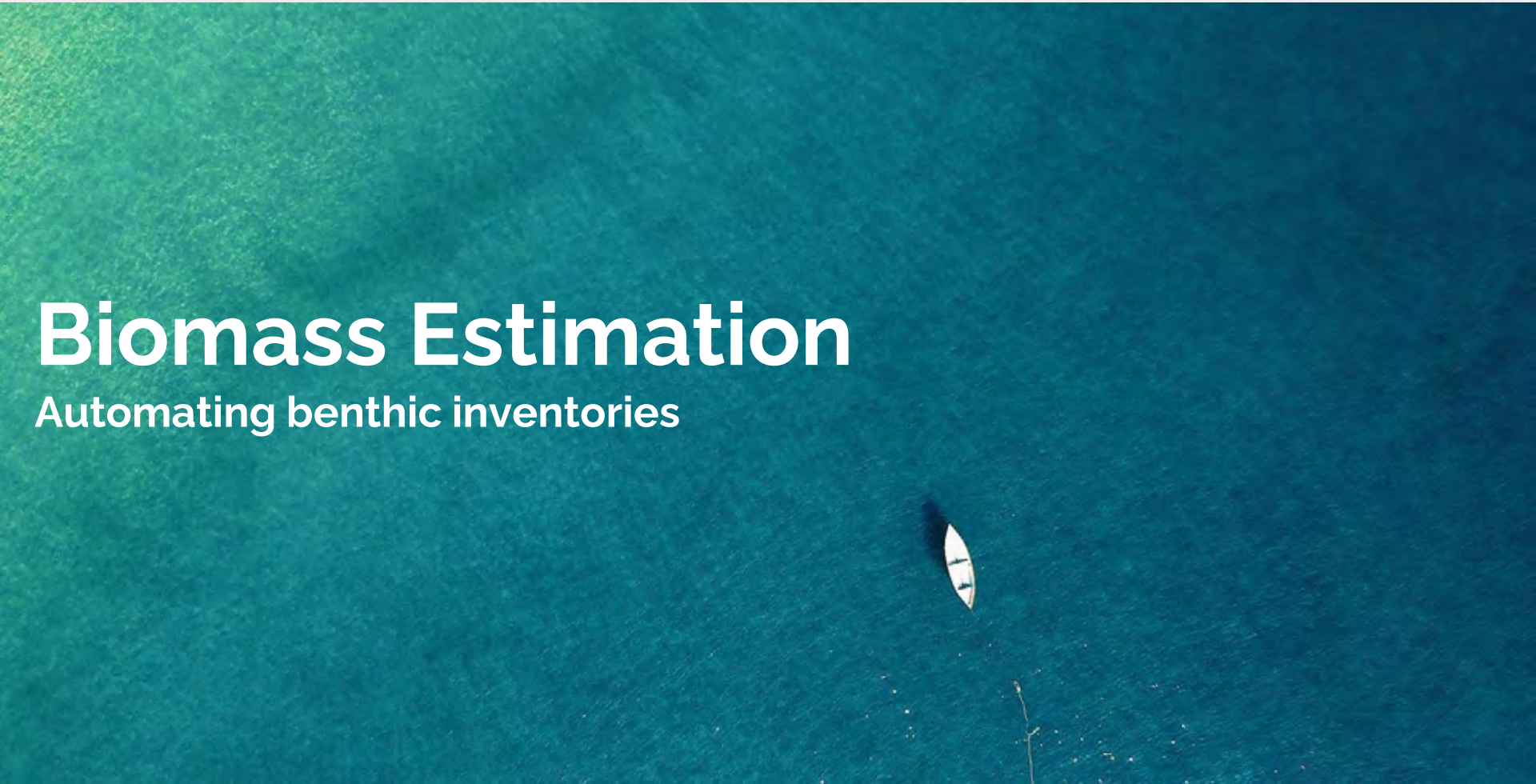
Automated Benthic Inventories

CIDCO

Ocean Riot

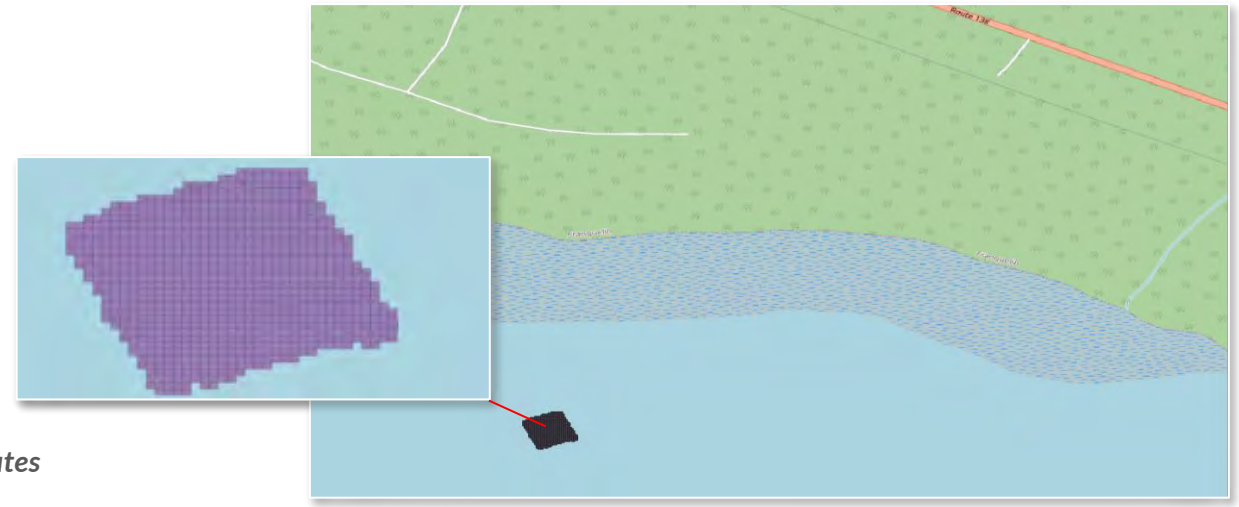

Biomass Estimation
Automating benthic inventories

Case study: The Green Urchin Population of Godbout

Canada
FISHERIES AND OCEANS

Zone of interest:
831 orthomosaics
6.858m² per zone
5699m² in total

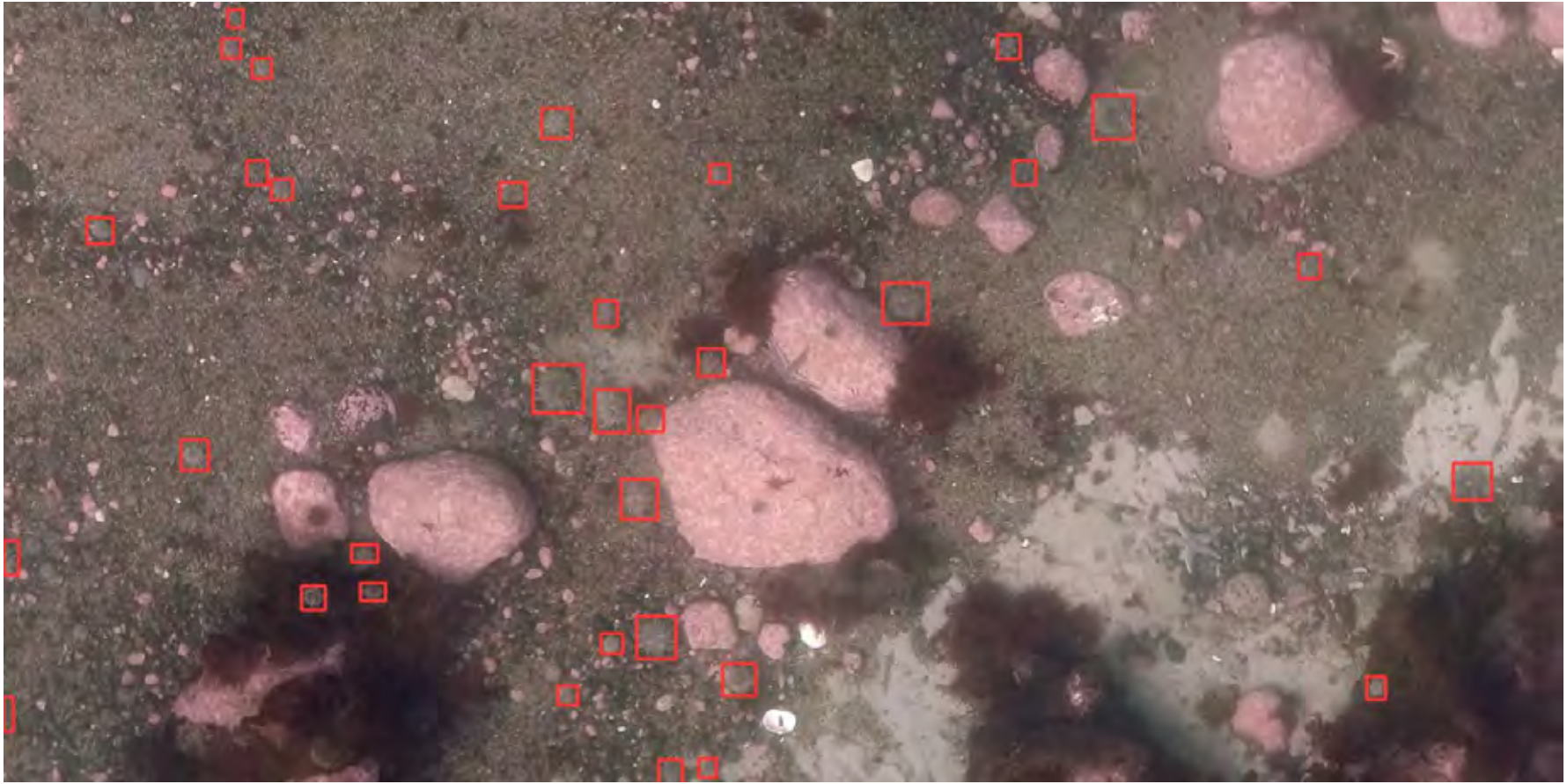
Results:
5668 Urchins Detected Under 3 Minutes



Results

Once trained, the AI can detect more urchins than the ***average*** human eye and alleviate issues due to contrast, illumination and turbidity.

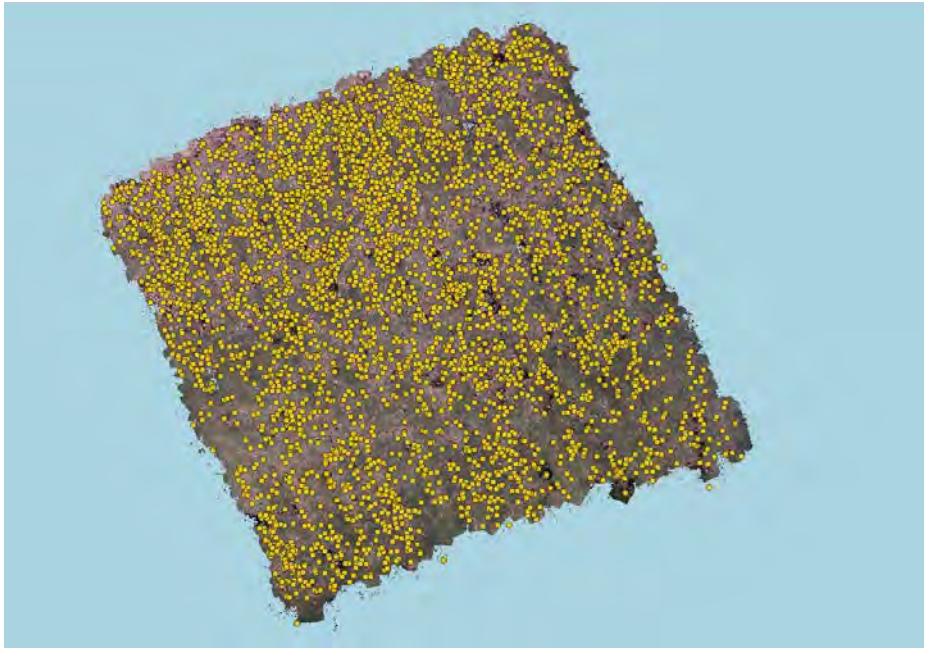
Can you spot them all?



Spatial distribution

The spatial distribution of detected urchins' positions and sizes can be readily exported as a SHP file for further analysis. Each dot represents an urchin over the seafloor's orthomosaic.

These standardized data products can be imported into GIS software for further analysis.

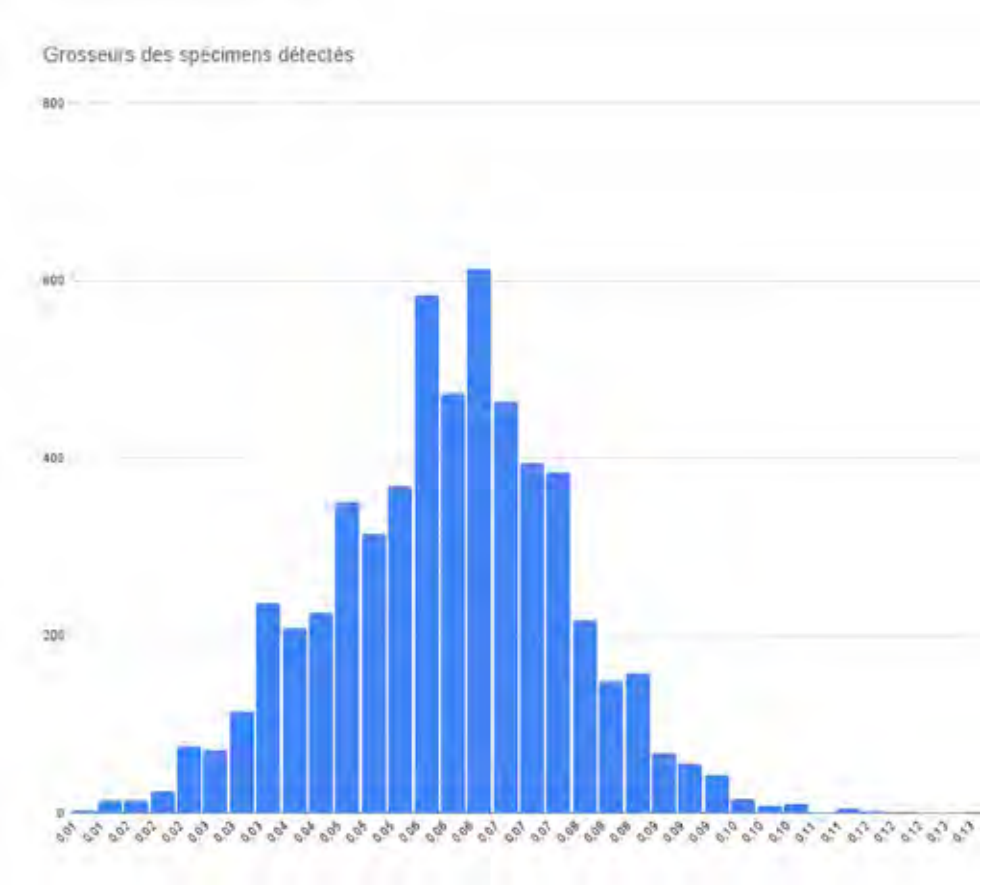


Specimen Size

The AI can estimate specimen size and generate value-added data for the area of study

"the shell of the green urchin can reach a diameter of 100 millimeters, with an average between 50 and 60 millimeters"

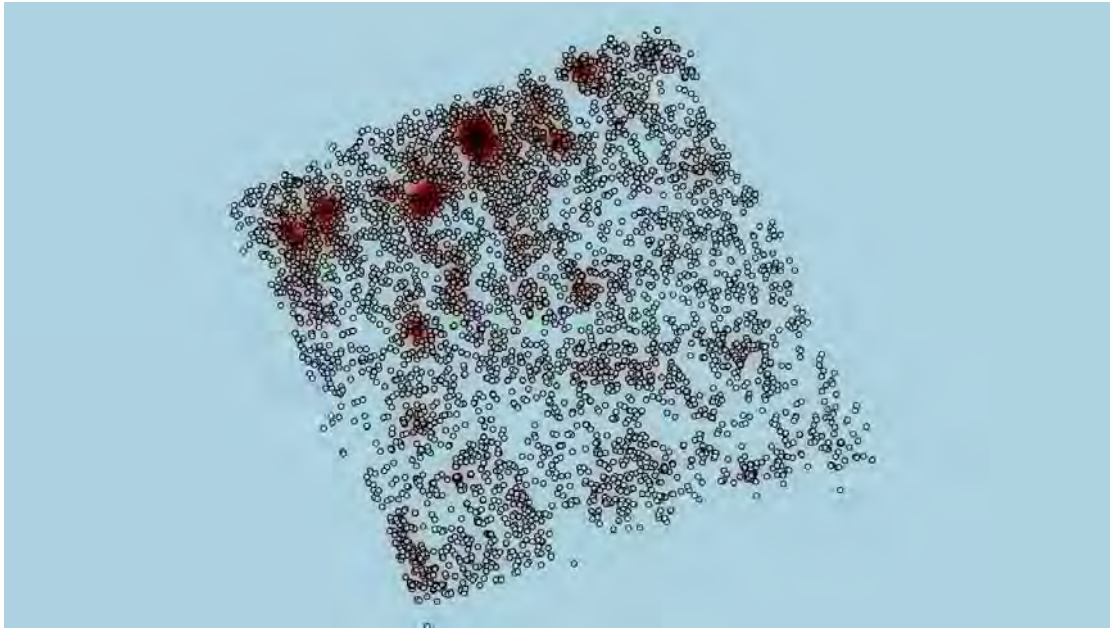
-DFO-MPO



Identifying commercially viable specimens

The algorithms yields significant value by quickly identifying commercially viable specimens automatically and extracting their distribution patterns.

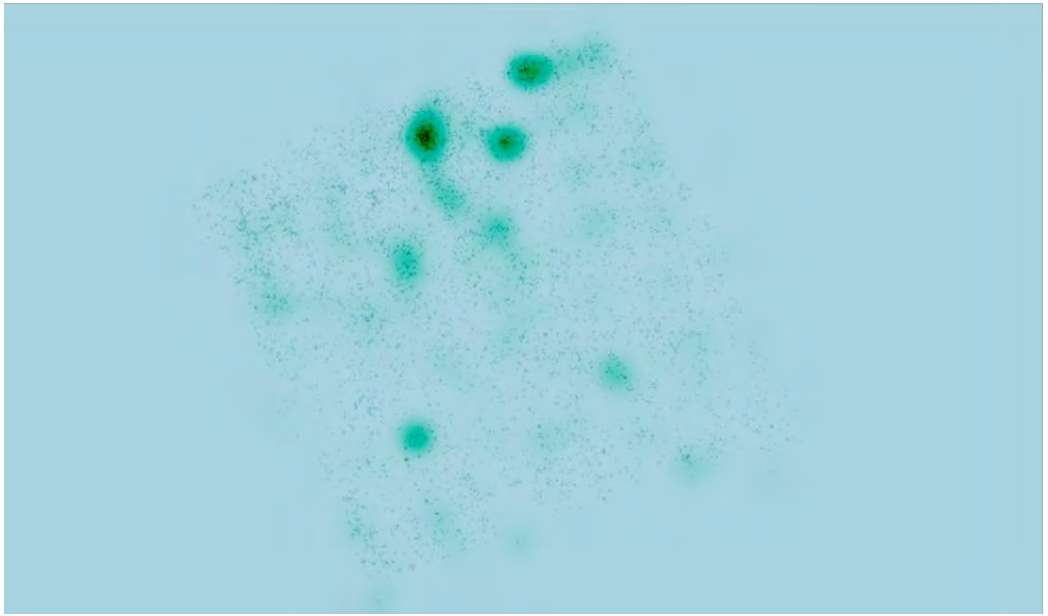
This allows for drastic efficiency improvements by reducing the area to prospect specimens over 50mm.



Identifying key recruitment zones for sustainability

Identifying key recruitment areas ensures that marine resource exploitation is compatible with sustainable development objectives.

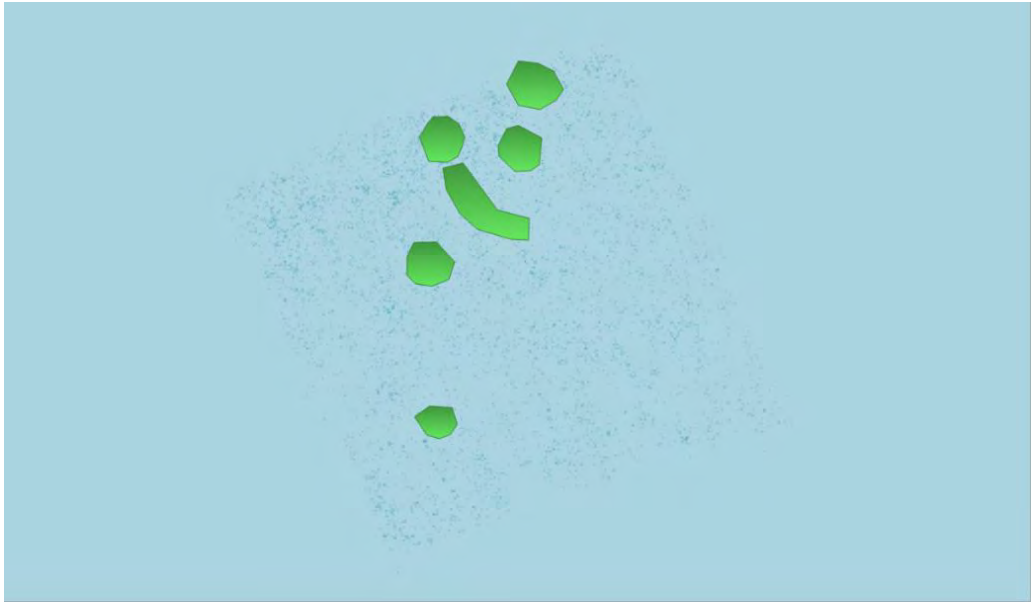
Juvenile specimens under 30mm can be readily identified by the algorithms.



Setting up protection zones to protect the resource

The outputs from the algorithms can automatically built into practical data-driven decision-making tools.

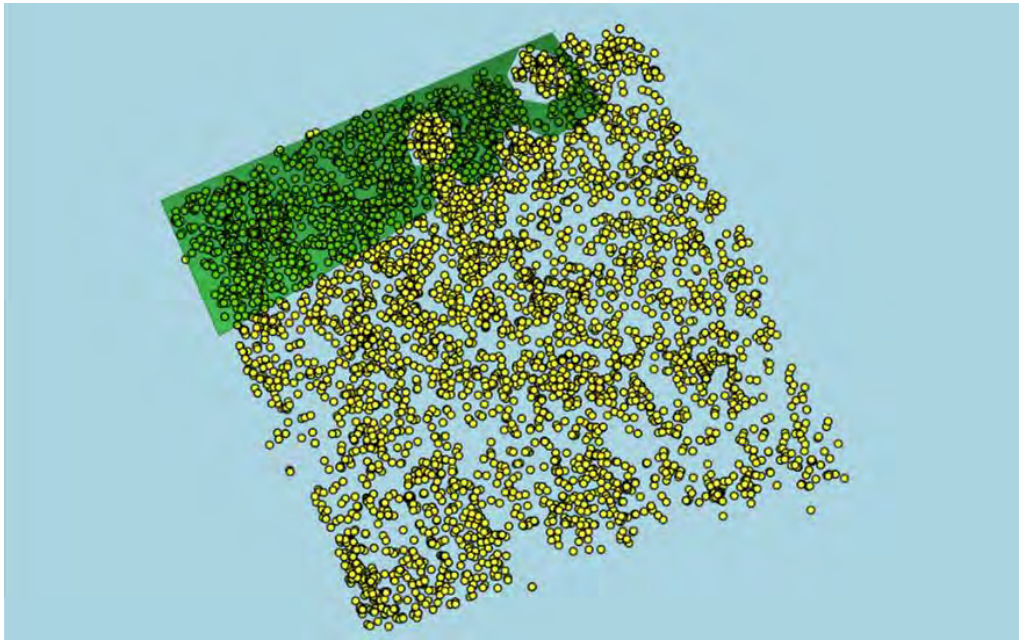
This allows the objective determination of reasonable boundaries to protect the resource, while at the same time protecting future profitability and jobs.



Maximizing profit while minimizing damage to the environment

Ultimately we can combine the analyses to systematically avoid immature specimens while targeting commercially viable individuals.

Work area ***before*** optimization: 5699m²
Work area ***after*** optimization: 834m²



85.4%

cost savings
less benthic destruction

Automated Marine Species Inventories

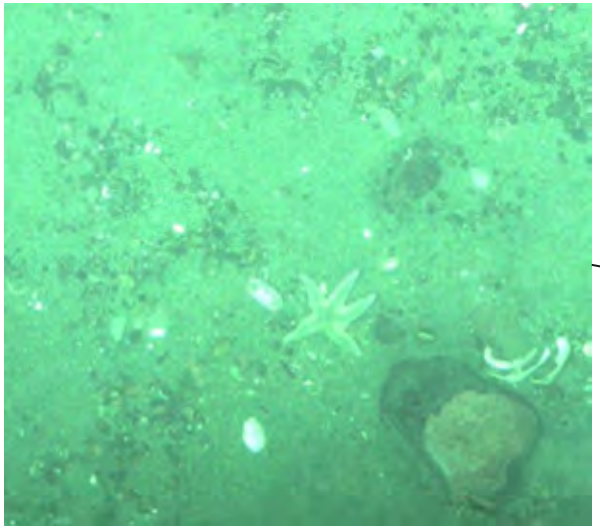
Submarine-based photogrammetry

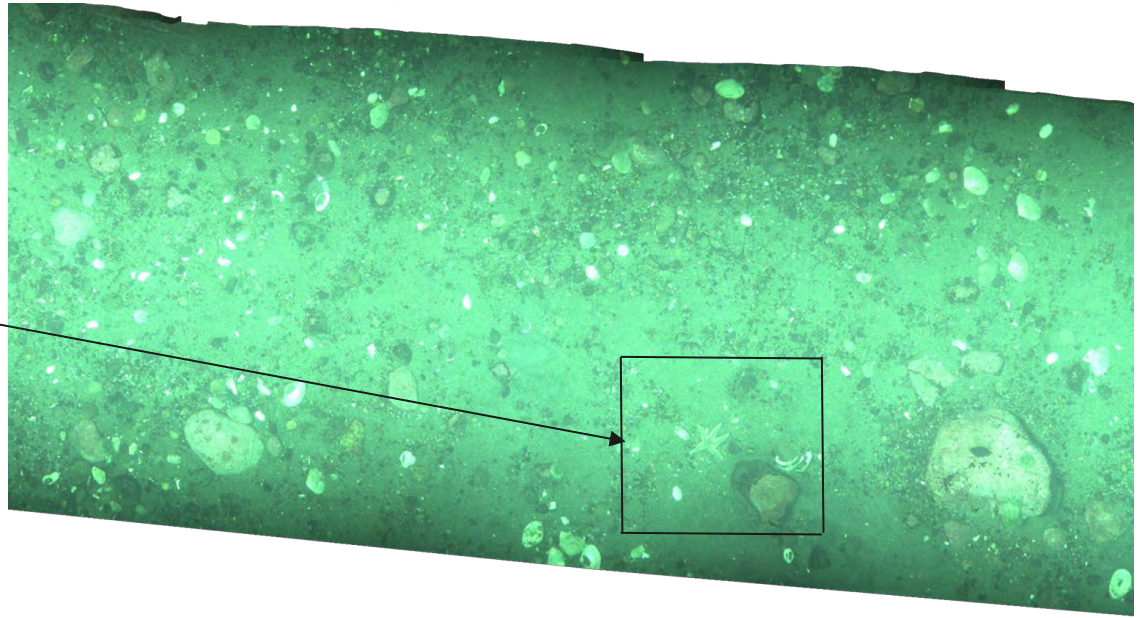
Automating the process of acquiring seafloor images using marine robotics techniques drastically improves the efficiency of the process.

Photographs are stitched together to build a complete view of the seafloor in the area of interest.

Automated Marine Species Inventories

Submarine-based photogrammetry

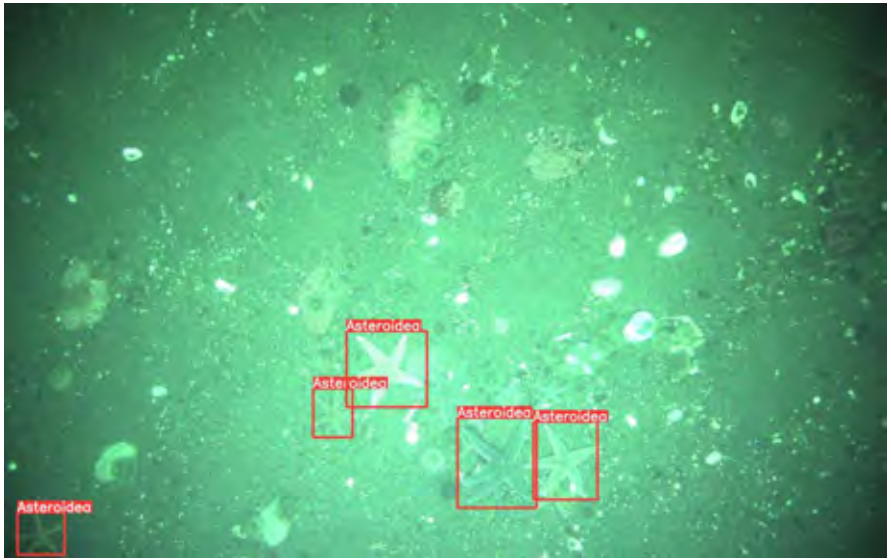




Inventaires subaquatiques automatisés

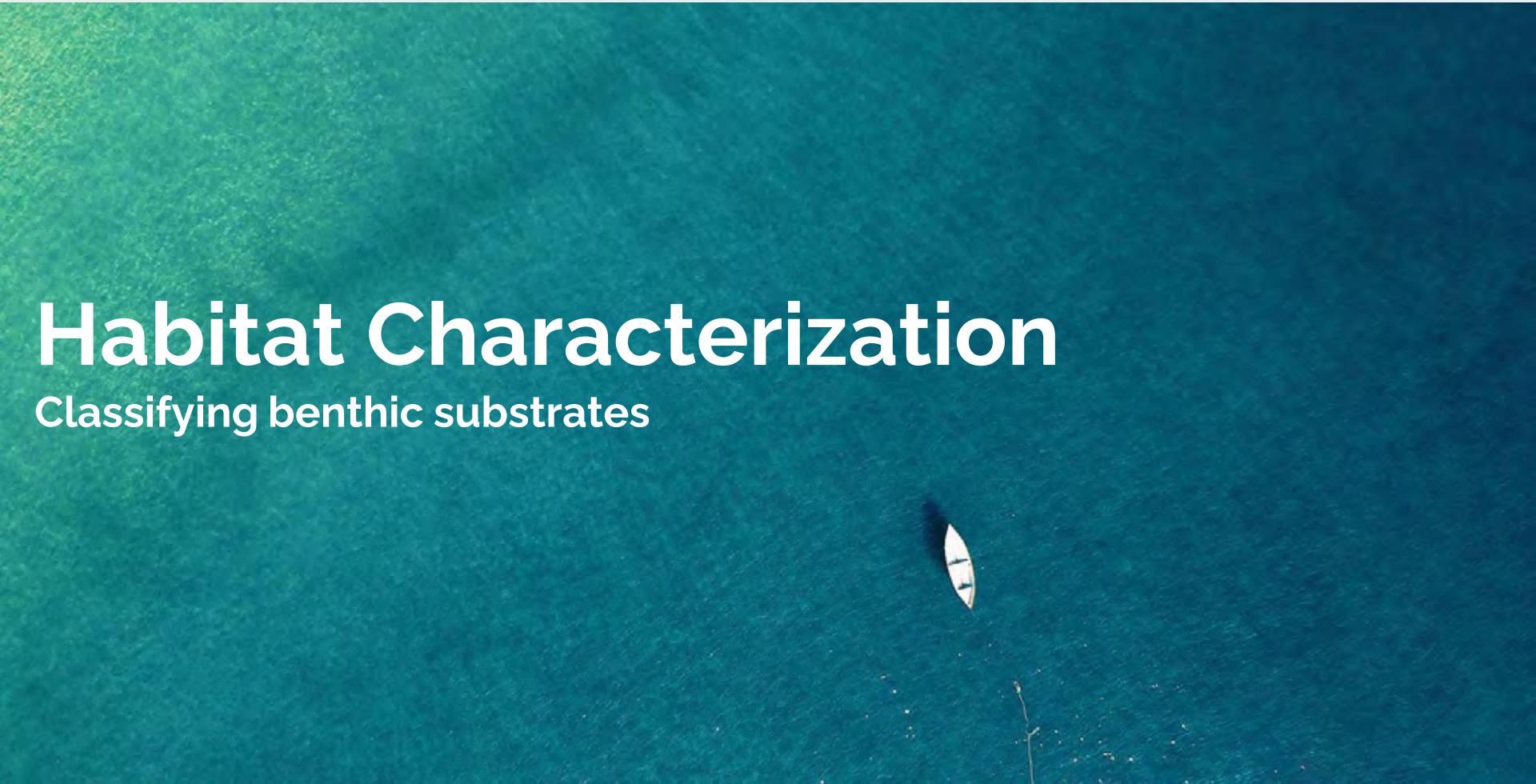
Collaboration avec les USA

Nous explorons en ce moment une collaboration avec le Monterey Bay Aquarium Research Institute et son projet Fathomnet. Ceci permettra de bonifier une immense base de données d'organismes aquatiques afin de faciliter la création de modèles d'IA innovateurs permettant de dénombrer des espèces multiples.

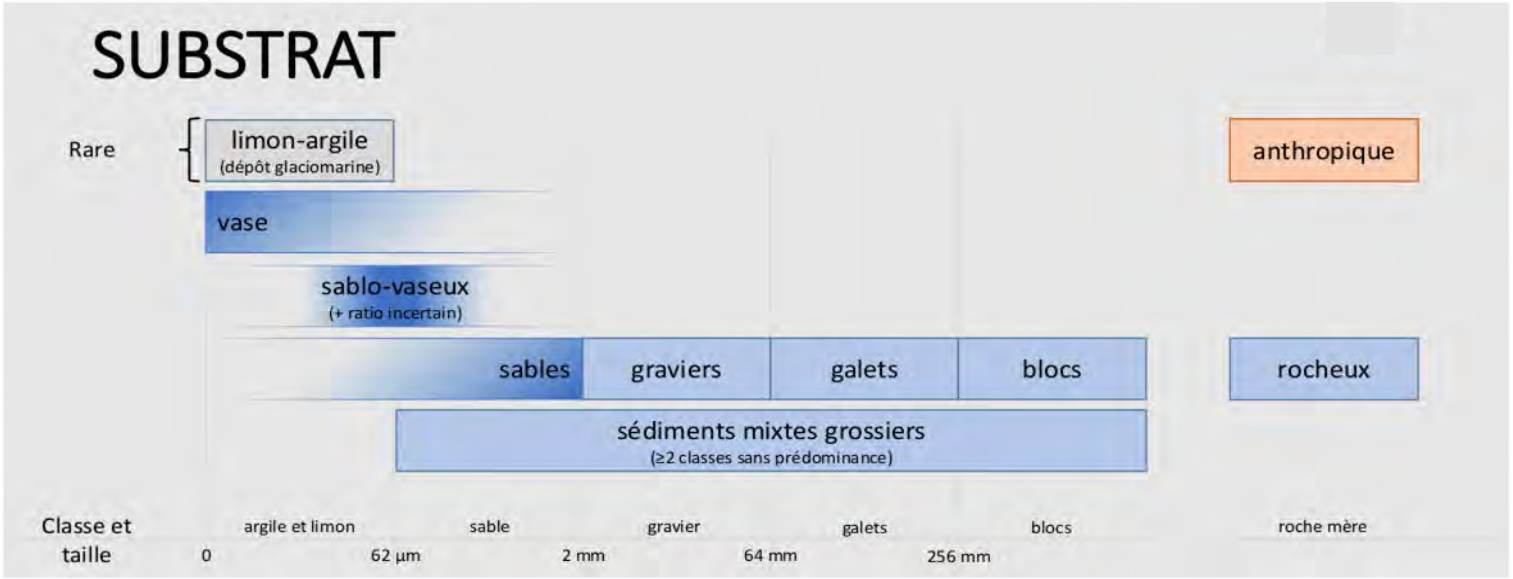


Habitat Characterization

Classifying benthic substrates



Marine Substrate Characterization

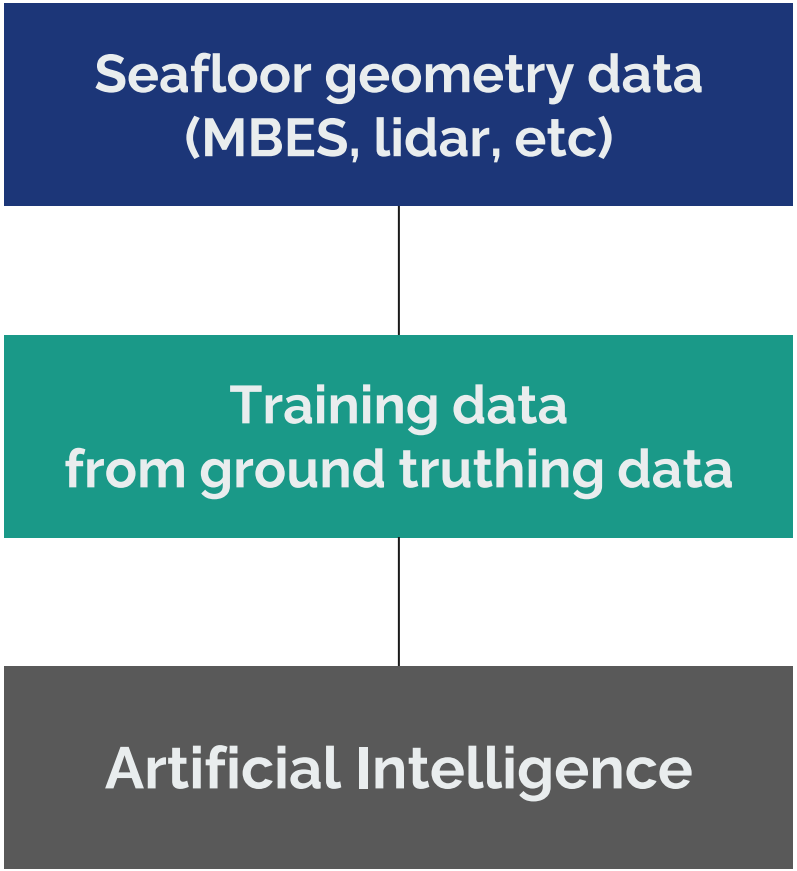


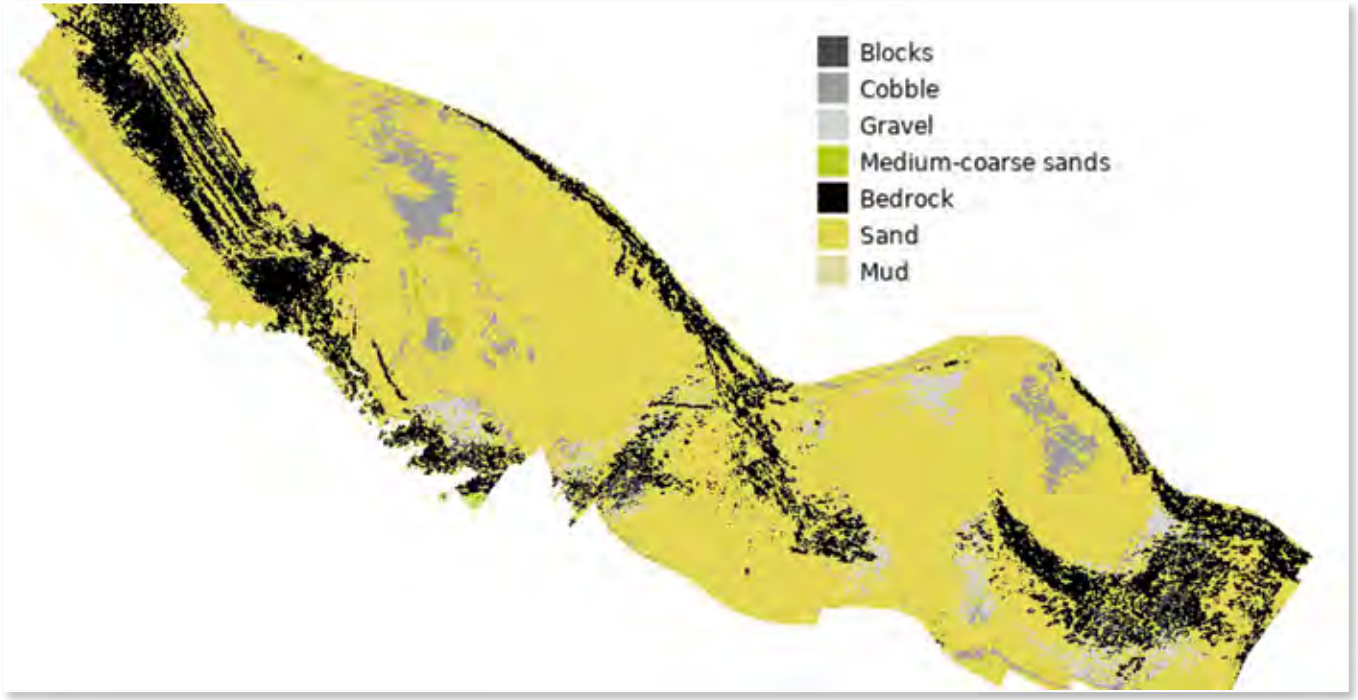
Ground Truth Stations

1000 DFO Ground Truthing Stations

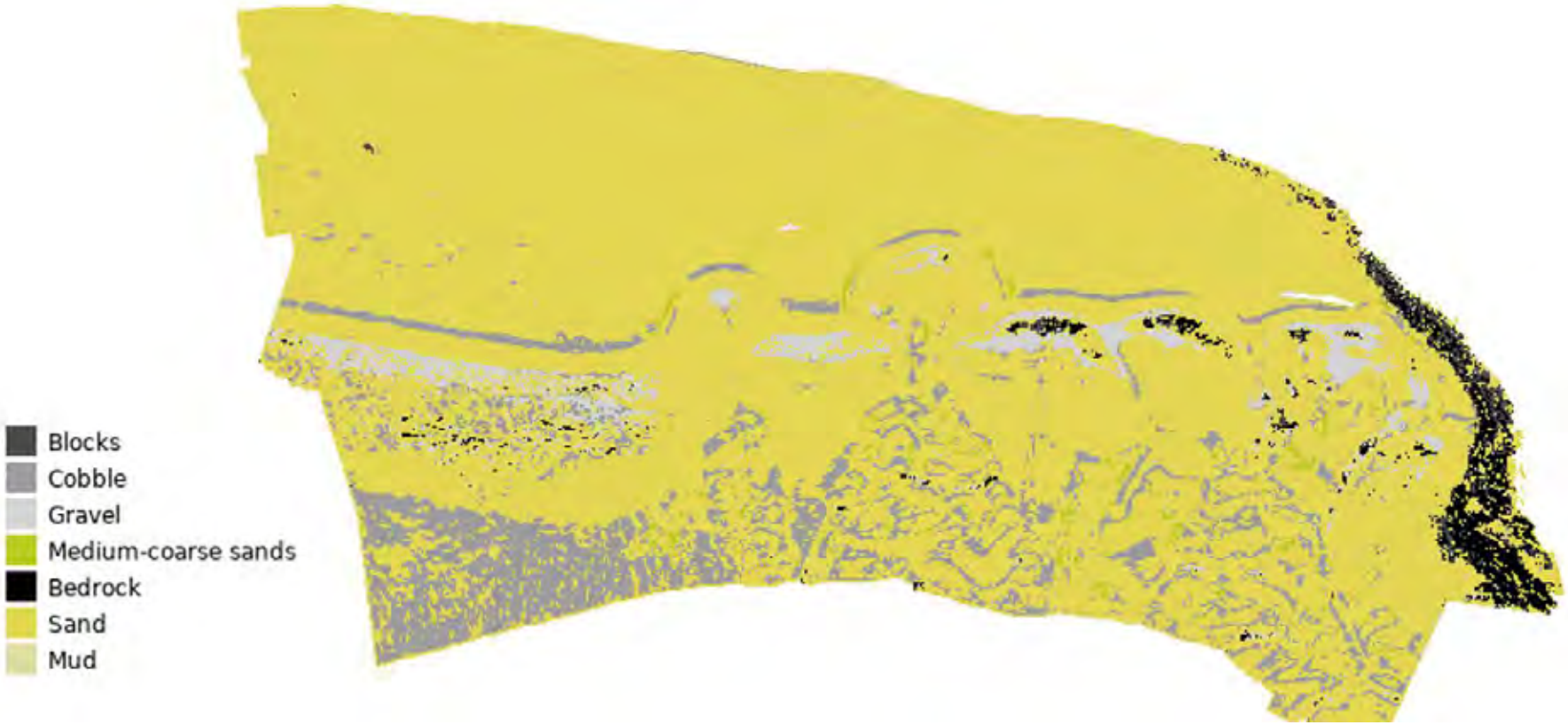
Process

Using supervised learning makes it possible to classify benthic habitats using proxy variables derived from seafloor geometry.





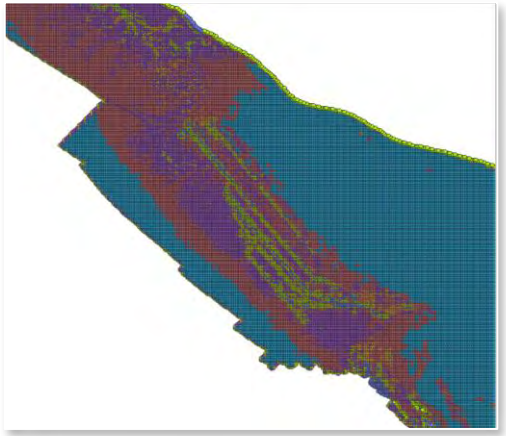
Baie-des-Anglais, Côte Nord, QC, Canada



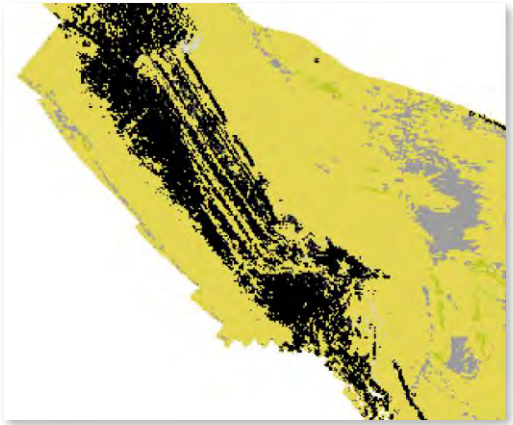
Franquelin, North Shore, QC, Canada

Peer-reviewed models

Unsupervised model (No ground truthing)



Supervised model (With ground truthing)



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Thank You