Amphibians in Drains Project 2012
Perth & Kinross Ranger Service

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Introduction:

The Amphibians in Drains Project was started in Perth and Kinross in 2010 after observations made by Countryside Rangers and Tayside Contracts gully maintenance staff found that a significant number of roadside gullypots contained amphibians and small mammals. Roadside gullypots are essential for road drainage but can act as pitfall traps when animals fall through the grid at road level, and once trapped it is unlikely the animals will be able to survive for any length of time. It was identified that a more robust study to ascertain the scale of the problem was required. 2012 was the final year of the study and this report summarises the findings of the study, and makes recommendations for more wildlife-friendly road systems for the future.

Aims:

- To estimate the number of drains that may be affected across eastern Perthshire and, through extrapolation, across Perth and Kinross.
- To estimate the number of amphibians & mammals that may be trapped.
- To record species of amphibian & mammals affected.
- To investigate if there is an association between adjacent habitat type and high numbers of trapped amphibians.
- To investigate if there is an association between proximity to ponds and high numbers of trapped amphibians.

The project is included in the UK Biodiversity Action Reporting System (UKBARS) which ensures that it is logged nationally and internationally, and is reported on within the Water and Wetland Working Group of the Tayside Biodiversity Partnership.

Methodology:

Roadside drains with a good line of sight en route to site visits were selected across eastern Perthshire. These were checked regularly from spring to autumn by the Ranger. This involved a quick visual check to see if there was any animal activity on the surface of the water, followed by a search in the water with a long handled net. It is likely that the number of dead animals is under-recorded in this study as the corpses sink to the bottom of the gullypot after a number of days.

Newhill primary school in Blairgowrie continued to carry out surveys close to the school in 2012 as part of their ‘Golden Time’, while a number of interested householders from Drimmie and Murthly also took part in amphibian rescue and recording.

Results 2012:

- **Numbers and species**

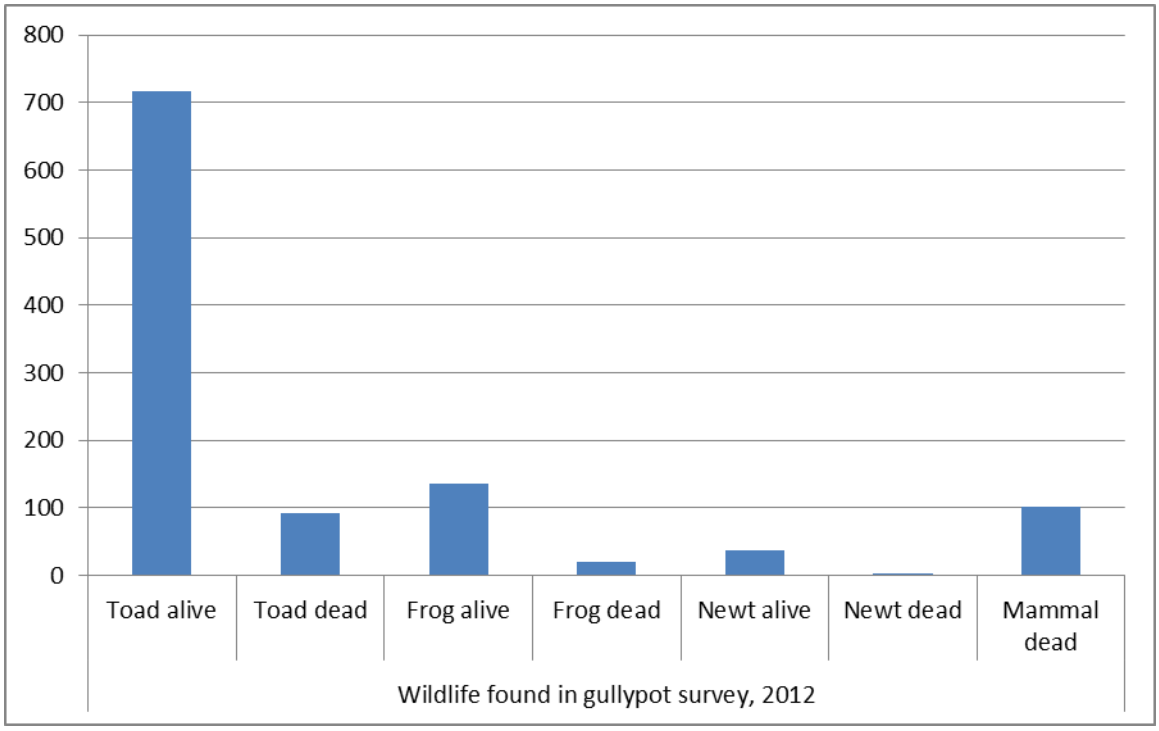
In 2012, six hundred and seven gullypots were checked, with four hundred and sixteen (69%) of these found to contain wildlife (see graph 1). As with previous years, toads were the most commonly found animal (716 alive, 92 dead), followed by frogs (136 alive, 21 dead), small mammals (voles, mice and shrews - 101 found dead), and then palmate newts (48 alive and 4 dead). See table 1 and graph1 for numbers and percentages.

Table 1 – Summary of wildlife numbers found in gullypots surveyed by Perth & Kinross Ranger Service in 2012:

Number of gullypots checked Feb-Nov 2012 Number containing amphibians/ mammals	**607** **416**	 **69%**
Total number of amphibians found alive: Number of toads Number of frogs Number of newts	**890** **716** **136** **48**	 **80%** **15%** **4%**
Total number of amphibians found dead: Number of toads Number of frogs Number of newts	**117** **92** **21** **4**	 **79%** **18%** **4%**
Number of mammals found alive:	**0**	
Number of mammals found dead:	**101**	**100%**

The species and numbers found are similar to those from the 2011 survey.

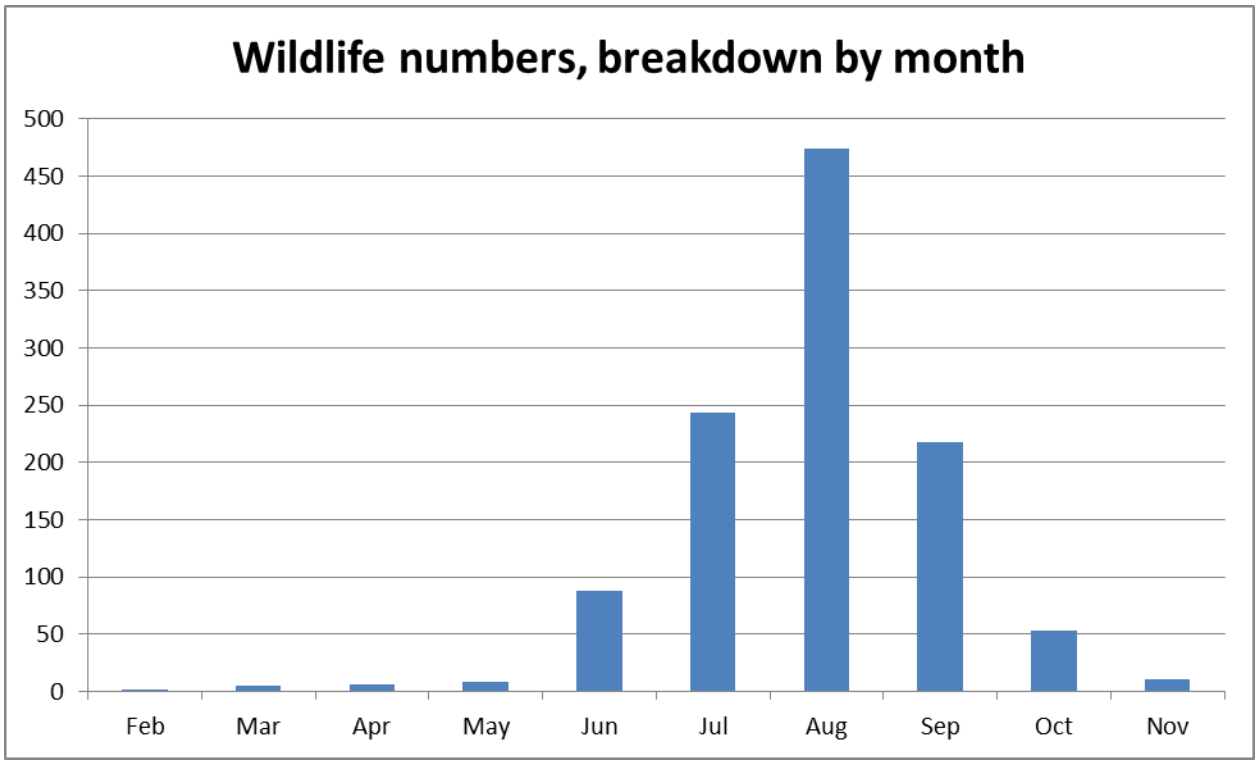
Graph 1 – Wildlife found in gullypots in 2012, breakdown by species.



As was found in 2011, the majority of animals were found towards the end of summer and early autumn (see graph 2). This will be the time that young amphibians are dispersing, so large numbers are susceptible to falling into gullypots when migrating, with the same migration routes being used for many years. By November most amphibians should be hibernating across Perth and Kinross.

It is surprising that more animals were not found in spring, when amphibians migrate to their breeding sites. The same pattern was found in 2011 and it would be interested to find out why this is the case.

Graph 2 – Wildlife found in gullypots in 2012, breakdown by month.



Using these data and the numbers of gullypots found across Perth and Kinross, we can work out how many animals might be trapped in gullypots across the whole of Perth and Kinross every year – over forty seven thousand amphibians and mammals.

Photo 1 – Toads and a newt which have drowned in a gullypot.

- **Habitat**

The habitat adjacent to the road and gullypot was noted – see graph 4. Grassland and suburban habitats were best represented in the survey, making up 40% and 38% of habitats next to gullypots. Woodland was found next to 19% of gullypots checked in the survey, with agricultural and urban habitats making up a very small percentage.

Terrestrial habitats most used by toads will be woodland and rough grassland, but they will also be found in gardens where they will use compost heaps, log piles and decking for shelter and hibernation. Only two animals were found in urban areas – in the centres of both Alyth and Blairgowrie. Agricultural areas can vary in how well they provide food and habitat, but intensively farmed areas will probably support low numbers of amphibians.

Graph 3 – Wildlife presence in gullypots by adjacent habitat.

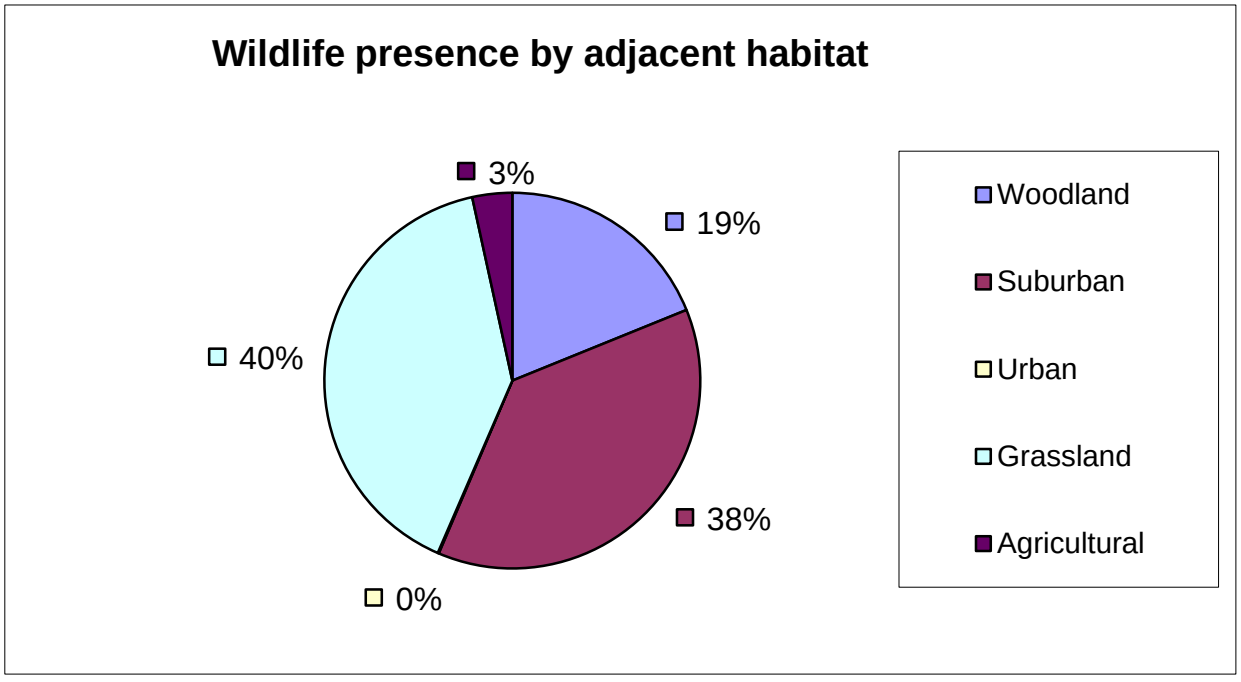


Photo 2 – A large common toad wedged in a gullypot plug - escaping drowning, but with no way out.

- **Distance from breeding pond**

The distance to a potential breeding pond was noted (see graph 5). As was found in 2011, the majority of animals – eight hundred animals (72%) were found within 500m of a pond, with smaller numbers – two hundred and forty (22%) - found between five hundred metres and one kilometre. Sixty-six animals (6%) were found between 1km and 1.5km from a pond, and only two animals (less than 1%) were found between 1.5km and 2km. Toads tend to prefer slightly deeper ponds than frogs and newts for breeding though toads will travel over a kilometre from hibernation and feeding sites to breeding ponds.

This information is significant for targeting road works involving gullypots or kerbs within a 1km radius of a breeding pond.

Graph 4 – Wildlife numbers found relative to distance from pond.

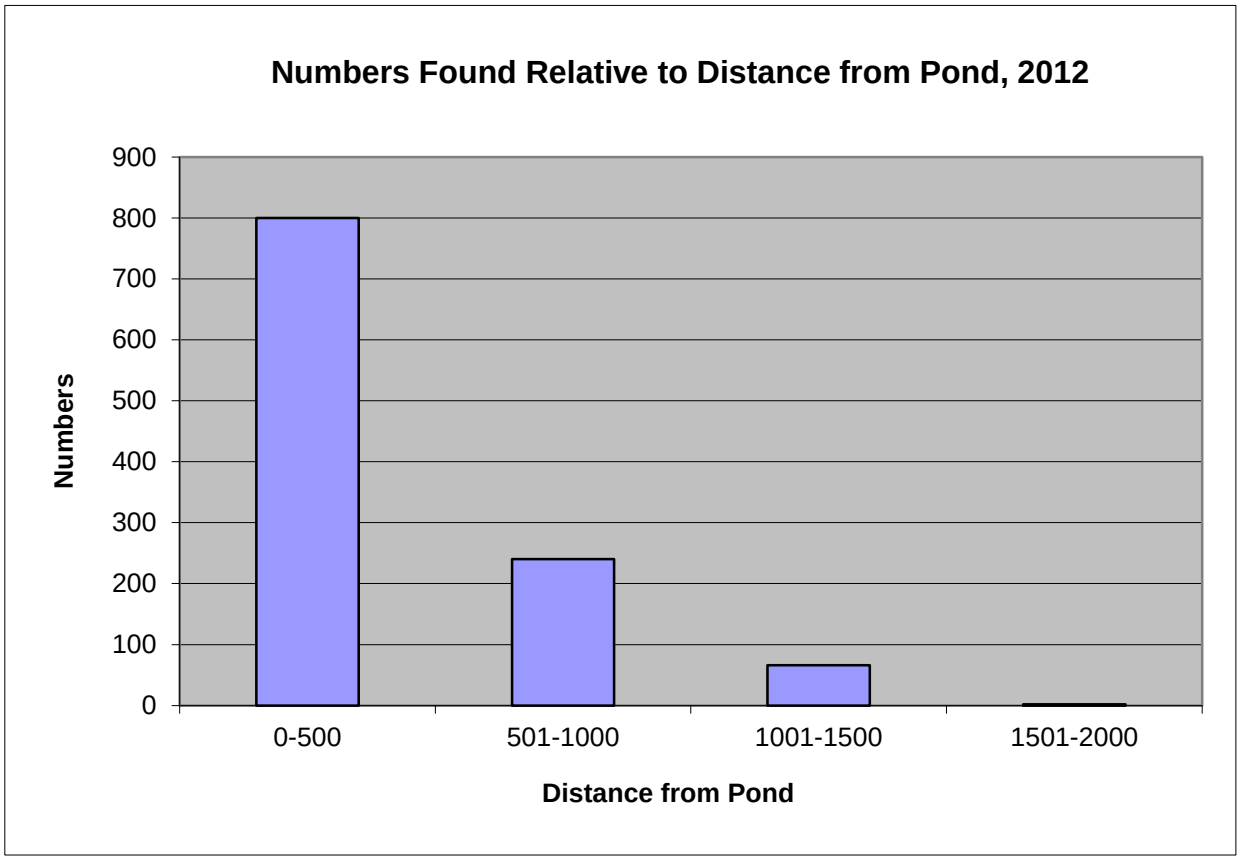


Photo 3 – A young palmate newt.

Conclusions and recommendations:

Results from the surveys carried out from 2010 to 2012 illustrate that gullypots create a substantial problem for amphibians and small mammals. A total of three thousand and seven animals were found in one thousand, five hundred and sixty-five gullypots, which works out at an average of 1.9 animal per gullypot. From these results we can extrapolate that with 37,252 gullypots being found across the county, if an average of 67% (24,958) of these contain wildlife (with an average of 1.9 animals trapped per drain), the total number of trapped animals would be 47,421 across Perth & Kinross per year. See Table 2 and 3 for numbers and species breakdown.

Table 2 – Summary of wildlife numbers from survey 2010-12

Year	No. of gullypots checked	No. of animals found	% of gullypots checked containing wildlife
2010	322	693	69%
2011	636	1201	63%
2012	607	1108	69%
Totals	**1565**	**3007 (average of 1.9 animals per gullypot).**	**Average % = 67**

Photo 4 – Young toads rescued from gullypots, August 2012.

Table 3 – Summary of wildlife numbers 2010-12, breakdown by species

Number of gullypots checked 2010-12	**1565**	
Number containing amphibians/ mammals	**1049**	**67%**
Total number of amphibians found alive:	**2265**	
Number of toads	**1966**	**87%**
Number of frogs	**219**	**10%**
Number of newts	**80**	**3%**
Total number of amphibians found dead:	**470**	
Number of toads	**423**	**90%**
Number of frogs	**36**	**8%**
Number of newts	**11**	**2%**
Number of mammals found dead:	**271**	
Number of birds found dead:	**1**	

The ideal solution to the problem would be to prevent wildlife falling into gullypots by making the drain cover grid too small for any wildlife to fall through. However, a smaller grid could easily become clogged with debris and prevent efficient drainage.

Providing an escape route from the gullypot to enable wildlife to climb out - similar to the principle of a hedgehog ramp in a cattle grid – could save countless lives and is worth investigating. Ravon - Reptile, Amphibian and Fish Conservation in the Netherlands - is researching the best material with which to do this, and a summary of a recent report is included in the appendix.

To look in to the most cost effective solution to the problem, the Amphibians in Drains Pilot Project was implemented (see page 11) with funding from the SITA Tayside Biodiversity Action Fund. This pilot project involved installing ACO wildlife kerbs to allow animals to avoid the ‘danger zone’ of the gullypot.

Amphibians in Drains Pilot Project.

In 2011 and 2012 the Ranger service researched potential solutions to the problem of small animals getting trapped in gullypots through the internet and communications with Froglife, the British Herpetological Society, Scottish Biodiversity Partnerships, and ecological consultants. It was discovered that many Great Crested newts, which are a European protected species, were falling into gullypots in the Vale of Glamorgan Council area. Mitigation measures were introduced by the Vale of Glamorgan Council by moving the gullypot 10cm further into the road and a concrete strip filled in against the kerb to create an amphibian walkway. This solution was identified as too costly but a new product – the wildlife kerb, made by ACO – had been recently manufactured to operate in the same way as moving gullypots away from the kerb, and at a much lower cost.

Working closely with the Roads Section, the Ranger Service initiated the most cost effective solution found by starting the Amphibians in Drains Pilot Project at Elm Drive in Blairgowrie. This site was chosen due to its proximity to a breeding pond, where large numbers of amphibians were falling into the gullypots. External funding was sourced from the SITA Tayside Biodiversity Action Fund to purchase and install the wildlife kerbs in Nov 2012. Surveys will continue in 2013 to enable comparison with previous years' data to see how effective the kerbs are.

Photo 5 – Wildlife kerb in place on Elm Drive.

The project received good coverage in the press and was awarded a Proggy Award from animal charity PETA (People for the Ethical Treatment of Animals):- the award recognises companies, people, and products for innovative and animal-friendly achievements. A summary of the project was published by Froglife in July 2012 (Croak online), the Mammal Society (Mammal News Spring/ Summer edition 2013), Scottish Biodiversity Forum Bulletin (Issue 43), Summit to Sand Issue 5 (Tayside Biodiversity Partnership), and UK Biodiversity News (DEFRA, Issue 59).

Photo 6 – Receiving the PETA Proggy Award.

Following on from the PKC work, Angus Council Ranger Service is now working with their Roads Department to implement amphibian-friendly drain covers and kerbs at Monikie. Plans are being put in place to ground-truth some of the key amphibian migration routes in Angus and to work with Angus Council in proactively planning installation of wildlife kerbs where necessary.

Advice has been sought by various groups eg Renfrewshire Council and Clyde Amphibian & Reptile Group as they are experiencing similar problems, an Islay Bird Group regarding amphibians trapped in cattle grids and Friends of Inchcoonans near Errol regarding roadside gullypots and toads crossing roads.

The Ranger who ran the project gave a presentation to the National Herpetofauna Workers Meeting in Edinburgh in January 2013. Following on from this, Froglife and Amphibian and Reptile Conservation are keen to take the project forward through working with volunteers, which will further raise the profile of the project and help communities to work together to benefit amphibians right on their own doorstep.

A report detailing the efficacy of the wildlife kerbs will be available at the end of 2013.

Photo 7 – The breeding pond next to Elm Drive, Blairgowrie.

Appendix.

RAVON - Reptile, Amphibian and Fish Conservation Netherlands – survey.

In the Netherlands, there are sixteen species of amphibians, all of which are protected by the "Flora and Fauna" law; eight of them are on the Red List. A number of these animals live in urban areas. During the spring and late summer migration period, they seem to follow the kerb, many of them falling into the kerb inlets, so entering the gully that runs alongside the pavement. Once in the gully pot, they cannot get out and eventually get lost in the sewage system. This leads to a high mortality for the animals in urban areas.

A recent investigation into this problem, made over a number of years and concerning the sewage system of the city of Delft, concludes that between one and three million animals die each year in the gully pots. A solution could be the introduction of a new type of construction inside these pots to help the animals to climb out. To see how effective such constructions were, a number of them was made and tested experimentally. In the Netherlands, four different types of gully pots with an opening into the sewage system were considered representative of the wide range used.

In this report you will find the results of introducing various constructions into four chosen types of gully pot, looking at whether the animals could climb out of the gullies, and thus whether the construction could be used to prevent or decrease mortality of the amphibians.

In this experiment, we used three kinds of material from which to make a climb-out construction: perforated aluminium board, a strip of synthetic eave guard (such as used to prevent birds from nesting under eaves) and synthetic open-structured fabric (such as used for rooting plants in ponds).
Four kinds of amphibians that live in urban areas were used in this experiment: the Common Frog (***Rana temporia***), Edible Frog (***Rana*** klepton ***esculenta***), Common Toad (***Bufo bufo***) and Smooth or Common Newt (***Lissotriton vulgaris***).

Various developmental stages of the animals were tested, categorised as small sub-adult, sub-adult and adult. They were tested in their ability to use the various types of climb-out construction.
Groups of same sized individuals were placed in the various types of gully pots, four days in a row, each day changing the type and depth of gully pot and cover . Every four days this process was repeated with a different type of climb-out construction, thus giving the animals the chance to escape.

The results of the tests show that all the climb-out constructions used in the experiment can be used to prevent amphibians starving in the pots or drowning in the sewers. But it is clear that the synthetic open structured fabric gives the best result. Test results showed the following percentages of animals managed to escape within 20 hours: aluminium perforated board allowed 25.2%, synthetic eave guard strip 38.7% and synthetic open structured fabric 65.6%.

Statistic analysis shows a relationship between the climb out construction, and the type of gully pot used. This relationship is significant (Chi2=38.620; df=6; p=0,000).
Essential in the design of any construction used for this purpose is that it will not obstruct the water flowing through the gullies, even during heavy rainfall.
However, apart from giving the best survival chance in this experiment, the synthetic open structured fabric took up the least space in the drain.