International conference

Restoration of Streams with special emphasis on the houting and the Houting Project

3-5 October 2011, Tønder, Denmark

A B S T R A C T S

Fish Farm Bramming in the River Sneum system after restoration (July 2011)

Monday 15^{30}-16^{50} - Session I

A short history of stream restoration in Denmark 4
Criteria for assessment of stream continuity 5
Genetic monitoring of the endangered North Sea houting (Coregonus oxyrhinchus) 6
River restoration of Nørresø in the Vidå system 7

Tuesday 10^{05}-11^{45} - Session II

Simulating the migration of Houting larvae in a constructed wetland using Agent Based Modeling (ABM) and hydro-dynamical modeling 8
The houting population of the River Treene: Hydromorphology, fish biological status and restoration measures 9
The houting population of the Treene River (Northern Germany): Genetics, resource use and population dynamics 10
In the Search for the North Sea Houting – a study of mitogenomics in the European lake whitefish and the North Sea Houting 11
Do indigenous brown trout populations persist in the western Jutland rivers? A matter of scales 12

Tuesday 12^{50}-14^{30} - Session III

Restoration of river-oxbow lakes ecosystem of the River Emajõgi, Estonia 13
An evaluation of restoration practises in lowland streams: Has the physical integrity been re-created? 14
Restoration of habitat as essential factor for improved fauna populations – Long term experience on North German lowland brooks 15
Morphological adjustments and macroinvertebrate re-colonisation following re-meandering 16
Effects of habitat and fauna passage improvement projects in Danish watercourses 17

Wednesday 0900-0940 - Session IV

Effects of watercourse restoration from 1999 – 2008 under the Seatrout Fyn project 18
Design and implementation of passage for the Houting (Coregonus oxyrhyncus) through dams at 6 fish farms in river system Sneum Å, South Jutland 19

Posters

Restoration of Vester Nebel river–Part of a holistic project for Kolding river catchment 20
Financing for the revitalisation of urban river spaces 21
Quantification and management of fine sediments in streams 22
The thick shelled river mussel (Unio crassus) brings LIFE+ back to rivers 23
Experience from restoring Vejle Stream 24
Exploring and evaluating science-policy interfaces in the Wadden Sea 25
The Houting-project – Denmark's second largest nature restoration project 26
Miljøstyrelsens tilskud til vandløbsrestaureringer 1983 – 1997 27
Genopretning af Varde Å–Danmarks hidtil næststørste naturgenopretningsprojekt 28

Participants ..... ….30

Programme 32

Monday 15^{30}-16^{50} - Session I

A short history of stream restoration in Denmark

Bent Lauge Madsen

Ministry of the Environment (retired 2001), Denmark

Half a century ago, the biological treatment of waste water was regarded as the solution to abate the deterioration of our lakes and streams. Much to the frustration of the local politicians, the lakes still grew greener, and the trout did not return to the streams cleaner water. The answer to the lakes problem was to reduce the nutrient load. To restore streams to a former trout habitat we had to realize that stream quality was more than just a good water quality. A major damage to the stream habitats was caused by channelizing and deepening the streams to drain the meadows, followed by repeated dredging and intensive weed cutting in order to enhance the streams discharge capacity.

The objectives of a good stream quality were defined in ca. 25.000 km streams as a habitat with self-reproducing trout populations. This includes, as a first step, a three dimensional definition of stream quality criteria: Good water quality, varied physical shapes, and a sufficient minimum water discharge. It was not unbeknownst to us then, that more dimensions were needed to meet an ecological sound stream quality. However, to achieve public acceptance, we “cut the sausage into thin slices.” Now, 40 years later, stream quality criteria include the upstream-downstream continuity as well as the stream’s freedom to flood its meadow. Almost 50% of app. 700 Danish trout farms, disrupting the streams, have been abandoned, and numerous streams have regained their meanders, some of them have even been reunited with their meadows. Such examples demonstrate the increasingly growing public acceptance.

Some of “the initial thin slices” of our attempts to improving the damaged stream’s physical shapes included artificial shelters for trout, construction of artificial current concentrators in order to clean up riffles, buried in sand. Even modified weed cutting, which left some weed shelters for fish, was tried successfully. All the experiments were well buffered by economical compensation to riparians, whose properties could be at risk. These experiments paved the road to a revision of the Danish water course act with room for more than water discharge.

The most important lesson from our initial attempts is that local public acceptance must have a very high priority. Our river keepers have been educated in managing streams, so that they are more than gutters. Riparians, e.g. farmers must feel partnership in the more natural streams, and they should be compensated for losses of property.

Criteria for assessment of stream continuity

Christian Dieperink

WaterFrame, Ryesgade 9A, DK – 8680 Ry, Denmark

Fish can be used to evaluate the environment in which they live. If the water is low in dissolved oxygen, only those species of fish that are tolerant to low oxygen levels will survive. Likewise, if a river contains numerous weirs and dams, obstructing the longitudinal continuity, the fish species that need to migrate will disappear.

In the Water Framework Directive (WFD), presence or absence, density and composition of the fauna and flora were intended to be used as cornerstones in environmental assessments of aquatic ecosystems. However, in Denmark as in many other European countries, these so-called biological quality elements (BQE's) have not been fully utilised in the first round of WFD-assessment.

With regard to riverine continuity, we are still lacking an easy-to-use European standard, based on those organisms that are most responsive to changes in continuity.

In Denmark, a set of guidelines regarding physical properties of streams have been introduced in order to try to determine what is acceptable and what is inacceptable continuity in running water.

However, in order to improve the living conditions for migratory aquatic animals, we will need a standardised continuity assessment system that uses the local presence of living organisms to define whether the continuity is adequate or not. A secondary benefit of such continuity assessment system would be its use as benchmark tool for evaluating the fulfilment of objectives behind projects such as the houting restoration project.

Criteria for such a continuity assessment system are proposed with special reference to the successful reestablishment of houting in the Wadden Sea tributaries.

Genetic monitoring of the endangered North Sea houting (*Coregonus oxyrhinchus*)

***Dorte Bekkvold*[1)]** - *Michael M. Hansen[2)], Karen-Lise D Mensberg[1)] & Noortje de Jong[1)]*

[1)] *National Institute of Aquatic Resources, Technical University of Denmark, Vejlsøvej 39, DK-8600 Silkeborg, Denmark.*
[2)] *Dept, of Biological Sciences, Aarhus University, Ny Munkegade 114, DK-8000 Aarhus C, Denmark*

Monitoring populations is an integral part of conservation and management programs. It can for instance be of importance to assess whether demographic and environmental stochasticity may lead to risk of extinction in small and fluctuating populations and to assess effects of directed conservation actions such as habitat restoration and restocking programs.

The endangered North Sea houting (NSH) (*Coregonus oxyrhinchus*) is an anadromous salmonid previously distributed throughout the Wadden Sea area including the Elbe and Rhine but now only persists in low numbers in four or five rivers. Of these, the River Vidaa is assumed to hold the only indigenous population, with other populations derived from reintroductions based on Vidaa broodstock. Stochasticity may seriously affect such vulnerable populations and lead to declines where the persistence of individual populations is at risk due to inbreeding and loss of genetic variation.

We used microsatellite DNA analysis to monitor genetic variation in time series of NSH samples collected in the rivers Vidaa, Varde and Ribe over nearly 30 years (1980-2009). We 1) evaluated genetic relationships among populations and 2) estimated genetically effective population sizes (essentially a measure of the number of individuals that contribute genes to the next generation) and tested for population bottlenecks in each population. We used simulations to evaluate the usefulness of the applied methods for monitoring NSH.

Our results show relatively close genetic relationships among sampled populations. The exception is the Varde population, where results indicate hybridization and admixture between NSH and its close relative, the European lake whitefish (C. lavaretus), both of which were stocked into the river. Effective population size of the Vidaa population is sufficiently high to avoid problems associated with inbreeding depression and loss of evolutionary potential. The genetic composition of Ribe and Varde rivers is temporally unstable, suggesting impact of stocking programs.

Simulation analyses indicate that a substantial decline in genetic population size would be detectable with the applied methods. We conclude that 1) the applied methods present a valuable tool for genetic monitoring in NSH, 2) the indigenous Vidaa NSH is not immediately threatened by inbreeding or loss of evolutionary potential, and 3) that genetic composition of reintroduced populations is likely to be more affected by stochastic effects and stocking.

River restoration of Nørresø in the Vidå system

Jes Kromann Bak

Rambøll, Englandsgade 25, DK 5100 Odense C, Denmark

The River Restoration at Nørresø and Hestholm Kog in the Vidå stream system has created a new wetland area of approximately 100 ha. This new wetland will be suitable for upbringing of the Houting.

The Vidå Stream used to be straightened out between two dikes and the area was used for agriculture. In periods with high water level the water would only raise in the narrow zone between the two dikes. With the River Restoration the stream meanders into the agriculture area and the northern dike has been established further north. Even at low water level the new wetland area is partly flooded, and at higher water level the wetland appears as a lake.

The dominating effort in the project was earthworks. In total approximately 255.000 m^3 has been excavated and build into the new dikes.

In the construction phase the logistic planning was a heavy challenge. The earthworks started with excavation for the new meandered stream and the soil was build into the new dikes. However the soil volume from this excavation was far from enough to establish the new dikes. To generate more soil the wetland area was modelled. The modelling also ensured that the wetland would be without depressions. During dry periods depressions may retain water and fish fry.

The dikes are of upmost importance, due to the fact that The City Tønder is lower than the highest water level in the Vidå stream. Therefore the existing dikes could not be removed before the new dikes were established and approved. To ensure settlements in the new dikes was completed measurements (levelling the dike top) were carried out for approximately 6 months.

Hereafter the water was let into the new stream. With water in the new stream, the wetland area was directly affected by the water level in the Vidå Stream. Removal of the existing dikes was indeed affected by the water level. Each time the water level was higher than the wetland terrain, the earthworks was difficult or impossible. Soil from the existing dikes was used to refill the existing Vidå Stream. To minimize the risk of damaging the fauna in the stream, the refilling was started upstream and the fauna was gently pushed downstream.

The presentation will describe the project briefly and describe the challenges in the construction phase and will be supported with a series of photos.

Tuesday 10^{05}-11^{45} - Session II

Simulating the migration of Houting larvae in a constructed wetland using Agent Based Modeling (ABM) and hydro-dynamical modeling

***Flemming Thorbjørn Hansen*[1)]** - *Mads Madsen[1)], Per Sand Rosshaug[1)], Ciarán Murray[1)] & Lene Kristensen[2)]*

[1)] *DHI, Agern Alle 5, 2970 Hørsholm, Denmark*
[2)] *Nature Agency Ribe, Department of Land Management, Skovridervej 3, 6510 Gram, DK*

To improve Houting habitats in Danish river systems the former Danish Forest and Nature Agency in co-operation with local counties initiated the EU financed Houting Project.

In this context DHI was asked to evaluate 2 alternative designs of rivers and inundated areas to achieve the most efficient detainment of Houting larvae and fry. During the early life stages (<5 cm's in length) larvae cannot tolerate high salinities and thus need to be detained in the river system upstream river sections influenced by salinity intrusions.

Utilizing MIKE by DHI software a combination of a 2D Hydrodynamic model and an Agent Based Model (ABM) was used for the analysis. The ABM was setup in MIKE ECO Lab based on the best available knowledge on the behaviour and preferences of juvenile Houtings, including rules and algorithms for e.g. larval growth, size dependent swim speed, age dependent mortality risk and restricted area search for selected habitat preferences.

The models were setup with 2-D bathymetry/topography representing the physical designs of the two alternatives. In each model 1000 newly hatched larvae were released upstream and a 2 month simulation period applied. Simulation results were compared by registering the length of each fish larvae at the time larvae were leaving the project area at the downstream outlet.

Results showed significant difference between the 2 wetland construction designs in the ability to detain larvae during the critical growth phase (up to 5 cm's.). The design where most larvae were retained during the simulation period was finally evaluated as the design likely to achieve the most efficient detainment. By combining the hydraulic simulation with ABM it was possible to evaluate the existing knowledge on behaviour of fish larvae and the implications in a highly fluctuating hydraulic environment.

The houting population of the River Treene: Hydromorphology, fish biological status and restoration measures

Matthias Brunke[1)] - *Jan Dierking*[2)]

[1)] *State Agency for Agriculture, Environment and Rural Areas (LLUR) Schleswig Holstein, Hamburger Chaussee 25, 24220 Flintbek, Germany*
[2)] *Leibniz-Institute of Marine Science), Düsternbrooker Weg 20, 24105 Kiel, Germany*

The Treene is one of the largest rivers in Schleswig-Holstein with a catchment size of 797 km^2. It is typologized under EC Water Framework Directive (WFD) as a sand-dominated stream along 37 km, sand-dominated river along 15 km and marsh river along 32 km of its course. The Treene flows into the Eider estuary 26 km upstream of the mouth to the North Sea (2065 km^2).

The houting was stocked the first time 1987 with fry of fish from the Danish Vidau population. Migrating adult houting have to pass the flood barrier at the mouth of the Eider and the sluice at the confluence of Treene and Eider, both of which are only temporarily open, on the way to their Treene spawning grounds. Other long distance migratory species that are regularly recorded include eel, sea trout, non-native salmon, and sea and river lamprey. A total of 33 fish species has been detected by 124 electrofishing investigations in the Treene catchment since 2004. The most dominant species refer to minnow, gudgeon, perch, roach, and eel.

The Treene suffers from a severe sand load, which probably stems mostly from (a) erosion by agricultural areas along the tributaries and (b) bank erosion induced by a high lateral mobility because of the lack of riparian wood to stabilize channel-forming processes. Despite the presence of this wide-spread stressor, the ecological status of fish assemblages in the Treene ranges between good and moderate. In contrast, tributaries are mostly heavily degraded and their fish ecological status ranges between moderate and poor.

Several restoration measures have been conducted to achieve a good ecological status as demanded by the WFD. Two migration barriers located in the river's middle section have been made permeable by building a nature-near ramp and reducing weir height. The last barrier will probably be restructured until 2012. Subsequently the houting will have full access to the upper Treene, which offers some nature-near sections and stretches that have previously been morphologically improved by adding gravel to form riffle structures.

A houting monitoring and research programme was started in 2009. It aims to clarify the genetic status of Treene houting because of the possibility of hybridisations in coregonids, which could have occurred via the Kiel Canal, to estimate the number of returning adults and overall population size, to detect larvae, analyse resource use of migrating adults and to assess habitat quality.

The houting population of the Treene River (Northern Germany): Genetics, resource use and population dynamics

Jan Dierking[1] - *Matthias Brunke*[2] *& Christophe Eizaguirre*[1]

[1] *Leibniz-Institute of Marine Sciences (IFM-GEOMAR), Düsternbrooker Weg 20, 24105 Kiel, Germany*
[2] *State Agency for Agriculture, Environment and Rural Areas (LLUR) Schleswig Holstein, Hamburger Chaussee 25, 24220 Flintbek, Germany*

The anadromous North Sea houting (NSH) (alternatively classified as *Coregonus oxyrinchus* or *C. maraena*) was once an important fisheries species in Northern Germany. The construction of migration barriers, water pollution and habitat loss resulted in its local extinction by the 1960s. Stocking with NSH from the last remaining population in the Danish river Vida in 1987 then led to the reintroduction in the German Treene River, which subsequently served as stepping stone for stocking of other German rivers. Here, we present data on the first biological characterization of the NSH in the Treene since the onset of stocking programs 24 years ago.

Regarding the genetic status of the Treene NSH, using 17 microsatellite markers and 2 mtDNA loci, we found weak genetic differentiation from the Vida source population, but substantial differences from German Baltic houting (*C. lavaretus* or *C. maraena* depending on authors) populations. This indicates that the reintroduction was not confounded by stocking errors or hybridizations and suggests that NSH and BH are distinct evolutionarily significant units.

Secondly, we characterized (1) the population dynamics and (2) the resource use of the Treene NSH population. Regarding (1), we will present effective population size, and census population size based on mark-recapture data. We also provide the first evidence for successful natural reproduction in the Treene, based on the observation of recently hatched larvae in spring 2011. Regarding (2), stable isotope analysis showed variation in migration strategies, with most adults migrating back to sea after spawning but some staying in freshwater year-round. Interestingly, full stomachs occurred throughout the freshwater stay. Finally, electrofishing surveys indicated the use of specific spawning areas, which should be targets for future habitat characterizations.

This study brings us closer to the goal to understand bottlenecks influencing NSH populations in the wild, including the respective role of migration barriers limiting access to spawning habitat, availability and extent of spawning habitat, and quantification of recruitment and mortality of different life history stages.

In the Search for the North Sea Houting – a study of mitogenomics in the European lake whitefish and the North Sea Houting

***Magnus W. Jacobsen*[1)]** - *Tom Gilbert[2)], Ludovic Orlando[2)], Dorte Bekkevold[3)], Louis Bernatchez [4)] & Michael M. Hansen [1)]*

[1)] Department of Biological Sciences, Aarhus University, DK-8000 Aarhus C, Denmark.
[2)] Centre for GeoGenetics, Natural History Museum of Denmark, 1350 Copenhagen, DK
[3)] Nat. Institute of Aquatic Resources,Technical University of Denmark,8600 Silkeborg, DK
[4)] Département de Biologie, Institut de Biologie Intégrative et des Systèmes, Pavillon Charles-Eugène-Marchand, Université Laval, Québec (Québec) G1V 0A6, Canada.

The North Sea houting (NSH) (*Coregonus oxyrhinchus*) has received considerable attention the recent decades. However, few studies have been conducted to assess its evolutionary history. Morphological analyses have revealed only small differences between the NSH and closely situated European lake whitefish (ELW) (*C. lavaretus*) populations, which has lead some authors to question the species status of the NSH.

However, morphology within *Coregonus* is very variable, thus it is questionable whether one can rely simply on morphological characters when investigating the evolutionary history. Earlier genetic investigations of the NSH using microsatellite markers have shown that the NSH is genetically distinct from the Danish ELW. However, it has diverged post-glacially, probably within the last 10,000 yrs. Nonetheless, divergence estimates are problematic and further separate analyses would provide stronger evidence of a recent divergence.

Studies on mitochondrial DNA have so far not been able to distinguish between NSH and Danish ELW. These studies have in general relied on short mtDNA sequences (<1000bp) which influence the results, as variation increases with length of the sequence. In this study we use next-generation sequencing to generate whole mitochondrial genomes of 21 Danish NSH, 63 Danish ELW, 16 ELW from the Baltic Sea and six American lake whitefish (*C. clupeaformis*). Using mutation rates derived from the literature as well as estimated directly from the data we date major divergence events within the whitefish-complex, as well as between Danish populations.

The phylogeny shows higher resolution than earlier studies, nonetheless, supports the same overall phylogeny. The sampled NSHs are not monophyletic. Moreover, analyses of divergence time show that the NSH diverged from the Danish ELW around the same time as other Danish ELW populations. Estimates of ELW mutation rates give mean estimates of divergence of <10,000 yrs.

In contrast to other Danish ELW populations, the NSH shows small values of effective number of migrants and do not share any haplotypes. This strongly indicates reproductively isolation from the Danish ELW populations, where the NSH might follow a separate evolutionary trajectory. In conclusion this study provides further evidence for recent reproductive isolation between the NSH and ELW which supports the NSH status as a separate unit of conservation. Its species status remains, however, elusive.

Do indigenous brown trout populations persist in the western Jutland rivers? A matter of scales

Michael Møller Hansen

Aarhus University, Department of Biological Sciences, Ny Munkegade 114-116, 8000 Aarhus C, Denmark

Other species than North Sea houting, such as brown trout, are also expected to benefit from the restoration of rivers in western Jutland. However, decades of intensive stocking of wild trout populations with non-indigenous hatchery strain trout could potentially have led to the swamping or even displacement of the original populations.

Analysis of genetic markers from archived scale samples and contemporary samples from the same populations allows for estimating the genetic contribution of hatchery strain trout.

Using this approach we focused on brown trout populations in six major rivers along the Jutland West Coast, spanning from Storaa River in the north to Ribe River in the south. We analyzed DNA from archived scales collected in the 1920s-50s prior to the major stocking activities (in the 1970s-90s), along with contemporary samples of the wild populations and the hatchery strains used for stocking.

The results show surprisingly low admixture in some populations despite stocking of 100,000s of hatchery strain trout, whereas in other populations strong introgression has occurred.

However, even in the most strongly introgressed population non-admixed individuals representing the indigenous wild population have been identified using genetic markers. Spawning time differences between wild and hatchery strain trout appear to be one of the factors delaying complete admixture of the populations.

Finally, analysis of large numbers of molecular markers linked to coding genes provides evidence for selection acting against hatchery strain trout in the wild. In total, the studies document the presence of considerable remaining indigenous genetic diversity, the conservation of which will benefit from recent and ongoing river restoration efforts.

Tuesday 12^{50}-14^{30} - Session III

Restoration of river-oxbow lakes ecosystem of the River Emajõgi, Estonia

Jaak Tambets - *Meelis Tambets, Einar Kärgenberg & Mart Thalfeldt*

Wildlife Estonia, Veski 4, 51005 Tartu, Estonia

The LIFE+ financed project called Happyfish aiming to restore the river-oxbow lakes ecosystem of Emajõgi River was started in 2009.

The 100-km-long Emajõgi River connects Lake Peipsi, the fourth largest lake in Europe, and Lake Võrtsjärv (270 km^2). Over long period of natural formation of Emajõgi River, its streambed has undergone significant changes, resulting in distinctive water bodies cut off from the former riverbed. There are 55 oxbow lakes in the Alam-Pedja Nature Reserve at the upper course (70-100 km from river mouth) of the river. The total length and surface area of oxbow lakes on the territory of nature reserve is greater than that of the present riverbed.

Unique river-oxbow lakes ecosystems have evolved over time. Oxbow lakes have rich fish fauna and together with alluvial meadows they provide excellent reproduction grounds for many fish species. Our studies have shown that many fish migrate to spawn here from Lake Peipsi, Lake Võrtsjärv and other water bodies of the Emajõgi River system. The abundance of juvenile fish in oxbow lakes is extremely high for Estonian conditions.

Fish fauna of Emajõgi River and its oxbow lakes includes four fish species listed in the Annex II of the EU Habitat Directive – asp (*Aspius aspius*), weatherfish (*Misgurnus fossilis*), spined loach (*Gobitis taenia*) and bullhead (*Cottus gobio*), but also various species of high fishing importance such as perch, pike, ide, common bream and pike-perch.

Oxygen deficiency regularly occurs in oxbow lakes in winter and sometimes also in summer.

Low water levels disconnect oxbow lakes from the mainstream of Emajõgi River due to silting of oxbow lake mouth with sand and mud. Fish trapped in oxbow lakes without oxygen may die. To prevent this from happening sediment should be removed from the mouths of oxbow lakes.

For the restoration and enhancement of ecological potential of the Emajõgi River system the sediment removal is carried out at the mouths of 10 major oxbow lakes in frames of the Happyfish project. The studies of oxbow lakes fish fauna demonstrate the increase of fish abundance following the sediment removal.

An evaluation of restoration practises in lowland streams: Has the physical integrity been re-created?

***Esben A. Kristensen*[1]**, *Annette Baattrup-Pedersen*[1] *and Hans Thodsen*[1]

[1]*Aarhus University, BioScience, Vejlsøvej 25, 8600 Silkeborg, Denmark*

Intensive land use by humans has led to severe degradation of streams and rivers, especially in highly industrialised countries and in lowland agricultural areas. Restorations have been conducted with the aim to improve hydromorphological conditions in modified streams. However, success has often been limited, partly because the restorations have been conducted without due regard to river-type-specific characteristics.

The aim of this study was to evaluate restorations of Danish lowland streams by applying a type-specific approach. We compared the physical condition of restored streams with that of near-natural streams (Least Disturbed Condition) and channelized streams. We stratified the data according to different stream types and included also reference sites from a less impacted country (Lithuania) in the evaluation.

Our results revealed that restorations have created physical conditions that do not resemble river-type-specific LDC conditions, primarily due to the addition of large amounts of coarse substrate. This may have implications for the ecological communities and for biodiversity and consequently for the implementation of the Water Framework Directive in restored lowland streams.

We also found that observations of physical condition in nearby reference streams may be used to advantage in future restoration planning, thereby assuring a higher degree of physical integrity in restored streams.

Restoration of habitat as essential factor for improved fauna populations – Long term experience on North German lowland brooks

Ludwig Tent, Dr.

Edmund Siemers-Stiftung, Buchenweg 11, D – 21255 Tostedt, Germany

Brooks and small rivers of the North German Lowland, caused by their geochemical background by the glacial ages, within the morane landscape once have been gravel streams. Their groundwater-fed origin and the high habitat variety, accompanying deciduous wood with roots and a high amount of dead wood giving three dimensional structures within the water column characterized these waters as productive summercool salmonid stretches – also important as spawning places for migrators from the rivers, e.g. sea trout, river and sea lamprey.

Heavy construction work, hard maintenance over time and increased excessive land use during the last decades turned these once thriving biotopes into sluggish canals with moving sand. Engaged people tried to restore these waters, mostly against heavy pressure of land users and authorities. International knowledge of how to regain the vital functions, however, grew steadily.

Now, in the time of the Water Framework Directive, the chance has come to restore habitats in a large scale. Long time experience, often gained in step-by-step activities, helps to take the most effective way, avoiding mistakes. Examples are given for rural and urban waters where the salmonid reaches have been restored.

Trout, brook lamprey, stone loach and accompanying characteristic invertebrates reveal the positive results. Adopt-a-brook groups and engaged individuals co-operate with water authorities, land owners and maintenance organisations to further improve the situation. To stabilize the results on catchment level and in the time of climate change develop the necessary adaptations, however, strong efforts have to be taken within the total system.

Stream corridors with deciduous trees as buffer to avoid the entrance of erosive materials, pesticides and nutrients as well as re-gaining the characteristics of the summercool stream are the inevitable basis. Altering present day subsidies for agriculture, adaptation of river maintenance to the goals and consequent action of water authorities are needed. – In addition, in the International Year of Forests 2011, one has to remind the important role of river accompanying woods as a means of climate adaptation.

Morphological adjustments and macroinvertebrate re-colonisation following re-meandering

Morten Lauge Pedersen[1] - *Gry Annika Jensen*[2] *& Mikkel Røjle Bruun*[3]

[1] *Aalborg University, Dep. of Civil Engineering,Sohngaardsholmsvej 57, 9000 Aalborg, DK*
[2] *Odsherred Municipality, Nyvej 22, 4573 Højby, Denmark.*
[3] *Jammerbugt Municipality, Lundbakvej 5, 9490 Pandrup, Denmark.*

In winter 2008 the small brook Skamlebækken was converted into a meandering watercourse after 60 years as a culvert stream flowing partly underground. The remeandering included reopening and remeandering of 225 m of formerly partly culverted stream. Skamlebækken is located on the top of the moraine hills in Odsherred on Zealand, Denmark. The total length of the brook is 1600 m and just upstream of the restoration area a constructed mill pond disrupts natural morphology and hence limiting up- and downstream migration of flora and fauna. The catchment area is 1.5 km^2 and the soil types are coarse grained sandy moraine and the landscape is dominated by high gradient grazed area and partly natural peat bogs and forest.

The morphology, in-stream habitats and macro invertebrate communities were monitored once before the restoration and 5 times following the restoration; after 1, 3, 6, 12, 18 and 30 months. One upstream control site and 3 reaches affected by the restoration were monitored.

The re-meandered brook experienced substantial initial morphological adjustments. The newly excavated course was prone to a large influx of sediment from the banks. This influenced both sediment transport and deposition patterns in the stream. In-stream habitat structure changed marked as consequence of the restoration. Velocity and depth as well as stream bed sediment structure were significant altered in the new watercourse. During the 30 month recovery period analyzed here the stream gradually evolved into to a stable condition. However, at the end of the monitoring morphological adaptation processes was still working and will do so for a long period, because no steady state exist between discharge, sediment delivery and morphology.

Macro invertebrate communities were heavily affected by the restoration. The brook was devoid of any macro invertebrates just after the restoration. The community slowly recovered and by month 12 the community abundance was up to 1% of the pre-restoration level respectively. By month 18 the community was dominated by chironomids, *Gammarus pulex* and *Baetis* sp. The taxonomic structure of the community had however changed significantly and some of the poorer disperses will take years to recover due to the isolation of the brook.

The results however indicate the time scale to be expected in small streams and brook with small upland areas and can thus serve as a more solid base to judge our effect studies on restoration in small water bodies.

Effects of habitat and fauna passage improvement projects in Danish watercourses

Anders Koed **-** *Anja Kragsig Mortensen, Jan Nielsen & Kim Aarestrup*

Technical University of Denmark, National Institute of Aquatic Resources, Section for Freshwater Fisheries and Ecology, Vejlsøvej 39, DK-8600 Silkeborg, Denmark

Anthropogenic changes such as channeling, gravel extraction and dam construction in rivers are common problems in many developed countries and the negative effects on fish populations are widespread. Remedial measures include spawning riffle restoration and fauna passage improvements. Several projects have evaluated local effects of such projects, but more overall approaches are scarce. The present study, funded the by the European Fisheries Fund (EFF) under the protection and development of aquatic fauna and flora scheme, represents the first Danish meta-study addressing the effects of habitat and fauna passage improvement projects on fish.

Habitat improvement in the form of spawning riffle restoration is a common type of project. The difference in population size of trout before and after restoration was used as a measure of the impact of the projects. Trout (*Salmo trutta*) were used as a metric since the trout is a good and measurable indicator of the ecological conditions of rivers. Data from a total of 71 projects form the basis of the analysis. The study concluded that spawning riffle restoration can be an effective method in streams and rivers to increase the population of trout fry: Mean population density on restored river beds increased by 175%, i.e. it nearly tripled. The density of older trout increased in average by 43 %. A smaller effect on older than on trout fry was expected because trout typically migrates away from spawning areas to other parts of the watercourse or to the sea as smolts when they reach a certain size. This means that such restoration projects, probably has a beneficial effect not only locally in the project area but potentially also in the entire distribution area.

Fauna passage improvement projects typically include dam and weir removal, construction of bypass or restoration of road culverts. Much fewer sites are included in the analysis because of fewer data available. For each type of project a series of cases were described. The best type of projects in relation to fish stocks, are when the dam, weir or road culvert are removed and the watercourse restored to the original gradient and flow. In these cases unimpeded fauna passage are achieved and also conditions for fish and other animals and plants are improved. Restoration projects where the natural gradient is not restored, such as bypass or fish ladders maintain suboptimal conditions, which may still be detrimental to the fish fauna including stem zones and restricted water flow for passage.

To critically evaluate effects of restoration projects in the future it is recommended to conduct standardized assessments of selected parameters, e.g. class fauna (macro invertebrates) stream gradient and estimates of trout population size, before and after project implementation.

It is also recommended that the additional information is added to the current fund application as a prerequisite for funding. Requiring standardized monitoring of selected parameters before and after restoration project implementation, creates the basis for in-depth impact studies, which gives a better basis for optimizing and adapting restoration efforts in the future.

Wednesday 09^{00}-09^{40} - Session IV

Effects of watercourse restoration from 1999 – 2008 under the Seatrout Fyn project

Lars Bangsgaard - *René oCording Jensen & Jan Kjeldsen*

Seatrout Fyn, Odense Municipality, Nørregade 36-38, 5100 Odense C, Denmark

Back in 1990 the former Fyn County implemented various projects to promote occupation in the region of Fyn. One of the initiatives was the Seatrout Fyn project. The project focuses on three main objectives:

- Watercourse restoration
- Improved fish stocks
- Development of seatrout angling as a tourism brand

The aim of the Seatrout Fyn project is to develop increasing stocks of seatrout along the shores of Fyn by improving the physical conditions in the watercourses and by massive releases of smolt. In turn, this will create the foundation for the development of angling tourism on Fyn.

The watercourses on Fyn are highly influenced by obstructions which limit migration and spawning of seatrout. Since 1990 the Seatrout Fyn project has supported the establishment of fish passages at 192 obstructions in the watercourses.

Recently the effect on the density of trout fry (0+) and elder trout was investigated upstream 24 obstructions where fish passage was established from 1999 – 2008. The development was compared to the density of trout at 193 locations upstream obstructions with limited fish passage in a number of watercourses on Fyn.

The numbers of fry increase significantly ($p<0.05$) in watercourse sections situated upstream an established fish passage. A fish passage typically results in a two to three fold increase in fry densities and at some locations the increase is even as large as 500 %. The average fry density has increased from 44 to 85 per 100 m^2 watercourse bottom.

In comparison the density of fry in watercourses where obstructions still occur did not increase significantly ($p>0.05$) in the same period. Thus, establishment of fish passages works and supports seatrout stocks. When access is secured to the spawning and growth locations in the watercourses the seatrouts respond very fast expressed by a pronounced increase in the production of fry.

Design and implementation of passage for the Houting (*Coregonus oxyrhyncus*) through dams at 6 fish farms in river system Sneum Å, South Jutland

Peter Mæhl [1)] - *Henrik Mørup-Petersen*[2)], *Jes Kromann Bak*[2)], *Jesper Aarosin Hansen*[3)] & *Ebbe Evendorf Høy*[4)]

[1)] *Ramboll Denmark, Lysholt Allé 10, DK-7100 Vejle, Denmark*
[2)] *Ramboll Denmark, Englandsgade 25, DK-5100 Odense C, Denmark*
[3)] *Ramboll Denmark, Hannemanns Allé 53, DK-2300 Copenhagen S, Denmark*
[4)] *Vejen Municipality, Teknik & Miljø, Højmarksvej 20, 6670 Holsted, Denmark*

As a part of the Danish management plan for the threatened fish species Houting *(Coregonus oxyrhyncus)*, launched by the Danish Nature Agency and financially supported by the EU-Life Fund, 6 major obstacles for the passage of Houting to the upstream spawning grounds in the river system of Sneum Å were removed. The river constitutes Habitat area No. 79, Sneum Å and Holsted Ådal.

When the fish farms were running, the water of the river at each fish farm was stemmed and conducted through a number of fish ponds, making it impossible for the Houting and other migrating fish as trout and three species of lamprey to pass through.

To create a passage, it was decided to re-meander the river through the areas of the fish farms and to fill up the former fish ponds.

However, a number of challenges had to be dealt with:

- The Houting is a "slow" swimmer, which avoids rapidly flowing water, meaning that the slope of the bottom through the fish farm had to be relatively small, which again required more space to compensate for the height difference.
- The upstream and downstream water level were not allowed to change (rise) due to requirements from landowners.
- The plant and animal life constituting the basis for the designation of the habitat area and other kinds of protected nature should not be affected negatively.
- Some landowners had special requirements to design.
- Shallow areas for growth of fry of Houting should if possible be incorporated with the purpose to delay the arrival of the fry to the Wadden Sea.
- The soil balance for the project should be maintained to save expenses for transportation of soil.
- The projects should be adapted to the landscape forms.

The paper describes the methods and the solutions to design and implement the project and to solve different kinds of challenges during all phases of the project, from the first sketches to the last cubic meter of soil filled in at the right place.

Posters

Restoration of Vester Nebel river – Part of a holistic project for Kolding river catchment

Hans-Martin Olsen - *Peter Ring*

Municipality of Kolding, Department for City and Development, Nytorv 11,6000 Kolding, DK

In 1918-20 an electric hydropower plant (Harteværket) was established near Kolding in Southeast Jutland, Denmark. The establishment secured a substantial part of the need for electricity in Kolding and surrounding villages. But at the same time the catchments of Almind river and most of Vester Nebel river were dammed, thus preventing the free migration for fish and fauna in the river catchments.

As the general use of electricity steeply increased during the 20th century, the importance of the electricity production at Harteværket decreased, and after years of negotiations in 2007 a project was initiated that should give back the water to Vester Nebel river and transform Harteværket into a working museum based on the water from Almind river.

In 2008 fish and fauna regained access to more than 40 kilometres of streams of high biological quality in the catchment of the Vester Nebel river through the establishment of 1000 meter new river around the artificial lakes at Ferup. Thereby free migration was secured parallel with the conservation of the important elements documenting the era of hydropower.

The poster presents the project completed and documentation for the effects of the project. The integration of other interests (e.g. history and biodiversity) in the project are discussed and the holistic project for Kolding river catchment, which the project in Vester Nebel river is part of, is presented.

Financing for the revitalisation of urban river spaces

Linda Bigga - *Robert Holländer*

Institute for Infrastructure and Resources Management (IIRM), Universität Leipzig, Grimmaische Str. 12, D-04109 Leipzig, Germany

Due to the historical development of industrialisation, urban courses of rivers and streams are often degraded, channelled or even culverted. At the same time private actors set a high value to rivers and streams as attractive urban landscape elements and soft location factors. Increasingly, municipalities recognise the benefits of revitalising rivers and streams, and they try to integrate their river spaces into urban structures under consideration of their ecological and aesthetic values for society.

The Central Europe project REURIS concretises the approach to the very complex issue of "REvitalisation of Urban RIver Spaces" and defines strategies and their application in individual revitalisation projects, e.g. in the field of flood protection as well as ecological revitalisation of rivers and streams and related green corridors.

One of the major obstacles to revitalising urban river spaces is lack of money. With regard to the financial restrictions characterising their budgets, municipalities depend in general on additional sources of funding. Involvement of private beneficiaries can be a solution to this problem. An analysis of the status quo in Germany, the Czech Republic and Poland which has been recently conducted in the framework of the REURIS project has shown that private funding can play a crucial role for the implementation of urban river revitalisation projects. However, it is only seldom used in Germany and usually not applied in Poland and the Czech Republic.

There are traditional markets, e.g. real estate markets, where the ecosystem services of rivers and streams generate values and induce payments. The problem is that the payments are usually not used for revitalisation projects. Instead, they occur as investors' rate of returns while the costs for the revitalisation of rivers and streams are usually borne by public funds.

The poster describes some selected case studies from different countries where private investors have been financially involved in the revitalisation of urban rivers spaces, and it highlights the key factors of success as well as the obstacles. Finally, the poster comes forward with some recommendations for the Central European context deduced from the described case studies.

Quantification and management of fine sediments in streams

Emil Dietz Fuglsang - *Morten Lauge Pedersen*

Water and Environment, Aalborg University, Sohngaardsholmsvej 57, DK-9000 Aalborg, DK

To improve drainage of agricultural areas channelization of streams has been carried out during the past centuries. As a result of the channelization of many Danish streams, the streams are left void of natural stones and gravel and an excessive sediment transport has been started.

Many projects have been carried out focusing on reintroducing gravel in small and large streams. The positive effects of reintroducing spawning gravel has some places been minimized due to the amount of fine sediments present in regulated streams. The negative consequences of high levels of infiltrated fines have been shown in numerous studies. Infiltrated fines block the exchange of oxygen rich water to the eggs of salmonids and thus kill the eggs [1].

In order to control and lower the sediment transport in streams sediment traps are widely used. The traps are constructed upstream the gravel area by excavating a segment of the stream in order to make the stream wider and deeper and there by store the sediment. These traps are to be emptied at appropriate time intervals. Design of sediment traps has traditionally been carried out following some general guidelines [2].

In this study, the effect of a sediment trap on the fine sediment deposition rates in reintroduced gravel in a small stream is investigated.

Along with the measurement of total sediments the grain sizes of the fines are measured. The infiltration rate is measured using infiltration baskets. These baskets were made of metal net with a mesh size of 6mm. They had a height of 250mm and a diameter of 240mm. Initially the baskets were filled with cleaned gravel and buried at a depth so the top of the basket raised the level of the gravel around the basket.

At fixed intervals the buried baskets were carefully taken up and the infiltrated fines were separated from the gravel and quantified. The baskets were then reburied again. Along with the basket measurements the flow and temperature of the water were measured.

[1] Sear, D.A., Frostick, L.B., Rollinson, G. and Lisle, T.E. (2008): The Significance and Mechanics of Fine-Sediment Infiltration and Accumulation in Gravel Spawning Beds. American Fisheries Society Symposium 65: 149-173 (2008)
[2] Bedre vandløb – en praktisk håndbog, Vejle Amt og Sønderjyllands Amt, ISBN 87-7750-530-1(2000)

The thick shelled river mussel (*Unio crassus*) brings LIFE+ back to rivers

Ivan C Olsson[1)] - *Martin Österling*[2)], *Jakob Bergengren*[3)], *Marie Eriksson*[1)], *Therese Asp*[4)], *Ursula Zinco*[5)], *Lars Gezelius*[6)], *Ted von Proschwitz*[7)], *Stefan Lundberg*[8)] & *Ola Gustafsson*[1)]

[1)] *The County Administrative Board of Scania, Dept of Environmental Affairs, SE-205 15 Malmö, Sweden*
[2)]*Karlstad University, Sweden;*
The County Administrative Boards of [3)]*Jönköping,* [4)]*Blekinge,* [5)]*Södermanland and* [6)]*Östergötland, Sweden*
The Swedish Museum of Natural History in Gothenburg[7)] *and Stockholm*[8]*, Sweden*

Numerous thick shelled river (*Unio crassus*, "*Uc"*) populations have become extinct throughout Europe, mainly due to anthropogenic disturbances causing habitat degradation and fragmentation. Therefore, concrete conservation actions focusing on mechanisms responsible for the *Uc*-decline are urgently needed for the remaining *Uc*-populations.

Here, we present a 4.9 M€ project which aim to:

1) investigate host-fish utilisation by *Uc* to ensure successful conservation actions, beneficial for both *Uc* and their host-fish species,
2) recreate natural river dynamics by restoring structures (substrate and cover) and processes (connectivity and corridor functions) beneficial for *Uc* and related host-fish species at 12 project sites,
3) re-introduction of *Uc* by rearing and stocking *Uc*-juveniles and glochidia-infected host-fish to build up *Uc*-populations at two project sites.

Allocation of adult mussels to more favourable habitats will also be conducted to improve reproduction at six project sites.

We predict that, during this five-year project, the conservation status of *Uc* will be improved by increased mussel recruitment at eight of the project sites where mussels are present today. We also predict that it will take a few more years until recruitment will be improved at the two sites where *Uc* is currently absent. Lastly, we also aim to build up local awareness for future river management at the project sites with the local Water Councils being the platform.

Experience from restoring Vejle Stream

Matthew Cochran - *Bo Levesen, Line Utzen Rønslev, Karsten Wandall & Henriette Lang Sørensen*

Vejle Municipality, Vedelsgade 17, DK-7100 Vejle, Denmark

Vejle Stream is located in the southeastern part of the Jutland Peninsula, Denmark and flows into Vejle Fiord. Over the last 100 years, Vejle Stream has been channelized, straightened and deepened in order to improve and create agricultural fields. The riparian areas along Vejle stream have also been drained and converted into agricultural fields. The result is a stream that is missing physical properties that are typical of a stream.

Due to the poor ecological state of Vejle Stream, Vejle Municipality and the Danish Nature Agency re-meandered 2.3 km of Vejle Stream between Tørskind and Vork. The restoration extended the stream by 0.5 km to a total length of 2.8 km. The restoration took place between October, 2010 and June 2011.

The restoration project was intended to improve the physical conditions in Vejle Stream including riffle/pool complexes, channel slope, stream bed variation and spawning ground habitat.

The goal was to create a beautiful meandered stream in a good ecological state requiring minimal maintenance. The aim of the project also included improving the riparian areas along the stream to create a diverse stream valley landscape.

This presentation will review the considerations taken for the placement of the stream, the interaction with the surrounding riparian area and constraints by the land owners. The elements of the restoration efforts including the methods of creating spawning grounds and the problems encountered during the restoration will also be presented. Finally, general considerations will be presented regarding future work with stream restoration in Vejle Municipality.

Exploring and evaluating science-policy interfaces in the Wadden Sea

Diana Giebels *– Arwin van Buuren & Jurian Edelenbos*

Erasmus University Rotterdam, Department of Public Administration, Burgemeester Oudlaan 50, NL- 3000 Rotterdam, The Netherlands

The realization of sustainable nature restoration projects in the Wadden Sea is a challenging as well as complex issue. On the policy level involvement of public and private parties has to be managed. Involved parties range from local, national and European government to ecological scientists, nature conservationists and national as well as transnational NGOs. These parties bring different rationalities, norms, interests and knowledge into the policy making process.

The controversies in the Dutch process of finding sustainable solutions on cockle fishery and gas mining have taught us that the construction of adequate science-policy interfaces in such a context is not straightforward, resulting in under-utilization of knowledge and unanswered questions on the part of decision-makers. Ideally, science-policy interfaces help to overcome the fundamental differences between the worlds of science and policy with their own rationalities, values and ways of knowing by facilitating interaction, coordination and mutual learning. Well-functioning interfaces between the worlds of science and policy are necessary for the production of useful, legitimate and policy relevant knowledge.

The objectives of this research project are fourfold. First, we want to increase our understanding of the constitution of a variety of science-policy interfaces within a complex system like the Wadden Sea, e.g. the specific example of the Houting project. Secondly, we refine the current evaluation frameworks to assess the quality of science-policy interfaces. Third, we shed light upon what explains the quality of science-policy interfaces. Finally, we translate our scientific findings into practically applicable results to get an empirical test of the prescriptions resulting from our analysis.

In the project we reconstruct the policy and science subsystem by analyzing the actors involved; their interaction patterns and the dynamic evolution of the primary processes within that system. We analyse the various interface components. These components are organizational, relational, contractual, and cultural. We subsequently evaluate the quality of specific compositions of science-policy interfaces in terms of its structure and its impacts.

The Houting-project – Denmark's second largest nature restoration project

Hans Ole Hansen

Nature Agency Ribe, Department of Land Management, Skovridervej 3,6510 Gram, Denmark

The fish called the houting definitely belongs amongst the worlds rare species. To save this fish species from complete extinction the Danish Forest and Nature Agency has initiated the Houting-project.

The 14 million € project is the second largest nature restoration project in Denmark – only exceeded by the restoration of the River Skjern.

At the end of 2012 the Houting-project will have restored four Danish rivers. The project will amongst other things:

- Remove 13 man-made obstacles
- Give access to additional 130 km new river habitats
- Eliminate mortality of drifting fry past fish farms
- Create new spawning grounds
- Restore approx. 30 km river
- Create 470 ha new nursery areas

Purchase a commercial netting right

Miljøstyrelsens tilskud til vandløbsrestaureringer 1983 – 1997

Den ”nye” vandløbslov af 9. juni 1982 indeholder en egentlig formålsbestemmelse og definition på vandløbsrestaurering.

Formålsbestemmelsen tilkendegiver, at loven skal bidrage til at sikre vandløbenes evne til afledning af vand under hensyn til den planlagte målsætning. Da mange vandløb med fiskevandsmålsætning p.g.a. vedligeholdelse og regulering var uegnede levesteder for især laksefisk, afsatte Miljøministeriet kr. 100 mill. fordelt på 10 år til revision af samtlige vandløbsregulativer inden 1. januar 1993. Formålet var primært at reducere grøde-skæringen og dette ville som oftest falde ind under begrebet ”erstatningsfri regulering”.

Vandløbsrestaurering fik hjemmel i § 37 og Miljøstyrelsen afsatte årligt kr. 3 mill. til vandløbsrestaurering. I 1985 blev okkerloven vedtaget og heri var der muligheder for tilskud til vandløbsforbedringer for i alt kr. 4,3 mill. om året.

Alt i alt var det svært at komme igennem med større restaureringsprojekter de første 10 år, idet hovedprincippet var, at lodsejerne skulle være frivilligt med i projektet. Miljøstyrelsen besluttede derfor at yde større økonomisk tilskud til to større restaureringsprojekter, der skulle være lokomotiver for udbredelsen af restaureringer i Danmark. Det blev amtsprojektet Brede Å og kommuneprojektet Savstrup Å, der begge kunne medfinansieres af okkermidlerne.

Den erstatningsfrie regulering – grødeskæring – har stadigvæk det trangt. Først skulle der være lokalpolitisk accept af at mindske den hårdhændede vedligeholdelse. Herefter skulle man så implementere tankegangen om, at mindre spredte grødebanker af f.eks. Vandstjerne, Vandaks og Mærke, der ikke har nogen væsentlig vandstandsende effekt, vil blive efterladt, ligesom Vandranunkel m.v.

Vi er ved at nå det. Vandløbsrestaurering er accepteret de fleste steder. Grøn Vækst-plan vil medføre mindsket eller slet ingen grødeskæring i 7.300 km vandløb.

Hvad er så årsagen til, at vi i Danmark har, kunne komme så langt med restaurering, når man ser på det anførte i § 37? Her er en vigtigt sætning fra miljøministeren:

”Det kan dog ikke udelukkes, at der i forbindelse med fremtidig forskning i vandløbsrestaurering vil udvikles metoder, som ikke vil falde ind under de typer af foranstaltninger, som er nævnt i forslaget. Opfattes vandløbsrestaurering lidt bredere, vil det i princippet kunne omfatte alle foranstaltninger, som genskaber/restaurerer en høj vandløbskvalitet.”

Disse ord var skrevet af Miljøstyrelsens Poul Nørgaard – den juridiske arkitekt bag gældende lov.

Genopretning af Varde Å – Danmarks hidtil næststørste naturgenopretningsprojekt

Lars Bo Christensen

Orbicon, Jens Juuls Vej 16, 8260 Viby J, Denmark

Participants

1	Anders C.	Bjørnshave-Hansen	NIRAS A/S	abh@niras.dk	DK
2	Anders	Koed	DTU Aqua	ak@aqua.dtu.dk	DK
3	Anne Husum	Marboe	Nature Agency		DK
4	Beatrice	Claus	WWF Deutschland	beatrice.claus@wwf.de	DE
5	Bent	Jepsen	ASTRALE GEIE	bent.jepsen@astrale.org	BE
6	Bent	Lauge Madsen		bent@laugemadsen.dk	DK
7	Bent	Rasmussen	Nature Agency Ribe	BRASM@nst.dk	DK
8	Bjarne	Moeslund	Orbicon A/S	bmoe@orbicon.dk	DK
9	Bo	Levesen	Vejle Municipality	bolev@vejle.dk	DK
10	Bo	Møller	Vandret	ebm@mail.tele.dk	DK
11	Carsten E.	Callisen	Esbjerg Municipality	cec@esbjergkommune.dk	DK
12	Christian	Dieperink	WaterFrame	cd@waterframe.dk	DK
13	Diana	Giebels	Erasmus University Rotterdam	giebels@fsw.eur.nl	NL
14	Dorrit	Grytter	Esbjerg Municipality	dg@esbjergkommune.dk	DK
15	Dorte	Bekkevold	Technical University of Denmark	db@aqua.dtu.dk	DK
16	Ellen	ter Stege	Natuurmonumenten	e.terstege@natuurmonumenten.nl	NL
17	Else Benete	Lei	Nature Agency Ribe	EBL@nst.dk	DK
18	Emil Dietz	Fuglsang	Aalborg University	edf@civil.aau.dk	DK
19	Erik	Dylmer	Grontmij	erik.dylmer@grontmij.dk	DK
20	Erik	Tveskov	Akvatikon v/Erik Tveskov	erik@tveskov.com	DK
21	Esben	Astrup Kristensen	Aarhus University	ek@dmu.dk	DK
22	Finn	Colmorn	Aabenraa Municipality	fc@aabenraa.dk	DK
23	Flemming Thorbjørn	Hansen	DHI	fth@dhigroup.com	DK
24	Flemming	Kofoed	Holstebro Municipality	flemming.kofoed@holstebro.dk	DK
25	Hans Harald	Hansen	Aabenraa Municipality	hhh@aabenraa.dk	DK
26	Hans Ole	Hansen	Nature Agency Ribe	ole@nst.dk	DK
27	Hans H Thiil	Nielsen	Haderslev Municipality	hhtn@haderslev.dk	DK
28	Hans-Henrik	Jørgensen	Nature Agency Vendsyssel	hahjo@nst.dk	DK
29	Hans-Martin	Olsen	Kolding Municipality	haol@kolding.dk	DK
30	Hans-Ulrich	Rösner	WWF DE	hans-ulrich.roesner@wwf.de	DE
31	Harald	Asmus	AWI, Wadden Sea Station Sylt	Harald.Asmus@awi.de	DE
32	Helle Kold	Jespersen	Nature Agency	hekje@nst.dk	DK
33	Henning Mørk	Jørgensen	DK Society for Nature Conservation	hmj@dn.dk	DK
34	Ivan	Olsson	County Administrative Board of Scania	ivan.olsson@lansstyrelsen.se	SE
35	Jan	Dierking	Leibniz-Institute of Marine Sciences	jdierking@ifm-geomar.de	DE
36	Jan Steinbring	Jensen	Nature Agency Ribe	JSJ@nst.dk	DK
37	Jens	Olesen	Danmarks Radio	jeo@dr.dk	DK
38	Jes	Kromann Bak	Rambøll	jkb@ramboll.dk	DK
39	Johannes	Lomborg	Esbjerg Municipality	jolom@esbjergkommune.dk	DK
40	Jonathan	Eberlein	WWF	jonathan.eberlein@awi.de	DE
41	Jørgen	Nicolaisen	Tønder Municipality	jn@toender.dk	DK
42	Jaak	Tambets	Wildlife Estonia	meelis.tambets@gmail.com	EE
43	Kasper	Rasmussen	ALECTIA A/S	kara@alectia.com	DK
44	Karsten	Gasseholm	Nature Agency	kga@nst.dk	DK
45	Keld	Mortensen	Grontmij	keld.Mortensen@grontmij.dk	DK

46	Kaare Manniche	Ebert	Danmarks Sportsfiskerforbund	kme@sportsfiskerforbundet.dk	DK
47	Lars	Bangsgaard	Bangsgaard & Paludan Aps.	lars@bangsgaardogpaludan.dk	DK
48	Lars	Briggs	Amphi Consult	lb@amphi.dk	DK
49	Lars	Brinch Thygesen	Danmarks Sportsfiskerforbund	lbt@sportsfiskerforbundet.dk	DK
50	Lars Bo	Christensen	Orbicon Ltd.	lbch@orbicon.dk	DK
51	Lasse	Fast Jensen	Fisheries and Maritime Museum	lfj@fimus.dk	DK
52	Lene	Moth	Ringkøbing-Skjern Municipality	lene.moth@rksk.dk	DK
53	Linda	Bigga	Universität Leipzig	bigga@wifa.uni-leipzig.de	DE
54	Ludwig	Tent	Edmund Siemers-Stiftung	ludwig.tent@gmx.net	DE
55	Mads Nistrup	Madsen	DHI	mm@dhigroup.com	DK
56	Magnus	Jacobsen	Aarhus University	mwj@biology.au.dk	DK
57	Mart	Thalfeldt	Wildlife Estonia	mart.thalfeldt@loodushoid.ee	EE
58	Martin	Janes	The River Restoration Centre	rrc@therrc.co.uk	UK
59	Matthias	Brunke	Landesamt für Landwirtschaft	matthias.brunke@llur.landsh.de	DE
60	Meelis	Tambets	Wildlife Estonia	mtambets@ut.ee	EE
61	Michael	Deacon	Nature Agency Ribe	midea@nst.dk	DK
62	Michael Møller	Hansen	Aarhus University	mmh@biology.au.dk	DK
63	Mogens	Christensen		astrupchr@mail.dk	DK
64	Moritz	Pockberger	Alfred Wegner Institut	moritz.pockberger@awi.de	DE
65	Morten Lauge	Pedersen	Aalborg University	mlp@civil.aau.dk	DK
66	Niels	Reinecke	Freelancer	nielsar2@web.de	DE
67	Olaf	Christiani	Nature Agency	ogc@nst.dk	DK
68	Ole	Ottosen	Tønder Municipality	OOT@toender.dk	DK
69	Paul	Landsfeldt	Vejle Municipality	palan@vejle.dk	DK
70	Per Nissen	Grøn	Orbicon Ltd.	pngr@orbicon.dk	DK
71	Per Søby	Jensen	Ringkøbing-Skjern Municipality	per.jensen@rksk.dk	DK
72	Peter	Clausager		peter-clausager@ofir.dk	DK
73	Peter	Ilsøe	Nature Agency	PIL@nst.dk	DK
74	Peter	Mæhl	Rambøll	pml@ramboll.dk	DK
75	Peter	Ring	Kolding Municipality	peri@kolding.dk	DK
76	Peter Noe	Markmann	Nature Agency Aalborg	penma@nst.dk	DK
77	Steen Ravn	Christensen	Syddjurs Municipality	src@syddjurs.dk	DK
78	Stig Per	Andersen	Dansk Vandløbsrådgivning	stigperandersen@live.dk	DK
79	Stine	Bundgaard Hansen	Faaborg-Midtfyn Municipality	sthan@faaborgmidtfyn.dk	DK
80	Søren	Brandt Poulsen	Fisheries and Maritime Museum	sbp@fimus.dk	DK
81	Terkel	Broe Christensen	Svendborg Municipality	terkel.broe.christensen@svendborg.dk	DK
82	Thomas Winther	Jepsen	Esbjerg Municipality	twj@esbjergkommune.dk	DK
83	Thomas	Vinge	Journalistik & Godt Sprog	thomasvinge@hotmail.com	DK
84	Thorsten Møller	Olesen	Nature Agency Aalborg	Thmol@nst.dk	DK
85	Tom	Rugaard	Nature Agency Odense	torug@nst.dk	DK
86	Tomas	Jensen	Esbjerg Municipality	tojen@esbjergkommune.dk	DK
87	Torben Tran	Ankjærø	Haderslev Municipality	ttan@haderslev.dk	DK
88	Tore B. Parmo	Bro		tore-bro@hotmail.com	DK
89	Troels	Karlog	Frederikssund Municipality	Tkarl@Frederikssund.dk	DK
90	Vibeke	Birkelund	Nature Agency Fyn	vibbi@nst.dk	DK

Restoration of streams with special emphasis on the houting and the Houting Project

3-5 October 2011 – Tønder – Denmark

Programme

Monday 3/10

09,00	10,00	Registration
10,00	10,05	Welcome
10,05	10,10	Opening of the conference by HRH Prince Joachim, patron of the Houting Project
10,10	10,30	Opening of the scientific programme – Peter Ilsøe, Vice Director, Nature Agency
10,30	11,00	Key note on the EU-LIFE Houting Project
11,10	11,30	Coffee & Posters
11,30	12,00	About excursions
12,00	13,00	Lunch
13,00	15,00	Excursion to houting projects in River Vidå
15,00	15,30	Coffee & Posters
15,30	16,50	Session I (4x20 min.)
17,00	19,00	Optional "leisure" excursion (eg. bike, walk, canoe) (sunset: 18,55)
19,30	20,30	Dinner
20,30	21,00	Presentation of LIFE Houting DVD

Tuesday 4/10

07,00	08,00	Optional sunrise excursion in the marsh lands (sunrise: 07,30)
09,00	09,50	Key note. The EU-LIFE RESTORE project – Martin Janes, *the* River Restoration Centre, UK
09,50	10,05	Coffee & Posters
10,05	11,45	Session II (5x20 min.)
11,50	12,50	Lunch
12,50	14,30	Session III (5x20 min.)
14,30	14,45	About excursion
14,45	15,00	Coffee & Posters
15,00	19,00	Excursion to the raised bog 'Kongens Mose' (LIFE-project) & the Wadden Sea
20,00		Dinner
		Networking(!)

Wednesday 5/10

		Check-out from hotels
08,00	08,40	Session IV (2x20 min.)
08,40	09,00	About excursion & Closing of the oral part of the conference
09,00	16,00	Excursion to the houting projects in Rivers Sneum and Varde
17,00		Return to Tønder
17,00		Good Bye

Miljøministeriet
Naturstyrelsen