



Investigation of bacterial community composition and abundance of surface waters in the Wensum catchment

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OUTLINE

- Bacteria are ubiquitous and diverse
- Patterns exist in the distribution of bacterial diversity
- The aim of this study
- Methodology
- Progress to date

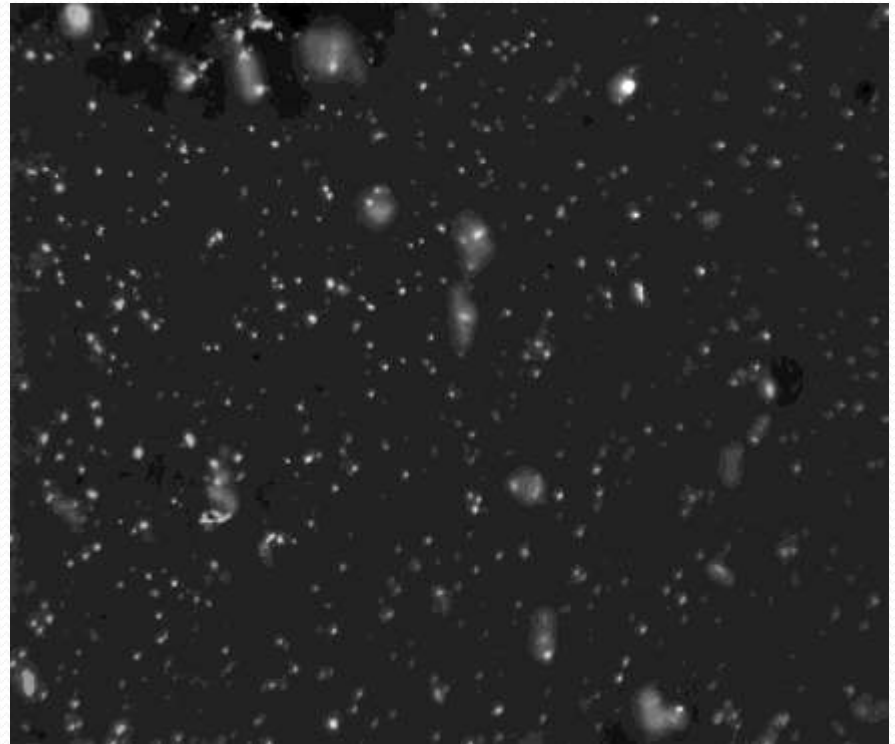


Sample collection, 15 June 2001
(Photo: K. Hiscock)

Introduction

Bacteria are ubiquitous and diverse:

- Bacterial distribution
- Bacterial abundance and composition
- Bacterial diversity and the role of new molecular technique



Bacterial cells in sample 8- Wensum river catchment - 15 June 2011

Patterns in the distribution of bacterial composition and diversity

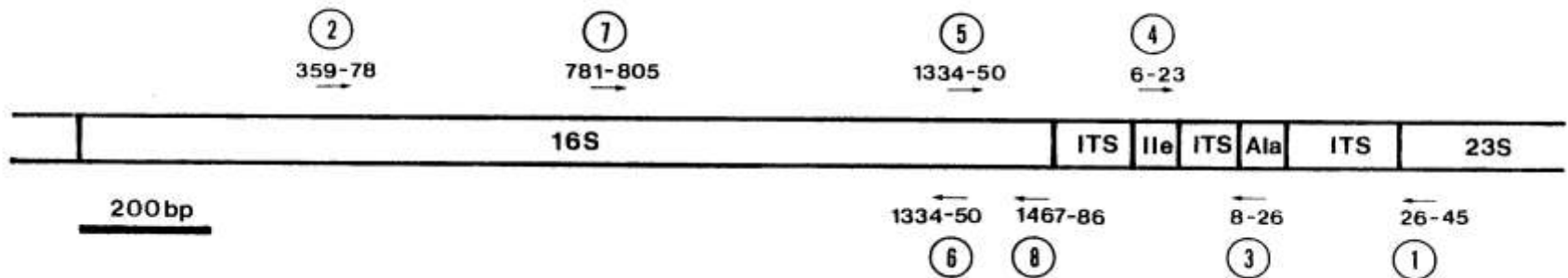
- Habitat type and bacterial diversity
- Primary productivity and bacterial diversity
- Biogeographical patterns in bacterial diversity



Aim of this study

- To determine the bacterial community composition using the ARISA (DNA) technique, and bacterial abundance using epifluorescence microscopy.
- To determine the environmental factors that drive this community.
- To find the relationship between these factors and the shifts of bacterial community composition and abundance.

ARISA technique and ITS region



Organisation of the ribosomal RNA (rRNA) operon showing the locations of the primers used for PCR amplification of the 16S rRNA and ITS regions

From: http://www.jcu.edu/mcp/Spirirestis_Fig8.htm

Methodology



Samples filtration (White-Black filters 0.22 μm)

DNA extraction

PCR amplifications

Checking on the electrophoresis gel

Fragment sizing

Analysis of ARISA fingerprinting

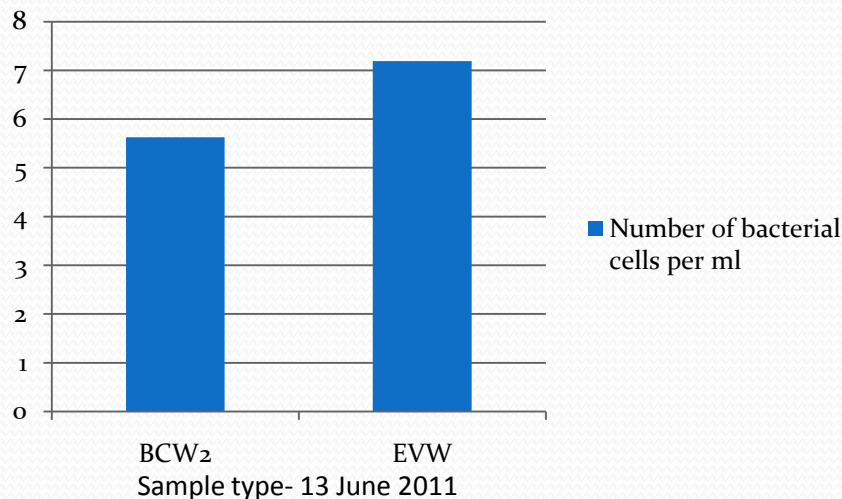
Bacterial enumeration by epifluorescence microscopy

Bacterial abundance

Some results (bacterial abundance)

Table 1: Number of bacterial cells per ml in Brecon Carreg water (BCW2) and Evian water (EVW) (under epifluorescence microscopy)- First experiment from 13 June 2011

Sample type	Number of cells per 20 or 50 ml	Number of cells per ml
BCW2 (20ml)	1.13×10^6	5.65×10^4
BCW2 (50ml)	2.81×10^6	5.63×10^4
EVW (50ml)	3.59×10^6	7.19×10^4



Evian



Brecon



Table 2: Number of bacterial cells per ml in some sites at the Wensum river catchment (under epifluorescence microscopy)- First experiment from 15 June 2011

Sample position	Number of cells per 20 ml	Number of cells per ml
2 (Wendling Beck, Gressenhall)	4.52×10^7	2.26×10^6
8 (Wensum, Swanton Morley)	7.58×10^7	3.79×10^6
12 (Blackwater, Lenwade)	6.19×10^7	3.09×10^6
13 (Wensum, Fakenham)	6.04×10^7	3.02×10^6

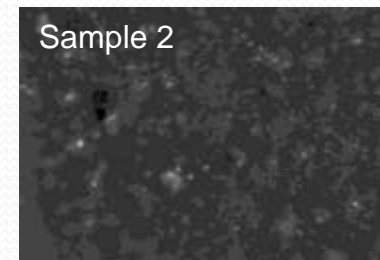
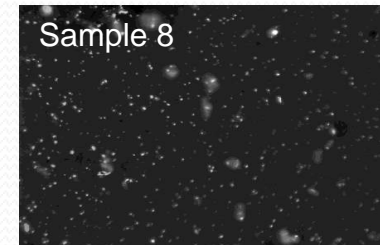
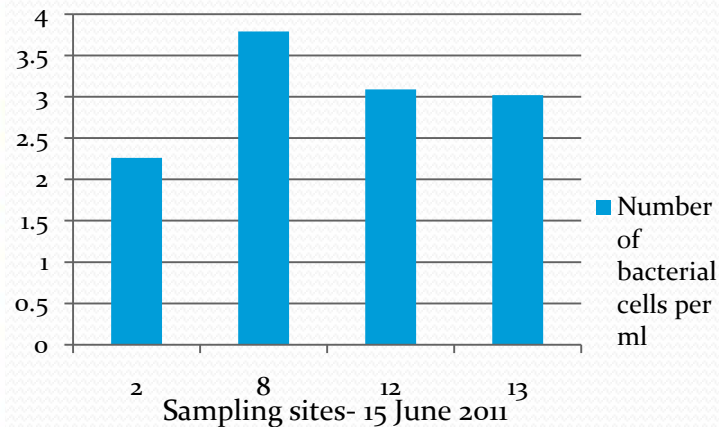
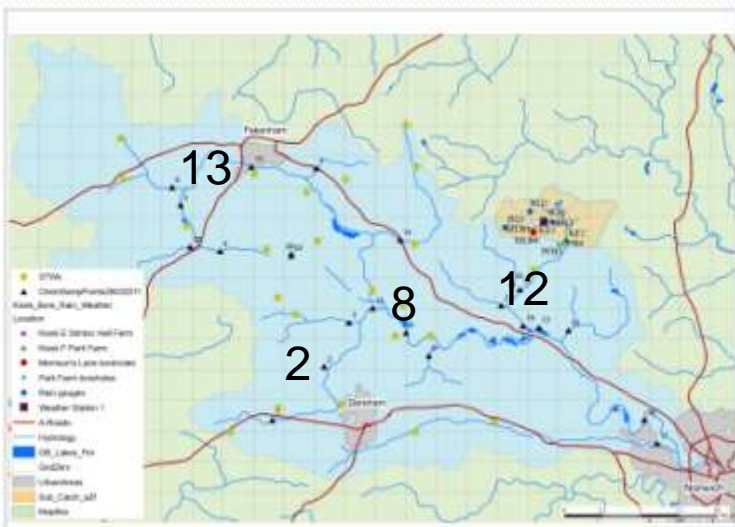


Table 3: Number of bacterial cells per ml in some sites at the Wensum river catchments (under epiflourscence microscopy-Second experiment from 11 July 2011

Sample position	Number of cells per 20 ml	Number of cells per ml
2 (Wending Beck, Gessenhall)	3.29×10^7	1.64×10^6
8 (Wensum, Swanton Morley)	5.00×10^7	2.50×10^6
12 (Blackwater, Lenwade)	4.46×10^7	2.23×10^6
13 (Wensum, Fakenham)	3.81×10^7	1.90×10^6

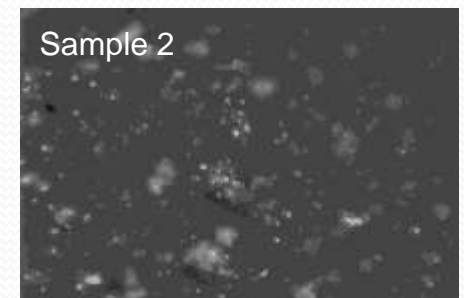
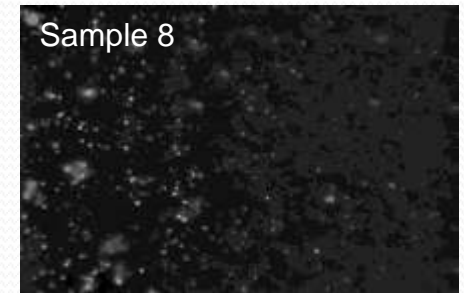
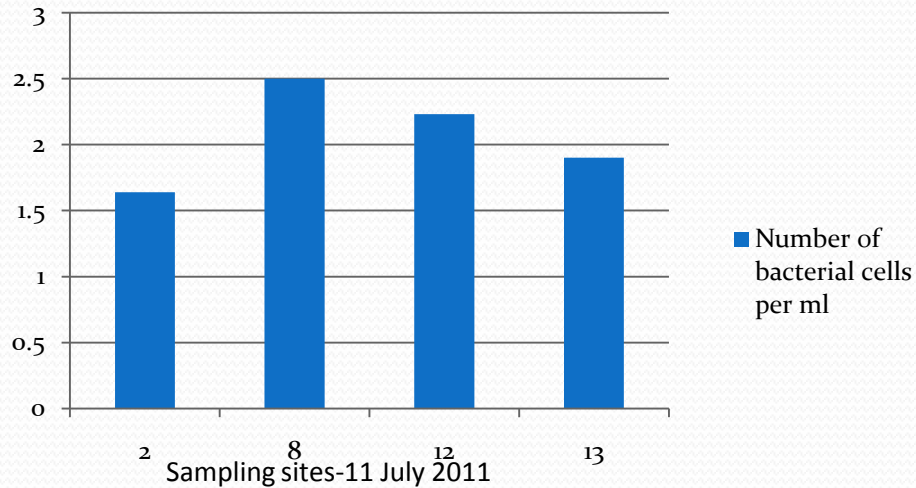
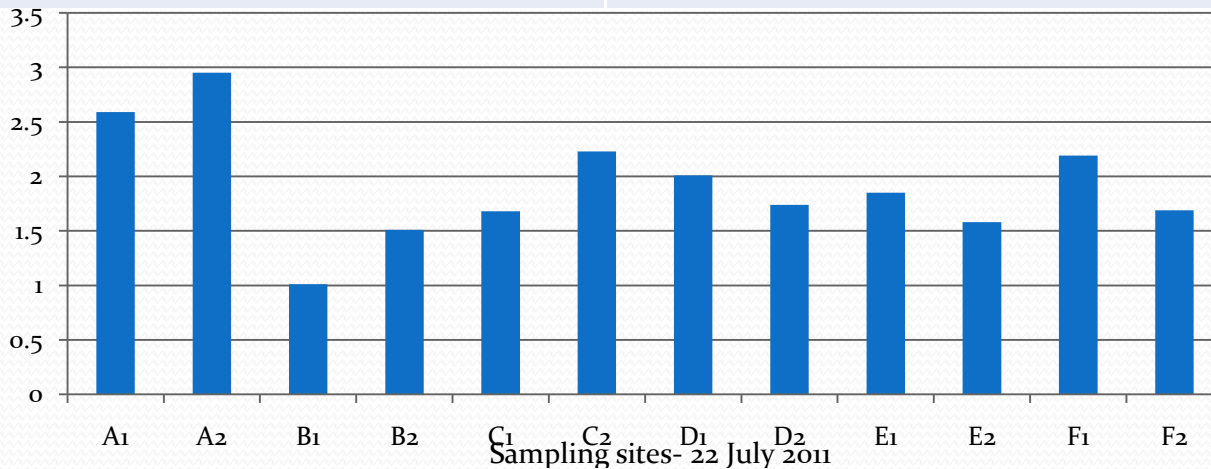
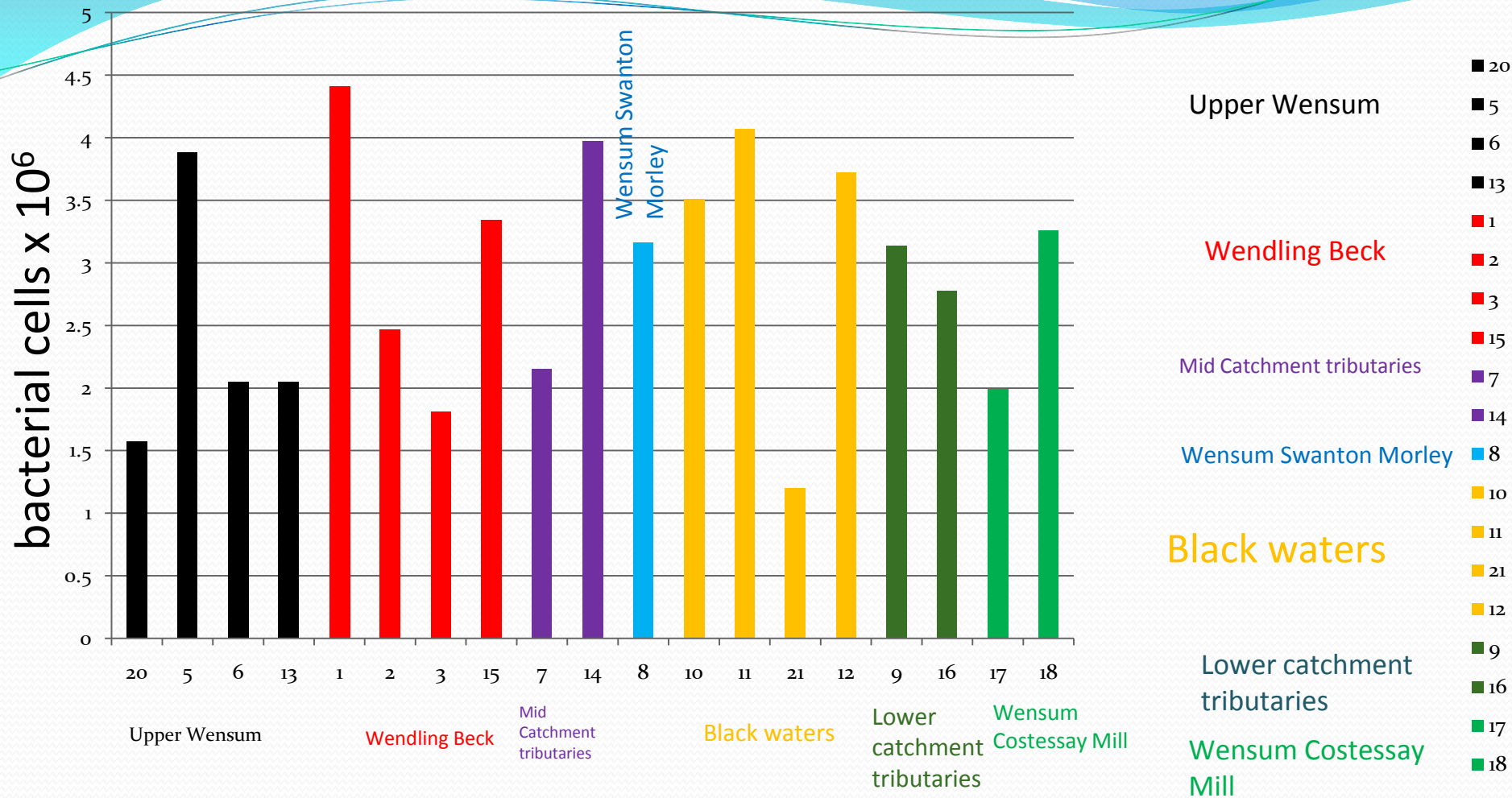


Table 4: Number of bacterial cells per ml in the Blackwater sub-catchment
(under epifluorescence microscopy- from 22 July 2011)

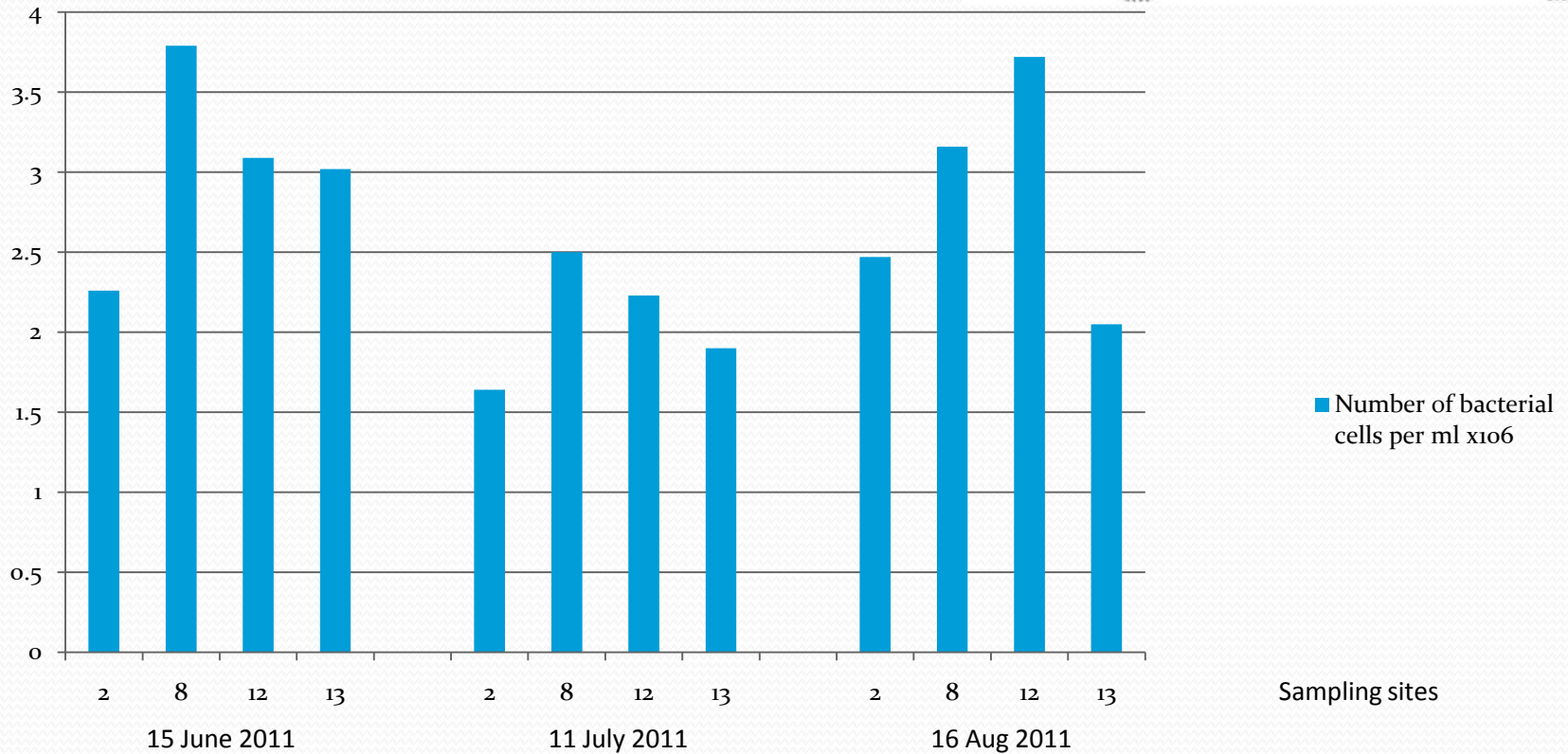
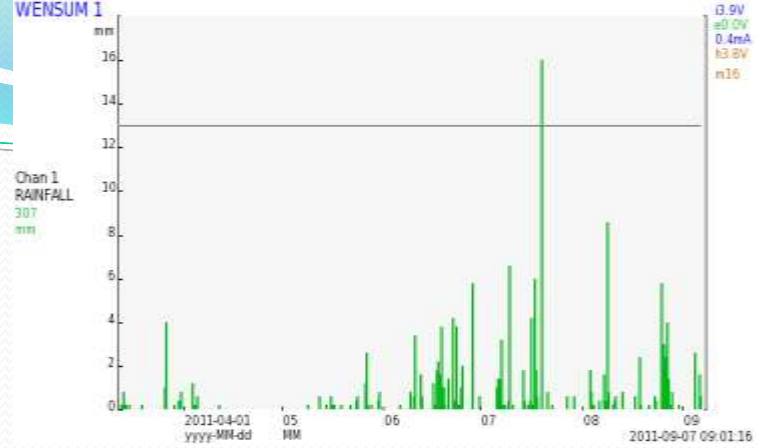
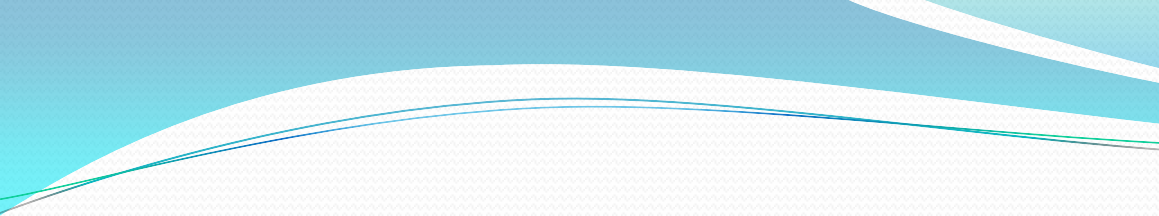
Sample position	Number of cells per 20 ml	Number of cells per ml
A1	5.18×10^7	2.59×10^6
B1	2.03×10^7	1.01×10^6
C1	3.36×10^7	1.68×10^6
D1	4.03×10^7	2.01×10^6
E1	3.71×10^7	1.85×10^6
F1	4.39×10^7	2.19×10^6
A2	5.91×10^7	2.95×10^6
B2	3.03×10^7	1.51×10^6
C2	4.46×10^7	2.23×10^6
D2	3.49×10^7	1.74×10^6
E2	3.16×10^7	1.58×10^6
F2	3.39×10^7	1.69×10^6





Sampling sites- 16 August 2011

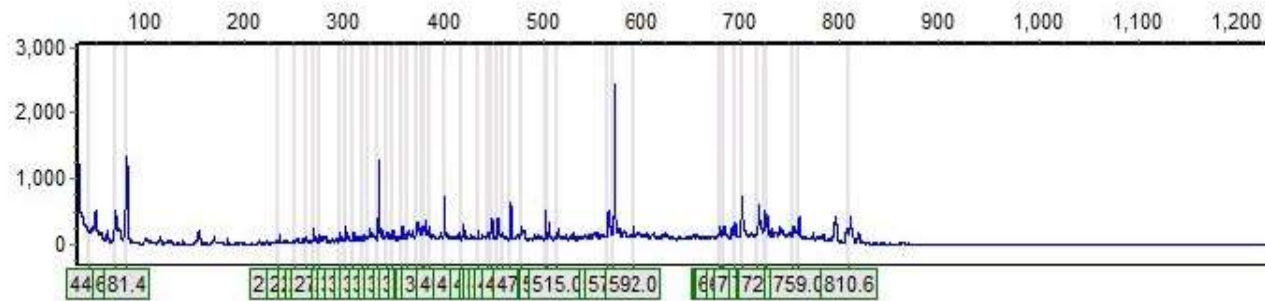
Number of bacterial cells per ml in all sites of the Wensum river catchment except site 4 and 19 (under epifluorescence microscopy- from 16 August 2011)



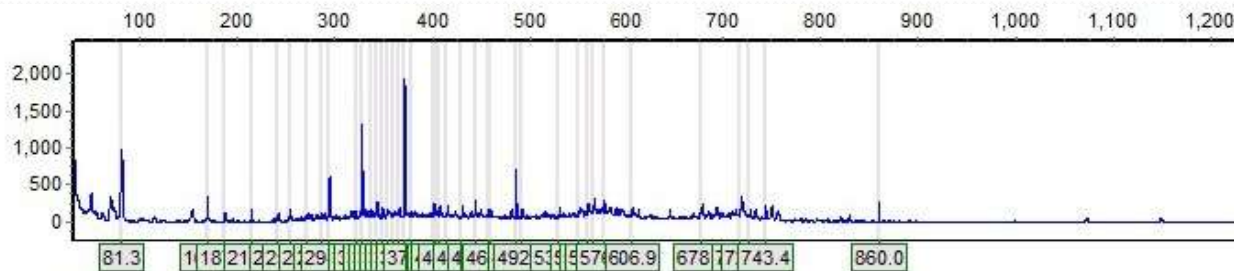
The number of bacterial cells per ml at four sites, 2, 8, 12 and 13 for three different sampling periods – Wensum catchment area

Results (bacterial community composition and diversity)- Fragment sizing

1 - WRCS 2 110615



2 - WRCS 8 110615



Similarities and differences of the bacterial communities between sites (example)

