

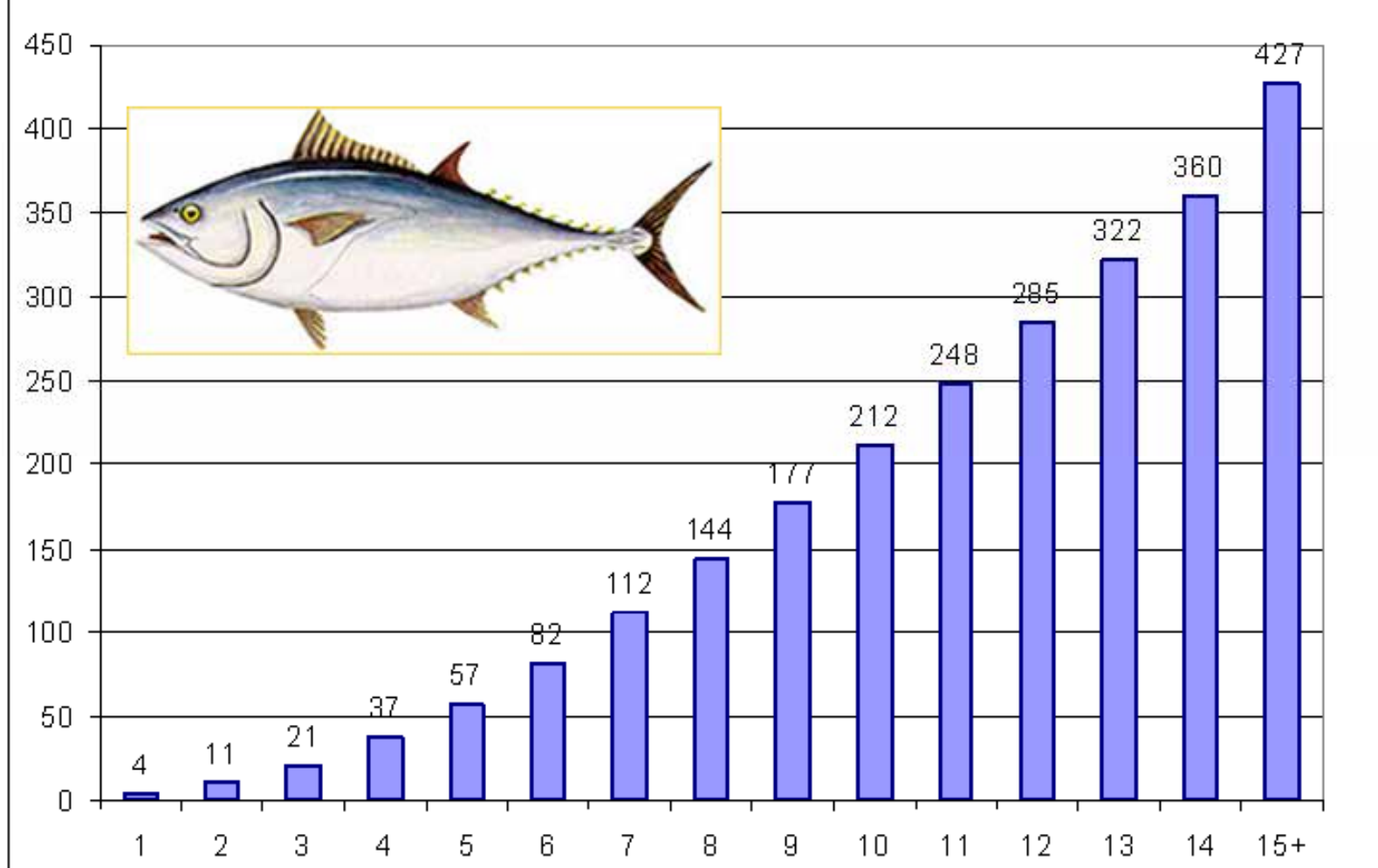
Large scale RTD facility to take tuna farming forward

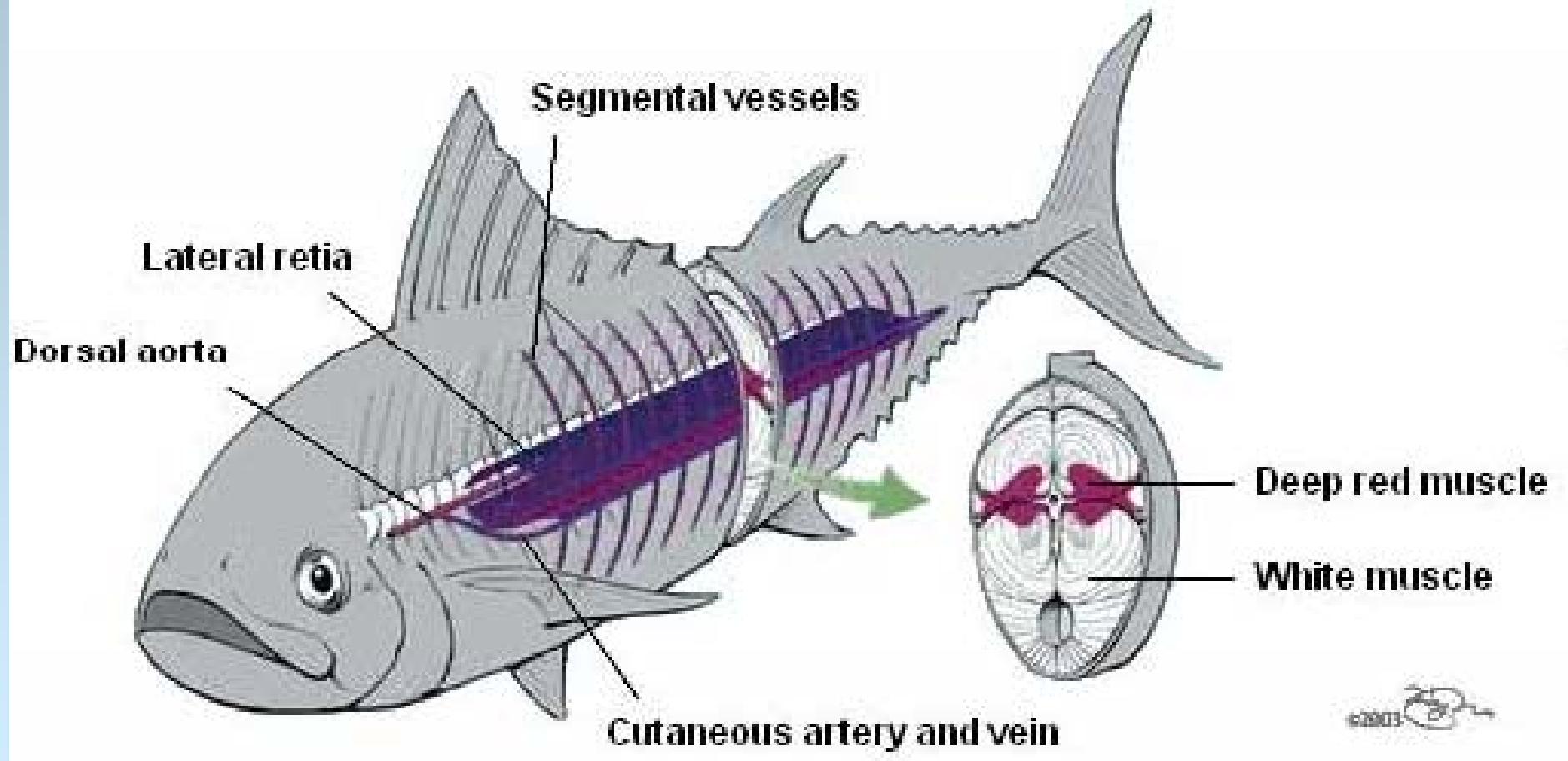
Fernando de la Gándara & Aurelio Ortega
Spanish Institute of Oceanography
IEO





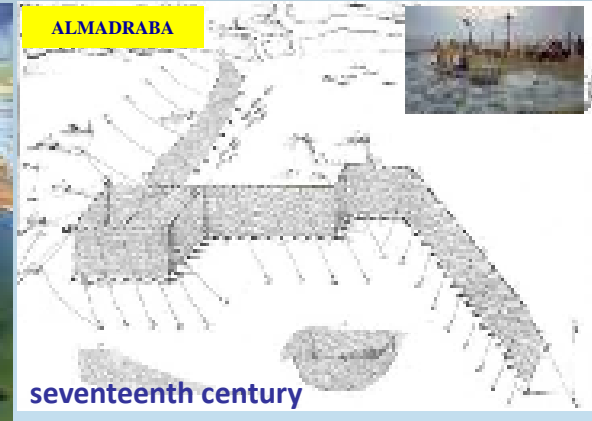
Bluefin tuna (*Thunnus thynnus*) growth







The fisheries

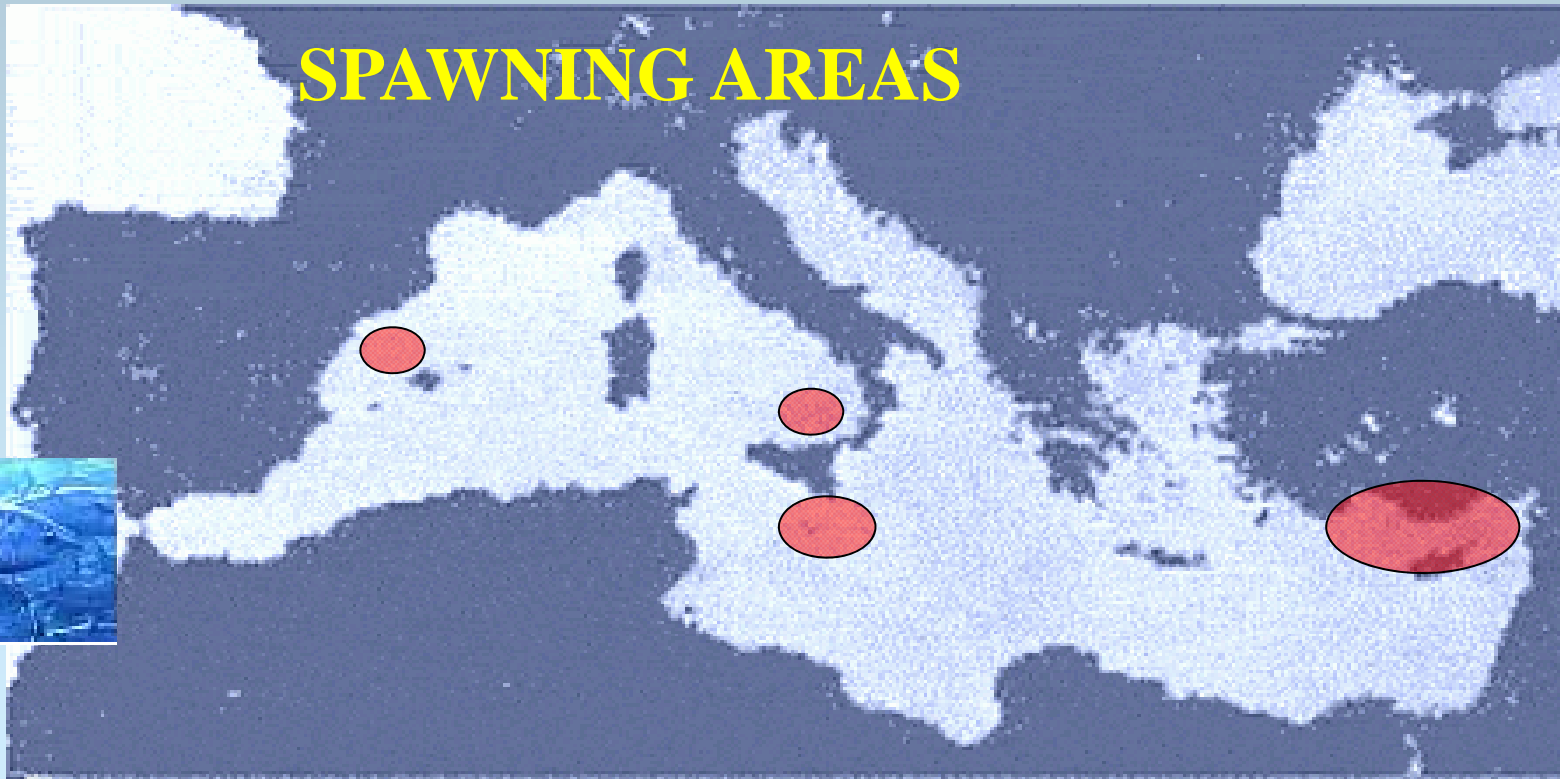


The fattening activity



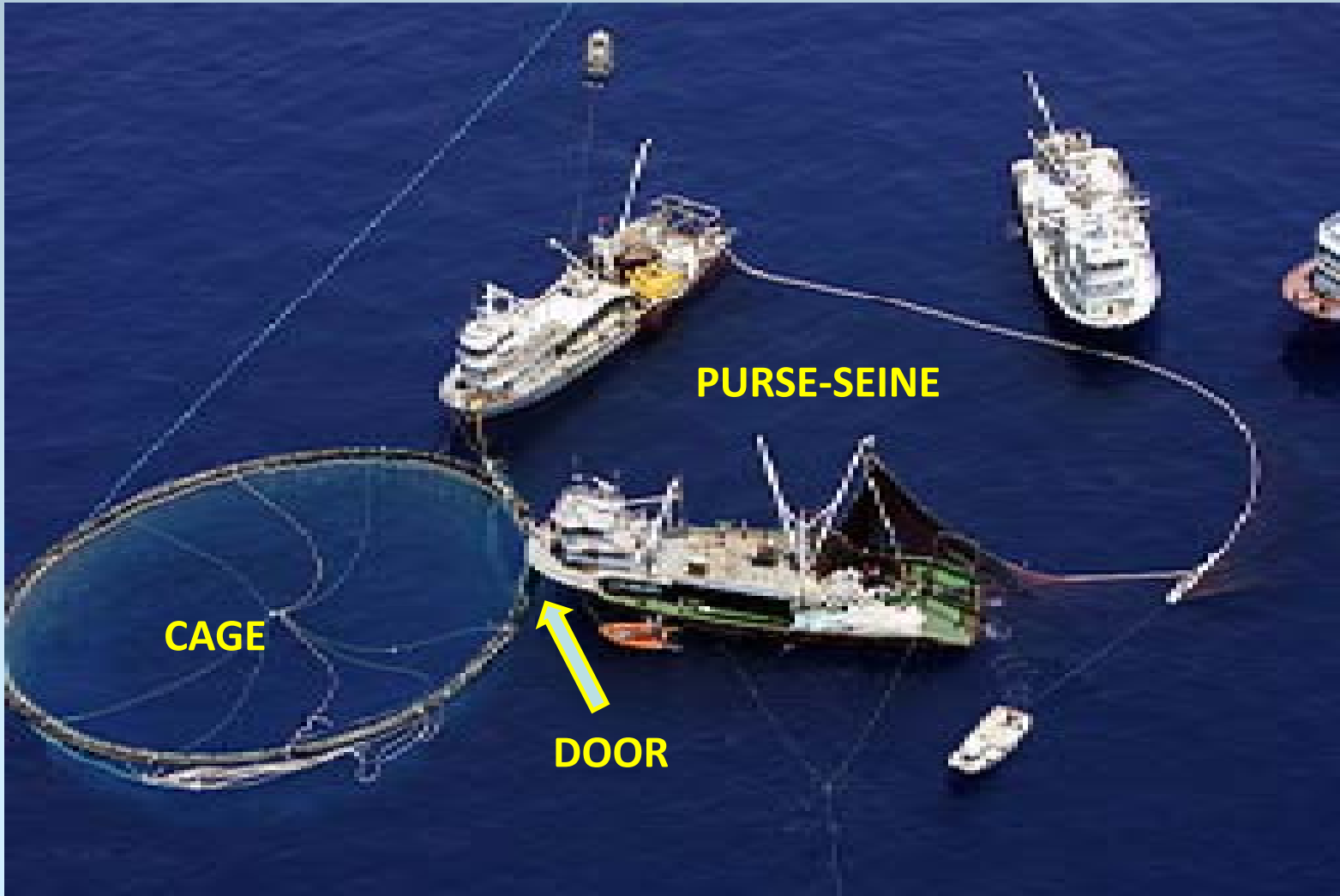
Capture

SPAWNING AREAS





Capture



Towing



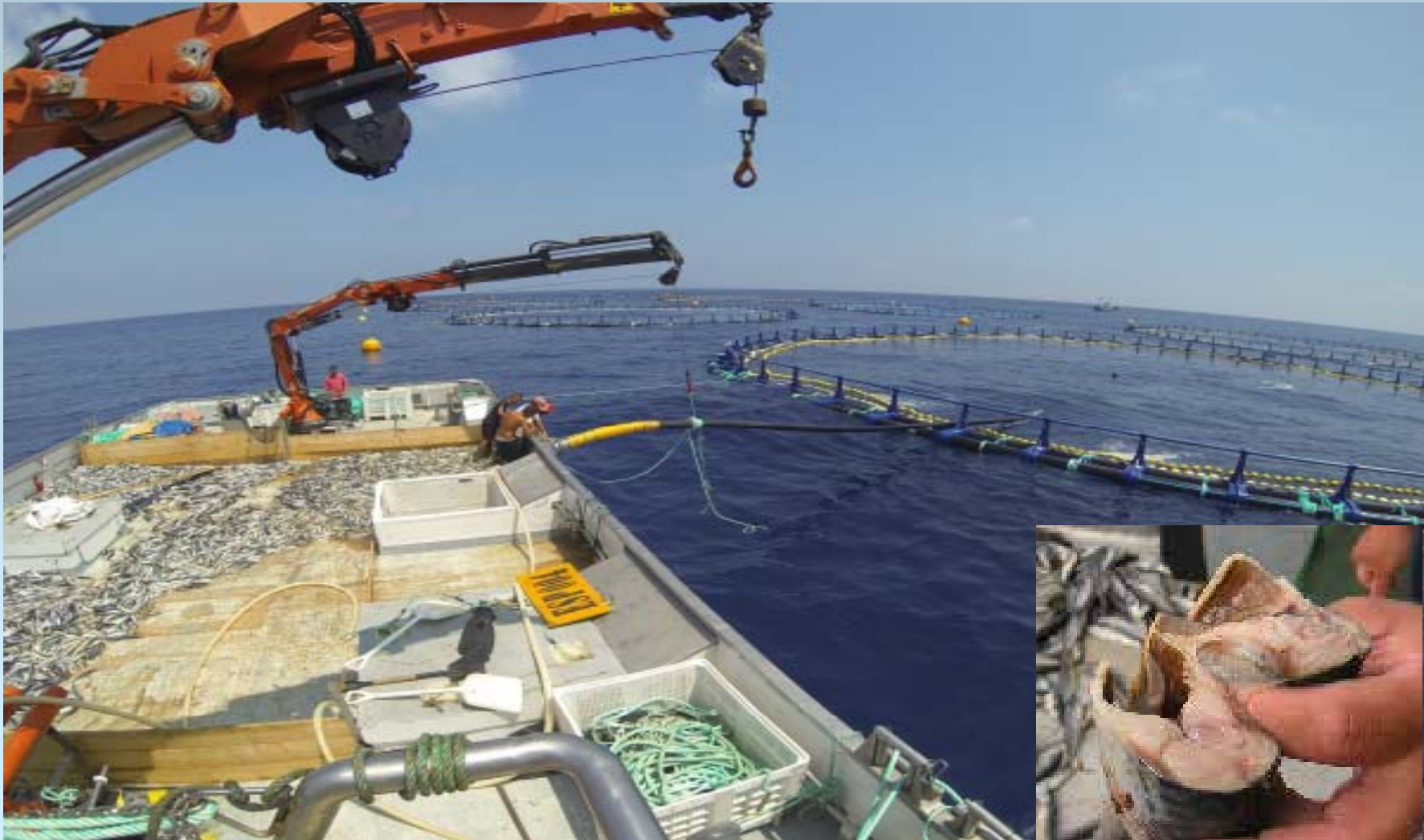
Towing



Farming -Fattening



Farming -Fattening



Slaughtering



Slaughtering



Marketing

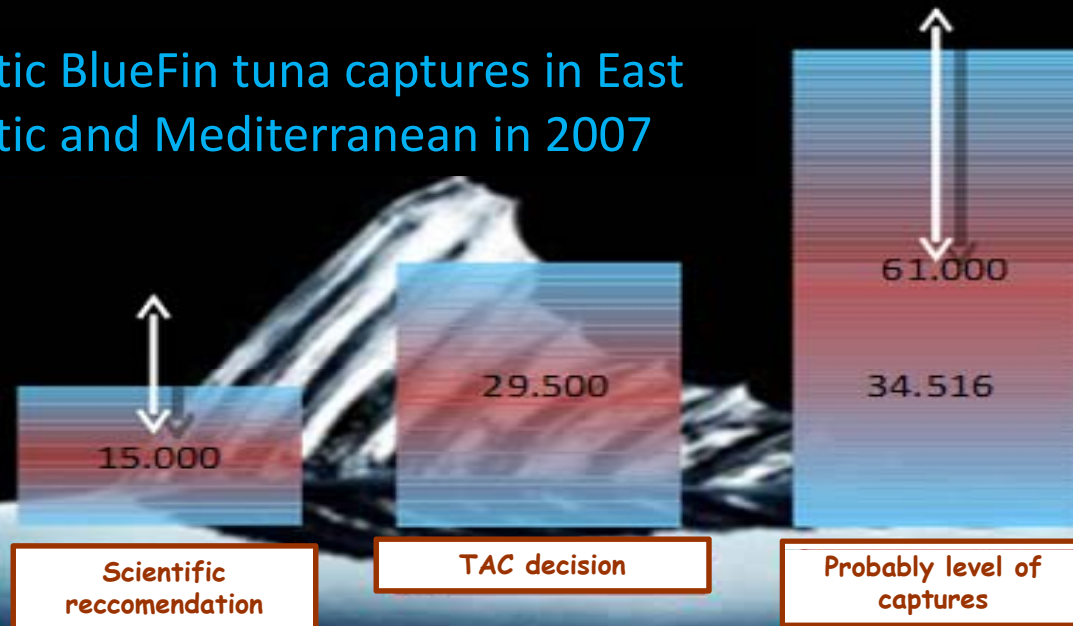


OVERFISHING

Josu Santiago. Balfego Conference 2012

A failure example

Atlantic BlueFin tuna captures in East Atlantic and Mediterranean in 2007



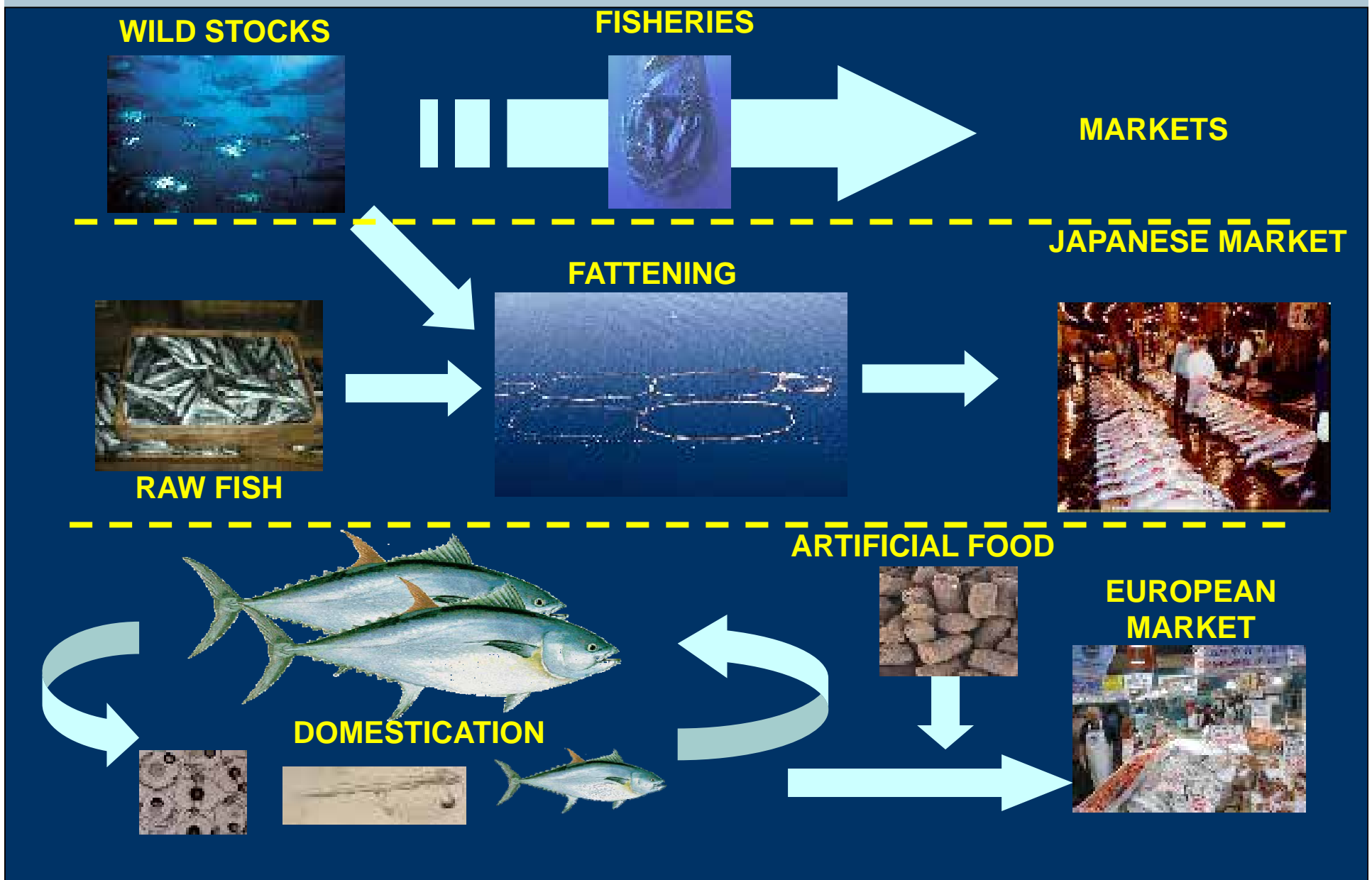


OVERFISHING



International Commission for the
Conservation of Atlantic tunas



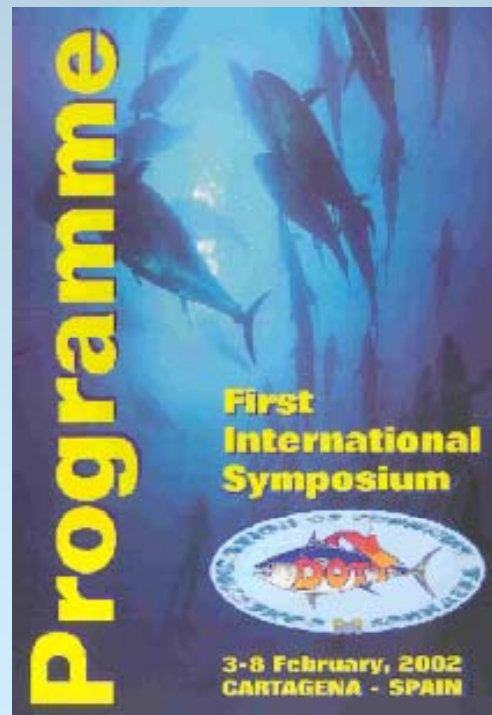


2001 - 2002

Domestication of *Thunnus thynnus*, the Bluefin Tuna. Strategies for European Development in the Context of a Global Market (DOTT, EU 5th FP)




IEO (Spain),
 UPCT (Spain),
 IOLR-NCM (Israel),
 IFREMER (France),
 WHOI (EEUU),
 ASETUN (Spain),
 CIHEAM (Spain),
 Univ. of Duesseldorf (Germany),
 IMBC (Greece),
 University of Cádiz (Spain)
 MCFS (Malta),
 ETSIN (Spain),
 CEASM (France),
 University of Bari (Italy)
 University of Padova (Italy)
 University of Stirling (UK)



Hillel Gordin
IOLR-NCM
(Israel)



Large scale RTD facility to take tuna farming forward
Fernando de la Gándara & Aurelio Ortega
Spanish Institute of Oceanography (IEO) 

CONCLUSIONS

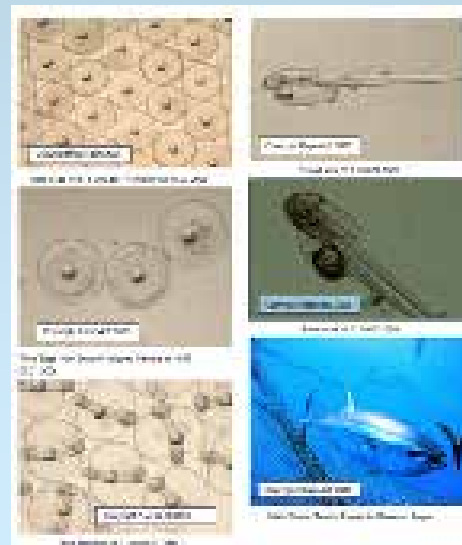
2002

1. It is believed that understanding all life cycle phases of the BFT will enhance the two facets of this species' interaction with Man;
 - a. Reducing the pressure on wild populations of the BFT
 - b. Setting the rational foundation for sustainable aquaculture and the domestication of this species.
2. These objectives will only be attained through the joint participation of fishing industry, farmers, management, regulators and scientists.
3. The DOTT conference recognizes the positive collaboration between the fishers and farmers, and calls for a stronger integration between the BFT fishing and the farming industries for future mutual benefit of all parties.
4. The DOTT conference recognizes that successful and sustainable aquaculture of BFT will only be possible if they are environmentally and socially acceptable.
5. Domestication of the BFT is a long, complex and expensive undertaking. Considering the trans-national dimensions of the problems, international strategic Research and Development efforts are called for as well as funding. The industry is seen as an active participant in the drive.
6. The Conference calls for the establishment of a European RTD “Virtual” Center for the BFT domestication, of which part will be a land-based facility for holding mature animals (BFT).
7. The DOTT Conference plenary session is calling on all relevant governments, under the leadership of the European Community, to support the drive for a sustainable development of the BFT domestication and farming, by creating a liaison committee which will facilitate interactions among the fishing industry, farmers, management, regulators and scientists.

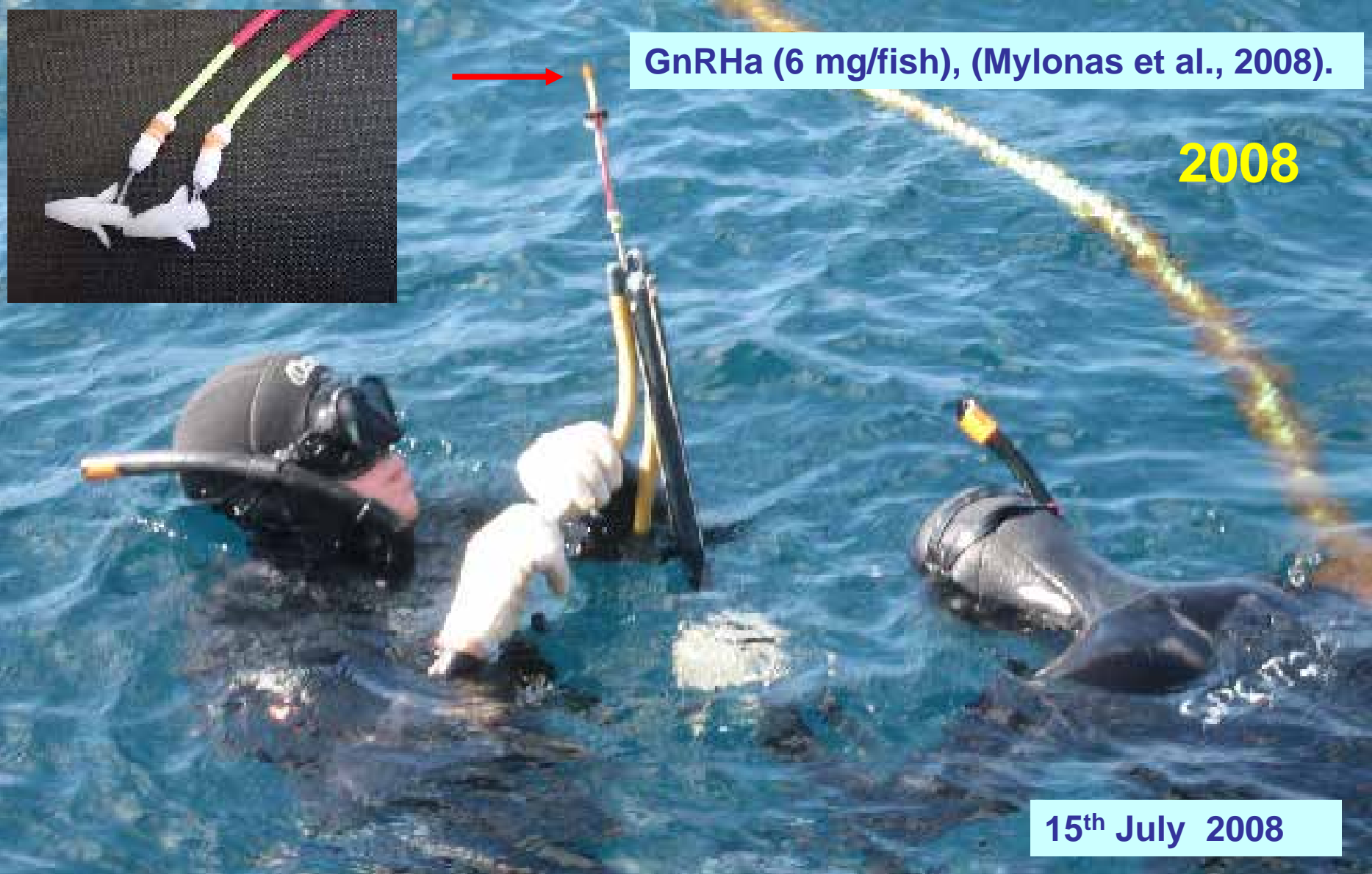
2003 - 2006

Domestication of *Thunnus thynnus*, the bluefin tuna
A Feasibility Study on its Reproduction in captivity
(REPRODOTT, EU 5th FP)

IEO (Spain),
 TUNA GRASO (Spain)
 IOLR-NCM (Israel),
 IFREMER (Francia),
 University of Cádiz (Spain)
 Univ. of Duesseldorf (Germany),
 MCFS (Malta),
 HCMR (Greece)
 University of Bari (Italy)




Antonio García
IEO



aquaculture
EUROPE 17


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October 17-20, 2017
Dubrovnik, Croatia

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Fernando de la Gándara & Aurelio Ortega
Spanish Institute of Oceanography (IEO) 





Large scale RTD facility to take tuna farming forward
Fernando de la Gándara & Aurelio Ortega
Spanish Institute of Oceanography (IEO) 


2003 - 2006

Domestication of *Thunnus thynnus*, the bluefin tuna
A Feasibility Study on its Reproduction in captivity
(**REPRODOTT**, EU 5th FP)

CONCLUSION

Although to further progress into the full domestication of BFT, all the researchers participating in the REPRODOTT project recognise that the need to improve the techniques developed and employed implies the availability of **specifically designed research infrastructure, which until now has been inexistent in Europe**; although not so in other parts of the world (Panama, Australia, Japan, Indonesia). An infrastructure of these characteristics would allow some of the difficulties found in the project to be resolved, such as the collection of eggs, and progresses in the development of adequate handling techniques for the tuna, which both result fundamental for a self-sustained BFT aquaculture and research.



Large scale RTD facility to take tuna farming forward
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Spanish Institute of Oceanography (IEO) 

2002 - 2006

RESEARCH INFRASTRUCTURES IN THE FP6 STRUCTURING THE EUROPEAN RESEARCH AREA

The term “research infrastructures” refers to facilities and resources that provide essential services to the research community in both academic and industrial domains.

TRANSNATIONAL ACCESS The objective of this scheme is to sponsor new opportunities for research teams to obtain access to individual major research infrastructures they require for their work. **Such infrastructures must be rare in Europe**, must provide a world-class service essential for the conduct of top quality research, and must have investment or operating costs that are relatively high in relation to those costs in their particular field. The infrastructures must also be able to provide adequate scientific, technical and logistic support to external, particularly first-time, users.

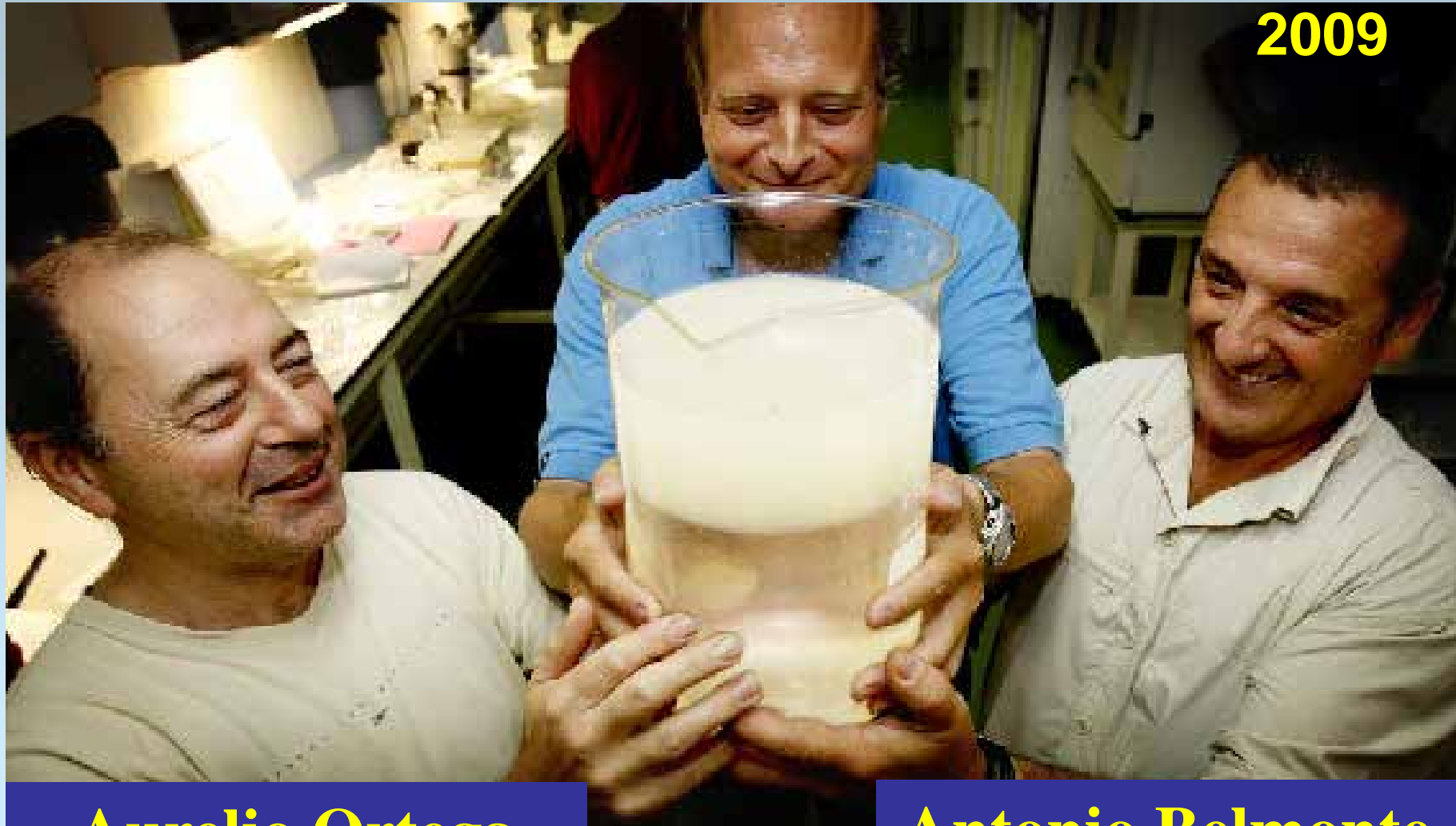
2008 - 2011

From capture based to SELF-sustained aquaculture and Domestication of bluefin tuna, *Thunnus thynnus*. (**SELFDOTT**) EU 7th FP

- Implementing the knowledge on the reproduction of bluefin tuna in captivity
- Establish the knowledge-base required for controlled development of eggs, larvae
- Establish the knowledge-base required for developing suitable and environmentally performing feeds

IEO (Spain)
 HCMR (Greece)
 IFREMER (France)
 University of Düsseldorf (Germany)
 TUNA GRASO S.A. (Spain)
 MRAE (Malta)
 IOLR-NCM (Israel)
 University of Cádiz (Spain)
 University of Bari (Italy)
 CNRS (France)
 SARC (Norway)
 University of Montpellier II (France)
 Malta Fishfarming Ltd (Malta)
 Caladeros del Mediterráneo (Spain)





2009

Aurelio Ortega

IEO

Antonio Belmonte

Tuna Graso S.A.


19th/06/2010 Spontaneous spawning - Egg collection



aquaculture
EUROPE
17

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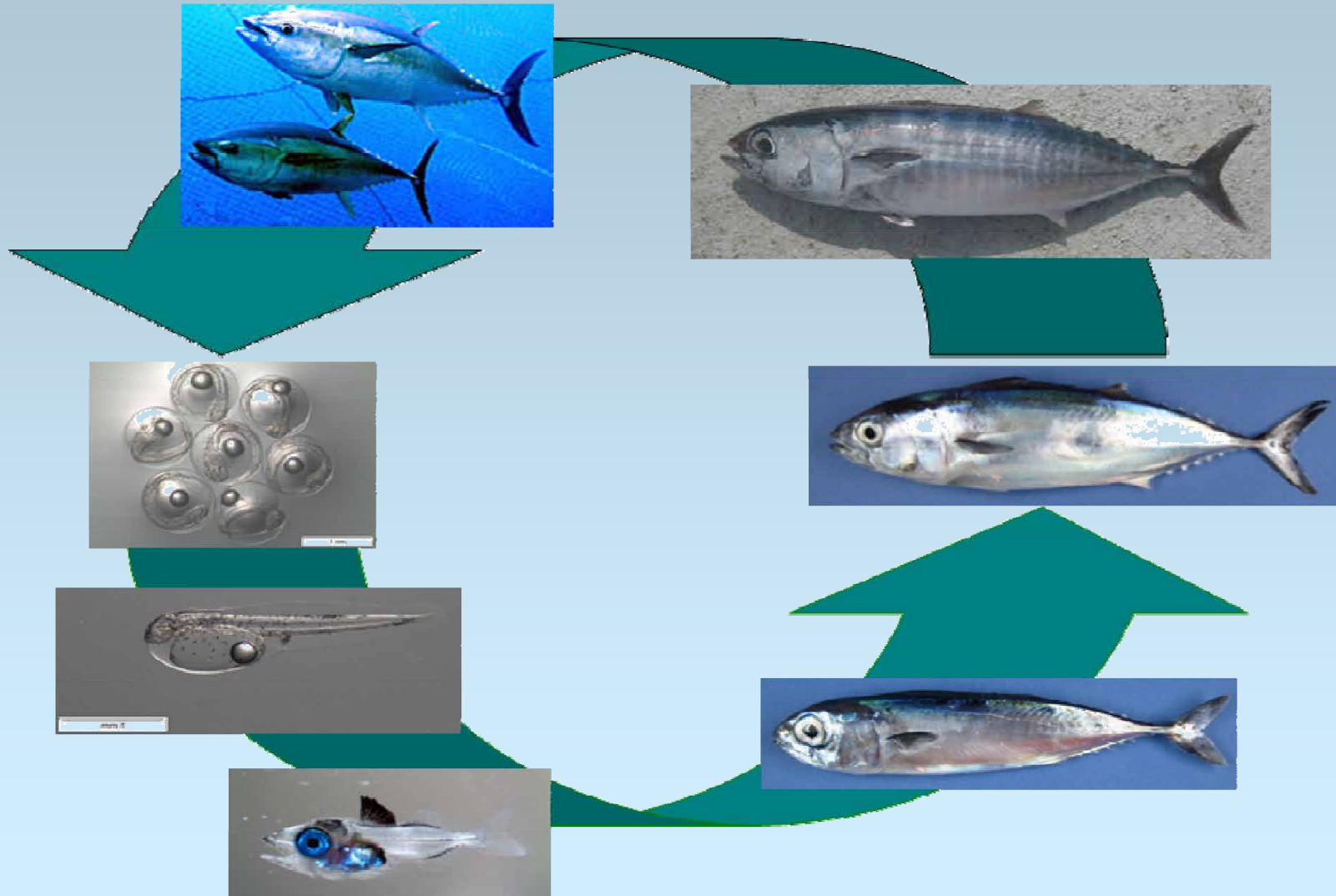
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Fernando de la Gándara & Aurelio Ortega
Spanish Institute of Oceanography (IEO) 






Large scale RTD facility to take tuna farming forward
Fernando de la Gándara & Aurelio Ortega
Spanish Institute of Oceanography (IEO)







Large scale RTD facility to take tuna farming forward
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EUROPEAN INITIATIVES FOR CLOSING TUNA LIFE CYCLE IN CAPTIVITY

DOTT GROUP: SELFDOTT PROJECT

ITALY: ALLOTUNA PROJECT: UNIV. BARI / PANITTICA PUGLIESE

TRANSDOTT: UNIV. DUSSELDORF / FUTUNA BLUE / MALTA / ISRAEL

SPANISH INITIATIVES: IEO / RICARDO FUENTES GROUP

WORLD INITIATIVES FOR CLOSING TUNA LIFE CYCLE IN CAPTIVITY

JAPAN: KINKI UNIV. CLOSED THE PBFT LIFE CYCLE IN 2002


AUSTRALIA: CLEANSEAS & SARDI SBFT

USA: MIAMI AND BALTIMORE UNIVERSITIES

PANAMA: ACHOTINES / IATTC / KINKI UNIVERISTY YFT

BALI (INDONESIA): YFT



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Spanish Institute of Oceanography (IEO) 

CONCLUSIONS

1.- The fact that the captive BFT broodstock spawned massively in a spontaneous way from 2010 up to now, far from the BFT natural spawning areas shows that :

(a) the conditions present in the area are sufficient to allow completion of the reproductive cycle

(b) the fish have reached an important degree of domestication as a result of their stay at the experimental farm for several years

2.- The sea weather and currents have a crucial influence on the amount of collected eggs

PROBLEMS

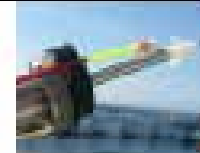
1.- The natural spawning period is too short (1.5 months) for maintaining a commercial activity

2.- Bad sea conditions could avoid the egg collection

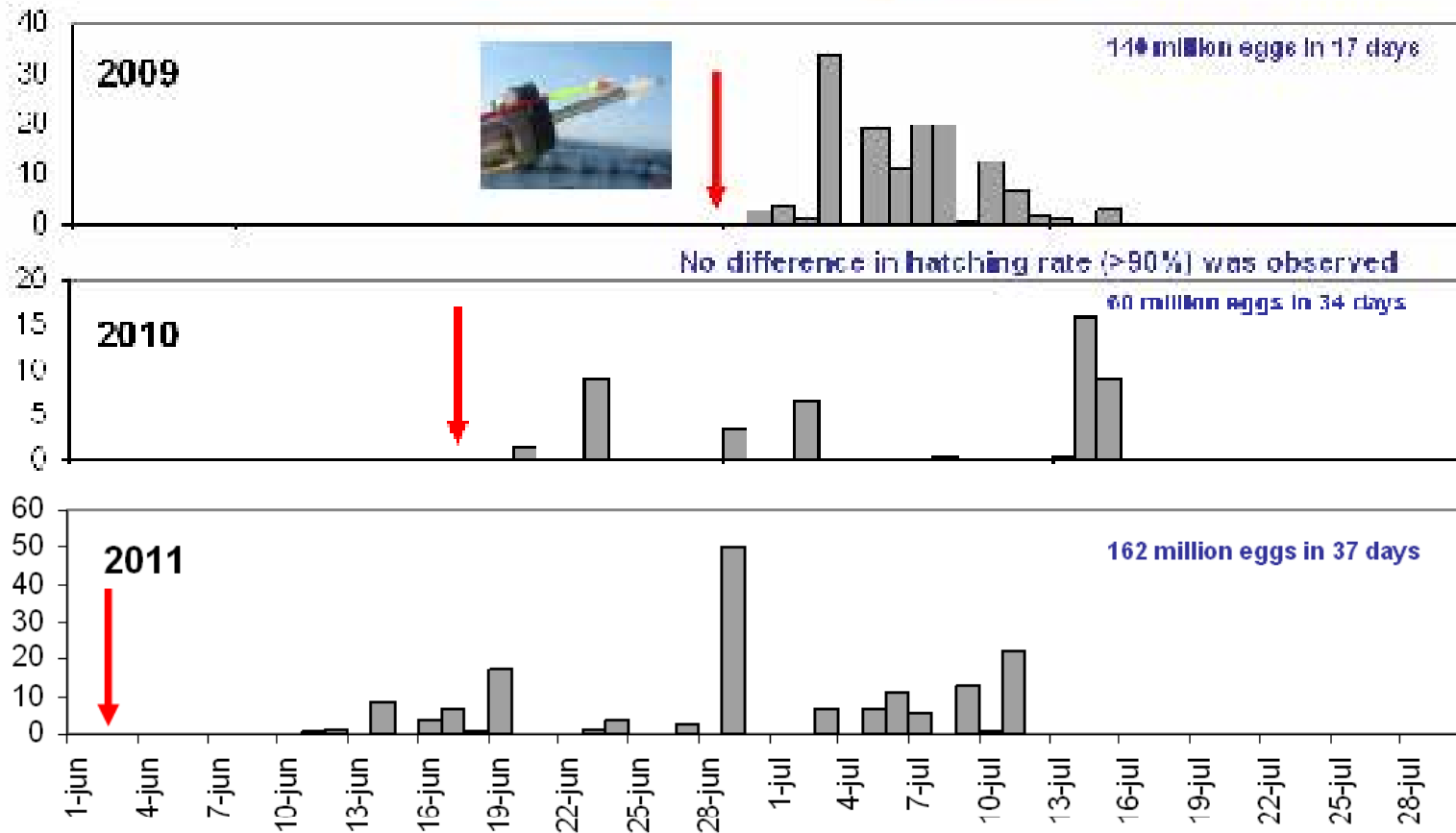
3.- The bluefin tuna eggs comes with eggs of another species, some of them predators

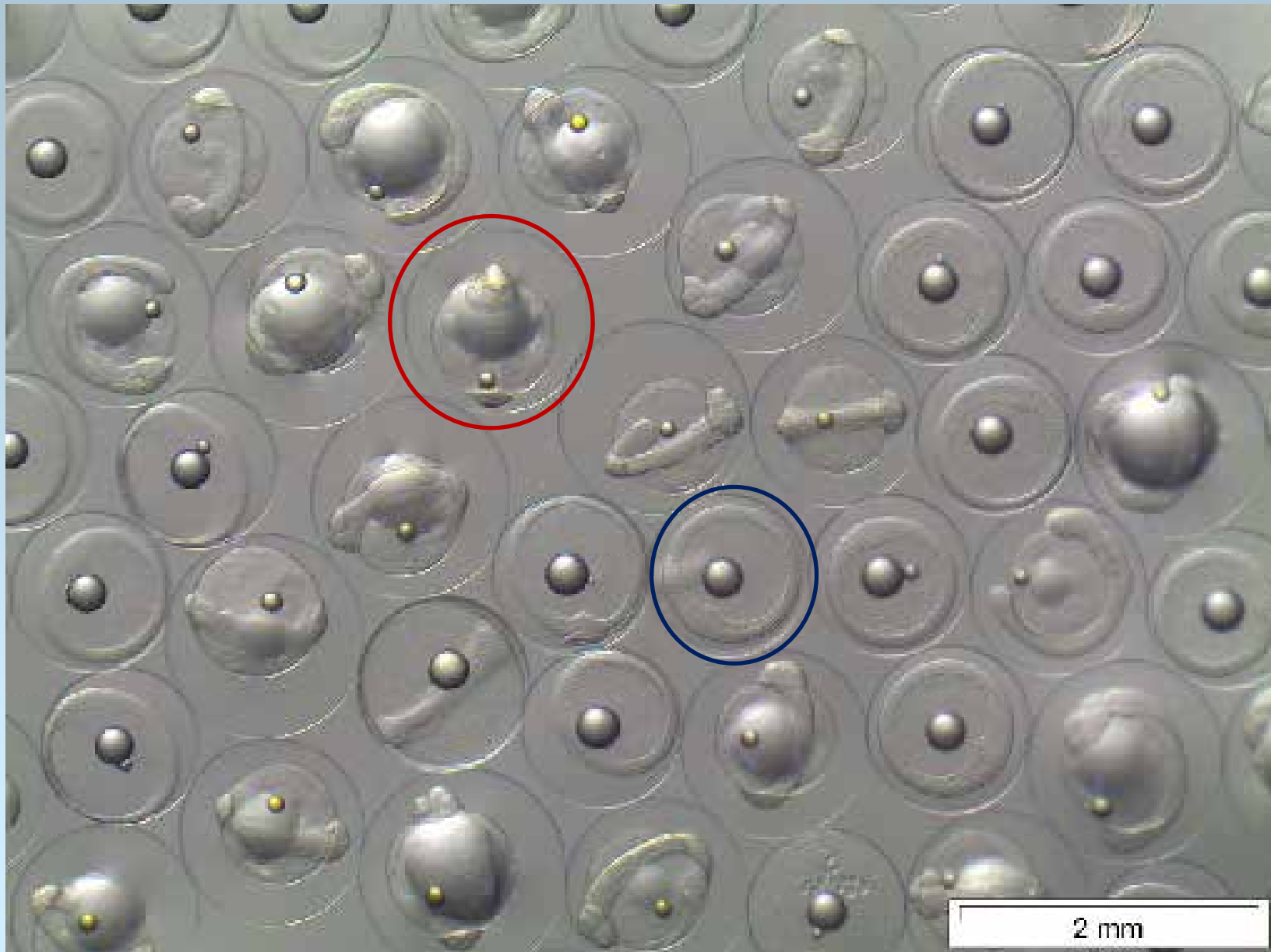



2008



No eggs were collected





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ICRA (Infrastructure for the Control of the Reproduction of Atlantic bluefin tuna)



aquaculture
EUROPE
17

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Dubrovnik, Croatia

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Fernando de la Gándara & Aurelio Ortega
Spanish Institute of Oceanography (IEO) 



ICRA (Infrastructure for the Control of the Reproduction of Atlantic bluefin tuna)

FUNDED BY

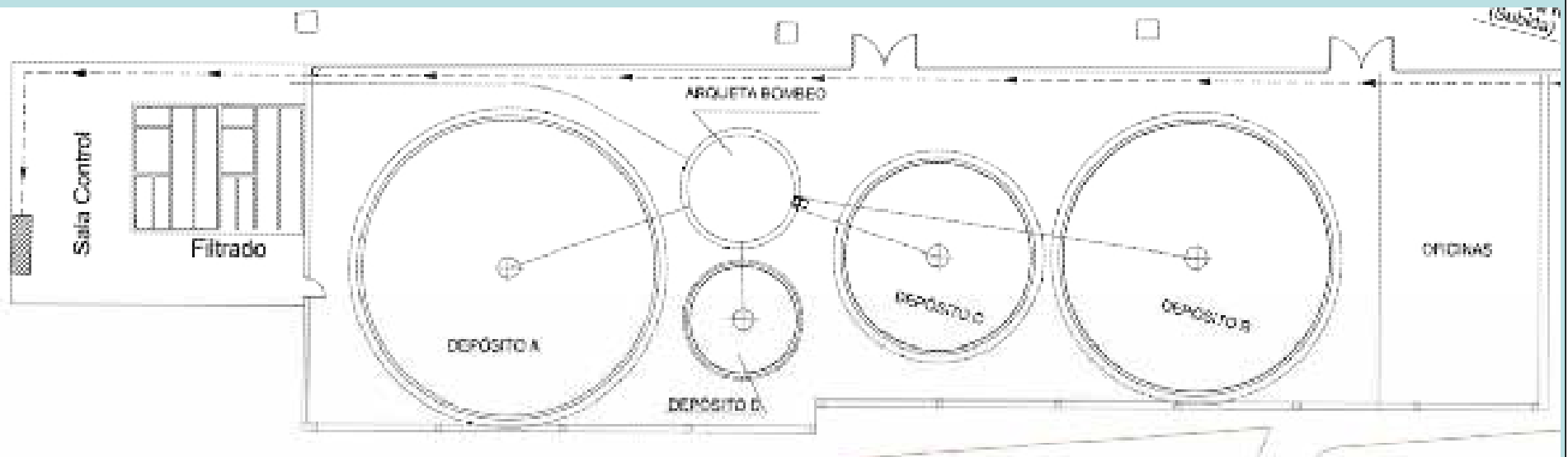
European Regional
 Development Fund –FEDER
 funded 70% , 4,25 M €
 IEO contribute 30%, 1,75 M €
 Duration: 2011 - 2013

PARTICIPANTS

IEO (Spain)
 SCIENCE MINISTRY (Spain)
 REGIONAL GOVERNMENT
 OF MURCIA (Spain)

RESEARCHERS


Aurelio Ortega IEO
 Fernando de la Gándara IEO




- 2 BROODSTOCK TANKS: 22 y 20 m Ø y 9 m depth 3.500 and 2.500 m³ 25 and 30 individuals
- 2 JUVENILES TANKS: 14 and 8 m Ø, 3 m depth. 900 and 150 m³


ICRA (Infrastructure for the Control of the Reproduction of Atlantic bluefin tuna)







PLANTA DE REPRODUCCION EN TIERRA DEL ATUN ROJO
VISTA GENERAL


 INSTITUTO ESPAÑOL
 DE OCEANOGRÁFIA

11:10:17
 martes, 20 de agosto de 2018

ACTIVIDAD

Inicio de la actividad

Fin de la actividad

Parar

Reanudar

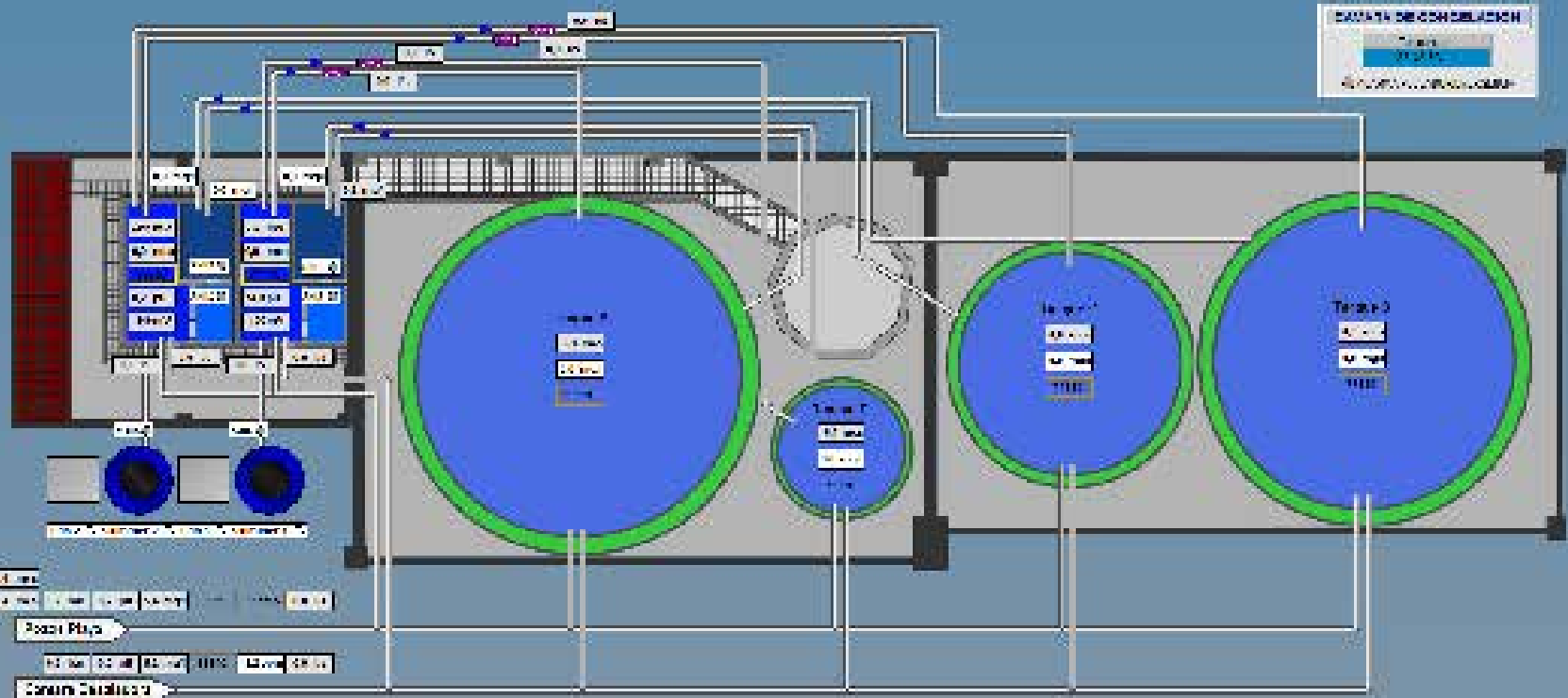
Actualizar

Configuración

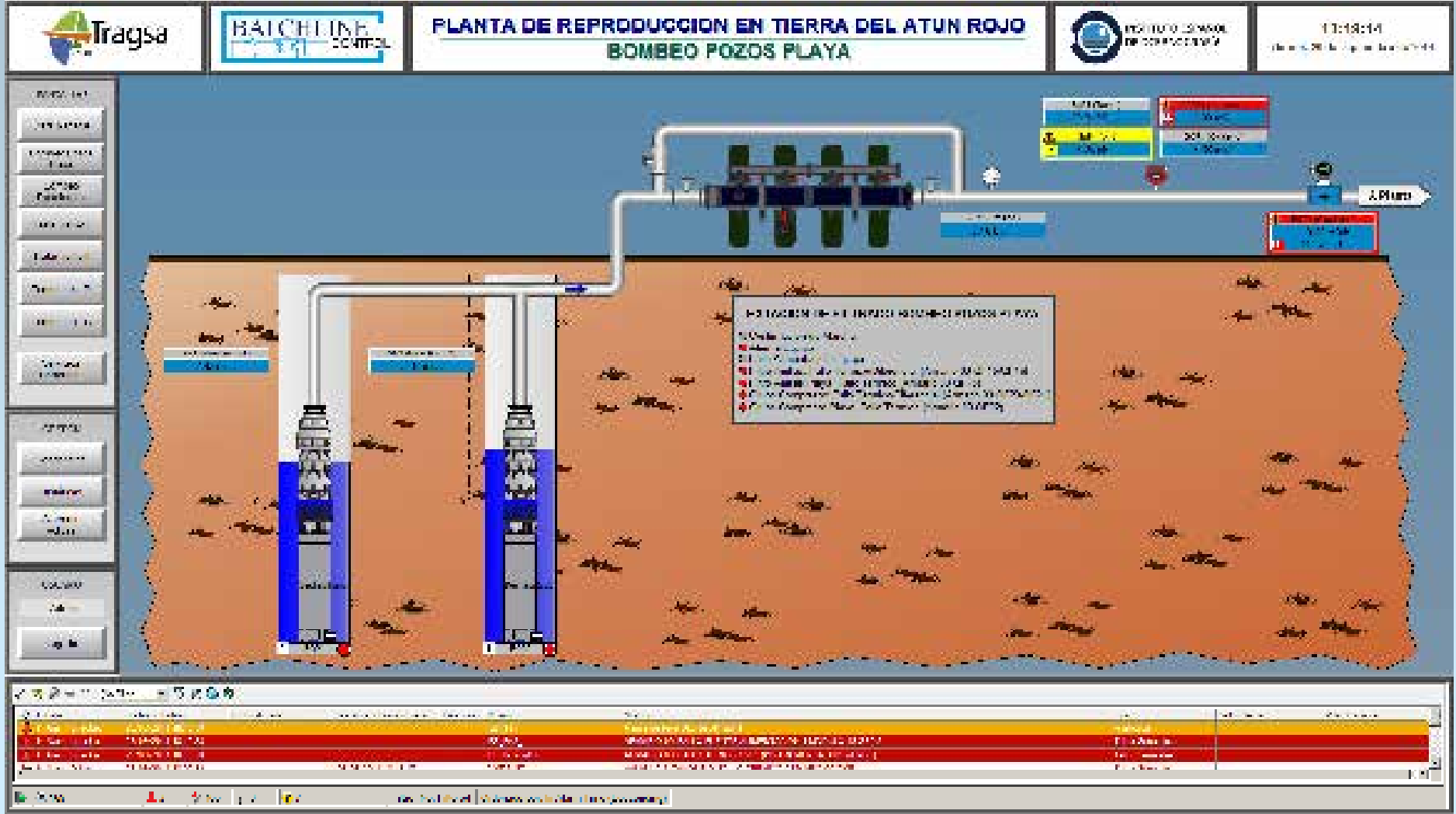
Estado

Historial

Salir




Id	Nombre	Estado	Operador	Comando	Fecha	Detalle
1	Inicio	Activo	Admin	Inicio de la actividad	20/08/2018 11:10:17	Inicio de la actividad
2	Fin	Activo	Admin	Fin de la actividad	20/08/2018 11:10:17	Fin de la actividad
3	Parar	Activo	Admin	Parar la actividad	20/08/2018 11:10:17	Parar la actividad
4	Reanudar	Activo	Admin	Reanudar la actividad	20/08/2018 11:10:17	Reanudar la actividad

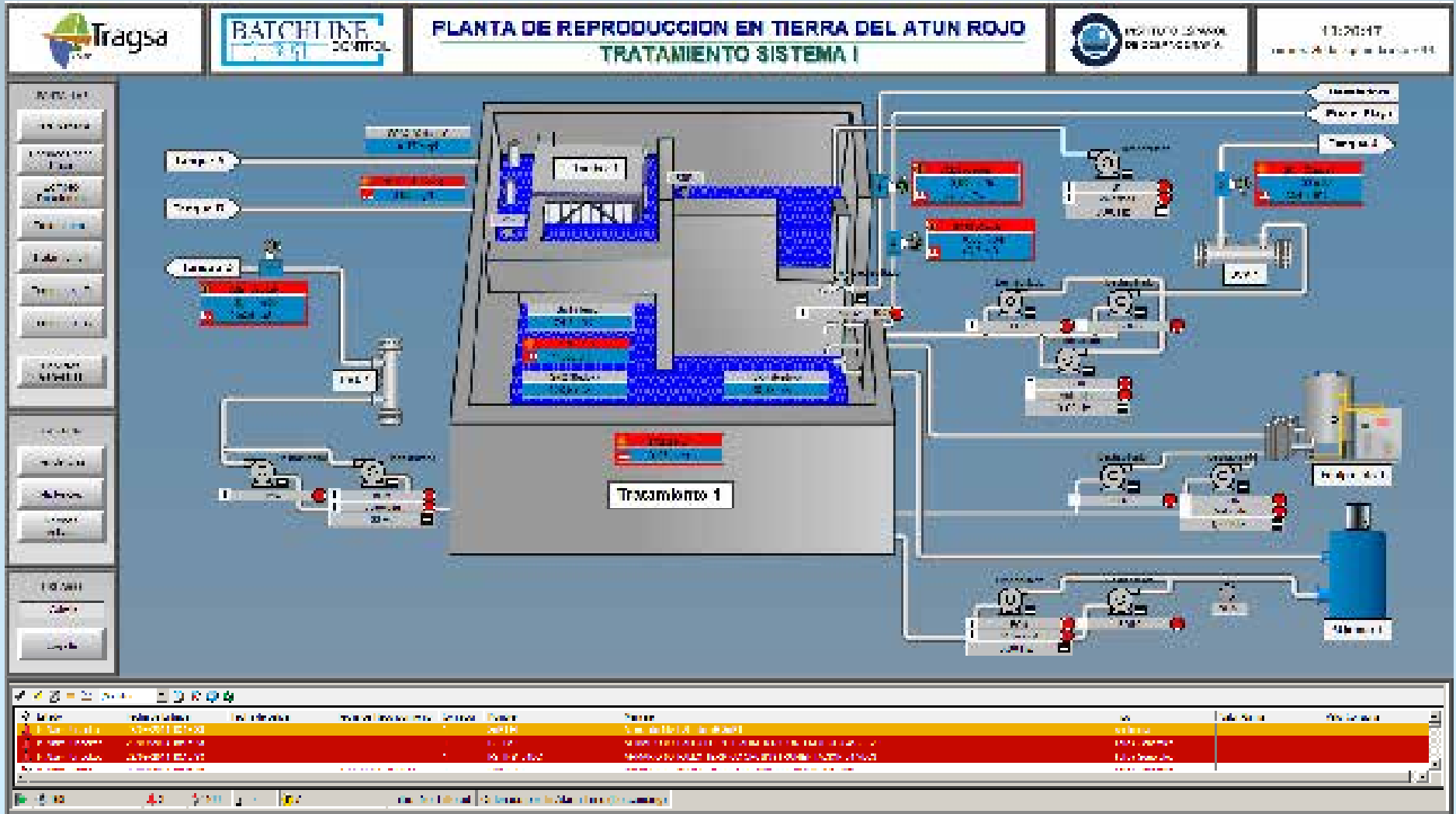




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for **GROWTH**

October 17-20, 2017
Dubrovnik, Croatia


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Spanish Institute of Oceanography (IEO) 



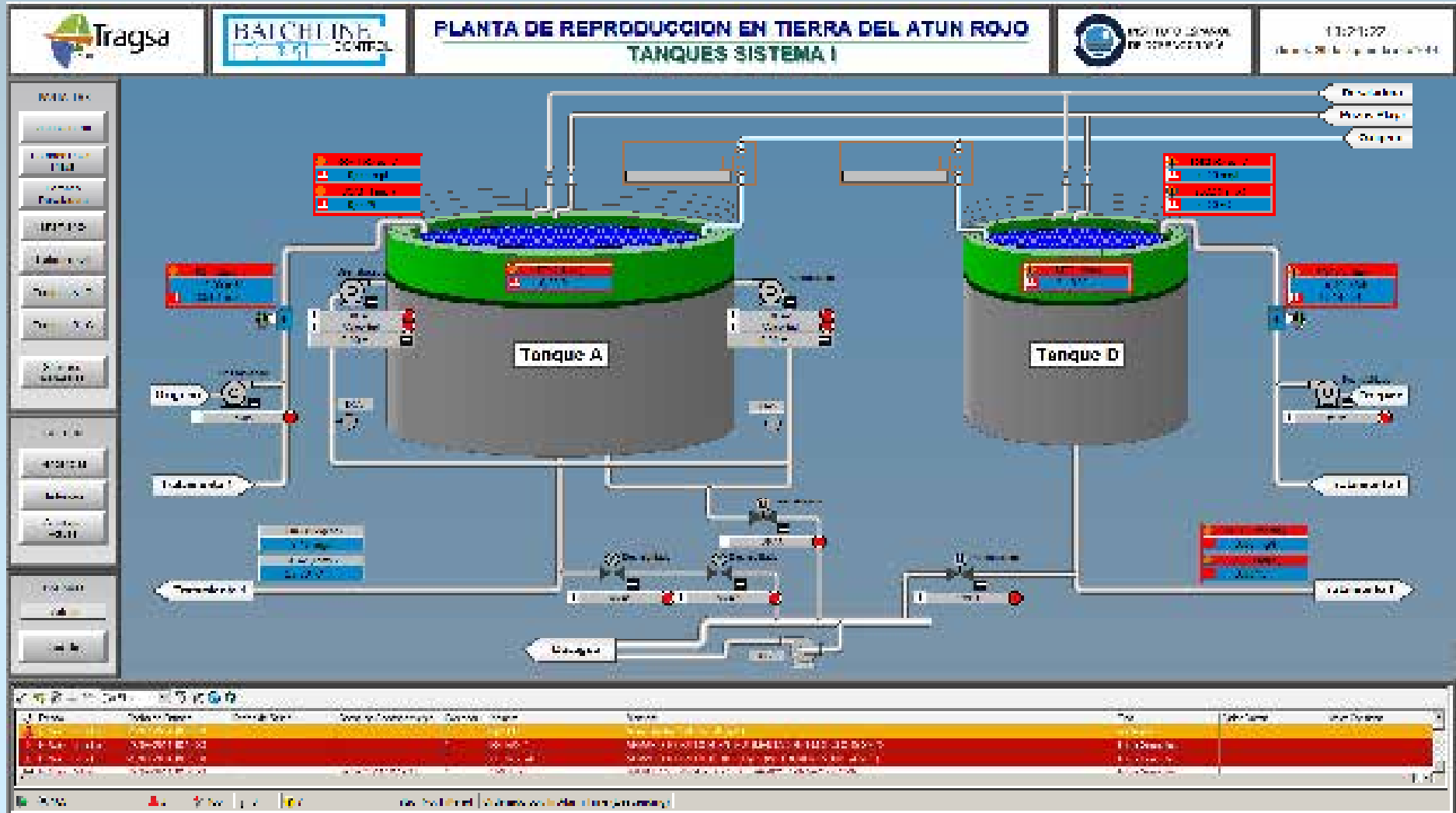


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Dubrovnik, Croatia


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**COOPERATION
for GROWTH**

October 17-20, 2017
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Spanish Institute of Oceanography (IEO) 





PLANTA DE REPRODUCCION EN TIERRA DEL ATUN ROJO
ALARMAS ACTIVAS

 INSTITUTO ESPAÑOL DE OCEANOGRÁFIA
 11:23:50
 10/19/2017 11:23:50 AM

Alarma	Descripcion	Activada	Activada (hh:mm:ss)	Estado	Señal	U.	Valor Actual	Valor Límite	Señal
Alarma 1	Temperatura Agua	Activada	11:23:50	Activo	20.5	°C	20.5	18.0	Temperatura Agua
Alarma 2	pH Agua	Activada	11:23:50	Activo	7.8		7.8	7.5	pH Agua
Alarma 3	Salinidad Agua	Activada	11:23:50	Activo	35.0	g/L	35.0	34.5	Salinidad Agua
Alarma 4	Nivel Agua	Activada	11:23:50	Activo	100	cm	100	95	Nivel Agua
Alarma 5	Temperatura Aire	Activada	11:23:50	Activo	25.0	°C	25.0	22.0	Temperatura Aire
Alarma 6	Humedad Relativa	Activada	11:23:50	Activo	60	%	60	55	Humedad Relativa
Alarma 7	Velocidad del Viento	Activada	11:23:50	Activo	5	m/s	5	3	Velocidad del Viento
Alarma 8	Presión Barométrica	Activada	11:23:50	Activo	1013	hPa	1013	1010	Presión Barométrica
Alarma 9	Temperatura Superficie del Mar	Activada	11:23:50	Activo	20.0	°C	20.0	18.0	Temperatura Superficie del Mar
Alarma 10	Temperatura del Suelo	Activada	11:23:50	Activo	20.0	°C	20.0	18.0	Temperatura del Suelo
Alarma 11	Temperatura del Agua	Activada	11:23:50	Activo	20.0	°C	20.0	18.0	Temperatura del Agua
Alarma 12	Temperatura del Aire	Activada	11:23:50	Activo	25.0	°C	25.0	22.0	Temperatura del Aire
Alarma 13	Humedad Relativa	Activada	11:23:50	Activo	60	%	60	55	Humedad Relativa
Alarma 14	Velocidad del Viento	Activada	11:23:50	Activo	5	m/s	5	3	Velocidad del Viento
Alarma 15	Presión Barométrica	Activada	11:23:50	Activo	1013	hPa	1013	1010	Presión Barométrica
Alarma 16	Temperatura Superficie del Mar	Activada	11:23:50	Activo	20.0	°C	20.0	18.0	Temperatura Superficie del Mar
Alarma 17	Temperatura del Suelo	Activada	11:23:50	Activo	20.0	°C	20.0	18.0	Temperatura del Suelo
Alarma 18	Temperatura del Agua	Activada	11:23:50	Activo	20.0	°C	20.0	18.0	Temperatura del Agua
Alarma 19	Temperatura del Aire	Activada	11:23:50	Activo	25.0	°C	25.0	22.0	Temperatura del Aire
Alarma 20	Humedad Relativa	Activada	11:23:50	Activo	60	%	60	55	Humedad Relativa
Alarma 21	Velocidad del Viento	Activada	11:23:50	Activo	5	m/s	5	3	Velocidad del Viento
Alarma 22	Presión Barométrica	Activada	11:23:50	Activo	1013	hPa	1013	1010	Presión Barométrica
Alarma 23	Temperatura Superficie del Mar	Activada	11:23:50	Activo	20.0	°C	20.0	18.0	Temperatura Superficie del Mar
Alarma 24	Temperatura del Suelo	Activada	11:23:50	Activo	20.0	°C	20.0	18.0	Temperatura del Suelo
Alarma 25	Temperatura del Agua	Activada	11:23:50	Activo	20.0	°C	20.0	18.0	Temperatura del Agua
Alarma 26	Temperatura del Aire	Activada	11:23:50	Activo	25.0	°C	25.0	22.0	Temperatura del Aire
Alarma 27	Humedad Relativa	Activada	11:23:50	Activo	60	%	60	55	Humedad Relativa
Alarma 28	Velocidad del Viento	Activada	11:23:50	Activo	5	m/s	5	3	Velocidad del Viento
Alarma 29	Presión Barométrica	Activada	11:23:50	Activo	1013	hPa	1013	1010	Presión Barométrica
Alarma 30	Temperatura Superficie del Mar	Activada	11:23:50	Activo	20.0	°C	20.0	18.0	Temperatura Superficie del Mar


10/19/2017 11:23:50 AM

Alarma	Descripcion	Activada	Activada (hh:mm:ss)	Estado	Señal	U.	Valor Actual	Valor Límite	Señal
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Alarma 8	Presión Barométrica	Activada	11:23:50	Activo	1013	hPa	1013	1010	Presión Barométrica
Alarma 9	Temperatura Superficie del Mar	Activada	11:23:50	Activo	20.0	°C	20.0	18.0	Temperatura Superficie del Mar
Alarma 10	Temperatura del Suelo	Activada	11:23:50	Activo	20.0	°C	20.0	18.0	Temperatura del Suelo
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Alarma 13	Humedad Relativa	Activada	11:23:50	Activo	60	%	60	55	Humedad Relativa
Alarma 14	Velocidad del Viento	Activada	11:23:50	Activo	5	m/s	5	3	Velocidad del Viento
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Alarma 16	Temperatura Superficie del Mar	Activada	11:23:50	Activo	20.0	°C	20.0	18.0	Temperatura Superficie del Mar
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Alarma 18	Temperatura del Agua	Activada	11:23:50	Activo	20.0	°C	20.0	18.0	Temperatura del Agua
Alarma 19	Temperatura del Aire	Activada	11:23:50	Activo	25.0	°C	25.0	22.0	Temperatura del Aire
Alarma 20	Humedad Relativa	Activada	11:23:50	Activo	60	%	60	55	Humedad Relativa
Alarma 21	Velocidad del Viento	Activada	11:23:50	Activo	5	m/s	5	3	Velocidad del Viento
Alarma 22	Presión Barométrica	Activada	11:23:50	Activo	1013	hPa	1013	1010	Presión Barométrica
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Alarma 25	Temperatura del Agua	Activada	11:23:50	Activo	20.0	°C	20.0	18.0	Temperatura del Agua
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Alarma 29	Presión Barométrica	Activada	11:23:50	Activo	1013	hPa	1013	1010	Presión Barométrica
Alarma 30	Temperatura Superficie del Mar	Activada	11:23:50	Activo	20.0	°C	20.0	18.0	Temperatura Superficie del Mar

10/19/2017 11:23:50 AM





Large scale RTD facility to take tuna farming forward
Fernando de la Gándara & Aurelio Ortega
Spanish Institute of Oceanography (IEO) 



Objectives

The general objectives of the infrastructure are to provide the scientific community at national and international level, an open access, state-of-the-art and unique facilities devoted to competitive research and technology transfer for bluefin tuna (*Thunnus thynnus*) reproduction in captivity and juvenile production.



The specific objectives are:

- To contribute to the sustainable production of the Atlantic Bluefin tuna by means of the full cycle aquaculture, independently of the captures
- To increase the knowledge of the bluefin tuna biology for a better fisheries management contributing to its sustainability



AQUAculture infrastructures for EXCELlence in European fish research towards 2020

Singular scientific and technological infrastructures (ICTS)



The ICTS are facilities, resources, equipment and services, unique in its kind, and dedicated to cutting edge high quality research and development, to promote transfer, exchange and preservation of knowledge, technology and innovation.




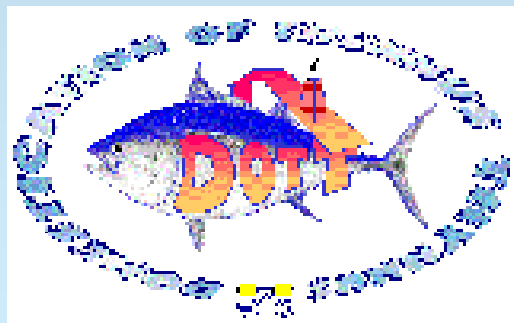
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**COOPERATION
for GROWTH**

October 17-20, 2017
Dubrovnik, Croatia

Large scale RTD facility to take tuna farming forward
Fernando de la Gándara & Aurelio Ortega
Spanish Institute of Oceanography (IEO) 



THANKS FOR YOUR ATTENTION