

# PRESENTATION OF THE INDIGO PROJECT

CleanAtlantic Final Conference

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# PROJECT CONTEXT : Plastic Pollution

## Where does the waste come from?

The majority of waste  
= land-based.

Fishing and aquaculture  
= not the main source /  
one of the sources of marine litter.

This is an area where  
action can be taken to  
reduce plastic pollution!



# PROJECT CONTEXT : Plastic Pollution

The impacts of marine litter can be obvious.

Macroplastics

## Problem of ghost fishing



Strangulation  
Suffocation



Malformation  
Premature death



## Integration in the marine food chain



Ingestion : feeling of false satiety  
Toxic → pollutant concentrator

Chemical characteristics of plastic :  
inert, low density,  
hydrophob character

Or not....

Microplastics

# INdIGO : Innovative fishing Gear for Ocean

## 10 French and English partners

### 6 research institutions

University of Southern Brittany,  
University Plymouth,  
University of Portsmouth, IFREMER,  
CEFAS, SMEL

### 4 private partners

NaturePlast, Filt, IRMA, Marine South East

## European funding



- Project funded by the European Regional Development Fund (ERDF)
- Interreg France (Channel) England programme



Total : 4,2M€ - ERDF : 2,9M€



September 2019 - June 2023



# INdIGO : Innovative fishing Gear for Ocean

## Global approach

- Consider the fishing gear from its conception to its end of life (work on both biodegradability and recycling).
- Multidisciplinary approach for development (technical, economic and human aspects)

## Main objectives



Reduce marine plastic pollution generated by fisheries and aquaculture.

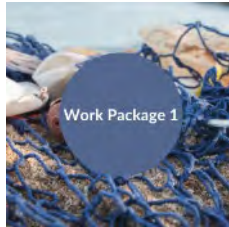


Develop biodegradable fishing gear with a finite lifespan to benefit the marine environment.

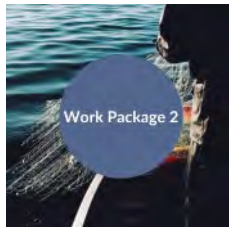


Identify fishing gear already lost and improve the recycling of fishing gear at the end of its life.

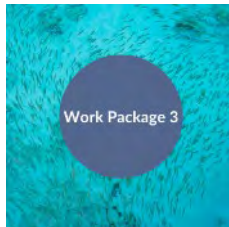
# WORK PACKAGES



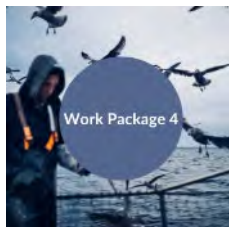
Situational analysis of pollution generated by the use of plastics in the fishing and aquaculture industry.



New fishing gear development.



Study of marine ageing and environmental impact of the new material.



Psycho-ergonomic approach : study of acceptability and acceptance.



Work Package  
COMMUNICATION



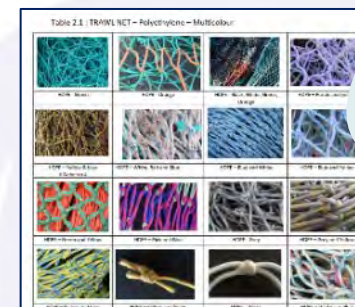
Work Package  
MANAGEMENT





## Situational analysis of pollution generated by the use of plastics in the fishing and aquaculture industry.

- ✓ Improve knowledge on the type of fishing gear used in the Channel area.
- ✓ Analyse fishermen's views on end-of-life gear and ALDFG.
- ✓ Know more about pollution from fishing gear found on the coast and at sea.
- ✓ Understanding the economic impact of ALDFG and ghost fishing in the Channel area.
- ✓ Carry out a market analysis to investigate the potential market for biodegradable gear.
- ✓ Develop and promote best practices for collecting and recycling used fishing gear.



Characterisation of polymers in fishing gear



Fish&Click citizen science programme



Harbour guide



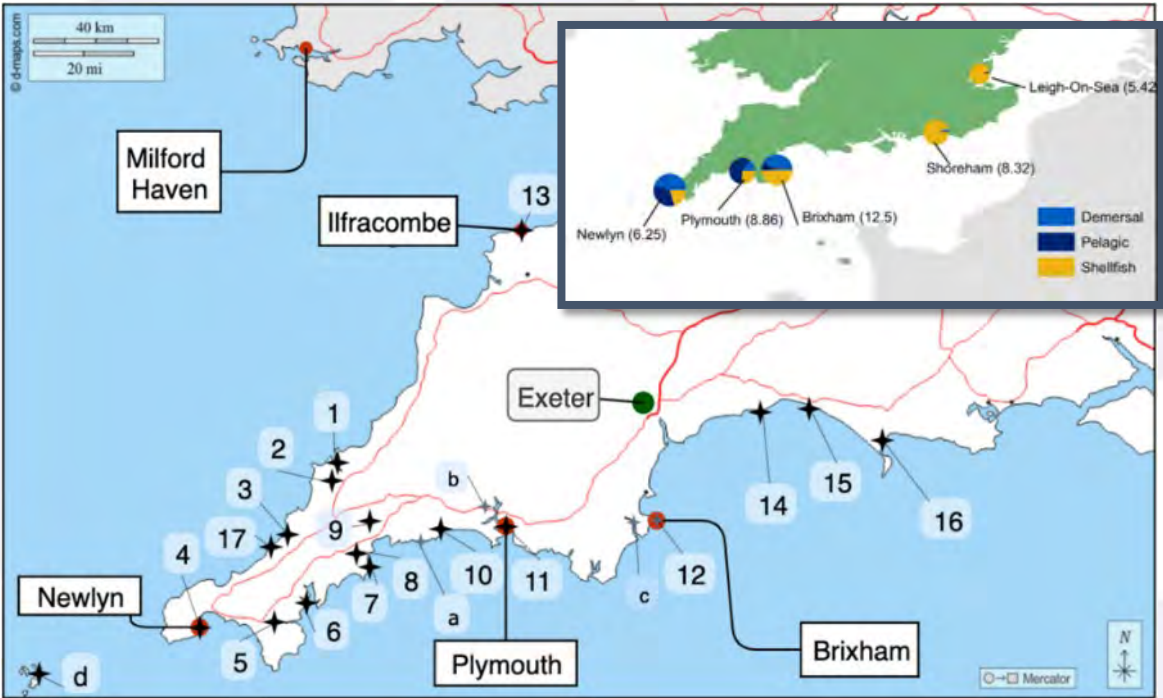


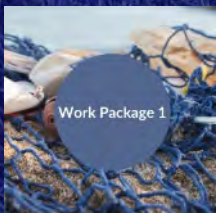
# WP 1 – Focus on collecting & recycling

## COLLECTING & RECYCLING fishing gear – UK

- 6 administrative ports in the FCE region, fleet of 1860 vessels below 10m and 300 over 10m in length
- Regional variation in landings – gillnet concentrated in Newlyn, trawl in Plymouth and Brixham
- 40 harbours are recycling fishing gear; rigid / gillnet / trawl / ropes

Recycling – English Channel Region	tonnes
Quantity of waste nets per year	345
Current total waste gear processed	38
Est of gillnet generated at Newlyn	61
Gillnet sent to Aquafil	25





## WP 1 – Focus on collecting & recycling

### COLLECTING & RECYCLING FISHING GEARS IN FRANCE

- 3 regions in project's area: a fleet of 1851 ships (48% of french fleet)
- Specificity of fishing trades by region
- 117 fishermen interviewed to find out about their fishing activities, waste production and their management.
- 19 invested ports in recycling of fishing gears and mainly in gillnet recycling
- Dismantling of gillnet easier than the others fishing gears
- Mechanical recycling to produce granulates
- Main outlet for gillnet: Fil et Fab in Brittany (130 tons)
- Trawl's collection in ports of South Brittany, Normandy, Hauts de France and outlet to Plastix (DN)
- Others outlets: Chicolino (SP) + Aquafil (SI)



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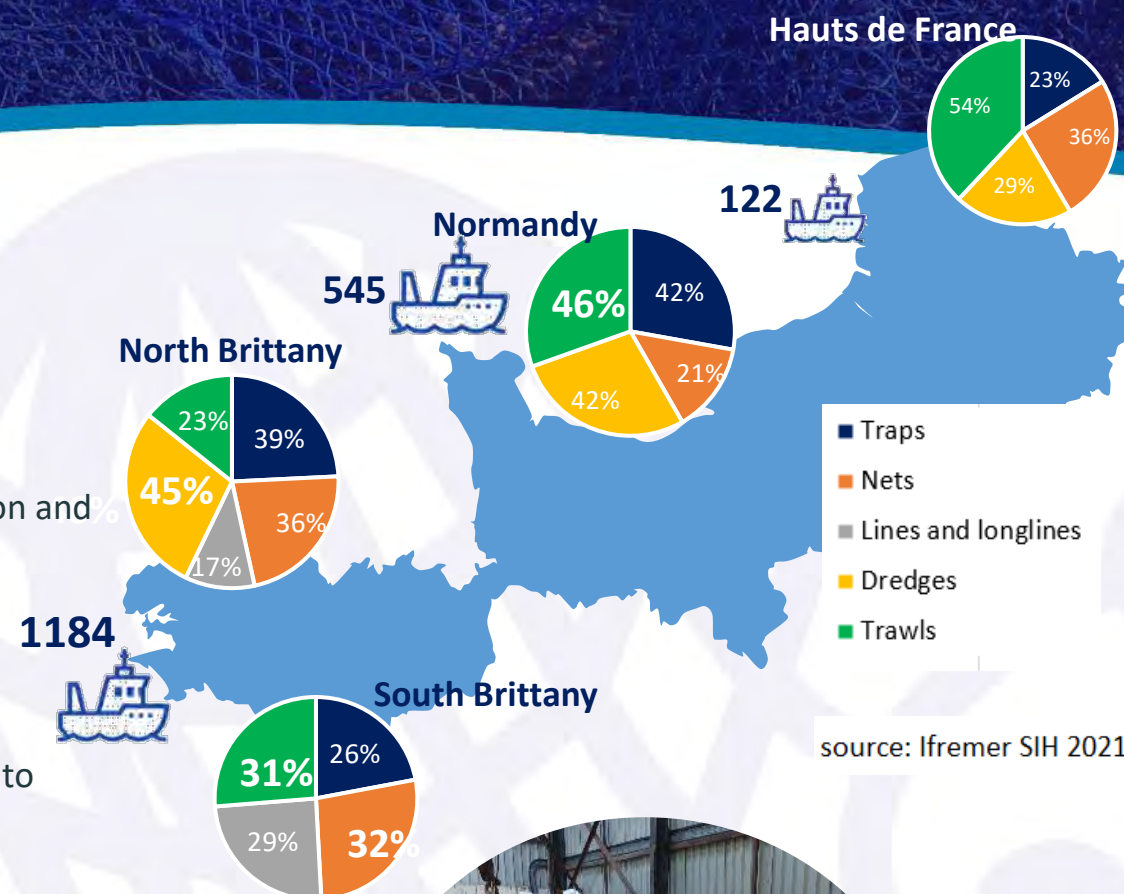
INnovative fishing Gear for Ocean



Before



After



source: Ifremer SIH 2021



## WP 1 – Focus on collecting & recycling



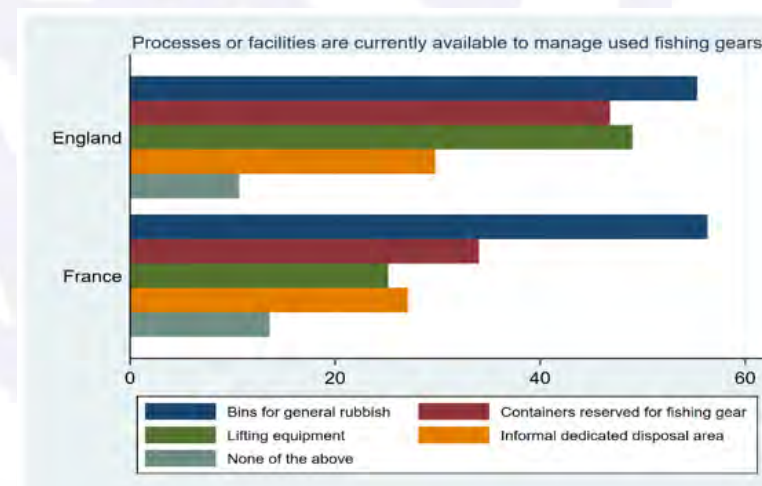
- Development of **raising awareness initiatives** specific for vessels owners and crews
- Fishers' **lack of awareness** of regulations or plans related to retrieved ALDFG EOL fishing gear

Results of the fishermen survey

Need for the **creation or improvement of waste collection facilities**

Capacity-building *plans /activities* for fishers focusing on used fishing gear **sorting, separating different materials and disposal**

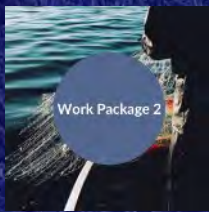
EOL fishing gear management **by country**



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INnovative fishing Gear for Ocean



## New fishing gear development.

Creation of prototypes of  
biodegradable fishing nets with  
controlled lifetime

### Biodegradables plastics



Two plastic formulations  
with different lifetime

- Developing innovative biodegradable nets for fishing and aquaculture sectors  
→ Fully compliant with the requirements of professionals

#### MONOFILAMENT



#### 1 fishing net



*Fine net (prototype)*



#### MULTIFILAMENT

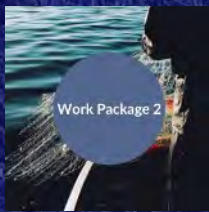


#### 1 aquaculture net



*Mussel net (prototype)*





## New fishing gear development.

### MONOFILAMENT

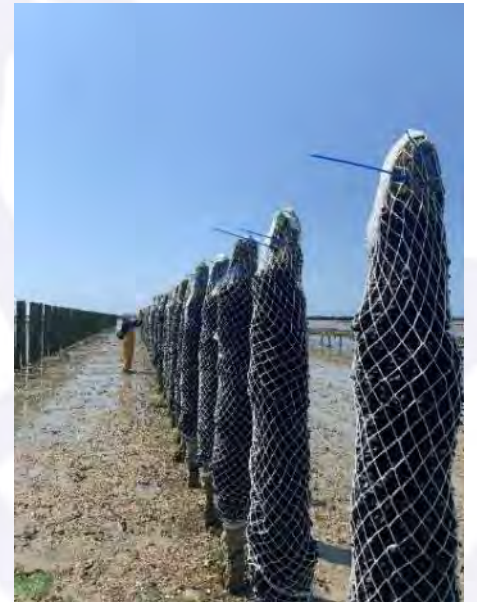
fishing net

- Mechanical properties are still too weak.
- Research need to continue in order to develop monofilaments that are strong enough.

### MULTIFILAMENT

aquaculture net

- The mussel nets were installed on 5 June at the Pointe d'Agon in Normandy.
- Samples will be collected every 15 days to test degradation and resistance.



## Study of marine ageing and environmental impact of the new material.

Study of the degradation  
of biodegradable nets in  
the marine environment



*In situ / in vitro ageing*

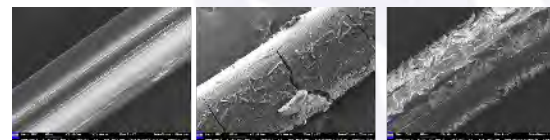


Study of the impact of  
biodegradable nets on the  
marine environment



*Ecotoxicological assessment*

*Biodegradability evaluation*



Control (T=0)

Aged in air (T=3 months)

Aged in seawater (T=3 months)



## Psycho-ergonomic approach : study of acceptability and acceptance.

**73 % of fishermen interviewed would be interested in using biodegradable fishing gear in the coming months**

- ✓ **Acceptability study of more sustainable fishing practices.**
- ✓ **Net prototype appropriation.**

### **PSYCHO-ERGONOMIC APPROACH**

Integrate the end users at each stage of the development of the new fishing gear in order to :

- ✓ strengthen their interest and awareness of the environment (psycho)
- ✓ to foster their appropriation by obtaining a product that really corresponds to their needs (ergonomic).

→ **PhD thesis defended on 12 June**

**Initiating the ecological transition process in small-scale fishing: The contribution of a multi-level approach to the implementation of a biodegradable fishing net**



# INdIGO learnings



## Industrial network

There is a lack of an industrial network at European level for the production of nets but also of local companies able to recycle them.



## Research & innovation

Research into biodegradable plastics is in its beginning stages and needs to be continued as it may be one of the solutions to reducing plastic at sea.



## Coordination of stakeholders

Researchers, fishermen, port authorities, fishing gear manufacturers and marketers, recyclers and public decision-makers. There are best practices, and it may be necessary to coordinate all initiatives at the territorial level.

## Financial support

The continuation of the initiatives undertaken requires financial support.



## Main concerned

Fishermen are open to change and to more virtuous practices. They must be supported, be the target of awareness-raising, and be placed at the centre of the transitions.





<https://indigo-interregproject.eu/en/deliverables/>

## Deliverables

Find here the deliverables produced by the INDIGO project in the different work packages.

### WORK PACKAGE 1 - Situational analysis of pollution generated by the use of plastics in the fishing and aquaculture industry.

#### Inventory of plastics used in fishing and aquaculture industry

The objective of this study is to assess the current situation regarding the pollution generated by the use of plastics in the fishing industry, in order to propose a relevant alternative solution adapted to the needs of the end-users.



[Download the deliverable](#)

#### Fish & Click : Website and mobile application and mapping lost fishing gears

Fish & Click is programme to collect data on abandoned, lost and discarded fishing gear. Walkers, divers, boaters and fishermen are invited to share their observations.



#### Good Practice Guide

Good practices on the management of end-of-life fishing gear for fishers, harbour and the general public. Have a look at the materials produced by the University of Plymouth and by Smel.

[Link to good practices](#)

#### Market analysis

The purpose of the market analysis is to understand the "potential market" for biodegradable fishing gear (BFG) in the programme area. The potential market is



## 19 DELIVERABLES

T1.1.1 Inventory of plastics used in fishing & aquaculture industry

T1.1.2 Mobile application and website mapping lost fishing gears – Fish&Click

T1.1.3 Impact of fishing gear on marine ecosystem

T1.2.1 Good practice guide on collecting & recycling fishing gear

T1.3.1 Specification of the prototypes

T1.3.2 Market Analysis

T2.1.1 The two selected formulations

T2.1.2 Semi-finished products developed at laboratory scale

T2.2.1 The two prototype nets

T2.3.1 Economical report concerning the definition of costs and cost-benefit analysis

T3.1.1 Report on the end-user feedback regarding the prototypes

T3.1.2 Technical Report on the study of ageing of the new fishing gear

T3.2.1 Report on the results of the biodegradation and ecotoxicity tests

T3.3.1 Life Cycle Assessment of the new fishing gear

T3.3.2 Environmental impacts of the new fishing gear according to the end-of-life scenarios

T4.1.1 Surveys and interviews regarding the acceptability study of more sustainable fishing practices

T4.1.2 Acceptability : Results and Recommendations

T4.2.1 Reports of the study of a net prototype appropriation

T4.2.2 Acceptation : Results and Recommendations

# INDIGO PICTURES



# To be kept informed

INdIGO Closing event  
22/03/2023



Website <http://indigo-interregproject.eu/>



@INdIGO\_interreg



INdIGO Interreg Project



Indigo - Innovative Fishing Gear for Ocean



indigo.interreg.project



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INnovative fishing Gear for Ocean



[https://www.youtube.com/channel/UCZbeTSkIEFi\\_q2m6DgwMPVg](https://www.youtube.com/channel/UCZbeTSkIEFi_q2m6DgwMPVg)

## What is biodegradable fishing gear in the marine environment?



***Thank you for your attention!***

***For further information, please contact:***

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