Hydropower production and riverine ecosystems in a future climate – introduction

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Mitigating against and adapting to climate change – the dual challenge

- Increased demand for renewable electricity
- Increased need for rehabilitation of ecosystems in and around regulated rivers


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Hydropower production in the future

- Increased demand for electricity

- Higher annual hydropower production

- Increased need for flexibility and frequency regulation
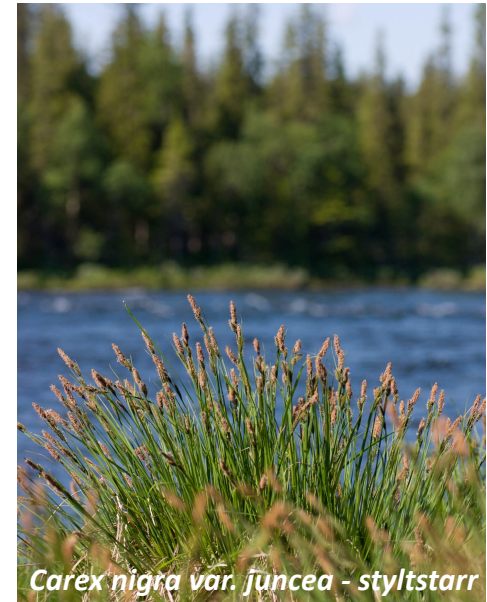
- Dam security and infrastructure

Increased need for rehabilitation of ecosystems in and around regulated rivers

- Enhance resilience against more intense hydropower production
- Climate change adaptation

Carex nigra var. juncea - styltstarr

Grayling - Harr
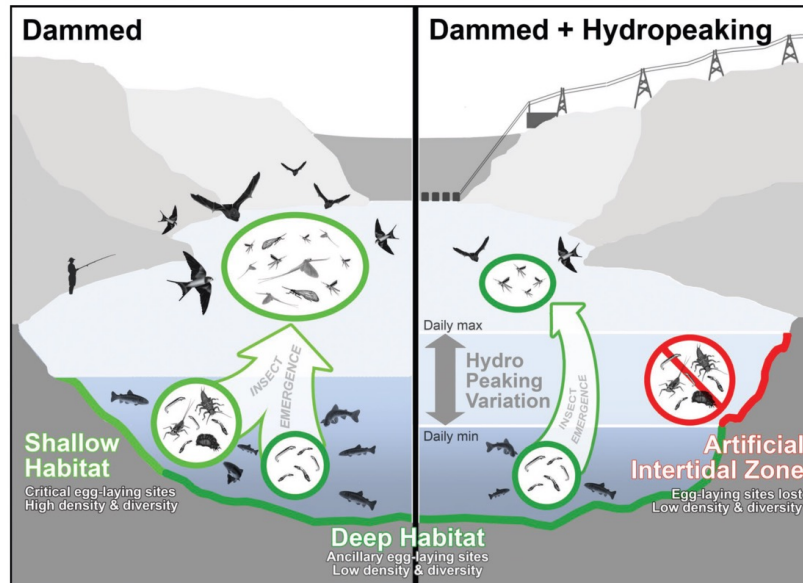
Kennedy et al. (2016) Bioscience
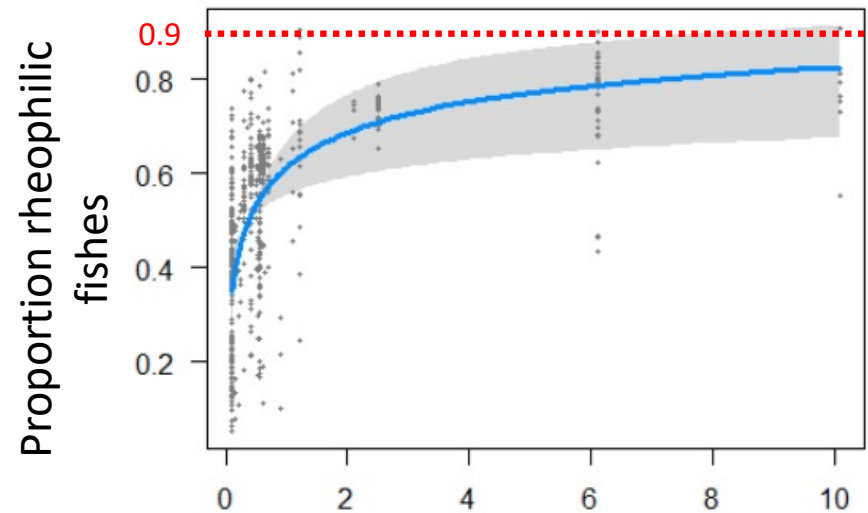
Climate change adaptation

- Increase resilience against stress and disturbance from climate change

- Need to facilitate geographic range shifts

- Provide habitat reduced in area or quality as a result of climate change

Minimum discharge release enhances communities of rheophilic fishes in bypassed reaches

Mean for references

Donadi et al., *under revision*

Methods to mitigate against and adapt to climate change

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Loss of spring flooded communities	Flood pulses

How much rehabilitation is needed
to adapt ecosystems to climate
change and make them resilient?

Status of regulated river systems in Sweden

Biodiversity
- Species richness of most taxa reduced
- Lake species replace running water species

Ecosystems:
- Riparian vegetation: 12 % remaining
- Rapids and water falls: 1% remaining

Ecosystem functions
- Connectivity of fish, aquatic insects and plants impaired
- Land/water interactions lost
- Yield from populations of native fish fish species reduced

How much rehabilitation is needed to adapt ecosystems to climate change and make them resilient?

- Provision of renewable electricity
- Conservation of biodiversity

Natura 2000-areas, redlisted species

Heavily modified reaches with few natural values