Preliminary results from a coastal stocking experiment indicate life-history effects & stocking site fidelity in European eels (Anguilla anguilla)

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[1] https://ostseemagazin.net/mecklenburg-vorpommern/; 23.05.2018
Life circle of *Anguilla anguilla*
Life circle of *Anguilla anguilla*

Stock situation

The European eel – an endangered species!!!

Decline of juvenile eel stock since 1970s by 90 – 99 %

Stagnates at historical low levels\(^3\)

ICES declared in 1999: stock is “outside safe biological limits”\(^4\)

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International protection, regulation & management

2008: “Critically endangered”[5]

2008 listed in the Washington CITES on Appendix II[6]

[6] https://www.cites.org/eng/disc/text.php#II; 07.08.2018
International protection, regulation & management

EU requested member states to elaborate **Eel Management Plans (EMP)**

**Objective:** sustainable attainment of **40 % silver eel escapement** (biomass)[7]

**Measures:** Most of these plans include monitoring, **stocking in inland waters** and reduction of mortality[8]
International protection, regulation & management

One EMP per eel river basin = 9

Institute of Fisheries is responsible for Warnow/Peene

Until 2014, eel stocking in freshwaters, only

Is stocking in coastal waters also a management option?

- 1 Mio glass eels
- 2 stocking areas
- 2014 – 2016
- Marked with alizarin red S (ARS)\(^{[12]}\)

Marking & stocking in 2014 – 2016

60 kg glass eel per stocking area per year [12]

30 X

1 kg glass eel

70 l

30 l ARS solution

150 mg ARS/1 l H₂O

Exposure time: 3 – 4 h & transport to both stocking areas

Sampling in 2017

16 sampling stations
Eels = 397
Fishing gear = eel-specific enclosure net system\textsuperscript{[14]}

Fishing gear for sampling in 2017

First Results

16 sampling stations
Eels = 397
Fishing gear = eel-specific enclosure net system[^14]

37% of potential stocked eels (n = 253) were marked

83% of marked eels were inside of both stocking areas

Observed distribution range of marked eels: ~35 km

Expanding study area in 2018 & 2019

Marked eels were significantly larger than unmarked conspecifics (age 3)

Different life-history effects of marked and unmarked eels?

Similar results in European\textsuperscript{[15]} and American eels\textsuperscript{[16]}

\textsuperscript{[15]} Lin et al., 2007: Growth differences between naturally recruited & stocked European eel from different habitats in Lithuania. Journal of fish Biology 71: 1773–1787.

Further Studies/Outlook

1. Assessment and advice on glass eel stocking in coastal waters as a management option
   - Additional parameter: sex ratio, health conditions (k, HSI), parasite infection (A. crassus) etc.
   - Calculation and modelling of eel density and silver eel escapement

2. Bioaccumulation potential of ARS in eel muscle tissue
   - Risk assessment authority: use of ARS → not harmless[17]
   - Detection of ARS in muscle tissue depending on body length

3. Genetical differences in ecotypes in relation to habitat preferences (salt – and freshwater)
   - Marker genes selected homologous to American eel[19]

[17] Bundesinstitut für Risikobewertung (Risk assessment authority), 2017: Stellungnahme zur Aalmarkierung mit Alizarin-Rot S und Strontiumchlorid, Gesundheitliche Bewertung des BfRs, S-3520-01-9346217
[18] http://themen-biologie.blogspot.de/2014/03/allgemeines-uber-die-dna.html, 22.05.2018
Thank you for your attention