

FITFISH Stakeholder workshop Porto 21 April 2018

Aim of the workshop

The workshop brought together scientists, managers, and policy makers with counterparts from the COST Action to share experiences and discuss opportunities to develop focused collaborative projects.

The workshop contributed to the following action objectives (as formulated in the Work and Budget plan of the FITFISH action):

5. The use of the established research network to search for collaborative project opportunities;
6. Set-up communication with policy makers (aquaculture, fisheries, environment and food authorities) for setting directions for policy and future studies;
8. Transfer of knowledge between scientists, industry and policy makers;

Agenda

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	<u>Oral presentations:</u> Jeroen Huisman
9:40-10:10	Jóhannes Sturlaugsson
10:10-10:30	Coffee / tea break
10:30-11:00	<u>Oral presentations:</u> André Breukelaar
11:00-11:30	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 proposed agenda was slightly adapted. Instead of a short discussion in sub-groups there was some discussion at the end of each of the oral presentations, followed by a short plenary round-up.

Main outcomes and recommendations

Oral presentations

- Jeroen Huisman, who is working at Van Hall University of Applied Sciences, but who also has experience as a researcher and policy maker at one of the Water authorities in the northern Netherlands identified the need for incorporation of knowledge on fish behaviour in the operational schemes of intertidal fish passages.
- Johannes Sturlaugsson, owner of a private company specialised in monitoring migration and fish behaviour in Iceland stressed the importance of long-term monitoring, using innovative technologies, to investigate behavioural aspects of migration in relation to

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the environment. Such monitoring could be instrumental in developing criteria for the protection of fish populations.

- André Breukelaar, a policy maker and researcher at the Ministry of Infrastructure and Water Management in the Netherlands, indicated the importance of telemetric studies to assess the effectiveness of habitat rehabilitation measures, such as opening of the Haringvliet, the main estuarine branch of the River Rhine.
- Pedro Almeida of the University of Évora explained the importance of integrating measures for migration mitigation of diadromous fishes and involvement of and communication with all stakeholders.

Derived priorities and recommendations

From the oral presentations and the ensuing discussion the following priorities from stakeholders were derived:

- Engineers and biologists should communicate about the operation of fish passages in relation to fish migratory behaviour;
- The importance of long-term monitoring should be communicated / implemented;
- New monitoring technologies should be used to a better extent: managers/researchers should not get stuck by rigid rules / traditions;
- Methodologies for assessment of fish passes should be harmonised (partly on the way);
- Keystone / umbrella fish species could be used as a measure for the health of migratory fish populations;
- Individual variation in migration behaviour is of importance for management: it should be included if possible;
- Fragmentation of data collection and analysis, caused by too much focus on project-based research (leading to loss of big picture) should be avoided;
- Fisheries and other activities, such as hydropower development, should be included in fish migration analysis;
- Basic species information should be extended. At present, species diversity and their (migratory) behaviour is often poorly known;
- The economic weight of river modification vs. ecological value loss should be explicitly weighted;
- Loss of genetic diversity through river alterations should be considered.

Results of the questionnaire

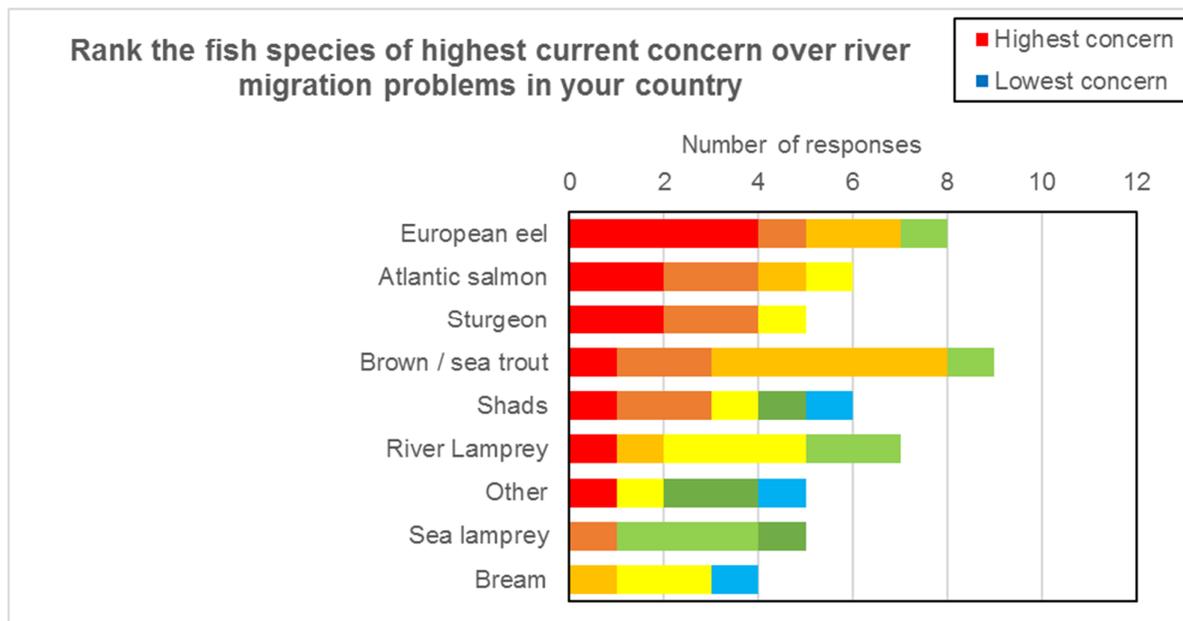
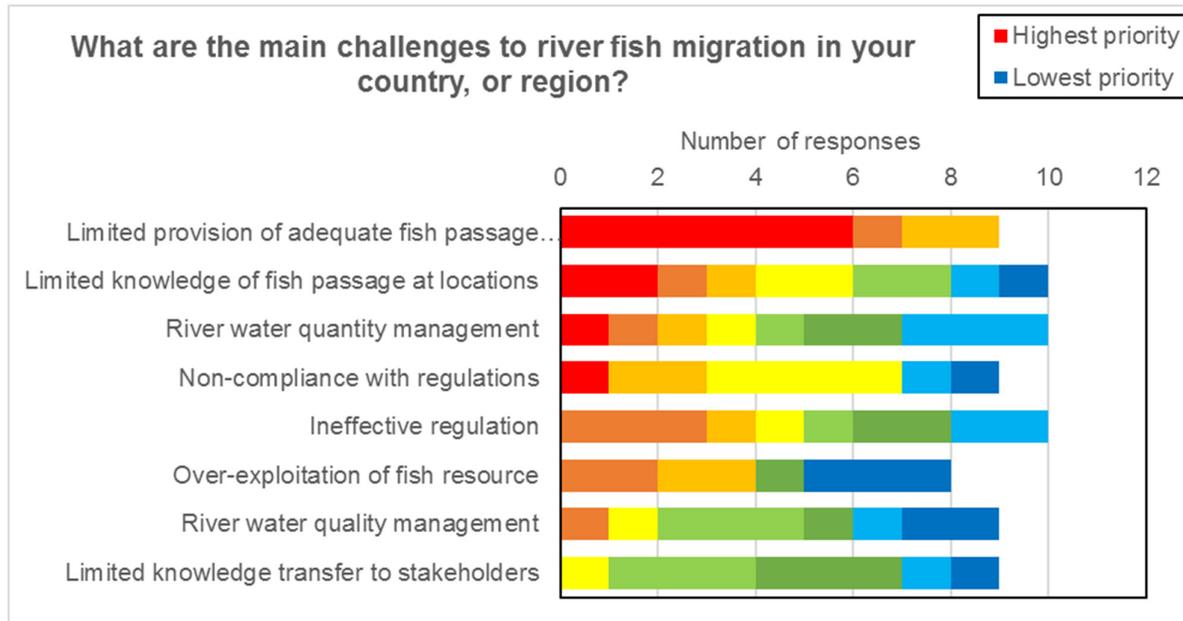
The questionnaire was sent out to 72 participants, of which 14 reacted to date. The questionnaire will stay open until 30 June 2018. There were large national differences in the responses to some questions of the questionnaire. As an illustration of this diversity underneath are some answers to the question "What Laws, Regulations or Standards for river fish passage are utilised in your country, or region?"

- not a lot... We lack legislation...(Portugal)
- ...Federal Water Act, Water Management Act, Fisheries Acts...standards...guidelines (Germany)
- Barriers are generally removed. Fish passage solutions have been abandoned...(Denmark)
- ...involving water intake...involving river quality...(Denmark)
- ...law on fisheries and aquaculture...(Romania)
- Water Framework Directive, Habitat Directive, Laws on Nature protection (The Netherlands)
- Fisheries Law... Environmental Law (Turkey)

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- Regulation no...on technical requirements on water structures; Standard on fishway methodology and testing the function... (Czech Republic)
- ...no regulations or standards... (Bosnia & Herzegovina)

Some additional preliminary results are shown below.



It is remarkable that the respondents did not consider limited knowledge transfer to stakeholders as a major challenge for fish migration.

Concluding remarks

The involvement of stakeholders interested in fish migration (water authorities, researchers, policy makers) appears to be rather well-developed. However, the relationships with stakeholders not primarily interested in fish migration, but rather with other uses of water

bodies (hydropower, fisheries) should be strengthened in most cases. The involvement of the general public is strongly recommended.

Appendix: Abstracts of the oral presentations during the WG2 stakeholder workshop

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

Ir. JAN BASTIAAN JEROEN HUISMAN

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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 built 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 life stages 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. Until 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, behaviour 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

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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 km² 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 (*Salmo 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 were 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 paid 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 promoters 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-fold 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.