Eels II: Analyzing Small-Scale Movements in the Downstream Migration of European Eel: A Radiotelemetry Study

Florian Kreische  
Ministerium für Klimaschutz, Umwelt, Landwirtschaft, Natur- Und Verbraucherschutz des Landes Nordrhein-Westfalen

Jost Borcherding  
Ministerium für Klimaschutz, Umwelt, Landwirtschaft, Natur- Und Verbraucherschutz des Landes Nordrhein-Westfalen

Torgeir Havn  
Ministerium für Klimaschutz, Umwelt, Landwirtschaft, Natur- Und Verbraucherschutz des Landes Nordrhein-Westfalen

Lisa Heermann  
Ministerium für Klimaschutz, Umwelt, Landwirtschaft, Natur- Und Verbraucherschutz des Landes Nordrhein-Westfalen

Maxim Teichert  
Ministerium für Klimaschutz, Umwelt, Landwirtschaft, Natur- Und Verbraucherschutz des Landes Nordrhein-Westfalen

See next page for additional authors

Follow this and additional works at: http://scholarworks.umass.edu/fishpassage_conference

Kreische, Florian; Borcherding, Jost; Havn, Torgeir; Heermann, Lisa; Teichert, Maxim; Thorstad, Eva; and Økland, Finn, "Eels II: Analyzing Small-Scale Movements in the Downstream Migration of European Eel: A Radiotelemetry Study" (2016). International Conference on Engineering and Ecohydrology for Fish Passage. 11.  
http://scholarworks.umass.edu/fishpassage_conference/2016/Jun22/11

This Event is brought to you for free and open access by the The Fish Passage Community at UMass Amherst at ScholarWorks@UMass Amherst. It has been accepted for inclusion in International Conference on Engineering and Ecohydrology for Fish Passage by an authorized administrator of ScholarWorks@UMass Amherst. For more information, please contact scholarworks@library.umass.edu.
Presenter Information
Florian Kreische, Jost Borcherding, Torgeir Havn, Lisa Heermann, Maxim Teichert, Eva Thorstad, and Finn Økland
Analyzing small-scale movements in the downstream migration of European eel: a radiotelemetry study

Florian Kreische, Jost Borcherding, Torgeir Havn, Lisa Heermann, Maxim Teichert, Eva Thorstad & Finn Økland
Analyzing small-scale movements in the downstream migration of European eel: a radiotelemetry study

Florian Kreische, Jost Borcherding, Torgeir Havn, Lisa Heermann, Maxim Teichert, Eva Thorstad & Finn Økland
Study site – River Sieg

- 153 km long, tributary to the Rhine
- Discharge: 53 m$^3$ s$^{-1}$
- Power station Unkelmühle 44 km upstream of confluence Rhine
Method – radio telemetry

- 134 living + 20 dead eels
- Length: 65.5 – 81.8 cm
- Caught in River Rhine
- 2 release groups: 1) 10.10.2015 => 70
  2) 13.10.2015 => 64

Lotek Nano Tag, weight in air 4.3 g, 9 x 30 mm
Method - release site

Living eels: 9.5 km upstream of power station

Dead eels: Tailrace of power station
Method - antenna stations

- 10 stationary receivers
- 23 antennas
Antenna stations

What happens in between stationary telemetry set-ups?
Manual tracking
Manual tracking

High precision
- Time-consuming for each fish
- Limited applicability

Time effective
- Vague fish positions
Manual tracking

- Portable receiver (Lotek SRX 600) and 3-E-Yagi antenna
Manual tracking

- Start 1.3 km upstream of release site => 40 km d\(^{-1}\)
- Continuous movement
- Every 1 – 7 days
Results - manual tracking

- 27 tracking sessions => 1017 km
- 94 % (n = 126) re-detection rate
- 25,850 valid signals => 1,291 fish positions
- 94.3 % tracking efficiency
Results - manual tracking

- Sequence of signals for 1 fish on 1 day

Signal range (average 199 m)
Results - manual tracking

- Concentrate on area of probable occurrence

Signal range (average 199 m)
Results – false codes

- 617 false codes (2.4 %)
- Distributed throughout study site

95 % < 101
Results - manual tracking

- Median signal range for each tracking
- Signals with power > 101
Results - manual tracking

- Mean = 109 m
- Diameter of buffer zone
Results - manual tracking

- Buffer zone around middle most powerful signals

- Overlap => no movement => no activity
Results – Activity per individual

- during low water period
- before actual migration
Results – Activity per tracking session

- **Frequency of Activity**
- **Discharge [m³ s⁻¹]**
- **Temperature [°C]**
- **Days after Release**
- **Water Temperature [°C]**

The graph shows the frequency of activity, discharge, and water temperature over time. The x-axis represents days after release, and the y-axes show the discharge and water temperature. The graph also indicates the presence of migrants with a specific marker.
Results – Activity per tracking session

- Frequency of Activity
- Discharge [m$^3$ s$^{-1}$]
- Water Temperature [°C]

Graph showing:
- Migrants
- Residents
- Discharge
- Temperature

Days after Release:
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9

Water Temperature:
- 0
- 5
- 10
- 15

Discharge:
- 0
- 100
- 200
- 300
Results

Distance from Release Site [km]

Days since Release

Migrants
n = 73

Residents
n = 36

n = Number of observations
Results

- Migrants: $n = 73$
- Residents: $n = 36$
- Stationary: $n = 16$
- Dead: $n = 20$
Summary

Manual tracking

- High redetection rates
- High tracking efficiency
- Fish position can be circumscribed
- Able to determine activity
Summary

Manual tracking

• Eels migrate once water levels increase
• Residents do not react to increase of water levels
• Manual tracking frequency needs to be adjusted to the conditions
Thank you!