

# Environment Agency Mobile Pump Fish Screening Field Trials – Results and Findings

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# Introduction

250+








# Purpose of the Field Trials

- Determine if.....
  - the standard rose is really the only solution
  - passive and active screen types can be used
  - the pump efficiency is affected - blinding
  - the screens tested meet guidance approach velocities
  - the screen deployment can be done easily



# Screening Guidance

## Advisory Eel Screen Gap and Approach Velocities Based on Location and Size

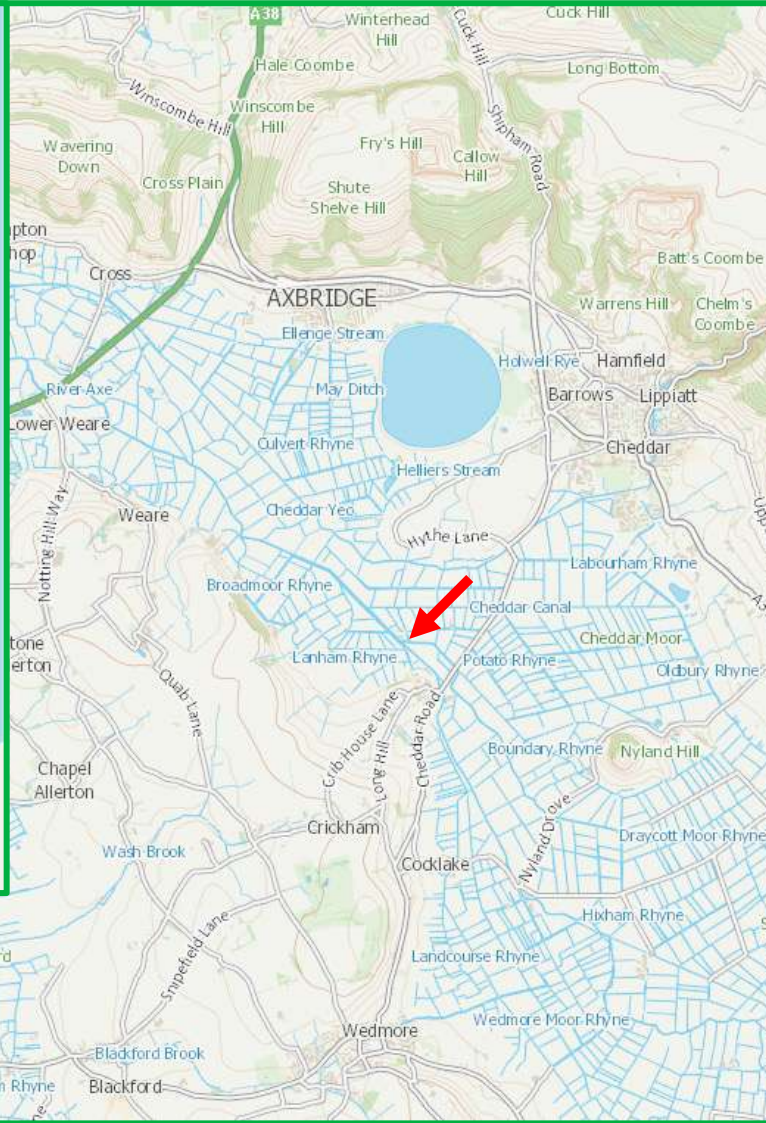
		Estuary to 30 km Upstream from NTL <sup>1</sup>	> 30km		
 Smallest Life Stage of Eel Requiring Protection		Glass Eel and Elver (60 -120mm)	Elver and Yellow Eel (121-300mm)	Yellow and Silver Eel (≥301mm)	
	 Maximum Approach Velocity	Screen Angle 26.5° – 90° to the flow	0.1m/s	0.15m/s	0.20m/s
		Screen Angle less than 26.5° to the flow	Lakes, Drains and Canals 0.1m/s	0.15m/s	0.20m/s
	Flowing Water	0.25m/s	0.30m/s	0.40m/s	
 Maximum Mesh / Bar Gap Size	Screen Angle 26.5° – 90° to the flow	2mm	3mm	9mm	
	Screen Angle less than 26.5° to the flow	2mm	3mm	12.5mm	



LIT 60516



# Location



Source: Google Maps, 2023





# Screens Tested



ISI Drum Screen



Rotorflush



Passive Screens



EA Cube



Standard Strainer(s)



# Pumps Used

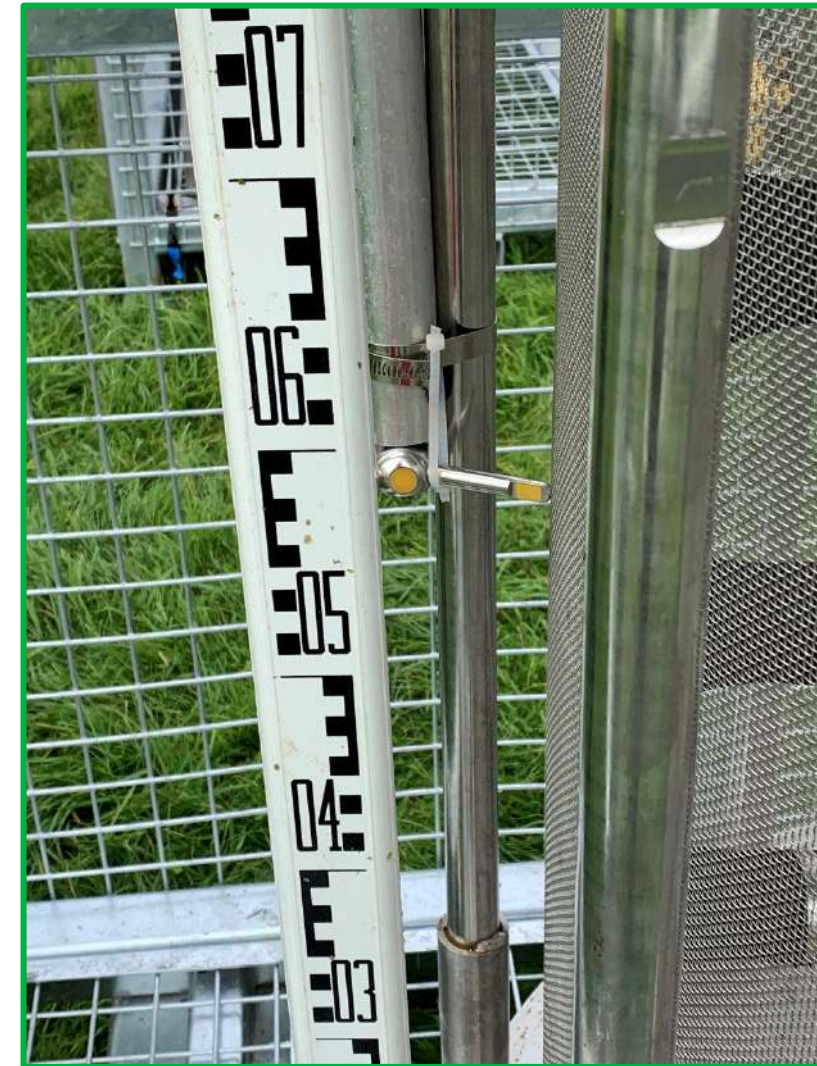
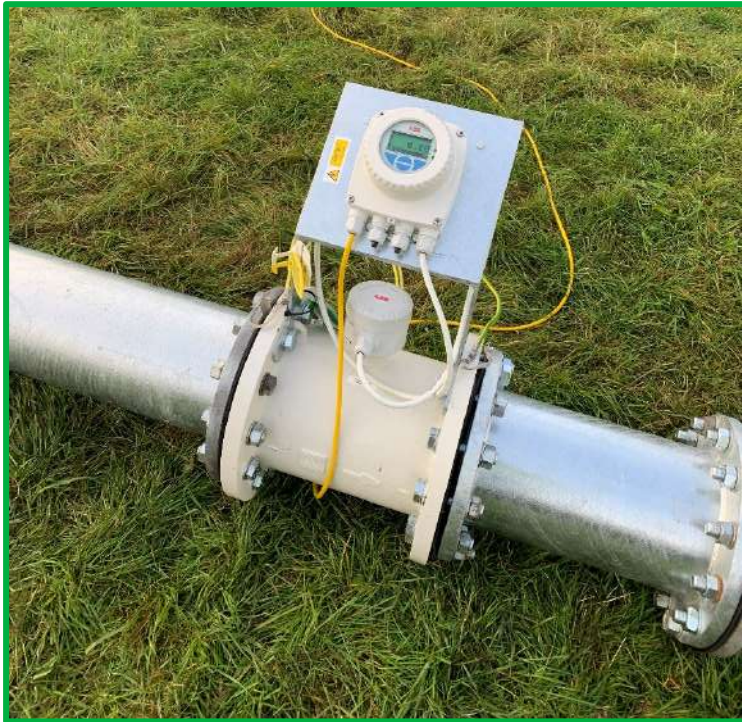
	2"	6"	8"
Make & model pump	Honda WMP20	Pioneer, 150SL-EA-TM	Pioneer, 200SL-EA-RT
Theoretical max flow (m <sup>3</sup> /hr)	46.8	480	680





# Methods

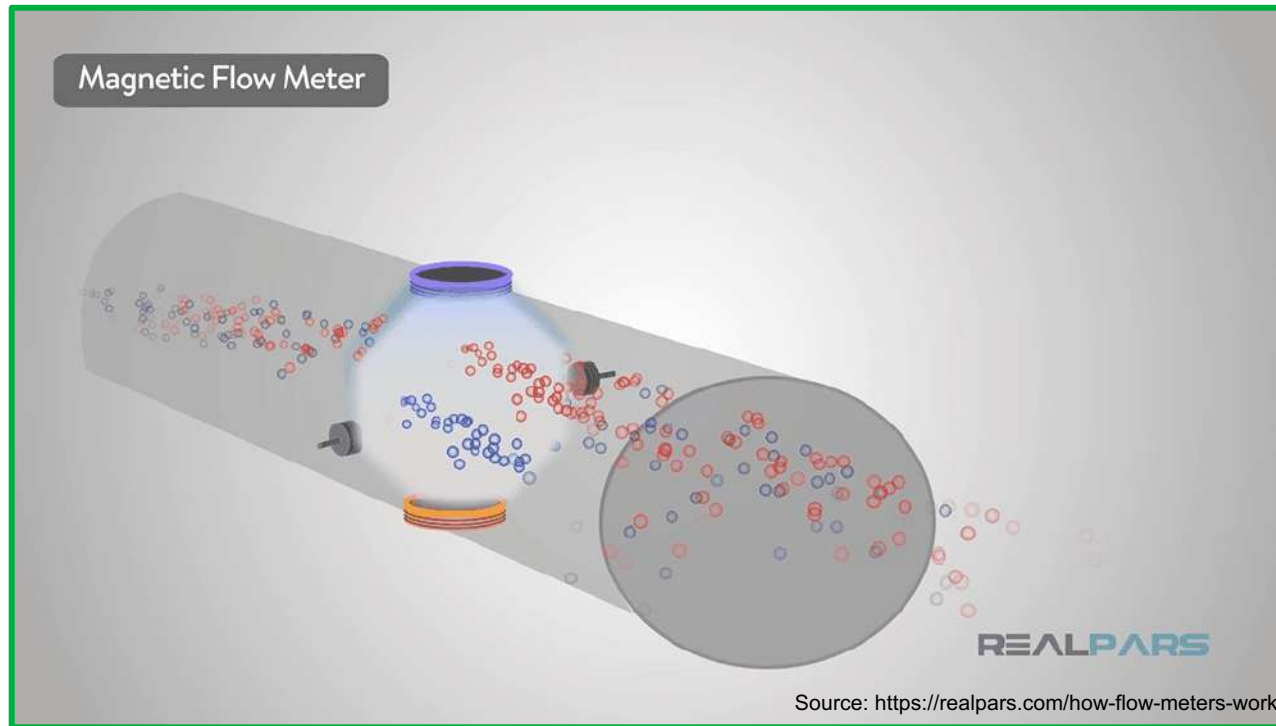
- Pipe flow meters
- Video
- Acoustic doppler velocity meters (ADV)





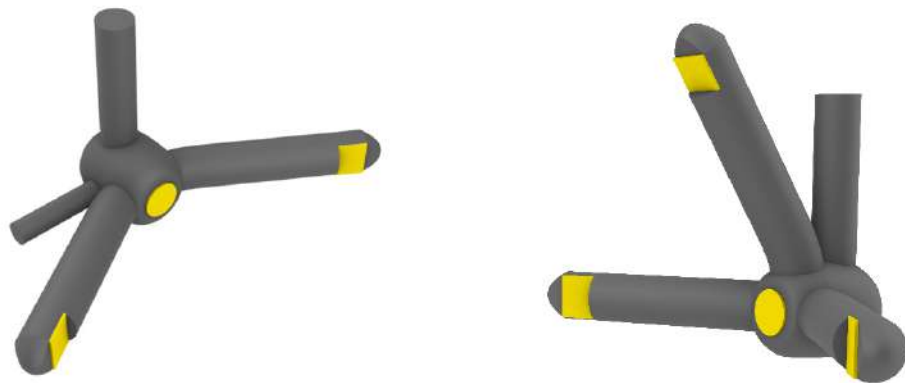
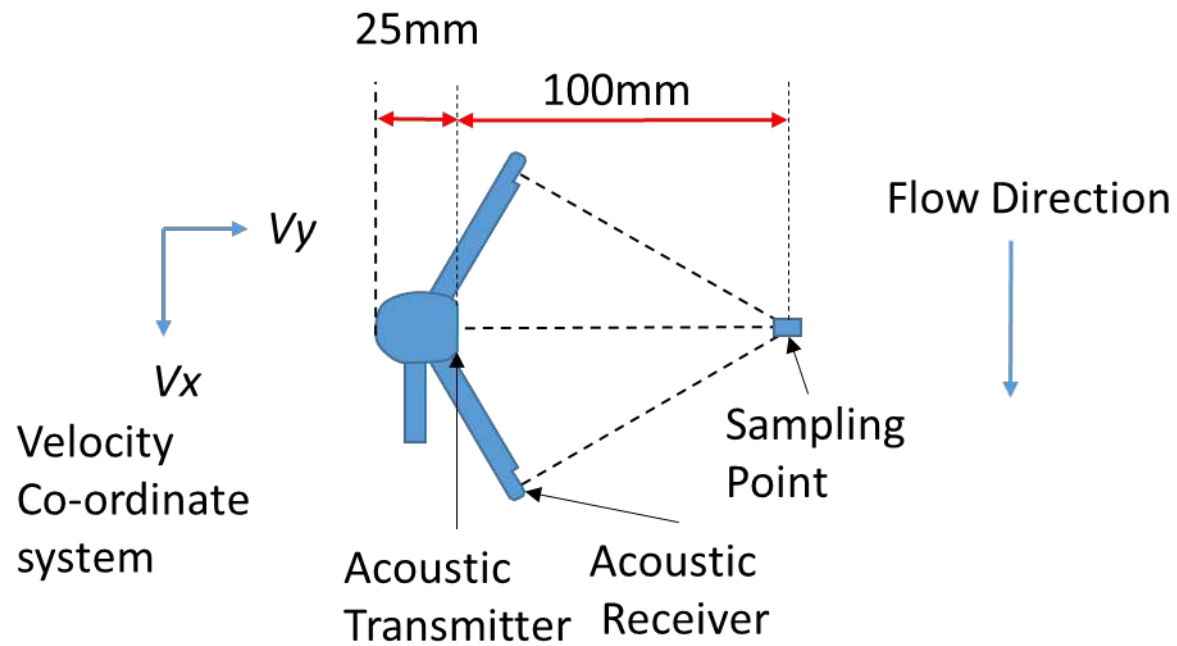
# Pump Flow Rates

- Two types
  - Ultrasonic and electromagnetic



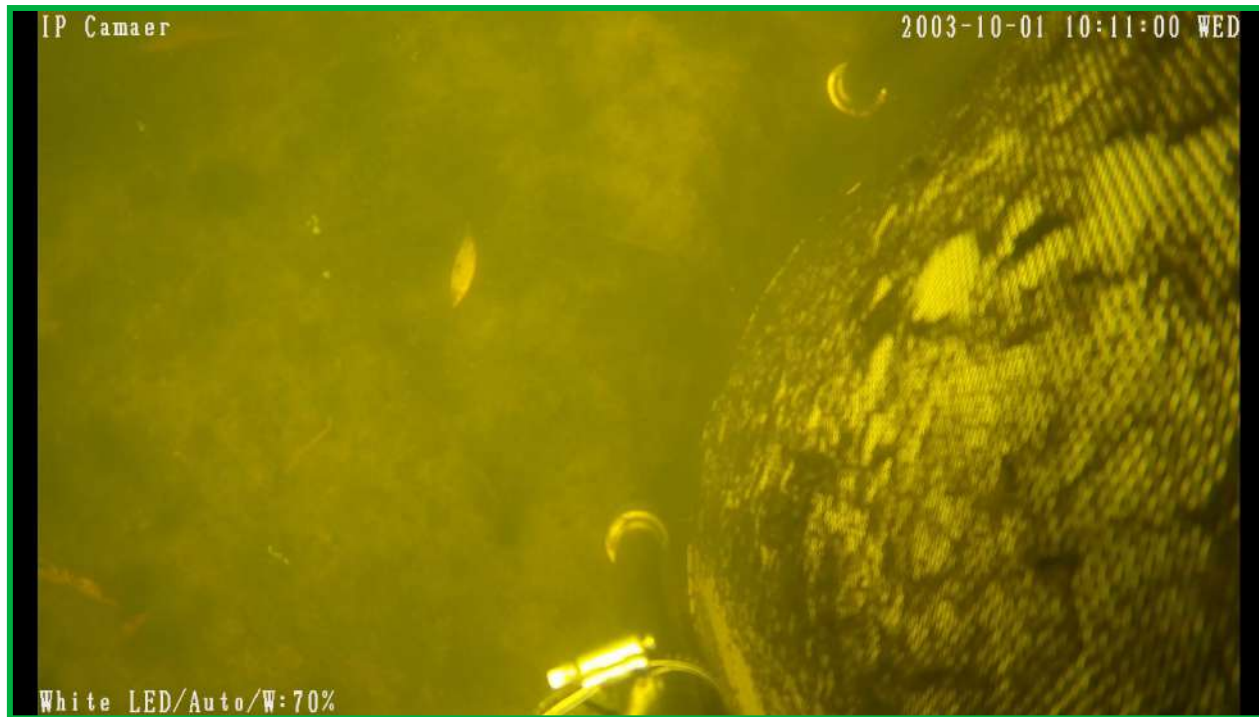


# Screen Approach Velocities





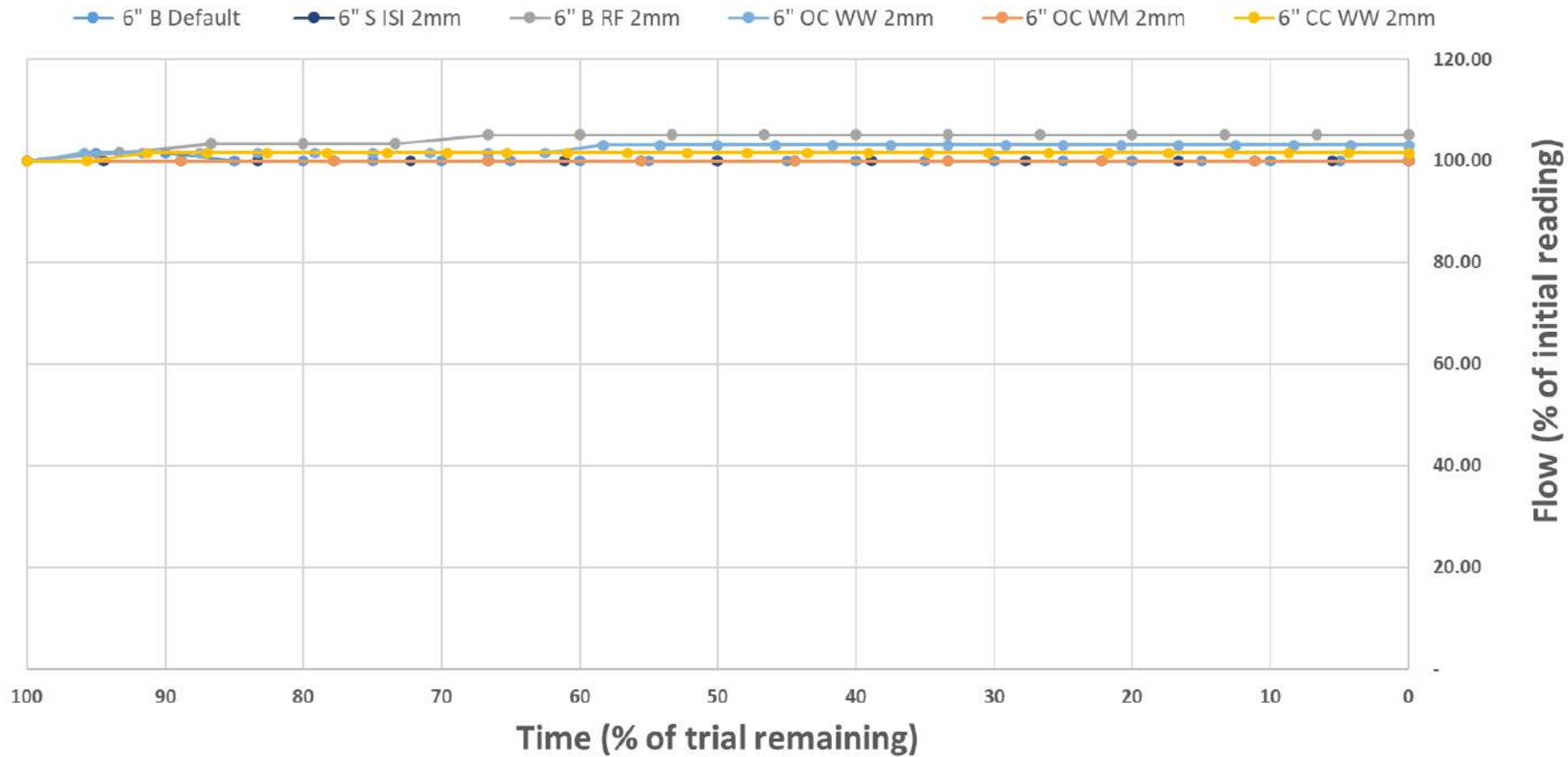
# Video Analysis





# Pump Efficiency Results

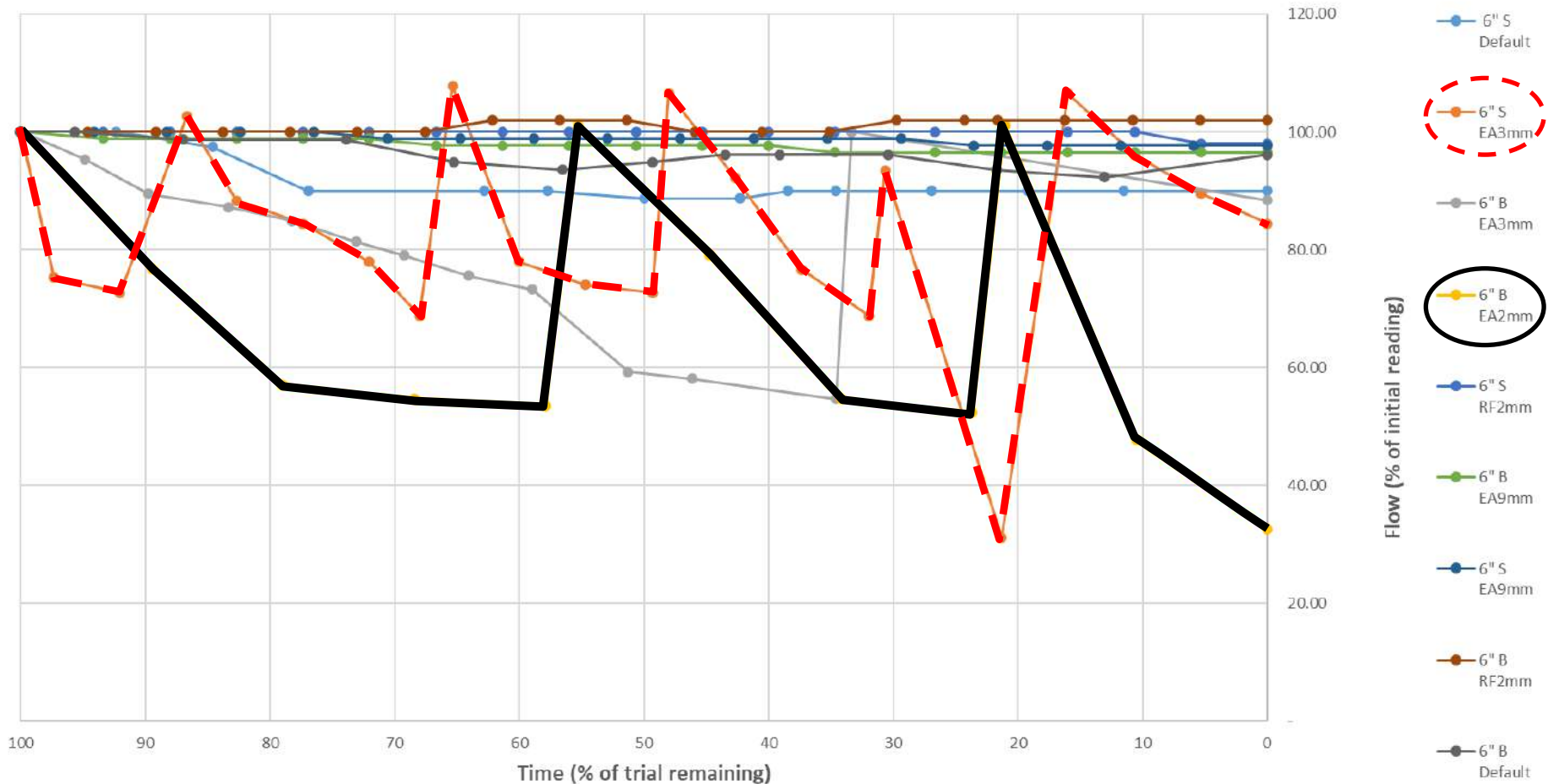
Change in flow over time during trials of a 6" pump with different screens.





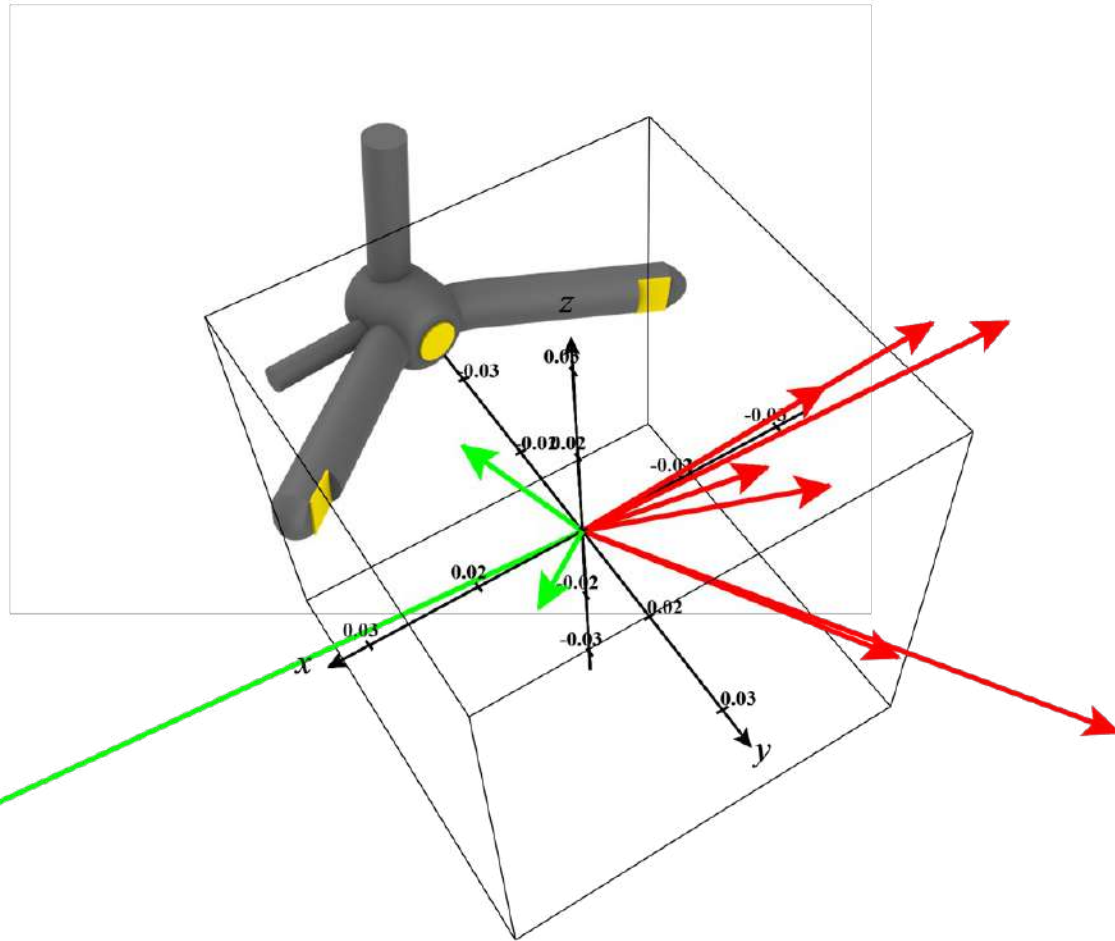
# Blinding and Pump Efficiency

Reduction in flow over time during trials of a 6" pump fitted with different screens and configurations.



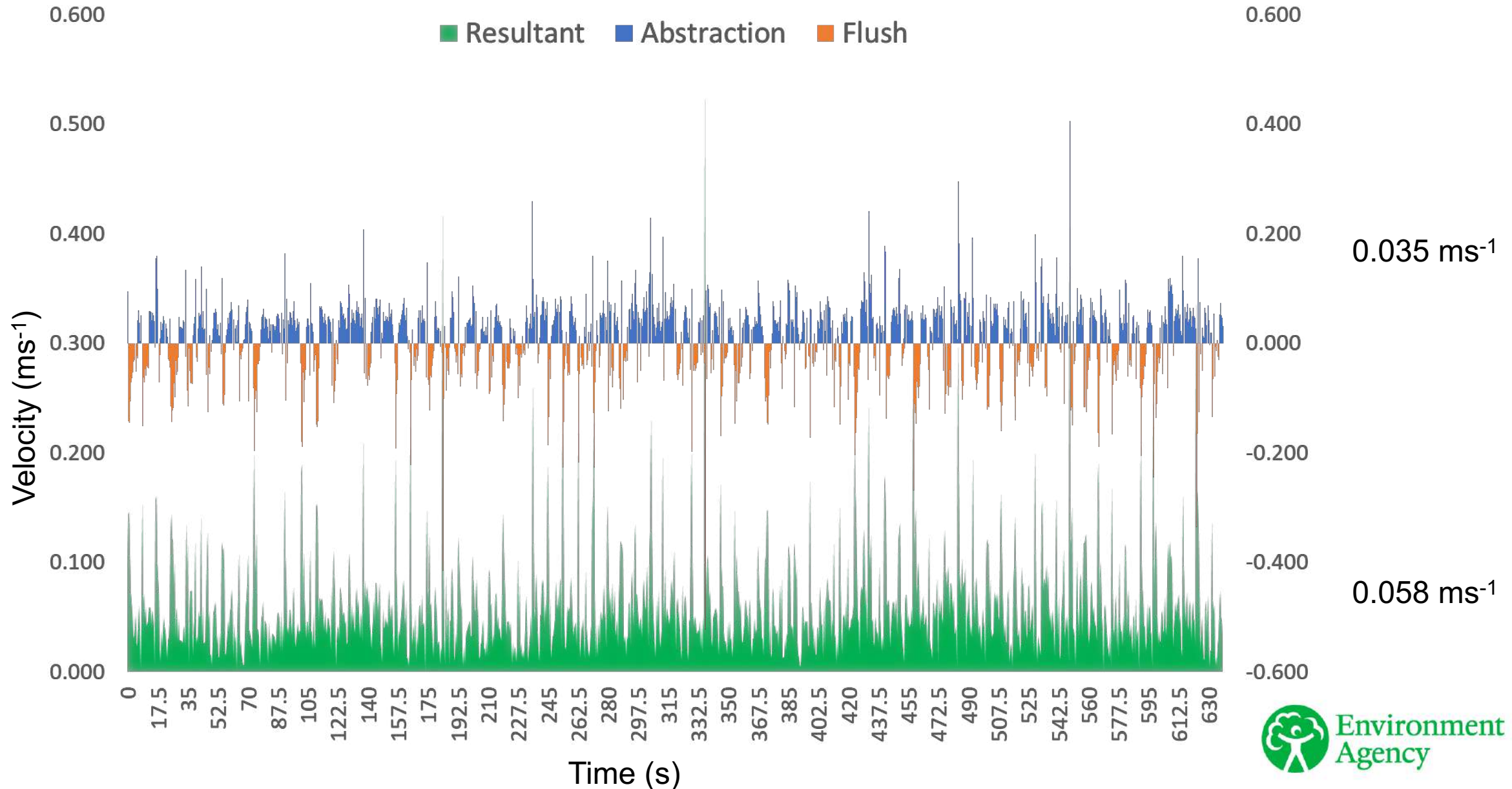


# Approach Velocity Data Collection Challenges





# Field Data Collection Challenges





# Approach Velocity Results

- Guidance Approach Velocities
  - $> 0.1 \text{ ms}^{-1}$  Still Waters
  - $> 0.25 \text{ ms}^{-1}$  Flowing waters
- Measured at 10cm from the screen face

Screen Test (Screen / pump / screen type / # tests)	Mean ( $\text{ms}^{-1}$ )	Median ( $\text{ms}^{-1}$ )	Min ( $\text{ms}^{-1}$ )	Max ( $\text{ms}^{-1}$ )
Rose 8" *	0.298	0.246	0.015	3.239
RF 6" W (3)	0.058	0.053	0.011	0.084
ISI 6" WW	0.005	0.003	0.000	0.038
ISI 8" WW (4) **	0.142	0.142	0.104	0.206
Cube Open 8" WW	0.045	0.045	0.010	0.142
Cube Open 6" WW	0.046	0.046	0.005	0.094
Cube Open 8" W	0.047	0.047	0.005	0.089
Cube Open 6" W	0.025	0.025	0.001	0.063
Cube 6" Closed WW (4)	0.028	0.028	0.004	0.060

\* Does not reflect an accurate velocity as we were unable to attach ADV directly to the rose and found it difficult to locate in deeper water

\*\* Was designed for use for a 6" pump and not an 8" as tested.



# Deployment



- Heavy pieces of kit
- Water depth
- Access
- Intended use
- Additional requirements





# Conclusions and Next Steps

- that Eels Regulations-compliant screens are available and can be used with our pump fleet
- Pump performance was, in some cases, better (lower RPM for same output) – Fuel efficiency
- Approach velocities in a ‘worst case scenario’ were tested and were shown to meet our guidance
- Deployment requires lifting equipment for larger pump screens
- Selection of screens have now been purchased and are available for use
- Better understanding of at screen velocities

# Acknowledgments



...thank you for listening.