

UsT2 Case Studies: Pesticide Amnesty



Introduction

Pesticides play a fundamental role in many spheres including agriculture, horticulture, forestry, local authority applications and others. However, the active ingredients present in pesticide formulations can become significant pollutants in the aquatic environment. Many of these compounds can have deleterious effects on the ecology of rivers, lakes and the marine environment and may also pose a threat to the quality of drinking water (DW). As well as increasing the cost of DW production, many of the treatment processes required to remove pesticides are energy-hungry and therefore undesirable from a carbon footprint perspective.

Reducing the impact of pesticides on water quality in key DW catchments was one of the key drivers in Phase 2 of the Upstream Thinking (UsT) project and WRT land advisers have worked extensively with farmers and landowners to minimise pesticide losses to watercourses. Combining initiatives such as optimal choice of active ingredients, improved storage facilities, enhanced application methods and better washdown practices have reduced both point source and diffuse pollution. Furthermore, WRT has operated a pesticide amnesty during which landowners & farmers in key catchments have been able to surrender unwanted pesticides to allow them to be appropriately disposed of, thus further reducing the likelihood of pollution. The type and amounts of pesticide formulations surrendered, and the subsequent reduction in potential impact on both riverine ecology and DW quality is summarised in this case study.

Methodology

The amnesty ran throughout the five-year period of UsT2 in eight key DW catchments within the SWW region, including the Dart, Exe, Fowey, Otter & Tamar in which WRT was one of the project delivery partners. Farmers and landowners in these catchments were encouraged to surrender containers of pesticides which were either unlabelled or known to contain banned or out-of-date material. These products were identified by the farmer and WRT advisor during the initial visit and an inventory form was completed prior to arranging the collection of the products by a specialist waste contractor.

Results and Discussion

Over the entire duration of UsT2, a total of ~5.2 tonnes of pesticide products were surrendered. The map shows the Tamar and Exe catchments yielded the largest amounts of material at 1978kg (38%) and 1883kg (37%), respectively, followed by the Dart (925kg), Fowey (190kg) and Otter (182kg). Often presented in unlabeled, ageing, and deteriorating containers, the majority of the recovered material (76%) was unidentified. Whilst it is therefore not possible to assess the potential impact of this material, older generation pesticides, such as organochlorine insecticides, are frequently highly damaging in the environment.

Widely used to control broad-leaved weeds in grassland, acid herbicides comprised the majority (39%) of the identifiable material. Compounds such as MCPA and 2,4-D are the most common pesticide pollutants in SW rivers. They are highly mobile in the environment, moderately toxic to many organisms and can be difficult to remove from DW. The quaternary ammonium compounds, paraquat and diquat, also featured prominently, accounting for 13% of identifiable material with over 90kg of the former being recovered in the Tamar catchment alone. Banned in 2007, paraquat is highly toxic to many organisms including humans, whilst the recently deregistered diquat, formerly widely used as a general herbicide and potato desiccant, also exhibits wide spectrum toxicity. A large quantity of highly phytotoxic tar oils (120kg) was surrendered (wholly in the Dart catchment) and asulam (86kg), extensively used in bracken control and recognised as a threat to private water supplies due to removal difficulties, was also recovered in significant amounts. Other notable products recovered included glyphosate ('Round-Up®', 61kg), the heavily used and controversial herbicide labelled in some quarters as a serious environmental pollutant and suspected human carcinogen; 33kg of organophosphate sheep dip from the Dart catchment in which hill farming is prevalent; small amounts of synthetic pyrethroids (cypermethrin, deltamethrin etc.) which are exceptionally toxic to aquatic invertebrates; quantities of the molluscicide metaldehyde, which is extremely difficult to remove during DW treatment; significant amounts of the long banned triazine herbicides atrazine and simazine (persistent pollutants in E Devon groundwater sources); small amounts of the obsolete and highly bio-accumulative organochlorines lindane & DDT and notable quantities of the banned herbicide trifluralin, a Water Framework Directive Priority Substance which is highly toxic to many aquatic life forms. In summary this amnesty has proved highly effective in recovering a wide range of pesticide products which, with the likely on-going deterioration of storage containers and associated labels, would otherwise have posed an increasing threat to the ecology and water quality of key drinking water catchments.

Pesticides Recovered Per UsT Catchment

FOWEY - TOP FIVE	
Active Ingredient	Formulation Weight (kg)
Unidentified Material	169
Acid Herbicides	13
Chlormequat	3
Miscellaneous	3
Triazine Herbicides	2

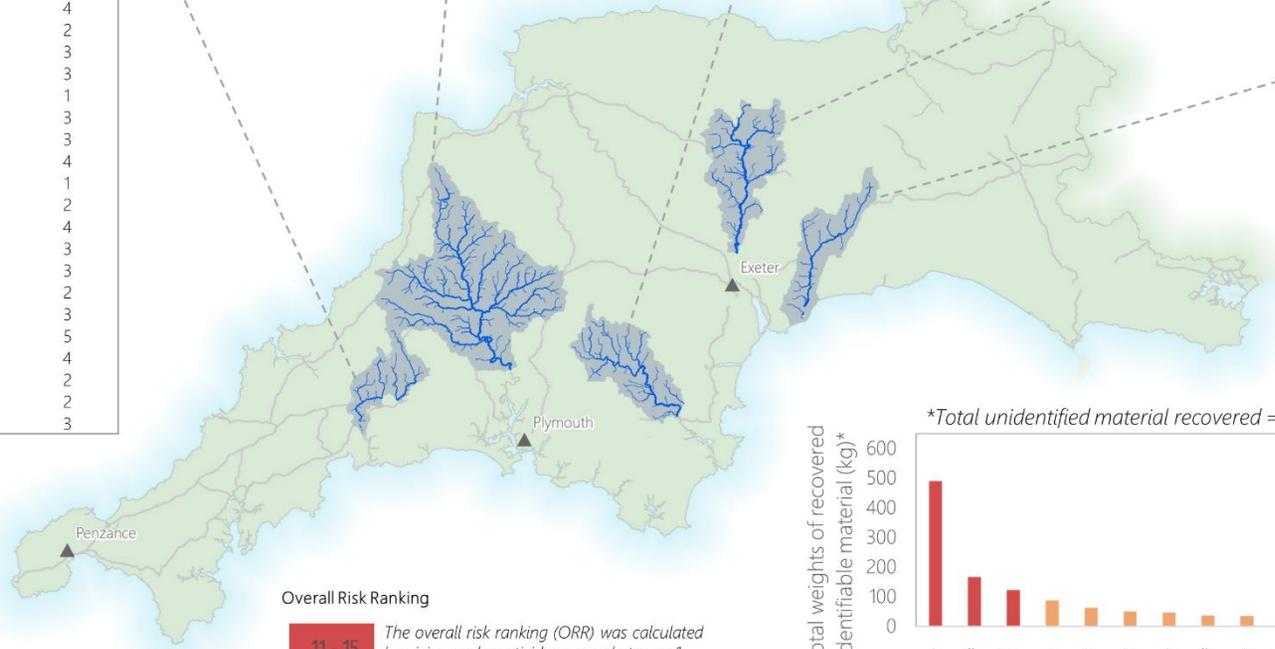
TAMAR - TOP FIVE	
Active Ingredient	Formulation Weight (kg)
Unidentified Material	1399
Acid Herbicides	257
Paraquat/Diquat	138
Asulam	60
Chlormequat	23

DART - TOP FIVE	
Active Ingredient	Formulation Weight (kg)
Unidentified Material	475
Tar Oils	120
Acid Herbicides	95
Azole/Strobin Fungicides	48
OP Sheep Dip	33

EXE - TOP FIVE	
Active Ingredient	Formulation Weight (kg)
Unidentified Material	1784
Acid Herbicides	35
Triazine Herbicides	26
Asulam	10
Trifluralin	10

Active Ingredient	Risk Score		
	Weight	Toxicity	DW Removal
Unidentified Material	5	5	5
Acid Herbicides	5	3	4
Diquat & Paraquat	5	4	2
Tar Oils	5	3	3
Asulam	4	3	3
Glyphosate	3	3	1
Azole/Strobin Fung	3	3	3
Triazine Herbicides	3	3	3
Chlormequat	3	3	4
Organophosphates	3	4	1
Trifluralin	3	5	2
Sodium Chlorate	3	2	4
Carbamates	3	4	3
Isoproturon	2	3	3
Pendimethalin	2	3	2
Chlorothalonil	2	4	3
Metaldehyde	2	2	5
Nicosulfuron	2	3	4
Triallate	2	3	2
Synthetic Pyrethroids	1	5	2
Organochlorine Insecs	1	4	3

OTTER - TOP FIVE	
Active Ingredient	Formulation Weight (kg)
Unidentified Material	99
Acid Herbicides	20
Diquat	20
Glyphosate	14
Propachlor	11



Overall Risk Ranking

11 - 15
8 - 10
≤ 7

The overall risk ranking (ORR) was calculated by giving each pesticide a score between 1 and 5 for total weight recovered, its human/ecotoxicity and its difficulty of removal during drinking water treatment. The sum of these scores equals the pesticide ORR.

