THE HOUTING-PROJECT
- The second largest nature restoration project in Denmark

In Denmark more than 350 species of plants and animals have disappeared over the last 150 years. In addition there are a large number of species, which are rare or endangered.

The fish called the houting definitely belongs amongst the rare species.

In addition, it now only lives in the Danish sector of the Wadden Sea area. It has disappeared completely from Germany and the Netherlands as a result of the advance of industrialisation and dike building over the last centuries.

Now, to save this fish species from complete extinction the Danish Forest and Nature Agency in co-operation with Ribe County and the County of Southern Jutland has initiated the Houting Project.

The project has obtained crucial economical support from the EU Life Fond.

View a video about the houting project here: http://www.youtube.com/watch?v=YJ0J6a9kva0

Read layman's report here

Background & objectives

Background

The houting (*Coregonus oxyrhynchus*), a fish species from the white fish family, has a complex ecology making it vulnerable to relatively small disturbances in its range.

It was previously distributed throughout the Wadden Sea (the Netherlands, Germany and Denmark) but it has declined severely and its occurrence is now restricted to Denmark, where it reproduces in six river systems.

The presence of even small obstacles in rivers is one of the main impediments to successful reproduction, as the houting is unable to pass weirs and fish ladders. Silting of spawning grounds is also a severe problem. Furthermore, juvenile houting require large areas of reed beds or flooded meadows, where they forage for several months prior to migration to the sea.

Previous restocking attempts in Denmark have not been successful because they were not followed up by habitat restoration.

Objectives

The overall project objective is to restore and maintain a favourable conservation status for the houting in four Danish river systems. The project is in accordance with national recommendations. It will explore possibilities and develop recommendations for reintroduction into other parts of the houting's previous distribution range within the EU.

The project will have a profound positive effect on all other components of the river ecosystems including the conservation status of the habitat type 'Water courses characterised by *Ranunculion fluitantis* and *Callitricho-Batrachion* communities'.

It will also result in improved access to areas of spawning habitats for other anadromous fish species, such as indigenous populations of Atlantic salmon (*Salmo salar*), species of lamprey (*Lampetra* sp.) and the only population of weather fish/pond loach (*Misgurnis fossilis*) in Denmark, and it will improve habitat conditions for the otter (*Lutra lutra*).

Weirs and dams in the four river systems will be removed and riffles or meanders constructed in order to facilitate upstream migration. Two hydroelectric power plants and three fish farms will be decommissioned. River sections will be restored with gravel and stone, creating new spawning grounds, and a combination of changes to hydrology and construction works will create new flooded areas adjacent to the river.

The project will be implemented in broad cooperation between a number of stakeholders including local and regional authorities, land and fish farm owners, a regional angling society, and owners of hydrological installations.

The four rivers in the Houting-project are River Varde Å, River Sneum Å, River Ribe Å and River Vidå River – all situated in the south-western part of Jutland, Denmark.

River Varde Å

The Varde Å river system is the largest river system that flows into the Danish part of the Wadden Sea.

Total catchment area of the river system is approximately 1100 km2. The main tributaries originate west of the Jutlandic ridge, from where they run toward west through the moorland plains and moraine islands from the previous ice age.

The mean water flow of Varde Å at the outfall in Ho Bay is 16,200 l/s, varying from a minimum of 4,200 l/s to a maximum of 60,600 l/s.

The Varde Å river system is the only system where water exchange with the Wadden Sea is not regulated by a sluice. Since there are no summer dikes along the riverbanks the hydrological regime in the lower parts of the river and the adjacent areas is in its natural state. These downstream areas are included in the ongoing Wadden Sea estuary nature and environment improvement project.

Karlsgårde Power Station

The key factor controlling hydrological conditions in central part of the Varde Å system is the hydroelectric power station at Karlsgårde. Downstream the town of Ansager 90 % of the water flow in Varde Å is led into Ansager Cannel to the artificially constructed Lake Karlsgårde . After use for power generating purposes, the water is returned to Varde Å approx. 24 km before the outfall in the Wadden Sea .

Consequently the natural hydrology in the water system is significantly disturbed and the demands for water to the hydroelectric power station courses a severely reduced water flow on 16 km of Varde Å.

Although the weir at Karlsgårde power station are equipped with fish ladders, passage conditions for migratory fish in the Varde Å river system are very poor because of the weir and the disturbance of the natural hydrology – and the houting cannot pass at all.

Spawning areas

Compared to the size of the water system the potential spawning ground area is also relatively low because of the previous hydrological modifications, intensive maintenance (weed cutting) of the watercourses, dredging of the streams and drifting sand.

More than 75 % of the spawning grounds in the Varde Å system is upstream the weirs of the hydroelectric Karlsgårde power station. Furthermore significant potential spawning areas over a distance of 20 km for houting in the original Varde Å has disappeared because of the diminished water flow and modifications to the watercourse.

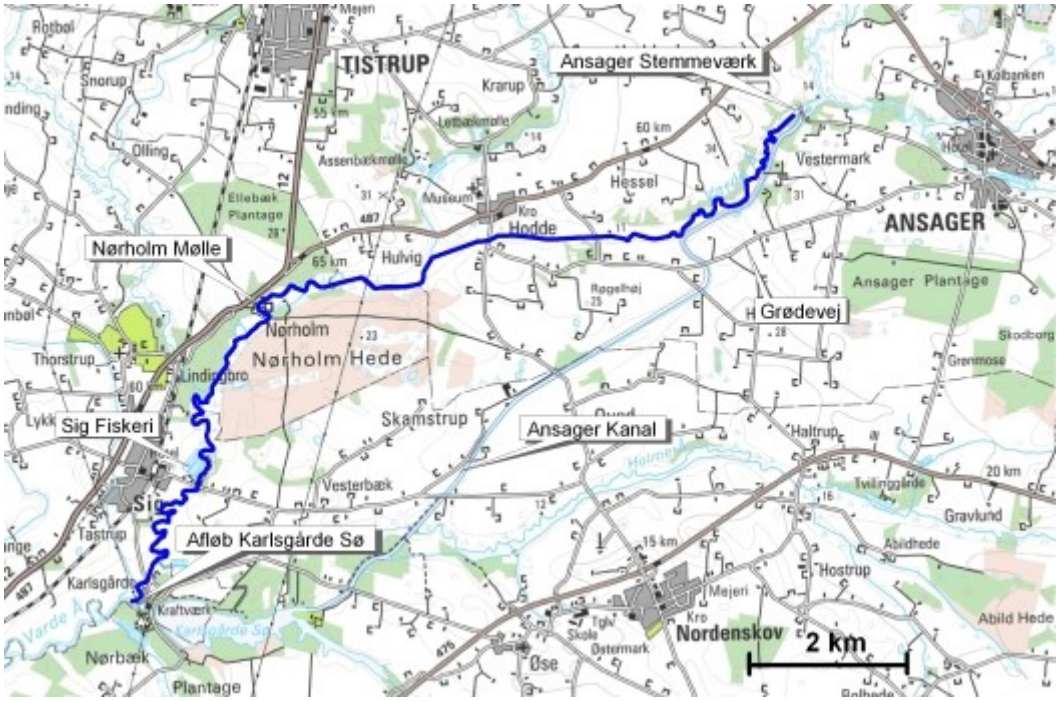
The project

Restoration of the hydrological continuity and improvement of the physical conditions in Varde Å will promote nature conditions in the water system. This will be of enormous beneficial value not only to the houting but also to all other species in connection to the river.

Besides the very small population of houting, the Varde Å system are of international importance for its populations of *Salmo salar*, *Alosa fallax*, *Petromyzon marinus*, *Lampetra fluviatilis* and *planeri*, *Lutra Lutra* and *Margaritifera margaritifera* – all listed under Annex II of the Habitats Directive. Varde Å is also designated as a watercourse characterised by *Ranunculion fluitantis* and Callitricho-Batrachion communities according to Annex I in the directive.

The Houting Project will:

- Close the Ansager Canal and bring the total water flow back into the River Varde Å.
- Decommission the Karlsgårde Power Station
- Widen and remeander the present 13 km heavily modified stretches of the River Varde Å into an approximately 18 km naturally meandering watercourse with good ecological status.
- Establish free passage for houting and all other fish at the fish farm at Sig town.



River Sneum Å

The catchment area of the River Sneum Å system is 510 km², making it the 14th largest river in Denmark .

The main watercourse River Sneum Å (26 km) and the tributary River Holsted Å (37 km) run towards southwest and west respectively, before they converges approx. 10 km before the outfall of in the Wadden Sea at Sneum Sluice.

The mean water flow of River Sneum Å and River Holsted Å before their convergence is 3,200 l/s and 3,000 l/s, respectively. The mean water flow at the outfall in the Wadden sea is 7,000 l/s (min. 1,900 l/s, max. 38,000 l/s).

The upper half of River Sneum Å along with the major part of tributaries is relatively unmodified with good physical conditions, while it is channelled on the lower half, where it runs through moor plains and marshland.

Apart from the upper few kilometres River Holsted Å holds unmodified in-stream habitats with good physical conditions.

All other parts of the river system are heavily modified. Drifting sand, former modifications, dredging, harsh handed in-stream maintenance and cutting of weed have a high, negative effect on the physical conditions of the watercourse.

About 70 % of the catchment area is used by agriculture. Land use is however considered varied, comprising of intensive arable agriculture and forest/plantation activities on the moor plains and moraine islands and extensive grazing and hay harvest in the stream basins.

A systematic mapping of the possible spawning areas in the system has shown that there are only shorter stretches with suitable spawning grounds for salmonids in the main run of River Sneum Å.

In River Holsted Å there are longer stretches with excellent spawning possibilities, which in turn, however, are not accessible because of weirs at several fish farms. Several other smaller tributaries hold good spawning areas as well.

Ecological status is good on approx. 65% of the water stretches in the system. Local problems in the major rivers Sneum Å, Holsted Å and Terpling Å are caused by fish farming.

Habitat area

The River Sneum Å is included in the 514 ha habitat area no. 79 ‘River Sneum Å and Holsted stream valley.

The Houting-project in River Sneum Å

- (1)&(2): The river will be remeanderen for a stretch of approx. 2-4 km improving the river and creating nursery areas for the houting fry.
- (3): The Bramming Fish Farm will be bought and dismantled.
- (4): The Endrup Mill Fish Farm will be bought and dismantled.
- (5): The Hjortkær Fish Farm will be bought and dismantled.

River Sneum Å with tributaries.

p : *River stretch open to houting from project start*

p : *River stretch open to houting after Houting-project*

p : *River stretch closed but suited for houting – the stretch are not included in the Houting-project*

p : *River stretch of no interest to houting*

River Ribe Å

River Ribe Å has a catchment area of 975 km² - the sixth largest Danish river. The main watercourses RiverGelså (43 km) and River Fladså (46 km) runs westward, and the confluence of these two rivers begins the River Ribe proper 17 km before the outfall in the Wadden Sea.

The mean water discharge of River Ribe Å at the outfall is 14,000 l/s (min. 5,500 l/s; max. 60,000 l/s).The mean water discharges in the main tributaries are: Gelså 5,000 l/s, Fladså 5,000 l/s, Hjortvad Å 2,250 l/s. The River Ribe Å are controlled by a sluice at the outfall to the Wadden Sea.

The main parts of the watercourses in the Ribe Å system are regulated - although significant parts of the main stretches are unregulated, especially in Fladså and the lower parts of Gelså and some shorter stretches of River Ribe Å east and west of Ribe town.

85 % of the catchment area is utilised for arable agriculture. However, land use in the catchment is very varied, comprising intensive arable agriculture and forestry/plantation on the moraine islands and moorland plains, while the lower laying parts typically is used for extensive pastoral agriculture and haymaking.

Blocked in Ribe town
River Ribe Å passes through the city of Ribe by four runs. Three of them are blocked by milldams and one by a weir built for hydroelectricity production purposes.

The dams and weir in Ribe town cannot under any circumstance be negotiated by houting. The houting are thus prevented from getting access to potentially good spawning areas upstream Ribetown.

The hydroelectric turbine, the Stamp Mill, supplied seven households with electricity until it was bought up under the Houting Project. In 2012 the mill and the obstacle will be removed. None of the other three milldams can be removed, as groundwater levels below the city has to be maintained to prevent deterioration of the city's foundation.

Upstream meadows
The dams and weir in Ribe town constitutes the basis for approx. 300 ha temporarily flooded meadows in the landscape east of Ribe.

The water levels on the meadows have always been regulated through management of the dams and weir in Ribe.

Levels are high during winter and considerably lower from April to October whereby significant areas of shallow water are dried out during spring.

Habitat area

The River Ribe Å is included in the 134.730 ha habitat area no. 78 ‘River Ribe Å, River Tved Å and River Varde Å west of Varde’. The major parts of the habitat area are within the Wadden Sea.

International importance
The major watercourses in the River Ribe Å system are of international importance for their populations of houting, salmon, sea-, river- and brook lampreys, twaite shad and otter - all listed under Annex II of Habitats Directive.

Under the Houting-project:

1. The Stamp Mill will be dismantled.
2. The water intake at Fish Farm Gelsbro in River Gelså will be altered.
3. The weir at Fish Farm Fole in River Fladså will be removed.
4. Spawning grounds will be laid out in the Hjortvad Stream, a tributary running to River Ribe downstream Ribe town.
5. A royal privilege of netting off the entire River Ribe Å have been purchased by the Nature Agency.

River Vidå

The 1,330 km² Vidå-catchment runs across the entire southern Jutlandand originates as far east as less than 5 kmfrom the eastern coast. The catchment is the fifth-largest in Denmark.

The mean water flow at the outflow into the Wadden Sea is approx. 15,000 l/sec. (min. 4,000 l/sec., max. 95,000 l/sec.). Water exchange with the Wadden Seais regulated by the sluice at Højer town.

A modified river
90% of the catchment area is arable agriculture – the main parts of the watercourses in the system are heavily modified through drainage, dredging and physical alterations.

However, throughout the 90s and 00s the former County of Southern Jutland completed a number of nature restoration projects in the Vidå system including reconstructing of 27 smaller weirs making them passable for migrating fish and 12 projects bringing 37 km of straightened, modified water stretches back to original meandering

The houting in River Vidå
In spite of the heavily influence by man, the River Vidå has the largest natural population of houting in the entire Wadden Seaarea - and thereby in the world! It is therefore of especial importance to preserve and help this population.

However, at the start of the Houting Project the population was vulnerable, as by far the majority of the spawning grounds was situated in a single branch of the Vidå system. Creating access for the houting to the entire water system has under the Houting Project given a greater security that the population will survive and possible increase.

Before the Houting Project the houting and many other species were effectively kept from migrating further up into the River Vidå proper and its two tributaries Arnå and Hvirlå at the Bachmann’s Water Mill in Tønder town.

Important shallow-watered lakes
The River Vidå differs from other Danish watercourses running to the Wadden Sea, because of the occurrence of larger areas of open, shallow and stagnant waters. The open water surfaces of Lake Rudbøland Magisterkog totals an area of approx. 87 ha with a mean water depth of 0.8 m.

Research on the biology of houting fry in the Vidå-system shows that the Magisterkog and Lake Rudbølare very important

nursery areas for the houting fry – and may in fact be one of the key reasons that a population of houting has survived at all.

A river rich in species
The River Vidå system is inhabited by 24 different fish species - that is considered high in Danish terms. However, the sizes of a number of the populations are quite small and they only occur in limited parts of the river system.

The River Vidå is the single only water system in Denmarkwith the occurrence of the loach (Misgurnus fossilis). Brook and River lampreys are also found the river system.

Habitat area
The River Vidå is included in the 494 ha habitat area no. 90 'Vidå with tributaries, Lake Rudbøland the Magisterkog'.

The Houting-project
In the Vidå system there were three major obstacles for the houting - the weir at Bachmann's Water Mill in downtown Tønder City (1), the weir in Sønderå at the Rens Fish farm (3) and the mill weir in Sønderå at St. Jyndevad (4).

With the Houting-project the obstacles in Tønder City (1) and at Rens Fish Farm (3) have been dismantled thereby enabling free migration for the houting – and also for all other fish and invertebrates. During the project it unfortunately showed impossible to acquire the weir at St. Jyndevad (4). That project was thus abandoned and the budget used at Fish Farm Gørding in the River Sneum catchment instead.

Further to the removal of the two obstacles, the Houting-project has restored approx. 100 ha of shallow-watered lakes (2) thereby creating new nursing areas for the houting fry.

The Houting-projects in the River Vidå - Bachmanns Mill (1); Lake Nørre Sø (2) and Rens Fish Farm (3).