



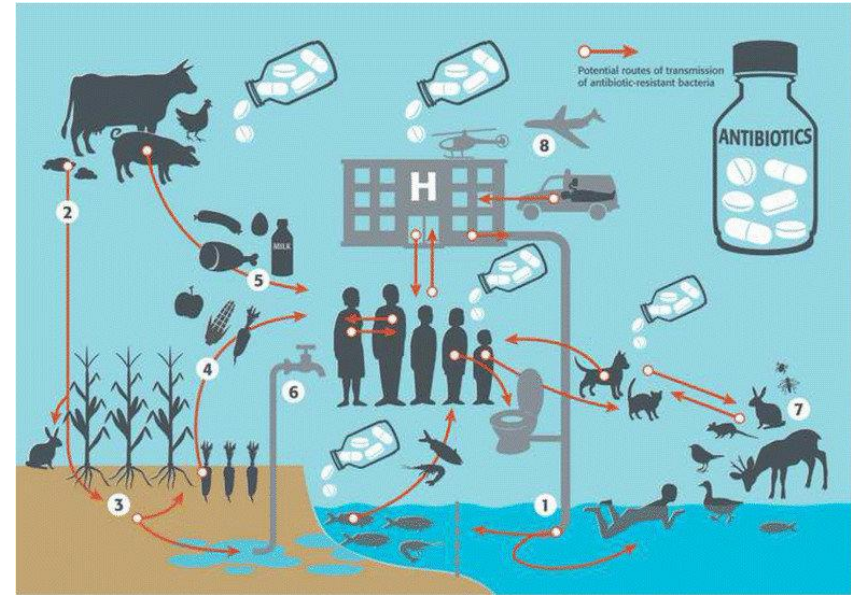
# Resistant bacteria in the Vechte

Heike Schmitt

Eri van Heijnsbergen, Alicia Borneman, Lucia Hernandez,  
Riekjen-Anna Veltman, Yede van der Zee

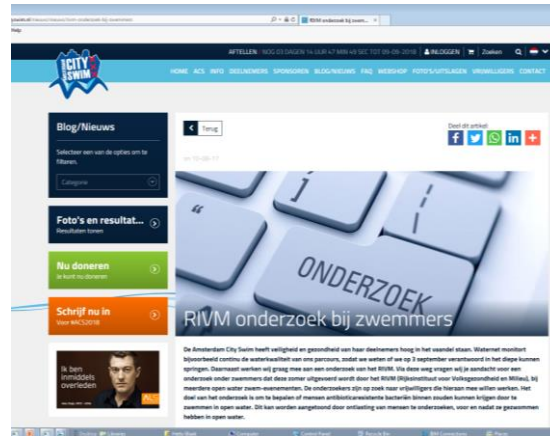
# Transmission of antibiotic resistance

- Transmission of resistant bacteria
  - Many routes
  - Also through water



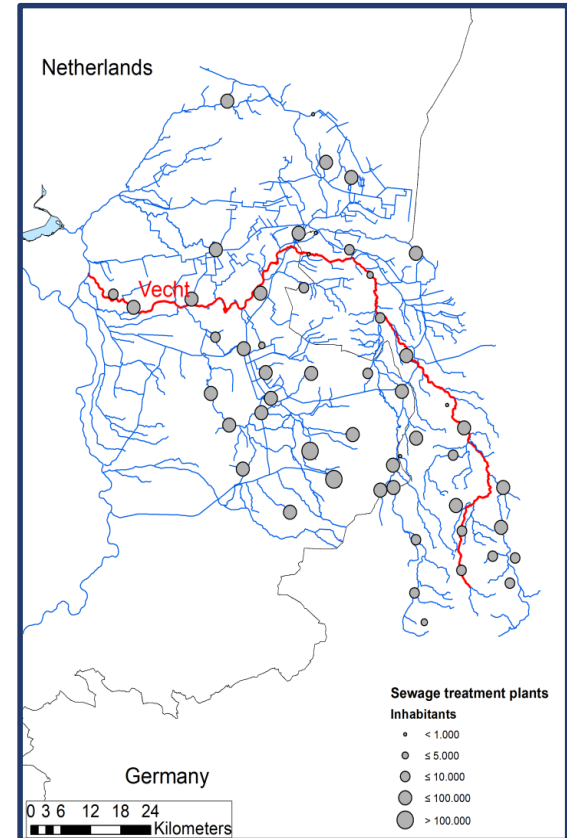
# Transmission of antibiotic resistance

- Transmission of resistant bacteria
  - Many routes
  - Also through water
  - Evidence for role of recreation in transmission...
  - ...although, in comparison with other routes, limited role

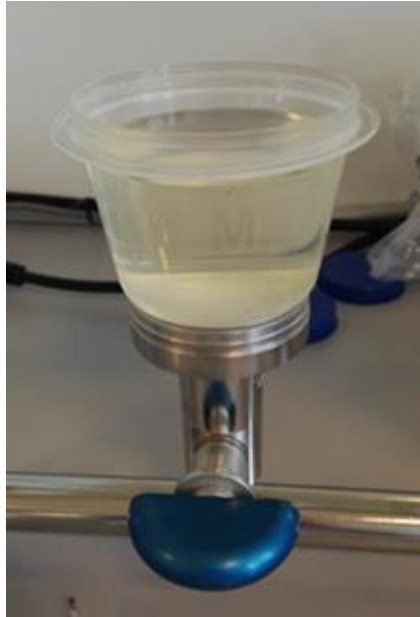


# MEDUWA: sampling the Vechte

- Analysing and modelling:
  - Antibiotics
  - ‘fecal indicator’ bacteria – *E. coli*
  - Resistant bacteria: ESBL producing *E. coli*

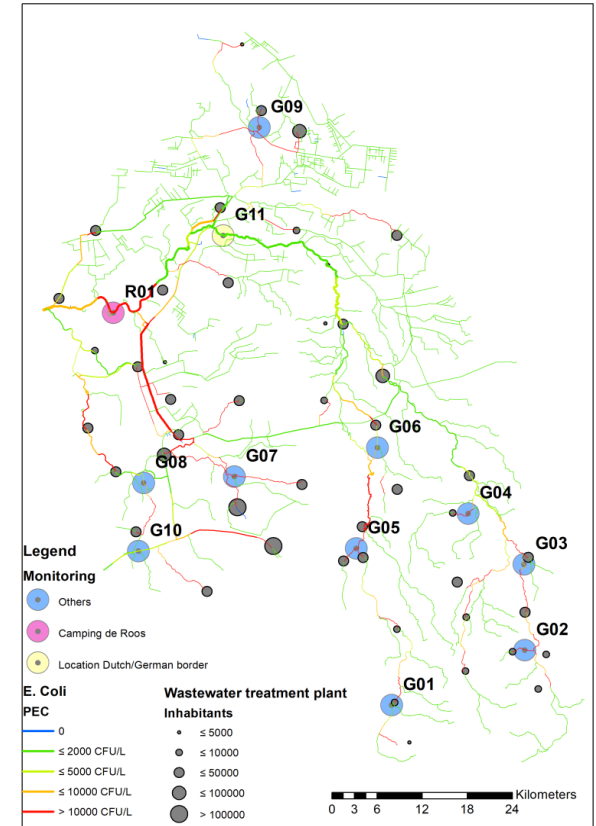
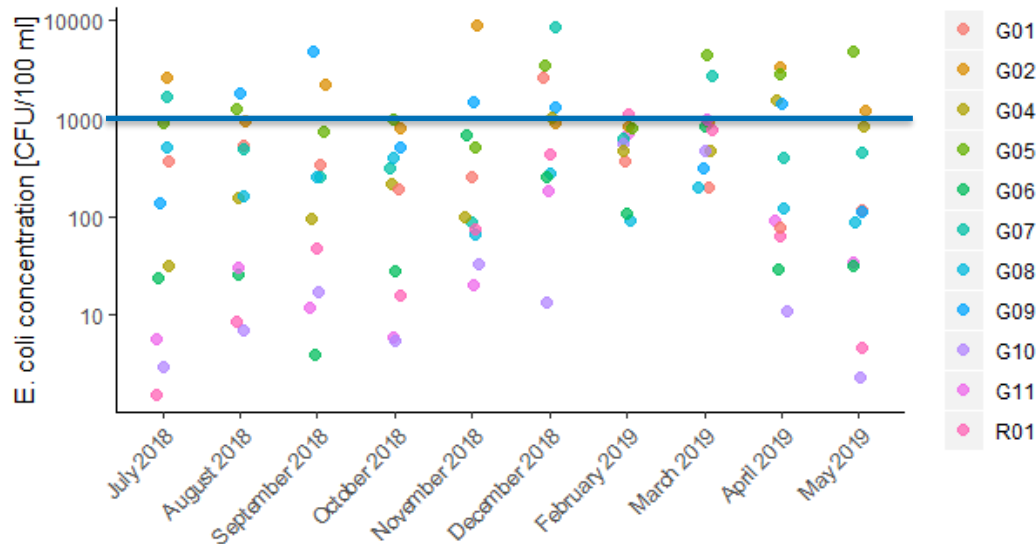


# How?



# Results - Vechte catchment

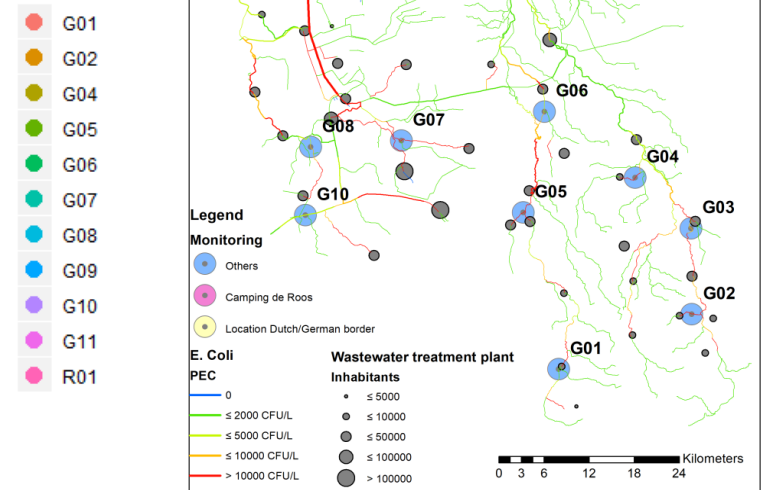
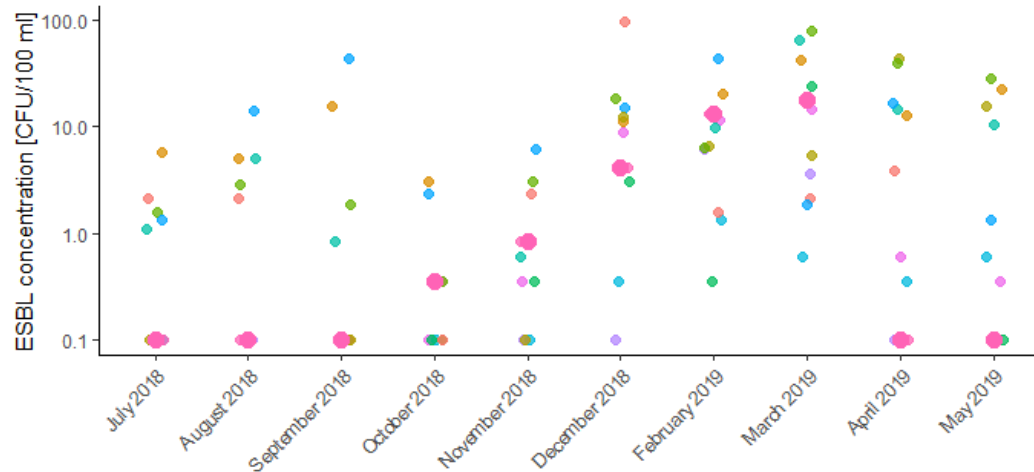
- *E. coli*: highest in winter / spring
- Often, 'good' bathing water quality
- Less so in proximity of WWTP





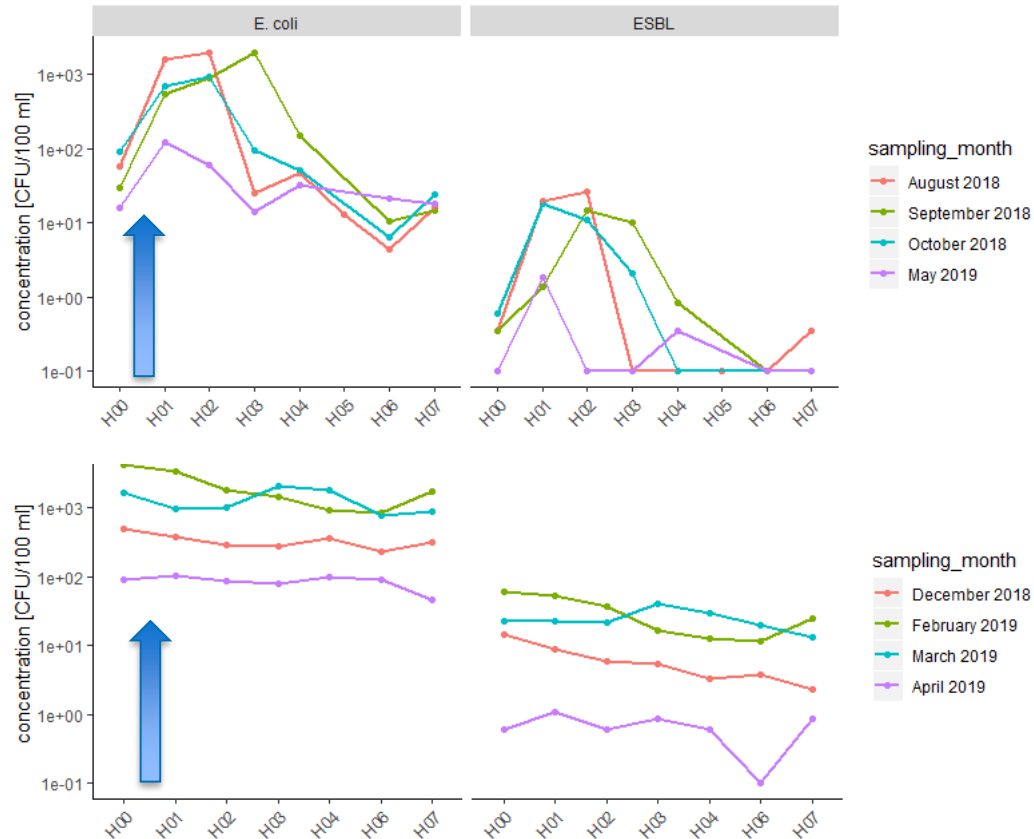
# Results - Vechte catchment

- ESBL *E. coli*: present (winter / spring)
- Uptake when swimming: mostly, but not always, low



# Sources: WWTP

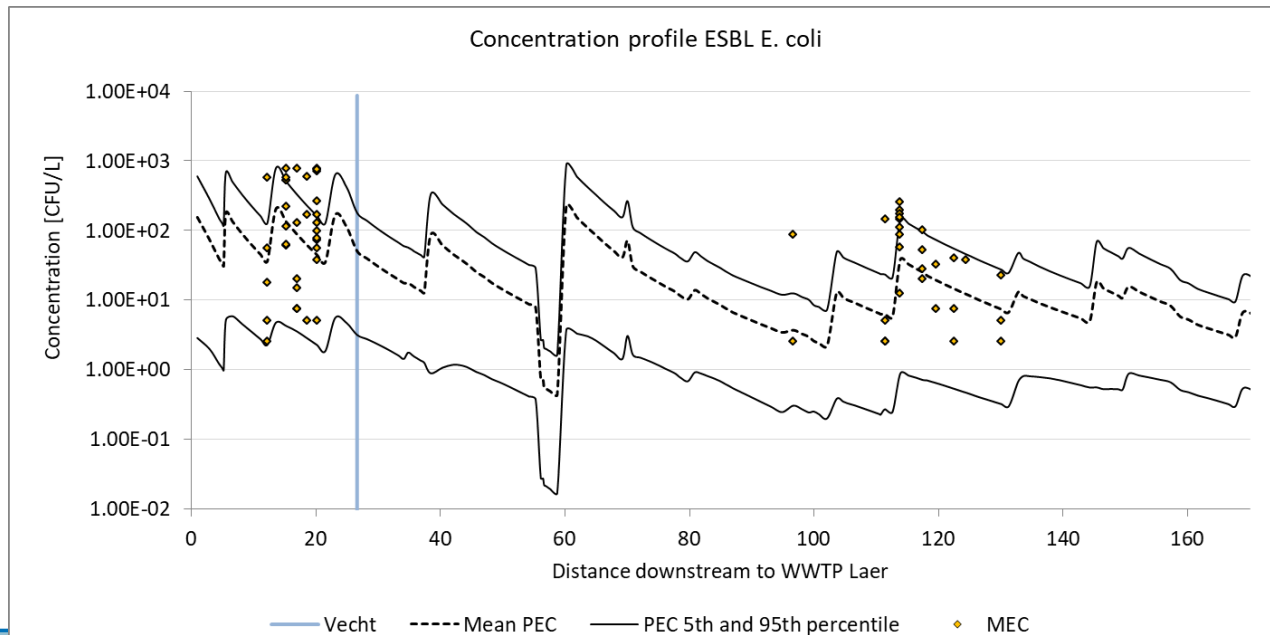
- Clear increase after WWTP discharge
- But not in winter
- Resuspension? Run-off? Overflows?





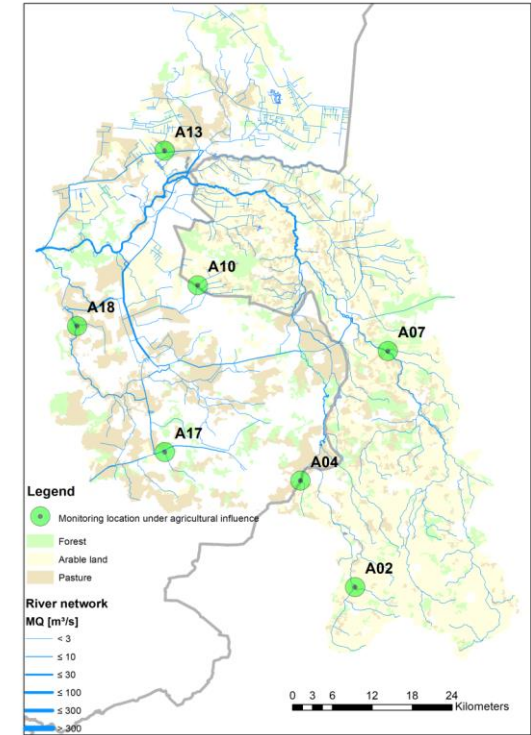
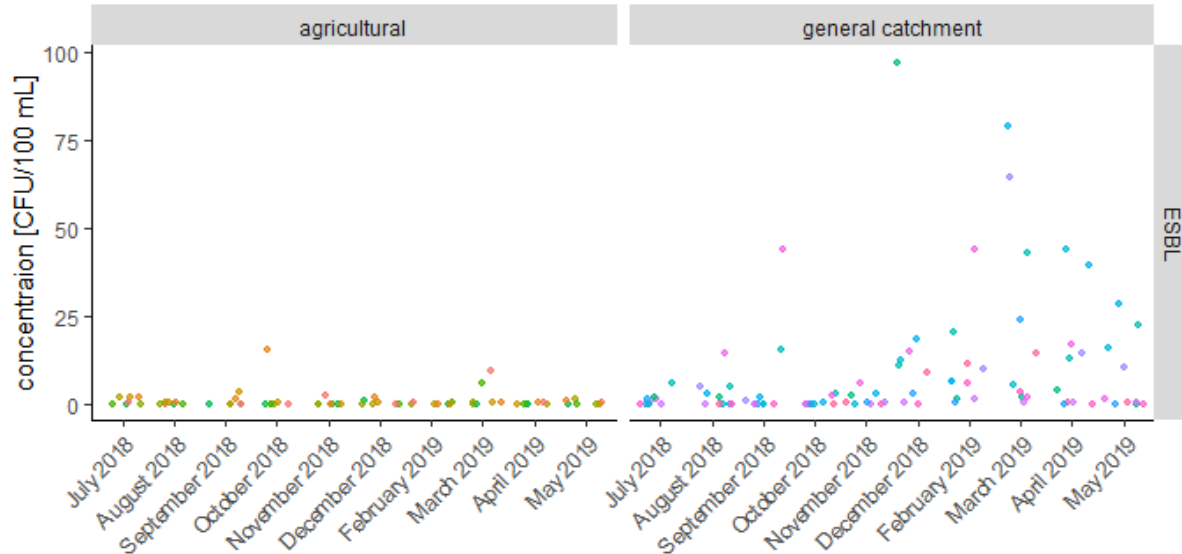
# Sources: WWTP - modeling

- Modeling so far confirms role of WWTP
- Work in progress



# Sources: agriculturally-influenced sites

- Concentrations of ESBL-*E. coli* lower than in Vechte



# Conclusions

- Swimming is healthy – balance positive and unwanted adverse health effects
- Water quality often good
- More *E. coli* / ESBL *E. coli* in proximity of WWTP discharge
- Other sources do exist
- Degree of exposure also matters (intensive swimmers vs occasional bathing)

# Thank you for your attention

