



*Foras na Mara
Marine Institute*



The LifeWatch ERIC Biodiversity
& Ecosystem eScience Conference
PLOVDIV, BULGARIA 7-10 JULY 2026

Preliminary Insights on Automated Video Marine Biological Monitoring at the SmartBay Observatory

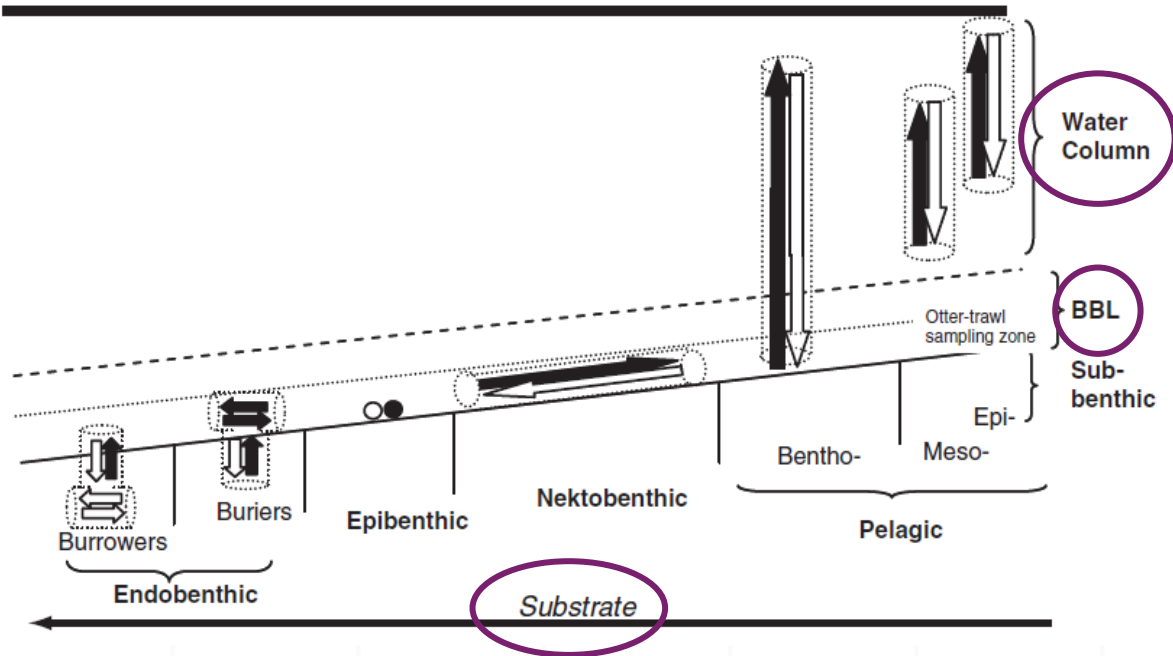
*Presenter: **Francescangeli, M.**, Gaughan, P., Smyth, D., Conway, A., de Lecea, A., Cusi, S., and Berry, A.*

8th July 2026



CONTENT:

- **Introduction**
- SmartBay Observatory / Methods
- **Results**
- **Conclusions**



Inter- & Intra- species Interactions

Environmental Variables

3D Displacement / Emergence:

- Water column
- BBL
- Substrate

TRADITIONAL MONITORING METHODOLOGIES IN COASTAL WATERS

SCUBA DIVING:

- Transect survey (strip or line transects)
- Point counts survey
- Rapid visual technique
- Mixed techniques

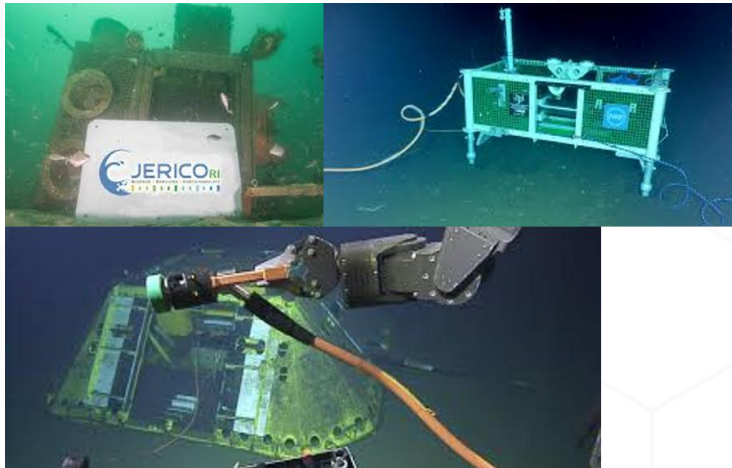


FISHERY-DEPENDENT METHODS:

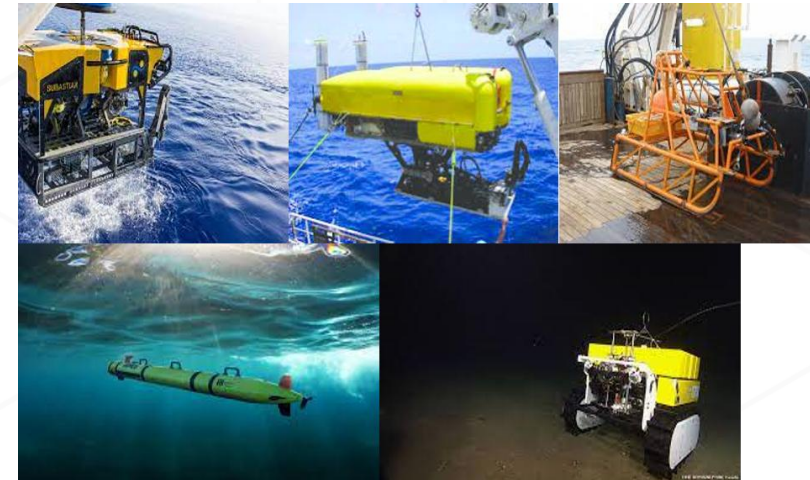
- Fish traps
- Trammel nets
- Hook-and-line
- Trawling



NEW ECOLOGICAL MONITORING TECHNOLOGIES (PLATFORMS)



FIXED
(landers, and seafloor
cabled observatories)

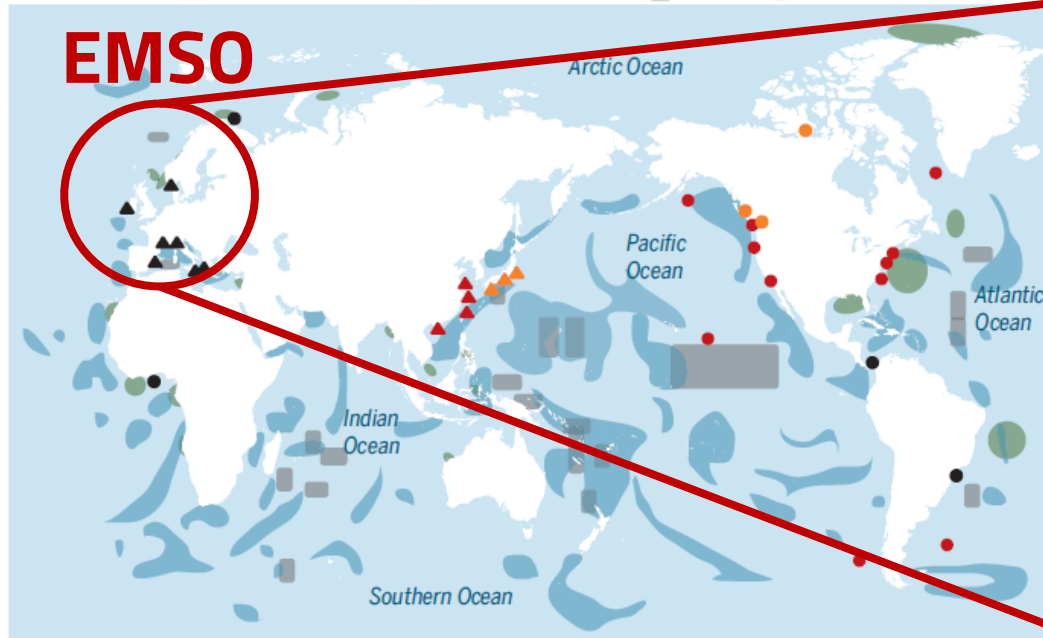


MOBILE
(ROVs, hybrid ROVs,
towed sledges, AUVs,
and crawlers)

Seafloor and water column Observatories Infrastructures

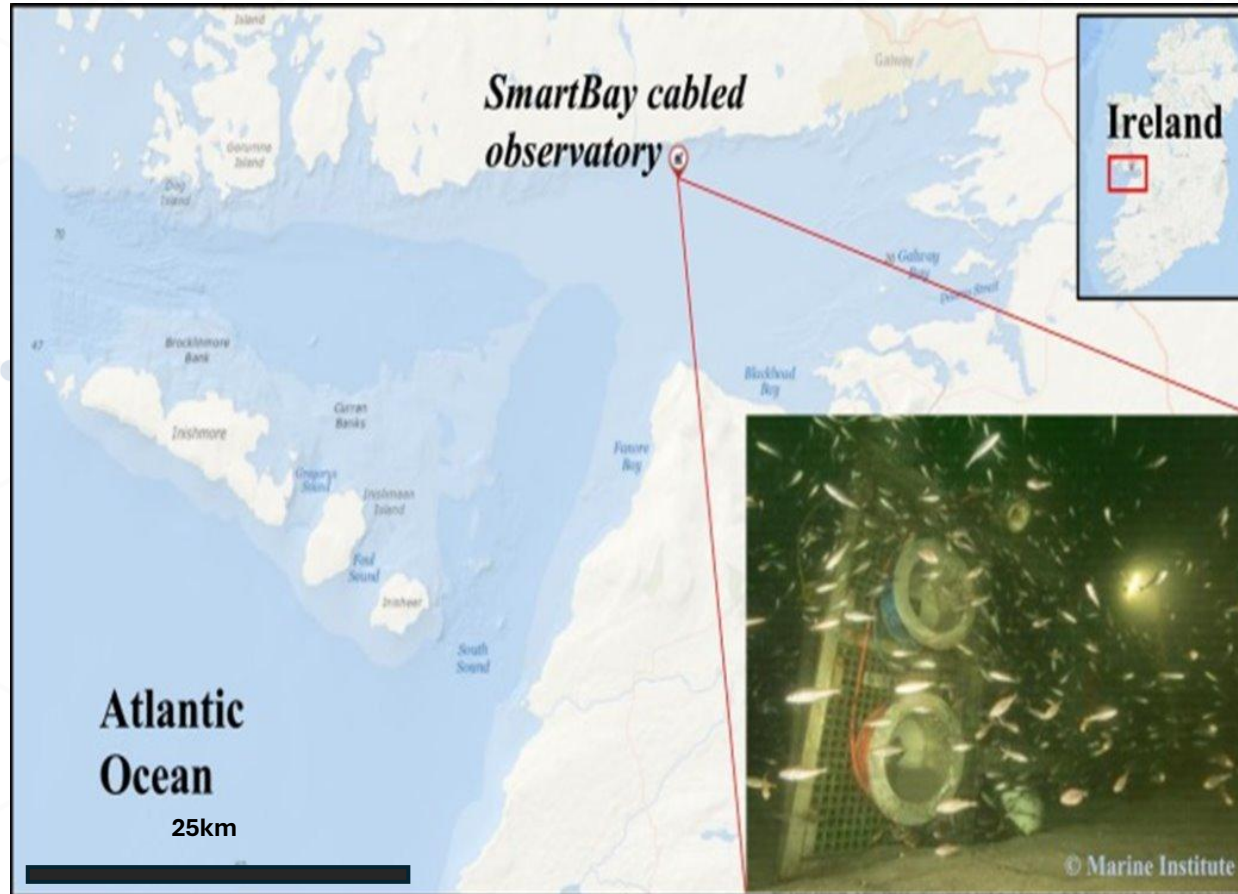


Deep-sea fishery Mineral resources Oil and/or gas extraction



Networks of Platforms
 ▲ EMSO ▲ Chinese initiatives ▲ DONET ● ONC ● OOI ● Isolated platforms





SmartBay sensors:

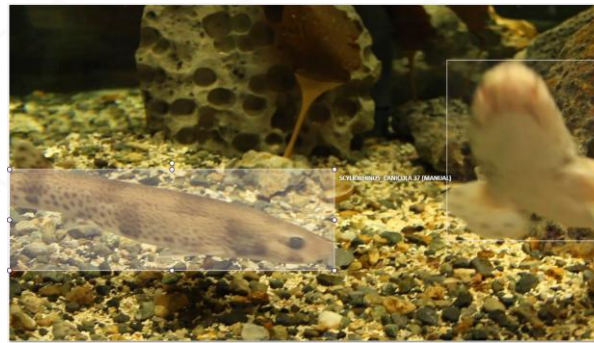
- Cameras
- Sonar
- CTD
- ADCP
- Hydrophone
- Fluoro/Turbidity meter
- pH Sensor

Image collection and labelling

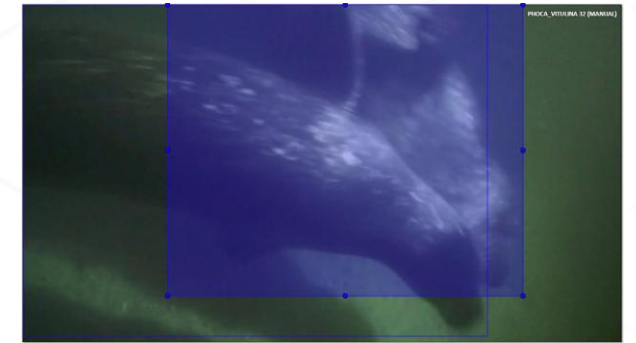
Citizen Science



Galway Atlantaquaria



SmartBay Cameras



WORK IN PROGRESS:

Image and Labels Quality control -> Training a YOLO Model for Species Detection and Classification

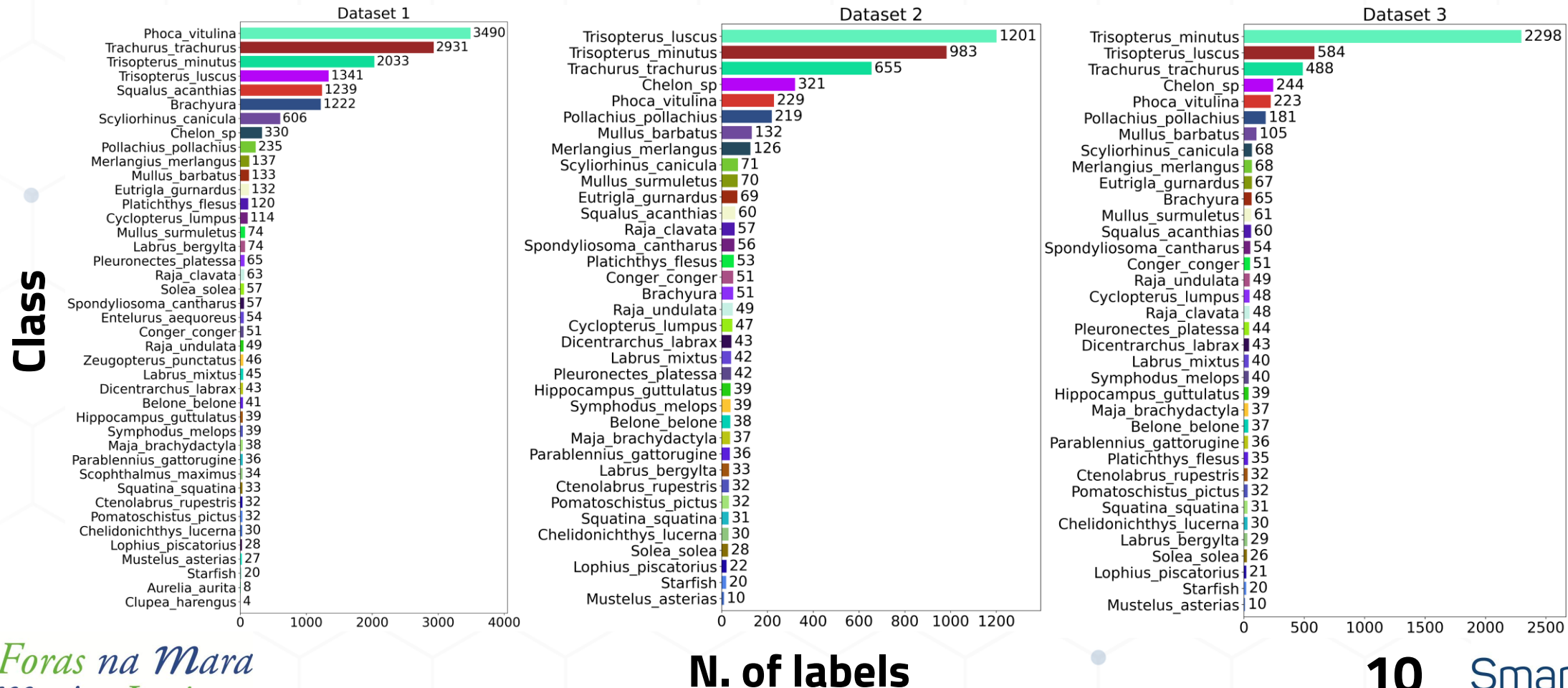


Model training parameters:

- YOLOv8s Model
- 25 epochs
- 640 image size

	Dataset 1	Dataset 2	Dataset 3
Curation	Remotion of general classes	Deduplication	Check of mislabelled bboxes
Number of images	6929	1704	1704
Number of labels	15182	5054	5344
Number of species' classes	41	36	36
mAP@50	0.85	0.90	0.89
mAP@50-95	0.64	0.69	0.67

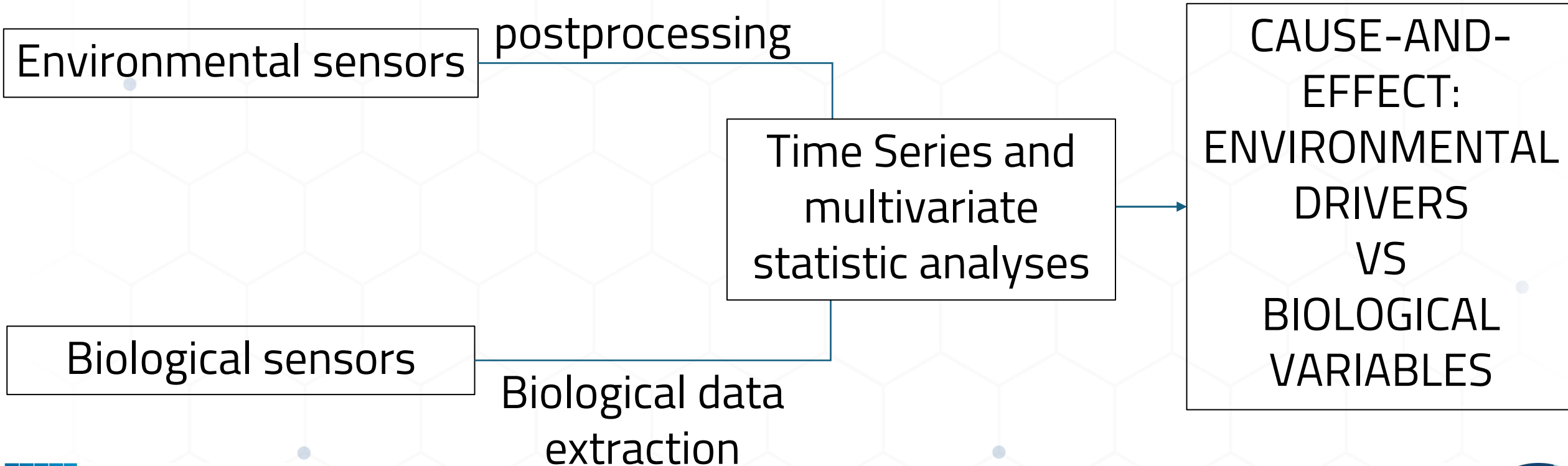
Dataset labels' histograms



Future perspectives:

- Balance the training dataset with citizen science images from iNaturalist
- Label more SmartBay images
- Train different YOLO models tuning their hyperparameters
- Try different object detection models such as CNNs
- Automatically compute species' counts time series
- Use lasers and or stereo cameras to measure the individuals, thus compute biomass

IMPORTANCE OF CONCOMITANT ENVIRONMENTAL AND BIOLOGICAL DATA ACQUISITION





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THANK YOU!

Questions?

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