

# Conservation of Freshwater Pearl Mussels (*Margaritifera margaritifera*) in Austria – Biomonitoring in the Interstitial

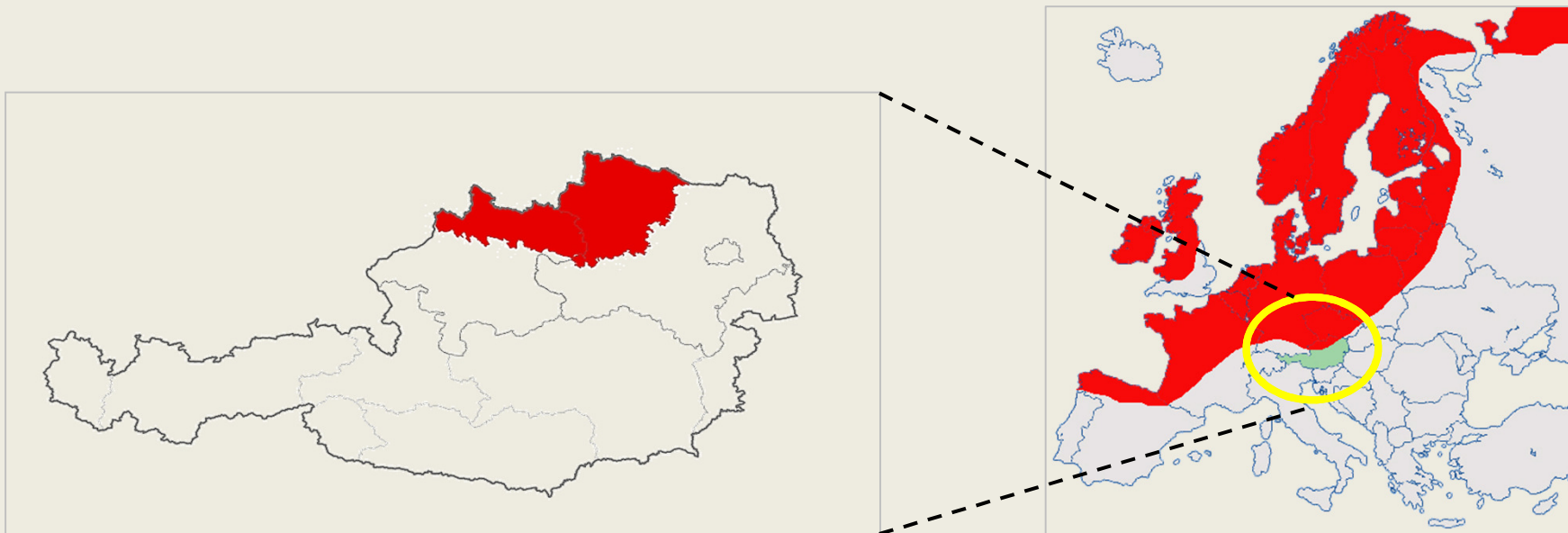
D. Daill & C. Gumpinger

International seminar „Monitoring and restoration of freshwater (mussel) habitats“

Clervaux, Luxembourg, 27 – 29.11.2018

## The freshwater pearl mussel in Austria

- Distribution in Austria restricted to the Bohemian massif



## The freshwater pearl mussel in Austria

- Declining populations → need for a conservation project
- „Vision Flussperlmuschel“
  - Since 2011
  - Funded by the Office of the State Government of Upper Austria and the European Union
  - Two main strategies: Captive breeding and Habitat restoration

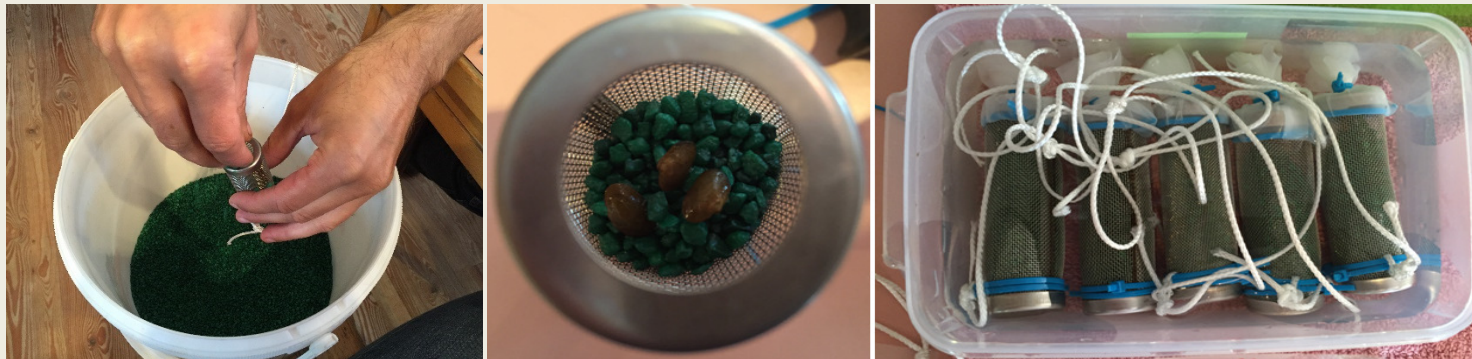


## Biomonitoring – different approaches

- Estimation of growth and mortality rates to draw conclusions about the environmental quality
- Monitoring in the open water and under controlled conditions
- Since 2016: Monitoring within the interstitial
- Estimation in 2 river systems:
  - Aist-system → River Schwarze Aist
  - Naarn-system → Käfermühlbach brook

## Biomonitoring in the Interstitial – Mesh cages

- Method following DURY et al. (2013)
- Small cages filled with substrate
- Used in the Käfermühlbach brook at three locations (potential sites for reintroduction)
- 10 cages with three mussels per cage at each location → 90 mussels in total buried



## Biomonitoring in the Interstitial – Mesh cages

- Duration of exposure: April to July 2016
- Experiment was terminated in July 2016 due to flood events
- Rust formations on several cages

→ survey continued with buried Buddensiek-Boxes

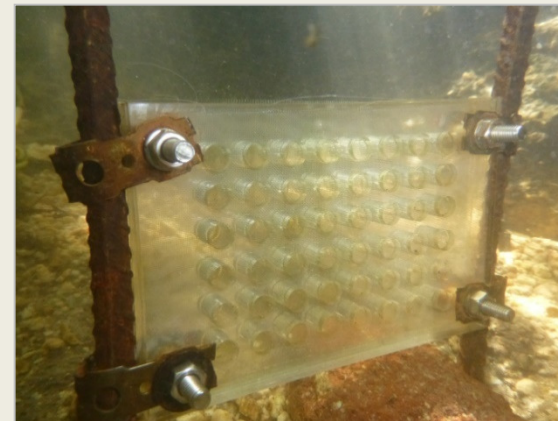


## Results – Mesh cages

- 3 months exposure in the Käfermühlbach brook
- 18 out of 90 mussels were lost in the course of a flooding event
- 4 mussels could not be found
  
- No dead mussels observed → 68 mussels (75,5%) survived

## Biomonitoring in the Interstitial – Buried Buddensiek Boxes

- Buried vertically
- Used in the Käfermühlbach brook at three locations (potential sites for reintroduction)
- 1 box at each location → 68 mussels in total
- Duration of exposure: July 2016 to April 2017



*Setup in the open water*



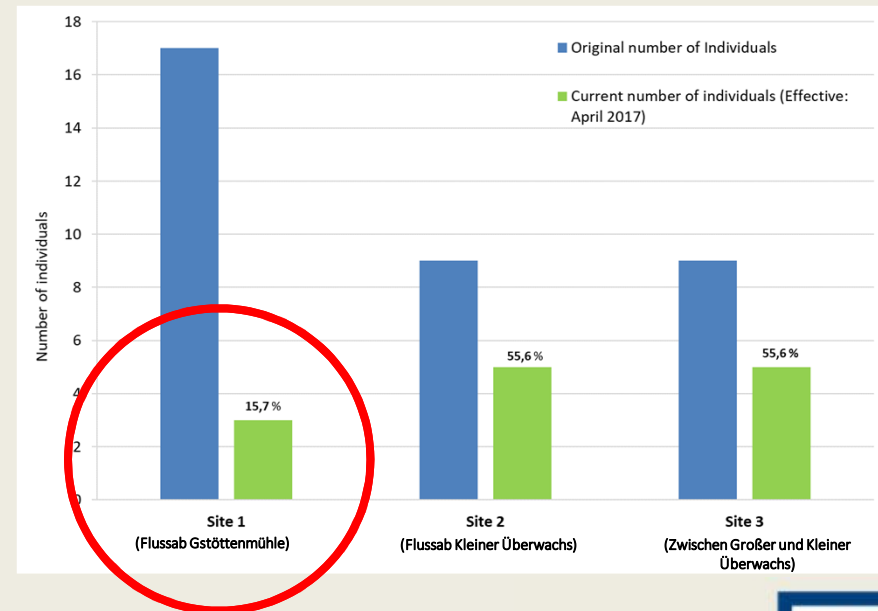
## Results – Buried Buddensiek-Boxes

- 9 months exposure in the Käfermühlbach brook

Gießenbach 2011



Naarn 2012



## Results – Buried Buddensiek-Boxes

- Mussels survived being in the substrate continuously for nine months!
- Position within the buried Buddensiek-Boxes had no effect on survival rates
- Signs of malnutrition observed in almost all individuals
  
- Oxygen supply does not seem to be the limiting factor, but rather the food availability

## Biomonitoring in the Interstitial - Substrate boxes

- Designed to assess the survival rates and vertical mussel movement within the substrate
- 3 boxes in the Käfermühlbach brook and 2 boxes in the river Schwarze Aist (sites of potential reintroduction)



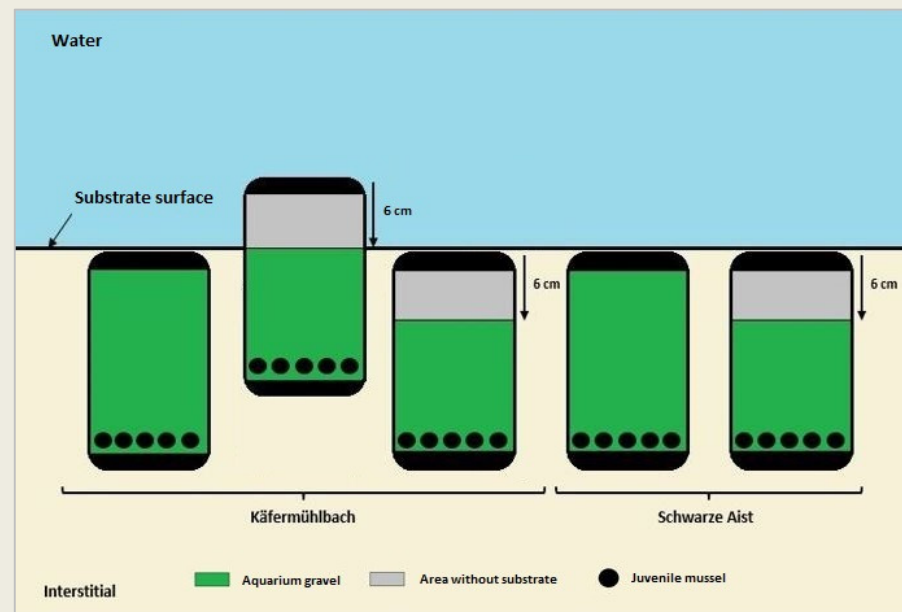
## Biomonitoring in the Interstitial - Substrate boxes

- First trials from October 2017 until December 2017
  - 5 mussels (Gießenbach 2011) per cage
  - Mussels were placed in the top layer of the cage
- Start with new concept in December 2017
  - 10 individuals (Aist 2015) per cage
  - Mussels were placed at the ground of the cage
  - Different variants of placement within the substrate
  - Ongoing survey
  - Survival rates were checked in April 2018



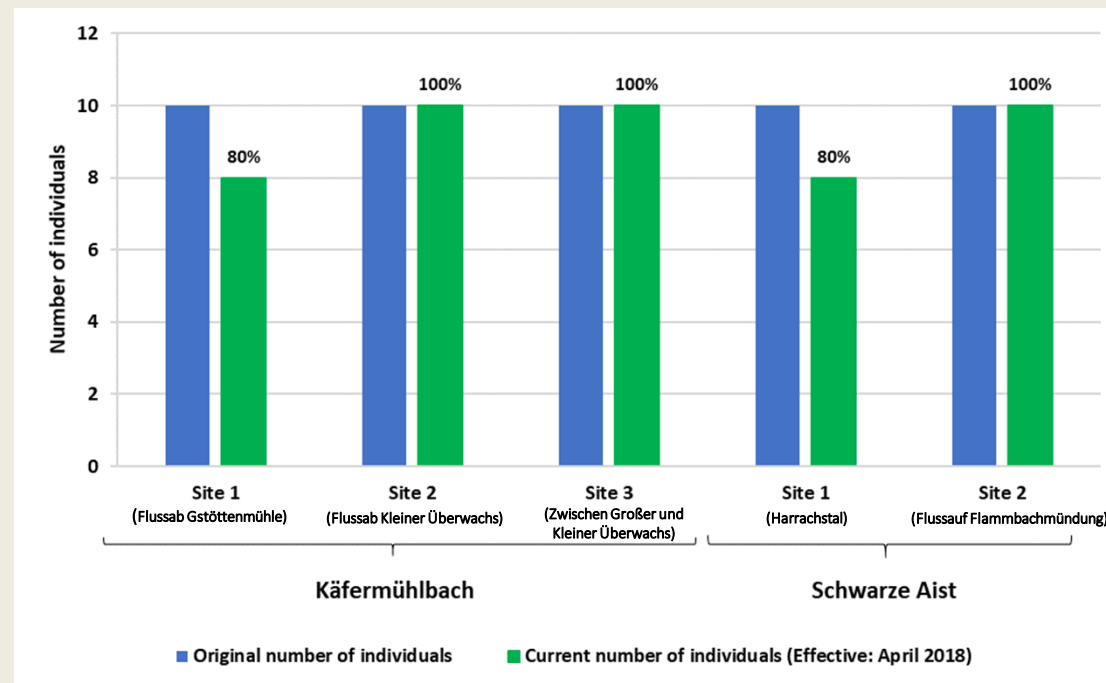
# Biomonitoring in the Interstitial - Substrate boxes

- Different variants of placement within the interstitial



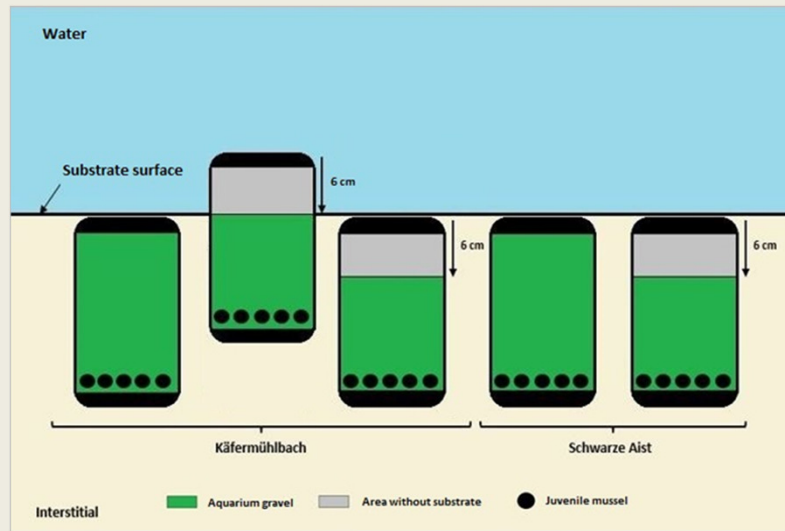
## Results – Substrate-Boxes

- 4 months exposure within the Käfermühlbach brook and the river Schwarze Aist



## Results – Substrate-Boxes

- Vertical movement



River	Site	Number at a depth of 0 – 5 cm	Number at a depth of 6 – 10 cm	Number at a depth of 11 – 15 cm	Number at a depth of 16 – 20 cm
Käfermühlbach	Site 1 (Flussab Gstöttenmühle)	0	0	4	4
Käfermühlbach	Site 2 (Flussab Kleiner Überwachs)	0	0	5	6
Käfermühlbach	Site 3 (Zwischen Großer und Kleiner Überwachs)	0	4	1	5
Schwarze Aist	Site 1 (Harrachstal)	0	0	6	2
Schwarze Aist	Site 2 (Flussauf Flamm Bachmündung)	0	0	5	5

➔ Results have to be seen as tendencies!

## Conclusion

- Areas in the interstitial with sufficient oxygen supply for mussel survival are present
- Food availability might be the limiting factor
  - Possible construction of a „food/rearing channel“ following HRUSKA (1998)
- Further investigations are necessary to evaluate the degree of vertical movement





The project is funded by:

€ Office of the State Government of Upper Austria,  
Section for Environmental Protection

€ European Union

MIT UNTERSTÜTZUNG VON BUND, LÄNDERN UND EUROPÄISCHER UNION



Europäischer  
Landwirtschaftsfonds für  
die Entwicklung des  
ländlichen Raums:  
Hier investiert Europa in  
die ländlichen Gebiete



Thank you for your attention!