Demonstration
Test
Catchments

University of East Anglia

Source control – targeting measures for arable tillage in the Wensum Demonstration Test Catchment, Norfolk

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With thanks to Sam Carr and Lister Noble

“Whole catchment audit” for Wensum DTC mini-catchments A

Example *gatekeeper* record: translate from this:

Detailed Operations

Main Business:
Year: 2011
From: 01/08/2010 To: 31/08/2011
Currency: GBP Area: ha

002.Rivetts.A Working ha: 18.23

Variety: SBN Fuego
Crop: Beans Dried Spring

Issued by: Poul Hovesen (09/08/2010)

Target growth stage: 1month Preplant
Volume rate: 133.000 L, Spray quality: Medium
Finish: 22/10/2010 13:52

Companion Gold	19.63 ha	0.500 L/ha
Rosate 36	19.63 ha	4.000 L/ha
MAPP:14459, Active Ingredients:Glyphosate, Manufacturer:Albaugh UK Limited		
Spraying	19.63 ha	1.000 ha/ha

... to this:

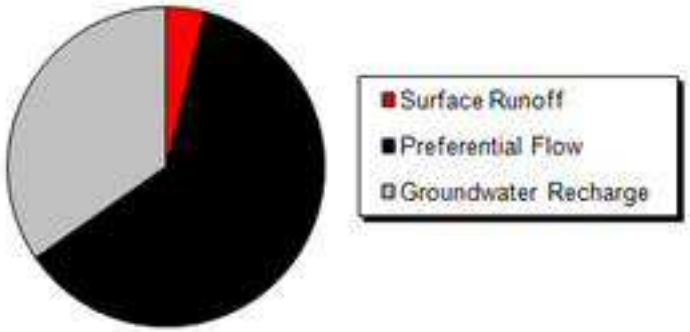
Week period	Total N (kg)	Total P (kg)	Total SO_3 (kg)	Total K (kg)
03/09/10 - 09/09/10	482.87	0	97.38	0
22/10/10-29/10/10	914.89	0	183.48	0
09/02/11-17/02/11	997.56	0	200.06	0
18/02/11 - 25/02/11	16910.79	0	3390.99	0
10/03/11 - 17/03/11	11343.42	0	2273.10	0

Selection of mitigation measures using *Farmscoper*

*FARMSCOPER** has been developed as a software tool to help evaluate different combinations of measures, such as those described in the Defra inventories

*http://www.adas.co.uk/Home/Projects/FARMSCOPER/tabid/345/Default.aspx

Inputs: farm type and records:



Cropping	Area (ha)	Fertiliser applied	
		N (kg/ha)	P_2O_5 (kg/ha)
Winter wheat (feed)	158.8	222.4	0
Winter oil seed rape	116.3	250.0	0
Maize (game cover)	15.8	64.2	0
Sugar beet	249.1	120.8	0

Outputs: soil zone pollutant losses (nitrate, phosphorus, sediment, ammonia, nitrous oxide) and optimisation of combinations of measures in terms of pollutant load reduction and net cost

Analysis of nitrogen leaching losses in mini-catchment A

Analysis period: December 2011 – August 2012 (275 days)

Mini-catchment area: 540 ha

Fertiliser N input (from *gatekeeper* records):

95,526 kg (176.9 kg/ha/a) (£81.0K)

Farmscoper modelled soil zone N loss:

16,135 kg (39.7 kg/N/ha/a or ~16.9% of applied N) (£13.7K)

Mini-catchment surface water N flux (mean of five load estimation techniques using weekly grab sample data from mini-kiosk A):

6630 kg (16.3 kg/N/ha/a or ~6.9% of applied N) (£5.6K)

Potential N load reduction and cost/saving of selected mitigation measures

Measure number	Measure	Average N load reduction (%)	Cost/saving per unit area (£/ha)
16	Allow field drainage systems to deteriorate	15.6	50
4	**Establish autumn cover crops**	**10.2**	**60**
7	**Adopt reduced cultivation systems**	**6.1**	**-40**
20	**Use plants with improved N efficiency**	**5.2**	**-20**
22	**Use a fertiliser recommendation system**	**5.2**	**-10**
25	Do not apply fertiliser to high risk areas	4.0	5
6	Cultivate spring rather than autumn crops	3.9	100
115	Leave over-winter stubbles	2.0	130

Optimisation of combinations of mitigation measures

Combination of measures by number	Net cost (£)
7, 20, 22	-33,048
7, 20, 22, 25	-30,348
4, 7, 20, 22	**-24,624**
4, 7, 20, 22, 25	-21,924

Measure 16 (Allow field drainage systems to deteriorate) omitted

Direct drilling methods (with no-till, strip till & cultivator drills)

One-pass systems

Strip-till drills either adopt discs or tines to till the land directly in front of where the seed is to be placed. Following the disc or tine is a coulter that drops the seed in and then the row is covered and consolidated by a press or roller

Claydon Hybrid direct seed drill

"45% of UK arable land is under a minimum tillage regime but with only a small percentage of farmers using no-till or direct drilling as their sole method of establishment"

(Source: Royal Agricultural Society of England study)

Direct drilling: *PROS*

- Reduced establishment costs
- Up to 96% less soil erosion
- Lower machinery costs
- Less fuel use (up to ⅔)
- Improved soil structure
- Better water quality
- Improved environment for wildlife

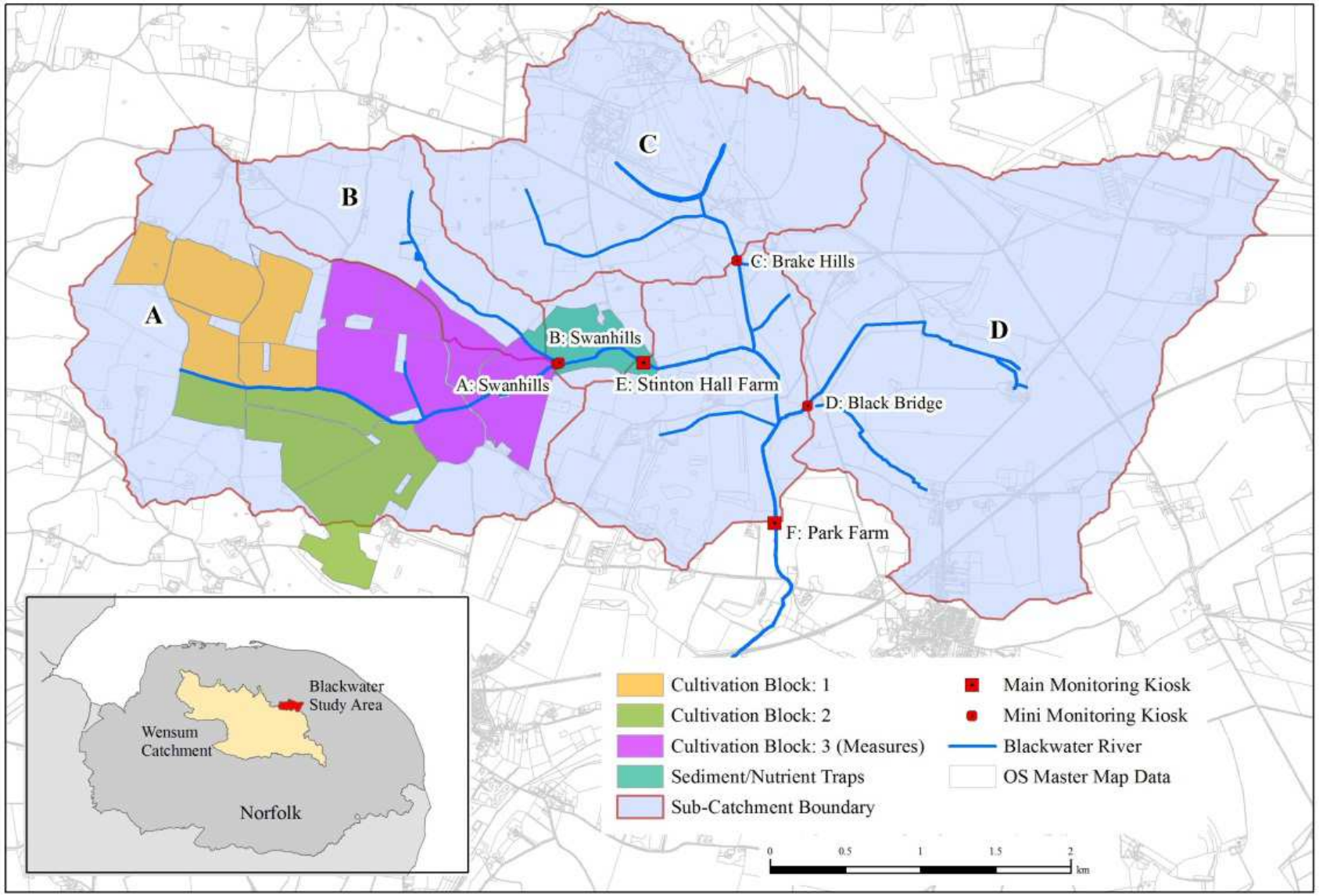
Direct-drilled winter wheat

Direct drilling: *CHALLENGES*

- Change from conventional methods to no-till is culturally difficult
- Initial high investment in machinery is costly
- Heavier reliance on herbicides
- Initially, the occurrence of weeds, disease and pests is hard to predict
- Damp climate in the UK means compaction is a concern
- Trash management
- Slug pressure
- Soil moisture management

(Source: HGCA Info Sheet 14, Spring 2012)

Target area for mitigation measures (Cultivation Block 3)



River Wensum, Hellesdon, 23 July 2012

Thank you for your attention!

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