



ParaFishControl



Towards an improved image of North European aquaculture products regarding food safety

ParaFishControl Workshop “North European Fish Parasite Management Strategies in Aquaculture Farms”

Berlin, 9th October 2019



Ariadna Sitjà-Bobadilla O.B.

Miguel Ángel Pardo



Challenge and Impact

➤ Challenge

- It is generally assumed that farmed fish products have a very low or null prevalence of these helminths
- However, this assumption has not been demonstrated scientifically



➤ Impact

- Improve image and competitiveness of European aquaculture sector
- Increase the commercial value of fish products
- To avoid costs for control (freezing) of zoonotic parasites in farmed fish products to be consumed raw or undercooked

Our approach and our team

Food Risk Analysis

To reduce the undesirable presence of zoonotic helminths in aquaculture fish products



RISK ASSESSMENT

Parasite infection: Marine and freshwater surveys
Allergy: Allergenicity tests (*in vivo*, *in vitro* and *ex-vivo*)

RISK MANAGEMENT

Identification of Critical Points with HACCP risk tool
Recommending appropriate prevention and systematic control solutions

RISK COMMUNICATION

Exchanging information throughout interested parties
Propose a “Parasite Low label”
Produce a “Good Practice Handbook for Minimum Parasite Infection”
Comprehensible and translational Visual Thinking Strategy

Our proposed solution (I)

2016-2018

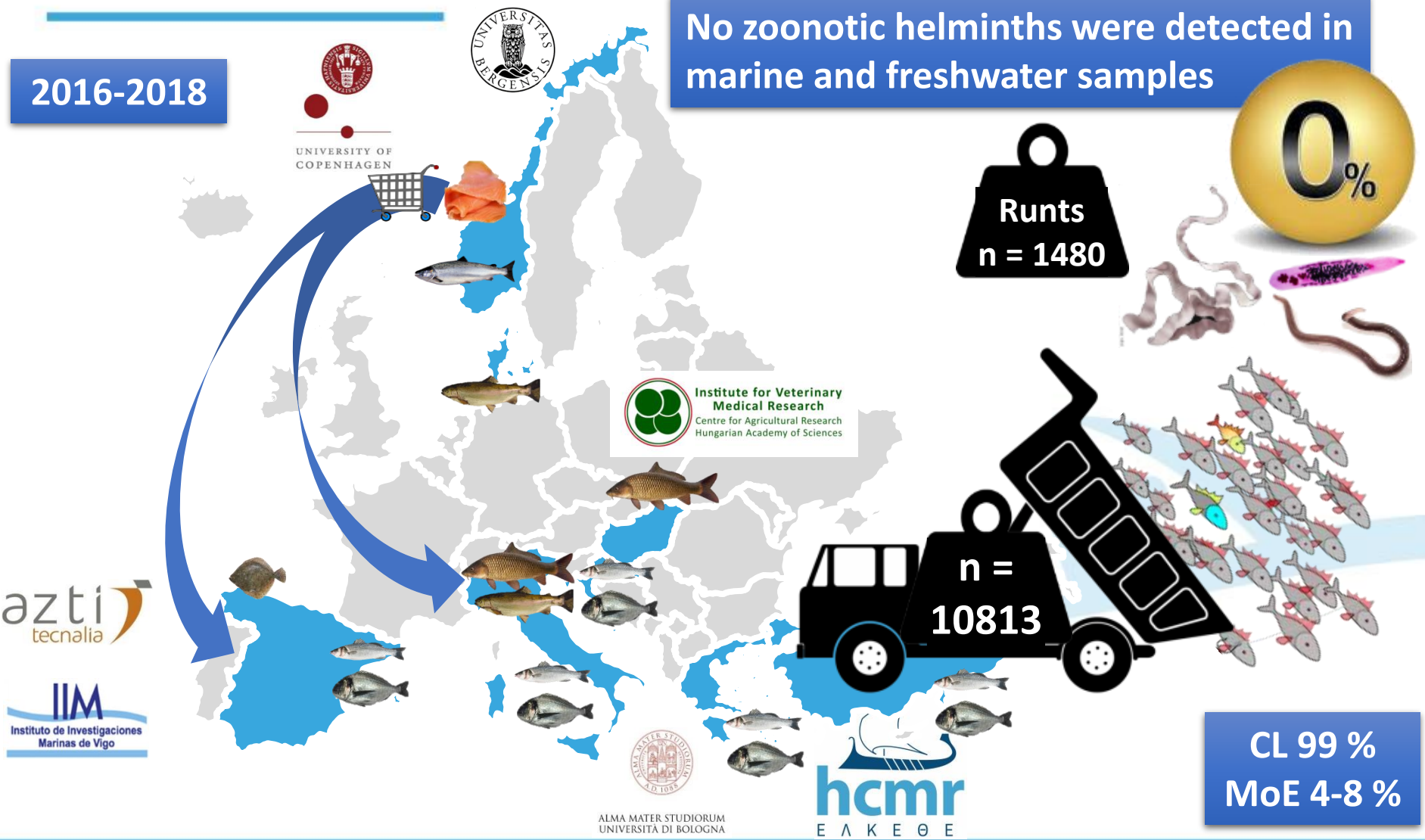
No zoonotic helminths were detected in marine and freshwater samples

0%

Runts
n = 1480

n = 10813

CL 99 %
MoE 4-8 %



azti
tecnalia







IIM
Instituto de Investigaciones
Marinas de Vigo

ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA

hcmr
ΕΛΚΕΘΕ



Our proposed solution (II)

Fish species	Production system (*)	Adult feeding (*)	Susceptible for parasitic infection in wild environments (*)	Zoonotic parasites found [Monitoring data available]	
				in harvest quality fish	in runts
 Atlantic salmon	Cages	Pellets	<i>A. simplex</i> , <i>P. decipiens</i> , <i>Metagonimus</i> spp.	None: this work, EFSA 2010, Skov 2009, Inoue 2000, Wooten 2010, Levsen 2016	A. simplex: Levsen 2016, Mo 2014, Crotta 2016
 Gilthead sea bream	Cages/ ponds	Pellets	<i>A. simplex</i> , <i>A. pegreffii</i> , <i>P. decipiens</i> , <i>Hysterothylacium</i> spp.	None: this work, Apromar 2015	None: this work
 European sea bass	Cages/ ponds	Pellets	<i>A. simplex</i> , <i>A. pegreffii</i> , <i>P. decipiens</i> , <i>Hysterothylacium</i> spp.	None: this work, Apromar 2015 A. pegreffii: Cammilleri 2018	None: this work
 Turbot	Indoor tanks	Pellets	<i>A. simplex</i> , <i>P. decipiens</i>	None: this work, Apromar 2015	Unknown
 Rainbow trout (**)	Cages/ ponds	Pellets	Diphyllobothriid, Opisthorchioidea	None: this work	None: this work
 Common carp	Ponds	Pellets	<i>C. sinensis</i> , <i>O. felineus</i> , <i>M. takahashii</i> , <i>H. taichui</i>	None: this work	Unknown

THE OVERALL RISK OF PARASITE INFECTION IN THE SELECTED FARMED FISH SPECIES IS NEGLIGIBLE

(*) source EFSA Report; (**) including marine rainbow trout

Our proposed solution (III)



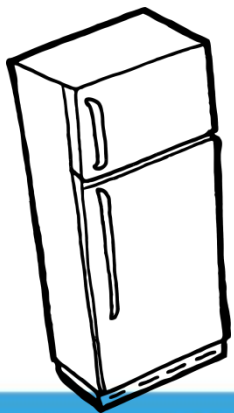
THE OVERALL RISK OF PARASITE INFECTION IN THE SELECTED FARMED FISH SPECIES IS NEGLIGIBLE

- Although the examination of all the runts in the current survey has been negative for zoonotic helminths, we recommend to discard runts (as already is done in many farms) from the processing line to the market
- Fish feed could be a potential source of allergenic peptides from zoonotic fish parasites. Although this risk is beyond the scope of this study, it is interesting to point that future studies are needed to evaluate if these parasite allergens can really pass from feeds to fillets and induce allergenic reactions in consumers, and if the potential can be decreased by the replacement of fish meal by other protein alternative sources



Expected benefits for the industry ParaFishControl

- Improvement of image of European Aquaculture after assessing the negligible the zoonotic risk due to these parasites (as already done for Atlantic salmon)
- Increasing the commercial value of fish products from aquaculture
- Possible exemption from the freezing treatment which is mandatory for fish products intended to be consumed raw/undercooked (as already done for Atlantic salmon) following the Commission regulation (EU) No 1276/2011



Fresh fish
from farms
Never frozen

SALMONE AFFUMICATO
NORVEGESE
Naturalmente ricco in Omega 3

SALMONE AFFUMICATO
NORVEGESE
co in Omega 3

LAVORATO SOLO
DA PESCE
FRESCO E MAI
CONGELATO

LAVORATO SOLO
DA PESCE
FRESCO E MAI
CONGELATO

SALATURA
A SECCO

50g e

Il Salmone Affumicato Norvegese proviene da allevamenti situati nelle acque fredde e profonde dei fiordi norvegesi, è selezionato con cura e lavorato da pesce fresco mai congelato con sapienza artigianale. Viene poi rifilato per eliminare le parti meno nobili del filetto e salato a secco. Successivamente affumicato, secondo tradizione, per combustione naturale del legno di faggio che conferisce al prodotto il caratteristico profumo e sapore. Il salmone, **naturalmente ricco di Omega 3** e con un alto contenuto di proteine, è un alleato importante da inserire in una dieta varia ed equilibrata. È ideale come ingrediente per primi piatti raffinati e perfetto come antipasto. Provalo marinato con olio, limone e pepe verde o rosa, con crostini caldi e guarnito con ciuffetti di aneto.

SALMONE NORVEGISE AFFUMICATO A FETTE.
INGREDIENTI: salmone. Salmone affumicato in Norvegia 97% sale.

DA CONSUMARE ENTRO: vedere la data riportata sopra.

CONSERVAZIONE: conservare in frigorifero da 0°C a +4°C e consumare entro 7 giorni dall'apertura. Prodotto confezionato sotto vuoto: non tirare la confezione.

MODALITÀ DI PREPARAZIONE: si consiglia di aprire la busta 15 minuti prima di consumare il salmone.

AVVERTENZE: può contenere occasionalmente krill.

50g e

**SALMONE AFFUMICATO
NORVEGESE**
Naturalmente ricco in Omega 3

VALORI MEDIE	Per 100g di prodotto
ENERGIA	539
GRASSI	15,2
di cui Acidi grassi saturi	1,5
CARBOIDRATI	0,1
di cui Zuccheri	0,1
FIBRE	0,1
PROTEINE	29,1
SALE	3,5

Contenuto medio in acidi grassi Omega 3 (EPA + DHA) in % di prodotto: 0,2%

Current status and next steps

A VOLUNTARY CONTROL SYSTEM (VCS) IS UNDERGOING

VCS: based on a certification aimed at the aquaculture sector, improves the profile of aquafarming businesses which, in addition to implementing measures to prevent the presence of anisakis, implement an exhaustive analytical control plan that allows them **to confirm that aquaculture products do not represent a health hazard regarding to the presence of zoonotic parasites**

This **certification** includes:

- Sampling plan
- Externals (single annual) and internal audits (conducted throughout the year)
- Exhaustive analytical plan (by Real Time PCR)
- Auditing documental control (registers, batch control, claims management)
- Etc...



THANKS TO



Kurt Buchmann

UNIVERSITY OF
COPENHAGEN



ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA

**Marialetizia Fioravanti
Monica Caffara
Andrea Gustinelli**



**Nagore Egurrola
Mari José Sierra
Amaia Mendizabal
Begoña Landajo
Alberto González de Zarate**



George Rigos



**Institute for Veterinary
Medical Research**
Centre for Agricultural Research
Hungarian Academy of Sciences

**Csaba Szekely
Gábor Cech**



**Santiago Pascual
Ángel F. González**



**Frank Nilsen
Aina Overgard**



Current status and next steps

A VOLUNTARY CONTROL SYSTEM (VCS) IS UNDERGOING

Under this future scenario and to enforce the certification of aquaculture products we have developed...

...a portable kit to identify the presence of *Anisakis simplex*



Challenge and Impact

➤ Challenge

- ***A. simplex*** is the second most predominant biological hazard
- A **portable and rapid** method to identify/manage the presence of Anisakis as “a point of care” solution
- This solution could become a **valuable tool** in a certification system (VCS)

➤ Impact

- Identify the contamination with ***Anisakis in the field*** (feeds, water intake, runts, sneakers, etc.)
- To **reduce the costs** linked to fish inspections
- Make **decisions quickly**



Our approach and our team

4LAB
Diagnostics

FOODBORNE PATHOGENS

ANISAKIDS
PCR REAL TIME KIT

Test kit for the qualitative detection of Anisakids DNA by PCR Real time

Product code: IC-02-1205 (25 tests) / IC-02-1207 (50 tests)



Available: Neither user friendly nor portable

Our approach and our team

In contrast to the PCR technology, in which the reaction is carried out with a series of alternating temperature steps or cycles, **ISOTHERMAL AMPLIFICATION** is carried out at a constant temperature, and does not require a thermal cycler

**Simply, low cost & portable
IN THE FIELD**



Our proposed solution (I)

RECOMBINASE POLYMERASE AMPLIFICATION (RPA)



**Isothermal
amplification**



Low cost



Fast



Portable



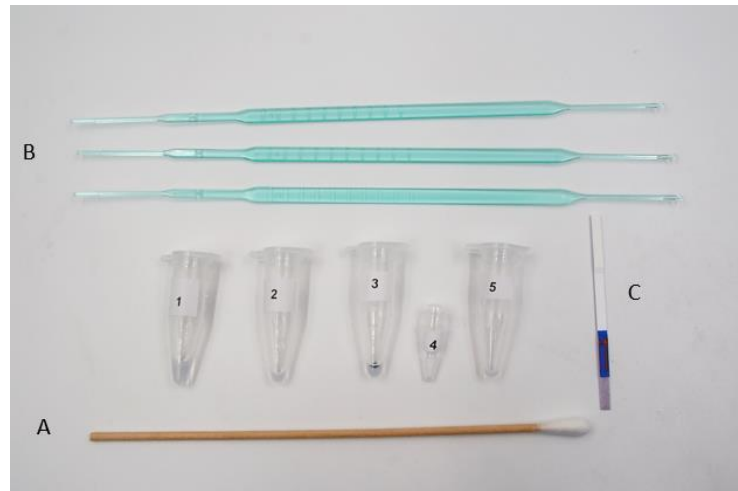
User friendly



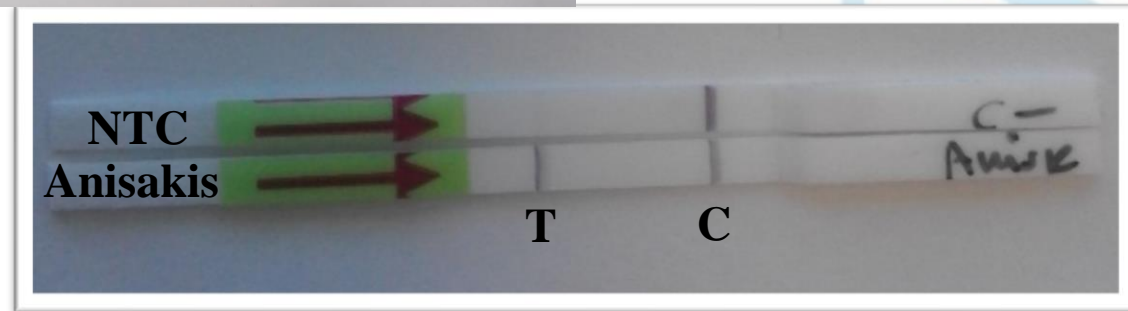
On site

Our proposed solution (III)

RAPID AND PORTABLE KIT BASED ON RPA TECHNOLOGY



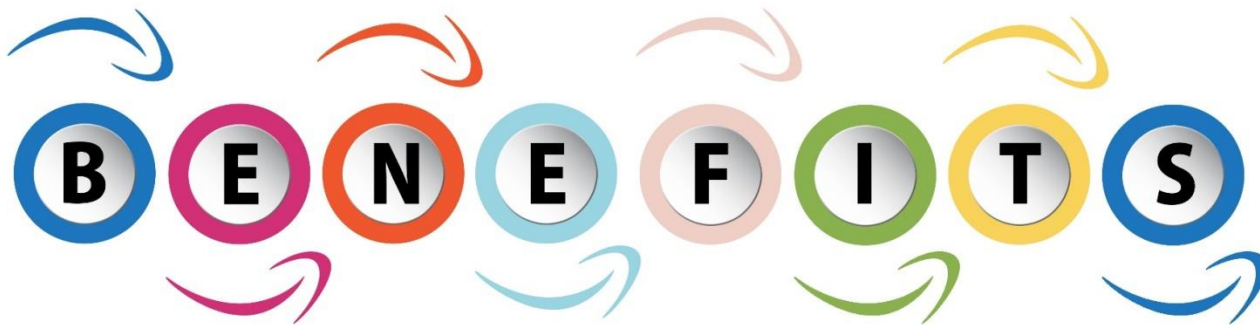
15 min
39°C



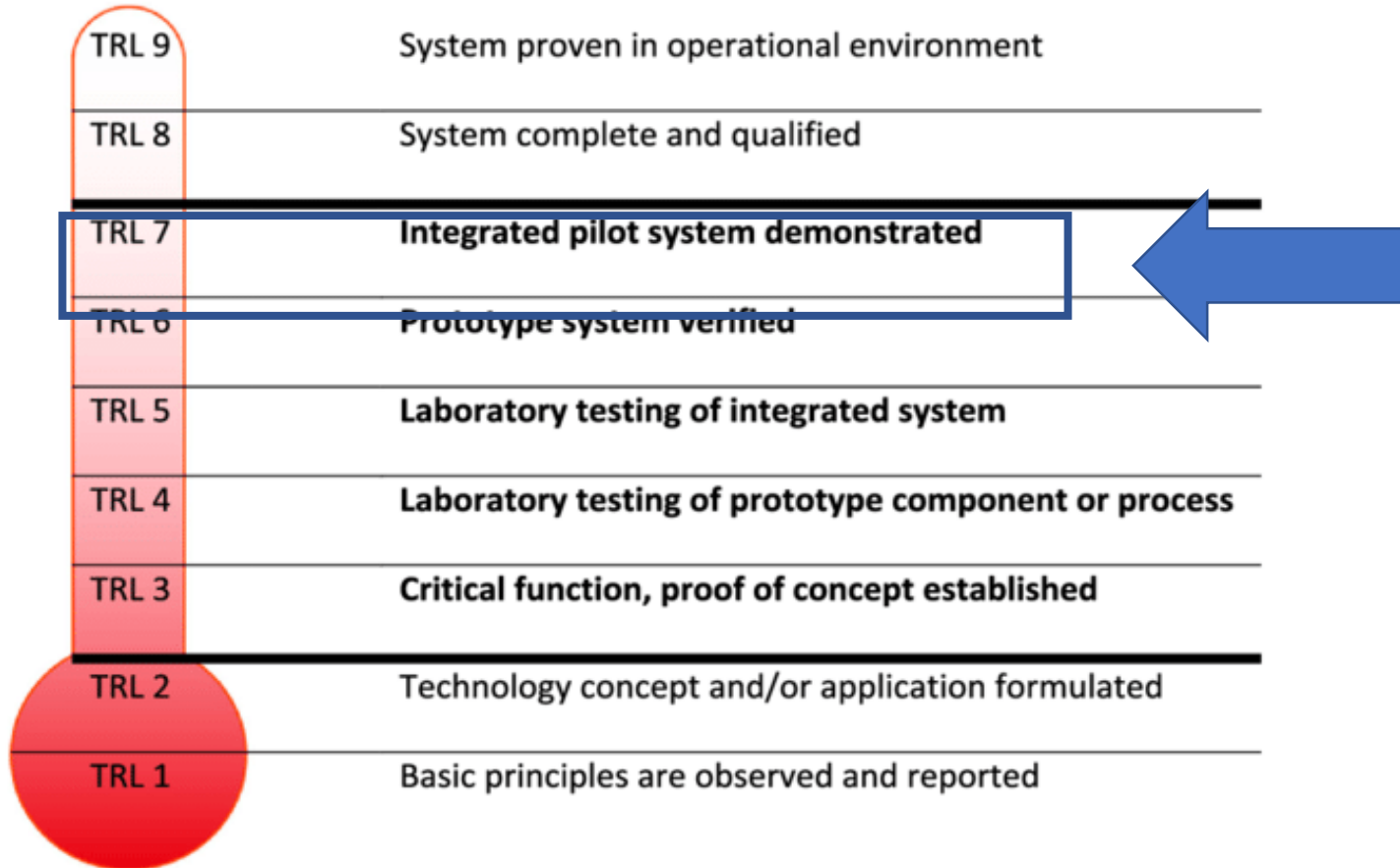
LF RPA Assay for the detection of *Anisakis simplex*: Test line (T); Internal Control line (C). Negative Template control (NTC)

Expected benefits for the industry

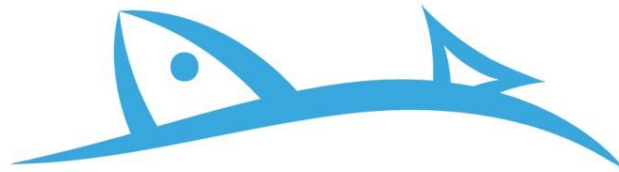
- Identify the contamination with *Anisakis* in the field (feed, water, runts, sneakers, etc...)
- Reduce the costs linked to fish inspections
- Make decisions quickly



Current status and next steps



Thank You



ParaFishControl

Miguel Ángel Pardo
mpardo@azti.es



 @parafishcontrol.eu

www.parafishcontrol.eu



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 634429. This output reflects the views only of the author(s), and the European Union cannot be held responsible for any use which may be made of the information contained therein.