

Västerkvarn HPP, river Kolbäcksån

First migrating fish in a 100 years...



Site conditions

- Kolbäcksån tributary to Galten, lake Mälaren with MQ 29 m³/s
- Västerkvarn most downstream migration obstacle, about 5 km from lake Mälaren
- Migratory fish species mainly *Aspius aspius*, *Salmo trutta* and *Anguilla anguilla*
- HPP built 1915 with Q_{MAX} : 45 m³/s
- H_{HPP} : 6,7 m; H_{DAM} : 2,8 m
- Problems regarding debree, ice buildup, head loss
- Complex site. canal, historical mill, bridges etc.
- Challenging site conditions and time schedule!





Time plan

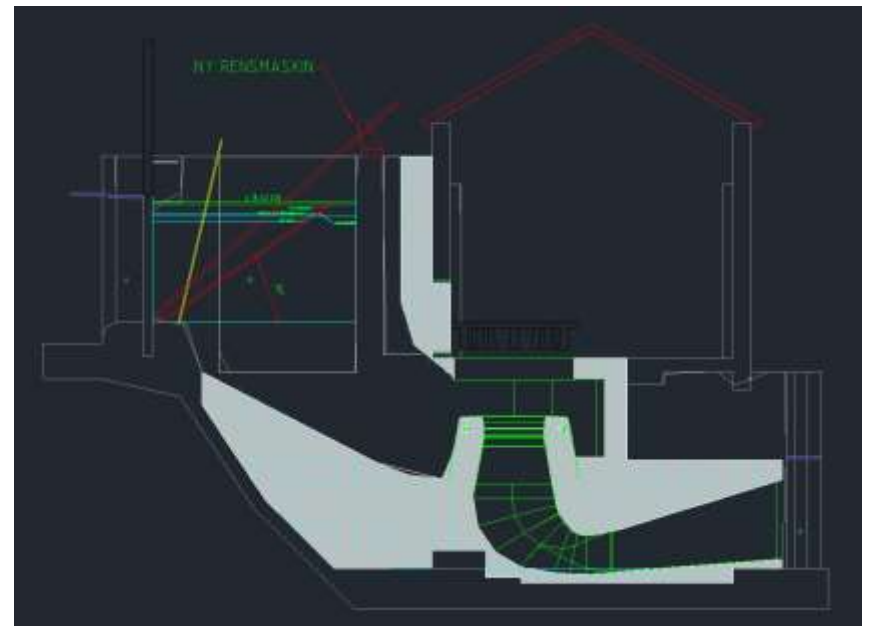
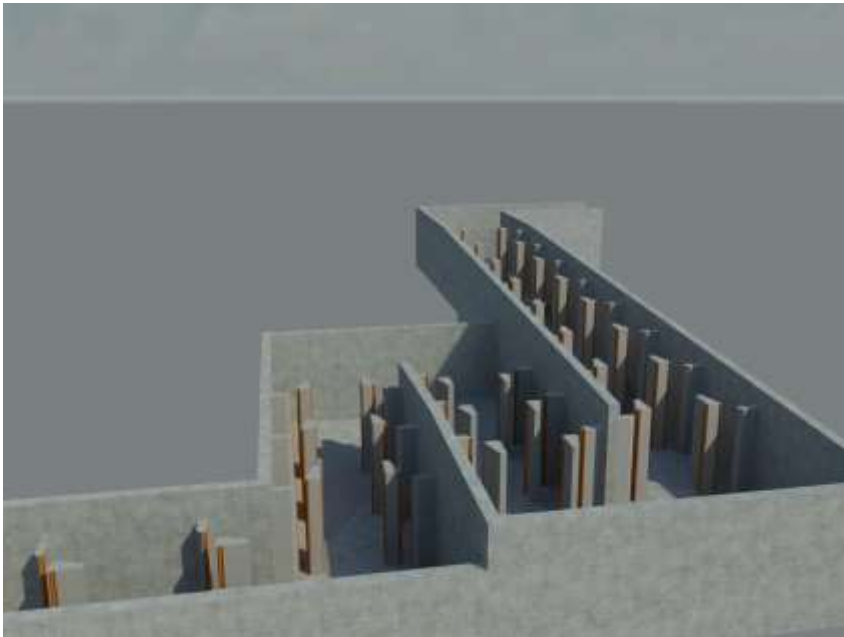
- March: establishment, coffer dams etc. Decision to adapt HPP for migratory fish
- April: demolition works
- May-jul: foundation works etc.
- Aug-nov: concrete works
- Dec: first commissioning new station







Solutions









After construction



After construction



After construction



After construction



Evaluation (early results)

- Counter deployed april 2016
- Within 1 week *Aspius aspius* passed
- Local record spawning of *A. aspius*
- Counter technical issues – not reliable results
- Spawning *A. aspius* observed in uppermost pool
- *S. trutta*, *A. anguilla*, *A. brama*, *R. rutilus*, *P. fluviatile*
- Up- and downstream migration about same numbers of fish
- Mainly trout observed in bypass, also bream, perch and roach



Conclusions

- Evaluation started before construction had finished...
- Improved cost efficiency coordinating projects (in this case about 30% for fishway)
- Construction type of vertical slot, not always cost effective
- Low incline, small spaced trash racks works fine, but demands adapted cleansing, especially hydrodynamically shaped ones



Work just started...

- Upstream HPP´ s will be evaluated for possible fish migration solutions, dam removal etc.
- HPP´ s in river Hedströmmen, Rällsälven and Svartån: ongoing work for fish migration and reproduction measures



Thank you for the attention!

