

#### **Benthic and Hyporheic Community Composition: response to natural and anthropogenic disturbance**



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#### **Hyporheic Monitoring**



• Research suggests a relatively impoverished fauna with 8 species of hypogean crustacea recorded in England and Wales

• Distribution limited predominantly to south of the limit of the Devensian Glaciation

• No current statutory monitoring programme in England and Wales

Hypogean Crustacea Distribution in England and Wales (data from HCRS, 2010)



#### **Study Aims**

- (1) Develop a lowland hyporheic monitoring strategy; and
- (2) Assess spatial and temporal changes in distribution as related to environmental variables

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#### **Study Site: The Kentish Stour**







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#### (1) Develop Monitoring Strategy

**Benthic Horizon** (0-10 cm) Benthic Kick Sampling Net

**Shallow Hyporheic Horizon** (10-20 cm) Buried Artificial Substrates



**Deeper Hyporheic Horizon** (20-50 cm) Stand Pipes, Bou-Rouch Pump, Freeze Coring and Modified Bou-Rouch Pump



# Depth Below Substratum

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#### (1) Develop Monitoring Strategy

**Benthic Horizon** (0-10 cm) Dominated by robust and pigmented epigean fauna - typified by high abundance and species richness



**Shallow Hypoheic Horizon** (10-20 cm) Mixture of epigean and hypogean fauna community composition corresponds with hydrological year and disturbance events



**Deeper Hyporheic Horizon** (20-50 cm) Characterised by unpigmented, blind, hypogean fauna and early instar benthic taxa – includes a number of cryptic and endemic species



# Depth Below Substratum

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#### (2) Assess Spatial and Temporal Changes in Relation to Environmental Variables



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• Study sites are located along a continuum of flow permanence.

• Community analysis indicates that flow has a significant effect on all three communities

• Ordinarily benthic species, such as *Eristali Gammarus pulex* become markedly more abundant in deeper horizons during periods of low flow

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#### (2) Assess Spatial and Temporal Changes in Relation to Environmental Variables

- Untreated sewage was discharged upstream of several study sites
- Additional samples were collected, providing a BACI framework
- Community analysis indicates that the incident influenced community composition at all three depths

• High numbers of ordinarily benthic species such as *Gammarus pulex* and *Agapetus fuscipes* moved into deeper layers





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#### Conclusions

This study assesses the composition and distribution of invertebrate communities in relation to depth and environmental parameters – the results suggest:

(1) A combination of sampling methods is required to provide a consistent monitoring programme

(2) Benthic and hyporheic communities respond differently to changes in environmental parameters, suggesting that the monitoring of a single community is insufficient





#### **Thank-you!**