



Workshop on Hydromorphology

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Possible HMWBs – LSOs in the Aura Hydropower scheme, Norway

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Main screening criterias

- Lake water level raised more than 10 m
- Lakes with an active annual regulation zone >3meters
- Change in the hydraulic load by factor of 5 or more
- No-bypass stream diversion; the 75% criterium

Main screening criterias

- All rivers with a minimum environmental flow required
- Winter temperatures always above +1 deg C
- Normal annual flow augmented more than 3 times
- Change in water flow more than 5 % per hour of maximum capacity of the hydropower plant

Result from Art 5 analysis in Norway

- Total # Water Bodies: App. 11000
- At Risk App. 4000
- HMWBs App. 1600
 - Rivers App. 940
 - Lakes App. 660

Exchange of information

- HMWB Guidance document process
- The Pilot River Basin Project
- The Hydropower Subgroup activities
- National Working Groups
- National Reference Groups

The Aura HP-scheme

- Catchment area 949 km²
- 4 reservoirs (max drawdown 30 m, max hydraulic head 760 m)
- 14 stream intakes, > 40 km of tunnels
- 2 HP plants with production of 1,7 TWh/year
- Main existing mitigating measure:
 - Fish stocking
 - Overflow sills

Pressure & Impacts

- Total diversion of 16 mountain streams
- Reduced average flow with more than 60% in the main river
- Large reservoir drawdown (30m)
- Temporarily dry stretches
- Change of river substrate
- Erosion in drawdown zone

Ecological consequences

- Alteration of biota composition and abundance
- Loss of Atlantic salmon
- Loss of sea trout
- Reduced littoral zone biological production
- Reduction of the spawning and breeding grounds in lake Aursjøen-reservoir (70-80%)

Art 5 analysis results from Aura

**All WBs affected by the HP-
development preliminary
identified as HMWBs or LSOs**

Watercourses subjected to extensive HP development, HMWBs or LSO??

Is ecological continuum a minimum criteria ?

- WFD, Annex 5: “...best approximation to ecological continuum especially with respect to spawning and breeding grounds”
- Guidance requirement interpretation: “An adequate quantity and quality of usable habitat to ensure structure and function of ecosystem maintained over space and time””longitudinal & lateral continuity of WB to enable biota access to habitat on which they depend”

HMWB or LSO in Aura?

- Practicing best approximation to ecological continuum, WBs in Aura HMWBs:
 - Best practice with continuum as main goal in the subsequent planning periods
 - Continuum still not achievable in a lot of WBs
 - Higher ambitions inherent in the classification?

HMWB or LSO in Aura?

- Practicing ecological continuum as a minimum criteria, WBs in Aura LSO:
 - Best practice to be applied
 - High number of LSOs
 - “Business as usual” (No deterioration, best achievable status?)

HMWB or LSO in Aura?

One or the other, Does it have any consequences for the for the management practice and the future environmental ambitions?