Session A1: Effects of Sluices on Migrating Elvers and Other Fish in a Dutch Salt Water / Fresh Water Gradient

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Effects of sluices on migrating elvers and other fish in a Dutch salt water / fresh water gradient

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Introduction: challenges for migrating fish

Study site (Spaarndam)
Introduction: research questions

- Do fish use the Spaarndam sluice to bridge this barrier?
- Can we use this sluice to improve fish migration?

Priority species:
• Elver (Anguila anguila)

Other species of interest:
• Three-spined stickleback (Gasterosteus aculeatus)
• Smelt (Osmerus eperlanus)
• Flounder (Platichthys flesus)
• Herring (Clupea harrengus)
• Common goby (Pomatoschistus microps)
Methods: study design

- Major pumping station (4)
- Minor pumping station (3)
- Minor sluice (2)
- Major sluice (1)
- Discharge channel
- Fresh water
- Brackish water
Methods: sampling

- Sampling in April and May 2014
- Simultaneous sampling of the four barriers
- Sampling both outside and within the barriers
- Mesh-trapnet, standard fyke and fine-mesh fyke

- Data on fish
- Data on abiotic variables
Results: species composition (individuals)

Mesh trapnet; outside the barriers
all four locations combined

- three-spined stickleback: 12%
- elver: 7%
- smelt: 4%
- fish larvae: 7%
- round goby: 3%
- other: 3%

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Results: temporal variation

Fine-mesh fyke; major pumping station

- perch
- flounder
- three-spined stickelback
- elver
- eel
- ruffe
- round goby

Date

T (°C)

CPUE (indiv./fyke night)
Results: comparing barriers

Why?
Discussion: why do elver cluster at the pumping stations?

- While at sea, elver passively migrate using tidal currents
- At inland waters, tidal currents decrease and elver actively swim
- They strongly focus on fresh water, detecting differences in water composition

- At our study site, pumping station has regular high discharge volumes
- Creates large fresh water attraction flow
Discussion: what are the options at Spaarndam?

**Elver**

- Continued discharge from pumping station
- Potential attraction flow in sluice has much smaller volume
- Elver will continue to focus on the attraction flow from pumping station
- Adjusting sluice management for elver at this site not recommended
- Instead, a species specific passage is required to facilitate elver migration.

**Other fish species**

- For other migratory fish species adjusting sluice management can have a positive effect
Conclusions

1) Elvers dominate the total catch
2) Elvers strongly congregate at pumping stations
1) Elvers do not congregate at the sluices
2) Elvers do not benefit from fish friendly sluice management
3) Other fish species do congregate in front of the sluices
4) Other fish species can benefit from fish friendly sluice management
5) At sites with multiple barriers, focus elver migration measures at spots with highest attraction flow options
Thank you for your attention

any questions?