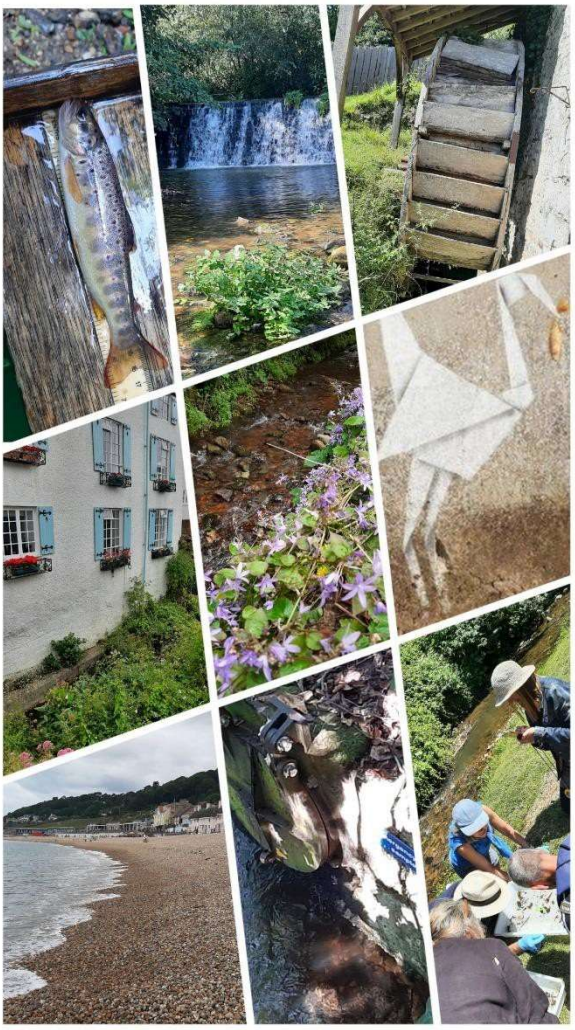
CATCHMENT STUDY OF THE RIVER LIM LYME REGIS

Spring/Summer 2023

Discussion Document & Action Points



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For and on behalf of River Lim Action Group and funded by Lyme Regis Town Council

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Objective assessment

Taking the results from the Catchment Study of the River Lim, Lyme Regis (Stubbing 2023) we can apply assessment to inform management of the river. Firstly, we can see a summary of the results. The main discussion following this is broken down into topics. The detail here is important in terms firstly the problems faced and then secondly the resolutions to take forward.

Summary of these concepts are noted and displayed conceptually. Then, finally a list of actions is provided to aid strategic delivery.

Study summary

Below is a summary of the River Lim study (Stubbing 2023).

Geology

The geology principally shows that there is Greensand deep down and, also near the surface around the edge of the catchment, this holds water and produces springs. Lias is in the middle of the catchment on the surface and has poor permeability and fissures, it does not hold water well and effectively leaks water into lower ground strata. This might supplement springs within other areas in the catchment.

Abstraction

There is a widespread history of abstractions that are mostly small but currently there appear to be no major abstractions.

Land-use

The land-use in the catchments is mostly grassland and woodland. Some woodland is forestry and there are a few arable fields. The grassland is of mixed use, some has been improved and there are some small cattle farms with silage pits. There is a small landfill site.

Sewage and drainage network

The sewage works is between Lyme Regis and Uplyme, and a main storage tank is at the bottom of the town, from which sewage is pumped up to the works. Untreated sewage has been entering the river at various points in recent years (not all of them permitted discharges). Some improvements have happened in the last two years. There are six Combined Sewer Overflows that discharge sewage when the system is overloaded by excessive rainwater.

Mills and weirs

There are many old mills in the area. The weirs associated with them are, in certain places, a barrier to fish migration. One has had a fish pass put on it, two more still form a barrier to fish passage.

Water quality

Water quality data shows that general nutrient values don't appear excessive, but some spikes do occur. *E. coli* data, some from human sources, does however show spikes – some very large at times. Levels are being recorded as unsafe much of the time.

Habitats

Habitats in the tributaries are generally good, with rough woody and hedge edges. Also, there is rough grassland but with some overgrazed patches. Below Uplyme there is wooded fringe channel, but it lacks instream debris. Macrophytes are notably absent from most of the catchment. There is just one patch of instream weed in the section between the Old Mill and Middle Mill. Within the town and to the top of Windsor Terrace, the channel sides are walled or concrete channeled and the riverbed is mostly natural. There is seasonal emergent vegetation in spring and summer along some sections.

Himalayan balsam is widespread throughout the catchment particularly in the upper reaches and there are dense patches of Japanese knotweed at least at four sites.

Macro-invertebrates

The macro invertebrate populations are reasonable but there was variation in numbers and diversity. There is not an index for the scores yet, but this will be forthcoming with a National based Riverfly score. This will be based on eight species currently being recorded by volunteers monthly at seven different sites.

Fish

The fish population is small and not very diverse. It has trout and smaller species, such as bullheads and minnows. Eels were observed, however, the loach that previously existed were not apparent in this survey. Otters were present as were non- native Signal crayfish.

Discussion

Issues affecting the ecosystem

From the results we can understand the ecology. If we look at the background, we can understand how some of the activities in the catchment influence ecology and water quality it hinges on. Below are details of some of the influences.

Groundwater and its use

It can be seen from the geology that the good water-bearing Greensand is near the surface only at the edges of the catchment. Otherwise, it is deep down. Lias is, therefore, the main bedrock around the catchment and this has poor water resource capacity.

It can be seen that over the past years many boreholes have been licensed. Most are shallow at 10 m and would produce minimal water from Lias. One was at 100 m and another 50 m, presumably designed to go through to the Greensand deep under the Lias. Of course, many if not most are dysfunctional. It can be seen from 1995 records of abstraction that there is little of any consequence.

This is very important, as the river and its tributaries with springs (from catchment edge Greensand) at the top, dries out in the lower part of some tributaries (Figure 1). This must be a natural occurrence due to the dry Lias letting water straight through, which has been associated with fissures, and can be seen going underground in places. Water reoccurs lower downstream as the cumulative mass of water is rebuilt.

Figure 1 Dry tributary, Carswell

It is interesting that these sites had good macro-invertebrate populations in the late spring. The repopulation will mostly come from the spring-fed upper river where they drift down from.

The trout population would seem low and the lack of year-round nursery streams (which you would normally find with alluvial streams) probably limits this population.

Sewage effluent

Treated waste water from the Sewage Treatment Works is discharged by a pipe into the sea by the Cardinal Buoy. Six Combined Sewer Overflows (CSOs) are legally permitted to discharge combined sewage and rain water into the river at times of high rainfall (Figure 2). One of these CSOs is at the mouth of the river by Gun Cliff Pumping station. An additional CSO discharges directly into the sea from the Cobb Pumping station.

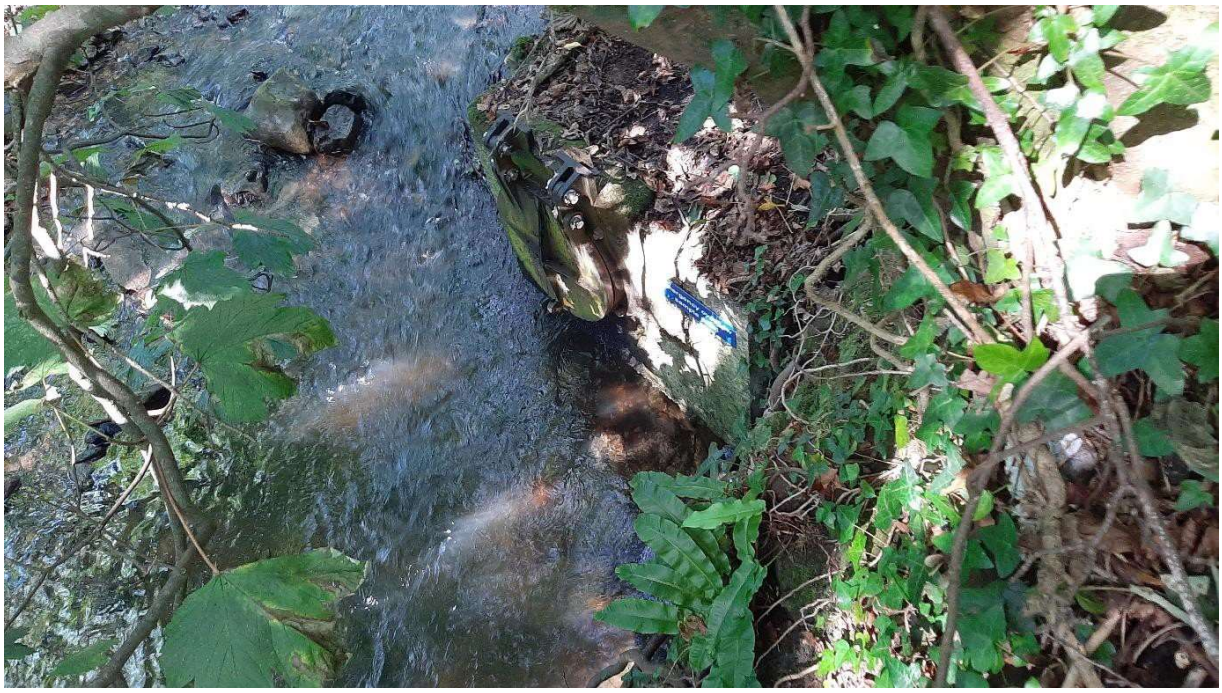
These CSOs are known to have been discharging when there has been little or no recent rainfall. It is mainly thought to occur when the Sewage Treatment Works (designed for up to 16,000 people) has insufficient capacity to treat the effluent of up to 40,000 during the tourist season. Repeated failures at Horn Bridge Pumping station are also responsible (Figure 4).

Some Storm Water Outfalls (SWO) designed for surface water only, also discharge sewage into the river and the sea (Figure 3). Broken sewage pipes and misconnections are responsible. Some improvements have been made.

Figure 2 Sewage works CSO

Figure 3 Rain Drain (SWO)

Figure 4 Pumping station CSO



Norovirus has been a problem to shellfish in other harbours in Dorset and is not effectively treated by UV. It has been an issue since Covid19 due to a lack of imported chemicals to treat it, although it may not be an issue in Lyme Regis which lacks a major hospital. It may not necessarily be an issue here for SWW water, but the 'know how' is there to prevent it entering natural water bodies.

River records of *E. coli* are high in the data from recent years. This would be one signatory factor of untreated sewage. Species were recorded for human, bovine and avian. Treated waste should not have *E. coli* as the treatment site is fitted with UV filtration.

E. coli can also survive in biofilm for some time and can spread through the water course without being in solution and so being picked up by monitored water quality sampling. It impacts ecology (the natural bacteria complex included) and humans. Riverine mammals can ingest it with water.

There are at times high levels of phosphate in data which would also be a signatory factor. The untreated waste would cause phosphate. It causes excessive algal blooms and associated problems. Currently, levels of algae are seen in the town river.

Data from the sea have shown some similar problems. This is due to the direct untreated releases from CSOs and the main town storage tank in particular. This is partly related to high volumes due to Summer population increase in town, but also likely storm rainwater influx. A broken pump has prevented some correct removal to sewage works.

Cesspits around the catchment can cause issues if not maintained correctly. There may be a problem from the odd one, but it may not directly reach the river and is unlikely to be a widespread issue.

It is interesting that the sites had good macro-invertebrate populations in the late Spring. The impact of flush-throughs of sewage would be short term, with repopulation coming from the river upstream. This could really cause problems in a Summer with high temperatures when deoxygenation would happen with low flows. Fish would also be affected if this were bad. Trout would have limited repopulation abilities due to restricted habitat access and a low population.

Diffuse pollution

Forestry forms a large portion of sub-catchments North and East. These can be an issue during felling operations although nothing significant was noted in the walkover looking for muddy water.

Livestock farming is common in the rest of the upland areas. Two farms did show slight runoff during rain but nothing that would cause major concern at the time. Carswell tributary was very slightly coloured downstream and was probably due to yard and manure-heap seepage. Cannington tributary was a similar situation with slight coloration in the stream and yards involved, here the road seemed to be part conduit to runoff (Figure 5).

Figure 5 Track with manure

Again, if there were a problem for aquatic life it would likely be in Summer, but the input levels seen should be manageable.

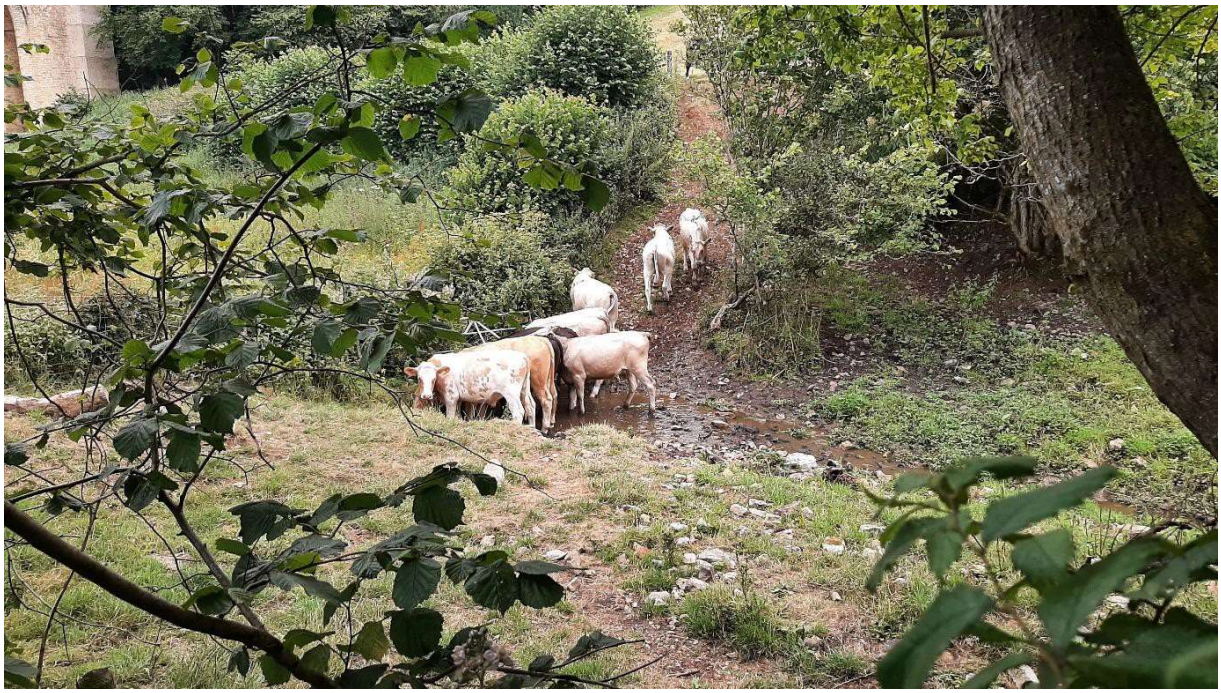
A waste pit exists to the West in the sub-catchment, but it is only rubble (Figure 6). This may have a negative impact on the ground-life around the wooded area involved. In terms of the river, the main issue is to ensure that powdered cement and plaster are not deposited here. It certainly could wash into the river and settle in gravels, where it can directly affect fish gills, fish eggs and invertebrate's eggs

Figure 6 Landfill

Damaged habitats

The main areas with notably overgrazed habitat were a little way down from the viaduct (Figure 7). This area could benefit from some protection, such as fencing, but still allowing drinking points. Further down where the next stream joins from the West there is short grass but fencing could enable bankside reed growth.

Figure 7 Cattle poaching banks of river



In the Uplyme Recreation Field a slight fringe along the bank edge would help establish vegetation and slow erosion. Downriver from Uplyme and just above Mill Lane there is a lot of dense laurels growing along the river edge and little else. The riverbed is in an acceptable state here, but if the

shrub growth was cut was cut back and opened up in patches along the river, more light would encourage marginal habitats to establish.

The big factor below here is in Lyme Regis town where there is concrete and walled channelisation. Plants have done well to colonize the area, but they die back leaving the river barren in Winter.

Fish numbers in these barren areas are low, with lack of habitats providing cover. Also, as it is barren, the macro-invertebrate populations would be lower in total, and so less able to support fish and bird life.

Instream weed seems to be lacking generally and may always have been so due to the shaded and dry nature of the river. Lack of weed and woody debris below Uplyme would explain the lower fish numbers (lack of cover and food organisms). Fortunately, there is one patch of *Ranunculus* next to Middle Mill, which presents a great opportunity for spreading and recolonization.

Alien species

Himalayan balsam (Figure 8, Figure 9) was found throughout the catchments and sub-catchments, with the exception of the middle and upper Rhodes tributary. Some patches were dense and extensive beyond the river. These areas are impacting natural vegetation and spreading seeds annually which will continue to colonise the whole catchment area.

Japanese knotweed was found in at least four locations and mainly around the Middle Mill and Bumpy Field in great quantity. Efforts are being made to kill it off. A small area downstream of the viaduct should be removed as soon as possible to prevent spreading into the scrub areas here. Native plant species would only be locally impacted by this species in the actual vicinity.

Non-native Signal crayfish are regularly being found throughout much of the catchment. They are also up at the lakes area in the Yawl tributary (Figure 10). This will mean the native crayfish are unlikely to exist in the river catchment, although there is always a small chance of an isolated population.

Figure 8 Himalayan Balsam

Figure 9 Himalayan balsam white seeds

Figure 10 Signal crayfish

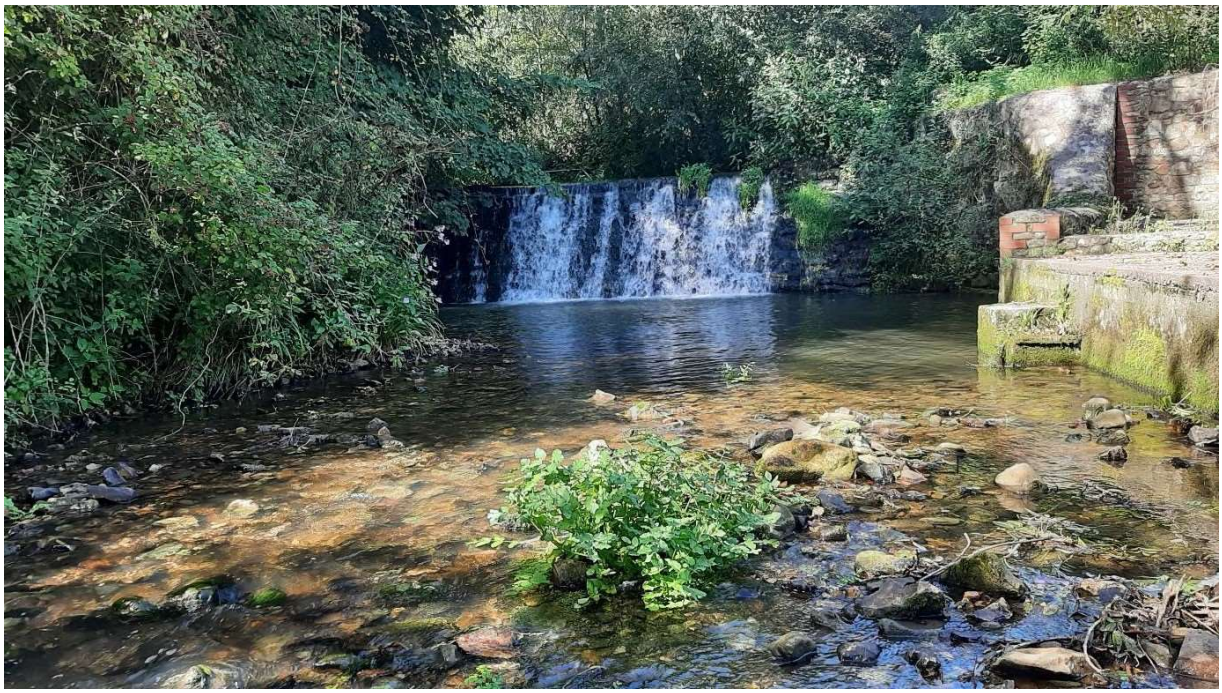
Migration barriers

Due to the history of mills on the river there are various weirs to impound the water, which cause barriers to migrating fish. The significant weirs are now only really in three places (Figure 11- Figure 13). There is a fish pass on a weir (Figure 12) but a board makes the lower chamber relatively shallow. There are no eel passes on the weirs.

Figure 11 Lower barrier by Banksy artwork (Gosling Bridge)

Figure 12 Fish pass weir

Figure 13 Middle Mill weir barrier



The brown trout should have genetics that could provide the basis for sea trout in the future. Small fish species will not be able to pass upstream, which should not be an issue for spawning, indeed eggs were found locally of small fish species. Although stone loach were not found, this could have been affected by pollution and lack of repopulation.

The trout population as a whole would appear low and the lack of sea trout egg deposition may contribute to this. Also, the lack of good access to the river above Middle Mill would be a cause for some limits on productive habitat availability, along with the lack of instream cover and drying up sections of river.

Potential resolutions to conflicting influences

If we look at the conflicting influences, we can understand how some of the activities in the catchment can be adjusted to protect and improve ecology and water quality.

Groundwater

The river would seem to be dry in parts of the catchment for natural geological reasons. Despite there being abstractions in the area there would appear to be no major abstractions in operation. The river is dry in places that are mostly mid-catchment. Springs run at the top and the water disappears but builds up again in Uplyme.

It is important to discuss dry rivers as this place's emphasis on the protection of habitats and water in the upper tributaries. These spring areas are obviously what repopulates the dry reaches with fly life in Autumn/Winter. In the Spring there is good fly life and this downstream drift from fully wetted tributaries will also be important to repopulating any population crashes in fly life on the lower river after pollution incidents.

In fish terms, there is unlikely to be any migration cycles of trout if there is annual severance of flow

and only very low flows around springs. Trout spawning is, therefore, limited which weakens the population's tolerance to other impacts. Small species, such as bullhead could probably sustain themselves in the spring waters.

Sewage effluent

The main sewage works needs to be provided with nitrogen and phosphate strippers to ensure the River Lim catchment does not increase the eutrophication of Lyme Bay. There is UV sterilisation, but this does require upkeep as bulbs need regular replacement. UV sterilisation should be used all year round, not just in the tourist season. Correct treatments for Nora virus should be used as required to ensure clean water into Lyme Bay.

The main tank for storage should be kept at a level that enables storm water to be captured without overloading incoming pipes or the tank itself. This will mean higher input to the sewage works, especially in a wet Summer. It is said that the tank is able to cope with current loading, but if the sewage works needs enlarging to achieve treatment of full load, then that should be done.

If storm overflow pipes still overload, then a programme of rainwater separation from foul water will need to be completed on a priority basis. Whether these overflows are within consented limits or not at times of discharge is unknown. This is in terms of volumes and water quality parameters. However, rather than investing in trying to prove compliance it would be prudent to eliminate the problem as recommended, considering it would be possible. And staying within consent is unlikely without investment and, ultimately, costly.

If the sewage works is not enlarged as required, then rainwater separation should be pushed through to reduce volume going to works. This could be done by using pipe network maps and on-the-ground observation. Potentially, this could be forwarded by locals who could help direct works. Large volume rain drains could be prioritised. However, there is always the issue of where water goes, and soakaways are sometimes an option if there are no other pipes.

Seafront improvements are underway and must be completed. Storm drains below the town council depot should be surveyed and rectified, if not complete yet.

Diffuse pollution

There are possibilities for fencing some upland riverbanks that would create good habitat and also reduce poaching and the direct inputs of faeces and sediments. There are a few areas where there is considerable cattle access, such as on the Cannington tributary. Drinking points still would need to be left.

Other farm issues may be blocked drains increasing road and yard wash off. There is good guttering on the whole, so water separation from manure is occurring. This water could be used for cattle water, if it is not already, thereby reducing mains water costs to the farms. If and where there is seepage from pits, they can be repaired and a reed bed area could be established before entering the water course. Further bunding or repairs of pits should be done.

Forestry should continue to avoid rutting and tracks across slopes. As conifer plantations get felled replanting a mix with deciduous trees would be best.

In terms of the landfill sites near the river, the main issue is to ensure powdered cement and plaster is not deposited, so it cannot wash into the river. Also, no other chemical treated rubble should be allowed. Building sites should conform to EA guidance.

Damaged habitats

As stated for diffuse pollution, the river being fenced off would form better marginal habitat.

Areas of heavy shading, such as the laurel area (which is evergreen), would benefit from being sky lighted along the river, which would enable better marginal habitats to establish.

The concrete and walled area is the sort of area where some brushwood bundles might help with marginal plants, but there are naturally shallow areas that offer marginal growth. However, this does die back in winter. There are more realistic opportunities though the lower reaches to hinge and lower some downstream directed branches into the river to increase year-round instream habitats. Woody debris is a good winter cover for fish.

Spreading the *Ranunculus* to new areas that have good light will offer great opportunity. This weed can be cut as lengths and then wrapped around stones and buried in the gravel. Areas with good water flow that are protected from grazing are preferable. Bat boxes are advised in trees where there is good flight access and minimal human disturbance. Many current bat boxes are in various stages of serious decay

Alien species

There is potential for control, but this would need to be organised working from upstream to downstream. For Himalayan balsam, however, tackling large swards is currently a massive and costly task. Securing "HB-free zones" – relatively unaffected sub-catchments areas – would help contain the problem and be low cost. Cleared zones can be secured by long-term monitoring and some signage and/or written agreements. The Lim sub-catchment to the East would be a first choice as it is seemingly clear already. In chosen sub-catchments of the Lim this could initially be done by deciding with all concerned to have Himalayan balsam-free zones. Initially this would need to be focused on upstream reaches. Added to this, small areas of Himalayan balsam present could be targeted for eradication using standard and new techniques.

One new technique involves focusing removals to when the plant is at a stage of having white seeds (Figure 9), (not fertile) which is in the first 2 weeks of August when the plant is fairly spent. This is then repeated 3 weeks later. In early years, slashing is warranted, as it is quicker and less demoralizing. Then for later years hand pulling is acceptable. Subsequently, clear zones can be secured by long-term monitoring and signage.

Removing Japanese Knotweed can be very difficult in most circumstances and it is recommended that help from licensed contractors is sought to irradicate this species from the valley as soon as possible

Education should be provided on trapping and restricting the movement of crayfish. Leaflets and information are available from the EA.

Migration barriers

The main barrier adjacent to the Banksy artwork (Gosling Bridge) and onwards should be made passable to provide the possibility for sea trout migration to occur. A similar stepped pool-to-pool system to that seen upstream might be best but because of existing buildings a bolt-on metal ladder styled pass may have less impact. The barrier upstream probably needs the board removed and depth checked to ensure it is 1.5 times the height of the jump. Eel passes would be important on these dams.

The weir at Middle Mill Farm is large and impassable, although it has a millstream that offers potential for trout to reach the upper river. However, full access under all flow conditions would be important to assure access upstream for trout. Even just having the millstream running and fully

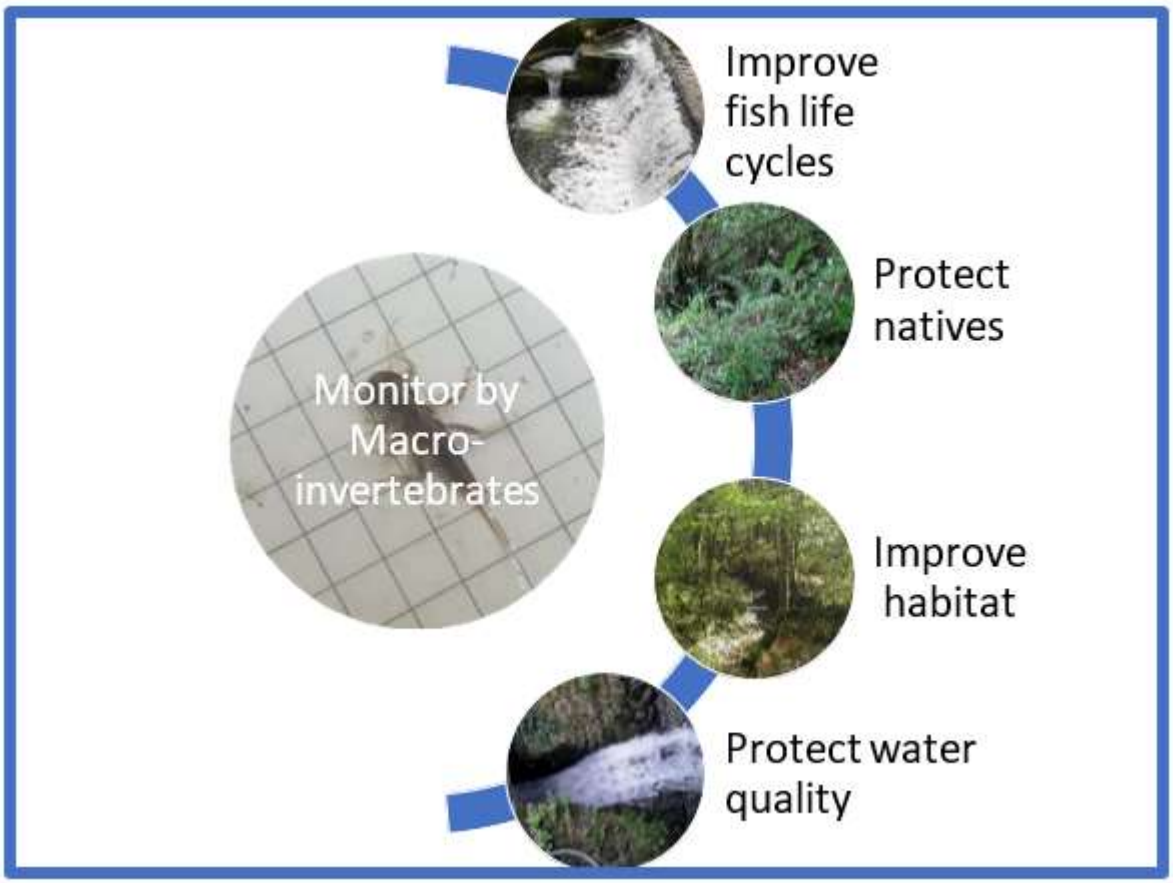
passable when rainfall is heavier in October/November would be beneficial as this is the key time for the final migration push.

Summary

Key points and diagram (Figure 14) of their relationship with each other:

1. The sewage system needs repair, development and to be managed for storm influx. Monitoring of water quality data to continue.
2. Farm improvements in water separation systems and waste containment are necessary. Also, protection of riverbanks by cattle fencing in places. Land-fill sites to be advised.
3. Make the lower barrier to fish and eels passable and ensure Middle Mill stream is passable. Add eel pass on existing fish pass.
4. Start strategic Himalayan balsam control. Eradicate Japanese knotweed. Educate on trapping and restricting movement of crayfish.
5. Hinge tree limbs into barren river. Some laurel canopy thinning.
6. Monitor macro-invertebrates to detect pollution and look for further stone loach.

Figure 14 Summary diagram of focus points



Action list

Sewage effluent

1. The main sewage works needs to be fitted out with nitrogen and phosphate strippers.
2. There is UV sterilisation, but this requires upkeep as bulbs need regular replacement; it should be used all year.
3. The main tank for storage should be kept at a level that enables the storm water to be captured and not overload incoming pipes or the tank itself.
4. The sewage works is said to be able to cope with volume but unlikely with increased tourist numbers over the Summer. If it needs enlarging, then this should be done.
5. If storm overflow pipes still overload, then a programme of rainwater separation from foul water will need to be completed on a priority basis until discharges stay within consent limits. This should be undertaken to take pressure off existing sewage works.
6. Seafront improvement is underway and must be completed.
7. Storm drain below the Town Council depot should be surveyed and rectified. River mouth aerial pipe checked.
8. Monitoring of water quality data should be continued.

Diffuse pollution

1. There are possibilities for fencing riverbanks to create good habitat (an action to benefit damaged habitats), in a few areas where there are cattle, e.g. the Cannington tributary. Drinking spots still need to be left.
2. Other farm issues would be clearing blocked drains to decrease road and yard wash off.
3. Guttering for water separation from dung is important. This water could then be used for cattle water.
4. If and where there is seepage from pits, such as at Carswell, a reedbed area could be established pre entering the water course.
5. Further bunding or repairs of pits should be done.
6. In terms of the landfill near the river, the main issue is to ensure powdered cement and plaster or other chemically treated rubble is not put down.
7. Building sites should conform to EA guidance.

Damaged habitats

1. Areas of heavy shading, such as for laurel area (which is evergreen) can be sky lighted along the river.
2. In the channelised lengths of river, some brushwood bundles might help with marginal plants.
3. Spreading the *Ranunculus* around to new areas.
4. Bat boxes in trees with flight access and in undisturbed areas.

Alien species

1. There is potential for control, but this would need to be organised working from upstream to downstream, securing as, “HB-free zones” – relatively unaffected sub-catchment areas. The Lim sub-catchment to the East would be a first choice as seemingly clear already.
2. Added to this, small areas of Himalayan balsam present could be targeted for eradication using one new technique that involves focusing removals to when the plant is at a stage of having white seeds (not fertile), which is the first 2 weeks of August; following this the plant is spent. This is then repeated 3 weeks later. In early years slashing is warranted, then later

years hand pulling is acceptable

3. Cleared zones will be secured by long-term monitoring and some signage and/or written agreements
4. Educate on trapping and restricting movement of crayfish

Migration barriers

1. The main barrier adjacent to the Banksy artwork (Gosling Bridge) should be made passable. An eel pass would be important here
2. The barrier upstream probably needs the board removed and depth checked to ensure it is 1.5 times the height of the jump. Also, an eel pass could be added
3. The weir at Middle Mill Farm has a millstream that offers potential for a bypass channel for trout to reach the upper river. However, the full access under all flow conditions would be important to assure access upstream for trout.
4. Establish the presence of stone loach.

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