Istituto Zooprofilattico Sperimentale delle Venezie

Centro di referenza nazionale per le malattie dei pesci, dei molluschi e dei crostacei

Fish welfare: a real challenge for fish farmers

DVM Amedeo Manfrin

National Reference Laboratory for fish, mollusc and crustacean diseases
Istituto Zooprofilattico Sper.le delle Venezie IZSVe ITALY

Webinar on Aquatic Animal Health - Strengthening National Capacities for Sustainable Aquaculture 02/09/2026

Istituto Zooprofilattico Sperimentale delle Venezie

Animal welfare

- Different points of view.
- **Breeder**: good production = good welfare.
- **Veterinarian**: avoid unnecessary suffering, chronic stress and distress.
- **Animal rights activist:** any constriction or traumatic action is illegal.
- **Vegetarians and vegans**: **NO** to any kind of animal production and slaughtering.

Istituto Zooprofilattico Sperimentale delle Venezie

Animal welfare

- New concept of animal welfare: global health, the set of positive psycho-physical conditions for the subsistence of sentient life **("life worth living").**
- Consumers want healthy, safe foods that respect the animals' mental and physical needs.
- According to a sustainable aquaculture

Consumers point of view

- Consumers view the welfare of farmed fish with growing attention, torn between the desire for ethical safeguards and the need for assurances regarding food quality. Key concerns center on living conditions, water quality, and the impact on the ecosystem.

Perception of fish consumers

Characteristic	Perception of Farmed Fish	Perception of Wild-Caught Fish
Living Environment	Artificially controlled	Natural but subject to marine pollution
Food Safety	Lower heavy metal accumulation	Potential risk linked to marine contamination
Ethics and Sustainability	Concerns regarding stocking density and feed	Risk of overfishing and bycatch

Istituto Zooprofilattico Sperimentale delle Venezie

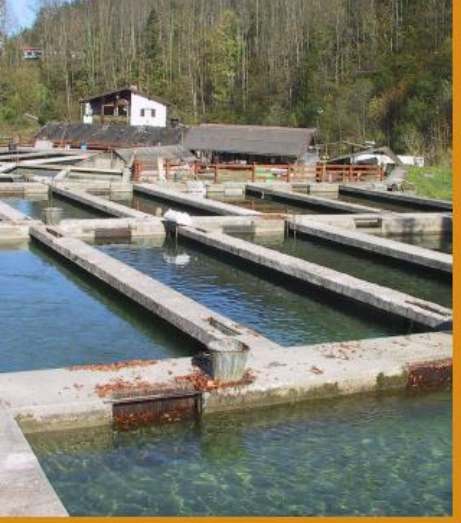
Legislation in Europe

- Still very lacking, both at national than international level.
- A few sentencies about fish.
- Great Britain and Norway among the most advanced countries.
- E.U. going to implement, but with typical bureaucratic slowness.

Istituto Zooprofilattico Sperimentale delle Venezie

Fish farming

- Approved the **recommendation** of the **Council of Europe** in Strasbourg (general part on "farmed fish") in December 2005.
- It became effective after six months from the officialization by the Standing Committee.
- Obligation from the Member States to ratify it….not all the members are applying this rule.



Guidelines on Water Quality and Handling for the Welfare of Farmed Vertebrate Fish

EU Platform on Animal Welfare Own-Initiative Group on Fish

Guidelines on Water Quality and Handling for the Welfare of Farmed Vertebrate Fish

EU Platform on Animal Welfare Own-Initiative Group on Fish

List of contributors

Convenor:
Katerina Marinou, Ministry of Rural Development and Food, Greece

Secretariat:
Douglas Waley, Alessia Virone, Sophie Aylmer, Eurogroup for Animals

Sponsors:
Biomedical Research Foundation of the Academy of Athens
Eurogroup for Animals
Compassion in World Farming
Federation of Greek Mariculture
Ministry of Agriculture, Nature and Food Quality, The Netherlands

Members of the Own Initiative:
Birte Broberg, Danish Veterinary and Food Administration, Denmark
Stefan Reiser, Thünen Institute of Fisheries Ecology, Germany
Katerina Marinou, Ministry of Rural Development and Food, Greece
Bente Bergersen, Inger Fyllingen and Kristine Marie Hestetun, Norwegian Food Safety Authority, Norway
Pilar León, Ministry of Agriculture, Fisheries and Food, Spain
Amedeo Manfrin, Instituto Zooprofilattico Sperimentale delle Venezie, Italy
Albin Gräns, Swedish University of Agricultural Sciences, Independent Expert
Evangelia Sossidou, Hellenic Agricultural Organization-Demeter, Veterinary Research Institute
Moira Harris, International Society for Applied Ethology
Malcolm Johnstone, RSPCA Assured
Douglas Waley, Eurogroup for Animals
Natasha Boyland and Krzysztof Wojtas, Compassion in World Farming
Kari Norheim and Alain Schonbrodt, Federation of Veterinarians of Europe
Bernhard Feneis, Federation of European Aquaculture Producers (FEAP)
Ana Granados Chapatte, European Forum of Farm Animal Breeders (EFFAB)
Helena Bauer, Animals' Angels

Contributors:
Maria Teresa Villalba, Ministry of Agriculture, Fisheries and Food, Spain
Andrea Fabris and Niels Henrik Henriksen, Federation of European Aquaculture Producers (FEAP)
Leonidas Papaharisis and Yannis Pelekanakis, Federation of Greek Mariculture
Michail Pavlidis, University of Crete, Greece
Hans van de Vis, Wageningen University, The Netherlands

World Organization for Animal Health
Aquatic Animal Health Code

SECTION 7.

WELFARE OF FARMED FISH

Istituto Zooprofilattico Sperimentale delle Venezie

EU Regulation 1/2005 on animal transport

Article 1 Field of application

This Regulation applies to the transport of live **vertebrate** animals within the Community, including specific checks to be carried out by competent authorities on consignments entering or leaving EU countries

Istituto Zooprofilattico Sperimentale delle Venezie

EU Regulation 1/2005 on animal transport

Article 3

General conditions for the transport of animals

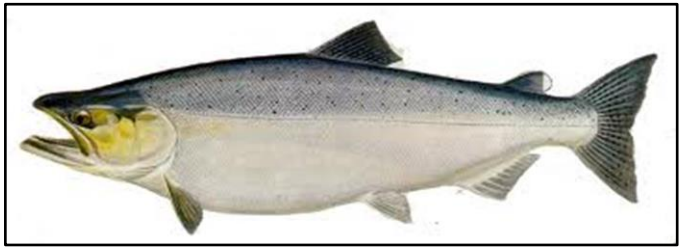
No one is authorized to transport or have animals transported in conditions that expose them to unnecessary injury or suffering

No specific rules available for fish

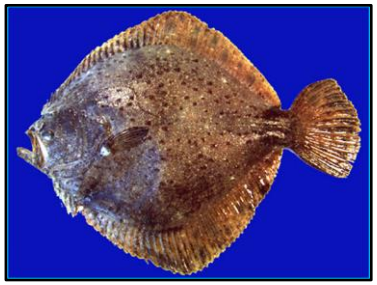
Fish welfare during transport

- Aquaculture is a very complex sector, with more than 300 species farmed all over the world (**at least 40 different species in EU**: finfish, mollusc and crustaceans).
- **Quite different "aquatic animals"** like embrionated eggs, post larvae (shrimp), fry and juvenile, broodstocks, live fish to slaughter-house, to put and take fisheries, for restocking purposes, *etc.*

Main farmed species in Europe



Atlantic salmon



Turbot

Rainbow trout

Sea bass

Carp

Sea bream

Minor species

Arctic char

Brown trout

Pike

Sturgeon

Different types of production

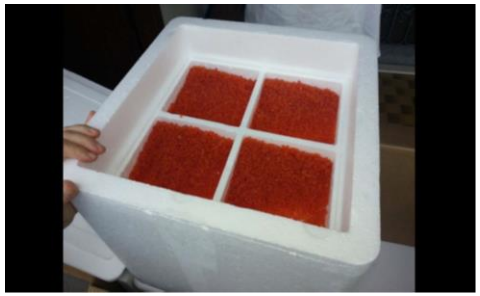
Fish welfare during transport

Different means of transport (trucks, well-boats, airplane)

Fish welfare during transport

Different materials:

- embrionated eggs
- broodstock or juveniles
- ornamental fish
- mollusc and crustaceans



Some critical point to be managed in aquaculture

Loading

Transport and unloading

Fish welfare during transport

- During long journey you need to change the water.
- **Few specific points in Europe.**....so you need to ask to other fish farmers (health problems!!) or to the fire brigade or to the Coast guard in a port...marine species

Istituto Zooprofilattico Sperimentale delle Venezie

EU Regulation 1099/2009 animals slaughtering

consideranda

The recommendations relating to farmed fish are not included in this Regulation due to the need for further scientific advice and an economic evaluation in the sector…

Istituto Zooprofilattico Sperimentale delle Venezie

EU Regulation 1099/2009 animals slaughtering

As for fish, only art. 3 paragraph 1: "During killing and related operations, the animals are limited any avoidable pain, anxiety or suffering".

Istituto Zooprofilattico Sperimentale delle Venezie

Farmed fish (finfish): EFSA opinion

Scientific Opinion of the Panel on Animal Health and Welfare General approach to fish welfare and to the concept of sentience in fish – Gennaio 2009

Animal welfare aspects of husbandry systems for farmed common carp - Dicembre 2008

Animal welfare aspects of husbandry systems for farmed European seabass and gilthead seabream – Ottobre 2008

Animal welfare aspects of husbandry systems for farmed fish - European eel - Settembre 2008

Animal welfare aspects of husbandry systems for farmed trout - Settembre 2008

Istituto Zooprofilattico Sperimentale delle Venezie

Slaughtering: EFSA opinion 2008-09

- **Species-specific welfare aspects of the main systems of stunning and killing of farmed Sea bass and Sea bream**
- **Species-specific welfare aspects of the main systems of stunning and killing of farmed Rainbow Trout**
- **Species-specific welfare aspects of the main systems of stunning and killing of farmed Eels *(Anguilla Anguilla)***
- **Knowledge gaps and research needs for the welfare of farmed fish**

Istituto Zooprofilattico Sperimentale delle Venezie

International guidelines

OIE – World Organization for Animal Health - Aquatic Animal Health Code 2026 - Chapter 7

FAO - Code of Conduct for Responsible Fishing which also includes the principles for the development of sustainable aquaculture.

FEAP – (Federation European Aquaculture Producers) - Code of Conduct for European Aquaculture

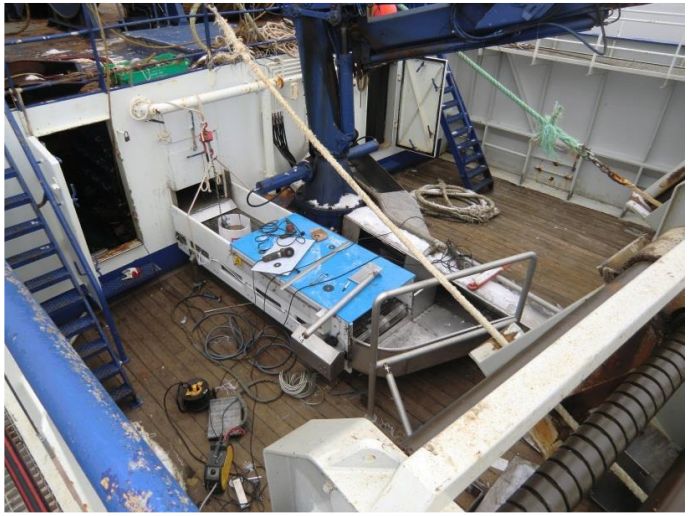
API – (Italian Fish farmers Association) Code of Good Breeding Practice in Aquaculture

API - Guidelines for Product Certification in Aquaculture

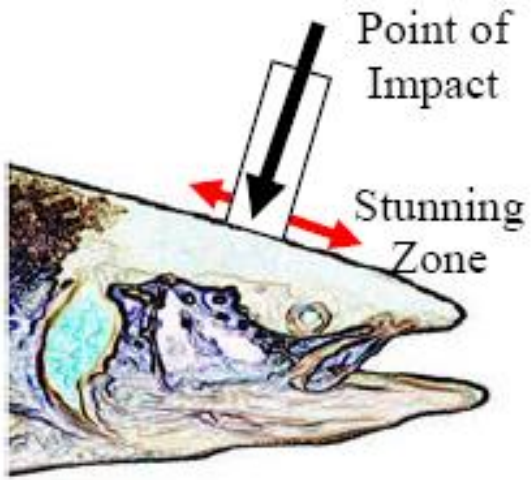
Examples of stunning/killing methods for fish groups (Aquatic code 2026 art 7.3.8)

- The following methods enable humane killing for the following fish groups:
- percussive stunning: carp, salmonids;
- spiking or coring: tuna;
- free bullet: tuna;
- electrical stunning: carp, eel, salmonids.

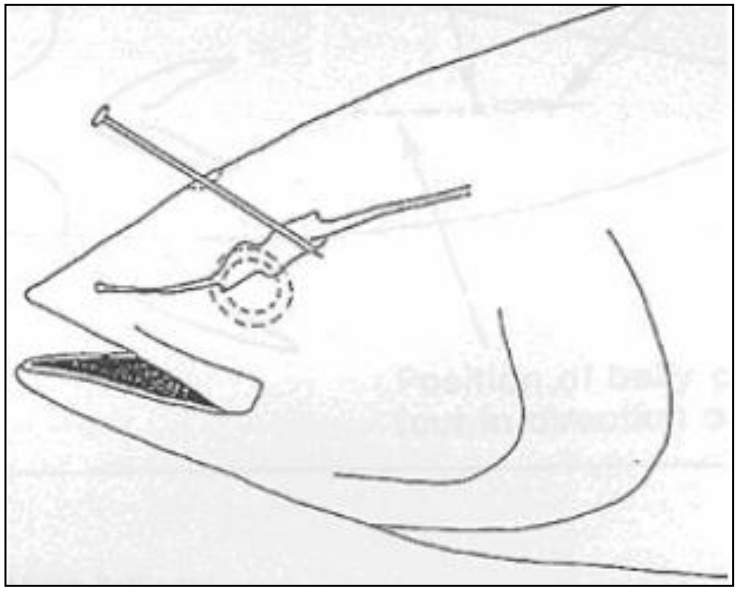
Electrical stunning



Percussive stunning



Spiking or coring



Istituto Zooprofilattico Sperimentale delle Venezie

Poor fish welfare (WOAH code 2026)

The following methods are known to be used for killing fish:
chilling with ice in holding water, carbon dioxide (CO_2) in holding water; chilling with ice and CO_2 in holding water; salt or ammonia baths; asphyxiation by removal from water; exsanguination without stunning.

These methods **should not be used** if it is feasible to use the methods described in points 2 and 3 of this Article, as appropriate to the fish species.

Istituto Zooprofilattico Sperimentale delle Venezie

Sea bass and bream

METHODS USED IN COMMERCIAL FARM

- Stunning in water with ice.
- Stunning in boxes with ice
- Asphyxiation

Stunning and killing...at the same time??

Allowed method...waiting for some better technique...

Electrical stunning (dry or wet) in marine species … work in progress

Pictures by Leonidas Papaharisis (Greece)

Istituto Zooprofilattico Sperimentale delle Venezie

EU COMMISSION: work in progress

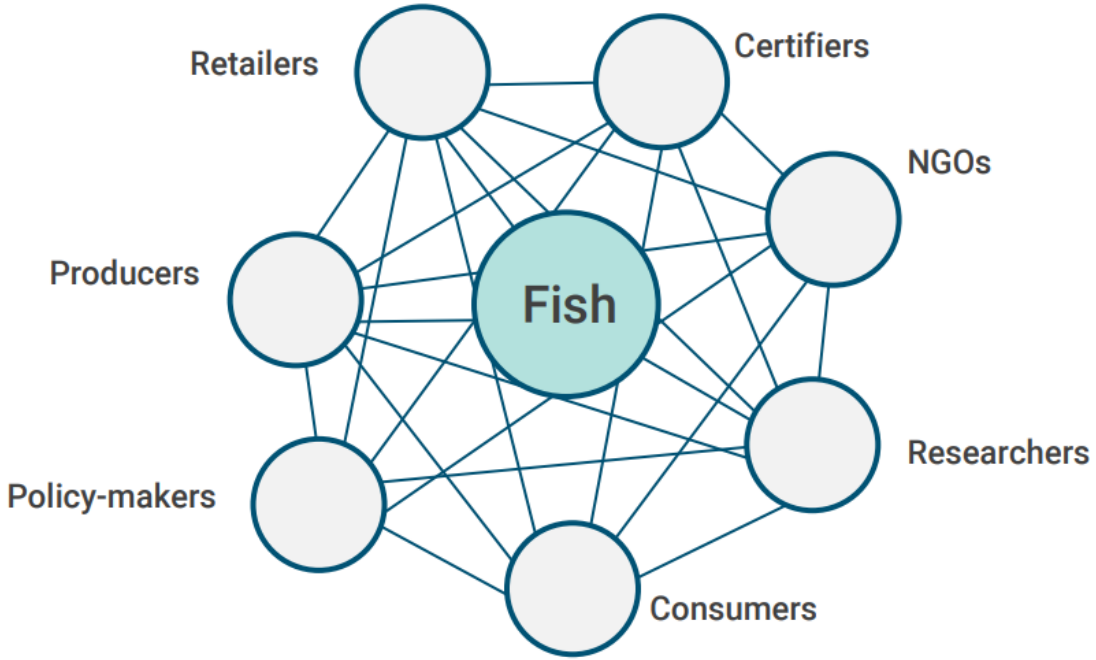
Istituto Zooprofilattico Sperimentale delle Venezie

EU COMMISSION: work in progress

Istituto Zooprofilattico Sperimentale delle Venezie

RESEARCH: work in progress

Science-based collaborative approach:



João L. Saraiva

FISH ETHO GROUP

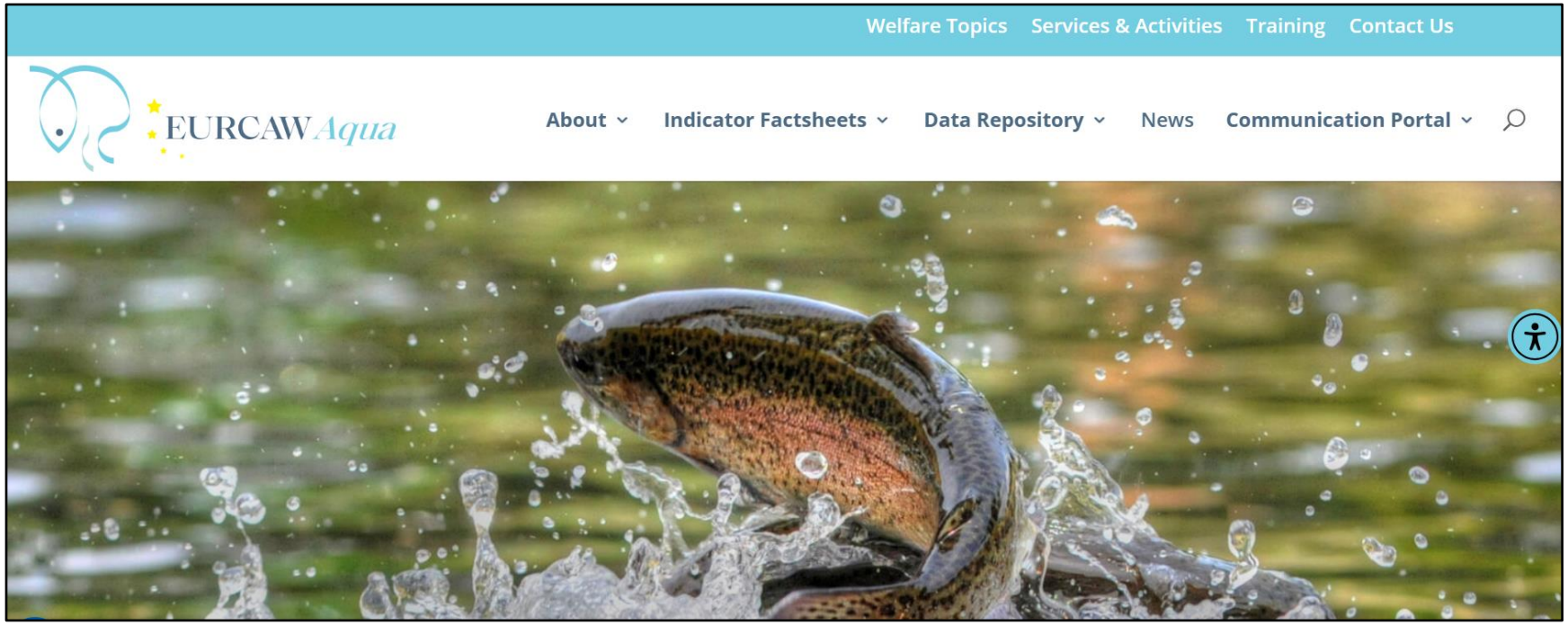
Good news……January 2024

Animal Welfare: New EU Reference Centre for the welfare of aquatic animals

Today, **the Commission has adopted a Decision designating the fourth European Union Reference Centre for Animal Welfare, which will specialise in the welfare of aquatic animals.**
The Reference Centre for the welfare of aquatic animals has been designated following a public selection process. It will be run by a **Consortium led by the University of Crete (Greece**), and also composed of the **Biology Centre of the Czech Academy of Sciences, Institute of Parasitology (Czechia) and the Universitat Autònoma de Barcelona (Spain).**
EU Reference Centres for animal welfare are established to assist EU countries in their official controls on animal welfare **rules in farms, during transport and at the time of slaughter or killing**.

Improving the welfare of aquatic animals, particularly in farms, during transport and at the time of killing, is an important part of the Commission's animal welfare agenda. The new EU Reference Centre will contribute to ensuring that EU rules in this area are respected. It will support the activities of the Commission and Member States by carrying out scientific and technical studies, as well as conducting training courses and disseminating research findings and information on technical innovations.
Reference Centres are foreseen under the Official Controls Regulation, adopted in March 2017, which harmonises EU rules on official controls along the whole agri-food chain, including in relation to animal welfare rules.

New reference laboratory – EURCAW-Aqua



EURCAW Aqua team and Ethics Committee

Michail Pavlidis

EURCAW-Aqua Director & Coordinator

University of Crete

Ivona Mladineo

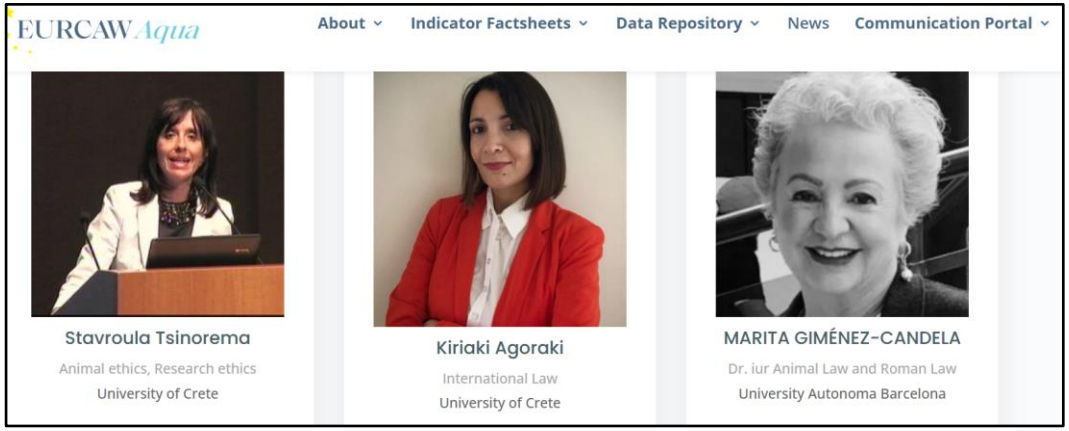
EURCAW-Aqua Deputy Director

Biology Centre Czech Academy of Sciences

Francesc Padrós i Bover

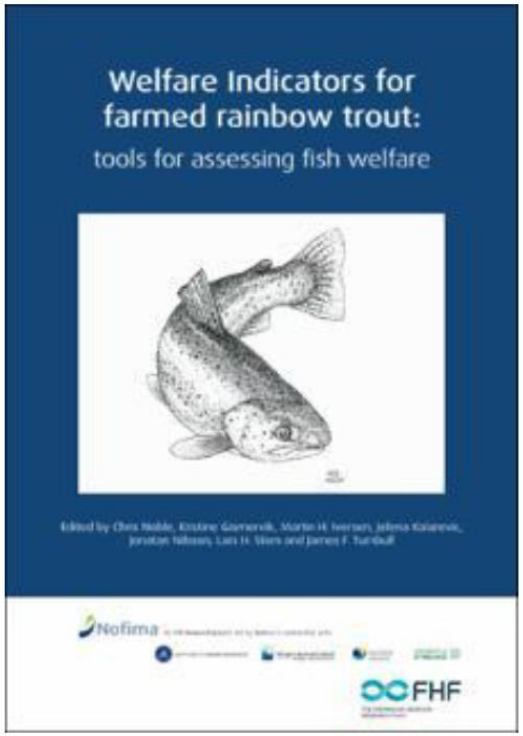
EURCAW-Aqua Training Coordinator

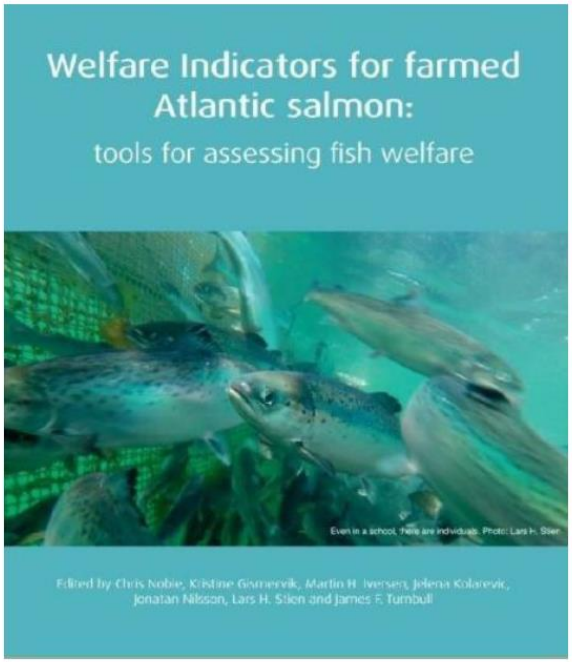
Universitat Autònoma de Barcelona



Welfare Indicators – The need for species-specificity

EURCAW Aqua





No legislation? But we need to do more

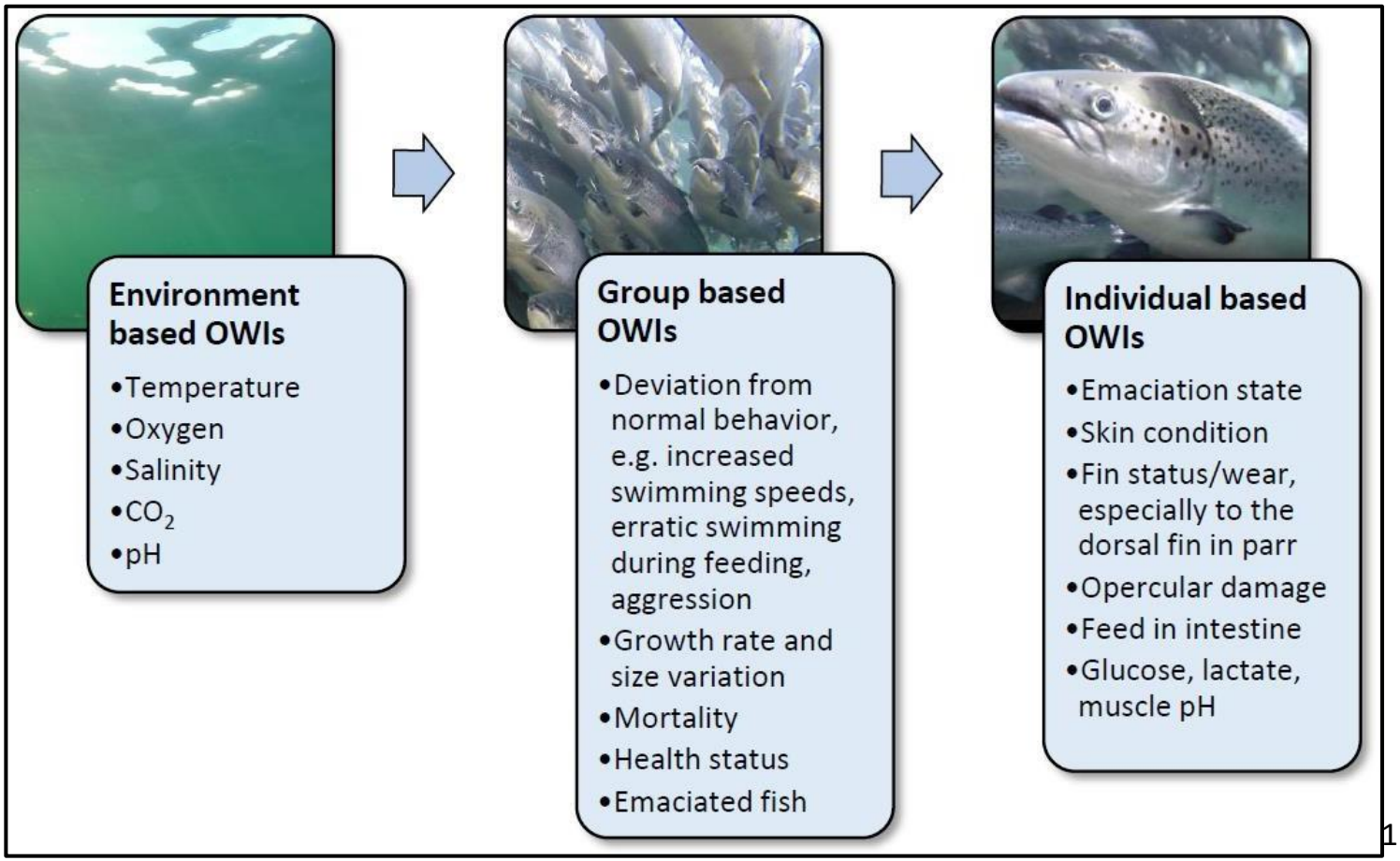
Welfare Indicators can be a good approach

Environment based – observations made on the environment, infrastructure and processes (also known as Indirect WIs or Resource-based WIs).

Animal based (group and individual)– observations made on or from the animal (also known as Direct WIs or Outcome WIs), both group based than individually based

<u>At the moment no indicators are available for sea bass and bream (some works and projects are in progress)</u>

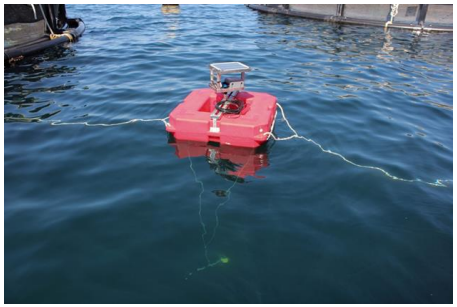
Welfare indicators (Noble *et al* , 2020)



1.9-2)

WELFARE INDICATORS (AdriAquaNet InterReg project)

Environment based



Animal based (group and individual)

Istituto Zooprofilattico Sperimentale delle Venezie

Istituto Zooprofilattico Sperimentale delle Venezie

OPERATIONAL WELFARE INDICATORS (OWIs) IN SEA CAGES

Environment based OWI	Group based OWIs	Individual based OWIs
Oxygen	Emaciated fish	Emaciation state
Temperature	Appetite	Fin damage
Salinity	Growth	Skin loss/ulcers
Turbidity	Mortality	Eye status
Other…..	Abnormal swimming	Deformities
	Abnormal behavior	Abnormal pigmentation
	Diseased fish	Opercular damage
	Other……	Mouth/Jaw damage
		Gill status
		Ectoparasites
		Feed in intestine
		Visceral fat

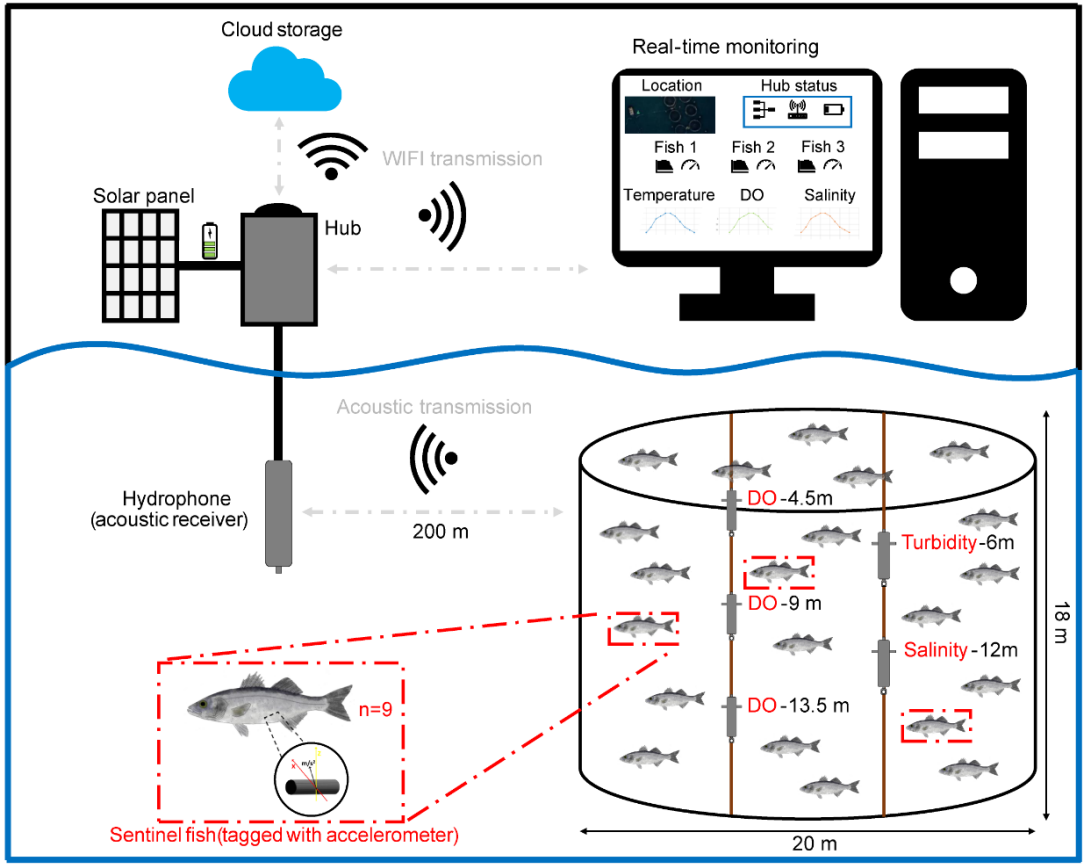
Istituto Zooprofilattico Sperimentale delle Venezie

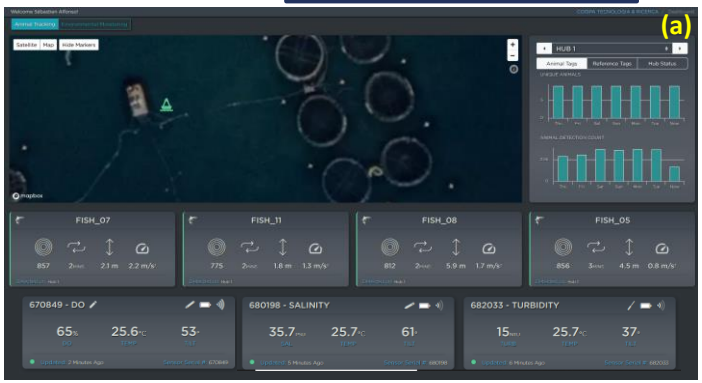
Istituto Zooprofilattico Sperimentale delle Venezie

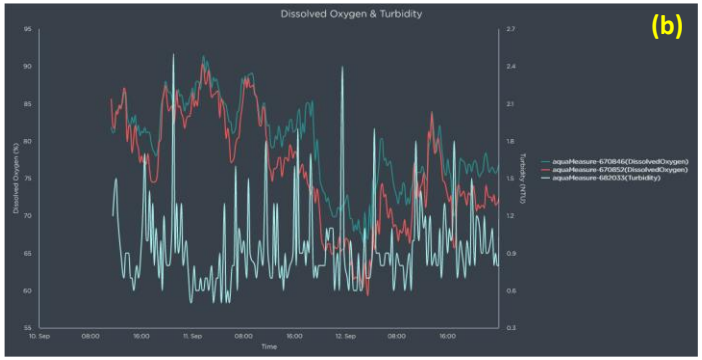
Use of sensors in aquaculture environments

- **Case study 4a:** Combination of physiological and environmental sensors – Sea bass

Monitoring – 68 days



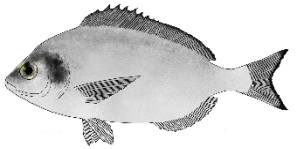




KEFALONIA fisheries

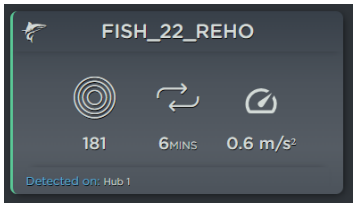
Toomey et al. / In prep.

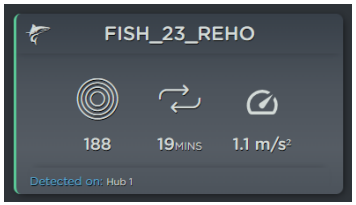
Use of sensors in aquaculture environments



- **Case study 4b:** Combination of physiological and environmental sensors – Sea bream

Ongoing experiment – September 2023 → August 2024





Real time data:
- Fish behavior (depth)
- Fish activity– proxy of energy expenditure
- Environmental parameters

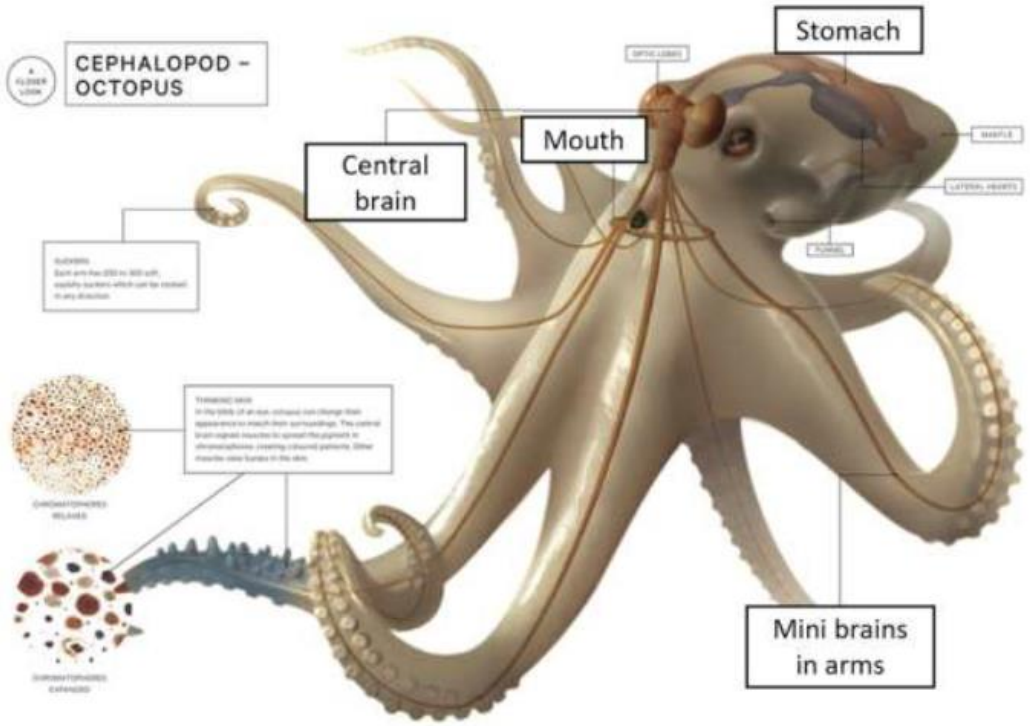
Results coming soon!

New challenges 2025-2030 (crustaceans)

- The **Italian Ministry of Health has established a working group on crustacean welfare.**
- The members belong to:
- Welfare office Ministry of Health – Rome;
- **National Reference lab on animal welfare – IZSLER Brescia**
- **NRL fish, mollusc and crustacean diseases - IZSVe**
- University of Naple;
- Local Competent authorities;
- Private company (to be identified)

Istituto Zooprofilattico Sperimentale delle Venezie

Octopus spp……the only invertebrate included in EU legislation about experimental trials



Istituto Zooprofilattico Sperimentale delle Venezie

Thanks…….

amanfrin@izsvenezie.it