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Enhancing upstream passage solutions for juvenile eels: effects of climbing substrate and ramp placement

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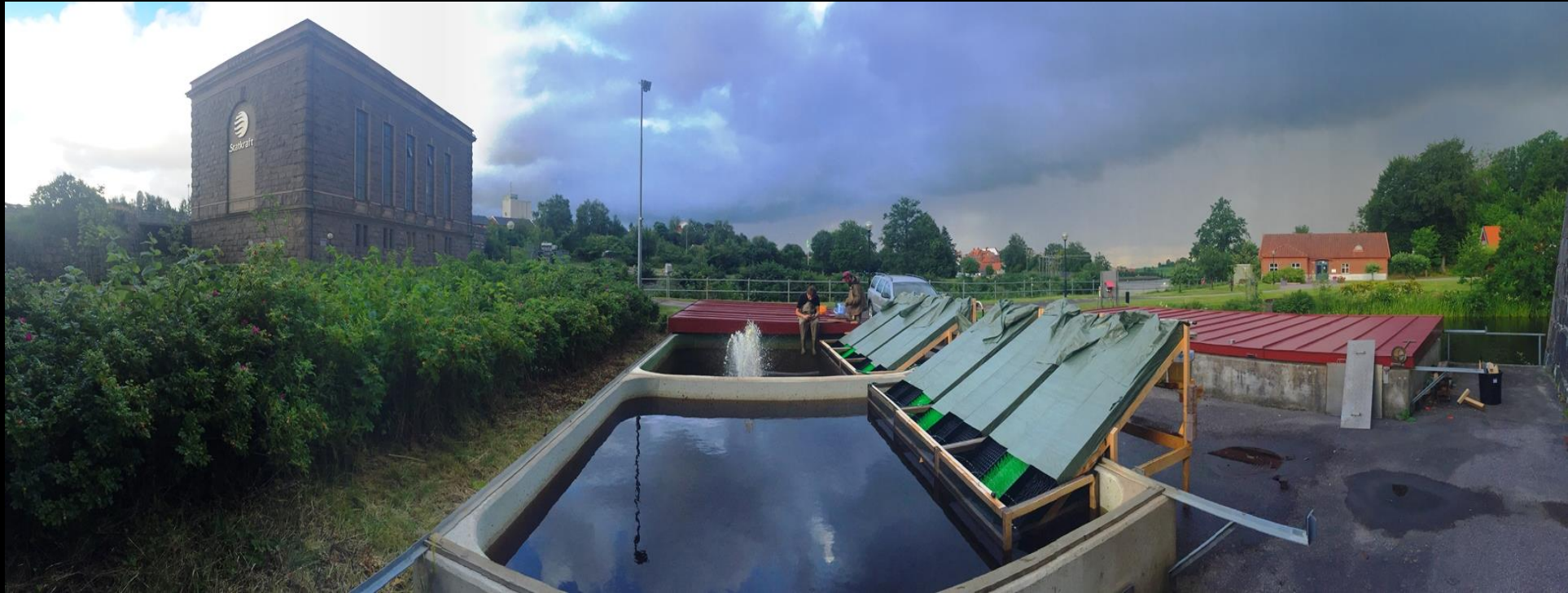
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Enhancing upstream passage solutions for juvenile eels: effects of climbing substrate and ramp placement



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4) Swedish University of Agricultural Sciences



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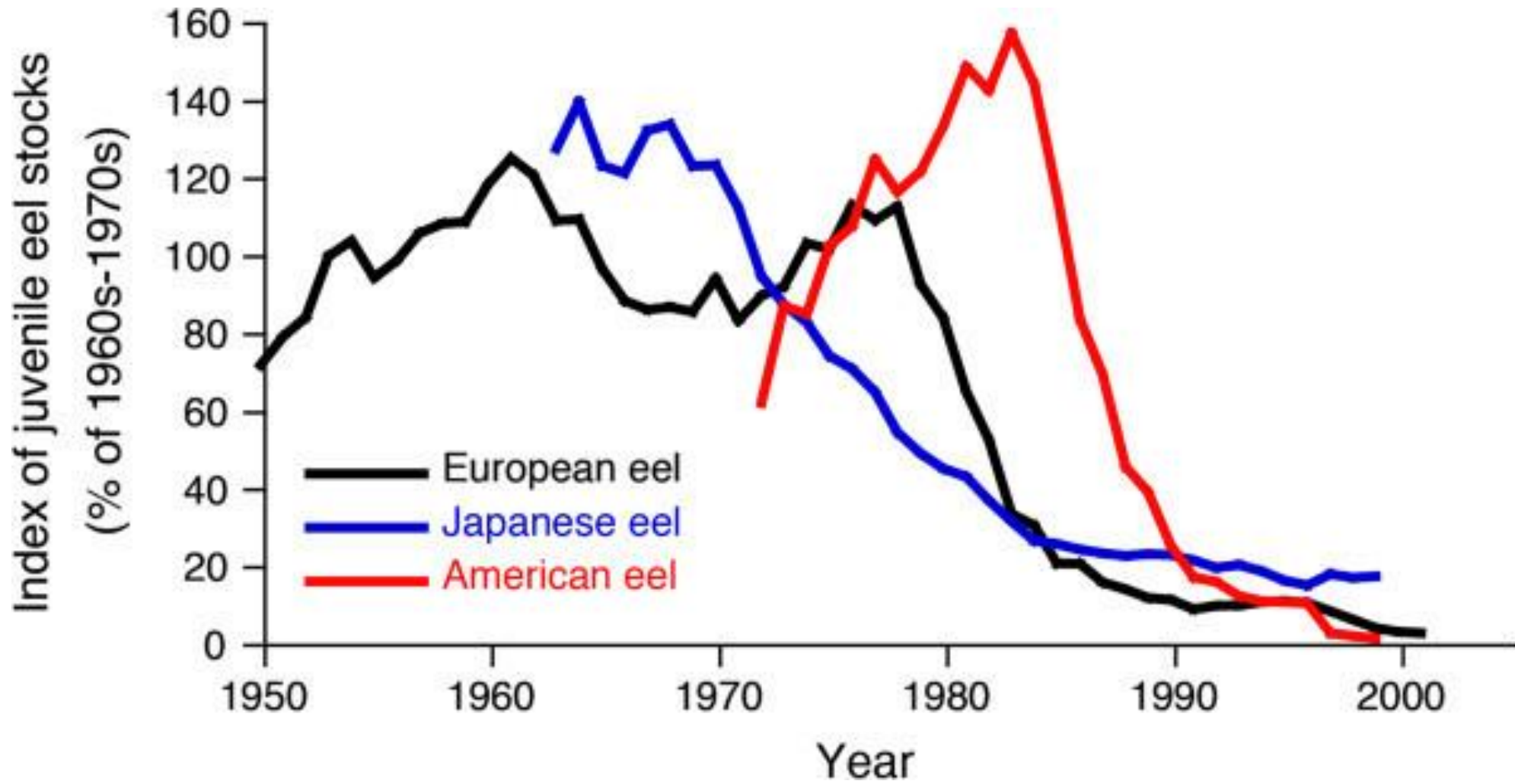
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*Courtesy of
Willem Dekker*



The situation

1. The situation for the European eel is bad
2. Multiple life stages need to be targeted
3. Fishing (yellow/silver eels)
4. Adult silver eel downstream migration
5. Glass eel/elver upstream migration

European eel conservation strategy (Council Regulation (EC) No 1100/2007)

National eel management plans:

- *To allow with high probability that the escapement of silver eel to the sea is at least 40% of the best estimate of escapement biomass that would have existed if no anthropogenic influences had impacted the stock.*

Actions of the Swedish eel management plan:

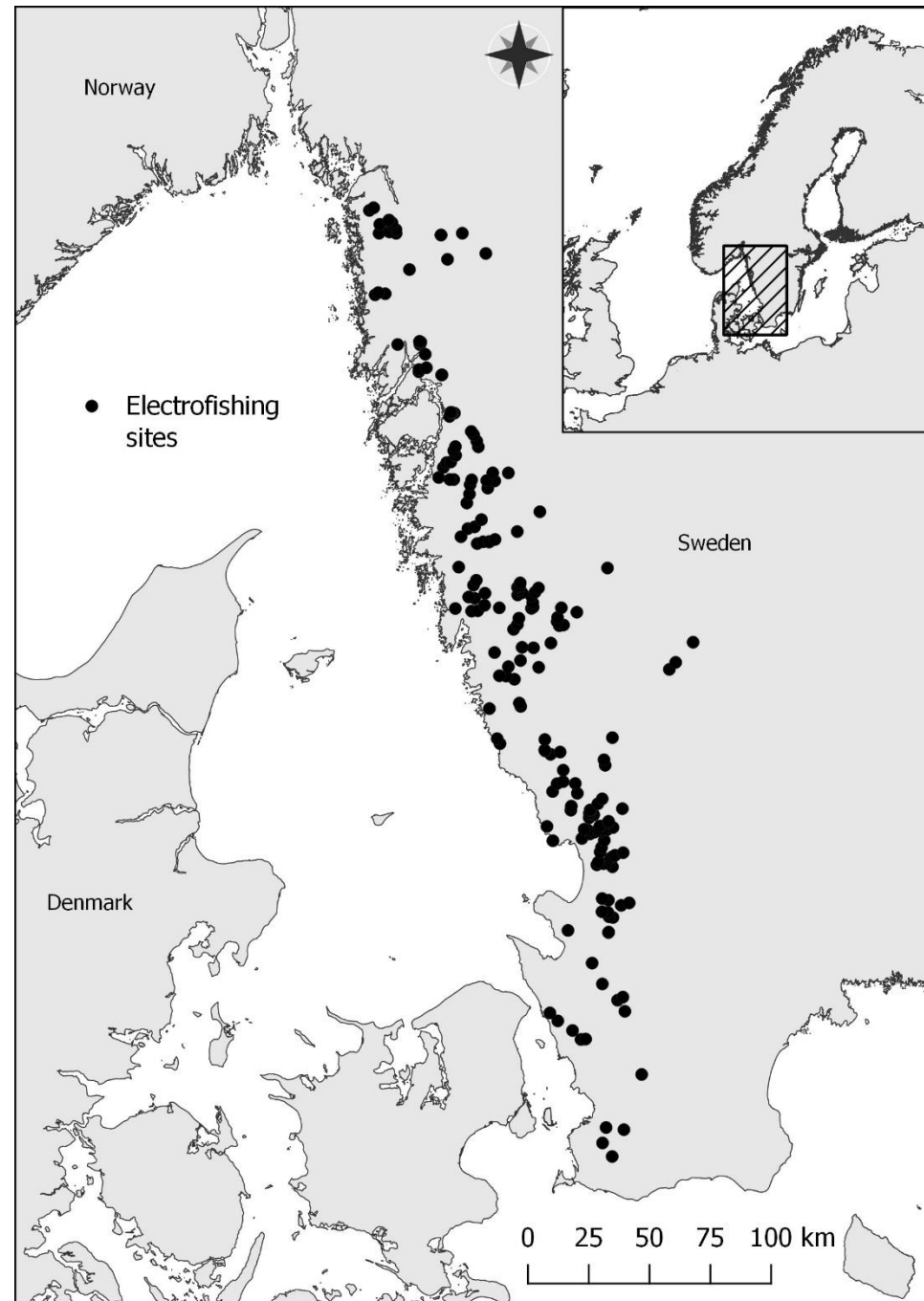
- 1) reduction of the fishery
- 2) increased control measures
- 3) reduced turbine mortality
- 4) increase juvenile eel recruitment

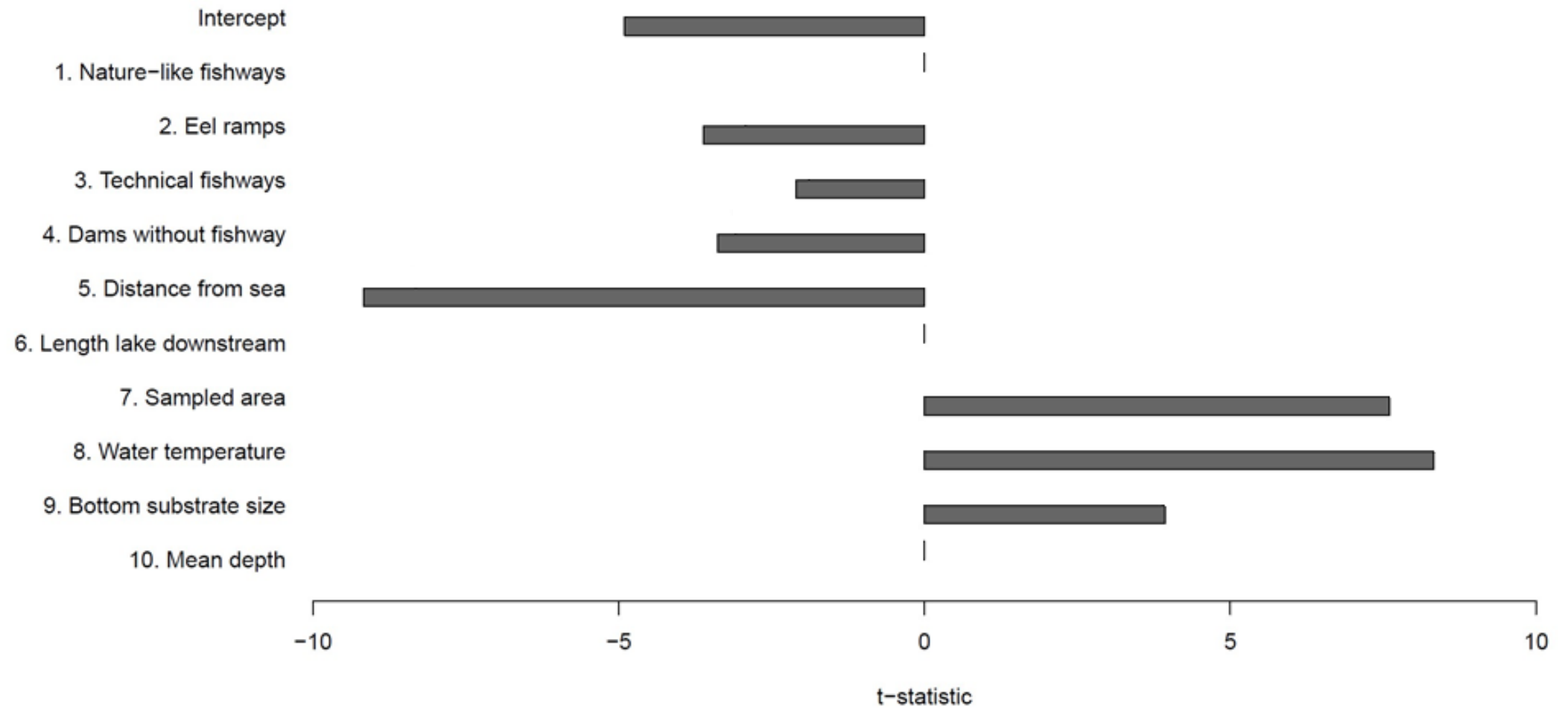


Upstream passage solutions

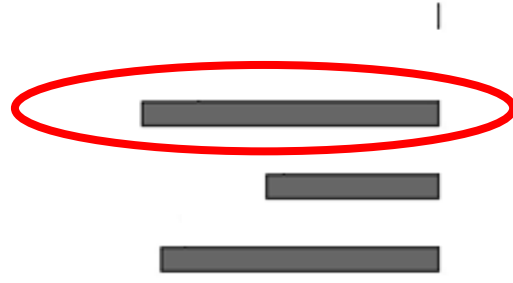
Coastal river connectivity
and the distribution of
ascending juvenile eels

***Do the existing
upstream fish passage
solutions work for
juvenile eels?***





- 1. Nature-like fishways
- 2. Eel ramps
- 3. Technical fishways
- 4. Dams without fishway



Nature-like

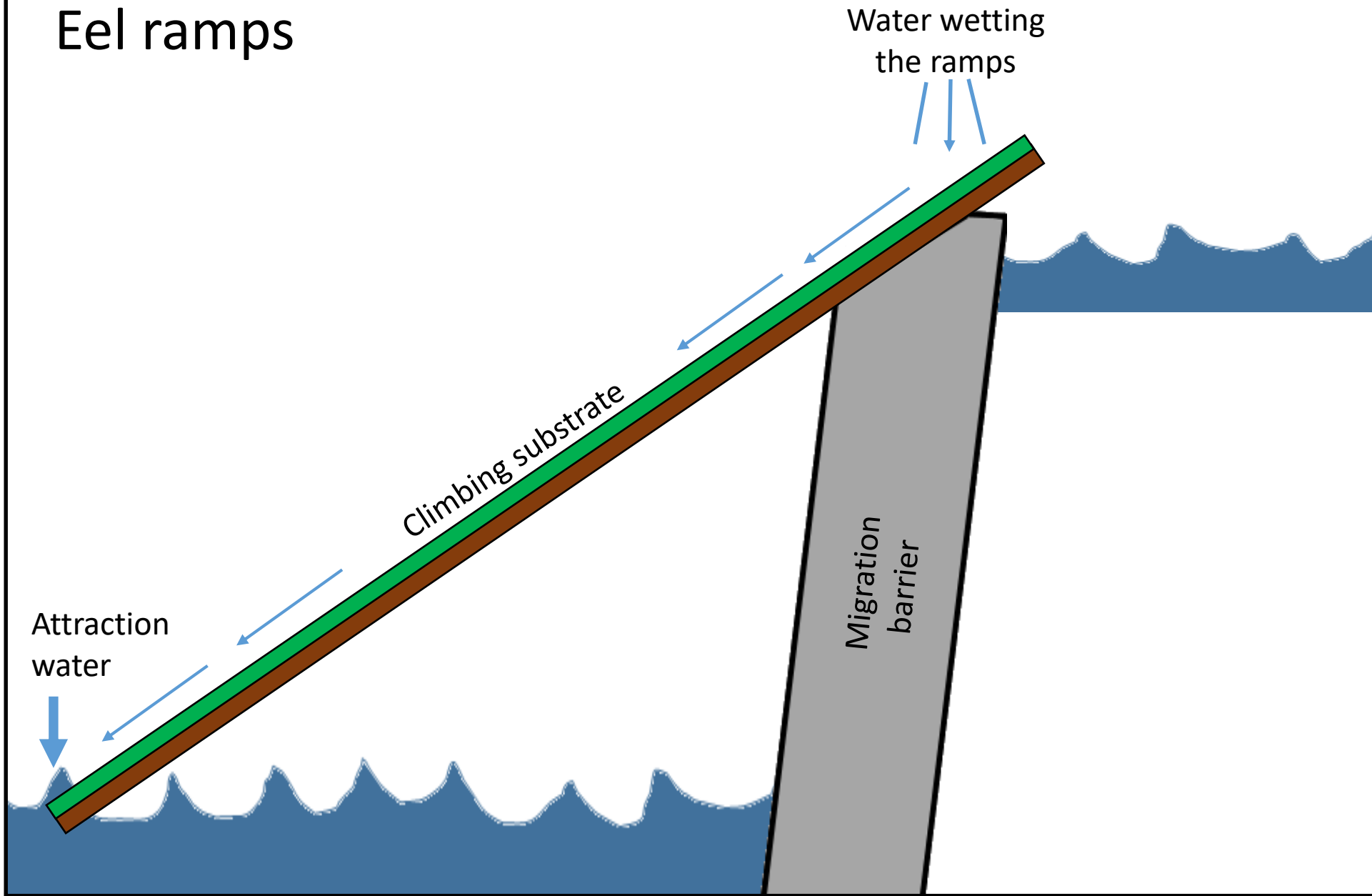


Eel ramp



Technical

Eel ramps



Eel ramps

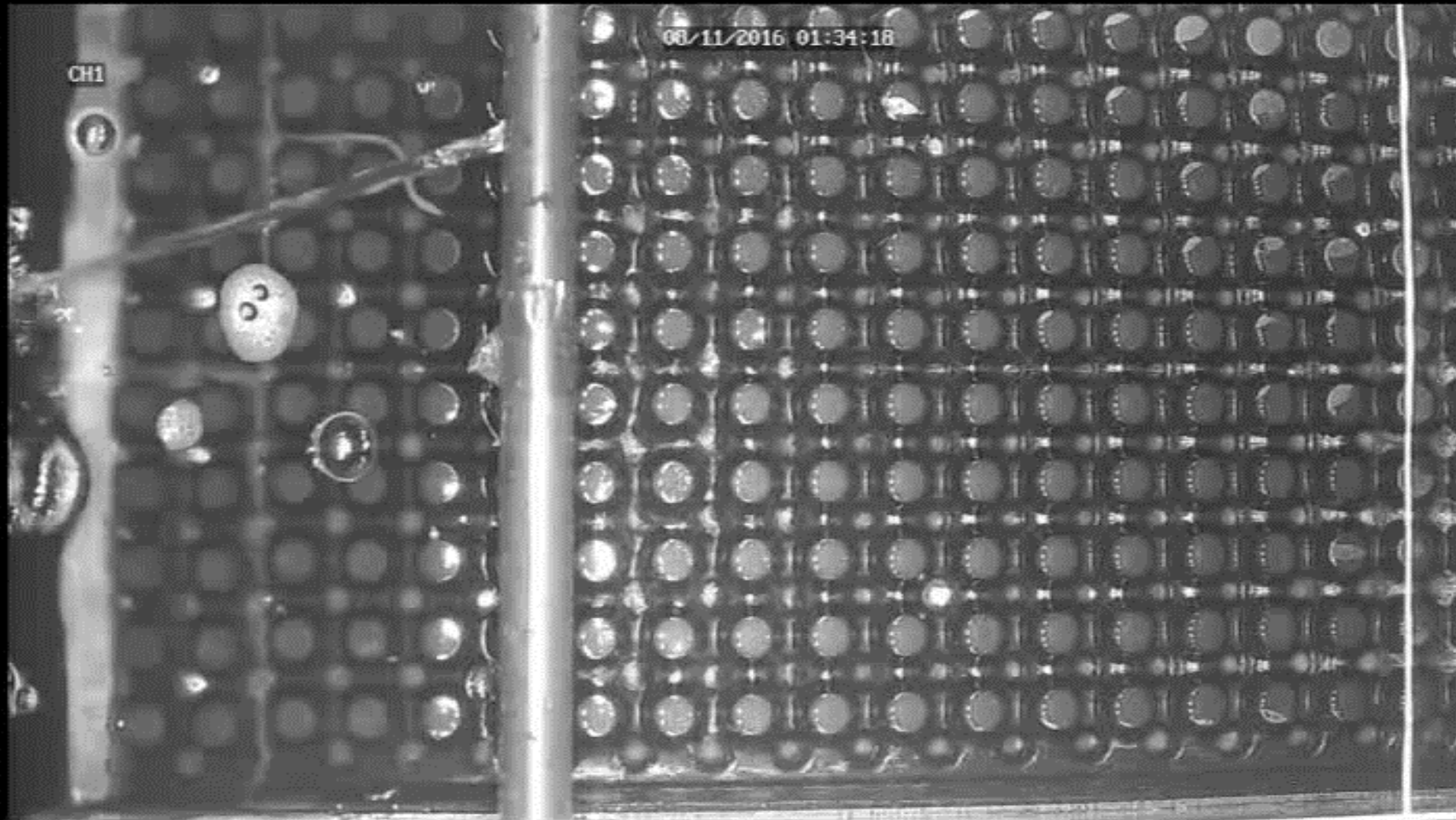


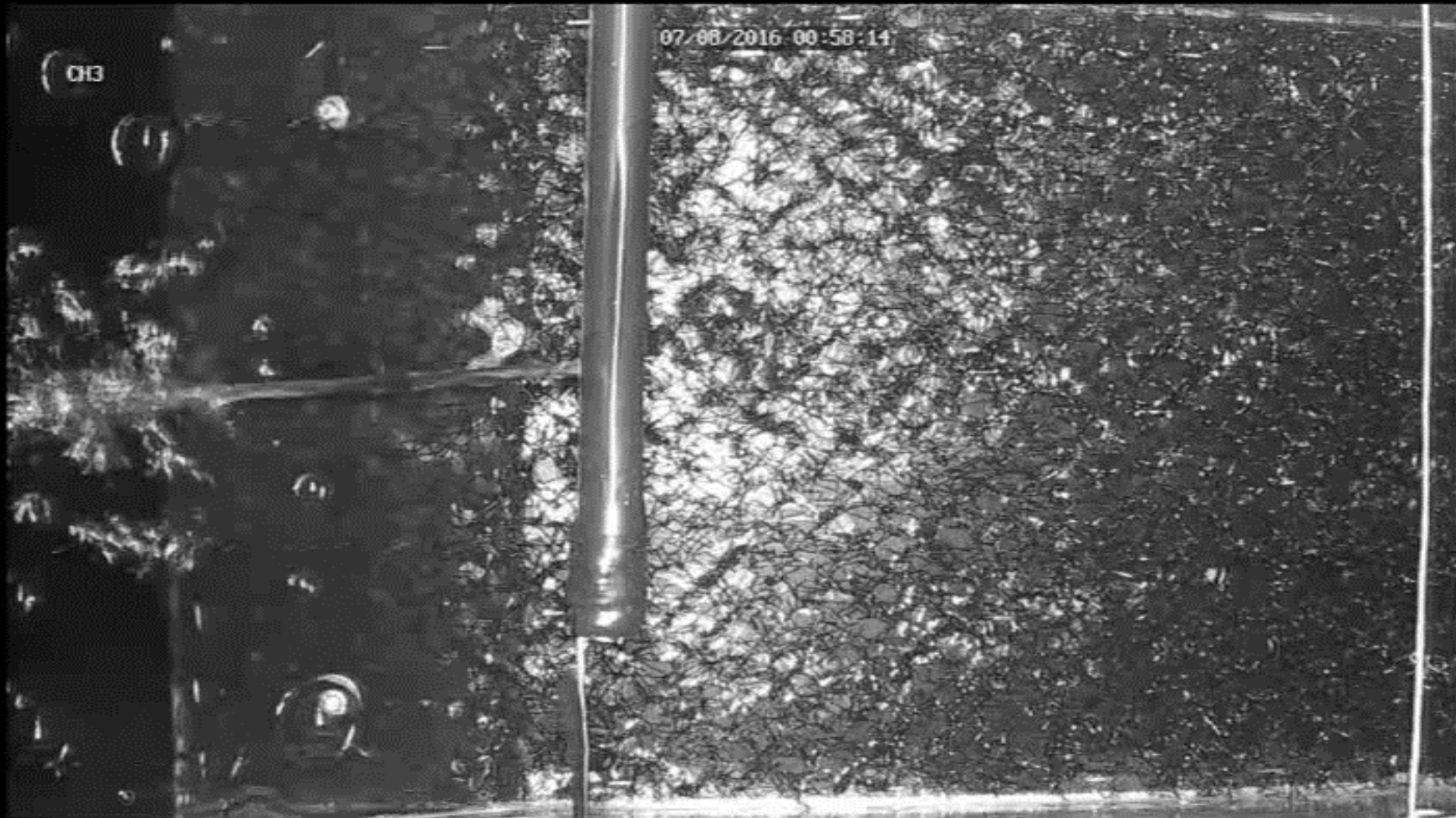
Climbing substrate types





- Substrate selection experiment
- 6 cages with triple ramps
- Over-night trials
- IR-cameras



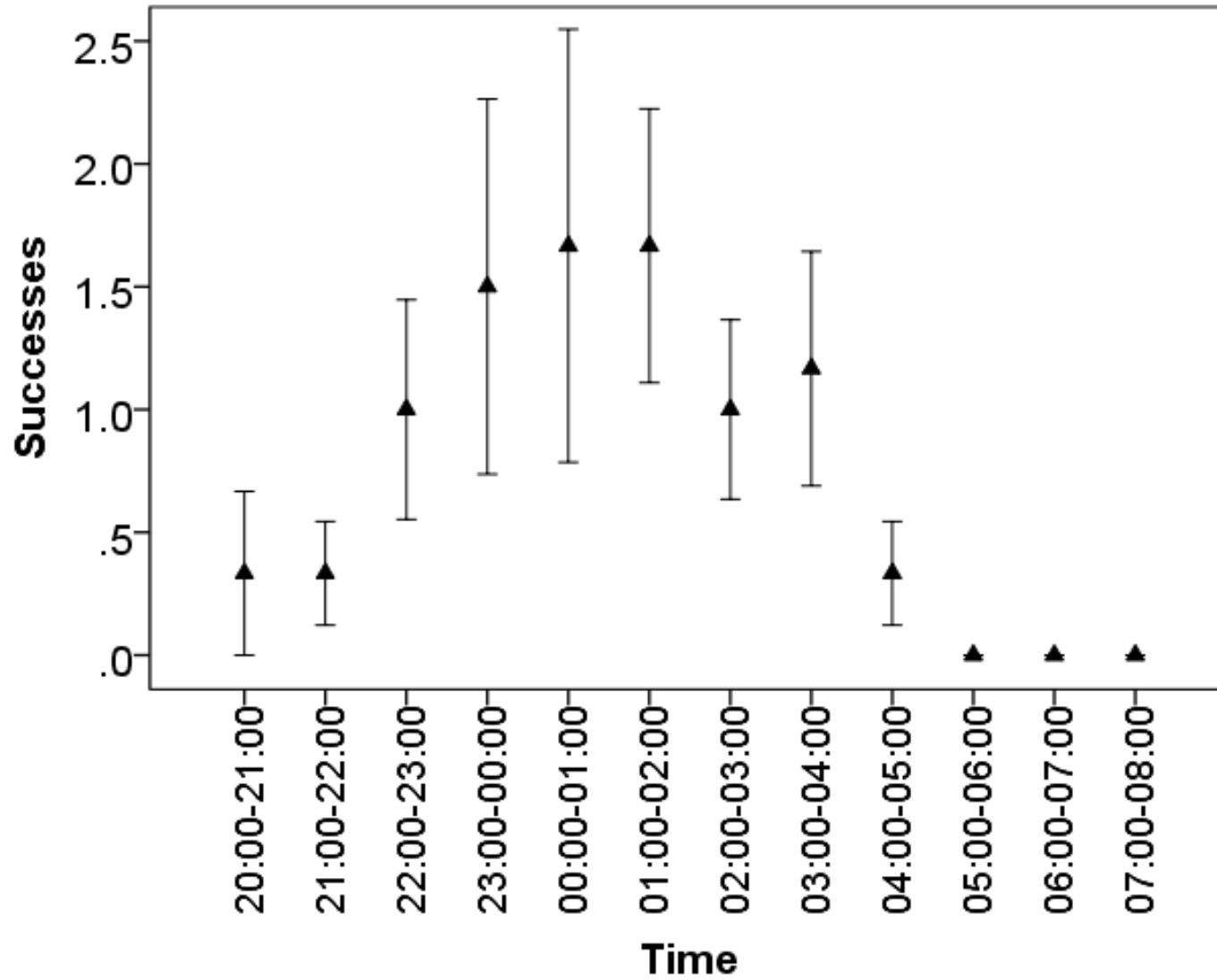




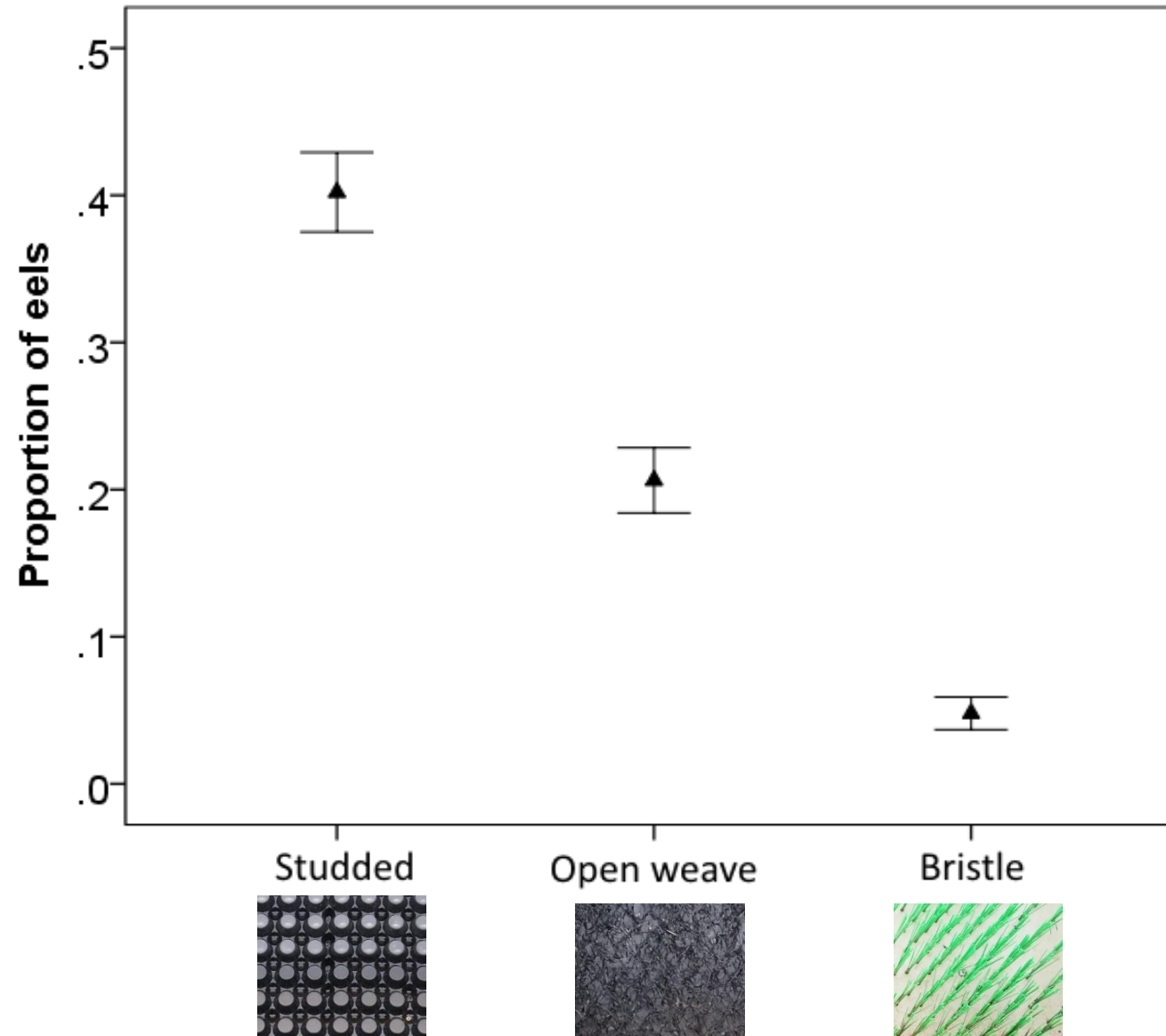
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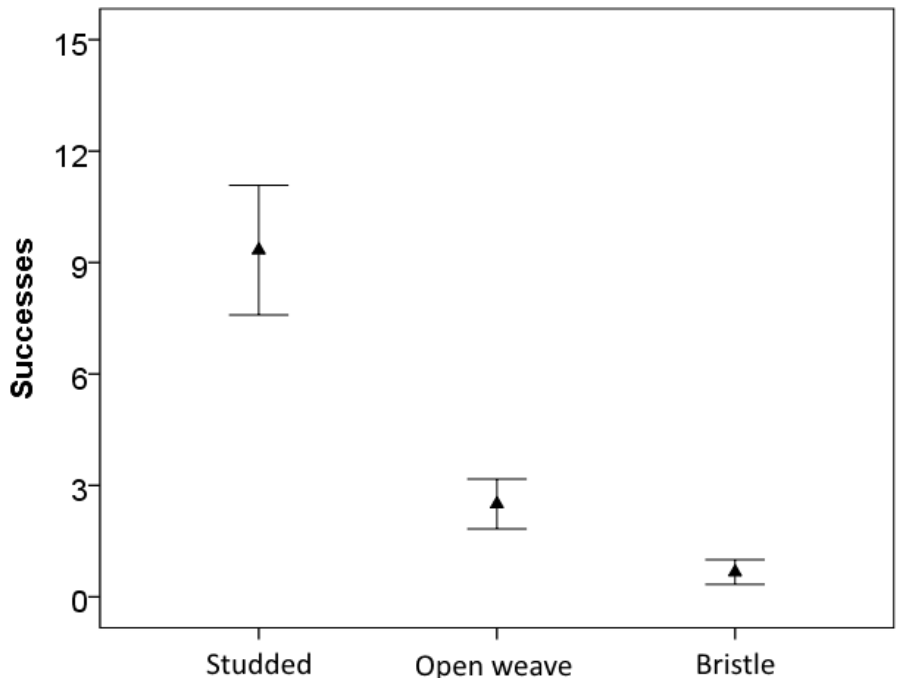
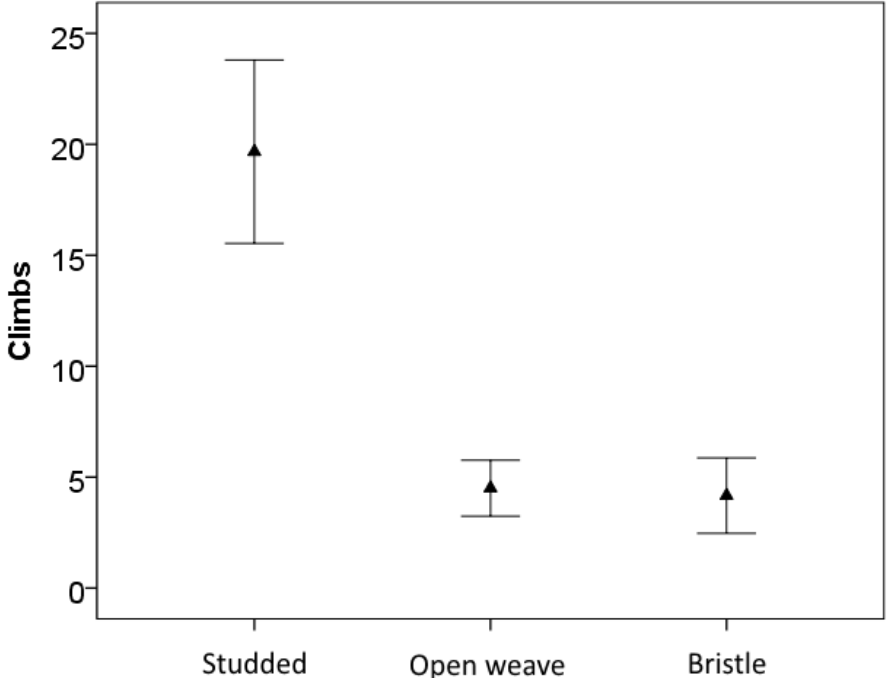
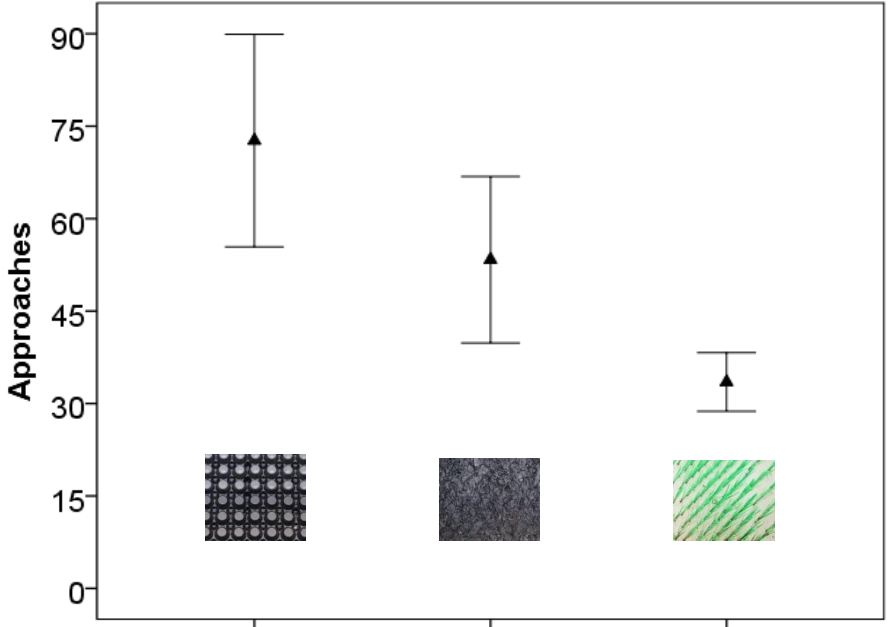
Peak activity at midnight



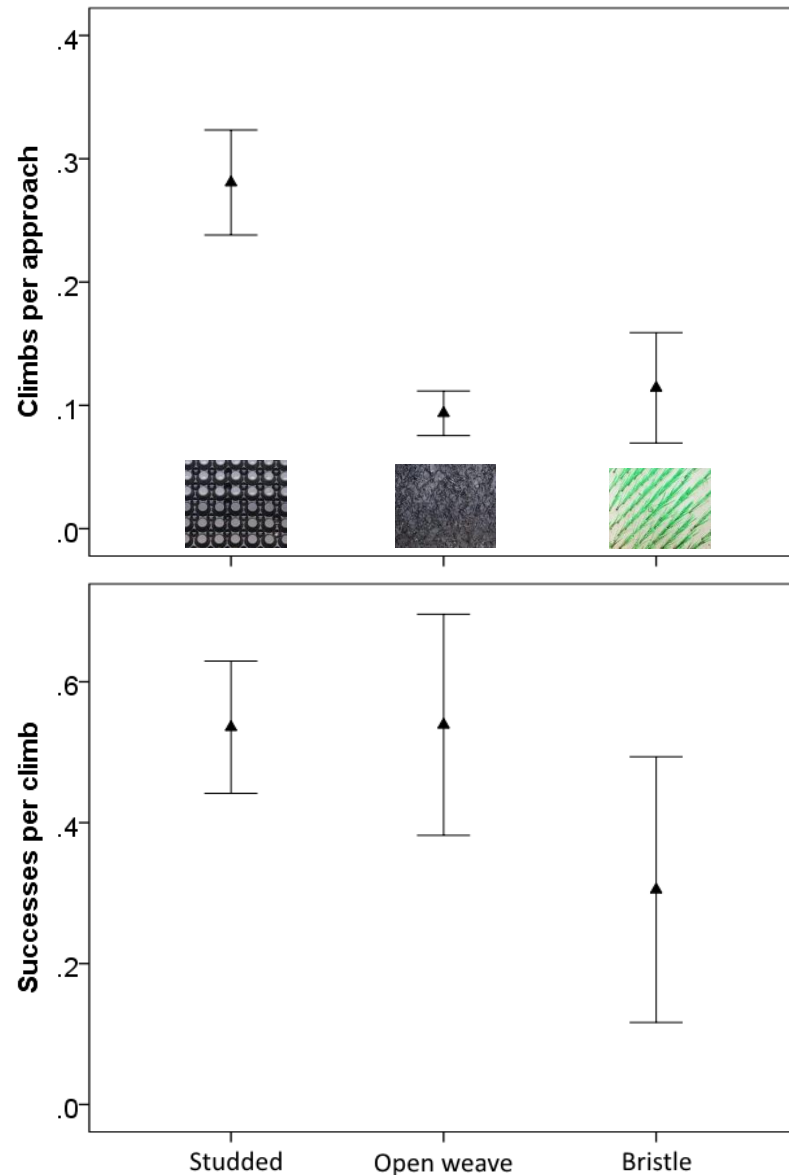
Which substrate did the eels use?



Why was the studded substrate the most successful one?



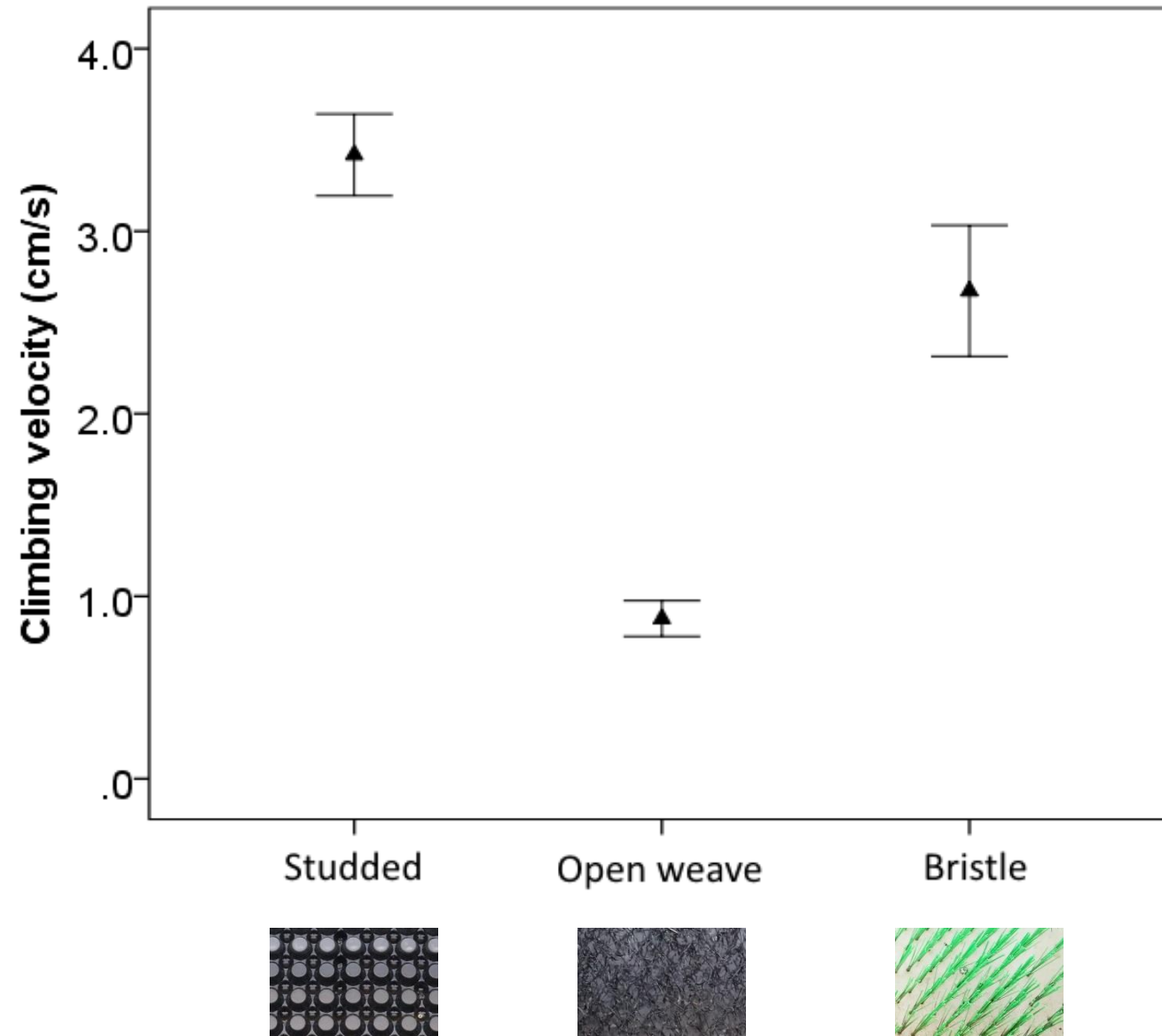
Why was the studded substrate the most successful one?



Studded substrate

- Most - approaches
 - initiated climbs
 - successful climbs
 - climbs per approach
- But! Once a climb had been initiated → no sign. difference among substrates

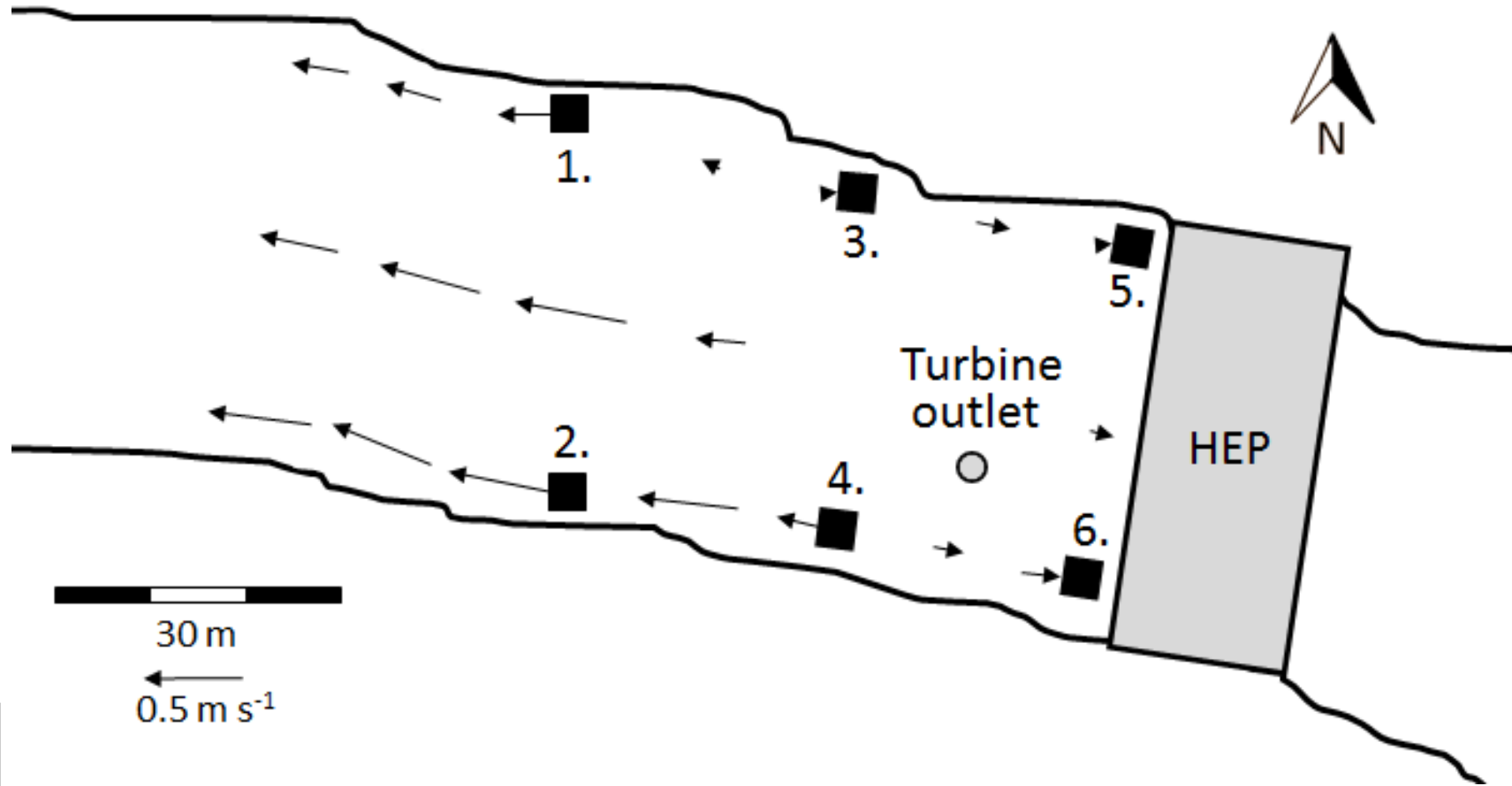
Climbing speed – (passage time)



Field validation!

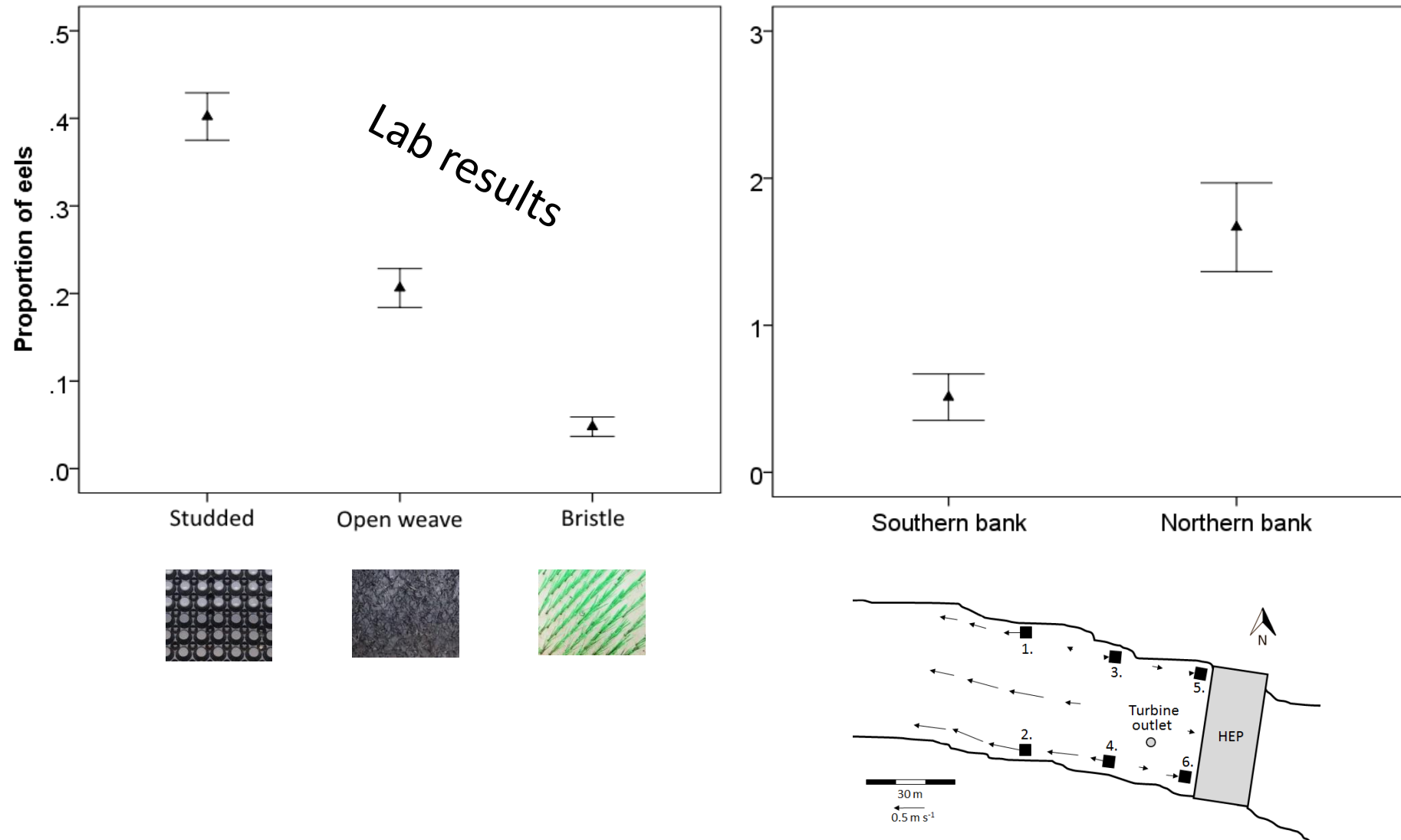


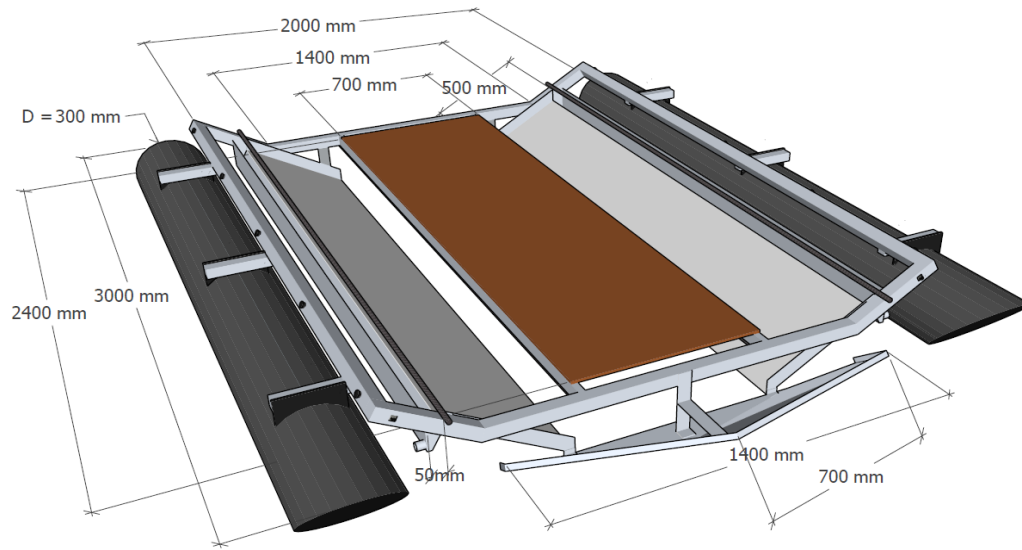
Field validation



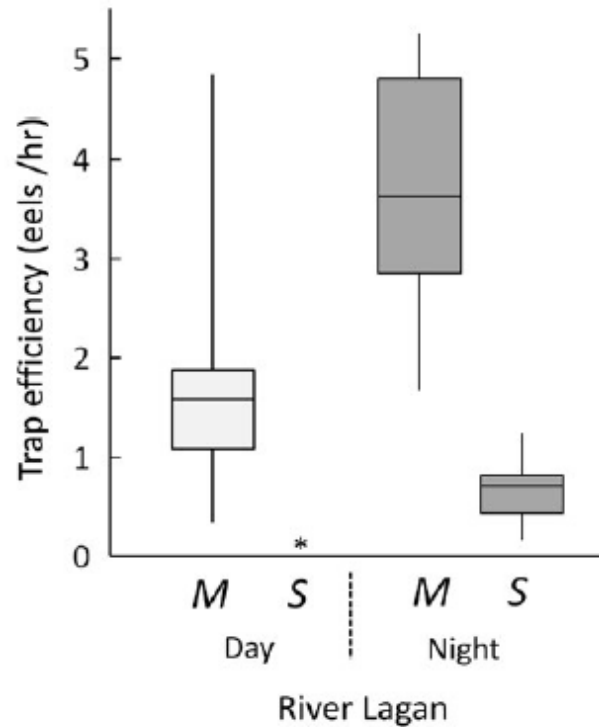
- 6 positions
- 5 nights
- 21:45 – 00:15

Field validation





A mobile trap



- + Wide and short ramps
- + Find optimal position

- Eels must be collected and transported (manually)

Conclusion

1. To recover the European eel, several life stages need to be targeted by conservation programs
2. Current upstream passage solutions for juvenile eels (i.e., eel ramps) function poorly
3. But there is great room for improvement
 - Ramp optimization – climbing substrate
 - Placement at barriers



Olle Calles



P. Anders Nilsson



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Carl Tamarío



Erik Degerman





Thank you for your attention!



Statkraft



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