

Living North Sea

Fish migration... from sea to source

Newsletter



A result from LNS: a book about fishmigration

The 15 Living North Sea partners have been working together for three years to improve fish habitats and migration in the North Sea region. A great deal has happened since the project was launched. The region has new fish ladders and fish-friendly pumping stations. Knowledge has been shared at expert meetings, and partnerships have been formed. Major studies have been performed on fish migration, and some of the results need action! In short, a lot has been achieved during the project; the way has been prepared for more efforts and collaboration on fish migration in the future. This newsletter describes some of the successes achieved in the Living North Sea project. You can find more information and downloads at www.livingnorthsea.eu.

LNS WebGIS

One of the results and an ongoing element of the LNS project is the LNS WebGIS (web-based Geographical Information System (GIS)). The WebGIS is a tool for sharing knowledge on fish populations and migratory fish routes between countries and sectors, using interactive maps. Datasets provided by the partners in the project are currently being prepared for input into the WebGIS.

Details of the final output from the constituent projects can be found at www.livingnorthsea.eu/webgis.



During the Launch in March 2010



European Union



The European Regional Development Fund

Three-day closing conference: sharing results and passions

The Living North Sea international fish migration project ended in November 2012 with a three-day conference near Newcastle (UK), on the banks of the river Tyne. Three days of discussions about fish migration issues, policy recommendations and challenges for future research.



They were all there: scientists, flood risk managers, water level managers, ecologists, industrial companies, national voluntary organisations and policy advisors. People from a wide range of backgrounds with one thing in common: the drive to improve fish migration routes. This is unusual for a fisheries conference, and it shows how the LNS partnership worked towards its goal of influencing policy and achieving transnational knowledge exchange. In and around Gateshead, on the south bank of the Tyne, delegates had an opportunity to experience and learn all kinds of things about the project's two main themes: 'international knowledge development', 'innovative solutions' and 'Trout Management Plan'.

Sharing stories and inspiration

On the first day, delegates were able to see the problems experienced by fish in the rivers Wear and Tees with their own eyes, along with examples of good community-led solutions. An instructive site visit.

Days two and three were devoted to listening and sharing, with lectures, informal contacts and the 'pitches' for the designs nominated for the Sturgeons' Lair competition (See page 3). The keynote speaker, George Pess of the National Oceanic and Atmospheric Administration (NOAA), managed to get everyone on the edge of their seats from the word go, with a talk on the removal of large dams in the US Pacific Northwest. The LNS constituent projects all presented their recommendations over these two days. After the lectures the delegates were able

to view the scientific posters, and visit a broadly oriented trade stand exhibition, which focused particularly on the latest technologies for fish guidance, tracking and monitoring, and the latest innovative designs of fish passage solutions. This provided a great opportunity for delegates to ask questions and allowed customers and suppliers to make contact.

What has been achieved?

Charles Crundwell is Senior Technical Specialist at the Environment Agency in the UK, and he was the LNS project leader on investigating tidal barriers. What does he think is the most important thing achieved during the three-year LNS project? 'In my opinion the LNS project has had two groundbreaking successes. In the first place there is the sea trout management plan. It is based on the latest genetic analysis of component stocks in the North Sea region and has links to similar European projects in the Celtic Sea and Atlantic region. This has really pushed the boundary of our understanding of North Sea migration routes and made clear the need for Europe-wide management. The second thing is the international exchange of knowledge and innovative solutions around tidal barriers and pumping stations. This end event illustrates the need for change, bringing together professionals of all kinds: academics, river managers, policymakers, water companies ...'

One thing is clear: this three-day conference was not in fact the end, simply a beginning. There is still a lot to do.

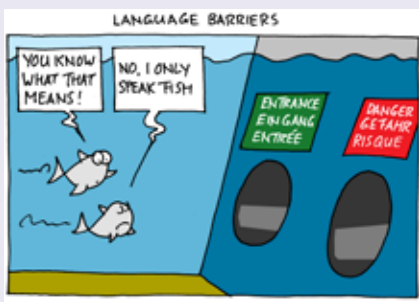
Crundwell: "The keynote speech on dam removal in the USA was particularly interesting and certainly got everyone engaged from the start. The presentations were a good mix of LNS outcomes and outputs on the one hand, and on the other hand generic introductions around each subject area that helped with scene-setting and stimulated discussion."

From Sea to Source

All the visitors at the LNS End Event left with an informative delegate pack that not only provided a synopsis of the LNS findings and recommendations, but also contained the book 'From Sea to Source'.

This book is a beautiful guide to the solutions and issues surrounding fish migration around the globe. It ties in nicely with the Living North Sea transnational knowledge transfer project.

You can buy the book 'From Sea to Source' or download it for free at www.fromseatosource.com.





Deerhurst Drain outfall

Sturgeon's Lair

Competition araised splendid fish passage ideas

Everyone working in fish passage has had the experience of meeting an angler or engineer working in a different field, with an idea for a fish passage solution that never gets the opportunity to be properly explored. With the Sturgeons' Lair competition we hoped to find some innovative solutions that would offer opportunities for the future, and we were not disappointed.

During an entertaining evening with international music by the members of the Falkenberg Swedish Youth Water

Council (songs from their environmental repertoire), eight proposals were shortlisted for interview in front of a panel of fish passage experts. They ranged from adapted culverts for trout passage, to adaptations to pumping stations for eel migration. As hoped, designs were submitted by a broad range of people including professional engineers, voluntary organisations, retired professionals and angling clubs.

Interestingly, three out of the eight designs – including the winning design –

concerned methods for providing passage through tide flaps. This shows both the recognition of this widespread problem across the North Sea region, and the variety of solutions possible to help address it.

Congratulations to Randolph Velterop and Howard Rushton of RoyalHaskoningDHV and Pete Kibel of Fishtek Consulting on the €10,000 prize they won for their tide flap dampers design. We look forward to seeing it implemented in the North Sea region soon.

During the meeting in Brussels

Lively discussions at fish migration networking event



October 2012 Living North Sea organised a networking event in Brussels, in collaboration with DG Mare and DG Environment. Representatives of a large number of EU-subsidised projects met to share knowledge and ideas about fish migration. The meeting was also designed to establish a permanent network on the theme of fish migration. Sixty EU officials and project representatives attended the enthusiastic talks and lively discussions.

The event also laid the foundations for new projects and a permanent network, as Sir Martinez-Capel of the University of Valencia, who attended the event, can confirm: 'It was an interesting meeting for me, because I am starting to research the subject of evaluation of rivers connectivity, and it was my first meeting in Brussels. I met people very involved in the subject who are working on very interesting projects; they showed they were open and wish to collaborate. All participants

were enthusiastic people fighting for our river ecosystems in very different contexts, with different levels of funding and with a great interest in learning from each other. I learnt how important it is to set the correct legal framework in Europe to protect the European eel, because the illegal trade is one of the threats to this species. Other presentations from different countries also illustrated the actual problems we face in conserving natural populations of fish.'

Barry Bendall: ‘Together we know so much more!’

We want to ensure that fish are free to migrate between different habitats in order to complete their life-cycle. But what kind of conditions do they need? Where do they want to go, what barriers do they encounter, and how can we work together more effectively to reduce the impact of human activities? In Living North Sea’s ‘Transnational Knowledge Development’ work package (led by the Environment Agency, UK) an international team of scientists and practitioners attempted to answer some of these questions in relation to sea trout. Barry Bendall, Regional Director at The Rivers Trust, tells us more about it.

Why sea trout?

“Sea trout is of considerable social, cultural, ecological and economic importance throughout the North Sea region. Sea trout is important for food and for local economies: people working in fisheries, trade and tourism earn good money from them. This is a fish that migrates back and forth between marine and freshwater environments in order to complete their life cycle. They are therefore a good bio-indicator of aquatic ecosystem health.”

What do you think are the highlights of the project?

“I think that one of the highlights was the sharing of knowledge within the partnership. Bringing all pieces of knowledge about biology, ecology and behaviour of sea trout together, we found the issues and challenges faced by sea trout and other migratory fish in the region. A great example of this collaborative process was the collection and analysis of genetic material from across the region, in order to understand the structure and evolutionary differences between different trout populations in the North Sea region.” A lot of information is already available at www.livingnorthsea.eu/webgis.

What happens to sea trout after they move from the river to the sea?

‘Although the project focused on developing and sharing knowledge on the freshwater phase of sea trout migration, understanding what happens to sea trout when they enter the North Sea was a key question within the project. We wanted to obtain as much information as possible about their migratory routes, behaviour, feeding locations, different population interaction and the potential for conflicts with human activities (e.g. fishing and renewable energy developments etc.). To achieve this we carried out several studies. We tracked the movements of migrating fish along the east coast of the UK using acoustic transmitters and fixed location receivers. We also used electronic data storage tags that enabled us to gather data on the swimming depth and temperature experiences of the fish. We carried out mark and recapture tagging studies and used biological material from the fish themselves in order to determine aspects of their migration and feeding ecology. We made an isoscape map of the North Sea, showing the isotopic composition of jellyfish and scallops – sea trout’s staple diet – in different areas in order to determine feeding locations. Besides that we obtained genetic material from sea trout caught in commercial fisheries and tried to assign each fish back to its river of origin. This provided insights into migratory routes and the stock composition of the catch. Catch records from these

fisheries have enabled us to compare catches with other marine indices (such as plankton abundance) in order to understand how such factors in the marine environment may regulate sea trout populations.

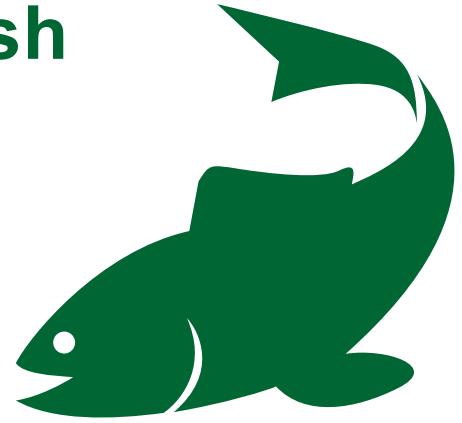
Can we really restore free passage for migratory fish?

‘We have a long way to go before we will get close to restoring free passage for migratory fish in the NSR. However, the outcomes of the LNS project contribute to the overall evidence base available to managers, authorities and decision makers. This enables the development of better policies and actions that protect and restore migratory fish populations. Negative impacts of historical and existing human activities now and in the future (e.g. barriers to migration, pollution, over abstraction, loss of habitat) need to be reversed. Also LNS activities have had a positive influence on addressing some of the challenges that lie ahead. For example we were asked to co-convene a session at the ICES science conference on the effect of renewable energy production on aquatic life, we were in an expert panel on improving the fish passage at the Haringvliet sluices, we attended an EU workshop on common implementation of WFD and hydropower and convening an EU network meeting to discuss the importance of policies to protect free passage for fish migration.’

Sea trout from Sweden (© Olle Calles)



Clear run for migratory fish



Tidal barriers and pumping stations are the major fish migration barriers in the North Sea region, especially in lowland areas. Hydro-electric power plants and loss of habitat are also major obstacles to fish migrating from the sea to their spawning grounds inland, and vice versa. This is one of the main conclusions of the Living North Sea 'Innovative Solutions' project. Technical experts and policymakers from the various participating countries explored what and where the biggest problems are in the North Sea region. Together, they developed new solutions and recommendations that should ensure that fish can once more move freely back and forth between rivers, the sea and tidal zones.

Ans Mouton, Senior Scientist at the Flemish Research Institute for Nature and Forest (INBO) and coordinator of the LNS Innovative Solutions project, says: 'There is growing pressure on water resources and flood protection, partly because of climate change. Part of the solution lies in a "source-based" approach, through things like re-meandering, retaining rainwater, the restoration of flood plains and of tide-inhibiting mudflats and salt marshes. But the need for flood protection barriers and controlled water evacuation is also set to increase. We have to find new solutions, better and innovative migration measures, such as passages, sluice management and restoration of habitats.'

This is what the LNS 'Innovative Solutions' partnership focused on. Happily, recent European legislation (the Water Framework Directive and Eel Directive) encourages measures to tackle

fish migration problems. As a result, pump manufacturers are also developing fish-friendly pumps.

Jointly designing a lock or pumping station

There are different causes for fish damage in pumps, such as shear and pressure changes. But most damage occurs from direct collisions between fish and propellers or guide-vanes in the pump. Research within the project shows us that large pumps are generally less harmful (to individual fish) than small pumps. And slow pumps tend to be less harmful than pumps that operate at high speed. Conventional screw pumps are usually the most damaging for fish, while three-blade Archimedes screw-type pumps are relatively fish-friendly.

How does one choose the right solution for a specific site? The new 'Guidance on the Realisation of Fish Migration and

Pumping Stations' can help. This guide for managers and technical experts provides practical guidance on the entire process from the use of relevant legislation and regional policy to the choice and construction of the right design and the monitoring of effects. The guide brings together people from different disciplines with their different expertise, and flow charts guide the user through the decision-making process.

Hydropower

The EU is committed to rigorously reducing greenhouse gas emissions. Hydropower is expected to make the biggest contribution to this effort after wind power. But not all renewable energy is environmentally benign. The whole environmental cost of a hydro-electric power plant needs to be assessed. Moreover, each member state should identify 'no-go areas' for hydropower development, taking into account Natura2000 sites, protected species, water resource availability and locally important habitats. Subsidies for hydro-energy plants should be dependent on approval of appropriate mitigation measures, licences need to be time-limited and effects should be monitored adequately.

Restoring habitats

Trial and demonstration projects have been carried out in all countries in the North Sea region, from buffering acid lakes in Sweden to putting stones in soft banks for smelt and eel (the Netherlands) and the restoration of sea trout spawning grounds in Bogense Bybæk (Denmark).

The key issues on habitat quality are highly related to connectivity problems. Both problems should therefore be addressed when considering river



LNS Pilot project: Stiffkey tidal outfall sluice (UK)



restoration. There are many projects within the North Sea region that aim to restore habitat or continuity or both. The exchange of knowledge from these projects on a catchment scale or even on a European scale has to be improved.

Policy recommendations

The key thing will be to keep the contacts going now this three-year project has ended, and ensure that all the wonderful measures are actually put in place. The European Water Framework Directive sets important reference points. Implementation will

not be straightforward. It requires managers to influence other sectors to carry out works which may appear to be insignificant in the face of modern environmental challenges. People often think that measures are disproportionately expensive. This idea may actually be misleading if the impact of a solution is felt across a wide area of the North Sea region.

It is not possible to tackle all barriers at once, so priorities have to be set. Ans Mouton is happy with the results of the project, though he realises a lot remains

to be done. 'There is still a lot we don't know about migratory fish,' he explains. 'That makes it difficult to assess whether measures to restore habitats work or not. We need more projects that research the effectiveness of measures on a larger scale. Furthermore, the whole life cycle of the fish should be considered when choosing restoration measures.'

These and more policy recommendations were presented and discussed at the closing conference in Newcastle (See page 2) and will be published on the Living North Sea website in May 2013.

Students investigate fish migration

Four students from the northern Netherlands focused on fish migration for their graduation project. Their research produced new insights for LNS. The students worked with several LNS partners to acquire the information they needed. The four, who are delighted with the international experience they gained and the collaboration with all partners, were supervised by Noorderzijlvest and Hunze en Aa's water authorities.

Sea trout

Marc Bartelds, who studied for a Master's in Marine Biology at the University of Groningen, focused on sea trout in the

Dutch region of the Waddenzee and adjacent freshwater inflows. 'Little was known about numbers of sea trout in these waters', he says. 'Despite the fact that it is not possible to precisely determine a population size, I found indications that tens of thousands live in the study area.' In [his report](#) he concluded that though the waters are fairly well-suited to sea trout, but that barriers seriously hamper their migration. 'The policy of facilitating fish migration helps, provided everyone along the entire migration route cooperates, from the spawning grounds to the marine habitat.'

Cultural value

Jessica Marchal, environmental science student at Van Hall Larenstein college of higher education, studied the socioeconomic value of eels, salmon and sea trout in Groningen and in the Odense river in Denmark, the Ätran in Sweden and the Tweed in Scotland. In Groningen province, the biggest source of income from these fish comes from the issuing of fishing licences. In the three other

regions, tourism is an important source of income, Jessica concluded. 'These fish species have great cultural value', she says. 'People used to be dependent on them. My [study](#) mainly contributed to exchange of knowledge.'

Guidance

Marlous Heemstra and Jos Veneberg, who studied coastal and sea management at Van Hall Larenstein, collated information on potential solutions to the problem of fish migration at pumping stations. 'There have been lots of projects and reports on fish migration in various countries, but they are not universally accessible, or have been published in technical reports', says Heemstra. 'We produced a synthesis.' The two students brought all the information together in a user-friendly guide, which has also been translated into English, with the title 'Guidance on the Realisation of Fish Migration at Pumping Stations'. 'Our book is in great demand,' says Veneberg. 'It's also available on the [LNS website](#)'.



Realisation of fish friendly pumping station Ennemaborgh

Reintroduction of endangered sturgeon to Rhine river system a real prospect

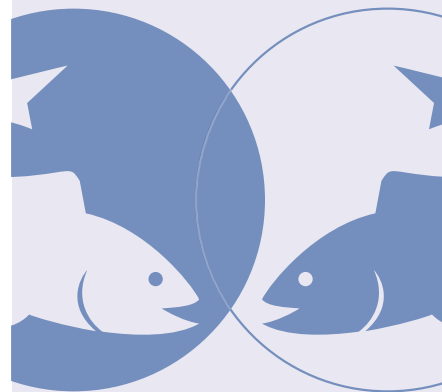
Co-financing from the Living North Sea programme has been used to reintroduce the European sturgeon *A. sturio* to the Netherlands. The quality of the river Rhine has improved substantially and might now be suitable for the comeback of this critically endangered species. In celebration of the 50th anniversary of WWF in May 2012, Princess Laurentien of the Netherlands helped release sturgeon in the port of Rotterdam. The event received a lot of media attention and featured on the national news. The release of 50 tagged fish was the start of a tracking study of hatchery-reared sturgeon in the Dutch lower Rhine, designed to explore the possibilities for a more extensive reintroduction programme. Project partners Sportvisserij Nederland (LNS beneficiary), WWF and ARK nature believed that the European sturgeon was under-studied and a further boost to research activity was needed to close information gaps on migration, concerning the timing of both travel to and residency in a particular habitat (riverine,

estuarine and marine waters). This information would allow a management scheme to be set up to protect habitats and distinct populations of reintroduced European sturgeon from certain impacts (e.g. habitat loss, pollution, illegal harvest, by-catch from fisheries that target other species).

Outcomes of the tracking study

The tracking study has so far shown that the observed seaward migration is fast and uniform. Preferred migratory pathways led into the port of Rotterdam, following the main flow of the Rhine, but neglecting the route into the sea through the historic estuary. Six sturgeon have so far been recaptured in coastal waters by commercial bottom trawlers. It has been concluded that for the species to survive the historic Rhine estuary must be opened up again, and that sustainable coastal fishing is also a key condition. In 2013, more work is planned to help the reintroduction of this precious fish species to the Rhine river system.

Release of European sturgeon in the Netherlands with Princess Laurentien of the Netherlands and schoolchildren from Rotterdam.



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