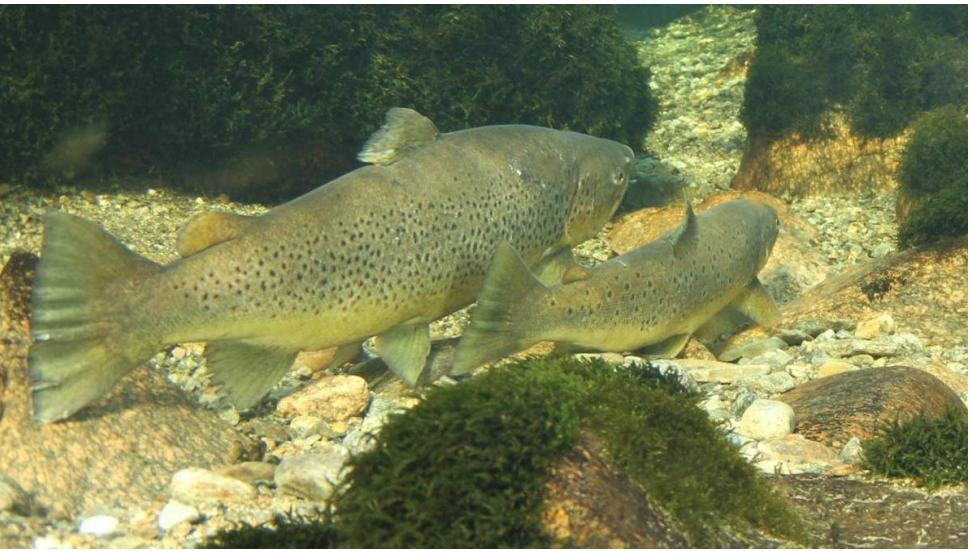
Restoring gravel bed spawning grounds – solution or cosmetics?

Lessons learned from European projects in the last decades



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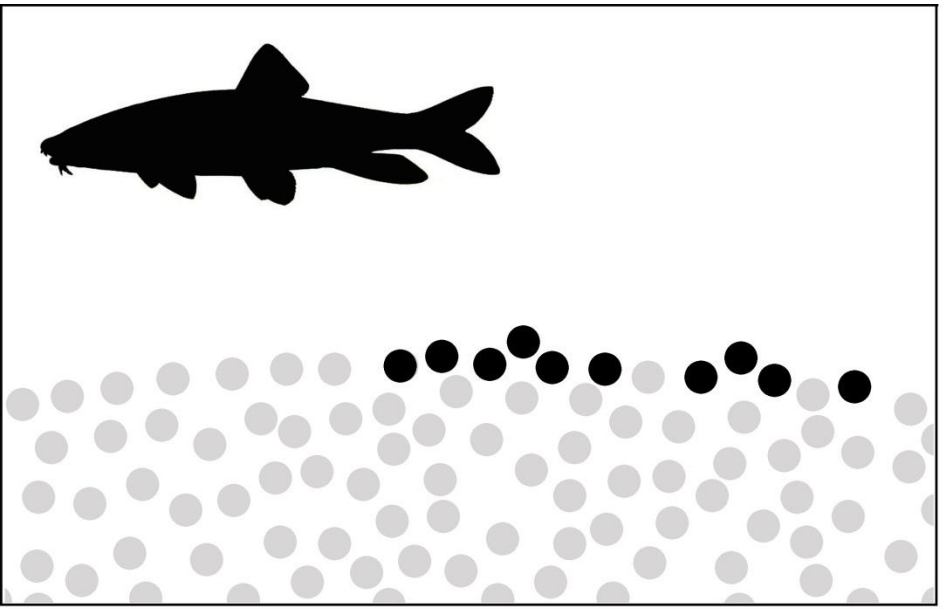
Objectives

- Gravel bed spawning grounds are essential for lithophilic fish species
- Severe decline of lithophilic species - overrepresentation in Red Lists
- Main reasons: Pollution - migration barriers - **habitat degradation**

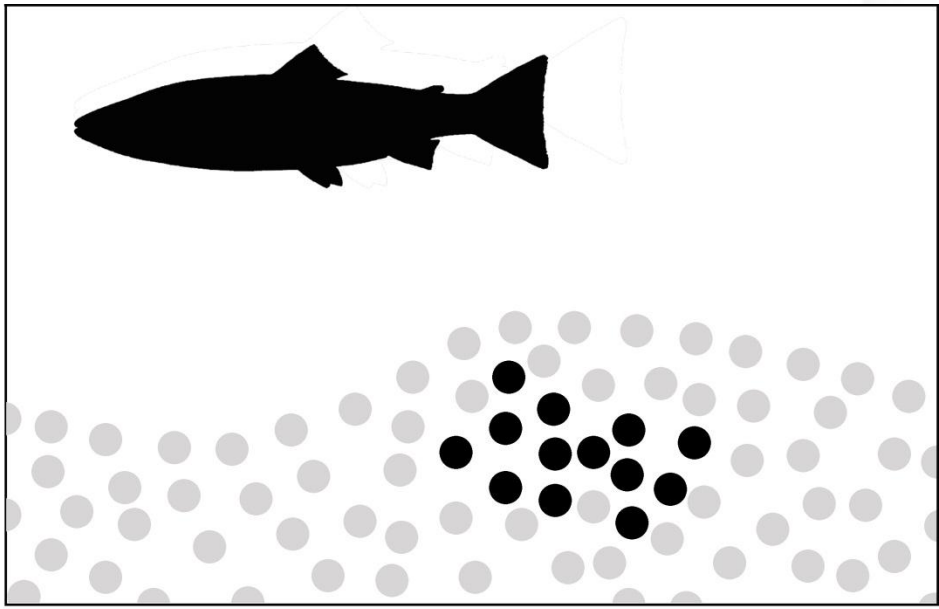
- **Topic today: Evaluation of restoring gravel bed spawning grounds**

Background

- Demands of lithopilic fishes



Substrate spawners
(e.g. Cyprinids)



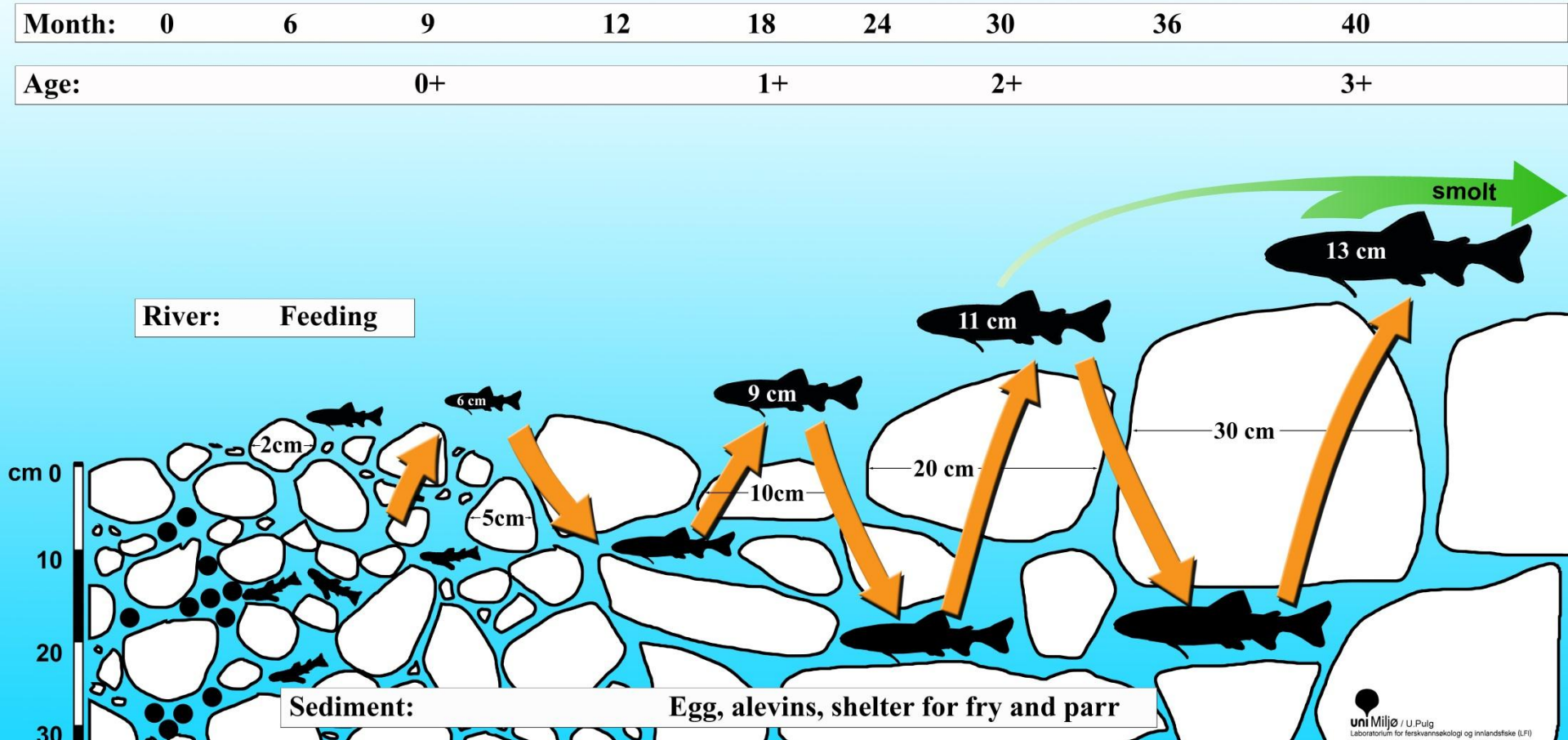
Interstitial spawners
(e.g. Salmonids)

Interstitial spawners, Atlantic salmon at Daleelva

Norway, Tore Wiers, Uni Research LFI

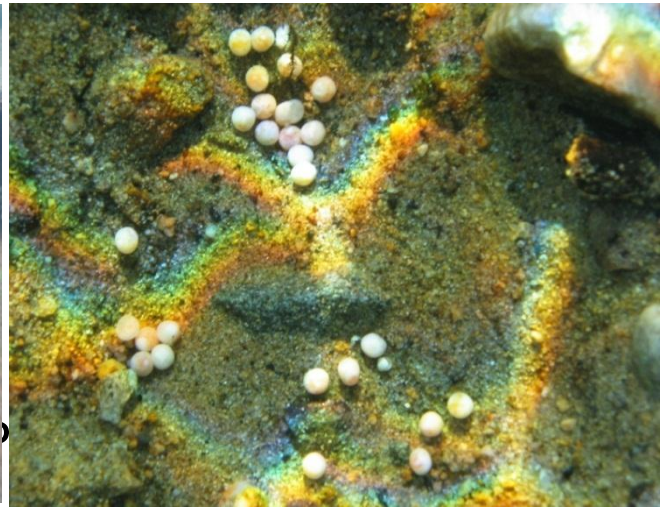
Background

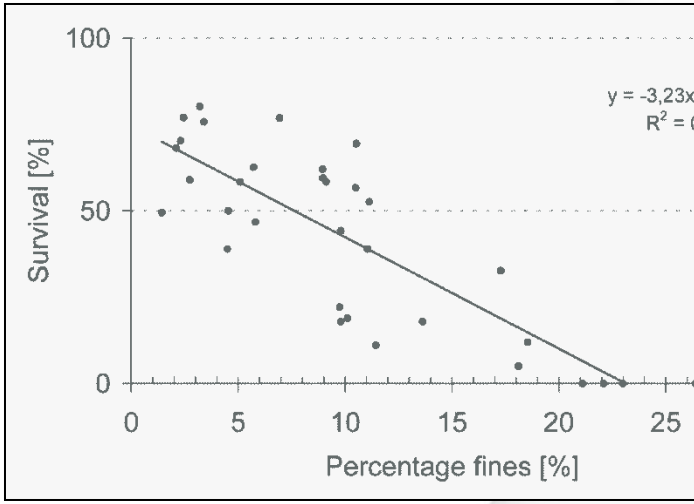
- Demands of lithopilic fishes



Spawning habitat degradation

- Degradation of spawning grounds due to fines, colmation, erosion, clogging





Barlaup et al. 2008
Pulg et al. 2013

Improving spawning habitats

Methods:

- River restoration
- Hydraulic adjustments
- Gravel cleaning
- Gravel augmentation

Are the methods successful?

Process-based versus local mitigation measures

Review of 20 projects

- Summary of 20 projects (Norway, Germany, Austria), *Hauer et al. (2013)*

- Success criteria: Sufficient sediment quality for target species to reproduce and juveniles to increase

- Focus on duration of the measures – **years of success**

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Improving spawning habitats

20 case studies, e.g.:

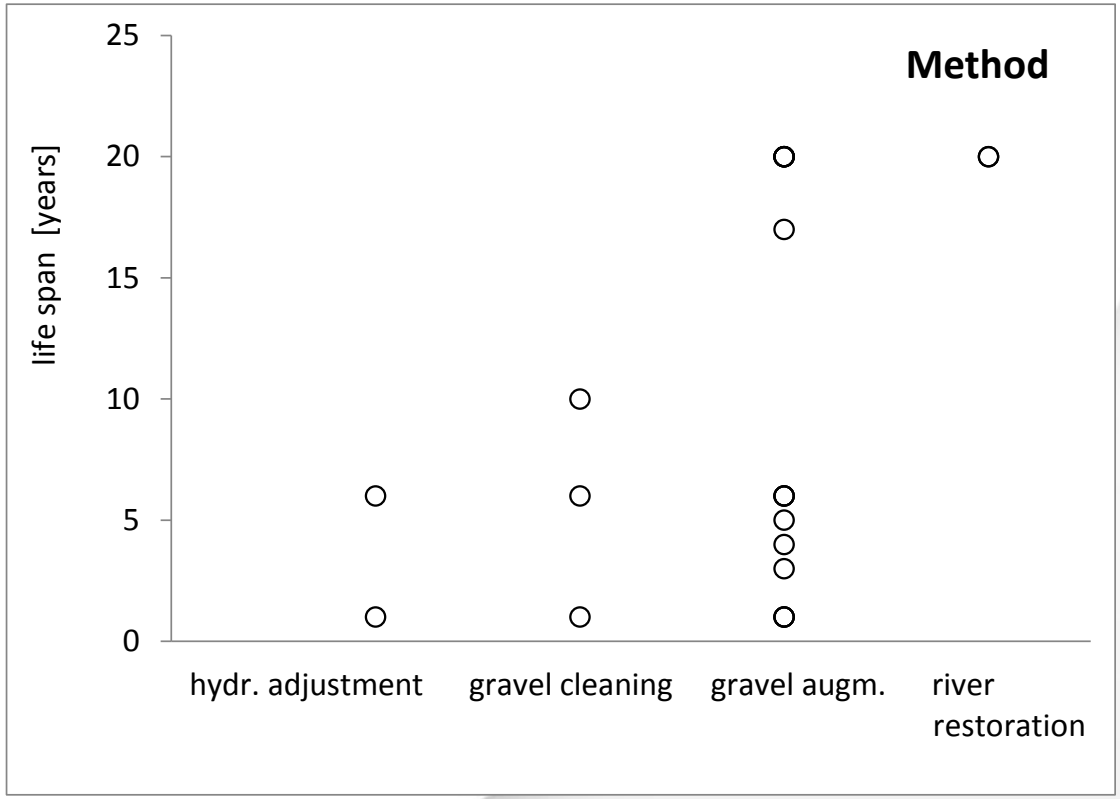
Peitnach river (Germany): Removal of dam, restoring of fluvial processes, sediment transport, years of success > 20

Bjornesfjorden (Norway): Gravel augmentation years of success > 20

Moosach river (Germany): Gravel augmentation, years of success = 6

Results

- Restoring processes is most successful and long lasting
- No significant differences between other methods, morphology, sediment dynamics



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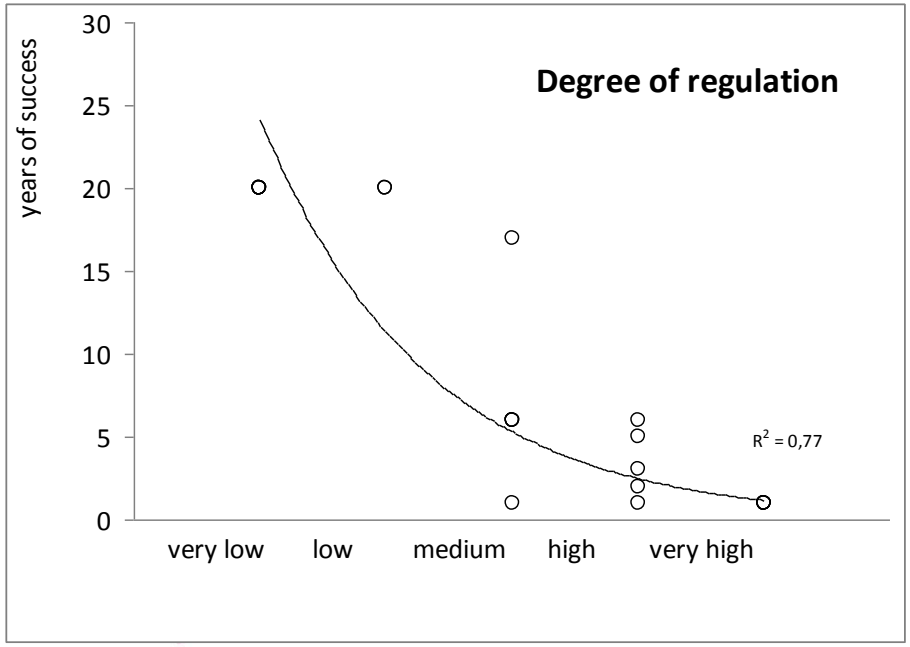
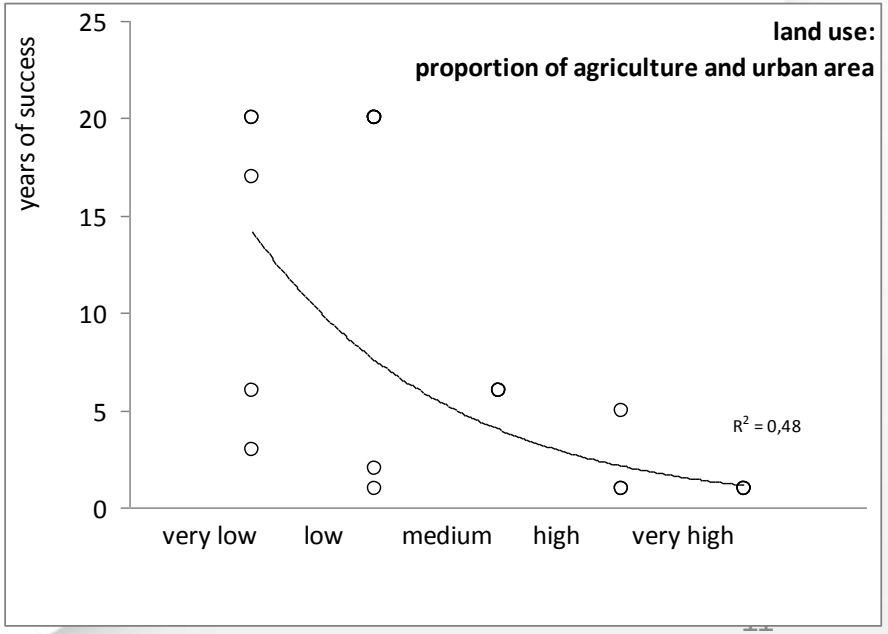
Results

Success correlates significantly with degree of regulation and land use





Discussion

What can we learn?

1.Best: Restoring fluvial processes,
especially bed dynamics & bed load
Long termed

If not possible

2. Second best: Local measures. Gravel cleaning/
augmentation/hydraulics
Short-long termed

Valid for both: Clean water increases success

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Discussion

Reality check

Is it possible to processes in heavily modified rivers?

Yes! Example Nidelva (Norway)

But in many cases not (yet)…

Should we give up lithopilic species in these rivers?

Stocking?

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Discussion

- Maintaining regulated rivers is a standard procedure: bank stabilization, dams, dikes, locks, power plants

- Why not key fish habitats?

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Discussion Conclusions

- **Restoring processes like river bed dynamics and bed load make long lasting spawning grounds**
- Mitigation measures like **gravel cleaning/augmentation** can be helpful tools in heavily modified stretches – but are **often short termed**
- **Maintenance** imitating natural processes is needed in such cases if gravel bed spawners should be conserved
- **Habitat management as standard** part of water management in regulated rivers is recommended

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