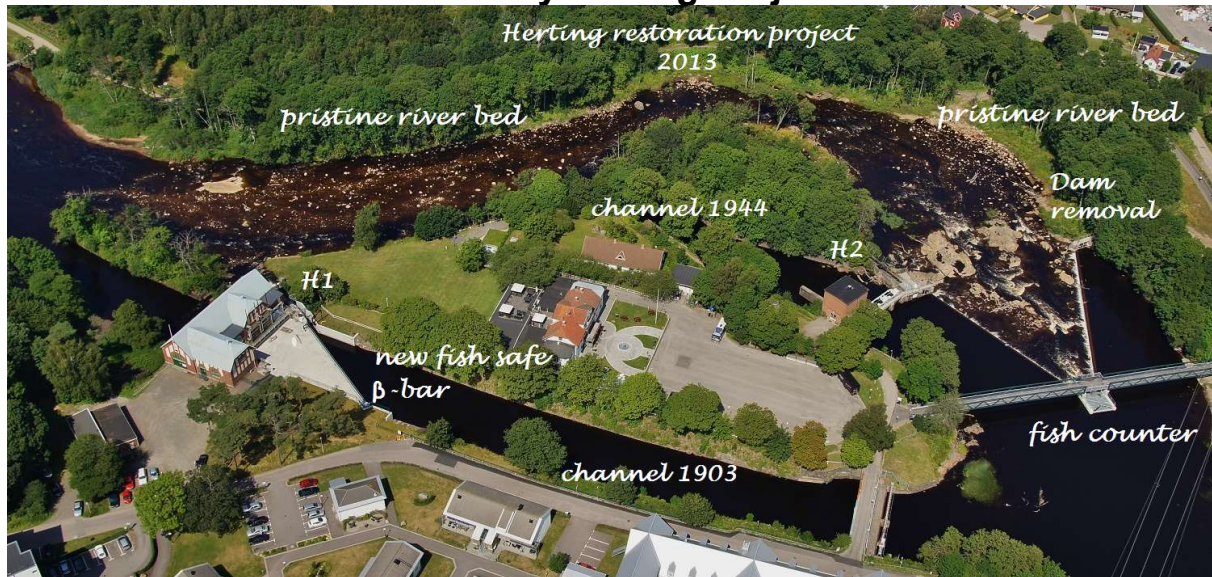


## Summary Herting Project



The water shed of River Ätran is 3342 km<sup>2</sup> and embrace three County Administrative Boards, seven Municipalities, Industries, field of nutrition and several NGO:s. The Water Board of River Ätran was funded in 1974 by these organizations in the spirit of the Water Frame Directive (WFD) implemented thirty years later in Swedish legislation.

The River Ätran in Southern Sweden has been subject to extensive efforts to improve water quality by liming operations since 1978 exceeding 100 000 metric tons of limestone, to counteract acidification caused by acid deposition. Massive economical efforts are made by authorities, industries and individuals to improve water quality and reduce nutrient impact. These efforts aims to restore ecosystems and populations of numerous migrating fish species in the river. The water shed is widely used for production of electricity and 35 hydro power stations are located in the water system. Only one of these sites, the Herting hydropower station, now provide a satisfactory solution for free fish migration.

The situation for migrating fish was not acceptable according to the ecological and sustainable strategies of the Municipality and caused considerable economical losses of tourist incomes for the Municipality and its operators and inhabitants. The Municipality of Falkenberg took action for Source-to-Sea Management and engagement in collaborative projects, promote best practices, and to improve the management of land, water, coastal and marine linkages as expressed in the Manilla Declaration adopted by 65 countries in 2012. This Action Platform facilitated contact between decision-makers and experts to provide on-demand knowledge, support, advice and guidance to policy making and implementation on freshwater, land, coast and sea. By doing so, we enhanced the efforts of the international community to fulfill its commitments to the Manila Declaration.

River connectivity is thereby one crucial factor concerning ecological functionality as most waters in Sweden partly suffers from heavily modified water bodies (HMWB) with thousands of dam constructions. The Municipality of Falkenberg consequently took part, together with seven European countries, in an Interreg IVB project named "Living North Sea" aiming to enhance "Free Fish Migration from Sea to Source".

The Municipality is the owner of two hydro power stations situated in a N2000 area close to the river mouth facing the Atlantic ocean. These stations were before 2013 a severe obstacle to upstream and downstream migration of genetically unique salmon (*Salmo salar*) and sea trout (*Salmo trutta*) populations in the river. Weak swimming fish species such as European eel (*Anguilla anguilla*), Sea lamprey (*Pteromyzon maritimus*), river lamprey (*Pteromyzon fluviatilis*), bullhead (*Cottus gobio*), lake (*Lota lota*) and cyprinide fishes were totally excluded from their important migration routes in the river totally drained by a massive hydropower dam built in 1944 and removed in 2013.

The main practical actions at the hydro power stations were: 1. Remove the hydro power dam. 2. Restore the pristine, original river bed. 3. Release a minimum of 11 kbm/s of water in the dried original

river bed. 4. Install a fish safe  $\beta$ -bar in front of the remaining hydro power station. 5. Install fish counters, video cameras and fish traps for monitoring of effects. All these practical actions were introduced in 2013.

The present report is mainly a summary of the project work and numerous positive effects generated during the work as a result of the measures taken to improve and restore the connectivity and ecosystem functions of the heavily modified river bed. The fish populations in Ätran and its important tributary Högvadsån has been constantly investigated since the 1950's. The University of Karlstad had the mission to investigate the effects on fish populations some years before and after actions. Among other techniques they used telemetry and specially designed fish traps. Their conclusions concerning the Herting project are:

1. Best available technique has been used
2. The project is unique as both upstream and downstream fish migration has been solved properly
3. Investigations are the most thorough ever in a project like this and is extremely well documented
4. The results are the best and most positive ever recorded in similar projects, concerning both upstream and downstream migration of different fish species.

Their conclusions concerning impact of fish populations are:

#### 1. European eel and sea lamprey

Upstream catches of alevines increased a hundred times at Ätrafors and five times in the tributary Lillån. Fish guidance efficiency (FGE) for silver eel increased from 0 % till 73 %. Passage efficiency (PE) for sea lamprey increased from 0 % till 67 %.

#### 2. Atlantic Salmon smolt and kelt

FGE for smolt increased 400% to 85%.  
Following actions PE for kelt measured 96%.

#### 3. Spawning Atlantic salmon

Registered silver bright salmon in the Vaki counter/ Video camera increased after mitigation 2013 with 50 % or 1500 till 2000 migrating salmon. This improvement is due to the Herting project combined with other positive actions.

4. Migration of Atlantic salmon starts one month earlier and spawning salmon reach the upper parts of spawning areas in Högvadsån one month earlier which is of great importance ecologically and for an extended sport fishing period. Natural salmon migration is restored.

5. Estimated salmon fry production in the Herting rapids, the old pristine river bed restored as bypass, is 13 000 salmon fry. This considerably increase total salmon production and enhance sport fishing.

The Swedish Agency for Marine and Water Management states about the project: New fish pass solutions at Herting hydro power station in River Ätran have radically improved migration for Atlantic Salmon, European eel and Sea lamprey. The innovative solutions with a big pristine fish pass and a leaning  $\beta$ -bar illustrates the potential in replacement of old fish pass solutions with new designed solutions according to recommendations of Best Available Technique (BAT).

The Herting Project was under observation of the Royal Swedish Court and the Royal House represented by His Majesty the King and Her Majesty the Queen who visited the work in 2013. One year later in April 2014 His Majesty the King Carl XVI Gustav inaugurated the restored fish migration paths at Herting. He urged hydro power owners: "my wishes are that the restoration of the Herting rapids will encourage and inspire other hydro power owners to promote actions beneficial to biological diversity and enhanced opportunities for sport fishing".

Natural fish migration and reproduction has radically improved in the Ätran river system following action within the Herting project 2013. These actions are crucial and beneficial in heavily modified water bodies (HMWB) to reach good ecological status, ecosystem resilience and salmon production in accordance with Swedish and international legislation.