HARMONISATION OF GOOD ECOLOGICAL POTENTIAL
- HOW CAN WE IDENTIFY SIGNIFICANT IMPACT ON HYDROPOWER?

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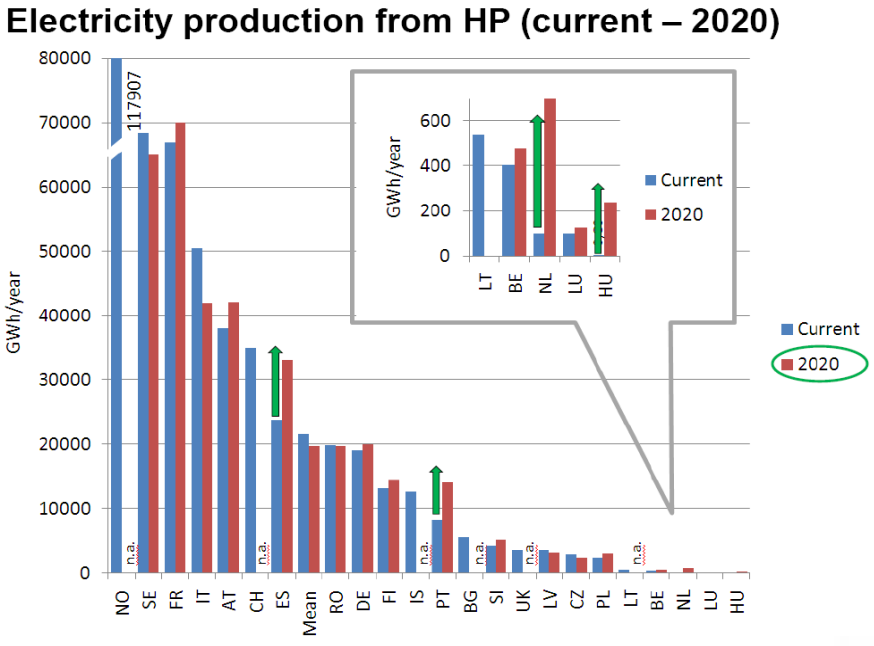
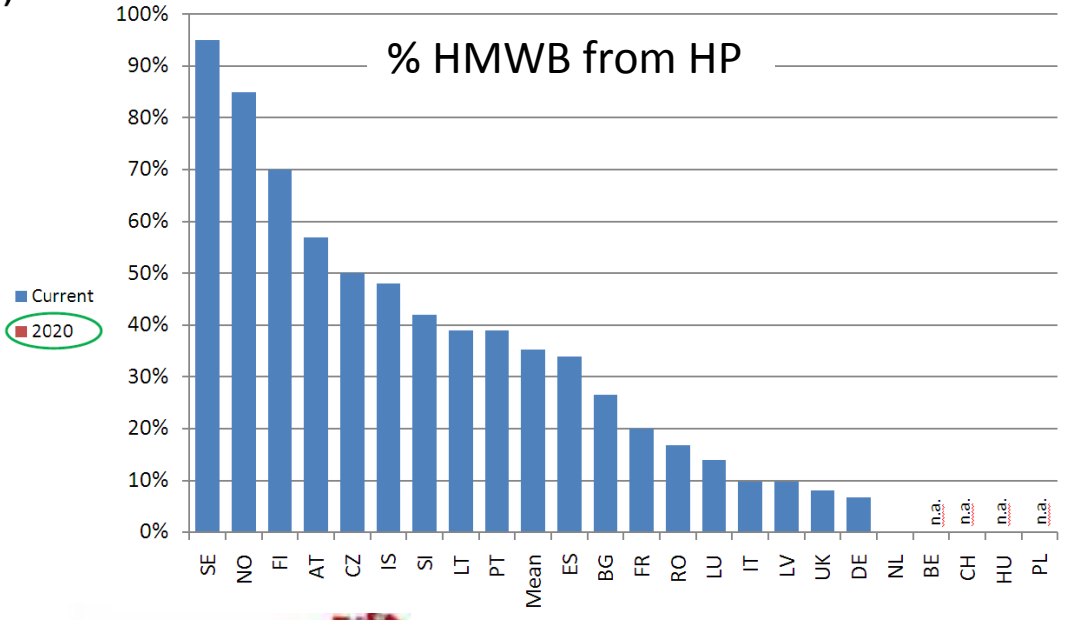
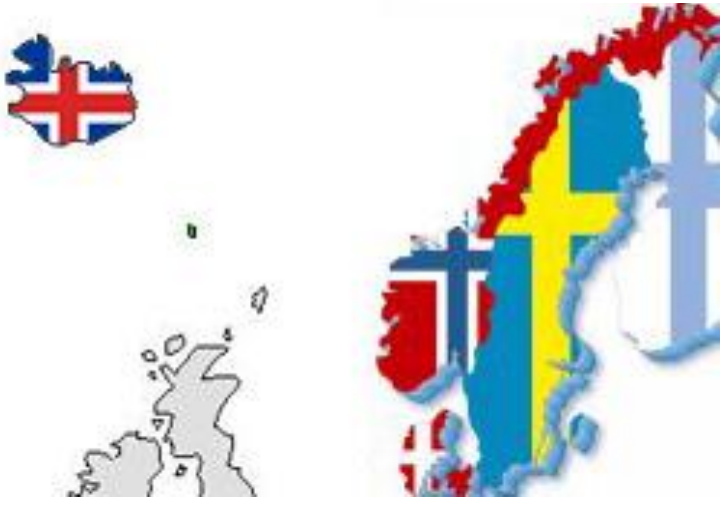
Hydropower – HMWB – Eflow and GEP – major issues for the Nordic countries

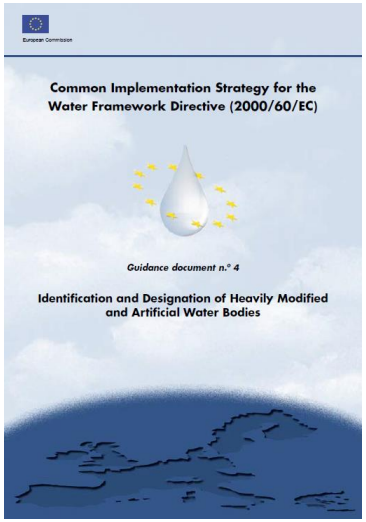


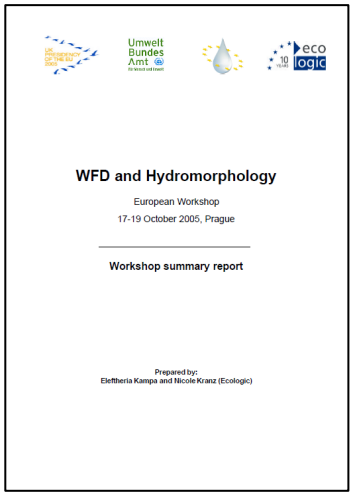


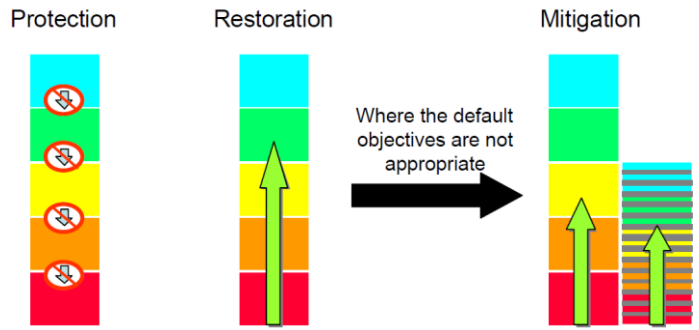


Towards an harmonised GEP

- In line with key principles of the WFD
- Ensure common understanding of impacts and use of mitigation measures
  - Criteria for significant adverse effect on water use; e.g. hydropower
  - Comparable reasons for out ruling measures
- Knowledge exchange of good practise
  - Share relevant mitigation measure
  - Best Available Mitigation Measures for water bodies impacted by water storage



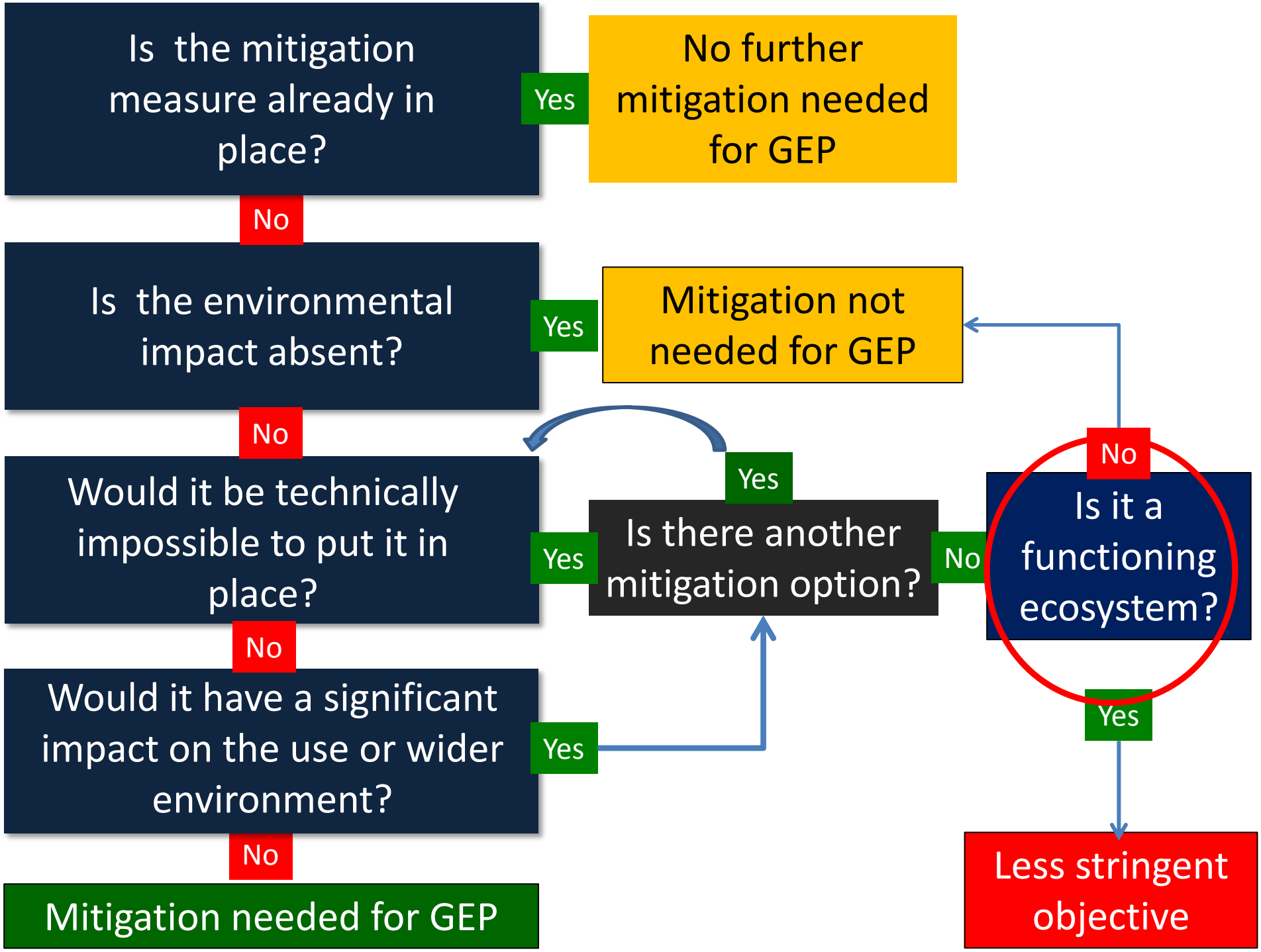




Reminder – approach to assessing comparability

Hydro-morphological alterations	Pollution pressures
Mitigation measures expected for GEP	Existing **intercalibrated** methods - where not significantly affected by the hydro-morphological alterations

Comparison of biology standards ruled out at this time

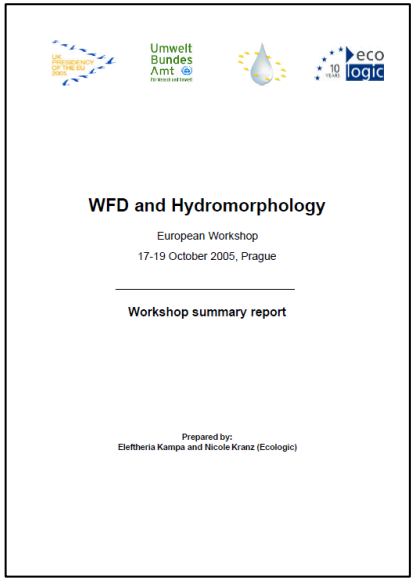

Is the mitigation measure already in place?
Yes
No further mitigation needed for GEP
No
Is the environmental impact absent?
Yes
Mitigation not needed for GEP
No
Would it be technically impossible to put it in place?
Yes
Yes
Is there another mitigation option?
No
No
Is it a functioning ecosystem?
No
Would it have a significant impact on the use or wider environment?
Yes
Yes
Less stringent objective
No
Mitigation needed for GEP

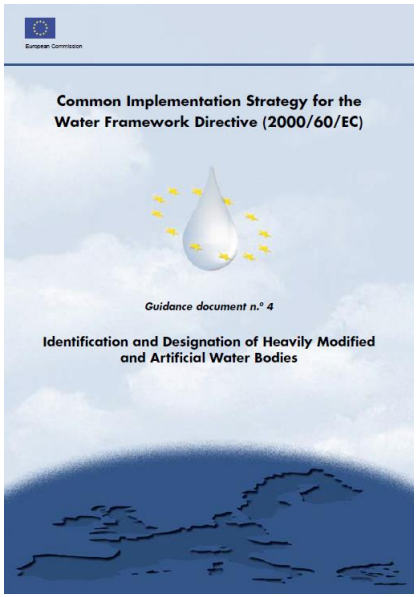
Recap – CIS HMWB key conclusions

- As much ecological improvements as possible with no or minimum impact on water use
- Ecological continuity for GEP

  «There must be fish»
- Thresholds for adverse effect on hydropower:

  «…everyone agreed that it can not mean no impact on use»





Ecological flow

- Eflow for good ecological status – CIS guidance no 31
- Partly the same flow components for GEP-flow as for Eflow
- Some measures may reduce flow needs
  - E.g. river engineering
- Flow needs and significant impact on hydropower?

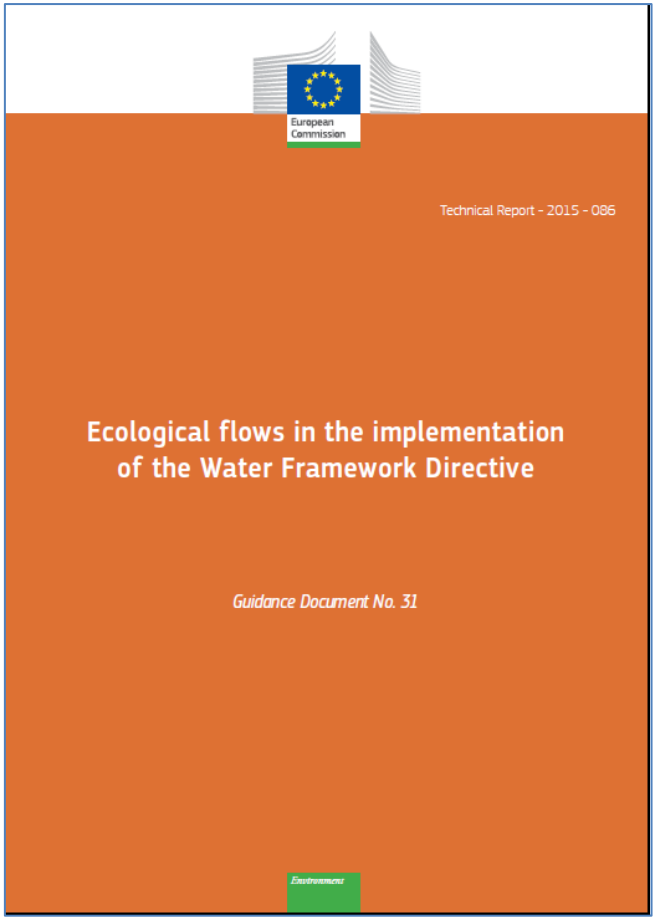
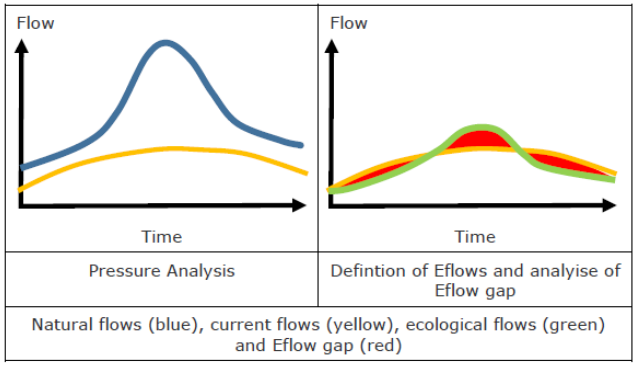
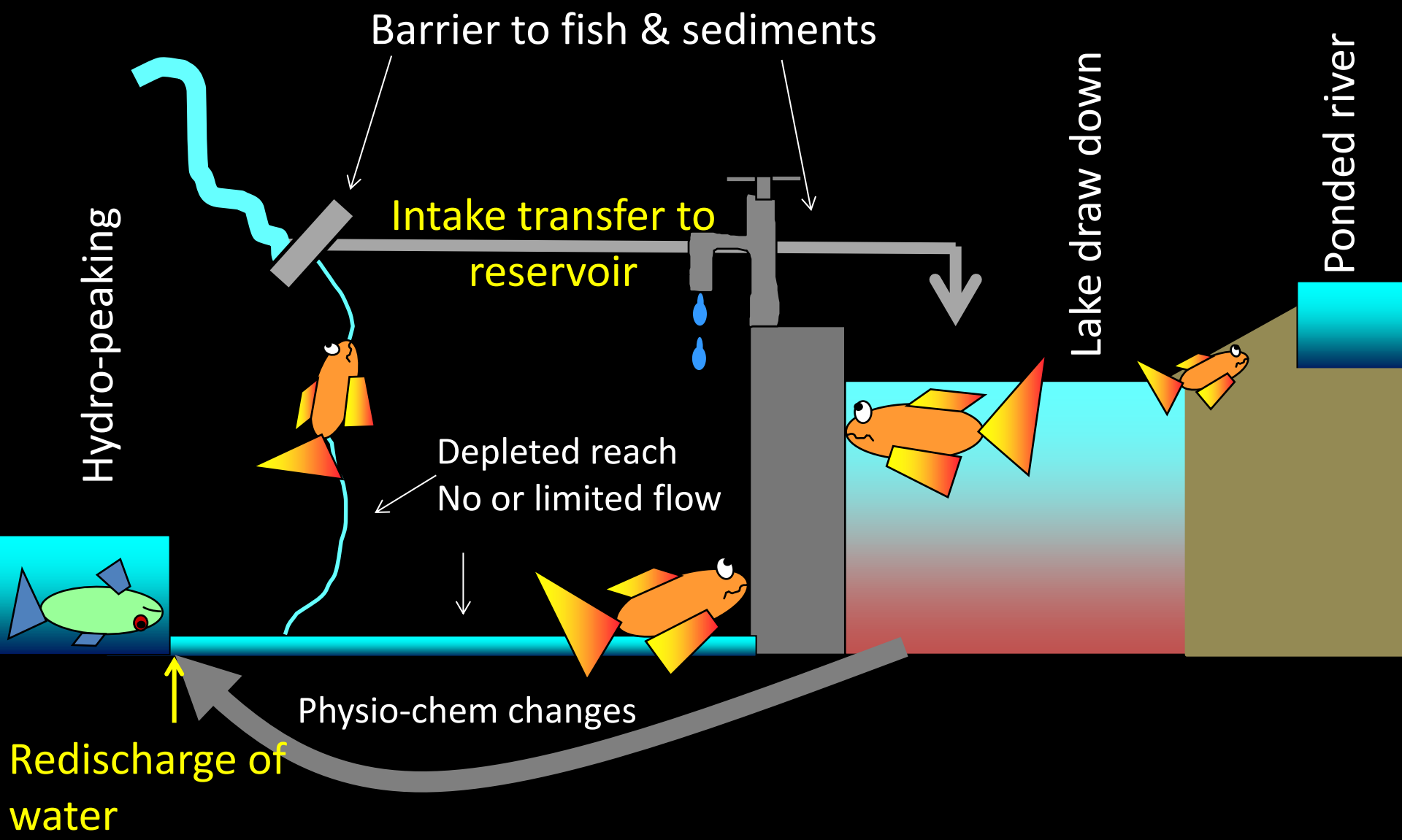


Figure 7.2: Pressure analysis and Eflow gap analyis



Impacts from water storage

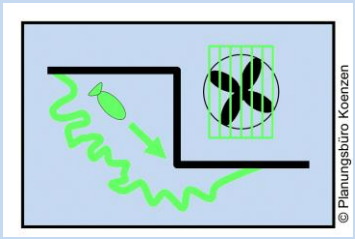
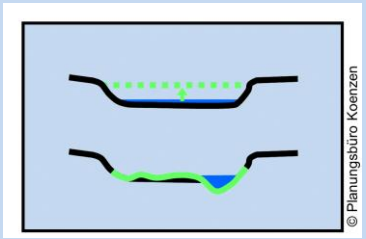
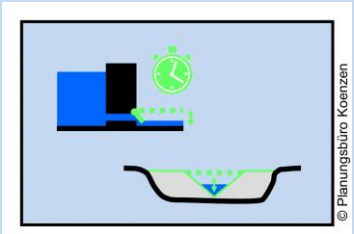
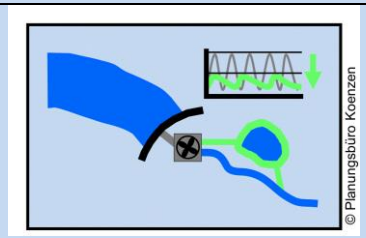


Responding countries to WG ECOSTAT on GEP

MMT filled in	Delayed/ issues still pending	No response
Austria	Croatia	Belgium
Bulgaria	Iceland	Greece
Cyprus	Slovenia	Hungary
Czech Republic		Latvia
Estonia		Poland
Denmark		Spain
Finland		
France		
Germany		
Ireland		
Italy		
Lithuania		
Luxemburg		
Malta*		
Netherlands		
Norway		
Romania		
Slovakia		
Sweden		
UK		

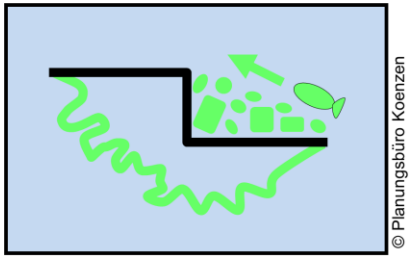
Incomplete template

* Mitigation of impact from water storage not relevant

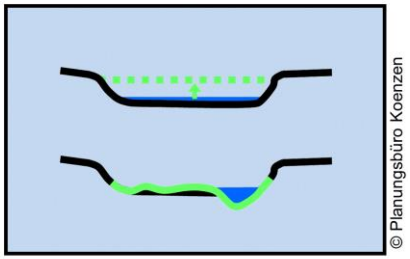
Hydromorphological alteration	Ecological impact	Mitigation measure for	Abb.	Pictogram
River continuity for upstream fish migration reduced or interrupted	Fish: Populations of migratory fish absent or abundance reduced	**Upstream continuity for fish**	CON 1	
River continuity for downstream fish migration reduced or interrupted	Fish: Populations of migratory fish absent or abundance reduced	**Downstream continuity for fish**	CON 2	
Artificially extreme low flows or extended low flows	Reduced abundance of plant & animal species. Alterations to composition of plant & animal species	**Low flow**	FLOW 1	
Loss of, or reduction in, flows sufficient to trigger & sustain fish migrations	Migratory fish absent or abundance reduced	**Fish flow**	FLOW 2	
Loss, reduction or absence of variable flows sufficient for flushing	Alteration/reduced abundance of fish & invertebrate species	**Variable flow**	FLOW 3	
Rapidly changing flows (including hydro peaking)	Reduction in animal & plant species abundance due to stranding & wash out	**Hydro peaking**	FLOW 4	

Measures normally expected for GEP

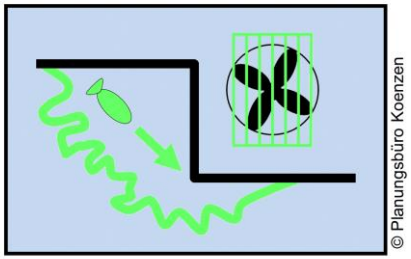
Key mitigation measure	% yes	*Yes*	*No need to mitigate this impact*	*No relevant measure available*	*No answer*
1. Upstream continuity - fish	**86 %**	*18*	*2*	*1*	*0*
3. Low flow	**67 %**	*14*	*4*	*2*	*1*
2. Downstream continuity - fish	**62 %**	*13*	*3*	*4*	*1*
5. Variable flow	**52 %**	*11*	*5*	*4*	*1*



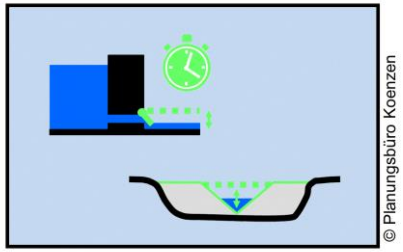
1. Upstream continuity fish



3. Mitigation low flow



2. Downstream continuity fish

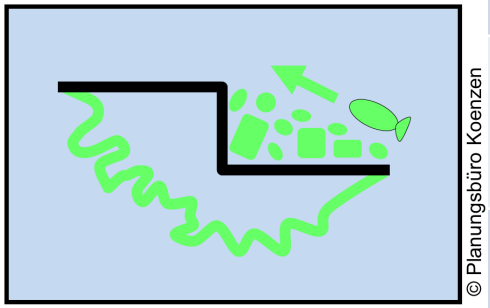


5. Mitigation variable flow

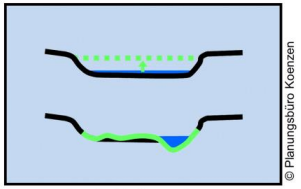
Based on information from 21 countries

Mitigating interrupted continuity - fish

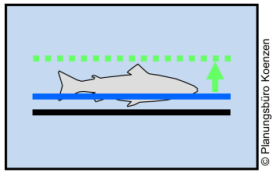
Inclusion in national libraries	• **Nearly all** countries • Upstream and downstream continuity important
Emerging good practice	• Bypass channels, lifts, ladders • Fish ramps possibly for smaller dams • Screens if risk of entering turbines • Trap/release or stocking if other options not feasible
Expected frequency	• **Normally expected**
Main reasons not required	• Natural barriers to fish • No fish habitats • Uncertainty about impact on non-migratory fish



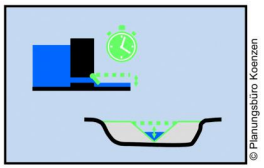
River flow mitigation



3. Mitigation low flow



4. Mitigation fish flow



5. Mitigation variable flow

Inclusion in libraries	• All countries include flow mitigation • Flow mitigation considered ecologically important
Emerging good practice	• Includes a low maintenance flow component + an additional variable/dynamic component • For long-distance migrators, includes suitable flow timed to trigger/support upstream & downstream migration • Optimising river morphology if not possible to restore adequate flow
Expected frequency	• **Normally expected**
Reasons not required	• No flow impact – Eflow in place already • **Significant impact on water use** – particularly maintenance low flow component

Significant impact on water use

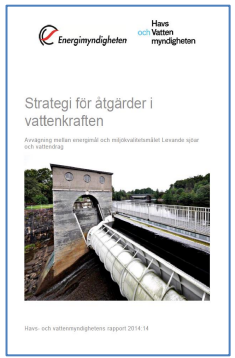
– no of answers from countries

Criteria	Second RBMP	
	River	Lakes
Magnitude of reduction in the benefit of the use as a proportion of the total benefit produced by the use at the site	5/17	4/11
Magnitude of reduction in the benefit of the use compared with the total equivalent benefit produced nationally or regionally	6/17	5/11
Monetary value thresholds for the reduction in benefit	3/17	1/11
Is the scale of the benefit of the environmental improvement taken into account in deciding acceptable thresholds for impacts on a use	**1?/17**	**4/11**

(Tab 8 - Info exchange template for GEP workshop in Vieanna, March 2014)

Transparent criteria – examples of impact on hydropower for reaching WFD objectives

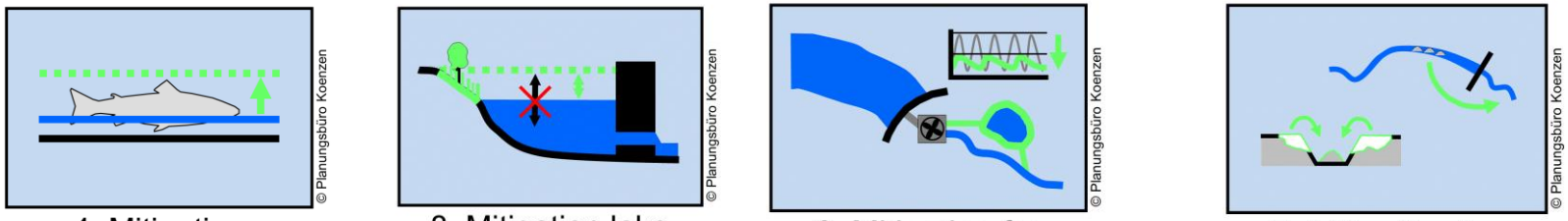
	Acceptance criteria	Significant adv effect on HP	Estimate on TWh or %
Austria	Eflow for fish migration (restore continuity)	Restriction on hydropeaking	**Yes**
France	Compensated by refurbishment and modernisation		**Yes**
Norway	< 50 high priority catchments (highest cost-benefit) before 2021	Catchment without full filling priority criteria	**partly**
Romania	Production loss **< 2%/year** for a single HPP and the reduction/loss of energy production **< 5%/year**		**yes**
Scotland	Scheme-level impact and cumulative impact		**yes**
Slovakia	QT monetary value, dependent on environmental benefit	QL reduction related to total recution	Unclear
Sweden	Dependent on environmental benefit	National «target» summer 2014	**Yes**



Source: Kampa et al (2011), info exchange template - GEP

Comparability – GEP/Water storage

- Common range of similar impacts recognized
  - Some impacts geographically restricted or only for particular water use
- Most countries have libraries (catalogues) with many mitigation measures
  - Mitigation exchange relevant
  - Varies how developed/implemented measures are
- GEP could not be close to (very) bad ecological status → lower limit exist
  - Functioning aquatic ecosystem



Possible lack of comparability – GEP/Water storage

- **Impacted scale** considered important varies
  - *< 1 km to >10 km*
- Significant **adverse effect on water storage**
  - *Few countries have reported on national transparent criteria or threshold*
  - *4 of 5 thresholds for hydropower at similar level*
  - *Others have flow measures in place or business as usual?*
- Restoration measures towards good status?
  - *Common understanding or still R&D needs for Eflow?*
- However, the “intercalibration” of GEP is still not finalized

Water storage is among the most significant impacts on Nordic water bodies

…assessment of GEP and implementation of mitigation measures are possible to compare

Questions?