Migration of European eel in an anthropogenically impacted wetland area in Belgium

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Take me down to the paradise city

where the eels are green
and their skin is slippy

...
Valuable habitats
Valuable habitats
However, we do have problems
However, we do have problems
Impact op het krekengebied

Current flow direction
Archimedes screw pumping station

- Previous research (Buysse et al. 2014)
Archimedes screw pumping station

- Previous research: min. 20% eel mortality at passage!
2. Evaluatie Vijzelgemaal
Objectives

- Impact of pumping station on eel behaviour?
  - Migration routes?
  - Search behaviour?
  - Delay?

- Potential solutions?
Methods

• Fyke nets & electrofishing => 553 eel caught
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- Silvering characteristics (Durif et al. 2005)
Methods

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=> 69 eels tagged (V13-L, battery life = 3 years)
=> only female silver eels tagged
Methods
Results (May 2014, tagging summer 2012)

- Number of eel tagged: 69

- 62 eel detected after release
• Number of eel tagged: 66

• 59 eel detected after release

  • 45 resident eel (stay in polder, min. 1 was fished)

  • 45 eel pass pumping station
    • 10 eel end up in zone between PS and tidal barrier
    • 35 eel pass tidal barrier and end up in estuary

• 1 eel selects alternative migration route
Results

- Different types of behaviour
POLDER AREA
POLDER AREA

Sea

Weir
Failed migration, return to home site
Results

- Different types of behaviour
Long homing, Followed by fast migration
Results

- Passage through PS
- No passage

GG3

Distance from pumping station (m)

Time (-)

29/06/2012
27/10/2012
26/01/2013
17/03/2013
06/05/2013
25/06/2013
14/08/2013
03/10/2013
22/11/2013
Short distance search + delay of migration
Distance from pumping station (m)

Time (-)
Long distance search
Migration to weir

Sea

Weir

POLDER AREA

Pumping station

Sea

Main flow direction

# 2
1 (50%)
Results

- Different types of behaviour

- No passage

- Passage over weir
Results

- Different types of behaviour

<table>
<thead>
<tr>
<th>Behaviour</th>
<th>Number of eel</th>
<th>Number of eel passing weir/pumping station</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homing</td>
<td>35</td>
<td>0 (0 %)</td>
</tr>
<tr>
<td>Failed migration, return to home site</td>
<td>2</td>
<td>0 (0 %)</td>
</tr>
<tr>
<td>Long homing, then fast migration</td>
<td>11</td>
<td>9 (81 %)</td>
</tr>
<tr>
<td>Short distance search + delay of migration</td>
<td>9</td>
<td>7 (78 %)</td>
</tr>
<tr>
<td>“Long distance” search</td>
<td>3</td>
<td>3 (100 %)</td>
</tr>
<tr>
<td>Migration to weir</td>
<td>2</td>
<td>1 (50 %)</td>
</tr>
<tr>
<td>Total</td>
<td>62</td>
<td>20 (32 %)</td>
</tr>
</tbody>
</table>
Conclusions
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- Eel migration in study area seriously disrupted
  - Mortality after passage through pumping station
  - Impact on eel behaviour
    - Unsuccessful migration attempts
    - Desorientation – search behaviour
    - Delays
  - Significant individual differences!
Conclusions

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Conclusions

- Extent of problem wider than study area
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- Cumulative effects!
Conclusions

• Implications for management?
  • Fish-friendly pumping stations (turbines)?
  • Gain insight into eel response on flow alterations
  • Individual-based approach
    • Take into account realistic migration period
    • Optimise flow regime
    • Develop appropriate models

=> Much work to be done
Conclusions

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Further research

- Permanent network of acoustic listening stations
  - Estuarine and marine migration behaviour
Thank you!

Questions?

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