#### Bringing Back Salmon to the River Kemijoki



IEA-seminar 10.6.2014 Erkki Huttula



# **SOME FACTS FROM HISTORY**

- After WW2 Finland lost ¼ of it's electricity production capacity due to cession of territory to Soviet Union (terms of Moscow truce agreement)
- Reparation to Soviet Union was \$300 000 000 (= 4,5 billion €)
- The German troops that retreated from Lapland exploded the <u>only railroad</u> <u>bridge to northern Finland</u> at the Kemijoki river mouth
- There was urgent need for electricity production (and a new bridge!) to get nation back on its feet





### **CLOSING OF THE RIVER**

- Pohjolan Voima Oy, a energy company owned by paper industry, promised to build a new bridge if it's allowed to build a dam and a power station also
- Construction of the Isohaara dam at the Kemijoki river mouth began in 1945. A <u>new bridge was ready</u> in record time after a year and the power station was completed in 1949
- The temporary license for construction of the Isohaara dam included an obligation to build a fish pass, which was at the end realized with infamous <u>Brofeldt's fish lift</u>.
- Kemijoki Oy was founded in 1954 and when the second power station in the river Kemijoki was construted in Petäjäskoski 1957, the mighty Kemijoki Salmon had practically died out.



### **SLOW RUSHES**

- The final fish compensations were set to be resolved in a separate legal procedure.
- The obligation to build a fish pass in Isohaara dam was struck down when final license for Isohaara power station was given in 1964.
- Final fish stocking obligations were set 1980.
- So, all in all this procedure lasted over 30 years and used to be an essential and understandable reason for bitterness towards hydropower companies, even though the companies were not solely responsible for the delay.



## SHORT COURSE IN FINNISH WATER LEGISTLATION

- If one poses harm to fish and fisheries, harm must be compensated primarily by manoeuvres (stocking, fishway etc.).
- If this kind of compensation is unfeasible, money talks.
- In the Kemijoki case, the Water Court (and Supreme Court) considered that the production of salmon in the <u>river area</u> can't be compensated by any manouvre (ie. fish pass, stocking other species), and therefore power companies were set to pay the loss of salmon.
- In the <u>sea area</u> a stocking obligation was set.
- So the legal picture like it or not is such that in the river area the loss of salmon is paid and salmon stockings are meant to benefit fishermen at the sea area.



# **TIMES THEY ARE A CHANGIN**

- However, the dream of Salmon returning to the river Kemijoki stayed alive.
- Building of fish passes has been claimed in several context.
- First fish pass to river Kemijoki was built to the second power station in Isohaara in 1993. The licensee and owner of fish pass is municipality of Keminmaa. Funding came mainly from state government.
- Finally, the European Unions Water Framework Directive launched a boom of fish pass projects.
- <u>National Fish Pass Strategy</u> was established in 2012.
- The role of local environmental authorities has been essential in promoting fish pass planning projects.



# **STEPS TO THE RIVER OUNASJOKI**

- In the river Kemijoki, the restoring of migratory fish stocks to river has been named and divided into Steps to the river Ounasjoki.
- At the moment Step III is ongoing and fish pass blueprints to Kemijoki Oy's power stations downstream Rovaniemi should be completed this year.
- Lapland Centre of Economic Development, Transport and the Environment has managed the project.
- Funding for the projects has become mainly from European Regional Development Fund.
- Kemijoki Oy is the only private financier in Step III.
- So far the plan for <u>Taivalkoski fish pass</u> has been completed.
- Modern and sophisticated <u>engineering methods</u> have been utilized to ensure best operability of fish passes.



## **TAIVALKOSKI FISH PASS**

- Flow in the fish pass 1-2 m<sup>3</sup>/sec
- In addition attraction flow 1-8 m<sup>3</sup>/sec
- Option to build second entrance nearer to the power house
- Two options for attraction flow
  - Pumping from the tailrace channel, 3×160 kW propeller pumps
  - Tube turbine , 2 turbines
- Construction costs
  - Pumping 2,9 milj.€
  - Turbine 4,4 milj.€
- Operation costs
  - Pumping 65 k€/a
  - Turbine 100 k€/a energy loss outside spilling time



#### **CHALLENGES REMAIN**

- While the construction plans for fish passes are about to be ready, there isn't agreement who would be the licensee.
- The funding of the construction is far from clear.
- Many critical phases in the life cycle of salmon, e.g. <u>post smolt survival</u> causes uncertainty for success.
- Efficiency of the fish passes should be very high!
- What goes up must come down downstream migration of smolts!
- Transportation of spawners to the river Ounasjoki is important!
- Hopefully hydro and salmon can live happily and succesfully together in our rivers in the future!



# THANK YOU FOR YOUR ATTENTION



MIA Kemijoen silta 1944 syksy. Kemin historiallisen museon valokuva-arkisto

















# **CFD modelling**







