Jun 24th, 10:50 AM - 11:05 AM

Session A7: Use of Telemetry for Fish Ecological Survey in Europe

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Use of Telemetry for Fish Ecological Survey in Europe

Dr. Beate Adam
Kirtorf-Wahlen / Germany

Photo: Blue Leaf Environmental Inc. 2012
Telemetry is ...  

... measuring the position of an animal over a ± big distance.
Topics

• What types of telemetric systems are available?

• Which kind of telemetric surveys have been done in Europe?

• What about the demands of the European Animal Welfare Act due to telemetric projects?
**Telemetric technologies**

- **emitter** (radio tag)
- **radio waves**
- **Jagy antenna**
- **detector**

Radio telemetry

![Diagram](image.png)
Emitters

Radio telemetry:
tag (mostly) with an external drag antenna

Acoustic telemetry:
tag without external drag antenna

Life time is limited by the capacity of the battery

RFID:

NEDAP-Transponder:
with batterie just to tune the signal, when transponder is activated

Life time depends on the number of detections

FDX and HDX-transponder:
no batterie

Works as long as the animal lives
Telemetry with fish in Europe since 2000

Number of surveys

- Switzerland (Swiss)
- Austria
- Portugal
- Spain
- Denmark
- Czech Republic
- Netherlands
- Sweden
- Belgium
- Germany
- England
- France
- Norway

n = 115
Deployment of telemetric surveys in Europe

n = 115
Type of used emitters

- Telemetric tags
- RFID transponder

<table>
<thead>
<tr>
<th>Number of Surveys</th>
<th>Telemetric Tags</th>
<th>RFID Transponder</th>
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<tbody>
<tr>
<td>&gt; 4000</td>
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number of surveys
presence/absence telemetry

- antennas report a signal with time and location of detection
Telemetric studies on freshwater fish
(incl. diadromous species)
2-dimensional tracking (2d)

- only acoustic telemetry
- tracking by comparing the runtime of a signal between 3 antennas
3-dimensional tracking (3d)

- only by acoustic telemetry

- tracking by comparing the runtime of a signal between 3 stable positioned and time synchronized hydrophones

Bypass

last detection

turbine intakes

start

deapth [m]

0 1 2 3 4 5 6 7 8 9 10

0 25 50 [m]

project: A. HARO, USGS Turners Falls 2010
Kind of tracking

- 3d
- 2d
- presence/absence
Criteria to choose the best fitting telemetric system

<table>
<thead>
<tr>
<th>Technology (acoustic, radio, RFID)</th>
<th>Turbulence, bubbles, turbidity</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Conductivity (more or less 800 μS/cm)</td>
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<td>Water depth</td>
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<td></td>
<td>Required detection range and precision</td>
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<tr>
<td></td>
<td>Presence/absence, 2d- or 3d-tracking</td>
</tr>
</tbody>
</table>
Tagging positions

external fixed through to the dorsal musculature

gastrointestinal

internal application

intraabdominal
Tagging positions

- gastrointestinal: 3%
- external: 8%
- intraabdominal: 89%
„Nobody is allowed to cause an animal pain, suffering or injuries without a reasonable agent“

European Animal Welfare Act

- cephalopods
- decapods
- vertebrates
Telemetrie = animal experiment

- narcotisation to keep fish quiet and relaxed
- surgery for an external or introabdominal application of a tag
- placing the transmitter in the stomach without narcotisation
- increasing the risk of predation for tagged specimen by a tag influenced habitus and behaviour

Manipulations done to lamprey and fish can cause pain, suffering and injuries.

Experiments with animals need to be permitted by gouvernemental authorities for veterinary affairs!

Animal experiments have to be planned and done with respect to the 3R-principle: replace & refine & reduce!

Experimentators need to be qualified; their actions are subject to strict control!
Animal experiment lore

• In Germany and some other European countries, f. e. Norway are specific training courses for researchers available to get the certificate as an experimentator for animal experiments with cephalopods, decapods, lamprey and fish.

• Actual exist no standards in Europe for surgical procedures on aquatic animals …

• … just a book how to handle aquatic animals respectfull and gentle.
Thank’s for your attention!