

Detecting Fishing Activity

Gina Escobar



Where are the boats fishing?

Identify and visualize where fishing is taking place at a global scale is important to eliminate **illegal**, **unregulated**, and **unsustainable** fishing practices.



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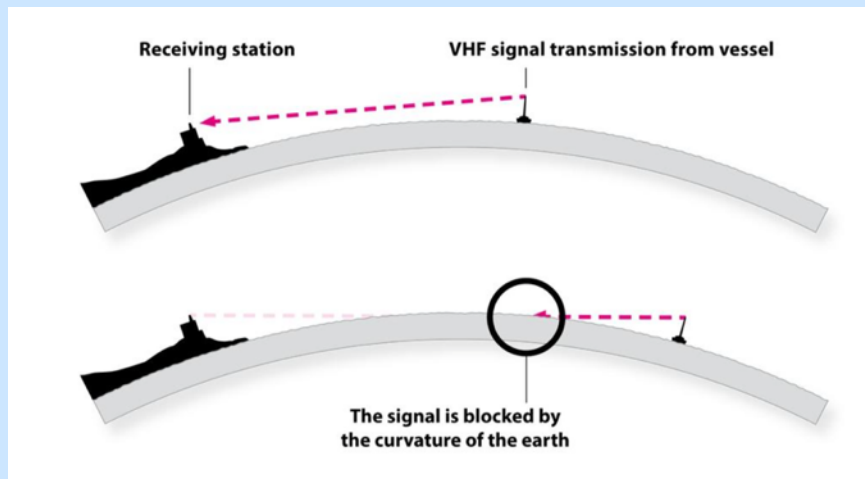


<http://www.globalfishingwatch.org>

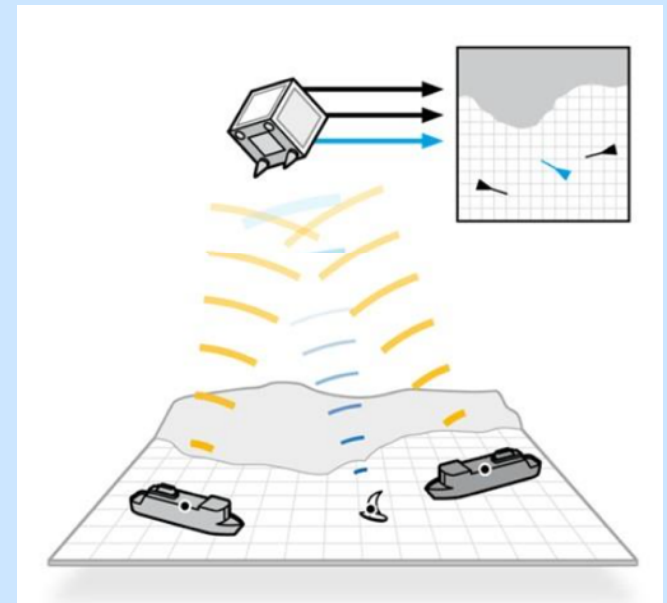


Automatic Identification System (AIS)

Emitted by all boats in order
to prevent collisions



Picked up by
satellites



2M rows of labeled data

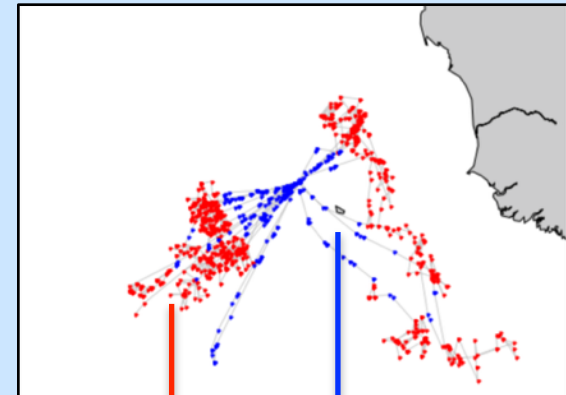
- Latitude
- Longitude
- Course
- Speed

70 engineered features

- Daylight
- Mean, standard deviation

Time windows: 0.5h - 24h

Track example

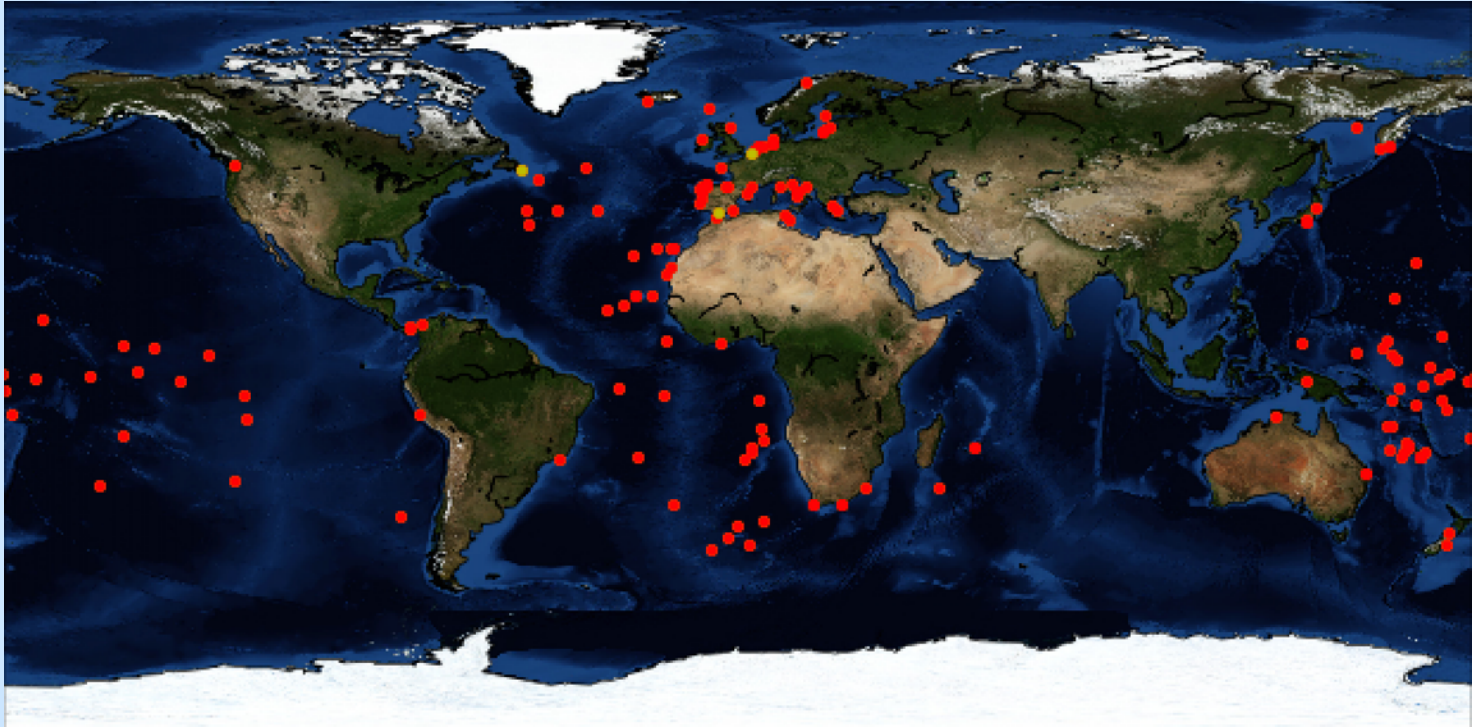


Fishing

No Fishing



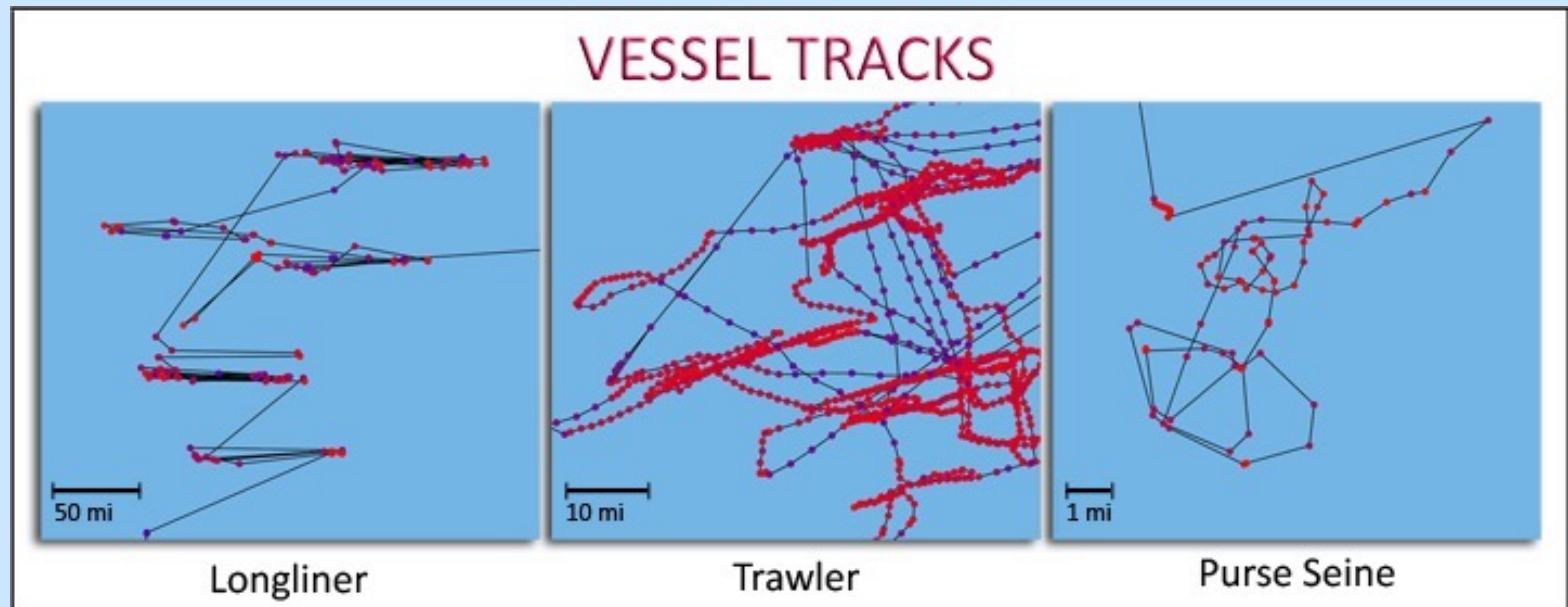
Fishing around the world



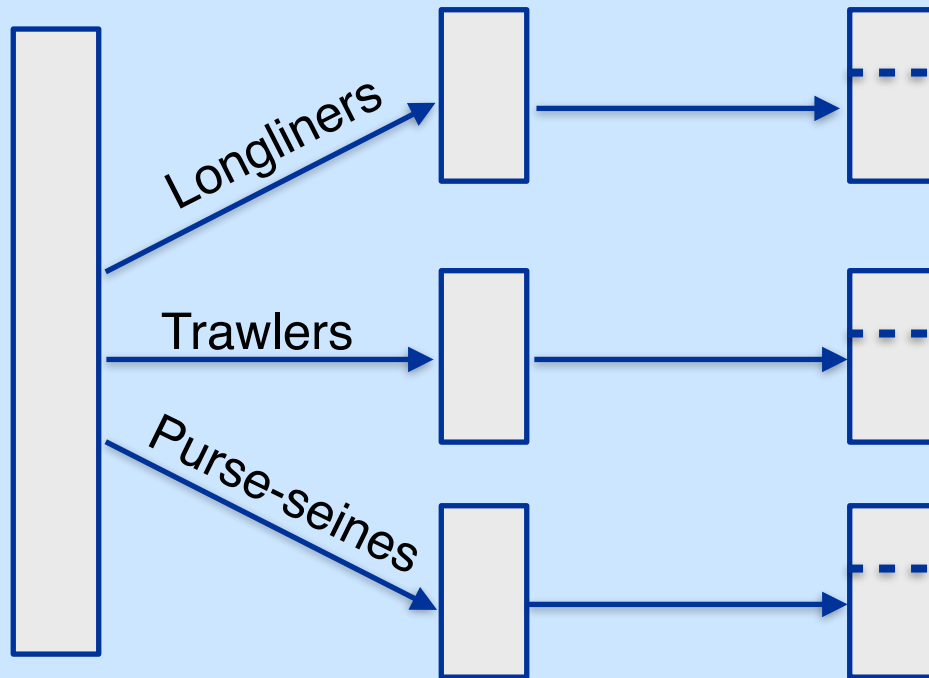
● Boats used for this project



Each type of vessel produces a different signature track



Data separation by vessel type



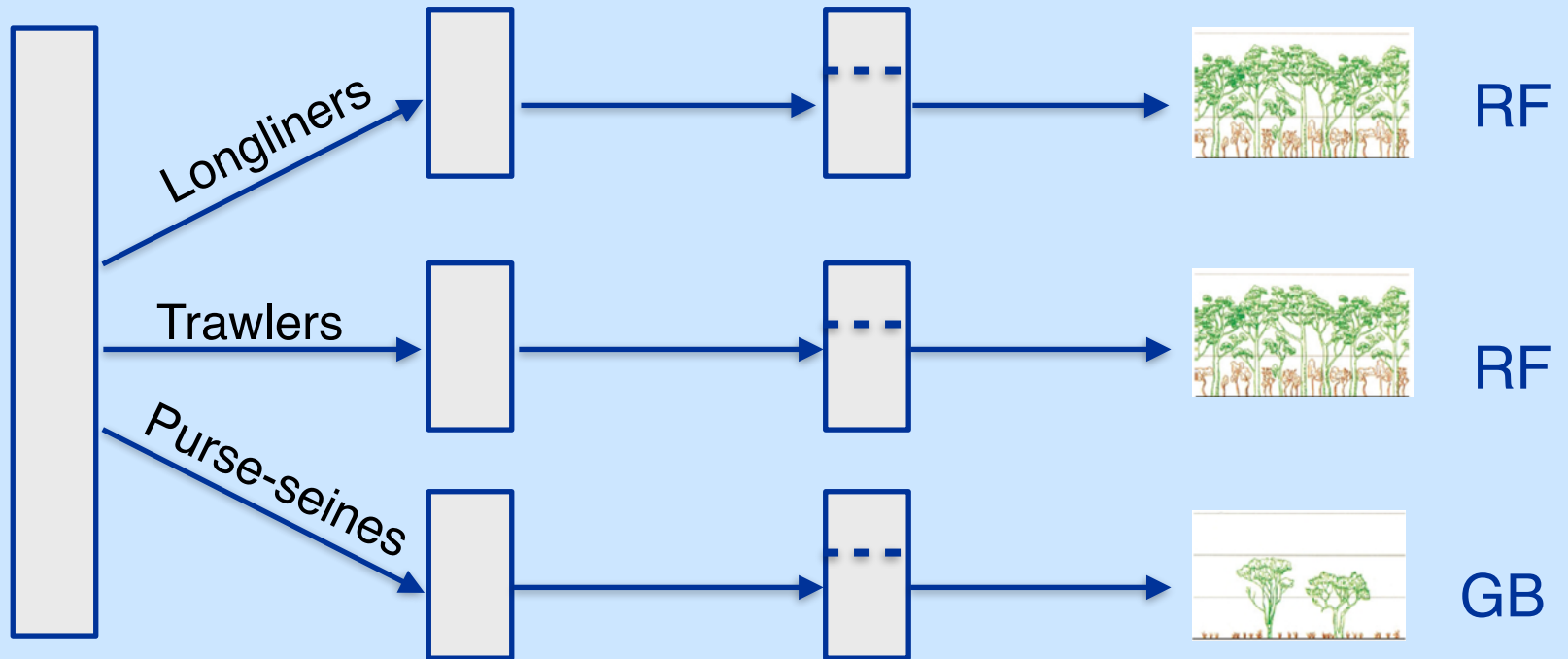
Pipeline

Train - CV - test split
based on vessel ID



Data separation
by vessel type

Best model for
each vessel type



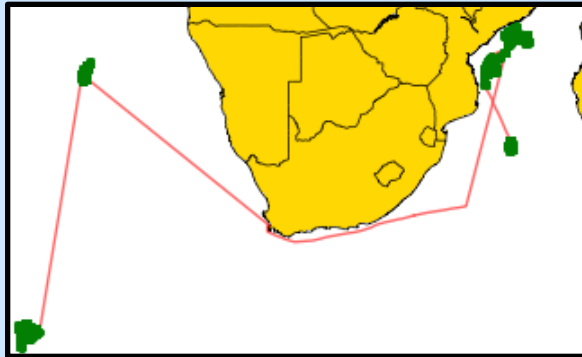
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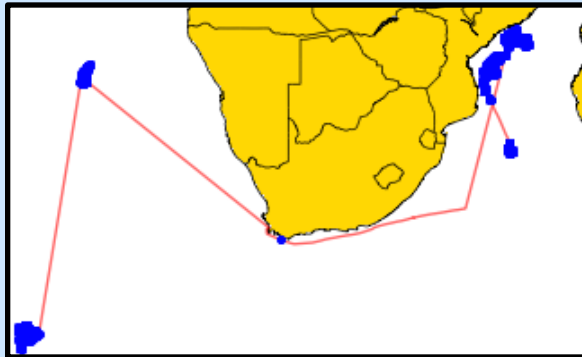


LONGLINERS

**Actual
fishing
sites**



**Predicted
fishing
sites**

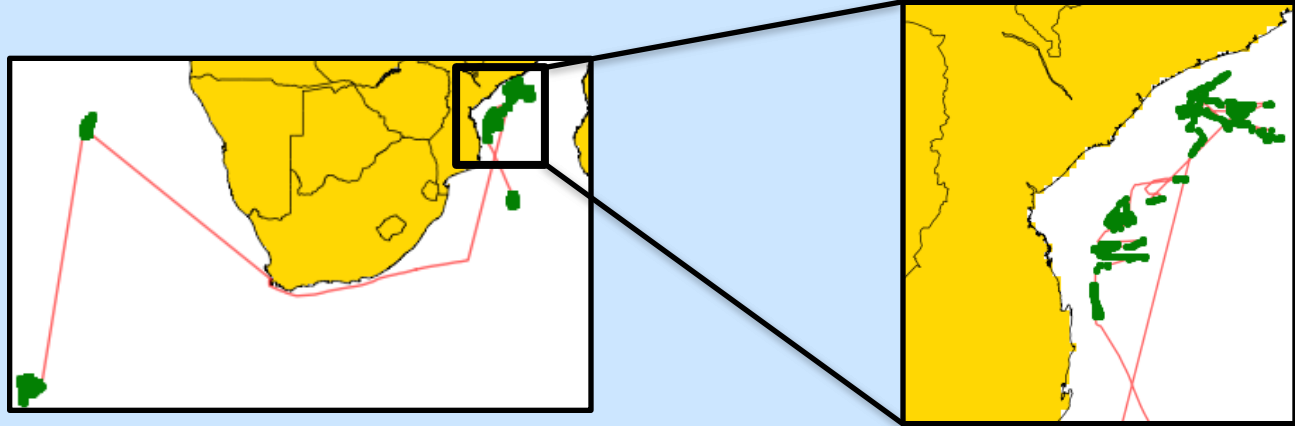


Jan 1 2015 - Feb 27 2015

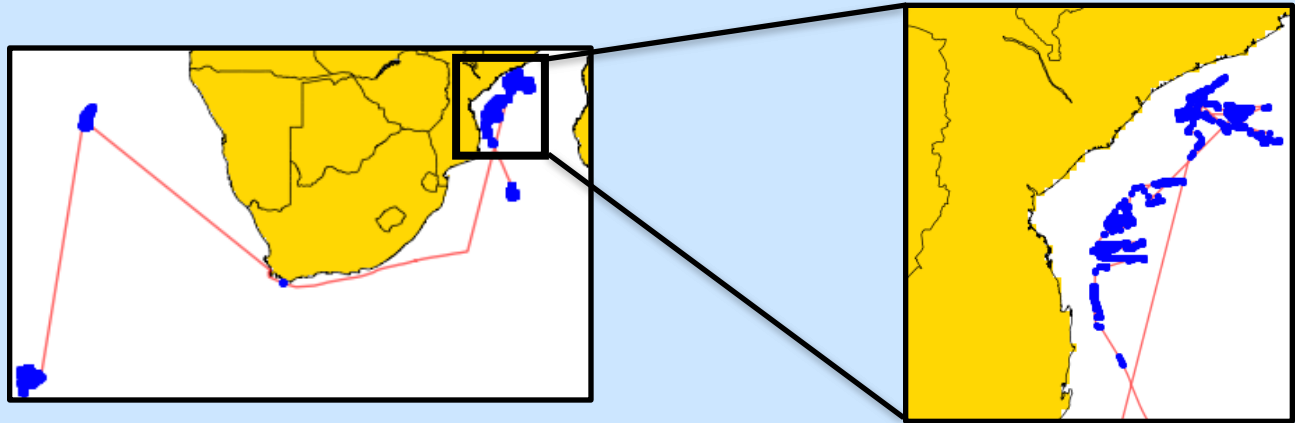


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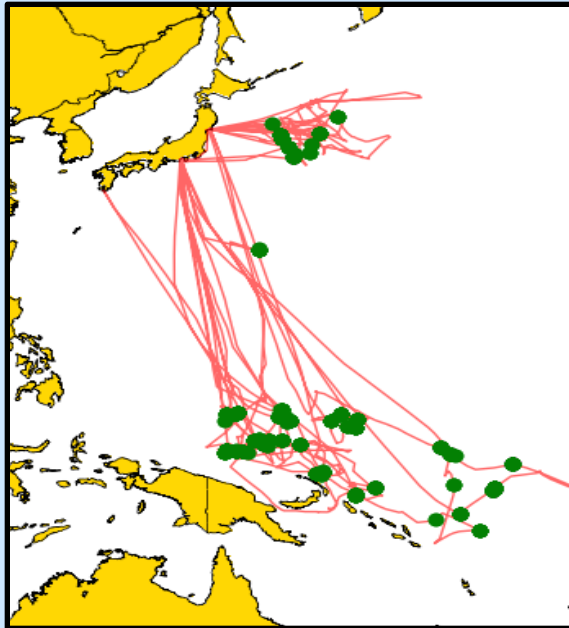


Jan 1 2015 - Feb 27 2015

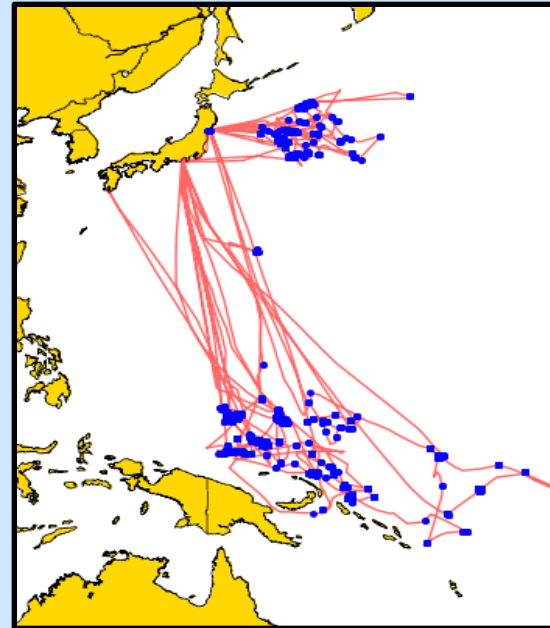


PURSE SEINES

**Actual
fishing
sites**



**Predicted
fishing
sites**



Jun 22 2015 - Oct 27 2015



Performance results

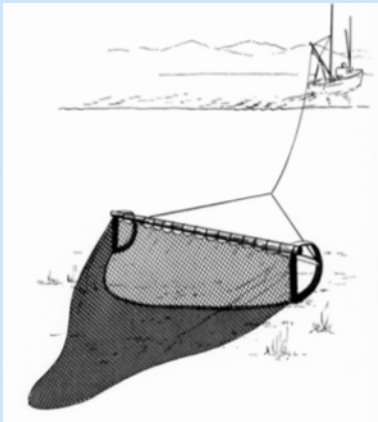
	Accuracy	F1-score
Longliners (RF + 24h windows)	0.99	0.95
Trawlers (RF + 24h windows)	0.98	0.87
Purse Seines (GB + 6h windows)	0.88	0.45*

RF: Random Forest Classifier
GB: Gradient Boosting Classifier

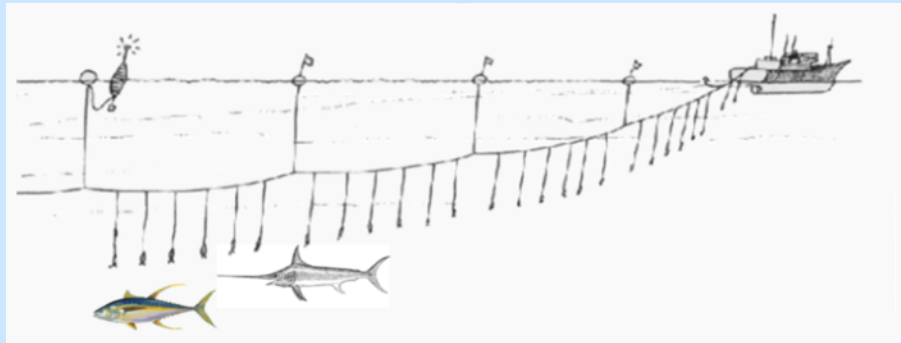
*** An improvement over value reported
by Global Fishing Watch of 0.38**



A word on Purse seines...



Trawlers



Longliners



Future work

- Improvement on purse-seiner model.
- Incursions into Marine Protected Areas (MPAs)



Marine Protected Areas

Acknowledgements:

- David Kroodsma
- Tim Hochberg
- Nathan Miller



Thank you!



GinaE/Detecting-fishing-activity



GinaEscobar



Backup slides



Performance of all the models

