FITFISH
STAKEHOLDER WORKSHOP ON FISH MIGRATION
21st April 2018

CIIMAR
Matosinhos, Portugal

The program

The workshop will bring together scientists, managers, and regulators with counterparts from the COST Action to share experiences and discuss opportunities to develop focused collaborative projects. The objective is to advance our understanding of fish migration, and how we can provide potential constrains and solutions to problems in river systems. We will be focusing on sharing experiences in fish migration across Portugal and other European countries to build effective networks to promote opportunities for future research.

The workshop will contribute to the following action objectives of the FITFISH COST Action by 1) synthesizing the gained knowledge on fish migration, and 2) integrating gained knowledge on swimming performance. Both objectives needed for implementation of biological solutions for optimal fish migration. Two important issues will be bring into the workshop: 1) The use of the established research network to search for collaborative project opportunities. 2) The transfer of knowledge between scientists, industry and policy makers.

Also is important to present this current knowledge and use it as a starting point for further collaboration with policy makers and industry and with the network in future research projects.

The workshop will be divided in a morning session including presentations from invited speakers from Portugal and other EU countries, followed by discusion sesion in panels and a general conlcuding sesion. Following lunch we would like to head out in minibuses to visit a river site within central Portugal where passage migration has been addressed, or where outstanding problems / issues can be illustrated in order to stimulate discussion and flow of ideas for possible areas of collaboration and future research.

SATURDAY, APRIL 21st, 2018
Auditorium, third floor at CIIMAR.
Program for the workshop:

Time	Action
8:45-9:00	Registration
9:00-9:10	Welcome- Introduction to the aims of the workshop Leo Nagelkerke Jóhannes Sturlaugsson Arjan Palstra Bernardo Quintella Leonardo Magnoni
9:10-9:40 9:40-10:10	Oral presentations: Jeroen Huisman Jóhannes Sturlaugsson
10:10-10:30	Coffee / tea break
10:30-11:00 11:00-11:30	Oral presentations: André Breukelaar Pedro Almeida
11:30-12:00	Discussion (in sub-groups) on prioritization of future research efforts
12:00-12:30	Plenary presentation of the main conclusions
12:30-14:00	Lunch
14:00-17:00	Trip to a monitoring fish migration site in Açude do Ponte, Mondego River (Coimbra, Portugal)

The Workshop will be held at the:

CIIMAR- Interdisciplinary Centre Of Marine And Environmental Research - University of Porto

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CIIMAR is a leading research and advanced training institution of the University of Porto, working at the frontier of Ocean Knowledge and Innovation.

CIIMAR uses knowledge-based approaches to promote the natural capital and the sustained management of marine resources through monitoring of ecosystems health, optimization of aquaculture, and biotechnological exploitation of the resources.

The Centre is scientifically organized in three Research Lines (Global Changes and Ecosystems Services, Marine Biotechnology and Biology, Aquaculture and Seafood Quality). CIIMAR implements various Transversal Programmes to strengthen the interdisciplinary collaboration between the various teams.

ABSTRACTS PRESENTATIONS

FUNCTIONAL INTERTIDAL FISH PASSES IN THE WADDENSEA, SEARCHING FOR A RED HERRING?

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The Dutch Wadden Sea is a large extensive intertidal coastal sea. Most of the marshlands, tributaries and estuaries in the Dutch part of the Wadden Sea have been lost to empoldering and measures ensuring flood protection e.g. pumping stations, weirs and sluices. The resulting loss of habitat and connectivity has had a severe impact on estuarine and diadromous fish species in the Wadden Sea region. The past five years many fish passes have been build in the to restore aquatic connectivity between the Wadden Sea and its former tidal marsh lands and tributaries.
Intertidal fish passes have to accommodate a wide range of fish species and lifestages migrating between fresh and brackish waters and the Wadden Sea. In addition, fish using intertidal fish passes, migrate between managed waterways with fixed water levels and the Wadden Sea, which has tidal action. As such, designing intertidal that adhere to the spatial-temporal behavioural patterns of fish is a challenge. However, evaluating intertidal fish passes is a “tour du force”, untangling the complex interaction between species and environmental variables in relation to time, directionality and space is a daunting task. Untill now an integrated research regarding fish species, life stages at multiple intertidal fish passes was lacking.
In our study we have focussed on assessing temporal spatial fish behaviour in relation to tidal action at 10 intertidal fish passes. We will present the design and functioning of a number of tidal fish passes and the results of a three-year study at 10 intertidal fish passes in the Dutch Wadden Sea. We will show that there is a link between tidal action and fish abundance, behavior and diversity. In addition, we will present a framework for assessing (intertidal) fish passes in relation to their function.

Key words: Fish migration, intertidal fish passes, Wadden Sea, diadromous fish.

MONITORING BEHAVIOR ECOLOGY OF FISH - A USEFUL FOUNDATION TO PROMOTE SUSTAINABILITY OF FISH STOCKS

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In later years electronic tags have more and more opened up possibilities to monitor distribution of fish throughout the year, as well as enabling sampling of environmental information simultaneously. This method of monitoring provides an opportunity to determine the relationship between the behavioral factors and the corresponding environmental factors. Therefore it is possible to map information on the behavioral ecology of fish, covering a vast area and long time periods – ranging up to few years for a single fish. Such data gives valuable information on fish, in relation to their feeding migration, overwintering and spawning migration. Based on results from such monitoring, carried out by my research company Laxfiskar, I will discuss practical use of data on the behavioral ecology of fish, mainly in relation to salmonids.

I will discuss an ongoing study where the geological distribution of the brown trout (*Salmo trutta*) in Iceland in Lake Thingvallavatn (84 km^2 area with max bottom depth of 114 m) is continuously monitored on multi-stock level. In this study I also monitor the fish depth of the trout and the temperature they experience, for both immature and mature fish. Mapping of the sea migration of the Atlantic salmon (*Salmo salar*) and the sea trout (S*almo trutta*) are another examples of monitoring work discussed, as well as the river migration pattern of these fishes; mapped by use of fish counters and traps.

It is possible to interpret such monitoring findings into criteria used in order to protect the fish stocks in question – to ensure their sustainability. Example of that is how we can improve management of regional fishing based on such data, both in freshwater and sea. Another example is how we can enhance the management of dam facilities based on results from detailed monitoring data on fish migration patterns in given river system.

Key words: Behavior ecology; Migrations; Salmon; Trout; Management

TELEMETRIC STUDIES ON FISH MIGRATION IN THE NETHERLANDS, AND LACK OF KNOWLEDGE ON FISH BEHAVIOR

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The ministry of Infrastructure and Water Management in the Netherlands is responsible for the water quality of the main Dutch waters. One of the water quality parameters is fish. A lot of measurements have been taken to give the fish the best opportunities for living in or passing the Dutch waters. Part of the work done is providing dams and weirs from possibilities to pass these constructions for migrating fish by building fish ladders.
In the big rivers already in the 1930s dams and weirs were built to have better opportunities for shipping. Also the Afsluitdijk was built and closed the former Zuiderzee from the North Sea to reclaim land from the sea. After the great disaster in 1953 when a big part of the province of Zeeland was flooded and more than 1000s of people where killed, the Dutch government decided to close substantial parts from the open connections from the Rhine Meuse Delta with the sea. Although the dams were provided with fish passing constructions these measurement had a very negative influence on the possibilities for migrating fish. Many of the constructions built for fish passing seemed not that effective.
Nowadays a lot of research is done on the migrating behavior of fish. Telemetric studies have been done on fish coming from sea into the fresh water area and vice versa. In the rivers studies were done on the effect of downstream passing weirs and hydropower stations in the rivers and the effectiveness of new built fish passes for upstream migration.
At the end of this year the management of the discharge sluices in the Haringvliet will be changed into Sluices Ajar, by which salt water will be let into the fresh water area which will give fish coming from sea better opportunities to reach the freshwater area. In the Afsluitdijk they will start building a fish migrating river to give fish better passing opportunities.

In this presentation there will be given results of telemetric studies done, also attention will be payed on lack of knowledge on fish behavior. By doing the telemetric studies a lot of insight information is collected about fish migration but there still is a big lack of information on fish behavior in front of barriers.

Key words: telemetry, fish behavior, barriers

REABILITATION OF DIADROMOUS FISH POPULATIONS IN PORTUGAL

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The conservation and management of diadromous fish populations is a challenging task, since these species use marine, brackish and freshwater environments, and are constantly submitted to a multitude of impacts, namely, pollution, habitat lost, fishing mortality, diseases and parasites from aquacultures located in their migratory pathway.
In Portugal, the high commercial value associated with these species (e.g. European eel, allis shad, sea lamprey) makes them primary targets for traditional fisheries, which need proper management to avoid overfishing and guarantee the long-term survival of their populations. Loss of river connectivity, caused by the construction of dams and other hydraulic infrastructures, also contributes to the decrease in population numbers of diadromous species, a scenario that is often aggravated by the associated river flow regulation, water scarcity and the climatic changes occurring at a global level but with special intensity in the Iberian Peninsula.
The high complexity and territorial scope of these threats demand the development of suitable and integrated measures for the conservation and management of diadromous fish. The scientific component can act as a link between all the stakeholders involved in these processes, namely the local and central administration managing rivers basins and fisheries, commercial fishermen, private promotors and general public.
Pilot restoration actions in the Mondego river basin involved the construction of seven fish passes that restored 45 km of freshwater habitat for diadromous fishes, including the first eel ladder built in Portugal. About 1.5 million fishes are annually recorded using the vertical slot fish pass installed at Coimbra dam and an increase of 100-fould in lamprey larvae abundance was registered in the upstream stretches.
The work being developed in the Mondego river basin for the past 20 years, and which recently begun to be replicated in the Vouga river basin, represents a valuable and decisive contribution to the recovery of diadromous fish populations in Portugal.

Key words: Compatibilization of uses; anadromous, catadromous, fish passes; commercial fisheries.

Notes

Field trip:

Habitat restoration for diadromous fish in River Mondego, Portugal

Research oriented to management and conservation of diadromous fish in River Mondego began in 1998, and since then the knowledge about the ecological requirements of these species and the specific threats in this watershed increased substantially.
After an initial period dedicated to collect baseline information, recent efforts are now directed to restore important habitats for diadromous fish in this basin, with particular focus in the reestablishment of the longitudinal continuity and habitat rehabilitation. These actions where supported by two projects, which constitute consecutive phases of a strategic rehabilitation plan of River Mondego for diadromous species:

i) the construction of a vertical-slot fish pass in Coimbra Açude-Ponte dam, which enabled the extension of the available habitat in 51 km (340% increase), constructed by the Portuguese Environmental Agency;

ii) the construction of five nature-like fish passes in small weirs, four of which are located upstream from the Coimbra Açude-Ponte dam, and the removal of another weir. All the restoration measures are being accompanied by pre- and post-operational monitoring.

This integrated approach linking fisheries management with habitat rehabilitation through the restoration of the longitudinal continuity in River Mondego is being successful and the main goal is to replicate this management strategy in other Portuguese watersheds also considered important for diadromous species.

http://www.rhpdm.uevora.pt/index.html