

Trumpington Meadows

River Cam Invertebrate Sampling

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Photo by Sian Williams

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1. Summary

Freshwater invertebrate sampling is being undertaken (2009 to present) following river enhancement work on the River Cam, south of Trumpington. The aim is to compare invertebrate communities in a natural riffle with invertebrate communities in a man-made shoal, and monitor changes over time.

Thirteen pairs of samples have been taken so far. Early results showed that the natural riffle appeared to be more diverse and contain a few more species indicative of good water quality which did not occur in the new site; however, overall the two sites are becoming more similar over time.

Diversity and abundance of invertebrate groups at the man-made site both showed an increase over the first few years and have remained fairly stable since. British Monitoring Working Party (BMWP) scores, which indicate water quality, have been increasing slightly for both sites over time.

2. Introduction

In late summer 2009, a stretch of the River Cam south of Trumpington was part of a major habitat enhancement project led by South Cambridgeshire District Council. This area forms part of a country park / nature reserve associated with a major new housing development, now underway at Trumpington Meadows. The country park is managed for nature conservation by the Wildlife Trust.

The work aimed to return a section of the channelized, fairly uniform river to a more “natural” structure. Work to achieve the enhancement included laying gravel to create shoals/shallows, digging backwater ditches, creating flow deflectors, and re-profiling areas of riverbank.



Figure 1 The new riffle at Trumpington Meadows

Upstream of these enhancement works is a section of river with an existing natural riffle area. The aim of this project is to compare the invertebrate fauna of the natural riffle with the new shallow, gravel riffle or shoal areas and to record changes in the invertebrate communities between seasons, and over time as the site develops.

3. Methodology

Invertebrates were surveyed using a kick-sampling method. Long handled pond dipping nets with a 1mm mesh were held upright, touching the bottom of the river, by the person sampling who kicked the substrate upstream of the net for 30 seconds.

For each sample site, several different meso-habitats were identified, and a single kick-sample collected from each.

For the natural riffle (TL42945298), the meso-habitats sampled were:

- Centre of the riffle, with gravel substrate and submerged vegetation, mostly water-crowfoot;
- Riffle / river edge, with overhanging vegetation from the shore;

- Silty, deeper pool area just past main riffle.

For the new site (location TL43125333), the meso-habitats sampled were:

- Centre of the shoal, with gravel substrate and some algal growth;
- River edge, with overhanging vegetation from the shore.

Each sample was emptied into a white tray on the river bank and the contents identified in the field, within a standard time limit (15 minutes per tray). Invertebrates were identified to a major taxon, or to family level if possible. An estimate of abundance (either 1, 2-10 or >10 individuals) was made for each group of organisms identified.

Results from the different meso-habitats were combined to obtain an overall species list / abundance for each site. N.B. Due to these estimates and combining of data, the level of detail / specificity that the results show is limited.

An initial visit was made to the natural riffle site on 14th October, 2009, to do a simple survey of the invertebrates present and to assess the feasibility of ongoing surveys. This has not been included in the results figures because there is no data for comparison from the new site, but results were broadly similar to the later ones for the same site.

The first full survey was undertaken on 9th December, 2009. The river enhancement work had been completed for only a few months, so the gravel used to create the new shoal was still bare. The adjacent habitat was a mix of access track, arable fields with margins, some fields that had been recently re-seeded with native wildflower and grass mixes, and areas of re-profiled river bank.

The second survey was undertaken on 7th June 2010. By this time there was some green algae growth on the gravel in the new site, and the seeded areas on the river banks had established. Another survey was done on 24th November, 2010.

It was decided that from 2011 and onwards, two visits per year will be undertaken at approximately the same times of year, to gather comparable data. In 2011, the two visits occurred on 21st June and 13th Dec. In 2012 the two visits were carried out on 1st August and 12th Dec. Due to high rainfall, the summer sample could not be carried out in June that year. In 2013 the two visits were carried out on 13th June and 5th December. In 2014 the two visits were on 12th June and 11th December. In 2015, the two visits were on 11th June and 9th December.

On all visits, the water was between 0.5-1m deep over the gravel at the new site, and between 20-70 cm at the natural riffle, clear, and visibly flowing.

4. Results

4.1 Invertebrate groups recorded

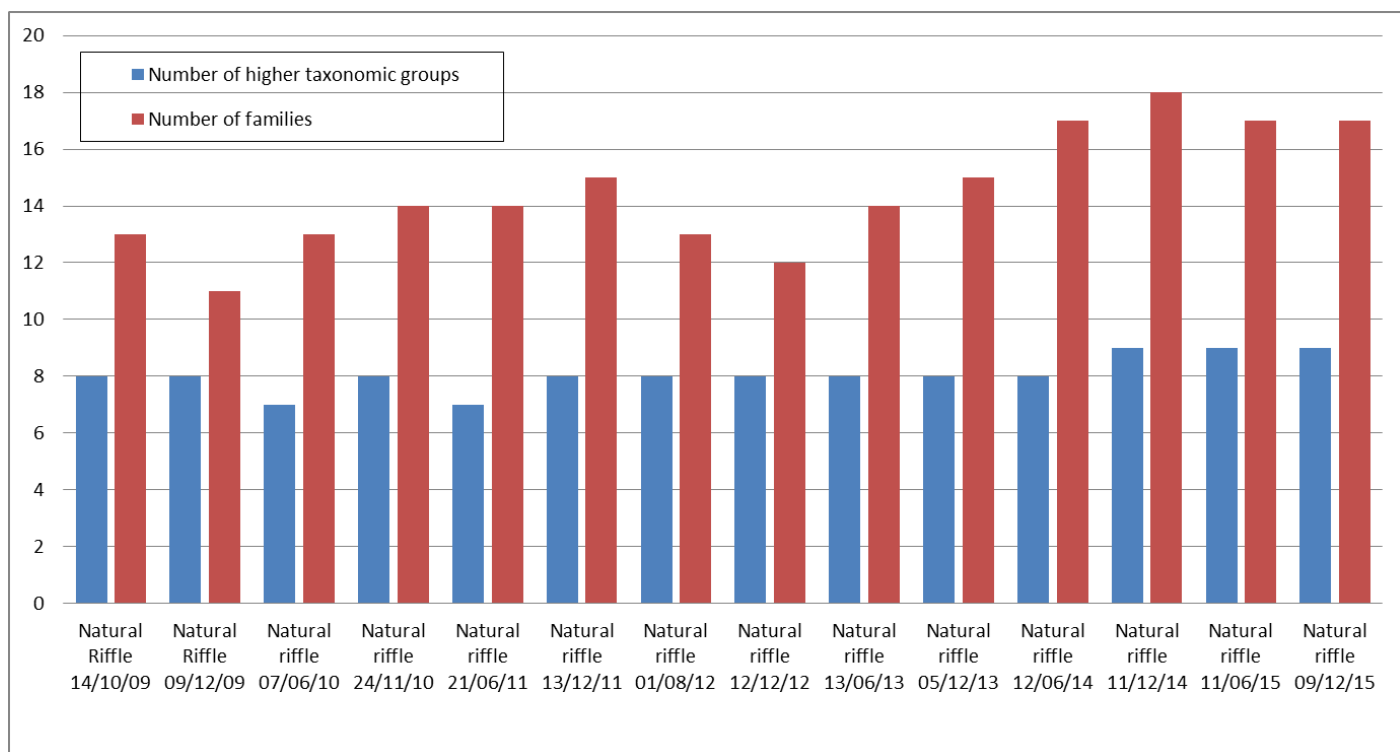


Figure 2 Number of families and number of higher taxonomic groups recorded at natural riffle site

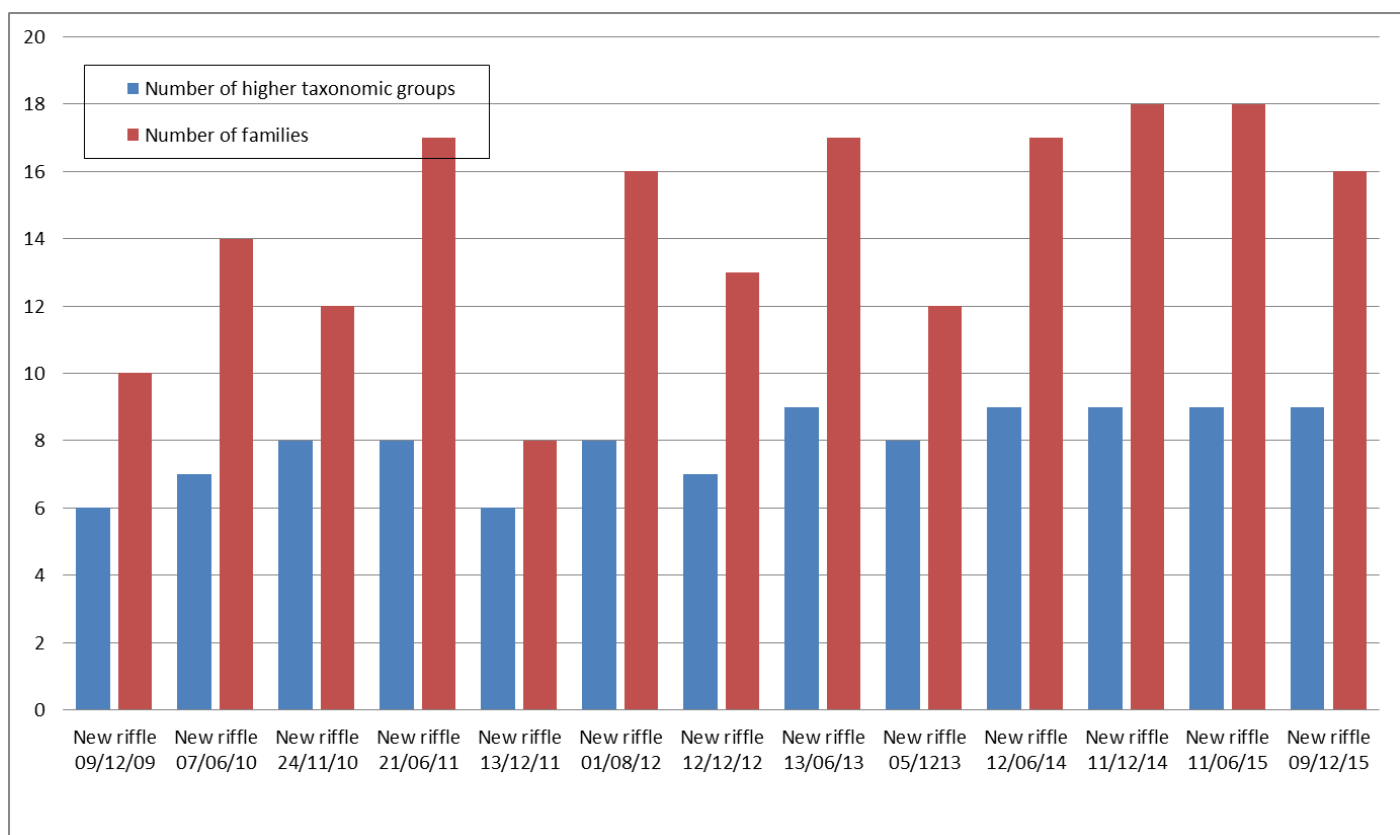


Figure 3 Number of families, and number of higher taxonomic groups recorded at new created riffle site.

The overall composition of invertebrate communities between the two sample sites is very similar. The total number of higher taxonomic groups does not appear to be noticeably different between the two sites and over the survey period. However, the number of families present has slightly increased for both sites over time (Figures 2 and 3).

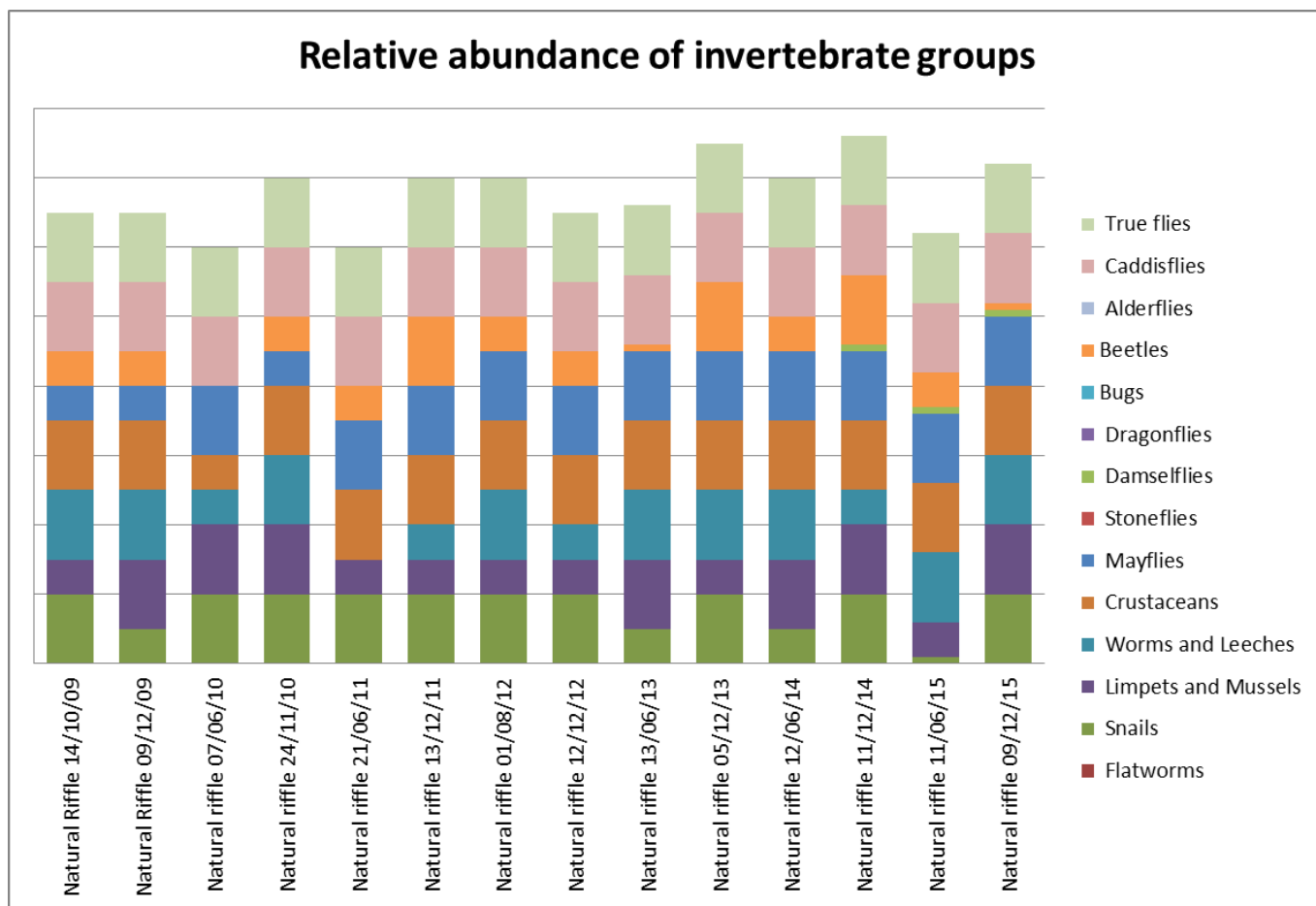


Figure 4 Relative abundance of major taxa comprising the invertebrate communities at the natural riffle site.

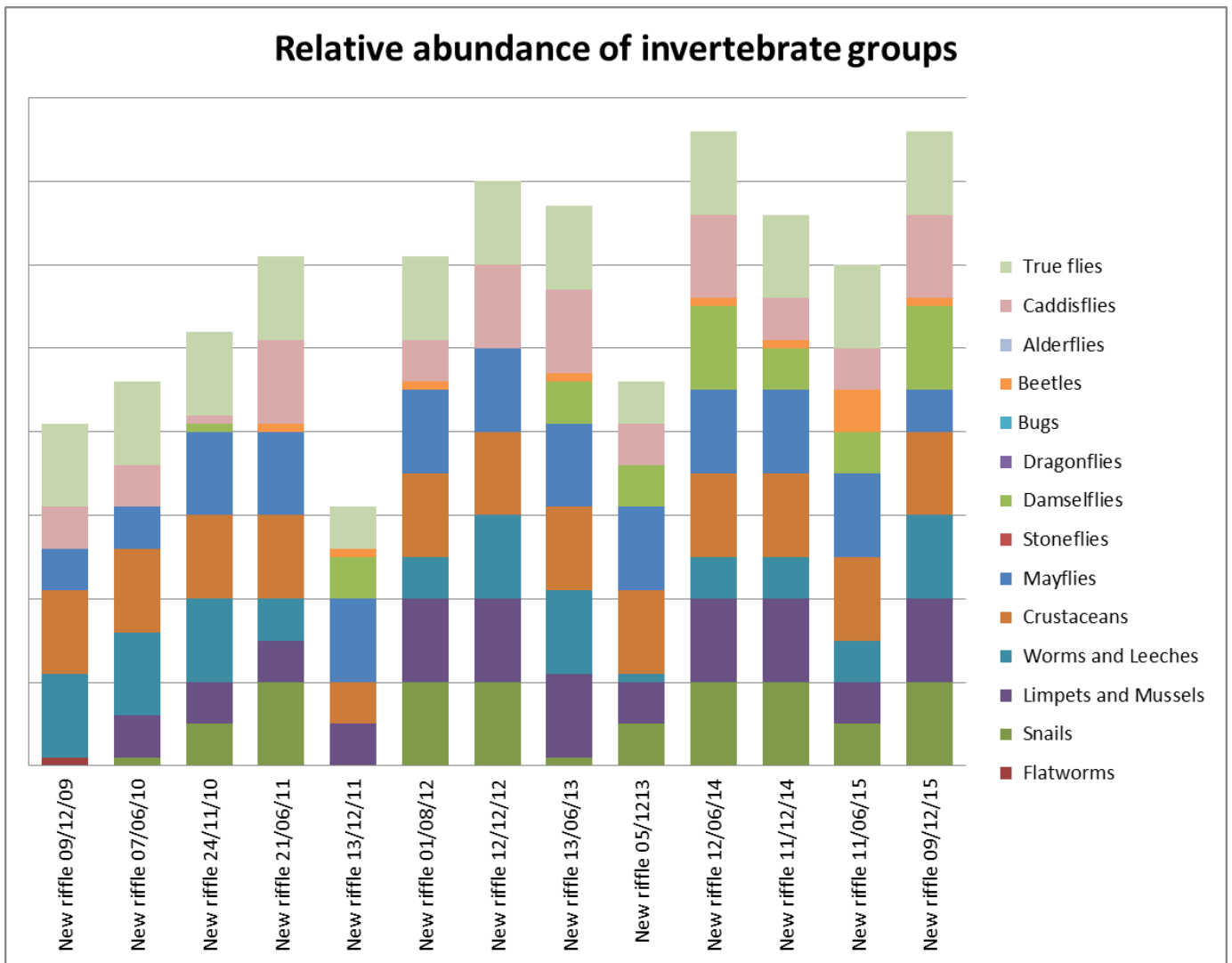


Figure 5 Relative abundance of major taxa comprising the invertebrate communities at the new created riffle site.

The total abundance of invertebrates at the new site is approaching that at the natural riffle, and although there are slight differences in the composition of the invertebrate communities, these are also becoming more similar with time (Figures 4 and 5). In particular, caddisfly diversity is increasing at the new site, and riffle beetles, not found originally at the new site, are beginning to be found there regularly.

Throughout the survey period, the relative abundance of groups at the natural riffle site has been fairly stable. Occasional drops in abundance at the new site (December 2011 and December 2013) were not mirrored by drops in abundance at the natural riffle site, so should not be cause for concern over the health of the river overall.

The two sites are generally very similar. Some groups, such as caddisflies and beetles, are consistently found in greater numbers at the natural riffle site. In 2012 there were more mayfly families (4) found at new riffle than natural (1) despite overall numbers of individuals being similar. Mayflies in the family Ephemeraidae are usually found in higher numbers at the new riffle site, where the natural riffle has generally had a greater range of mayfly families. Some differences in species composition between the two sites may be expected, because the water depth is generally slightly deeper at the new site.

Also notable was the presence of several juvenile signal crayfish at the new site on the 7th June 2010, 21st June, 2011, 13th Dec 2011 and 1st August 2012, 13th June 2013, 12th June 2014 and 11th June 2015. On the 1st August 2012 a mature individual was caught in addition to the juveniles. Signal crayfish were also found at the natural riffle site on the 21st June 2011, 1st August 2012, 13th June 2013, 5th Dec 2013, 12th June 2014 and 11th June 2015. Signal crayfish are an invasive non-native species, found throughout the catchment. Native white-clawed crayfish are present in a few locations in the county, but so far have not been found nearby. On the 13th Dec 2011 there were also some fragments of the invasive plant *Azolla filiculoides* found at both sites, but this plant has not been seen since.

4.2 Monitoring scores

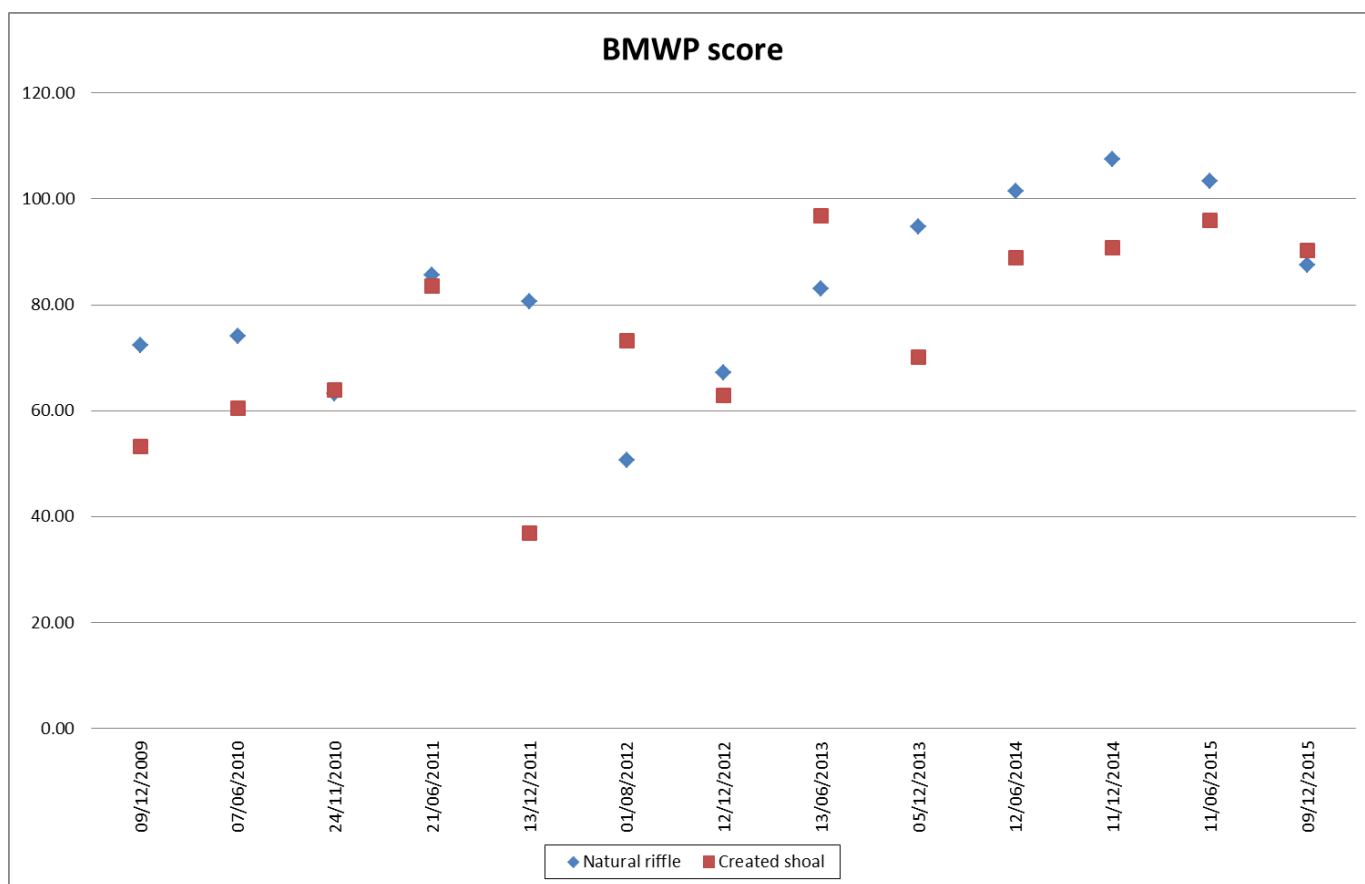


Figure 6 Biological Monitoring Working Party (BMWP) Scores for the natural site and the man-made site.

Taxon data were used to calculate Biological Monitoring Working Party (BMWP) and Average Score Per Taxon (ASPT) scores - using the habitat specific calculator for riffle habitats. BMWP is a measure of water quality, oxygenation and conditions based on the ecological sensitivity of the invertebrates present. A combined score of 25 or less is poor, and 50+ is good.

Water quality as indicated by the BMWP scores is good for both sites and has shown a gradual increasing trend over the survey period (Figure 6). A low BMWP score for the man-made riffle was recorded in December 2011, but this has since recovered.

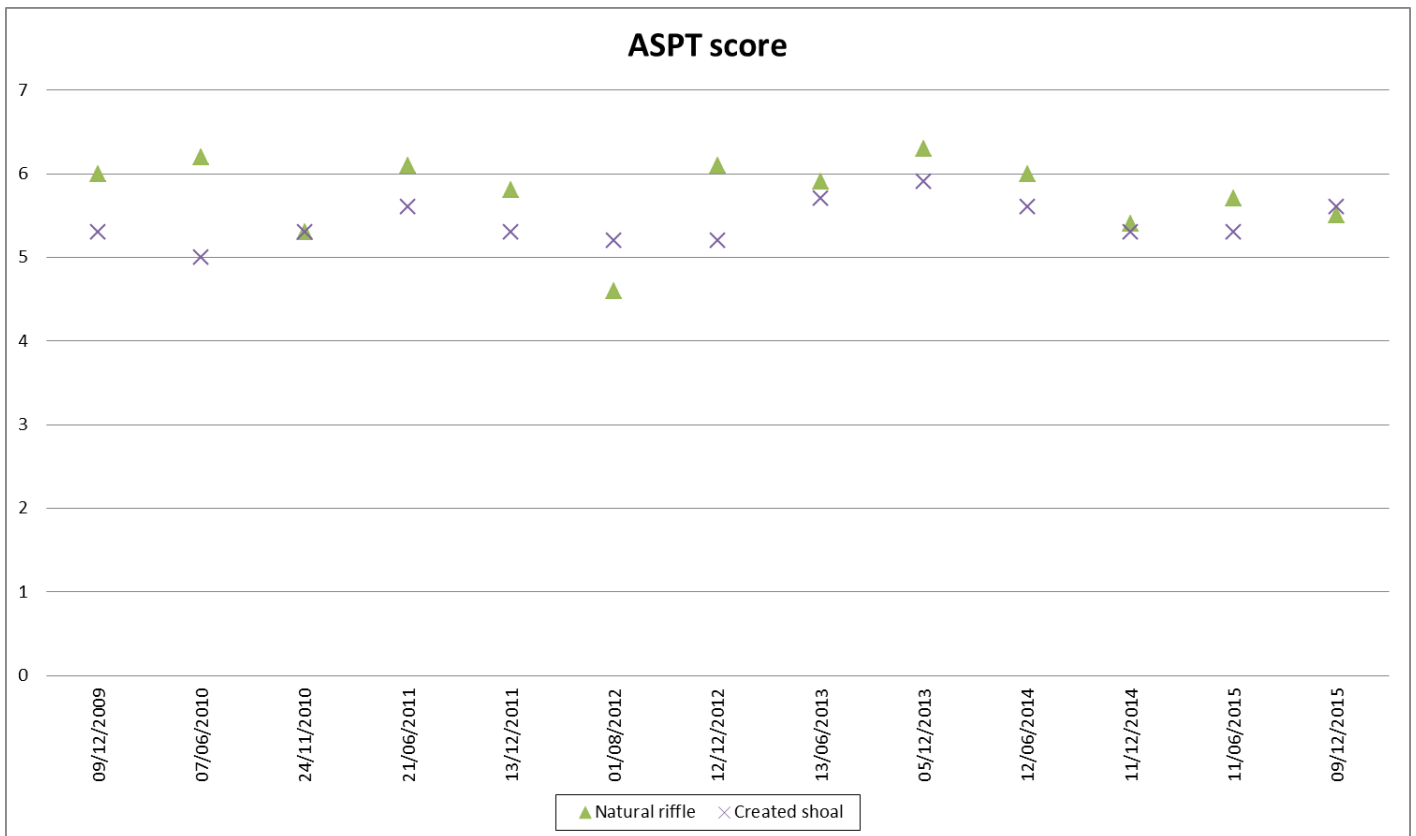


Figure 7 Average Score per Taxon (ASPT) for the natural site and the man-made site

ASPT is calculated from the BMWP score, and is also indicative of water quality. It is useful to show year to year changes and trends in the invertebrate population. Any score above 4 is good. ASPT for both sites has been fairly consistent, with most scores between 5 and 6 (Figure 7).

Some groups associated with lower water quality (e.g. water hoglouse, worms), were more abundant at the new site in early years, but their numbers appear to be decreasing over time.

Despite the dip in BMWP in winter 2011, the ASPT remained similar to previous samples, which indicates that the difference in species abundance is not indicative of a change in water quality, and therefore not cause for concern.

A prolonged drop in either score, or a drop in both at the same time, would require further investigation, as it would suggest a decrease in water quality.

5 Management Suggestions

The surveys to date provide a useful record to continue monitoring as the adjacent land use changes and will highlight if there are future variations from the baseline conditions.

Development of the housing and associated infrastructure has now begun. However, effects are more likely once the housing is complete, new residents have moved in, and there is increased public access to the river, so it is important to continue the monitoring.

Development of the former pesticides factory site at Hauxton upstream may also have an impact in the future.

It is suggested that 2 annual survey visits are conducted each year following the methodology in this report.