

What's happening in the Wensum DTC?

Investigation of bacterial community composition and abundance of the River Wensum catchment

Ali Albaggar

School of Environmental Sciences
University of East Anglia, Norwich
E-mail: ali.albaggar@uea.ac.uk



Objectives of this study

- 1.To investigate the bacterial community composition (BCC) and abundance in the River Wensum catchment
- 2.To determine the effects of spatial and temporal variation and environmental factors on the BCC and abundance



Methodology



Sample filtration (White-Black filters 0.22 μm)

DNA extraction

PCR amplification

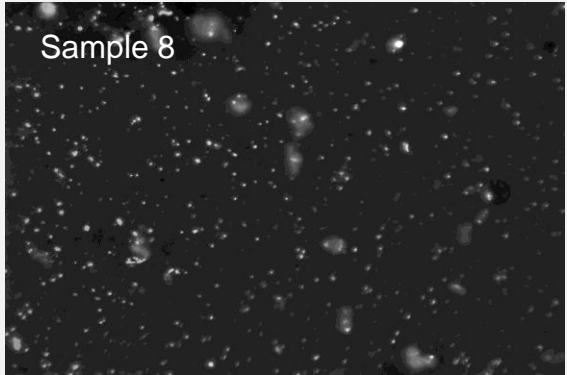
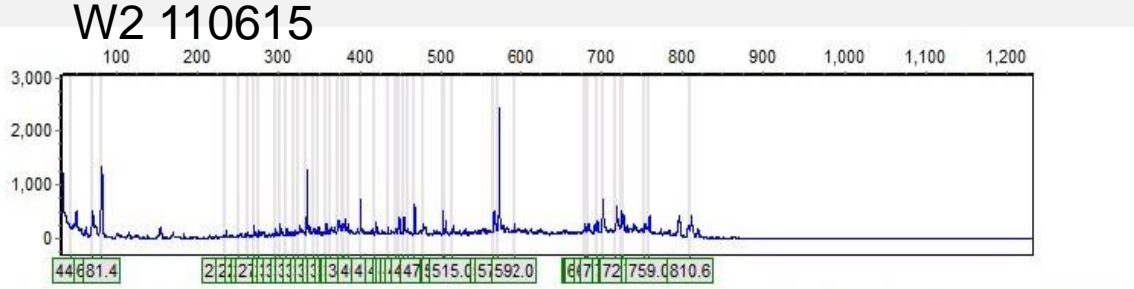
Check electrophoresis gel

Fragment sizing (JIC)

Analysis of ARISA fingerprinting

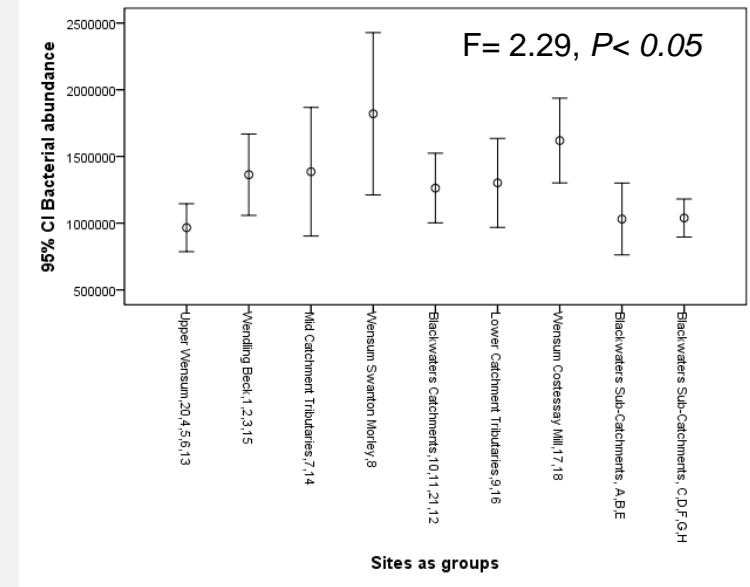
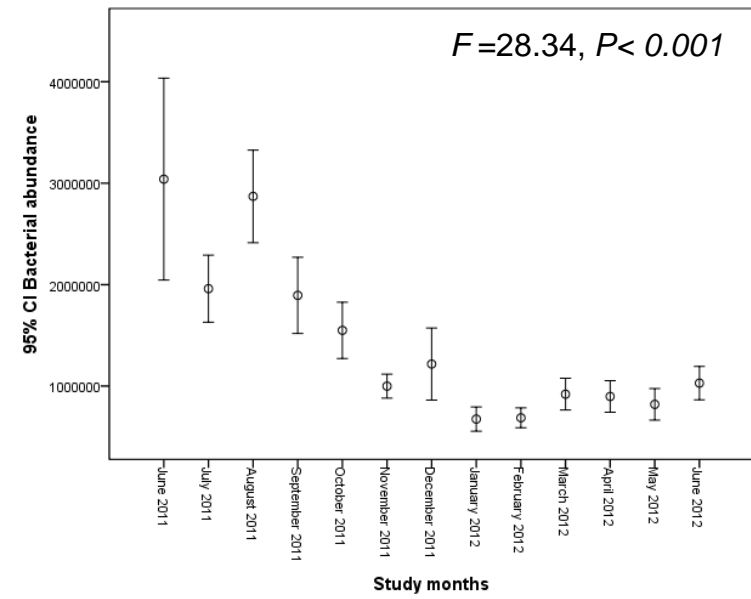
Bacterial enumeration by epifluorescence microscopy

Bacterial abundance

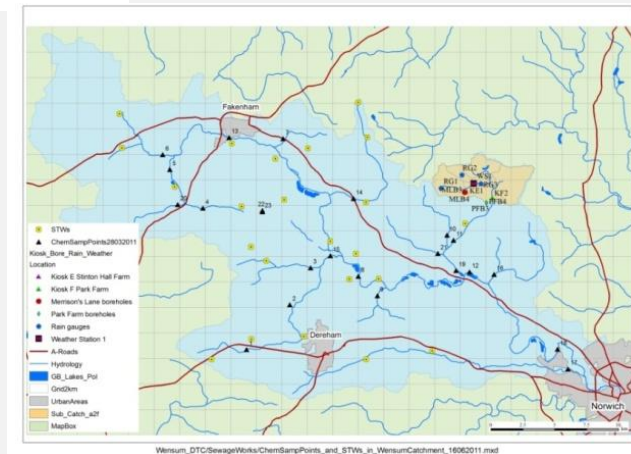


Results (Total bacterial numbers)

A- Effect of sample site and time



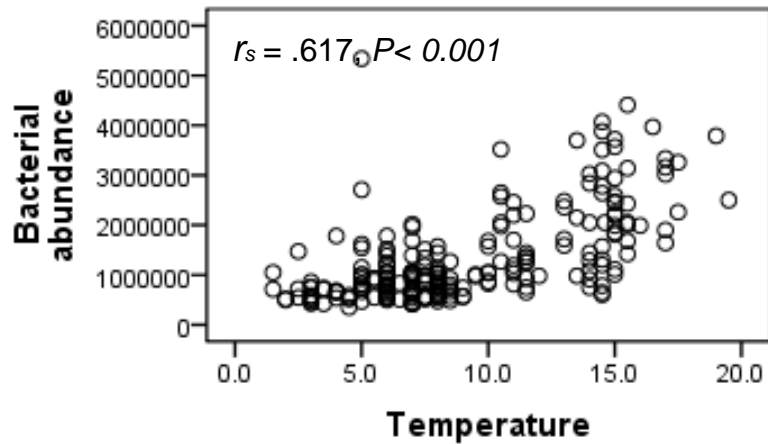
Total bacterial numbers in the Wensum river catchment and sub-catchment areas **by month** from June 2011 to June 2012



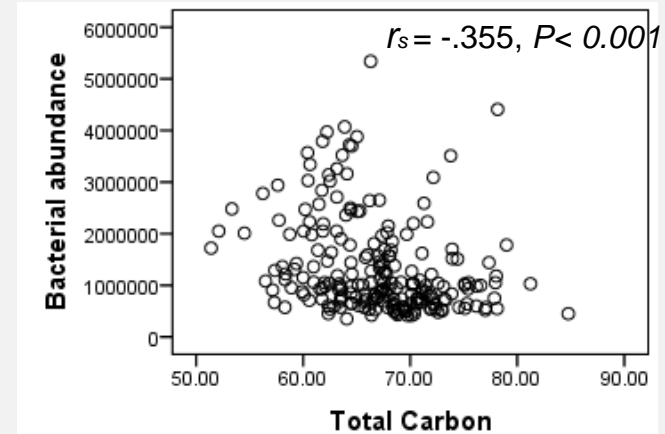
Total bacterial numbers in the Wensum river catchment and sub-catchment areas **as groups of sites** from June 2011 to March 2012

Total bacterial numbers

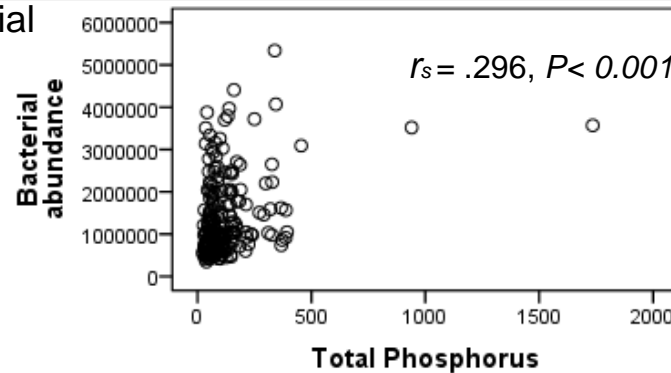
B- Effect of environmental factors



Correlation between total bacterial numbers and **temperature** from June 2011 to March 2012

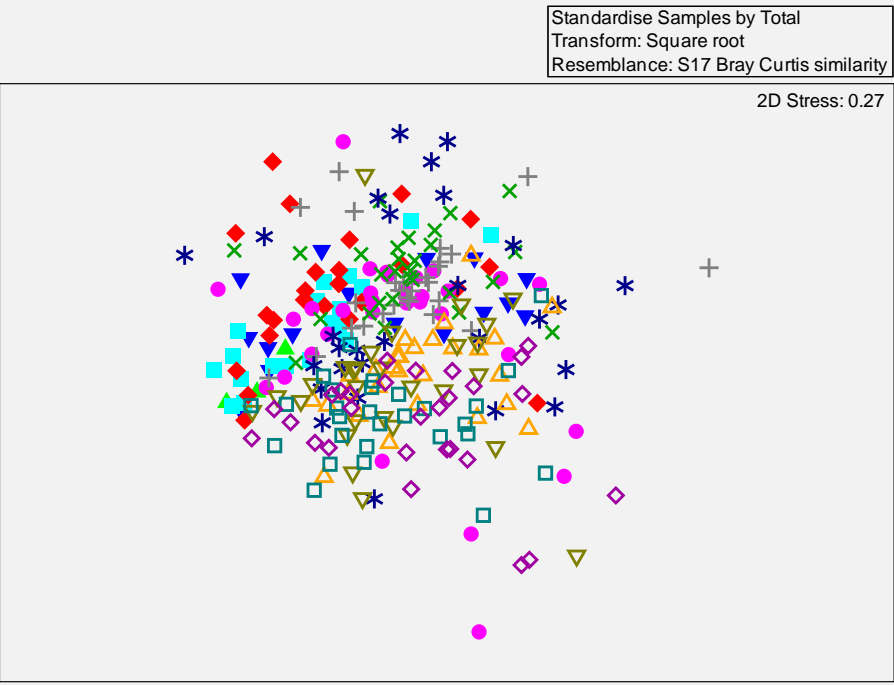


Correlation between total bacterial numbers and **total carbon** from June 2011 to March 2012

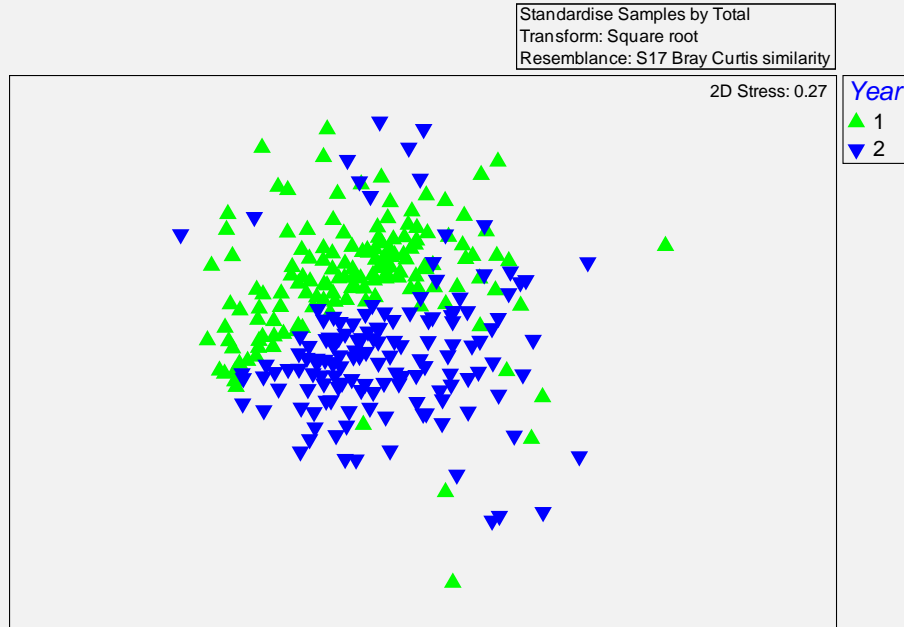


Correlation between total bacterial numbers and **total phosphorus** from June 2011 to March 2012

Bacterial composition: A- between months



Multi dimensional scaling ordination (MDS) of bacterial composition of the Wensum river samples from June 2011 to May 2012 (monthly data)



Multi dimensional scaling ordination (MDS) of bacterial composition of the Wensum river samples from June 2011 to March 2012 (yearly data)



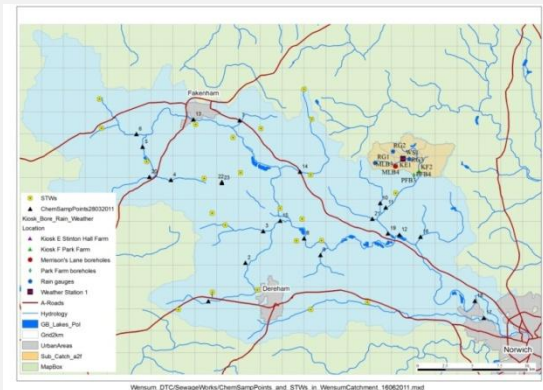
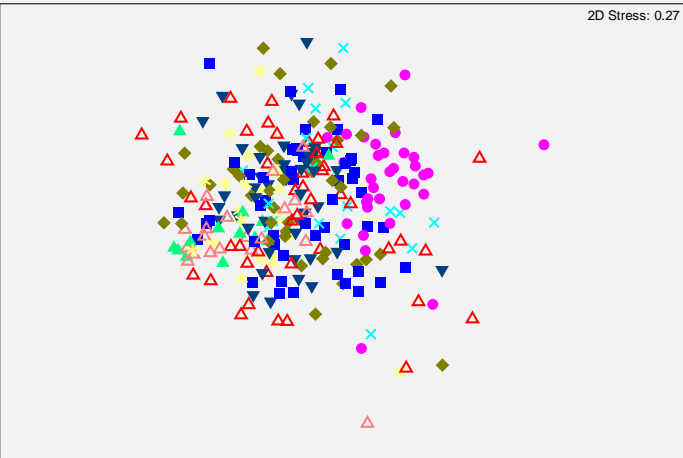
Bacterial composition: B- between sites

Standardise Samples by Total
Transform: Square root
Resemblance: S17 Bray Curtis similarity

2D Stress: 0.27

Group

- ▲ 4
- ▼ 5
- 1
- ◆ 2
- 8
- × 9
- × 3
- × 6
- △ 7

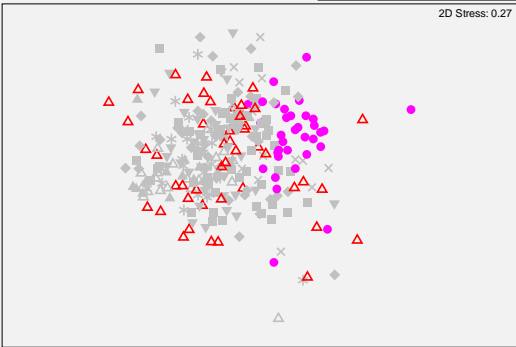


Standardise Samples by Total
Transform: Square root
Resemblance: S17 Bray Curtis similarity

2D Stress: 0.27

Group

- ▲ 4
- ▼ 5
- 1
- ◆ 2
- 8
- × 9
- × 3
- × 6
- △ 7

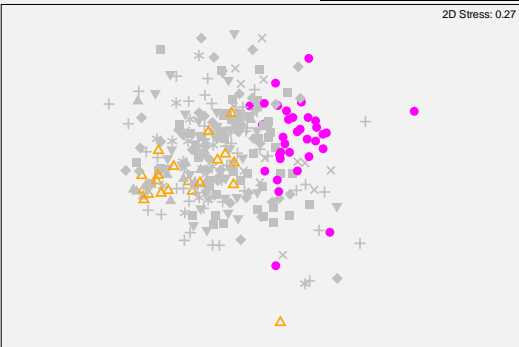


Standardise Samples by Total
Transform: Square root
Resemblance: S17 Bray Curtis similarity

2D Stress: 0.27

Group

- ▲ 4
- ▼ 5
- 1
- ◆ 2
- 8
- × 9
- × 3
- × 6
- △ 7

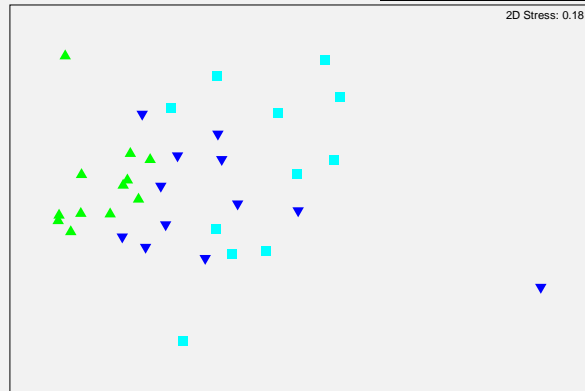


Standardise Samples by Total
Transform: Square root
Resemblance: S17 Bray Curtis similarity

2D Stress: 0.18

Site

- ▲ 8
- ▼ 12
- 2

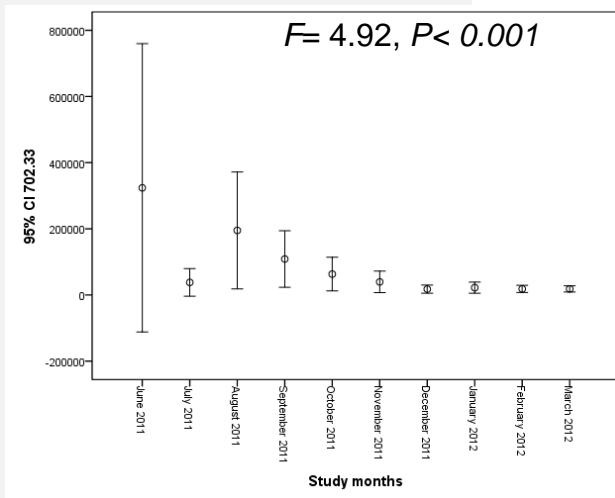
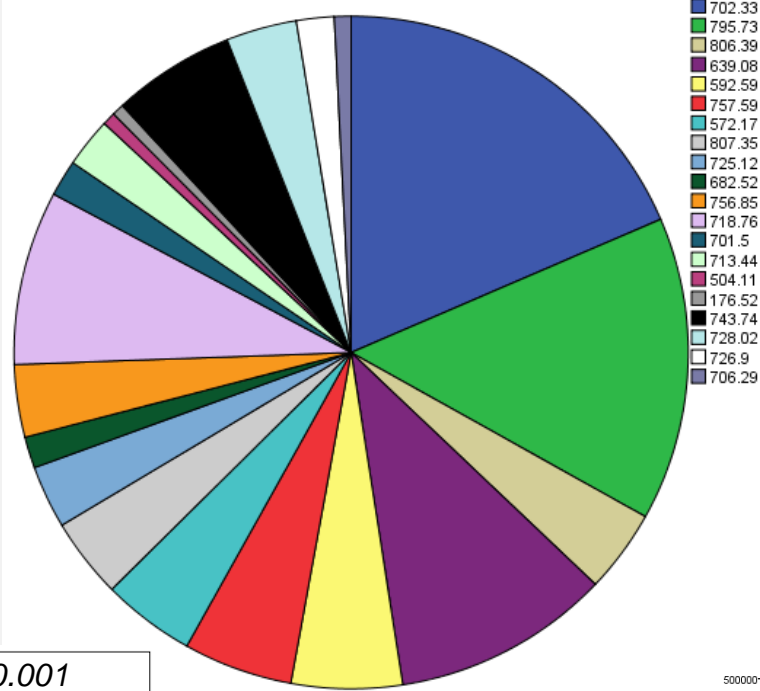


Multi dimensional scaling ordination (MDS) of bacterial composition of Wensum river samples from **June to December 2011** and from **April to May 2012**

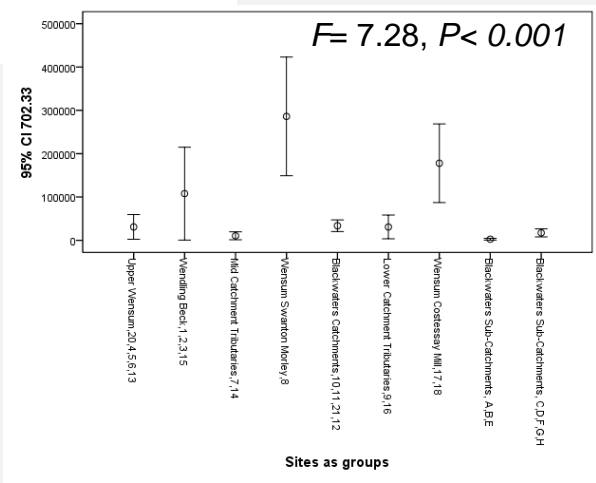
Multi dimensional scaling ordination (MDS) of bacterial composition of Wensum river for sample sites 2, 8 and 12 from **June 2011 to May 2012**



Abundance of common DNA fragment sizes of bacterial communities in the Wensum river from June 2011 to March 2012

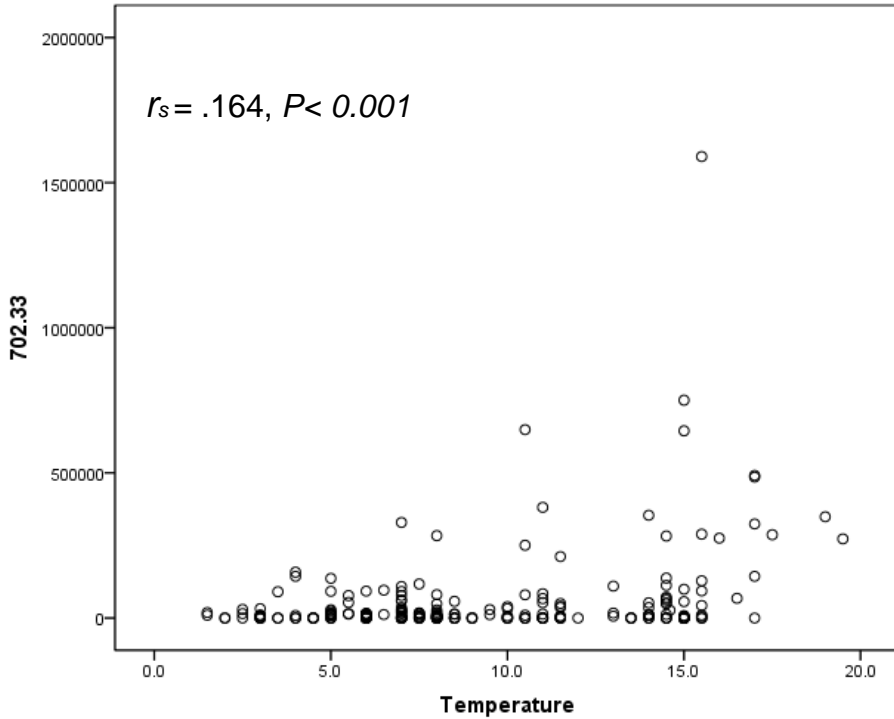


Relationship between the second common fragment size (702.33) and months from June 2011 to March 2012

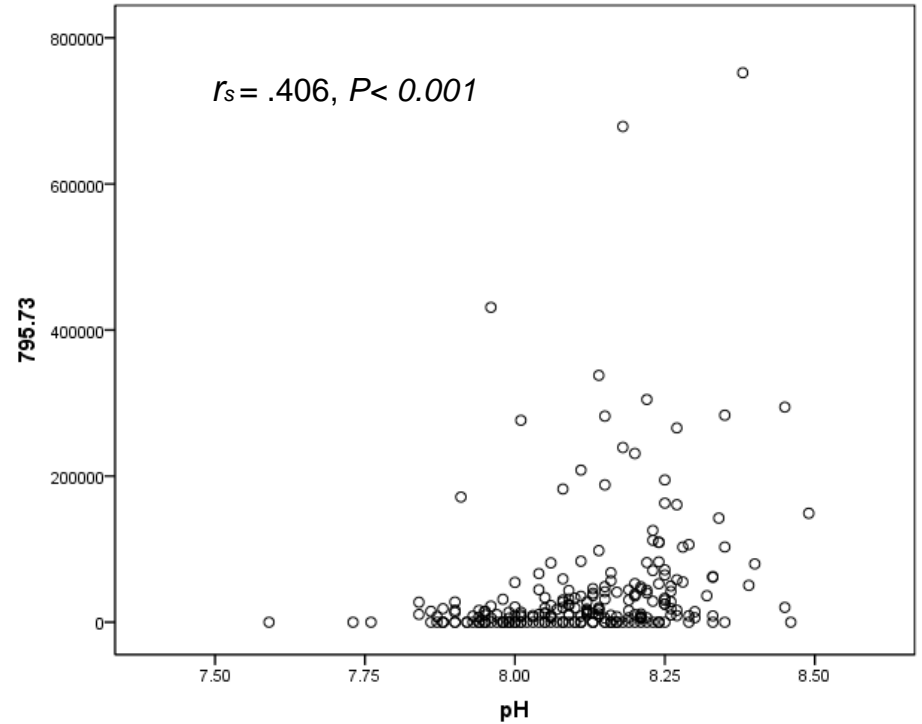


Relationship between the first common fragment size (702.33) and sites as groups from June 2011 to March 2012





Correlation between the first common fragment size (702.33) and **temperature** from June 2011 to March 2012



Correlation between the second common fragment size (795.73) and **pH** from June 2011 to March 2012

Future work

- 1- Continue determining bacterial numbers and composition
- 2- Continue collection of catchment characteristics data for comparison with bacterial numbers and composition
- 3- Determine the types of bacteria present at all sites using DNA analysis

