

SOWAP

SOil and WAtEr Protection

Finding and demonstrating ways of better managing the land

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SOWAP: what, where, who

What:

- Looking at the effects of soil management in arable agriculture on and off-site
- Measuring a range of economic and environmental - especially soil erosion and runoff - indicators
- Demonstration and dissemination to a range of stakeholders



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SOWAP: what, where, who

Where:

- UK, Belgium, Hungary+ Czech Republic
- At least 1 demo site/country
- Network of farmers around these sites



SOWAP: what, where, who

Who:

Multi-disciplinary, multi-stakeholder

- Academia: Harper Adams, Cranfield, KU Leuven, HAS
- NGOs: RSPB, National Trust, Pond Conservation, FWAG, WOCAT
- Industry: Syngenta, Vaderstad, Yara
- Consultants: CWi, Agronomica
- Farmers



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SOWAP: soil management

Conservation tillage – the minimum amount of tillage required to establish a crop



Compared with **ploughing** - soil is inverted

Management method is dependent on farm, soil type and state, climate and cropping



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SOWAP: early results

- Conservation tillage can reduce soil loss and water run-off from fields. In some cases, soil erosion has been reduced by up to 90% and water run-off by up to 40%.

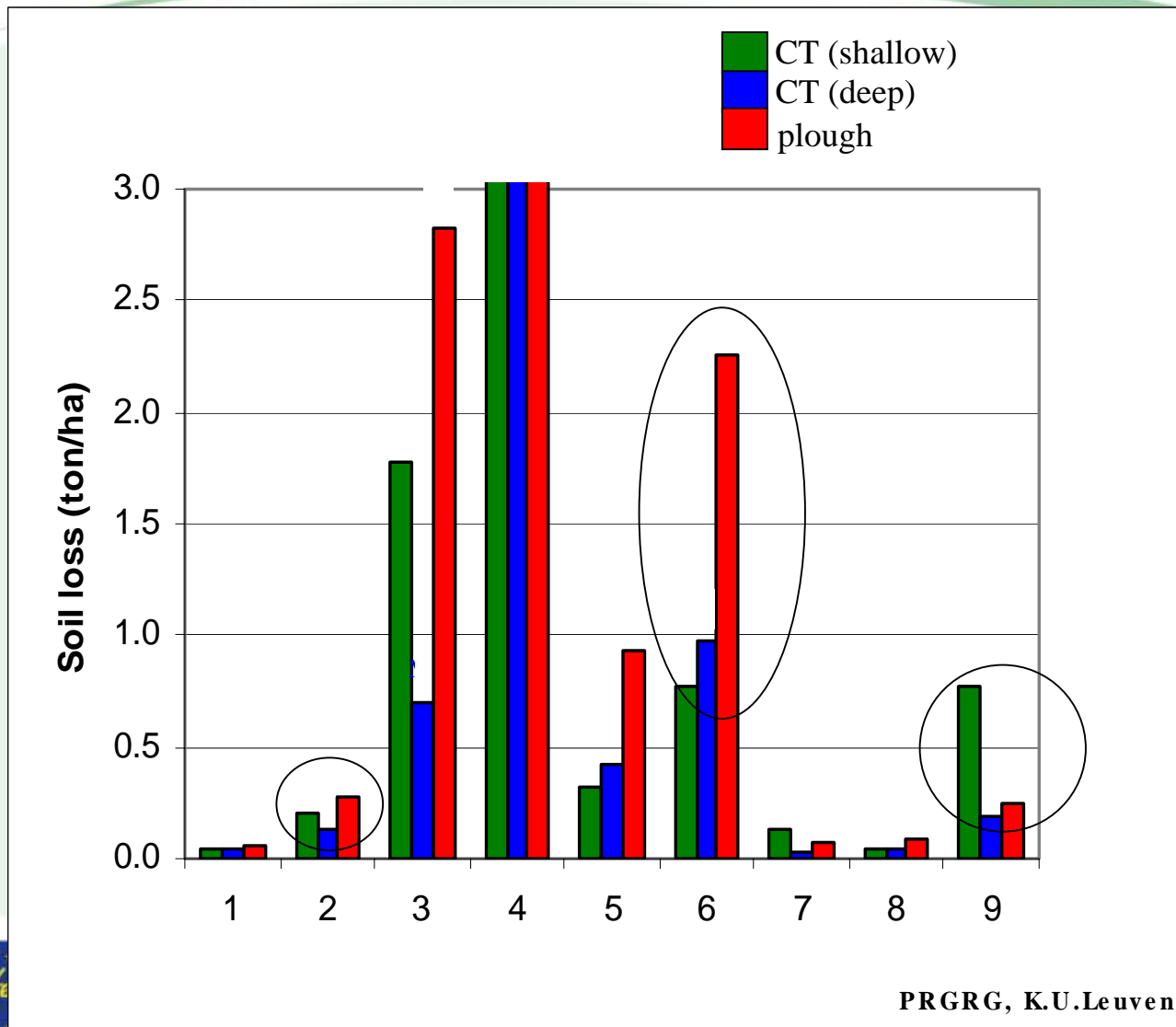
Plough-based seedbed preparation



Conservation tillage seedbed preparation



SOWAP: early results



SOWAP: demonstration and dissemination

- Number of open-days in all 3 countries, in collaboration with other organisations
- Several articles in ag. press
- Television in Belgium
- SOWAP newsletter
- SOWAP website www.sowap.org



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SOWAP aquatic studies

Preliminary results of water quality and
biological studies



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Overall aim

To assess the effect of conservation tillage on stream ecology

- Comparing streams in conservation tillage with streams with traditionally ploughed catchments
- Control = streams in woodland.



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Project design (1)

Sites

- 1st order streams
- Catchments (as far as possible) wholly allocated to each cultivation type
- Only practical approach to avoid other impacts (STWs, farmyard runoff, house septic tanks)

Biotic groups:

- Macroinvertebrates
- Wetland plants
- Diatoms
- Not fish – because too infrequent

Wide range of physico-chemical parameters



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Project design (2)

Sites

- UK: 5 sets of streams
 - 'Set' =
 - 1 conservation till
 - 1 inversion till and
 - 1 woodland control
 - Total of 15 sites
- Sampling bimonthly for 1 year (Oct 04 - Dec 05)
- Sites chosen to be as similar as possible, except landuse



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Minimum tillage: Elsfield (Oxford, UK)



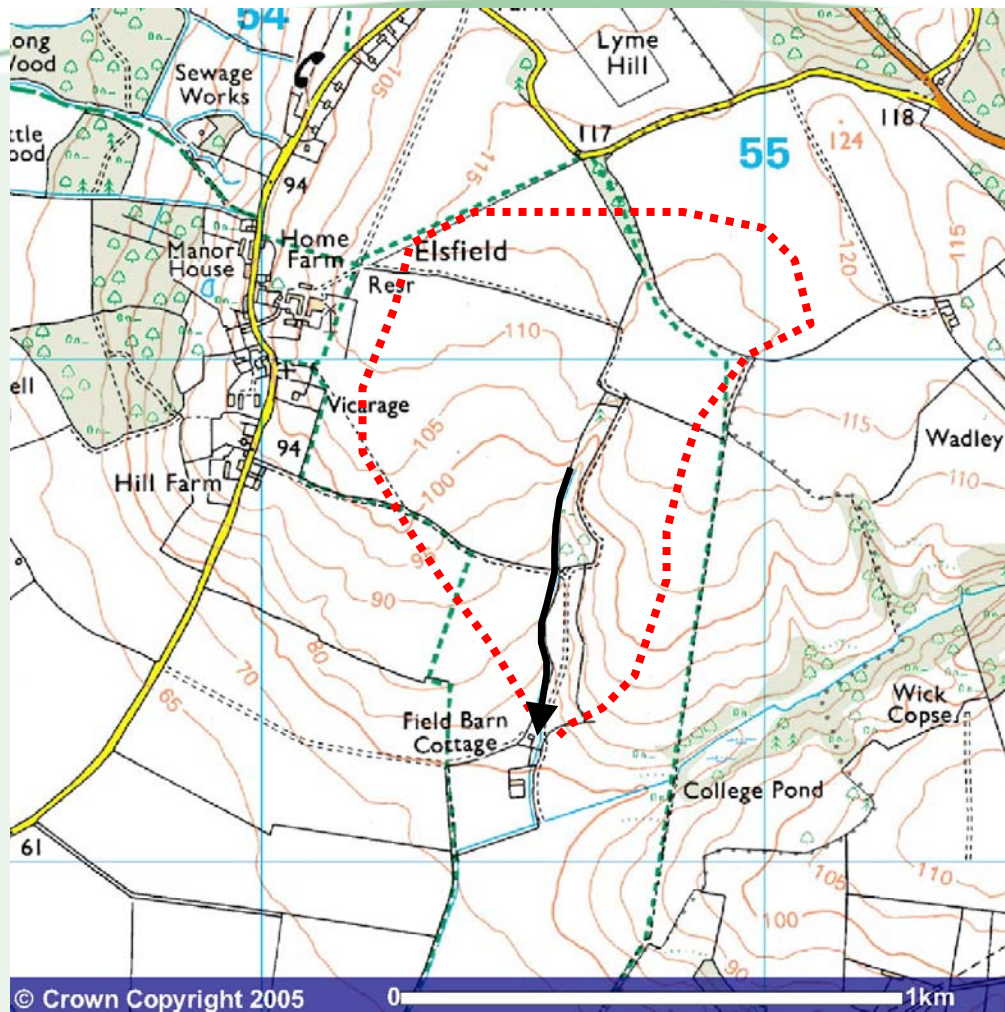
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Stream channel: Elsfield (Oxford, UK)
Mean width = 50 cm; Mean depth = 4 cm



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Elsfield catchment



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Control: Whichford Wood Top



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Results

- Water quality
- Invertebrates

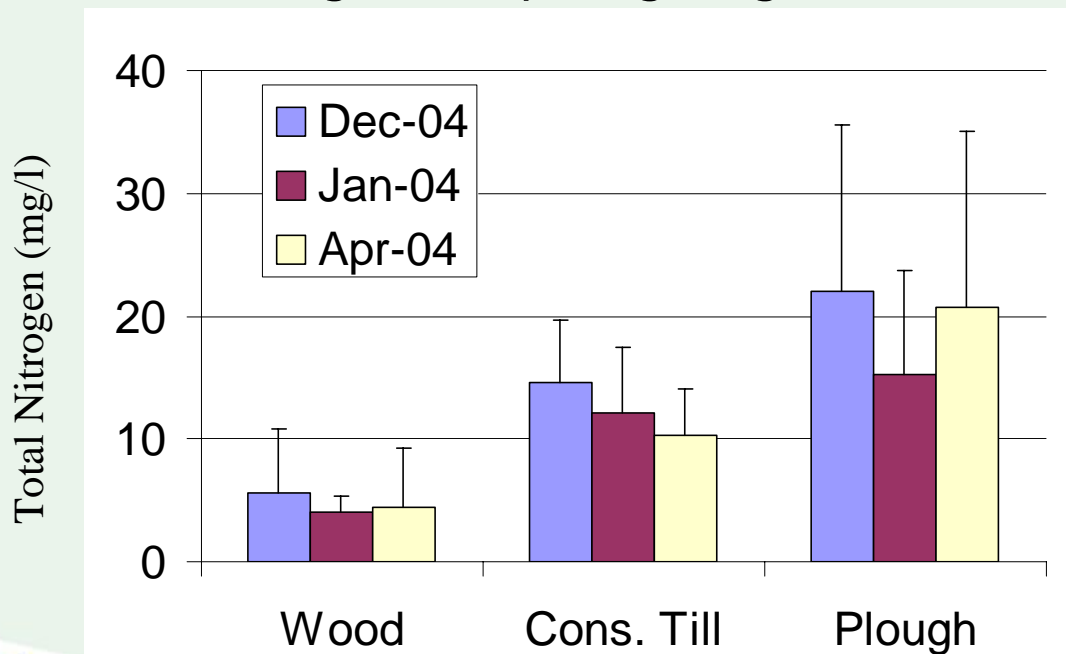


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Stream water quality

Total Nitrogen

- Woodland significantly lower than cultivated areas
- Slight, but non-significant, differences between conservation tillage and ploughing

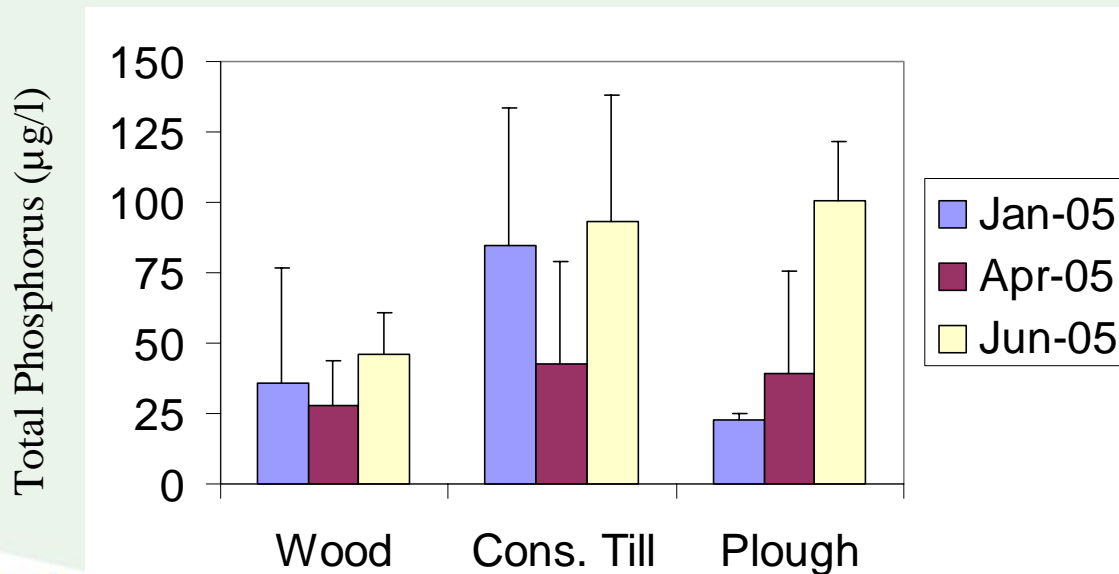


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Stream water quality

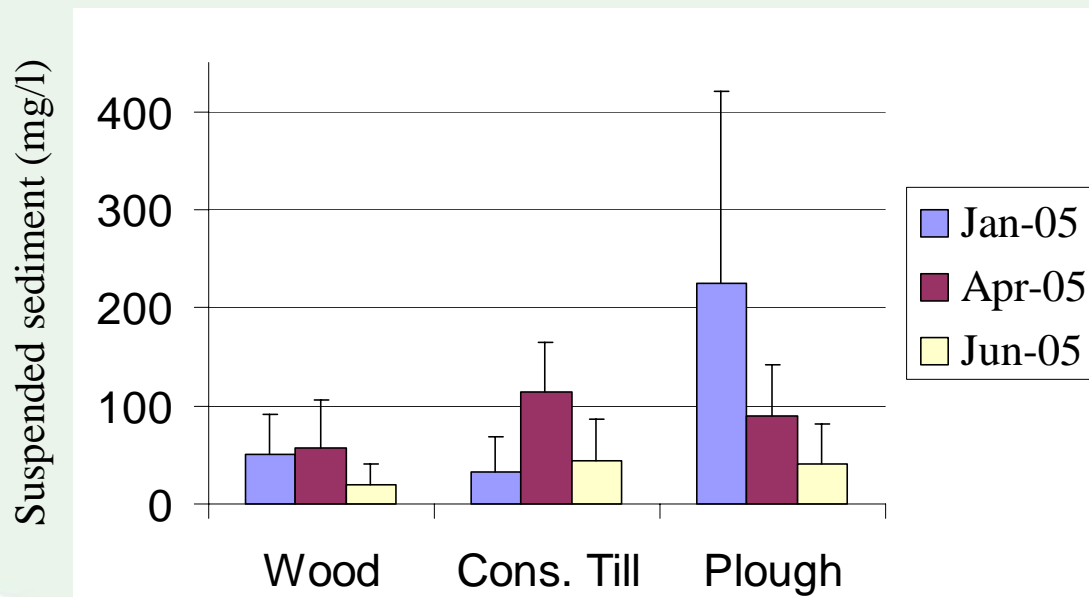
Total Phosphorus

- Woodland usually lower than cultivated areas
- Not much difference between conservation and plough



Suspended sediment

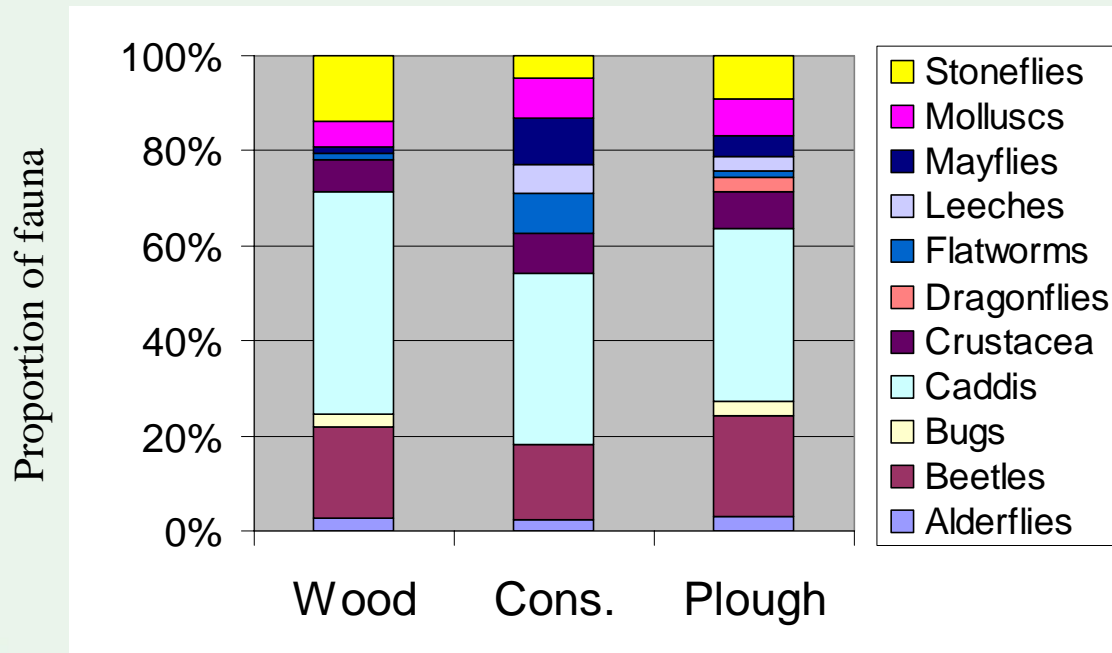
- Woodland generally quite low
- Conservation tillage lowest in winter; no difference between conservation and ploughed in April or June



Invertebrate fauna

In terms of number of species:

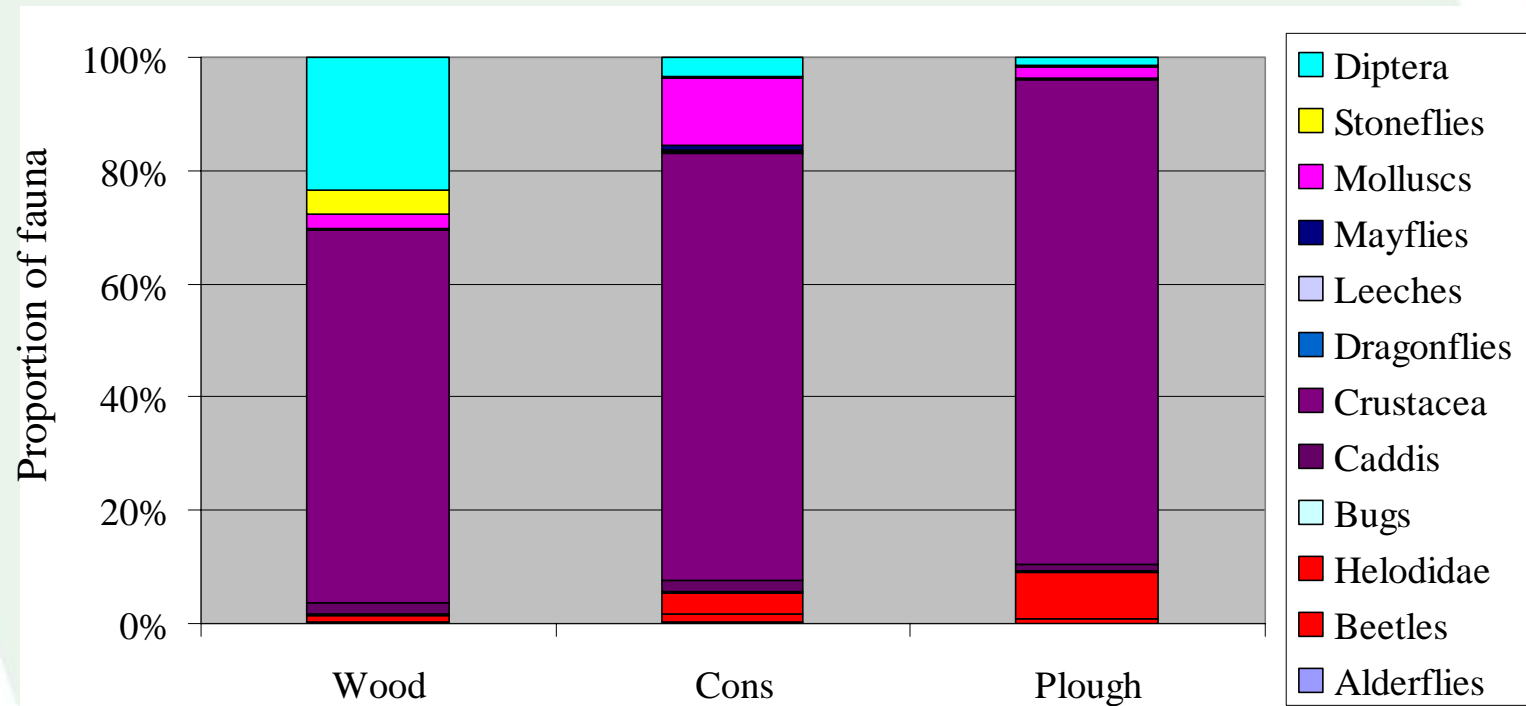
Caddis, water beetles most species rich groups



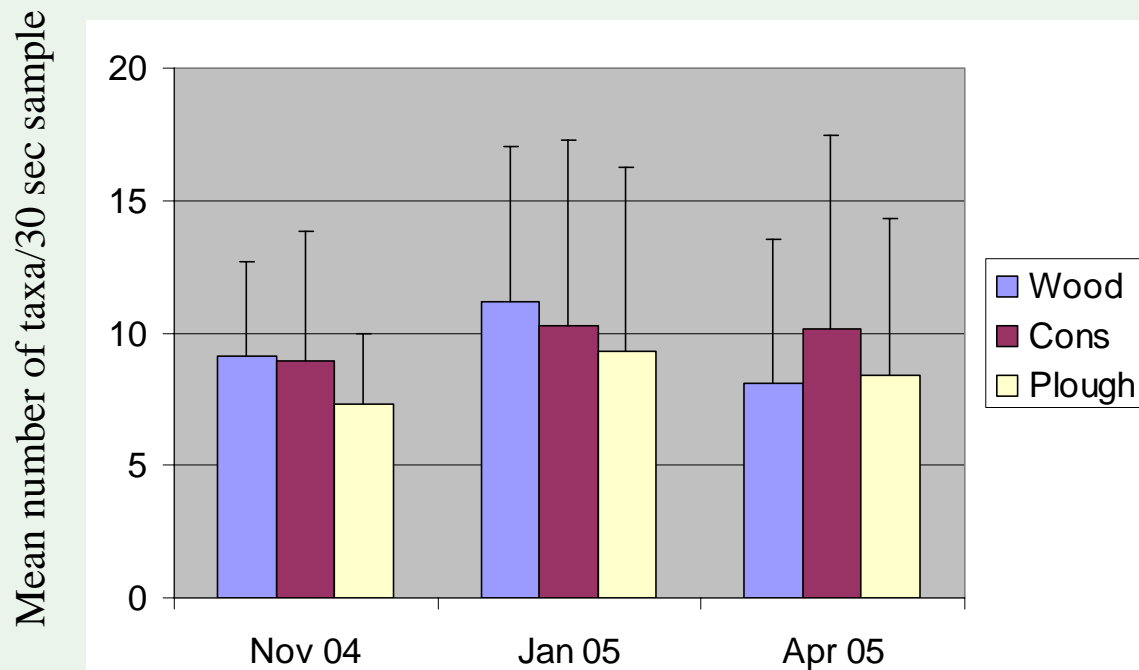
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Invertebrate fauna

In terms of abundance: *Gammarus* dominate



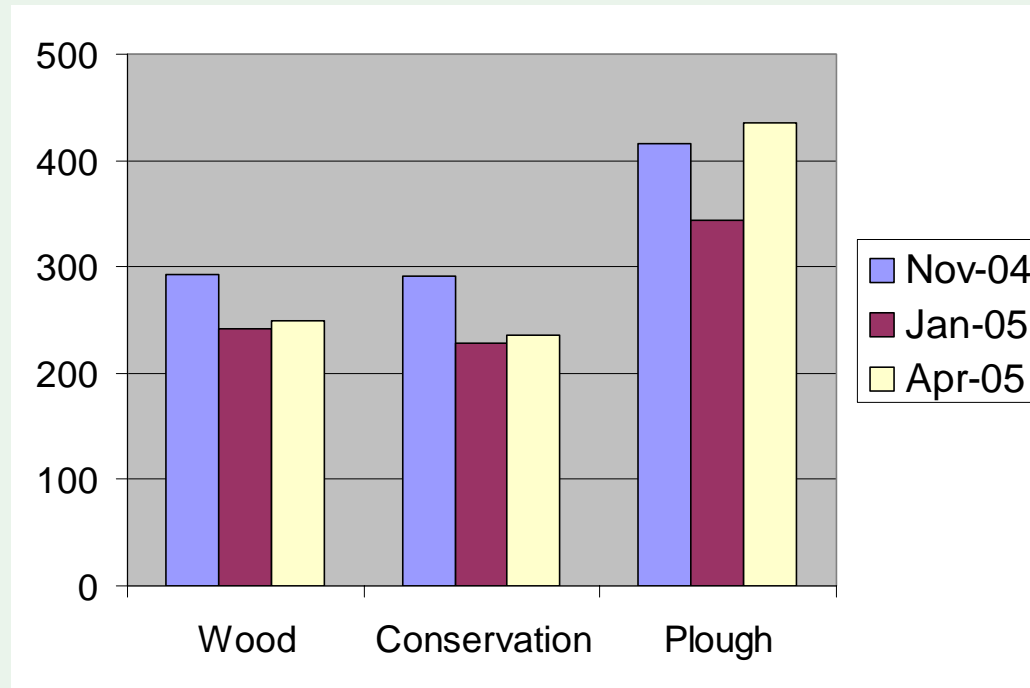
Invertebrate taxon richness



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Invertebrate abundance

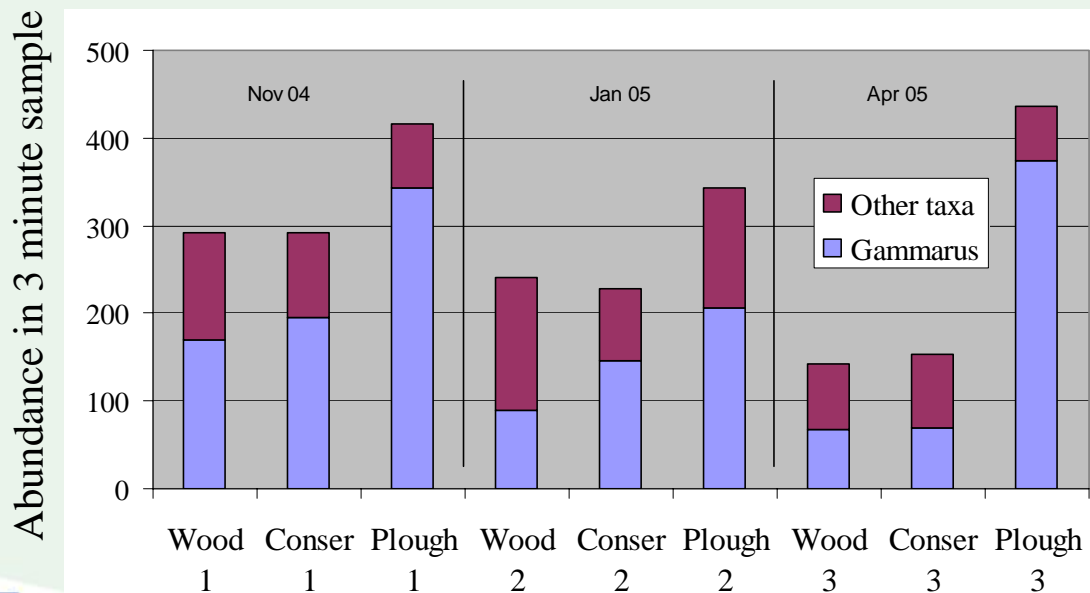
Abundance of taxa/30 second sample



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Gammarus (freshwater shrimps)

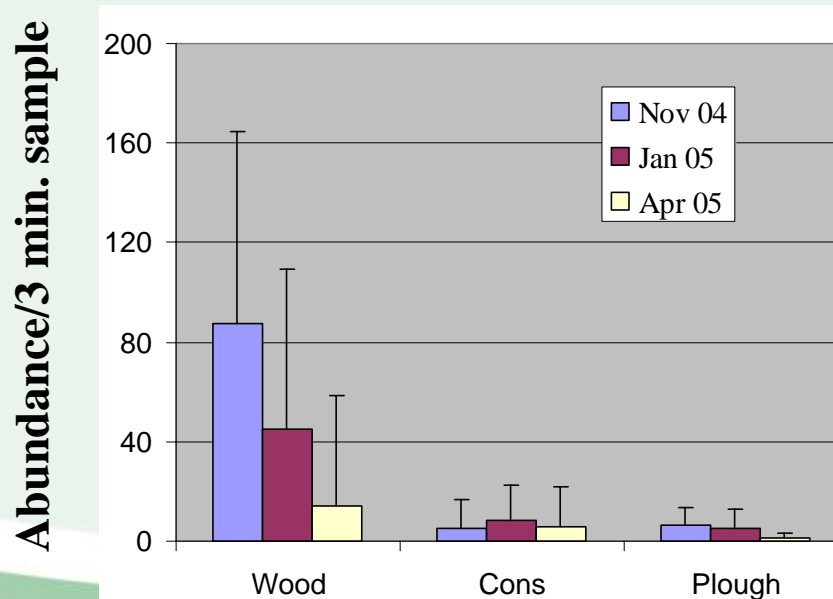
- Significantly *more* abundant ($p < 0.001$) in conventional sites than in wood or min. till
- Reason: more sensitive species lost; *Gammarus* takes over



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Stoneflies

- Stoneflies: most sensitive macroinvertebrate group to environmental stress
- Significantly less frequent in cultivated landscapes than woodland
- No difference between conservation and ploughed.



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Conclusions

- We're only part way through collecting the data – so results *very* preliminary
- Water quality better in woodland controls than cultivated areas, as expected
- Less suspended sediment in conservation tilled streams in winter (concentrations similar to woodland)
- Invertebrate species richness may be lower in ploughed sites; abundance significantly *higher* in ploughed sites.
- Higher *Gammarus* abundance and loss of stoneflies *may be* indicators of impacts.



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A last thought....

- We don't know if these are general trends.....

.....partly because SOWAP is one of the few projects to look at both biological and physico-chemical effects of agriculture in these systems

- Urgent need for more studies of biological response



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