

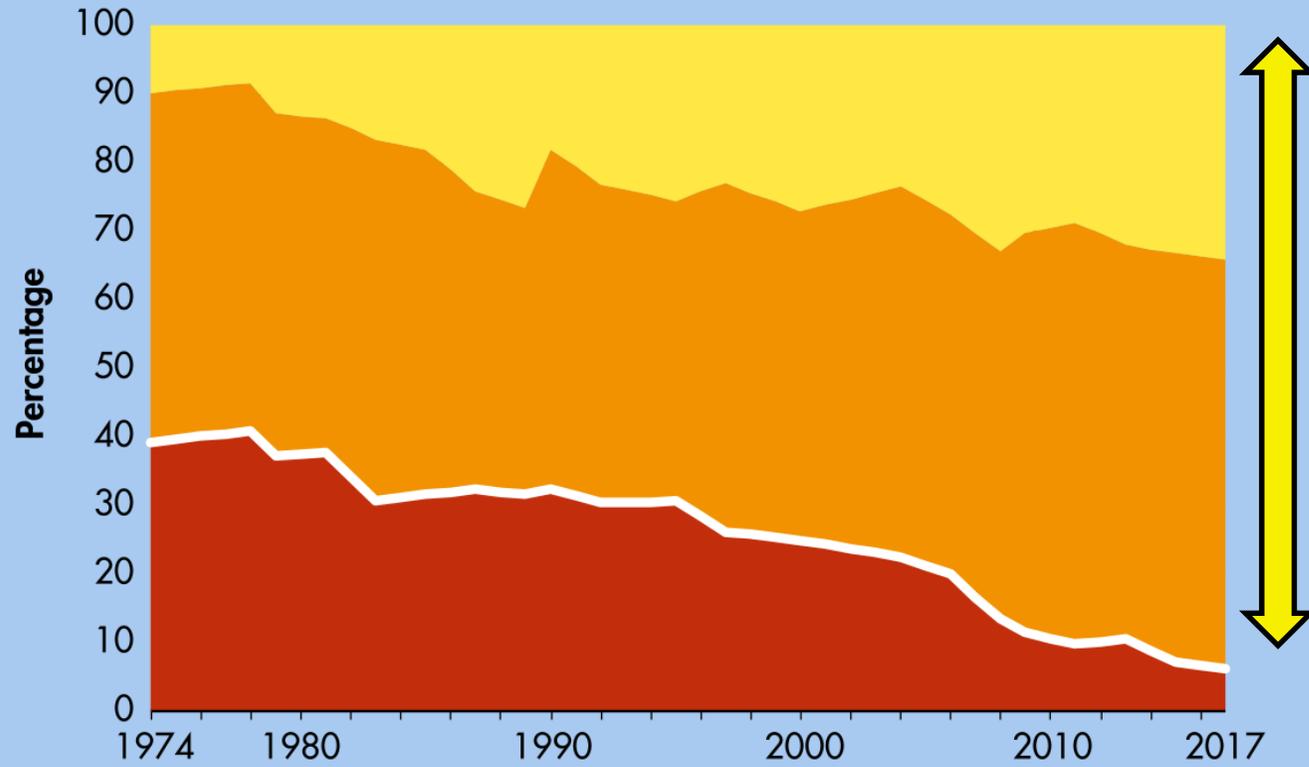


## Sean Wheeler

Fisheries & Oceans Canada  
Conservation & Protection  
International Program



April 2021



- Biologically sustainable – underfished
- Biologically sustainable – maximally sustainably fished
- Biologically unsustainable – overfished

## Big Picture

*Est 4.6M fishing vessels in the world*

*94% of global stocks are maximally or over fished*

*1/3 of global catch estimated to be result of IUU fishing*

Source: IMO, FAO, World Food and Agriculture – Statistical Yearbook 2020. Rome: FAO. 2020.

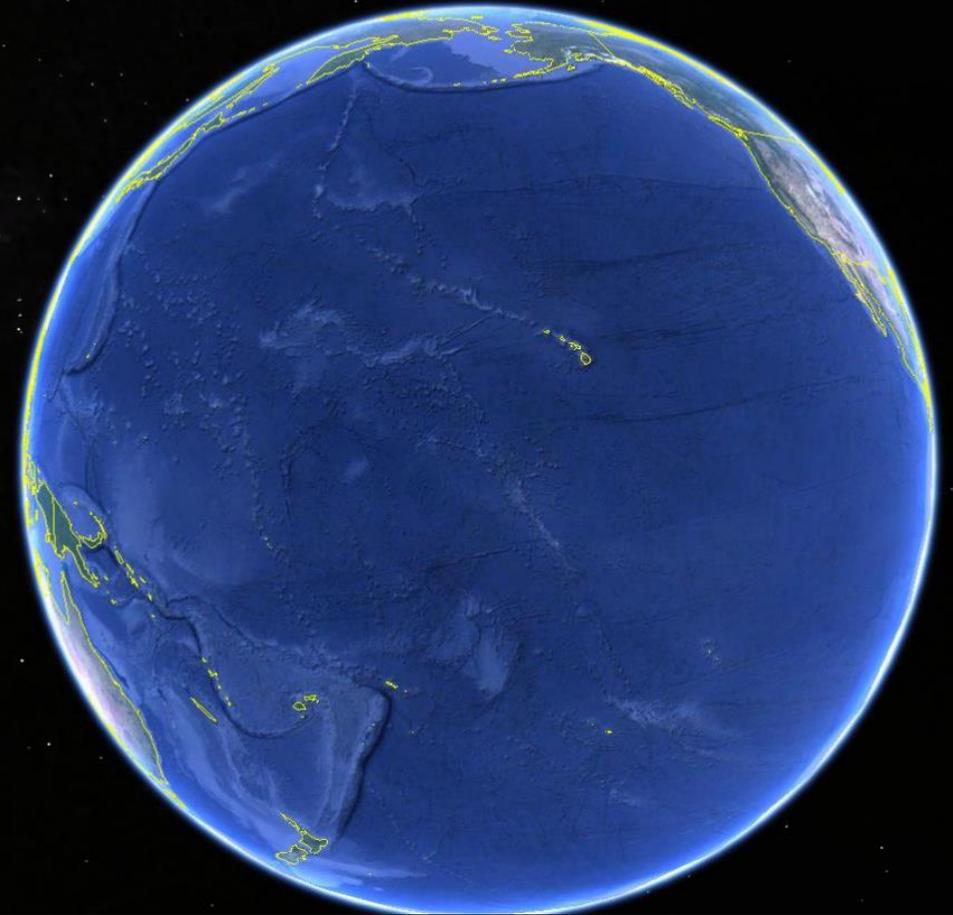


- Space-based sensing required given the distances involved
- Capabilities, sources and cost of data improving:
  - New commercial sources
  - Improved analysis
  - Power in combining sources & layered surveillance

Canada is working to combat IUU fishing through space-based sensing by:

1. Investing in research and development of new capabilities
2. Engaging in partnerships to improve transparency & data access

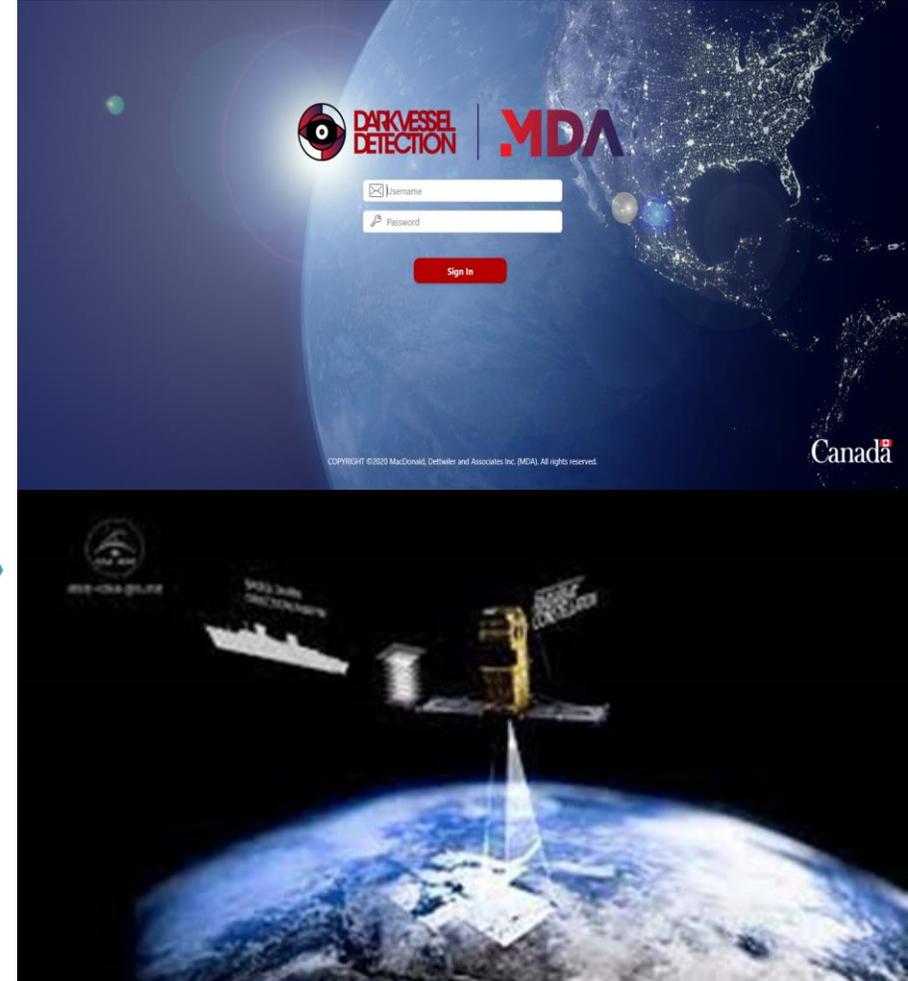
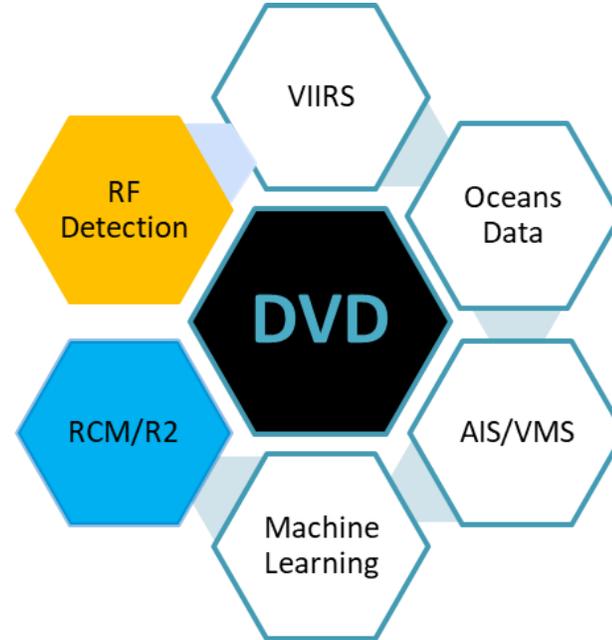
Pacific: 165M km<sup>2</sup>





## Canada's Dark Vessel Detection Project

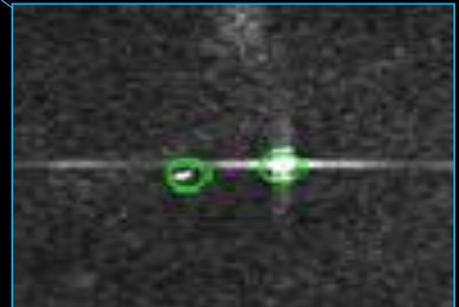
- Canada working to test layered approach to near real-time surveillance
- Working to identify vessels that extinguish transponders – 'Dark Vessels'
- Leveraging Canada's Radarsat Constellation Mission for SAR
- Partnered with Ecuador to provide monitoring support around the Galapagos Islands in 2021-2022





**DARKVESSEL  
DETECTION**

**RCM/R2**  
**Synthetic-Aperture Radar**  
Radarsat Constellation Mission

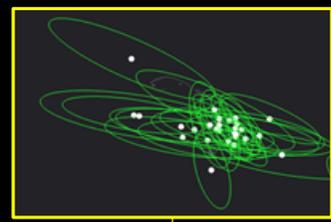


**Voluntary Signals**  
AIS / VMS



**RF**  
Detection

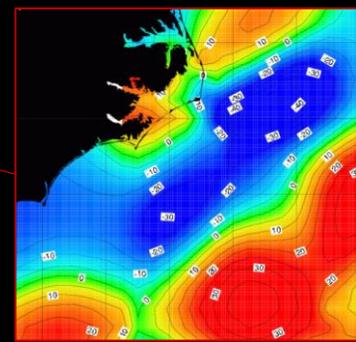
**Radio Frequency Data**



**VIIRS WX Satellite**  
Light emissions



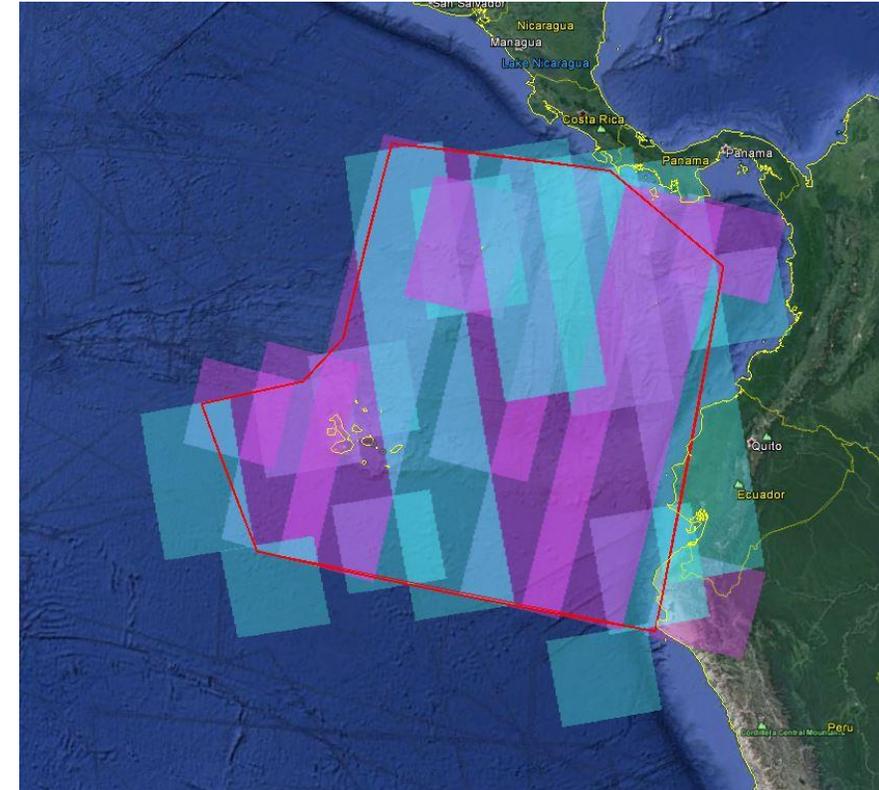
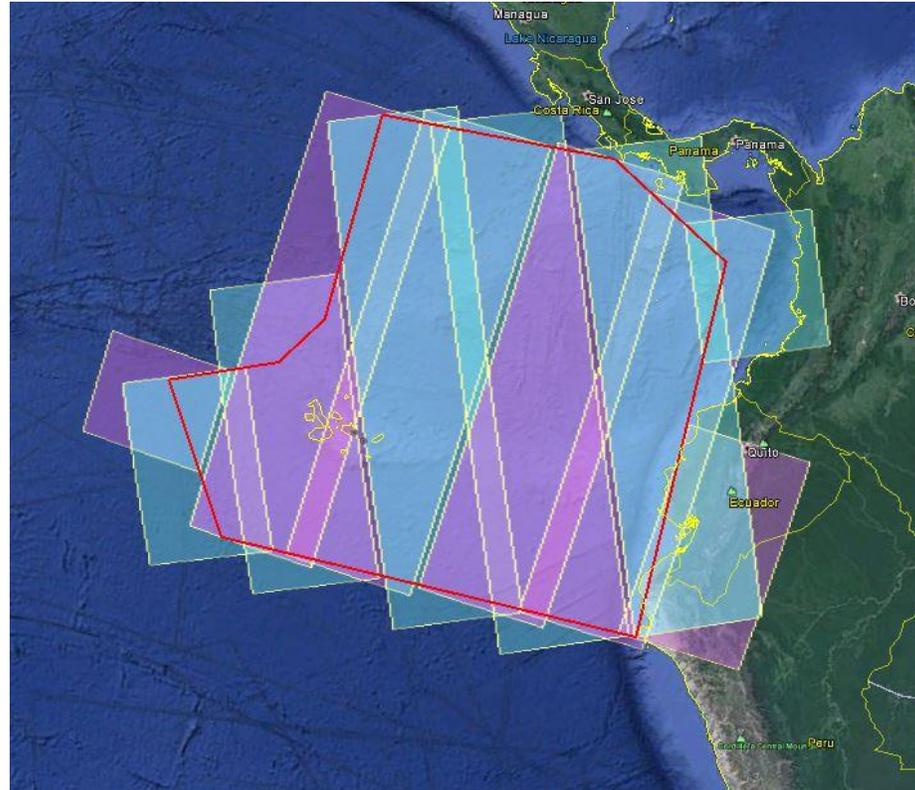
**Sea Surface Data**  
Track the Fish

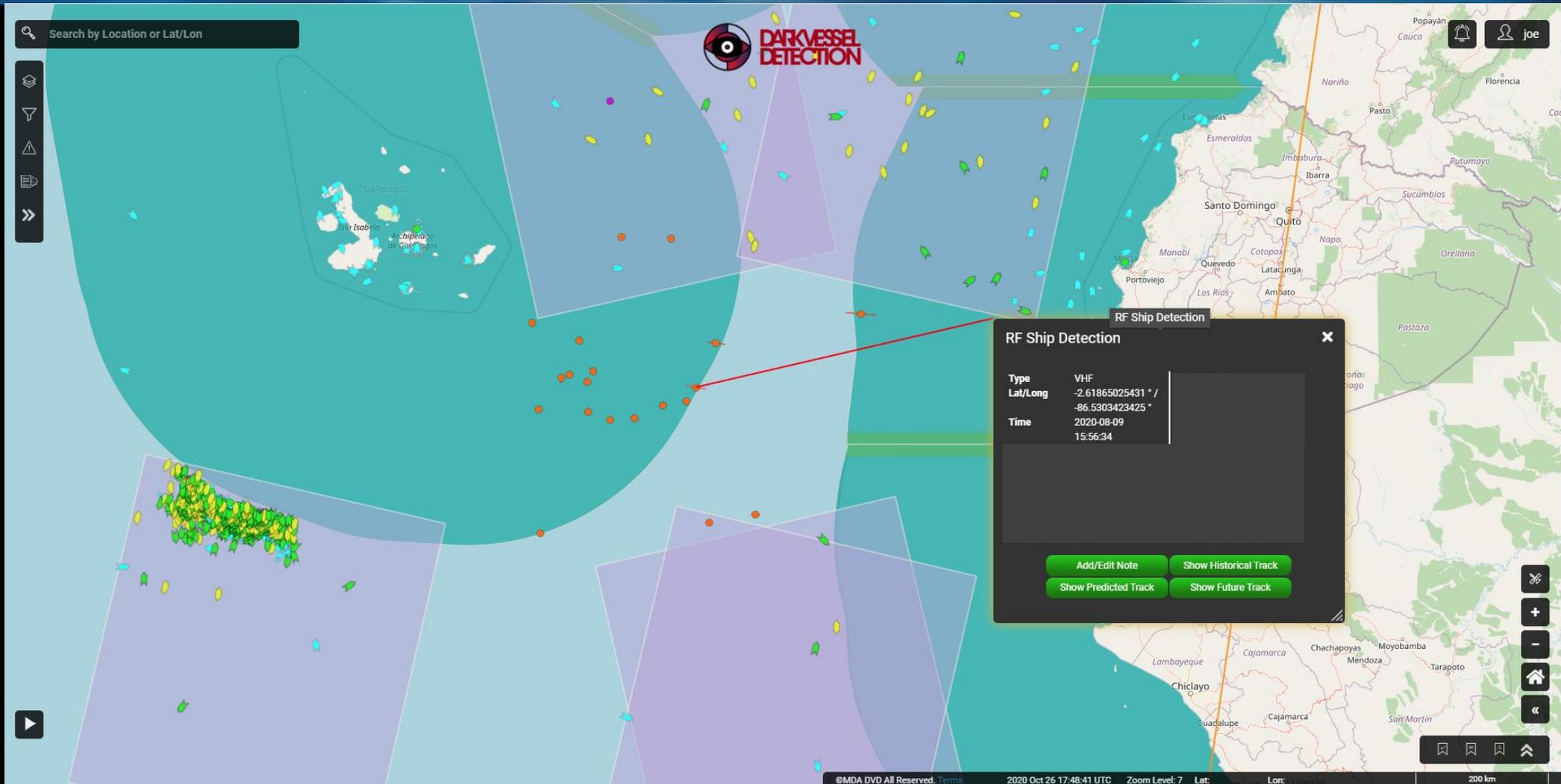




## Example: Ecuador – 1 Week Access Opportunities

- Accessing multiple constellations can provide robust monitoring
- To have operational relevance, data must be rapidly processed and displayed (vessels are moving)





DVD platform & Pacific monitoring



- **Partnerships** are critical to addressing the vast area of our oceans, expansive fleets and multi-jurisdictional nature of illegal fishing
- Canada partners with Non-Governmental Organizations on the issue of IUU fishing to increase global impact
- Canada has a partnership with **Global Fishing Watch** to support their mission of bringing greater transparency through open data



*Tony Long, CEO Global Fishing Watch &  
Minister Jonathan Wilkinson, Fmr Minister DFO*

# Global Fishing Watch

*Advancing ocean governance through  
increased transparency and use of space-  
based systems*

Tony Long  
CEO, Global Fishing Watch

April 2021

# Our ocean is under immense pressure

A third of the world's major commercial fish species are overfished and the United Nations estimates that two thirds of the marine environment has been significantly altered by human actions.

There is huge cost to the sustainability of the fisheries, to the coastal communities that depend on this source of food and to the environment.



# Our ocean is poorly monitored

There is no global picture of all human activity at sea and we cannot truly understand humanity's impact on life below water. This lack of visibility allows illegal, unreported and unregulated fishing to thrive.

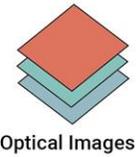
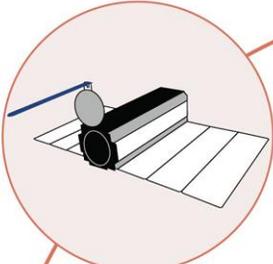
But, advances in big data and the access and affordability of space-based technology are rapidly transforming our ability to generate new insights at global scale and make them public and visible.



# Combining more satellite data to reveal more activity at sea

## Optical Imagery

Daytime, high-resolution optical imagery can be used to visually identify vessels



Optical Images

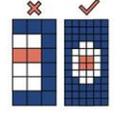


Track movements



## AIS

Automatic Identification Systems (AIS) is a collision avoidance system that constantly transmits a vessel's location at sea and can be used to identify and track fishing vessels



High Resolution



Identify vessels



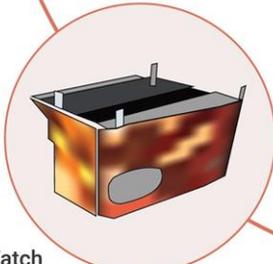
Detect lights



Penetrate clouds

## Night-time Light

Night-time optical imagery (VIIRS) picks up the presence of fishing vessels using lights to attract catch or conduct operations at night



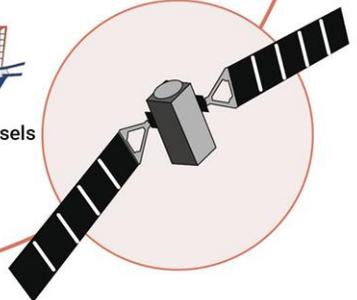
Global daily coverage



Identify metal vessels

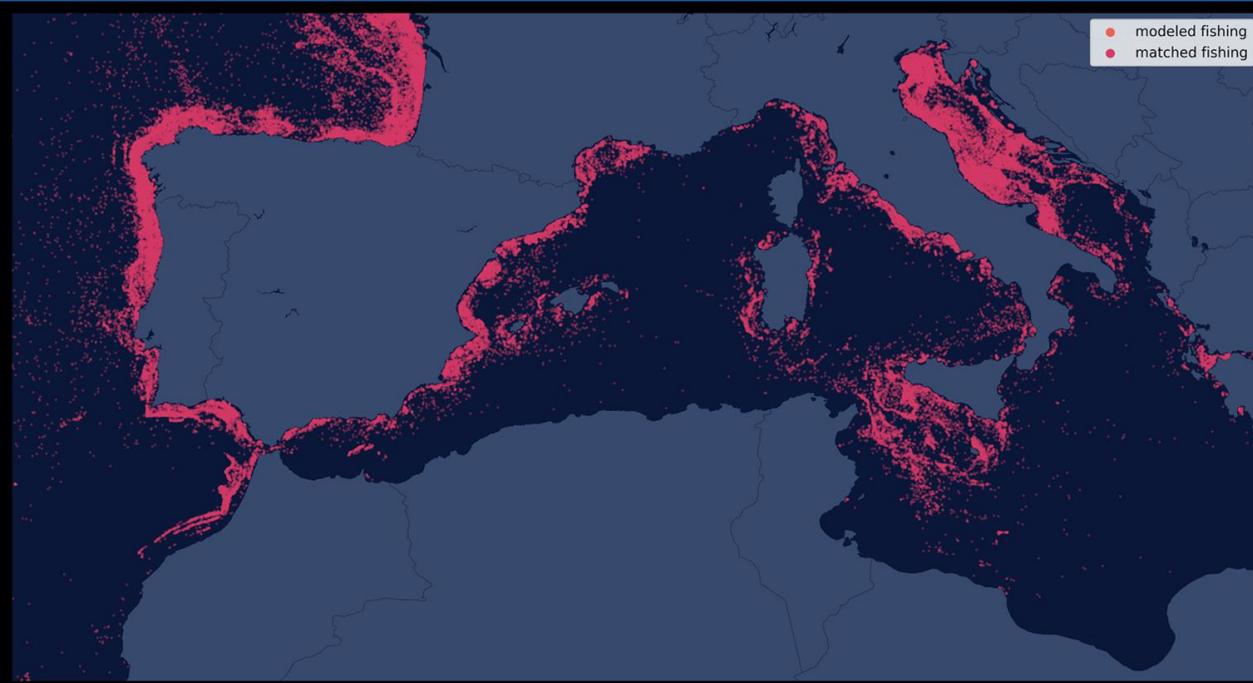
## Radar

Radar images (SAR) can identify large metal vessels and penetrate clouds



# Satellite Radar Can Illuminate “Dark” Fishing

AIS Only:  
Fishing appears only in Europe



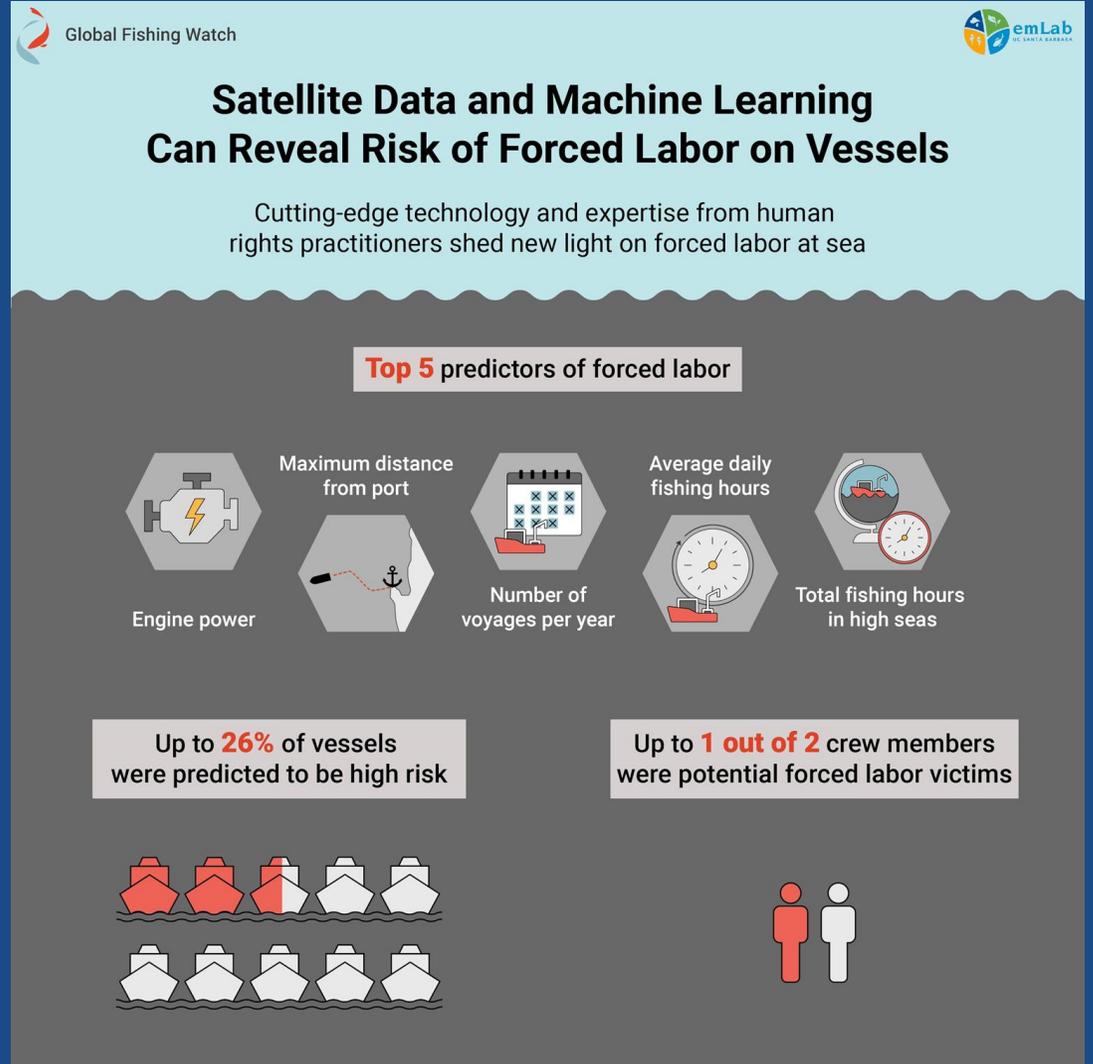
AIS + Satellite Radar:  
Widespread fishing along the African continent



We are processing more than 1000 terabytes of satellite radar to identify all fishing vessels > 15m that do not use AIS

# Scientific study reveals risk of forced labor in fishing fleets

Vessels known to have crew that are subject to forced labor behave in systematically different ways to the rest of the global fishing fleet. The discovery was used to build a first-of-its-kind model to identify and predict vessels at high risk of engaging in these abuses.



## Datasets and code that power Global Fishing Watch

Global Fishing Watch is committed to making as much of its data and code publicly available as possible. This page provides links to datasets for download, some of which will take you to pages on GitHub with more documentation and details. For commentary on our data releases, see the data blog on the right.

[DOWNLOAD DATA](#)

### Datasets and Code

- [Fishing effort](#)
- [Fishing vessels](#)
- [Transshipment](#)
- [Anchorage](#)
- [Anonymized AIS data and other data](#)
- [Fishing Detection Models](#)

### What is required for me to access and use the data?

- Register (free, self service)
- Agree to the terms of service
- Participate in follow-up surveys
- Acknowledge Global Fishing Watch in anything you publish (see terms for proper citation)

### Need help?

Contact [research@globalfishingwatch.org](mailto:research@globalfishingwatch.org) with questions

**Note:** Unless otherwise stated, Global Fishing Watch data is licensed under a Creative Commons Attribution-ShareAlike 4.0 International license and code under an [Apache 2.0 license](#).



### Latest Data Blog posts

#### Half the Ocean: Updating The Global Footprint of Fisheries

By [David Kroodsma](#)

Global Fishing Watch's updated fishing data offers new insight into the presence and behavior of the global fishing fleet [...]

#### New Fishing Data Paves the Way for Improved Analysis

By [Jenn Van Osdel](#)

Improvements to our fishing effort data and vessel classification can help promote transparency of human activity on the world's [...]

#### COVID-19 Brings Unmatched Downturn in Global Fishing Activity

By [Tyler Clavelle](#)

One year into the pandemic that triggered turmoil around the world, an analysis of Global Fishing Watch data sheds [...]

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UNIVERSITY OF WOLLONGONG



<https://globalfishingwatch.org/datasets-and-code/>

# Marine Manager



## Human Use Data

AIS Fishing, AIS Non-Fishing, VMS, Dark Targets, Seismic Resource Testing, Underwater Noise, Mining, Tourism,...



## Oceanographic Data

Sea Surface Temperature, Bathymetry, Salinity, Currents,...

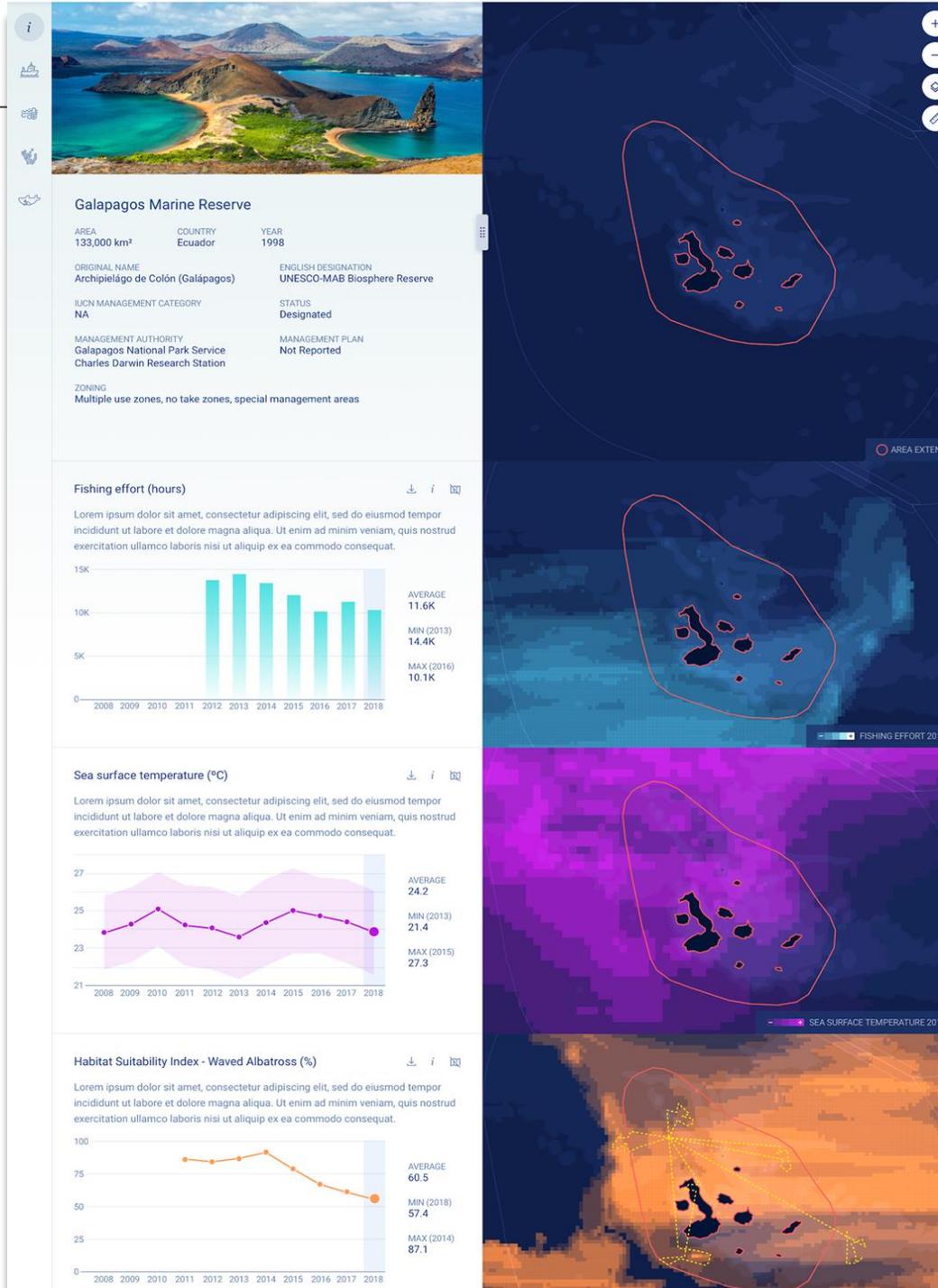


## Biological Data

Net Primary Productivity (Chl a), Migratory Patterns, Habitat Suitability, Coastal & Deep Sea Ecosystems, Animal Telemetry (upload capability), and more



Global Fishing Watch



The screenshot displays the Marine Manager interface for the Galapagos Marine Reserve. It features a top navigation bar with icons for information, home, layers, and search. The main content area includes a metadata table, a fishing effort bar chart, a sea surface temperature line chart, and a habitat suitability index line chart. Each chart includes a legend and statistical data.

AREA	COUNTRY	YEAR
133,000 km²	Ecuador	1998

ORIGINAL NAME	ENGLISH DESIGNATION
Archipiélago de Colón (Galápagos)	UNESCO-MAB Biosphere Reserve

IUCN MANAGEMENT CATEGORY	STATUS
NA	Designated

MANAGEMENT AUTHORITY	MANAGEMENT PLAN
Galapagos National Park Service Charles Darwin Research Station	Not Reported

**Fishing effort (hours)**

Average: 11.6K, Min (2013): 14.4K, Max (2016): 10.1K

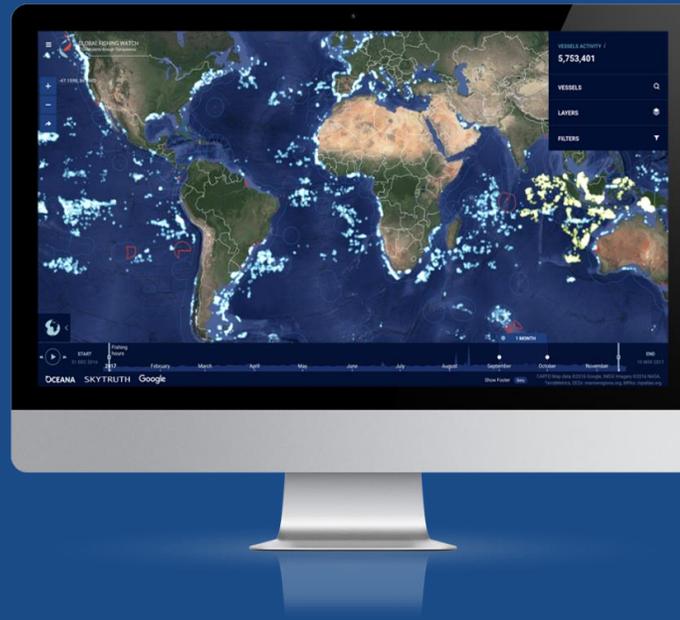
**Sea surface temperature (°C)**

Average: 24.2, Min (2013): 21.4, Max (2015): 27.3

**Habitat Suitability Index - Waved Albatross (%)**

Average: 60.5, Min (2018): 57.4, Max (2014): 87.1

# Thank you



Global Fishing Watch is an international nonprofit organization dedicated to advancing ocean governance through increased transparency of human activity at sea. By creating and publicly sharing map visualizations, data and analysis tools, we aim to enable scientific research and transform the way our ocean is managed. We believe human activity at sea should be public knowledge in order to safeguard the global ocean for the common good of all.

Discover more at [globalfishingwatch.org](https://globalfishingwatch.org)

