Number of Invertebrate species recorded at three different sites just before, during and after the Byofix trial in Maidenhead's Waterway from Spring to Autumn 2021

Introduction

In 2021 on advice from the Environment Agency, a trial of Byofix, that uses bacteria to control blanket weed (Zygometalean algae) by reducing nutrient and pollutant levels in the water, was begun on 21st March, some months earlier than the 2020 Dyofix (blue dye) trial. The blue dye treatment creates shade to control weed growth but there was an indication that it had an impact on faunal diversity in the new waterway.[1] The Byofix was administered by Maidenhead Waterways' volunteers every two weeks from 21st March to 5th September (13 doses). Before each dose a survey of aquatic fauna was carried out at three of the same sites used last year for the Dyofix treatment i.e.

Site 1 West bank under Library Bridge
Site 2 East bank- north of Railway Bridge
Site 3 Boat Lift

Prior to the treatment beginning I accompanied Tim Flood of the Environment Agency (EA) to survey four sites that included a site north of the A4 bridge that would be unaffected by the proposed treatment. It became obvious that the pond net I was using was inadequate[2] so, again with advice from the EA, a better net was acquired for me by Maidenhead Waterways that was the same as the EA net though without the extra pole section.

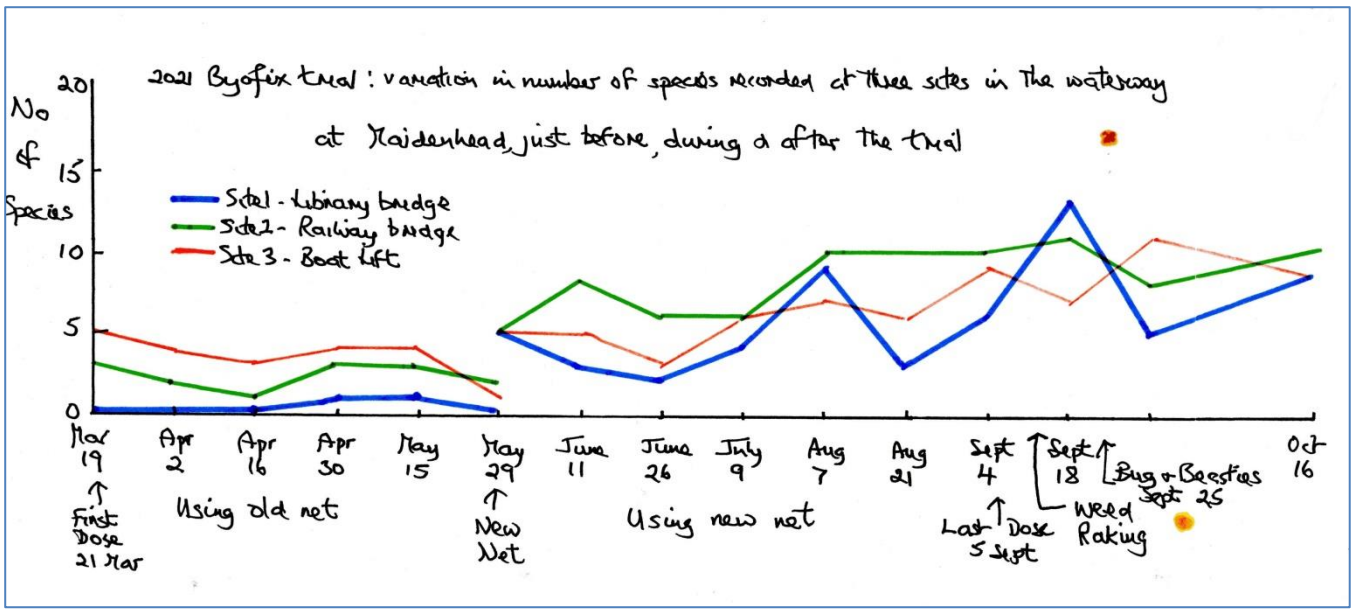
Short-handled net used initially replaced by a bigger net on 29th May

Tim Flood of the Environment Agency demonstrating the net he used

Sampling at each site was done over a similar time period.

Results

Environment Agency judges the quality of the aquatic environment by the faunal diversity of the invertebrates present. Therefore the number of invertebrates sampled over the survey period at the three sites was graphed based on data in Table 1 below. The numbers are conservative as, for example, no attempt was made to differentiate the different species of snail apart from the ramshorn snail.



The results show the following:

1) The larger net gave a more accurate idea of the faunal diversity of the habitat, as it could sample into deeper water and reach the bottom.
2) Generally, the Library Bridge site exhibited the least diversity.
3) Weed raking had most effect on diversity at the Library Bridge site whereas the Railway Bridge and Boat Lift site seemed unaffected.
4) That the diversity recorded is conservative is confirmed by the greater number of invertebrates recorded on 25th September during a dipping activity for primary school children (see yellow dot on graph). This was due to the use of four nets.

More detail of the fauna sampled and other comments from the monitoring programme are at the end of this report.

Moor Cut

Earlier in the season the Green Lane Pool next to the Boat Lift site was subject to growth of blanket weed due to inoculation from the shallow Moor Cut which was in contact with it. The construction of a bund at the junction has resolved this problem.

Bund constructed to prevent water backing into Moor Cut from the Green Lane Pool.

Conclusion

The Byofix controlled the growth of blanket weed at all sites and the results are in accord with the Environment Agency's finding that compared data before and after the treatment concluding that the *use of ByoFix to control plant growth in York Stream was found to have had no impacts on the macroinvertebrate communities. The communities were found to be recovering from previous water quality issues, and by autumn 2021 the downstream communities were better than the upstream community, and actually indicated that water quality improved as the water flowed through the town centre.*

Other effects of Byofix

According to the operator of the Weed Cutter machine, used in mid-September after the last Byofix dosing, the effect of the treatment was to allow more sunlight into the water encouraging the growth of pond weed, particularly Nuttalls Pondweed *Elodea nuttallii*. This weed is said to be a common problem in canals.

Finally, it is likely that the lower diversity at the Library Bridge site is due to its proximity to the Waterside Basin (located just north of Chapel Arches Basin), which has a concrete bottom and probably little flora to add oxygen to the water. This should change as silt and plants, such as water starwort, are brought down by York Stream and colonise the new basin. It would be worth monitoring the flora and fauna in this basin once access is possible.

Ann Darracott
Maidenhead Civic Society
28th October 2021

Table 1: Number of invertebrate species recorded at the three sites used to survey the waterway with dates of Byofix dosage

Date	Site	No.	Byofix Dates plus notes on fish
19th March	1	0	Sampled before Byofix trial started; this began on 21st March with the dispersion of 6kg distributed along the length of York Stream from Chapel Arches down to Green Lane weir plus 6kg on 31st March
	2	3	
	3	5	
2nd April	1	0	3nd dose of 6kg on 4th April
	2	2	
	3	4	
16th April	1	0	
	2	1	
	3	3	
30th April	1	1	4th dose 2kg 2nd May -Moor Cut only
	2	3	
	3	4	
15th May	1	1	5th dose 6kg 16th May
	2	3	
	3	4	
29th May	1	0 5	6th dose 30th May 2kg –Moor Cut only Both old and new nets used in parallel. New nets sampled greater range of species and was used from then on
	2	2 4	
	3	1 5	
11th June	1	3	7th dose 13th June 4kg young fish (0.5-1cm TL) present
	2	7	"
	3	5	young fish (0.5-2cm TL) present
26th June	1	2	8th dose 27th June 2kg –Moor Cut only young fish (0.5-1cm TL)
	2	6	young fish (0.5-1.5cm TL)
	3	3	stickleback & young fish (0.5-2cmTL) present
9th July	1	4	9th dose 11th July 3kg young fish (1.5cm TL)
	2	6	stickleback & young fish (1.5-2 cm TL)

	3	6	young fish (1cmTL)
23rd July	1	9	10th dose 25th July 3kg
	2	10	
	3	7	young fish (1.5TL)
7th August	1	3	11th dose 8th August 4kg young fish (2.5cm TL) ?juvenile stickleback
	2	10	
	3	6	young fish (1-2.5cmTL) ?juvenile stickleback
21st August	1	6	12th dose 22nd August 3kg fish (2 – 5cm TL) ? sticklebacks
	2	10	
	3	9	young fish (3cmTL)
4th September	1	13	13th & last dose 5th September 3kg
	2	11	
	3	7	Plus larval stages of lesser water boatman & water beetle
18th September	1	5	Update after weed raking (from 13th to 15th September)
	2	8	
	3	11	
16th October	1	8	Final survey approximately a month after the weed raking
	2	10	
	3	8	

Details of the fauna recorded at the three sites with notes on water conditions

Fish recorded as TL (total length)

Pre-Byofix Dispersal Surveys

Survey 1
17th March 2021
Before Byofix was dispersed, a joint survey was carried out by Ann Darracott of Maidenhead Civic Society (MCS) and Tim Flood of the Environment Agency (EA). It is evident that the net used by the EA is far better at establishing faunal diversity as it has a longer reach, allowing sampling in the middle and bottom of the water body and the net itself is larger. The table below shows the difference.

No.	Site	MCS	EA
1.	Half way between the diffluence on Town Moor and the A4 bridge	ramshorn & pond snails mayfly nymph chironomid pupa water mite	leech pond snail mayfly nymph water mite water louse freshwater shrimp (2 species) bloodworm sludge worm
2	East bank of waterway - south of the Library Bridge	No species	leech pond snail water louse bloodworm water mite stickleback
3	South of Railway Bridge	leech mayfly nymph caddis fly larva water mite	leech mussel ramshorn & pond snails water louse freshwater shrimp copepod mayfly nymph caddis fly larva bloodworm *Dytiscus* water beetle water mite stickleback
4	West bank of waterway - halfway between Stafferton Way and the weir	Bank too steep for net	sludgeworm ramshorn & many other snails caddis fly larva- (*Sericostoma* sp) – biological indicator bloodworm water mite

Survey 2

19th March 2021 (1st dose of Byofix to be disbursed on 21st March)

Despite the deficiencies of the equipment the Civic Society was asked to continue to assist in monitoring the waterway. This second survey was undertaken on 19th March, the sites selected were those used last year where access to the waterway was possible.

No.	Site	Species	Notes
1.	West bank under Library bridge	No species	No blanket weed visible on surface
2.	East bank- north of Railway bridge	leech pond snail, eggs also seen water mite - several	Pond weed *(Elodea nuttallii) p*lus other flora sampled
3.	Boat Lift	leech pond snails of different sizes. water louse freshwater shrimp water mite	Large amounts of slimy blanket weed on bottom, breaking the surface in places

Blanket weed (filamentous algae) is already present in the waterway and only the cold weather has restricted its growth. It is only currently only breaking the surface at the Boat Lift, where it is also present in large quantities on the bottom.

This survey was repeated regularly after the Byofix had been dispersed.

Post-Byofix Dispersal Surveys

Survey 3
2nd April 2021 (2nd dose of Byofix to be disbursed on 31st March and 3rd on 4th April)
This survey was done with the same short-handled net as before so fauna on or near the stream bed was not sampled.

No	Site	Species	No	Notes
1.	West bank under Library bridge	No species		No blanket weed visible on surface or in water column
2.	East bank- north of Railway bridge	damselfly nymph bloodworm? very small	1 2	*Melosira* (diatom) and small amount of Zygometalean algae. Dark brown coils of excreta.
3.	Boat Lift	pond snails of different sizes bloodworm? very small water mite copepod	4 1 1 1	Large amounts of Zygometalean algae (slimy blanket weed) on bottom. Large patches now on surface at boat lift, weir and Moor Cut convergence. Diatom *Melosira* on boat lift surface.

Site 1 As previously, no fauna was sampled at the library bridge site. There is fools watercress nearby but my net couldn't reach it. Fauna are often sheltering or attached to such flora.

Site 2 Fauna at the railway bridge site was quite different from earlier samples. It is likely the damsel fly nymph was sheltering in the fools watercress near to the bank.

Site 3 The boat lift is next to the Green Lane Pool and the Moor Cut convergence where Byofix was disbursed extensively on 20th March. However, at present this has not affected the growth of blanket weed which is now more extensive that on 19th March with large patches of the weed breaking the surface. Pond snails still dominate the fauna. In April freshwater shrimp and water louse were not found at this site. As previously the sample was dominated by blanket weed which makes it hard to see the fauna.

Survey 4
16th April 2021 (4th dose of Byofix to be disbursed on 2nd May- Moor Cut only)

This survey was done with the same short-handled net as before so fauna on or near the stream bed was not sampled

No	Site	Species	No	Notes
1.	West bank under Library bridge	No species		No blanket weed visible on surface. *Melosira* (diatom) on bottom and few strands in water column
2.	East bank- north of Railway bridge	water mite sticklebacks	1 2	*Melosira* on bottom and some strands in water column
3.	Boat Lift	copepod water mite water louse	>10 5 3	Large amounts of Zygometalean algae (slimy blanket weed) on bottom. Patches of it now more numerous on surface at boat lift, weir and Moor Cut convergence. Diatom *Melosira* on boat lift surface.

Site 1 As previously, no fauna was sampled at the library bridge site despite being able to sample near to the fools watercress (the water level had dropped). There is extensive *Melosira* on the bottom.

Site 2 Fauna at the railway bridge site was again different. This time it seemed that the two sticklebacks sampled were sheltering in the fools watercress near to the bank.

Site 3 The boat lift is next to the Green Lane Pool and the Moor Cut convergence where Byofix has been disbursed extensively. However, on 16th April, there were more patches of BW on the surface than on 2nd April despite the Byofix and manual removal on 10th April. No snails were sampled on 16th April. The most numerous invertebrate was copepods, followed by water mites and then water lice. As noted previously, the sample was dominated by blanket weed which made it hard to see the fauna. Biodiversity was slightly greater at this site compared with the others; also species occurred in greater numbers. Evidently the weed is providing shelter. However diversity is still less than before the Byofix trial started.

Survey 5
30th April 2021
This survey was done with the same short-handled net as before so fauna on or near the stream bed was not sampled.

BW = blanket weed/ Zygometalean algae

No	Site	Species	No	Notes
1.	West bank under Library bridge	water mite	1	No BW visible on surface. Few filaments of blanket weed in water column *Melosira* (diatom) on bottom and few strands in water column
2.	East bank- north of Railway bridge	biting midge larva (Ceratopogonidae) water mite freshwater shrimp	1 2 2	BW sampled. *Melosira* on bottom and some strands in water column. Strand of water starwort
3.	Boat Lift	ciliophore ?*Paramecium* copepod ?copepod nauplii water mite	>2 >10 2	Large amounts of BW on bottom and on the surface in the Green Lane Pool and Moor Cut convergence. Diatom *Melosira* on boat lift surface.

Site 1 For the first time a water mite was sampled whereas previously, no fauna were recorded at the library bridge site. There is extensive *Melosira* on the bottom. The water looks murky.

Site 2 Fauna at the railway bridge site again included water mites but also freshwater shrimp and the worm–like biting midge larva which swam with a sinuous action and had what seemed to have a rosette of hair like spines at its posterior end. More blanket weed was sampled here than previously possibly accounting for the slight increase in species.

Site 3 The Green Lane Pool perhaps has slightly less blanket weed on the surface compared to mid-April. As was found then, the most common species sampled was copepods, possibly including their nauplii larvae. However the dominance of blanket weed in the sample hinders observation of fauna. The ciliophore was only spotted after a sample was studied using a microscope.

Survey 6

15th May 2021 (5th dose of Byofix to be disbursed on 16th May)

This survey was done with the same short handled net as before so fauna on or near the stream bed was not sampled.

BW = blanket weed/ Zygometalean algae

No	Site	Species	No	Notes
1.	West bank under Library bridge	ciliophore ?*Paramecium*		No BW visible on surface. column *Melosira* (diatom) on bottom and few strands in water column
2.	East bank- north of Railway bridge	biting midge larva exoskeleton of mayfly nymph water mite	1 1 1	*Melosira* on bottom. Strand of water starwort
3.	Boat Lift	ciliophore ?*Paramecium* copepod water mite pond snail	>2 >5 2 1	Almost no BW on the surface in the Green lane Pool and Moor Cut convergence but still present on bottom & in water column. Diatom *Melosira* on boat lift surface.

Site 1 Only a ciliophore, possibly *Paramecium* was found. There is extensive *Melosira* on the bottom. The water looks murky.

Site 2 Fauna at the railway bridge site again included a water mite. The exoskeleton of the mayfly nymph indicates that this fauna is present but has not so far been recorded in this trial.

Site 3 Either due to the Byofix, manual removal or the wet cold weather, there was almost no blanket weed on the surface at Green Lane Pool and Moor Cut. Again, the most common species sampled was copepods. The other smaller fauna were probably ciliophores which could only be clearly seen using a microscope. As before the dominance of blanket weed in the sample hinders observation of fauna.

The faunal diversity is very poor.

Survey 7

29th May 2021 (6th dose of Byofix to be disbursed on 30th May- Moor Cut only)

A parallel survey using both the old and new net was done today. BW = blanket weed/ Zygometalean algae

No	Site	Species	No	Species	No	Notes
		Old Net(ON)		New Net(NN)		
1.	West bank under Library bridge	No fauna		pond snails (dextral shell- different sizes) water mite	4 1	ON -few strands of BW NN- very silty bottom, some water starwort sampled
2.	East bank- north of Railway bridge	water mite copepod	8 1	water mite copepod ciliophore water louse	4 >10 >20 1	ON – strands of BW NN – mat of BW sampled. BW on bottom and probably in water column but not on surface
3.	Boat Lift	pond snails (small)	14	pond snails (small) copepod ciliophore bloodworm fish (1cm TL)	2 >5 >15 1 5	ON & NN both samples contained mats of BW.

The new net can reach further away from the bank and also sample from on or near the bottom. It recorded greater faunal diversity at every site so this net will be used in future.

Site 1 No fauna was sampled with the old net. The new net sampled snails and a single water mite. There is extensive *Melosira* on the hard surfaces on the library bank. The water looks murky.

Site 2 Fauna at the railway bridge site was dominated by copepods and ciliophores. Evidently the stream further away from the bank has more BW in it as a mat, rather than a few strands, was sampled by the new net.

Site 3 Again there was almost no blanket weed on the surface at Green Lane Pool and Moor Cut though a couple of patches were seen below the weir which the moor hens were feeding on. However, the samples from both nets contained mats of BW.so it is still present below the surface. Copepods and ciliophores were again found. The latter were observed under a microscope and appeared to be able to attach themselves temporarily onto a strand of BW. As before the dominance of blanket weed in the sample hinders observation but it is evidently providing a habitat for fauna, including very small fish.

N.B. Ciliophores are common in freshwater where they feed on microorganism such as bacteria, algae and yeasts. Are they feeding on Byofix???

Survey 8
11th June 2021 (7th dose of Byofix to be disbursed on 13th June)
Only the new net was used. BW = blanket weed/ Zygometalean algae

No	Site	Species	No	Notes
1.	West bank under Library bridge	pond snails (small) water mite copepods fish (0.5-1cm TL)	>10 2 >20 >15	For the first time the sample was dominated by BW which seems to have colonised the bottom since two weeks ago
2.	East bank- north of Railway bridge	water mite copepod ciliophore water louse freshwater shrimp *(Gammarus*) water beetle *(?Acilius sp)* leech fish (0.5-1cm TL)	5 >10 ? >20 1 >5 1 1 >5	BW sampled on bottom and probably in water column but not on surface
3.	Boat Lift	pond snails (mostly large) water mite copepod ciliophore bloodworm (small) fish (0.5 – 2cm TL)	9 1 >10 >15 1 3	BW on bottom and in the water column with some mats on the surface. A snail egg mass was seen on a waterlogged dead leaf. Cormorant on boom and several mallards in pool

Site 1 Greater faunal diversity was recorded this time, when compared to two weeks ago, probably because of the presence of increased amounts of blanket weed. As noted previously BW provides food and shelter. For the first time, in the current survey, small fish were recorded at this site.

Site 2 The greatest diversity was recorded at this site including small fish, a water beetle and freshwater shrimp. Copepods and ciliophores again occurred. Fools watercress is beginning to grow on the stream bed under the railway arch.

Site 3 Some mats of blanket weed now occur on the surface at Green Lane Pool and Moor Cut with large mats occurring elsewhere (see intro above). Two of the fish sampled here were slightly large than in the other sites, probably why the cormorant is there. The pair of cormorants seem to patrol the water way. Whereas two weeks ago the snails sampled from the weed were small, this time they were mostly large. Copepods and ciliophores were again found.

As before the dominance of blanket weed in the sample hinders observation but it is evidently providing a habitat for fauna, including very small fish. The increased quantity of the weed probably accounts for the increased faunal diversity.

Survey 9
26th June 2021 (8th dose of Byofix to be disbursed on 27th June- Moor Cut only)
Only the new net was used. BW = blanket weed/ Zygometalean algae

No	Site	Species	No	Notes
1.	West bank under Library bridge	Leech *Piscola geometra* water mite (small & large) fish (0.5-1cm TL)	1 2 ca10	Sample was dominated by BW from bottom. Strand of water starwort. Several mallards nearby, resting on bank
2	East bank- north of Railway bridge	water mite copepod water louse bloodworm water beetle leech (large) fish (0.5-1.5cm TL)	> 5 >20 1 1 1 1 >5	Sample dominated by BW sampled on bottom and probably in water column but not on surface. Evidence of oil slick on surface said to be due to oil pollution incident. Moor hen and young near sampling site.
3.	Boat Lift	pond snails (mostly large) lesser water boatman *Corixa* ciliophore stickleback fish (O.5-2cmTL)	17 1 1 1 5	Less BW on bottom with some patches of weed- less substrate. A few small BW mats on surface, larger mats below weir. Many ca 5cm TL fish seen swimming near boat lift.

Site 1 Small fish again recorded at this site, also a leech parasitic on fish, suggesting presence of larger fish. Copepods and ciliates not seen.

Site 2 The greatest diversity was again recorded at this site despite the proximity of a recent oil pollution incident (details said to be on Facebook).

Site 3 Fauna dominated by large pond snails found in the BW. Water mites & copepods not sampled and only one ciliate, but did record the lesser water boatman. Both juvenile fish and a stickleback sampled and larger fish were seen swimming nearby. Blue damsel flies were hovering over water here.

As before the dominance of blanket weed in the sample hinders observation but it is evidently providing a habitat for fauna, including very small fish and, at the boat lift, snails.

Survey 10
9th July 2021 (9th dose of Byofix to be disbursed on 11th July)

No	Site	Species	No	Notes
1.	West bank under Library bridge	pond snail (1 small) water mite fish (1.5cm TL) fish louse copepod	5 1 2 1 1	BW and silt on bottom.
2	East bank- north of Railway bridge	ramshorn snail (large) pond snail water mite copepod(with and without eggs) lesser water boatman *Corixa* fish (1.5-2 cm TL) stickleback fish louse	1 1 > 15 > 5 1 4 4 4	Small patches of BW on surface. Underneath the railway arch where previously fools watercress grew there is now abundant water starwort
3.	Boat Lift	pond snail ramshorn snail snail eggs water mite water beetle ?*Rantus* mayfly nymph fish (1cmTL) fish louse	2 1 3 1 2 2 1	More BW on surface and on bottom that two weeks ago. Larger fish seen swimming near boat lift.

Site 1 Slight increase in faunal diversity

Site 2 Greater diversity was again recorded at this site. The reported oil pollution incident appears to have had no long term impact.

Site 3 This site also showed increased diversity. The presence of mayfly nymphs and a water beetle is encouraging.

For the first time this season, the fish louse, *Argulus* was recorded and at all three sites. This is a further indication, apart from the resident cormorant and the parasitic fish leech found two weeks ago, that there are many fish in the waterway. The presence of water mites, an indicator of good water conditions, was found at all sites, in increased numbers at site 2.

As before the dominance of blanket weed in the sample hinders observation but it is evidently providing an adequate habitat for fauna. The application of Byofix does not seem to be preventing the increase in faunal diversity usually seen as the summer progresses.

Survey 11
23rd July 2021 (10th dose of Byofix to be disbursed on 25th July)

No	Site	Species	No	Notes
1.	West bank under Library bridge	leech pond snails plus eggs on weed copepods (no eggs) freshwater shrimp water louse water mite mayfly nymph biting midge larva fish louse	1 12 >20 1 5 10 2 1 3	BW on bottom. Water starwort visible
2	East bank- north of Railway bridge	leech pond snails plus eggs on weed copepods freshwater shrimp water louse water mite mayfly nymph water beetle biting midge larva fish louse	1 6 >10 >5 5 >10 3 1 1 2	BW and some water starwort
3.	Boat Lift	pond snail ramshorn snail copepods water mite mayfly nymph – different sizes lesser water boatman fish louse fish (1.5cmTL)	2 2 >10 5 >5 1 1 3	.Water starwort on bottom , yellow BW at surface

Site 1 Increase in faunal diversity. Worm like biting midge larva (Ceratopogonidae) recorded for the first time.

Site 2 This site still supports good diversity.

Site 3 This site maintained diversity.

Survey 12
7th August 2021 (11th dose of Byofix to be disbursed on 8th August)

No	Site	Species	No	Notes
1.	West bank under Library bridge	pond snail copepod water mite fish (2.5cm TL) ?juvenile stickleback	3 >10 3 6	BW and silt on bottom.
2	East bank-north of Railway bridge	biting midge larva leech (small) pond snail & eggs water mite copepod freshwater shrimp *Gammarus* water louse mayfly nymph water beetle fish louse	4 1 6 >20 > 20 4 4 2 1 1	Slight oily slick on surface. BW on bottom. Water starwort visible under railway arch. *Melosira* on edge of stream
3.	Boat Lift	pond snail (small) water mite (one red) copepod ciliophore mayfly nymph lesser water boatman *Corixa sp* fish (1-2.5cmTL) ?juvenile stickleback	>30 2 >20 ?20 6 3 4	BW on surface mainly at edge of stream. Few mats below weir. BW & water starwort visible on bottom

Site 1 Slight decrease in faunal diversity but numbers up

Site 2 Slight increase in diversity. Oil slick on surface suggests pollution due to discharge from a nearby site though it does not appear to affect the aquatic fauna.

Site 3 Diversity similar to that recorded on 9th July. Mayfly nymphs again found as well as the lesser water boatman. Water mites not as numerous as at Site 2.

As before the dominance of blanket weed in the sample hinders observation but it is evidently providing an adequate habitat for fauna. It seems that the Byofix is suppressing the blanket weed, helped by the recent cold & wet weather. It is also evident that Site 2, near the railway bridge, supports the most diverse fauna. Although water mites, an indicator of a good aquatic environment, were found at all three sites, the greatest number was found at Site 2. Also although ciliphores were recorded today only from Site 3, these are difficult to spot and may have occurred at the other sites.

Survey 13
21st August 2021 (12th dose of Byofix to be disbursed on 22nd August)

No	Site	Species	No	Notes
1.	West bank under Library bridge	pond snail (small) copepod water mite (diff sizes) mayfly nymph + test water boatman nauplius fish louse fish (2 - 5cm TL) ? sticklebacks	4 >15 8 1 1 1 7	Some green BW but more brown material *?Melosira*
2	East bank- north of Railway bridge	biting midge larva leech pond snail water mite copepod branchiopod ?*Daphnia* freshwater shrimp *Crangonyx* water louse mayfly nymph fish louse	4 1 2 >5 >5 2 1 4 3 1	BW on bottom. Water starwort visible under railway arch. *Melosira* on edge of stream. Duckweed on surface in patches. Dead bird (? pigeon)in stream
3.	Boat Lift	pond snail (diff sizes) water mite (diff sizes) copepod branchiopod ?*Daphnia* freshwater shrimp *Gammarus* mayfly nymph lesser water boatman *Corixa sp* water beetle fish louse (small) fish (3TL) ?juvenile stickleback	5 > 20 >20 10 3 >15 2 1 1 2	Very little BW on surface or below weir. Spherical small green alga (? *Eudorina*) seen under microscope.

Site 1 Increase in faunal diversity due to more invertebrates.

Site 2 Diversity similar to that found on 7th August.

Site 3 Increase in faunal diversity again due to more invertebrates.

Blanket weed was still present but was not so dominant in the sample. As noted previously the Byofix is suppressing the blanket weed, helped by the recent cold & wet weather. All three sites had good faunal diversity with Sites 1 & 3 showing an increase compared to two weeks ago due to more invertebrates being sampled. Site 2, near the railway bridge, in the past has supported the most diverse fauna with the greater number of water mites, an indicator of a good aquatic environment. However, today more mites were found a Site 3, the boat lift. It's possible the dead bird at site 2 has affected the habitat there. As noted previously ciliphores are difficult to spot and may have been present but not recorded. Apart from ciliphores there are evidently other species present that can only be seen with a microscope such as the small green alga *?Eudorina* sampled at Site 3.

That the waterway is providing a suitable environment for the growth and development of aquatic fauna can be assumed from the presence of larval forms and different sizes of particular species.

Survey 14

4th September 2021 (13th[th] dose of Byofix to be disbursed on 5th September)

No	Site	Species	No	Notes
1.	West bank under Library bridge	biting midge larva leech flatworm pond snail copepod branchiopods (large) freshwater shrimp *Crangonyx* water louse water beetle larva *(?Agabus*) water mite mayfly nymph (small) China mark moth larvae fish louse	3 1 1 >20 >20 2 5 2 1 2 2 2 1	Growth from the bottom covered in *Melosira*, is breaking the surface in small patches. BW in water column plus water starwort
2	East bank-north of Railway bridge	biting midge larva leech pond snail (diff sizes) ramshorn snail (small) copepod branchiopod ?*Daphnia* water louse water mite mayfly nymph(small) water beetle fish louse	5 3 4 1 >10 >20 4 >10 1 1 3	Water starwort visible under railway arch. *Melosira* on edge of stream. Some scattered duckweed.
3.	Boat Lift	biting midge larva pond snail (diff sizes) copepod branchiopod ?*Daphnia* mayfly nymph lesser water boatman(diff sizes) *Corixa sp* water boatman larva/nauplius water beetle water beetle larva	2 14 > 5 >50 6 6 3 1 1	Very little BW on surface. Some patches below weir.

Site 1 Increase in faunal diversity at this site continued. The China Mark Moth caterpillar larvae were only identified under the microscope (where they were eating strands of blanket weed!).

Site 2 Diversity similar to that found previously.

Site 3 Diversity similar to that found previously.

As recorded on 21st August, blanket weed was still present but not so dominant in the sample. As August has been un-seasonally cold and wet, this has helped the Byofix suppress growth. Site 1, at the Library Bridge, showed the biggest increase in diversity on 4th September. Interestingly no small fish were sampled at any site and the numbers of water mites found were also less than previously.

As has been noted previously some species have only been detected by viewing samples under the microscope e.g. China Mark Moth caterpillars at Site 1 (see above). The use of a microscope has not been done routinely so it is likely the actual number of species at these sites is greater than given here. However as said earlier the waterway is providing a suitable environment for the growth and development of aquatic fauna from the presence of larval forms and different sizes of particular species.

Survey 15

18th September 2021. After weed-raking from 13th to 15th September

No	Site	Species	No	Notes
1.	West bank under Library bridge	pond snail (rounded with 1 pointed) branchiopods water mite water spider fish louse	9 7 4 1 1	Bottom very silty. *Elodea nuttallii* and water starwort visible on bottom. No flora in sample, just silt.
2	East bank-north of Railway bridge	biting midge larva pond snail (diff sizes) ramshorn snail (small) branchiopod ?*Daphnia* water louse water mite mayfly nymph(small) bloodworm	3 7 1 50 6 6 2 4	*E. nuttallii* and blanket weed sampled. Water starwort still growing under railway arch, fools watercress growing from the bank. Lemna weed on the surface
3.	Boat Lift	biting midge larva flatworm leech pond snail (mostly very small) ramshorn snail branchiopod ?*Daphnia* freshwater shrimp *Crangonyx sp* water louse mayfly nymph(very small) lesser water boatman *Corixa sp* damselfly nymph	3 1 2 >40 3 >15 2 1 3 3 1	Due to weed cutting water surface clear. Sample included *E. nuttallii*, blanket weed and a few strands of water starwort. Lemna weed on surface. No water mites recorded although many were present attached to weed raked on 15th September from deeper water (see table below).

Apart from the weeds, the diatom *Melosira* was found at all three sites, especially visible on hard surfaces near the bank.

Site 1 Marked decrease in faunal diversity probably due to weed removal to which organisms are attached.

Site 2 Diversity reduced though less than at Site 1.

Site 3 Diversity comparable to the survey on 4th September, with the welcome record of a damselfly nymph. This site showed little impact due to the raking probably because the boat lift site was too shallow for the weed cutter machine to operate in so the flora there has probably not been so affected.

It is estimated that raking by the "weed cutter" machine has removed 30-35 tons of weed from the waterway. This was to improve conditions for the canoe cavalcade on 25th September. As many aquatic organisms are attached to the weed it means these have mostly been lost and this is largely reflected in the reduced biodiversity. The numbers and species types recorded from a few strands of weed (*E. nuttallii* & blanket weed – see table below) give an idea of what the removal of 30-35 tons will have done. Photos (*upper*) show the weed on the rake from which the few strands were taken; and (*lower*) weed being deposited on the bank. Suggest in future the operator arranges for more weed to trail into the water to allow fauna to escape.

Aquatic life recorded from small weed sample taken from the rake in Green Lane Pool on 15th September

Species	Number	Remarks
biting midge larva	3	Weed a mixture of *E.nuttallii* and blanket weed. A few sticklebacks seen on the rake but were not in the sample.
leech	3	
pond snail (different sizes)	>15	
ramshorn snail(small)	2	
branchiopod *?Daphnia*	<100	
copepod(few with eggs)	<10	
freshwater shrimp *Crangonyx sp*	3	
water louse	>5	
water mite	>50	
mayfly nymph(very small)	10	

N.B It seems that the main pond weed found throughout the survey area is *Elodea nuttallii* but there is some differentiation depending on area. The following may be amended following the report from Weed Cutters.

The operator suggested that the reduction in blanket weed due to Byofix has allowed the weeds to grow more because of more sunlight getting through.

a) From just before the diffluence on Town Moor to the A4 bridge: *E nuttallii* and water starwort but more blanket weed than in the next few sections.
b) From the A4 bridge to Crown Lane steps: mostly *E nuttallii* and water starwort.
c) From Crown Lane steps (car park exit) to Chapel Arches bridge: not much weed, almost certainly because the concrete bottom does not provide a suitable substrate for plants to grow. It will be interesting to find out whether any blanket weed was found here.
d) From the A4 bridge to the railway bridge: mostly *E nuttallii* (probably because it was growing higher than the water starwort that tended to be closer to the bottom). Visual inspection when looking for supermarket trolleys next to the car park supports the dominance of *Elodea*.
e) From the railway bridge to the weir: mostly *E nuttallii* and blanket weed. Probably blanket weed entering from Moor Cut has encouraged the growth of the latter in this area despite the Byofix dosage.

Survey 16

16th October 2021. Final survey approximately a month after the weed-raking.

No	Site	Species	No	Notes
1.	West bank under Library bridge	*Tubifex* worm pond snail (Wandering Snail) branchiopods freshwater shrimp (*Gammarus* 2: *Crangonyx* 1) water louse water mite fish louse	5 10 >20 3 2 > 40 2	Blanket weed in sample. Water starwort on bottom. Some parts of substrate visible.
2	East bank- north of Railway bridge	leech biting midge larva Pond snails (mostly wandering snail -diff sizes) branchiopods water louse freshwater shrimp water mite mayfly nymph(small) water beetle fish louse	2 2 >10 >50 10 5 >100 >20 1 3	Oily scum on water surface. *E. nuttallii* and blanket weed sampled. Water starwort still growing under railway arch, fools watercress growing from the bank. Some months ago this site, or one nearby, apparently suffered from oil pollution which affected the swans.
3.	Boat Lift	leech(one parasitic) wandering snail (some very small) ramshorn snail branchiopod freshwater shrimp *Gammarus sp* water louse mayfly nymph(very small)	2 >20 1 >100 1 4 >40	Blanket weed in water plus *E. nuttallii*,. Water starwort on bottom especially below weir. Water clear.

Site 1 This site was most affected by the weed raking but seems to have recovered slightly increasing its faunal diversity.

Site 2 Faunal diversity has also increased at this site since the weed raking.

Site 3 Diversity at this site has decreased but numbers, especially of branchiopods and mayfly nymphs, have increased.

It appears that faunal diversity in the site, most affected by the removal of weed, the Library Bridge, has been able to recover.

The regular presence of the fish louse *Argulus sp* and occasional sampling of the parasitic leech *Piscicola geometra* (Site 1 26/6/21: Site 3 16/10/21) indicate the presence of fish in the waterway,attracting herons and cormorants and evidently fishermen. Photos of a roach taken from the waterway (and returned) featured in a post on Maidenhead Past & Present Facebook Group on 24th October 2021.

[1] See Flood T, 15/10/2021 *Summary Report - Investigating the use of BioFix to control plant growth* pp21-24.
[2] See report of joint survey Darracott A, *Biota Survey of Waterway 2021* April 2021.