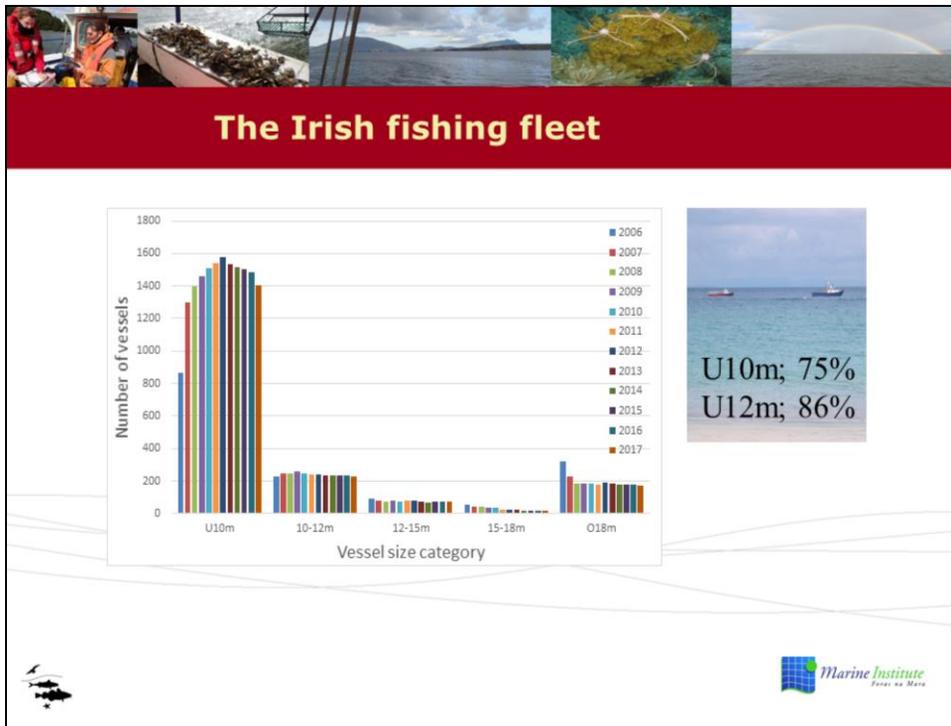


This report summaries a pilot project undertaken by the Marine Institute on the use of VMS (Vessel Monitoring Systems) on vessels under 12m in length in Ireland.

Funding in recent years has come from the EMFF Marine Biodiversity Scheme(MBS).



Over 75% of registered vessels in Ireland are under 10m in length. 86% are under 12m.

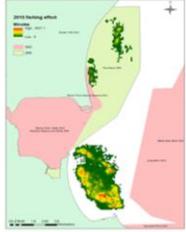
Vessels under 12m do not currently have VMS and vessels under 10m do not have logbook and do not report landings.

Rolling out VMS or logbooks to inshore vessels is a significant task given there are over 1600 such vessels



## Why do we need more data?

- Fisheries Statistics
- Economic value
- Management of fisheries
- Assessment of environmental pressure and impacts for EU Directives
- Identifying the fishing footprint for Marine Spatial Planning
- Traceability and seafood hygiene regulations






There are many reasons to improve and expand the data being reported by the Inshore fleet. These reasons are mainly related to making the fleet visible, showing its presence in the marine landscape, expressing its true economic value, highlighting its distribution at many piers and ports around the country and to enable better planning for the sector. Better data provision is identified by the industry as a priority in the ‘Strategy for Inshore Fisheries’ in Ireland.

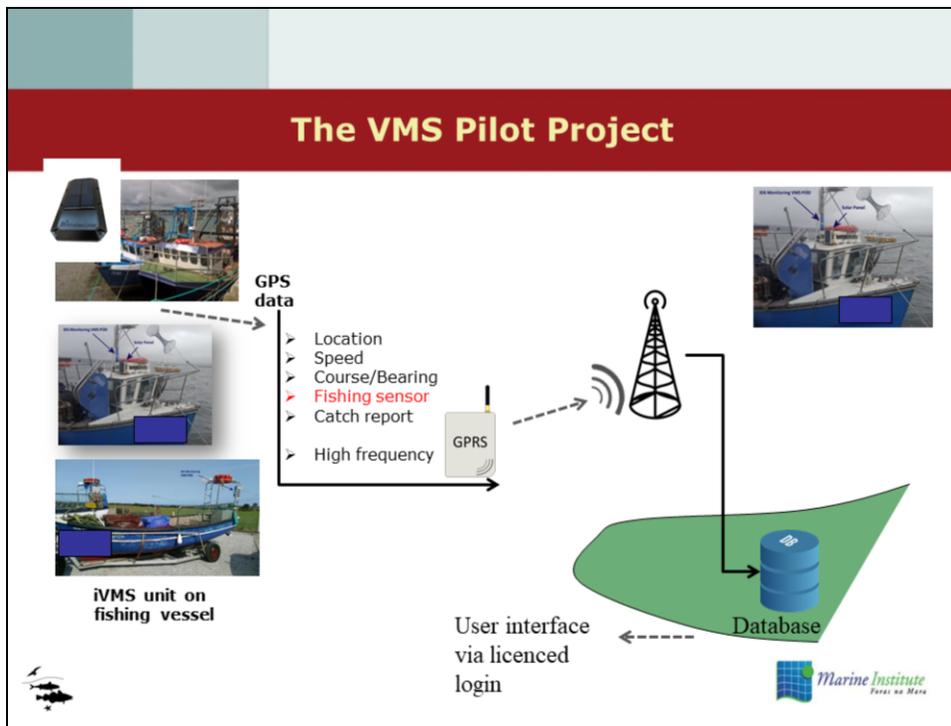


## Why do we need data?

- Inshore landings are under reported
  - The Inshore Sector is therefore undervalued
  - There are knock on consequences;
    - Spatial planning,
    - State investment and grant aid
    - Acknowledgement of the sector
    - Policy for the sector
    - Market development
    - Attracting and retaining crew



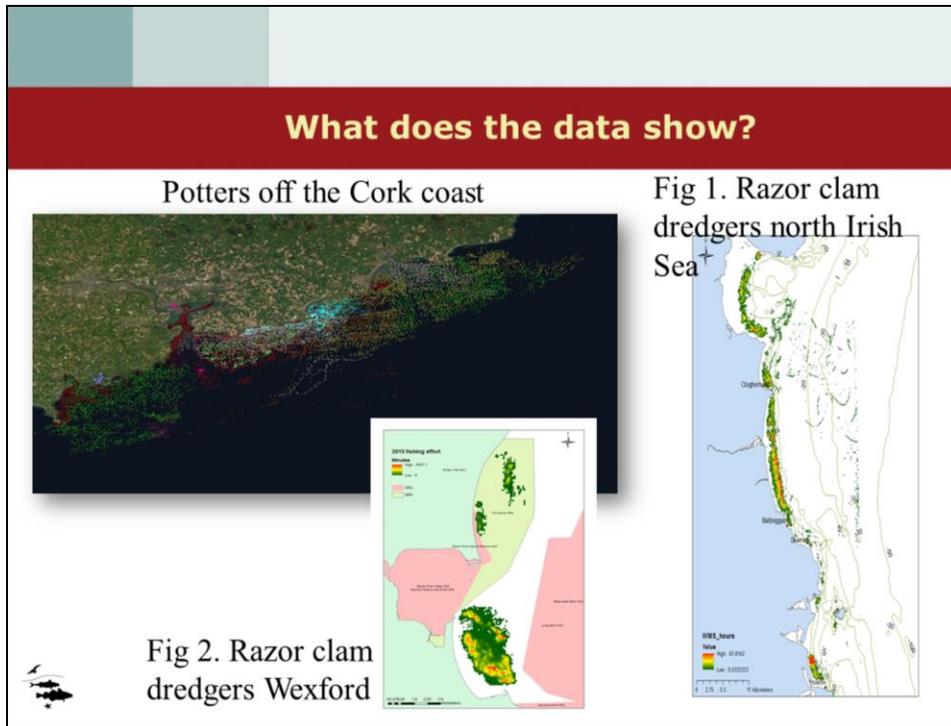
One of the really significant implications of the absence of comprehensive data on landings by the Inshore fleet is that it is undervalued. There are knock on consequences



The Marine Institute have operated a pilot VMS project on vessels under 12m since 2014. All vessels fishing for razor clams are required to report position when fishing. Over 100 razor clam vessels have over the years been fitted with VMS units. A further 50 potters and netters on the south east and south west coasts joined the project in later years.

The data are transmitted from the vessel via sim card to a central database. Three types of units from 3 suppliers have been trialled for over 4 years. Data reporting frequency is generally 10minutes but some units report every minute. Gear sensors, to identify fishing events, have been used on some vessels. These sensors connect to the VMS unit on board using Bluetooth. Trials using forms on mobile phones for electronic reporting of catch have also been completed.

All equipment, data transmission and maintenance costs are covered by the pilot project.



VMS data enables the location and level of fishing activity to be mapped. The resolution of these maps depends on the frequency at which the vessel pings its position. In this pilot project standard reporting frequency was 10min. This compares to 2hrs frequency by vessels over 12m. The data for vessels fishing mainly for Razor clams in the north Irish Sea show the fishery in a continuous band in shallow water from north Dundalk Bay south to Malahide (Fig 1). Some of these vessels also fish to the east in deeper waters for prawns (Fig 1). In the south Irish Sea the data showed that the razor clam fleet fishes mainly between Special areas of Conservation. This enabled other spatial restrictions on this fishery to be relaxed (Fig 2). Data along the Cork coast show that potting is present in all areas in coastal waters inshore of trawling ground (Fig 3).

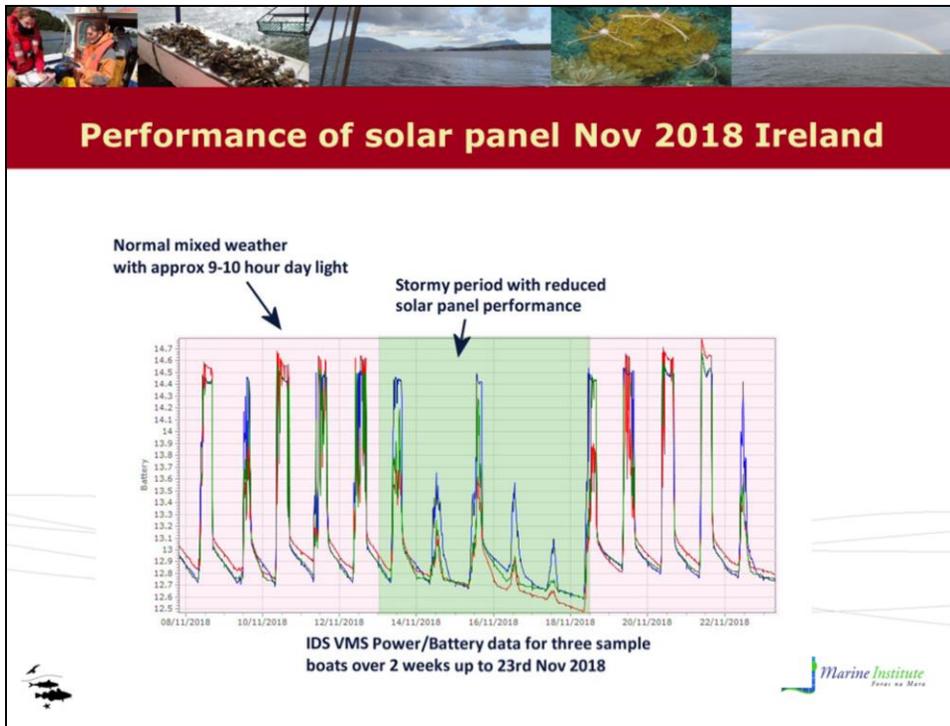


## Main findings of the Pilot Project

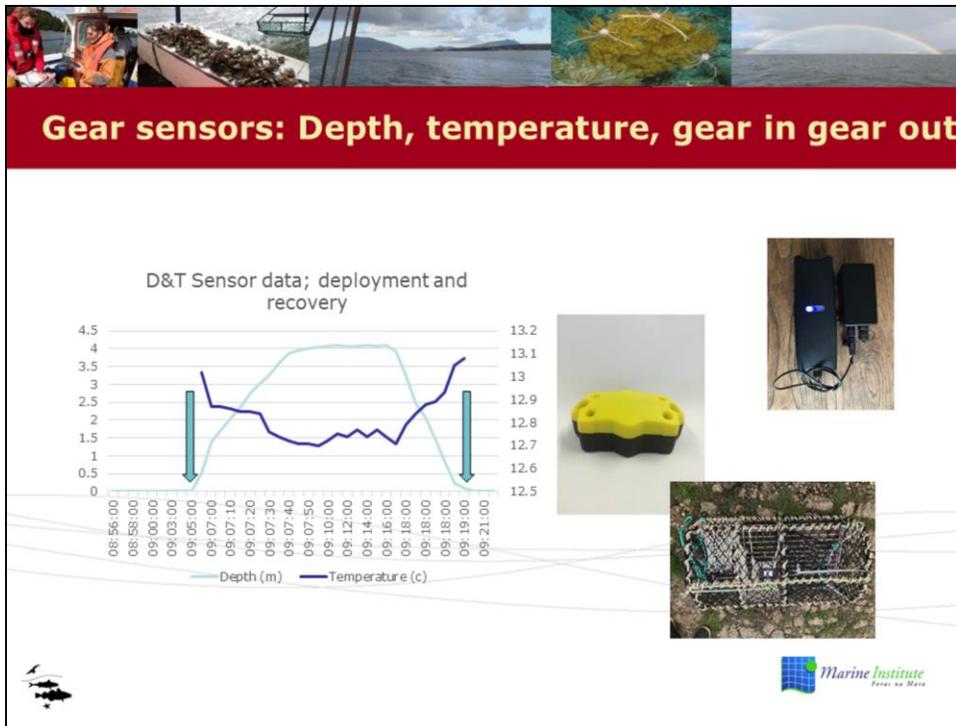
- Main findings
  - Low costs systems can be reliable
  - Communication between Skippers and maintenance engineers important to maintain reporting. This is mainly for units which are connected to vessel battery power where the internal batteries of the VMS units become depleted
  - Data needs to be visual on mobile devices (phones, tablets)
  - It is possible to integrate data from different suppliers to a single database. So the future business model could have single or multiple suppliers of these units
  - VMS units that autonomous from vessel power and which use solar panels seem to be trouble free, to maintain charge in Irish winters and have much lower maintenance costs. Solar technology has improved during the pilot project and a number of suppliers now provide units with integrated solar panels.



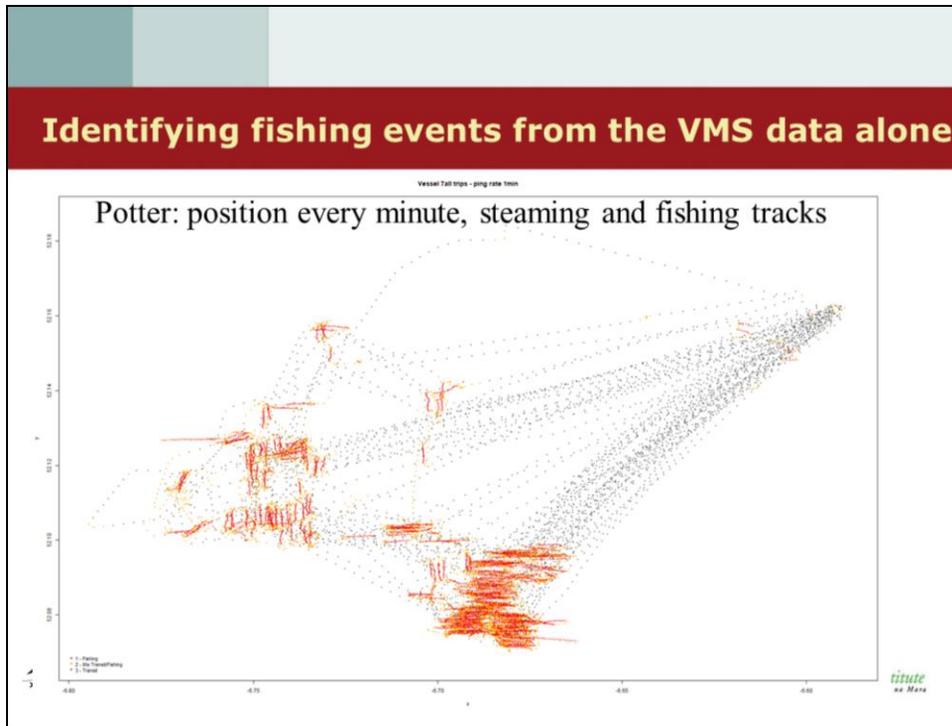
The project has used 3 different systems. Two requiring connection to vessel power and 1 with solar panels and independent of vessel power. The units vary in cost and depreciation. Low cost units can be reliable. Maintaining reporting of units which need vessel power has been the main problem as many Skippers withdraw power from the vessel during tie up or bad weather. This often requires units to be re-set remotely.



Solar panels maintain the internal battery of VMS units reporting at 10min frequency even during winter in Ireland



Various types of sensors have been used on fishing gears during the trial. These sensors send data to the VMS system and essentially identify when a set of fishing gear is in the boat or in the water. For instance sensors report data on depth and temperature which identifies when the gear is in the water and also provides valuable seabed temperature data while the gear is ‘soaking’. Other sensors are binary; the gear is present or absent (Gear in Gear out GIGO sensors). Identifying fishing events in the VMS data is the ‘next step up’. Although Skippers might think twice about wanting to reveal these data the data will only ever be reported on a fleet basis and anonymously. The capacity to separate fishing events from VMS activity generally has a number of advantages; the estimated footprint of fisheries on the environment or estimated environmental pressure caused by fishing is highly correlated with the resolution of data being reported. The footprint is much smaller if fishing events can be isolated. But it may not be necessary to use gear sensors to achieve this



Analysis and modelling of high frequency VMS data from potting vessels shows the capacity to identify fishing events without using gear sensors. The reliability of this method increases as the frequency of VMS reporting increases to 1 ping per minute. If individual events can be identified then it's a simple next step to count all events to report fishing effort by the fleet per day or over a given period of time for any given area. In the case of pots if the fishing activity associated with hauling a string of pots can be identified given that the spacing between pots is fairly standard then the number of pots being fished can be estimated. It would then be possible to monitor and report the number of pots being hauled by each vessel and by the fleet every day or week and in near real time; once the data is transmitted to the database ashore it is available for input to the modelling process and for immediate reporting.

The process described above has been developed by the Marine Institute in an Application 'Pings to Pots' as part of the EMFF MBS Informatics project.

## Confidentiality

1. The Marine Institute is prohibited from disclosing fishing location and effort of individual vessels by GDPR
2. Data are always aggregated
3. Only data 'products' are published not raw data
4. Skippers can see their own data through a log in user name and password on iVMS suppliers websites

