Spawning channels for fish reproduction and landscape - example of Imatra, Finland

> Jukka Jormola Saija Koljonen Finnish Environment Institute SYKE

6th European River Restoration Conference 2014 Vienna 27-29 October 2014



#### Contents

- How to ensure all ecosystem services in modified rivers
- Interest for reviving migratory fish
- Good examples in Canada and Europe
- Flowing water as landscape feature
- Imatra urban brook constructed channel for trouts and tourists

## **Boom of renewable energy – can ecosystem services of rivers be ensured?**

- Use of rivers: Utilzing all for energy production or enabling all ecosystem services?
- Values for political argumentation
  - Regulation and adjustability of water power according to consumption
  - Defining Environmental flows for fish and other values
- Compensative measures to ensure processes of ecosystems

## Water related ecosystem services



## **Compensation of lost habitats is needed**

- Decisions to get salmon stocks back are made
- Natural reproduction is essential to revive endangered stocks
- Compensation of ancient reproduction amounts of juveniles should be required in permits
- Water Framework Directive:
  All feasible methods should be applied



## **Measures for modified rivers**

#### Impact

- Loss of connectivity <----</p>
  - fish, good/weak swimmers
  - Invertebrates, mammals
- Loss of reproduction < habitats
  - damming rapids to stagnant condition, dry rapids
  - dredged and filled channels
- Discharge patterns
  - regulation
  - o dry old channels
  - Need for fish pass and bypass flow summer/winter

#### Mitigation or compensation

- Removing barriers
- Fish passes
- Nature-like bypass channels
- Constructing new compensative side channels
  - spawning channels
  - rearing channels
- restoration of rapids

#### **Environmental flows**

- Seasional minimum flows in permits
- Requirements for migration, spawning and juvenile habitats
- Sediment balance

## **Canada:**

#### **Compensation creek for Atlantic salmon** Granite Canal Hydroelectric Development and Compensation Creek, New Foundland

Massive measures to revive lake salmon and brook trout



## **Spawning channels in Europe**

- Normally a section of a bypass channel designed for migration
- Can also be a separate channel with a diversion to a fish pass
- Legislation for habitat compensation can be applied if available
- Rheinfelden, Rhine



Ruppoldingen, Aare



# Nature-like fish passes and spawning channels: New landscape attractions

Canada: Weaver Creek

Finland: Kissakoski fish pass



## Imatra, Finland One of biggest rapids in Europe was lost

- Was a famous tourist attraction
- Today only a show for 15 minutes



## Imatra: New urban brook

- To have flowing water all time in the National Landscape
- To maximize habitats for the local brown trout
- 1 km long, 300 l/sec summer, 150 l/sec winter Construction August 2014



## **Plan of Imatra urban brook**

• Water depths, gradients and diversity were considered



## Modelling was applied for decision making

• Flow model of the planned channel



# **Habitat modelling**

- Habitat model shows good circumstances for small juveniles
- Monitoring will prove performance for reproduction



#### Conclusions

- Spawning and rearing channels are promising to revive fish stocks and to enhance landscape
- Political will can be gained by combining different ecosystem services, - tourism
- Planning tools like modeling can help decisions
- Evaluation of benefits for landscape and fish are needed for wider targetting of restoration goals

15