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Lincolnshire Chalk Streams Project

Extending Riverfly Monitoring

Pilot Project – Lincolnshire

Will Bartle – LCSP

John Boulton - Volunteer

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Lincolnshire Chalk Streams Project

- Partnership organisation set up in 2003 to protect and enhance Lincolnshire's chalk streams.
- As a project we;
  - Carry out river restoration
  - Educational projects
  - Community projects
  - Volunteers - carrying out Riverfly surveys

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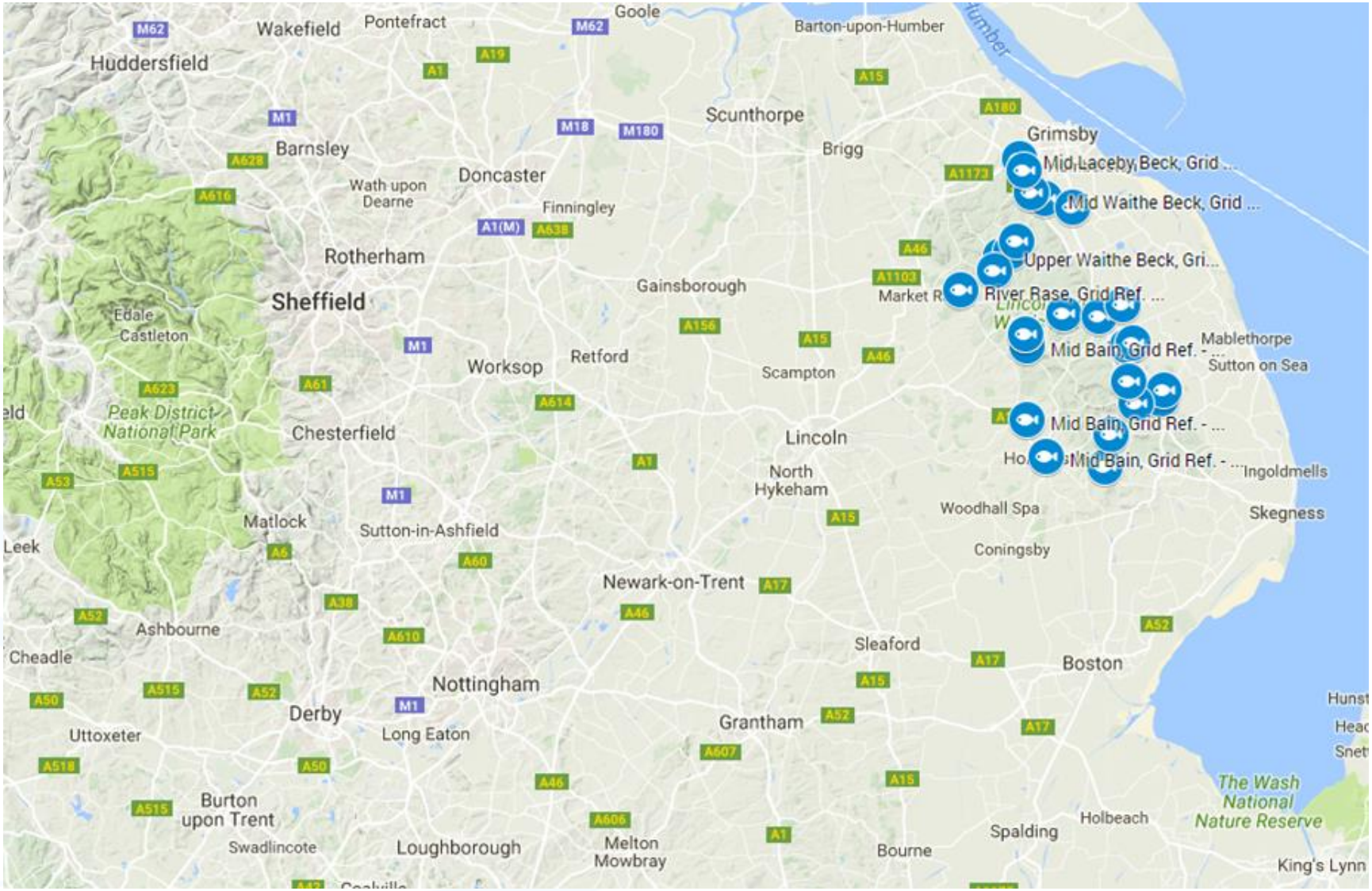

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Why extend Riverfly Monitoring ?

- Current 8 taxon designed to pick up **water quality** issues.
- Not sensitive enough to pick up other issues such as:
  - Sedimentation
  - Flow
  - Hydromorphology, which influences both

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Different stresses - Drought & abstraction pressure.

- Leads to development of Lotic-invertebrate Index for Flow Evaluation (LIFE) in 1999.
- British invertebrates placed in one of six flow-groups based on velocity preference.
- Final index is derived from taxa in these groups and adjusted by relative abundance.

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Different stresses 2- Sediment accumulation

- Eg - livestock poaching, urban runoff
- Metric for this - Proportion of Sediment-sensitive Invertebrates (PSI)
- Derives an abundance-weighted ratio of **sediment-sensitive** to **sediment-tolerant** taxa (output = 0 - heavily sedimented to 100 - unsedimented)

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Extending Riverfly Monitoring

2015 - New pilot system to extend the list of invertebrates devised by:

- **Richard Chadd** –
  Senior Environmental Monitoring Officer, Analysis and Reporting -
  Environment Agency

- **Chris Extence** –
  Analysis and Reporting Team Leader
  Environment Agency

- Seeks to give indication of **water quality**, **flow** and **sedimentation**

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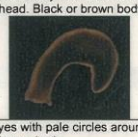
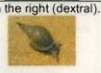
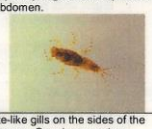
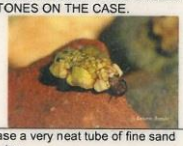
8 taxa to 26 – Adding information

Flatworms (Turbellaria)	
Planariidae (*Polycelis* sp.) Up to 15 mm.	Multiple black eyes all around the front of the head. Black or brown body. 
Dugesiidae Up to 25 mm.	Two eyes with pale circles around them, brown body. 
Dendrocoelidae Up to 30 mm.	Bright, white body. Two small black eyes on the front edge of the head. 
Segmented worms (Leeches & true worms)	
Erpobdellidae (leech) Usually 30 to 40 mm, but can reach 100 mm.	Sucker at either end. 8 eyes in 2 chevrons, dark brown body. 
Glossiphoniidae (leech) Usually 15 – 20 mm, but can reach 25 mm.	Suckers, 2, 6 or 8 eyes in parallel lines, normally pale brown body. 
Oligochaeta (true worm) Range from 1.5 mm up to 50 mm +. Usually around 10mm.	Looks like an earthworm. Can be tiny. 
Molluscs	
Planorbidae (ramshorn snails) Range from 3 mm to 30 mm in breadth.	Curled-up like a ram's horn. 
Lymnaeidae (pond snails) Usually 15 – 20 mm in height, but can reach 60 mm.	Aperture on the right (dextral). 
Hydrobiidae/Bithyniidae ('trapdoor' snails) Range from 5 mm (Hydrobiidae) to 15 mm (Bithyniidae) in height.	Hard, bony plate which seals up the shell. 
Sphaeriidae (orb & pea mussels) Range from < 2 mm up to 22 mm, but commonest species is typically around 10 mm in width.	Small to tiny bivalves. Usually shades of pale brown. 

CRUSTACEANS	
Gammaridae/Crangonyctidae (freshwater shrimps) Up to 20 mm.	Look like shrimps! 
Asellidae (water hog lice) Up to 15 mm.	Aquatic woodlice. 
INSECTS	
Mayflies (Ephemeroptera)	
Ephemeridae (Green Drake/Drake Mackerel Mayfly) Up to 30 mm.	Large, pale brown nymphs with triangles on the abdomen and feathery gills. 
Ephemerellidae (Blue-winged olive) Up to 12 mm.	Stripy body, legs & tails. Spines on top of abdomen. 
Baetidae Up to 15 mm.	Plate-like gills on the sides of the abdomen. Grey-brown colour. 
Caenidae (Anglers' Curse) Up to 9 mm.	Small, robust nymphs, with TWO FLAT PLATES COVERING THE GILLS AT THE BASE OF THE ABDOMEN. 
Stoneflies (Plecoptera) **WHOLE ORDER** Range from 5 mm to 16 mm.	Two spiny tails. Heads like earwigs. 
True bugs (Heteroptera)	
Corixidae (lesser water boatman) Range from 2 mm to 14 mm. Typically around 7 mm.	'Paddles', brownish body with yellow stripes. SWIM THE RIGHT WAY UP. 
Notonectidae (greater water boatman) Typically around 15 mm.	'Paddles', orange & black body, big eyes, SWIM UPSIDE DOWN. 

Lacewings (Megaloptera)	
Sialidae (alder flies) Typically around 15 to 20 mm.	Spiny gills down the side of the abdomen and a single spine for a tail. Gnashy jaws. 
Caddisflies (Trichoptera): caseless	
Hydropsychidae Range from around 10 mm to 20 mm.	Greyish body WITH WHITISH GILLS UNDER ABDOMEN. 
Rhyacophilidae Typically 20 to 25 mm.	Green body WITH RED GILLS DOWN THE SIDES OF THE ABDOMEN AND THORAX. 
Caddisflies (Trichoptera): cased	
Goeridae Up to around 10 mm.	Smallish larvae WITH BIG BALLAST STONES ON THE CASE. 
Sericostomatidae Typically 15 to 20 mm.	Case a very neat tube of fine sand grains. 
Molannidae Up to 30 mm.	Case kite-shaped, with flanges around the tube. 
True/two-winged flies (Diptera)	
Simuliidae (Blackflies) Up to 8 mm.	Shaped like a dumb-bell, with feathery mouthparts. 

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Surveying methodology

Surveying methodology is the same as Riverfly surveying

- Standard Riverfly kit is used to kick sample
- Transferred to a tray
- Abundance of 26 taxa estimated
- Abundance of taxa given a score
- Scores added together to give final figure
- Trigger level set based on existing data

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New taxa - Examples

Planorbidae – Ramshorn snails

‘Found in standing and slow-flowing waters of all sizes’ – *FBA’s Guide to Freshwater Invertebrates*

Therefore could indicate possible flow issue

Sialidae – Alderfly

‘Typically (lives) in mud at the bottom of ponds, lakes and streams.’ – *FBA’s Guide to Freshwater Invertebrates*

Therefore could indicate possible sedimentation issue

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Original Riverfly Scoring System

Riverfly Scoring system

Abundance of 8 key invertebrates

Abundance	Category	Score
1-9	A	1
10 – 99	B	2
100 – 999	C	3
1000 – 9999	D	4

E.g. Number of stoneflies in kick sample = 40

Category = B

Score = 2

Recording data

13. Record the category and *estimate* the numbers of each invertebrate group as noted on the recording sheet.

Abundance	Score	Estimated number
1-9	1	Quick count
10-99	2	Nearest 10
100-999	3	Nearest 100
over 1000	4	Nearest 1000

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New Scoring System

- Invertebrates split into 2 groups
  - Those that indicate fine sediment and low flow
  - Those that are sensitive to fine sediment and low flow

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New Scoring System

- Score rises with sediment & flow-sensitive taxa e.g. caseless caddis
- Score reduces with rising abundance of fine sediment & low flow indicators e.g. leeches

(Original 8 'Riverfly' taxon list still operates.)

Recorded By : John Boulton and Paul Dady		**Scoring system**			
Organisation : LCSP + EA					
River : Mid Bain					
Site Name :Hemingby Downstream					
Grid Ref : TF 23527 74243			25.09.2016		
Pilot Project Trigger : 8			Cat.	Score	Abund.
Flatworms	*Planariidae*	1, -1, -2, -3			
	Dugesiidae	1, -1, -2, -3			
	Dendrocoelidae	1, -1, -2, -3			
Segmented worms (Leeches and true worms)	*Erpobdellidae* (leech)	1, -1, -2, -3			
	Glossiphoniidae (leech)	1, -1, -2, -3			
	Oligochaeta (true worm)	1, -1, -2, -3	B	-1	24
Molluscs	*Planorbidae* (ramshorn snail)	1, -1, -2, -3			
	Lymnaeidae (pond snails)	1, -1, -2, -3			
	Hydrobiidae/Bithyniidae ('trapdoor' snails)	1, -1, -2, -3			
	Sphaeriidae (orb or pea mussels)	1, -1, -2, -3			
Crustaceans	*Gammaridae/Crangonyctidae* (Shrimp)	1, 2, 3, 4	B	2	45
	Asellidae (Water hog lice)	1, -1, -2, -3			
Mayflies (*Ephemeroptera*)	*Ephemeridae* (Green drake)	1, 2, 3, 4	A	1	3
	Ephemeridillae (Blue-winged olive)	1, 2, 3, 4			
	Baetidae (Olives)	1, 2, 3, 4			
	Caenidae (Angler's Curse)	1, -1, -2, -3			
	Heptageniidae (Flat-bodied upwings)	1, 2, 3, 4			
Stoneflies	*Plecoptera* (Whole order)	1, 2, 3, 4			
True bugs (*Heteroptera*)	*Corixidae (Lesser water boatman)*	1, -1, -2, -3			
	Notonectidae (Greater water boatman)	1, -1, -2, -3			
Lacewings (*Megaloptera*)	*Sialidae* (Alder flies)	1, -1, -2, -3			
Caseless Caddisflies	*Hydrosychidae*	1, 2, 3, 4	B	2	20
	Rhyacophilidae	1, 2, 3, 4			
Cased Caddisflies (*Trichoptera*)	*Goeridae*	1, 2, 3, 4			
	Sericostomatidae	1, 2, 3, 4			
	Molannidae	1, -1, -2, -3			
True/two-winged flies (*Diptera*)	*Simuliidae* (Blackflies)	1, 2, 3, 4	B	2	11
		SCORE		6	

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New Scoring System

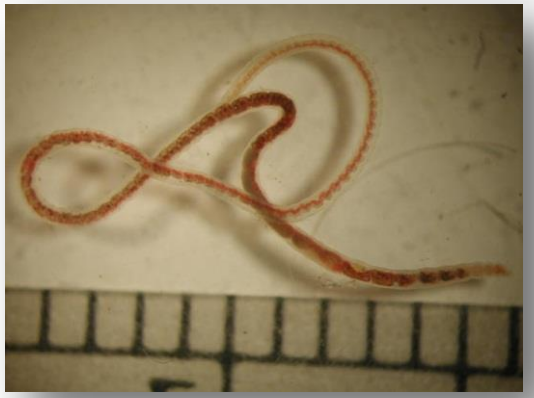
Pilot Project Scoring system

Sediment and slow flow sensitive taxa i.e. stoneflies

Abundance	Category	Score
1	A1	1
2-9	A	1
10 – 99	B	2
100 – 999	C	3
1000 – 9999	D	4

Sediment and slow flow indicators i.e. true worms

Abundance	Category	Score
1	A1	1
2-9	A	1
10 – 99	B	-1
100 – 999	C	-2
1000 – 9999	D	-3



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Example – Hemingby, River Bain

25th Sep 2016 sample:

- Standard Riverfly trigger level – 6
- Results for Riverfly survey – 8 Above trigger level

- Pilot Project trigger level – 8
- Results for Pilot Project - 7 Under Trigger

- Pilot Project – Addition of true worms *Oligochaeta* – Indicator of slow flows and fine sedimentation.

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Extended list – Training and support

May 2015 - Training day held, led by Richard Chadd and Chris Extence

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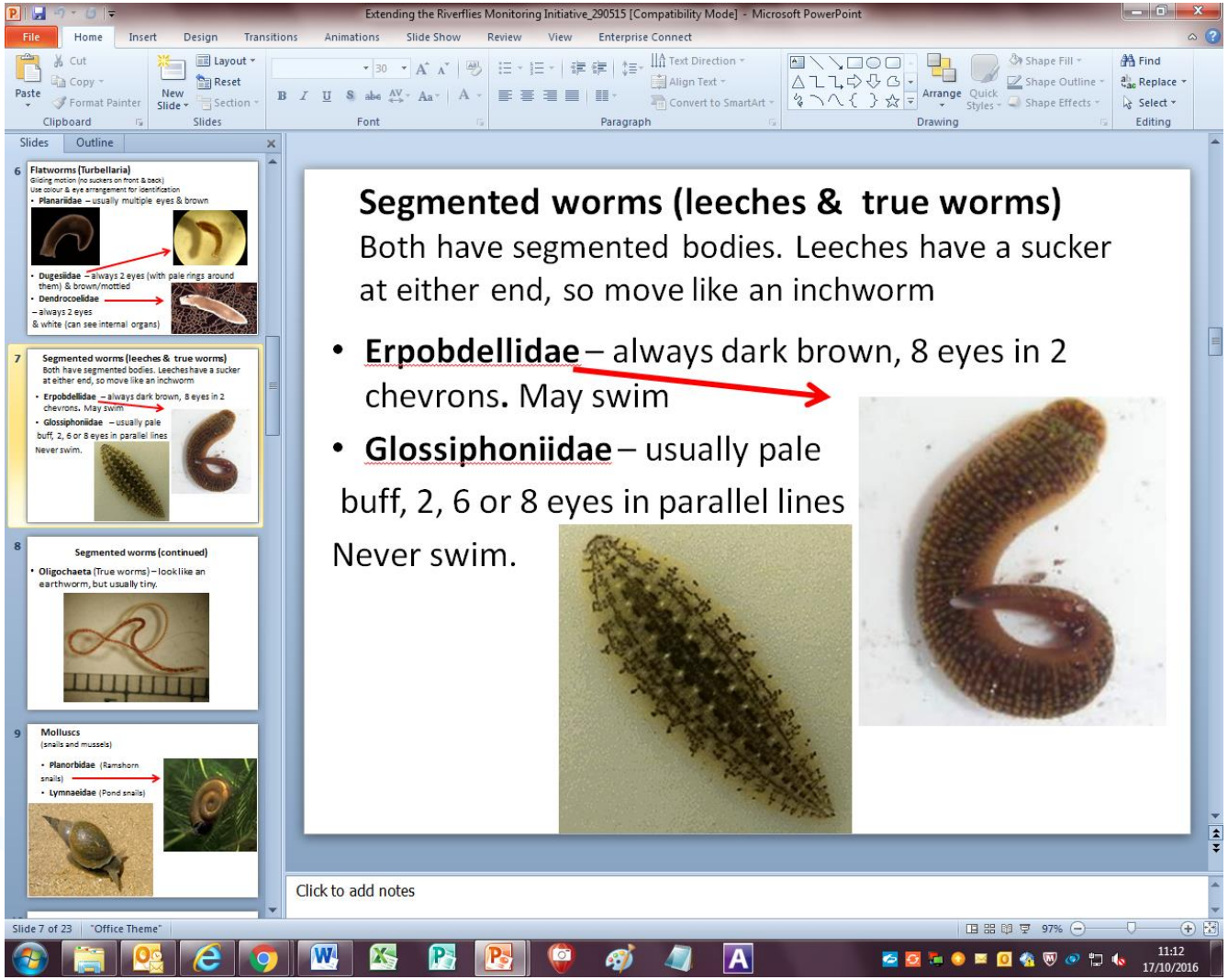
Extended list – Training and support

May 2015 -
Training included:

- Synopsis of water monitoring techniques
- ID help for each taxa
- Long practical session in afternoon for volunteers to practice



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Extended list – Equipment

All volunteers provided with:

- Key – ‘Guide to freshwater macroinvertebrates for biotic assessment’
- High magnification jeweller’s loupe (10x + 20x)
- ID Guide - pictures and ID ‘pointers’

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John Boulton, an introduction……

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Email: chalkstreams@lincolnshire.gov.uk

Tel: 01522 555780

Web: www.lincswolds.org.uk/chalk-streams

Facebook: @LincolnshireChalkStreams

Twitter: @LincChalkStream

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Pilot Project sampling at Hemingby

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A raw Hemingby sample

- A very dirty raw sample complete with signal crayfish.

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River Bain signal crayfish

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Getting down to species level

- Large dark olive dun - Baetis rhodani?
- Baetis scambus?
- Caenis luctuosa?

We were faced with the need to get to know much more about our river than ever before. We needed not only to be able to quickly distinguish between *Ephemerella ignita* and *Baetis 'whatever'*, but it became increasingly important to get down to species level within each group. This helped with quick recognition and subsequently reduced our sampling times dramatically.

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Spotting the unusual

- Getting to know your river.
- Paraleptophlebia.
- Taking things further.
- Nitrates to Trout.

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Conclusion to practical sampling and the Pilot Project

- Understanding the river
- Adapting to your conditions
- Learning as much as you can about your target species'
- Don't expect to find everything on the list!
- Do be prepared for the unusual

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