

LINKING THE RUN-OFF MODEL PRZM WITH A GIS DATABASE TO DETERMINE VARIABILITY IN SURFACE WATER EXPOSURE



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FOCUS surface water scenarios are highly protective and represent worst-case assumptions, including minimal distances between a crop and a water body and no vegetative buffer strips. This poster examines how landscape approaches may be used to refine the exposure assessment for an autumn applied herbicide. First-tier modelling for a hypothetical herbicide used in bulb and flower production in the South West of England demonstrated high exposure concentrations in surface waters. A conceptual model linking a GIS database with the run-off model PRZM v3.2.1 and the surface water model (TOXSWA) is presented.

1. First-tier modelling

Application rates and e-fate endpoints

- Application rate 2 x 250 g a.s./ha.
- No degradation between application and drainage event (October).
- $K_{OC} = 100$ mL/g; DT_{50} soil = 10 d.

UK assessment

- No run-off scenario.
- Drainage scenario is challenging (Table 1).
- PEC drain = 26.92 µg/L.

Table 1 – Percentage loss in drainflow according to K_{OC} data

SSLRC Mobility Classification	K_{OC} (ml/g)	% Pesticide transported per 10 mm drain water
Very mobile	< 15	1.90%
Mobile	15 – 74	1.90%
Moderately mobile	75 – 499	0.70%
Slightly mobile	500 – 1000	0.50%
	1000 – 4000	0.02%
Non-mobile	> 4000	0.01%

2. Relevance of FOCUS

Bulb production in the UK

- Flower and bulb production is concentrated in two main areas of the UK – Cornwall and Pembroke.
- The run-off scenario of most relevance to bulb production sites in the UK is R3.
- The spatial distribution of R3 soil types is shown in Figure 1.
- R3 has relevant soil to Cornwall, but the associated weather is not representative of UK conditions.

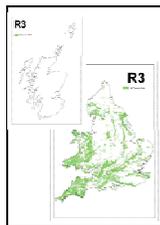


Figure 1 – Distribution of R3 type soils in the UK

Table 2 – FOCUS Surface water PEC values

	FOCUS Surface water		
	Step 1	Step 2	Step 3 (R3)
PEC _{SW} (µg/L)	147.1	41.8	13.4

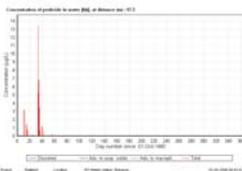


Figure 2 – Exposure profile for R3

FOCUS assessments

- FOCUS Step 1 to 3 demonstrates high PEC_{SW} values for hypothetical compound (Table 2).
- UK drainage assessment is more conservative than FOCUS Step 3.
- Benefit of FOCUS models is that exposure profiles (Figure 2) are derived for use in ecological risk assessments (See Poster TU1/Y1/P50).

3. Landscape analysis

Identification of high production areas

- A high bulb production area was located in Cornwall. A preliminary GIS analysis examined the area immediately around the farm and at 5 and 25 km around the farm (Figure 3).
- Information on pesticide usage, landcover, landuse, water bodies and soils are being collected (Figure 4).
- Dominant soil characteristics are summarised in Table 3.

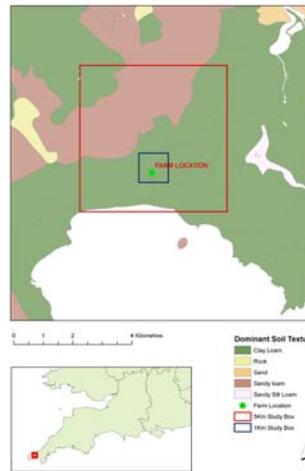


Figure 3 – Study area

GIS Interface

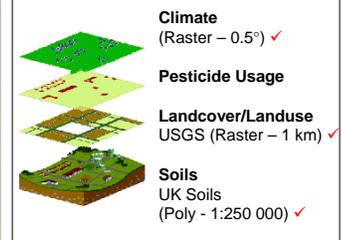


Figure 4 – GIS Interface

Table 3 – Dominant soil types

Area	Soil type	Slope (%)
Farm	Dominant: Clay Loam	2.2
	Others: None	
5 x 5 km	Dominant: Clay Loam	5.4
	Others: Sandy Clay Loam and Sandy Loam	
25 x 25 km	Dominant: Clay Loam	8.9
	Others: Clay, Sandy Loam, Silt Clay Loam and Silty Clay	

4. Linking GIS with PRZM + TOXSWA

Interfacing the current surface water models (PRZM and TOXSWA) with a GIS interface will enable:

- Site specific ERA, building alternative scenarios.
- Regional/ catchment investigations.

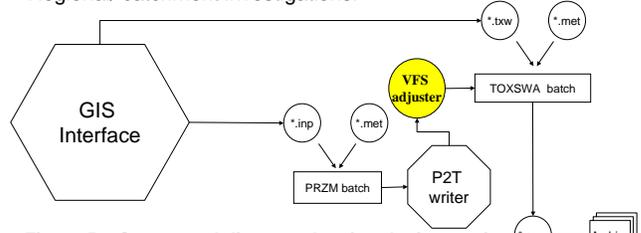


Figure 5 – Conceptual diagram showing the interaction between PRZM, TOXSWA and GIS software

5. Ongoing work and current regulatory status

- Accessibility of high resolution geoDatabases is increasing and enables more realistic ERA's to be conducted.
- Full implementation of the GIS/PRZM/TOXSWA conceptual model will now be investigated.
- Calculation of UK specific run-off curve numbers should be considered (calibration using field datasets needs to be examined).
- UK registration does not currently require an assessment of run-off, PSD have commissioned a project to review the relevance of the FOCUS surface water scenarios to the UK landscape. The findings of this work will be discussed later this year.