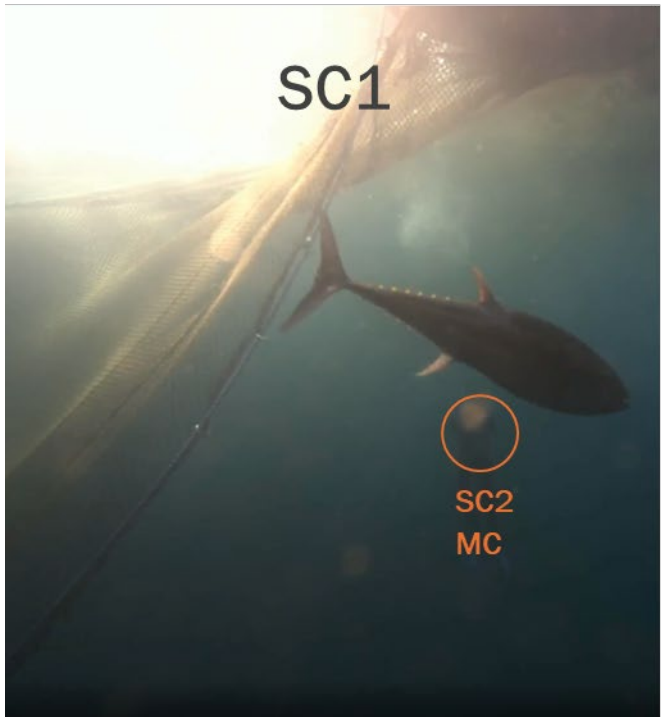

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FIRST TRANSFERS RECORDED

8 first transfers:

- 4 from purse seiners in the Mediterranean with Balfegó Tuna.
- 3 from traps with Tunipex.
- 1 from purse seiners in the Adriatic with Jadran Tuna.

For all transfers:

- Manual counting and length estimation.

For 2 transfers in the Mediterranean

- Manual estimation by the authorities
- Data from harvesting

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COUNTING IN FIRST TRANSFERS

ID	M1	M2	M3	M4	A1	TR1	TR2	TR3
First transfers	308/430 Poor visibility	282	1379	688	295	129	368	91
Second transfers	-	-	1315 (-5%)	653 (-5%)	-	-	-	-

- Successful manual counting with monocamera.
- Due to its narrower field of view, the stereocamera is not recommended for counting.
- For transfers M3–4, no additional fish were introduced, allowing for a direct comparison between the first and second transfers. Since all fish were within the camera's field of view, the observed 5% discrepancy can likely be attributed to factors such as water turbidity, operator variability, and the inherent challenges of counting fish in overlapping schools

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SIZING IN FIRST TRANSFERS

ID	M1	M2	M3	M4	A1	TR1	TR2	TR3
First transfers	23%	20%	37%	59%	45%	85%	35%	79%
	-	-	201,9	210,5	-	-	-	-
Second transfers	-	-	21%	20%	-	-	-	-
	-	-	192,6	207,4	-	-	-	-

- Successful manual length estimation of at least 20% of the stock

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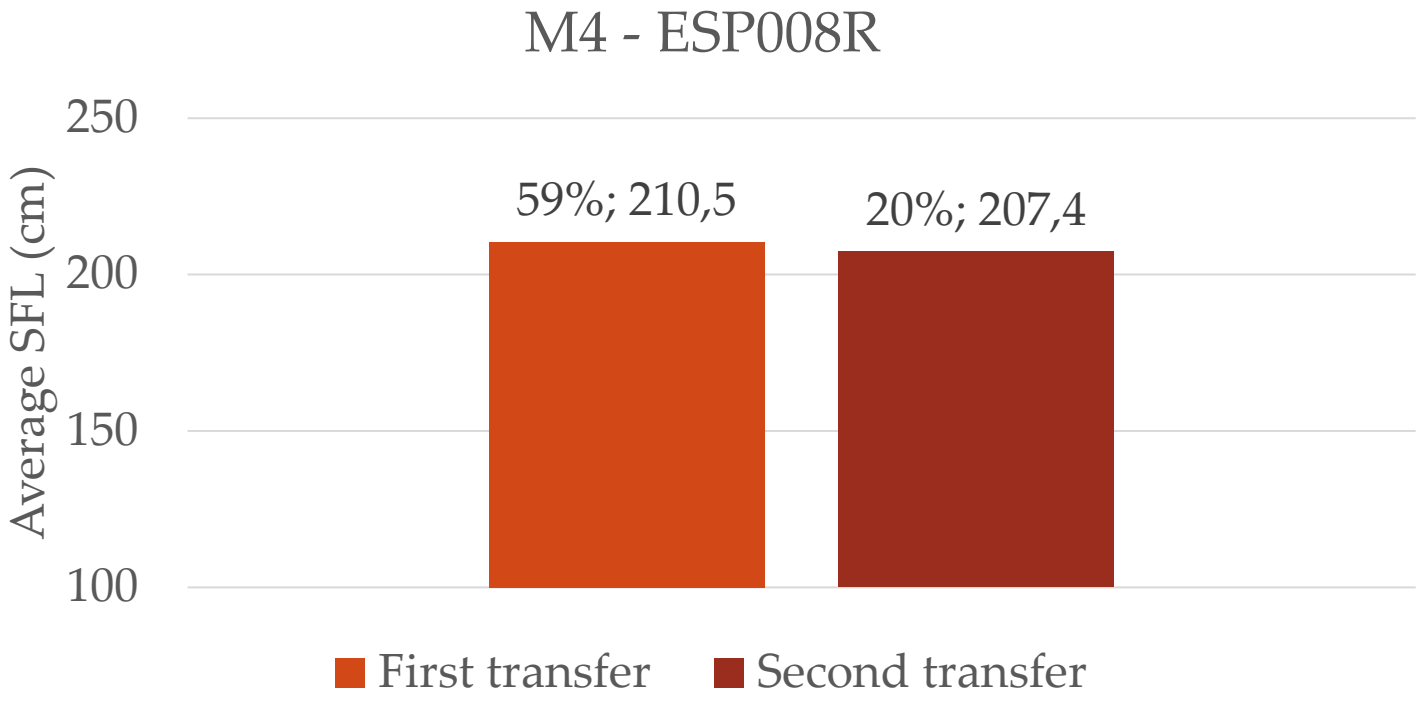
SIZING: FIRST VS SECOND TRANSFERS



- Small discrepancy in between first and second transfers (-3.1 cm, -1.5%) can be attributed to sampling variation and stereoscopic measurement error (which is operator-dependent).

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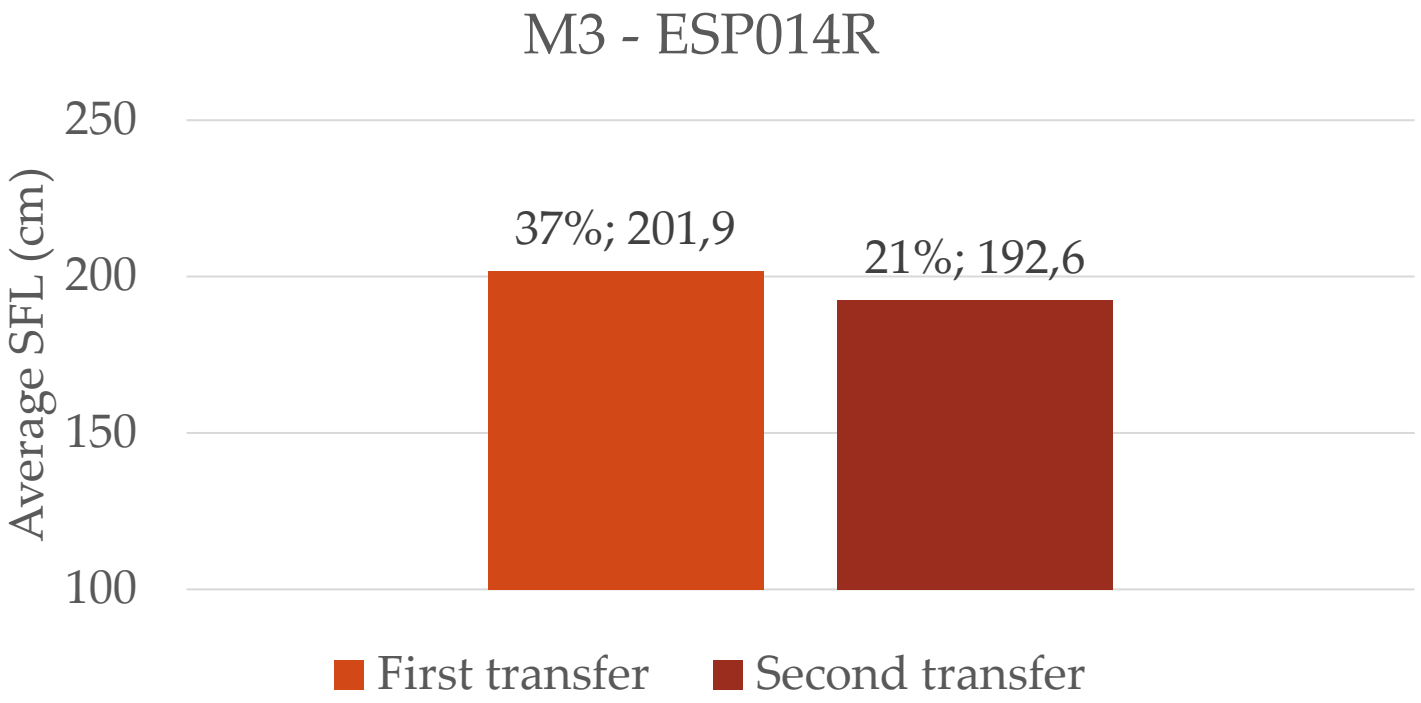
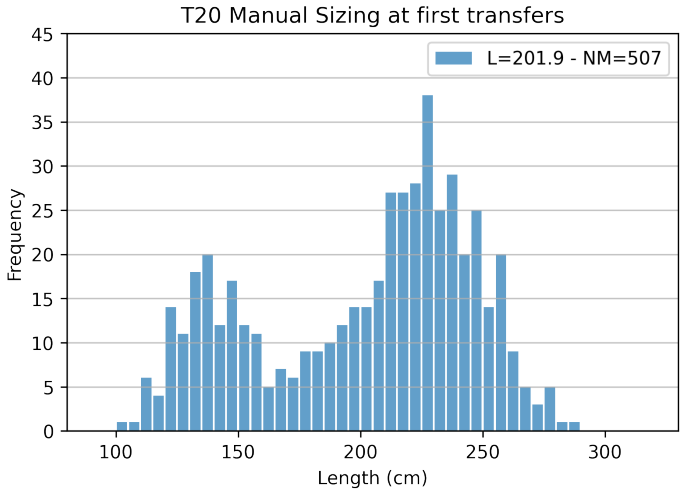
SIZING: FIRST VS SECOND TRANSFERS





- Larger difference in M3 (-9.3 cm, -4.6%) suggests a more complex cause - specifically, the multimodal distribution of fish lengths, which makes average values highly sensitive to the subset of fish sampled.

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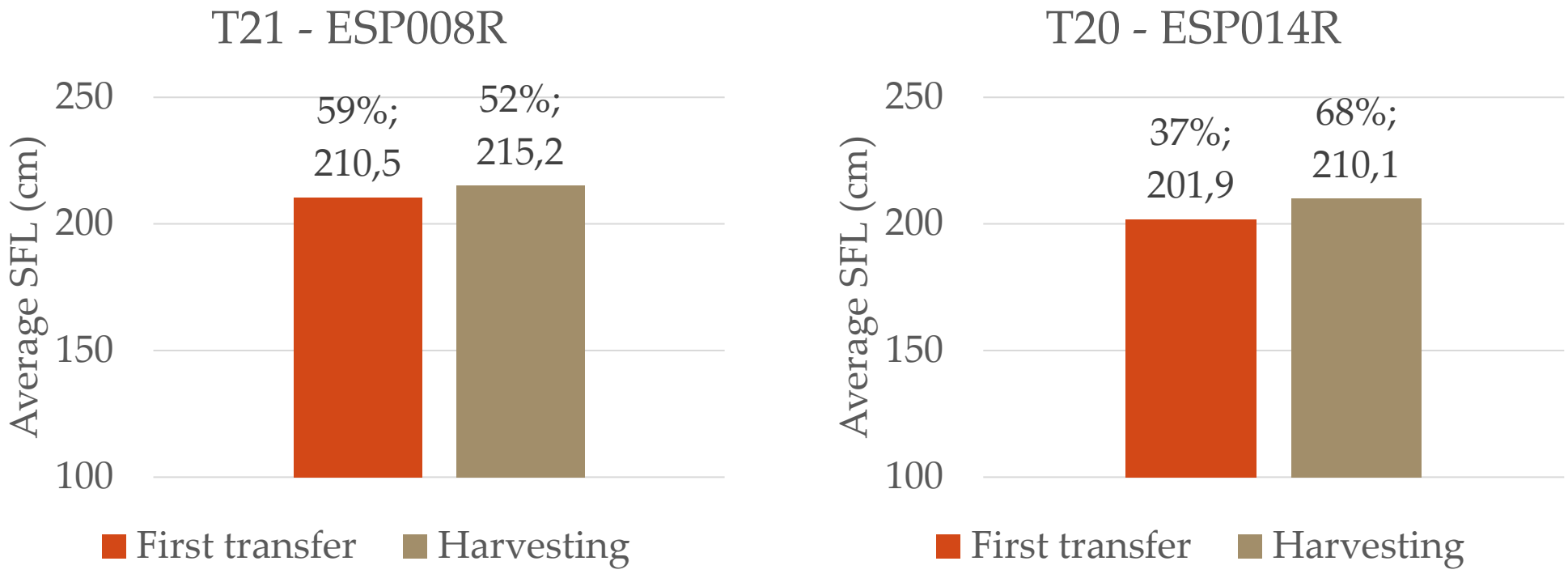
SIZING: FIRST TRANSFERS VS HARVESTING



- Harvestig +4.7 cm in T20 and +5.5 cm in T21. Consistent with the 2–5 month delay between caging and harvest, which allowed for fish growth. Furthermore, selective harvesting of 52% and 68% of the stock.

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CONCLUSIONS

Objective 1 of Pilot Project: Evaluate the use of stereoscopic cameras during the first transfers from purse seine vessels to transport cages for estimating weight at this stage.

- Length measurements can be obtained manually from stereocamera recordings by marking the snout and fork tail points of individuals, while fish counts can be determined always from monocamera recordings and depending on the setup also with stereocamera recordings.
- Estimating weight at first transfers with stereoscopic and conventional cameras is feasible in Med and traps using manual methods consistent with ICCAT Recommendation 22-08, as in caging transfers.
- Further trials are required in the Adriatic to confirm gate dimensions and stereocamera configurations, since only one transfer was recorded (with promising results).
- While the tests relied on diver-held cameras, attaching cameras to frame gates when possible is preferable to ensure stability and data quality.

ACKNOWLEDGMENTS

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