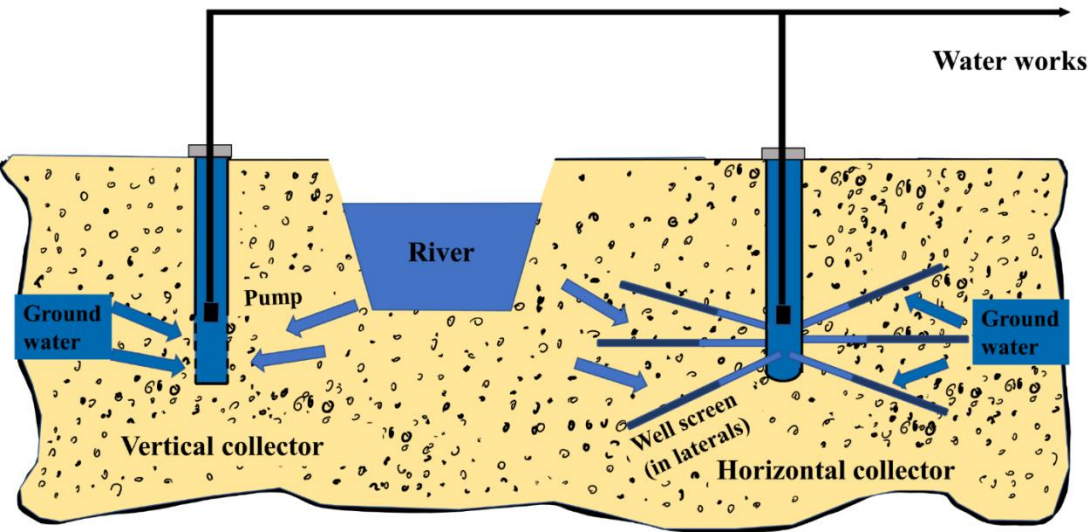# Dynamics of pathogens and fecal indicators during riverbank filtration in times of high and low river levels

Wang H., Knabe D., Engelhardt I., Droste B., Rohns H., Stumpp C., Ho J., Griebler C.
Contact: wangh92@univie.ac.at

Helmholtz Zentrum München
Institute of groundwater ecology

universität wien

Technical University of Munich

Objectives

❖ Dynamics of adenovirus, bacterial and viral indicators during riverbank filtration under different hydrological events.

❖ Predictability of hygienic contamination via individual bacterial and/or viral indicators for monitoring riverbank filtration efficiency

Investigation site
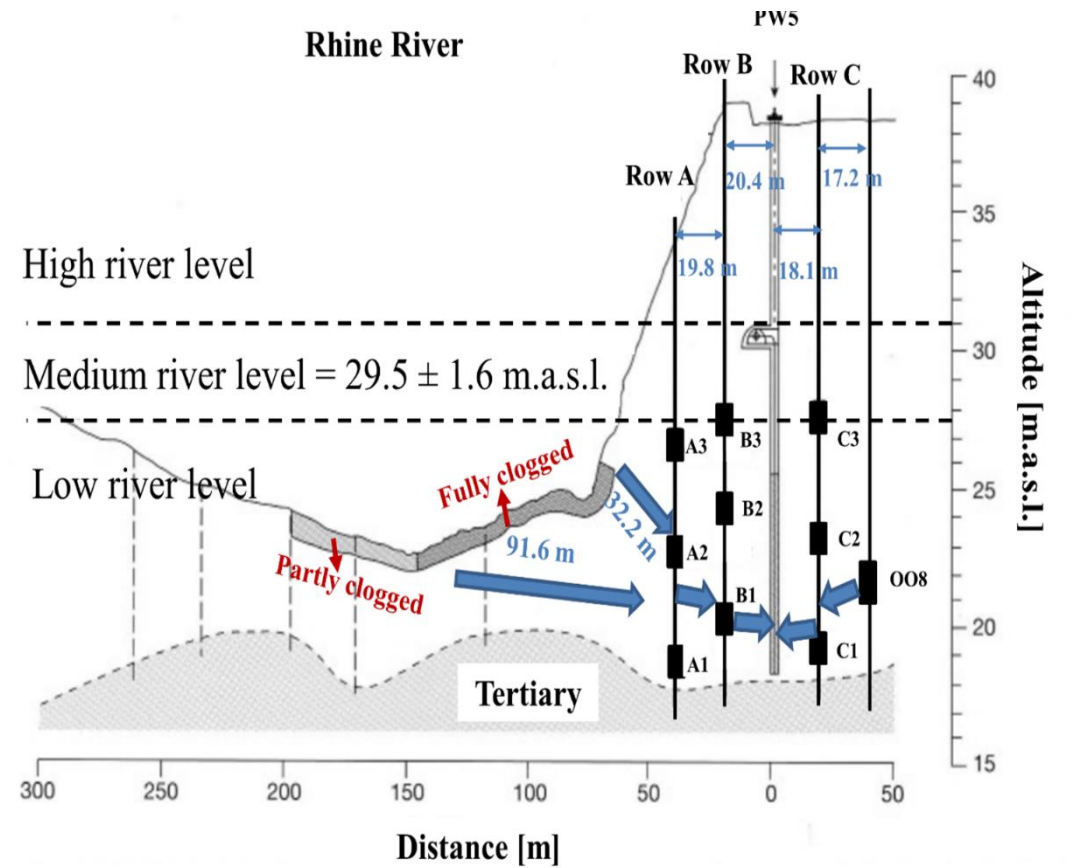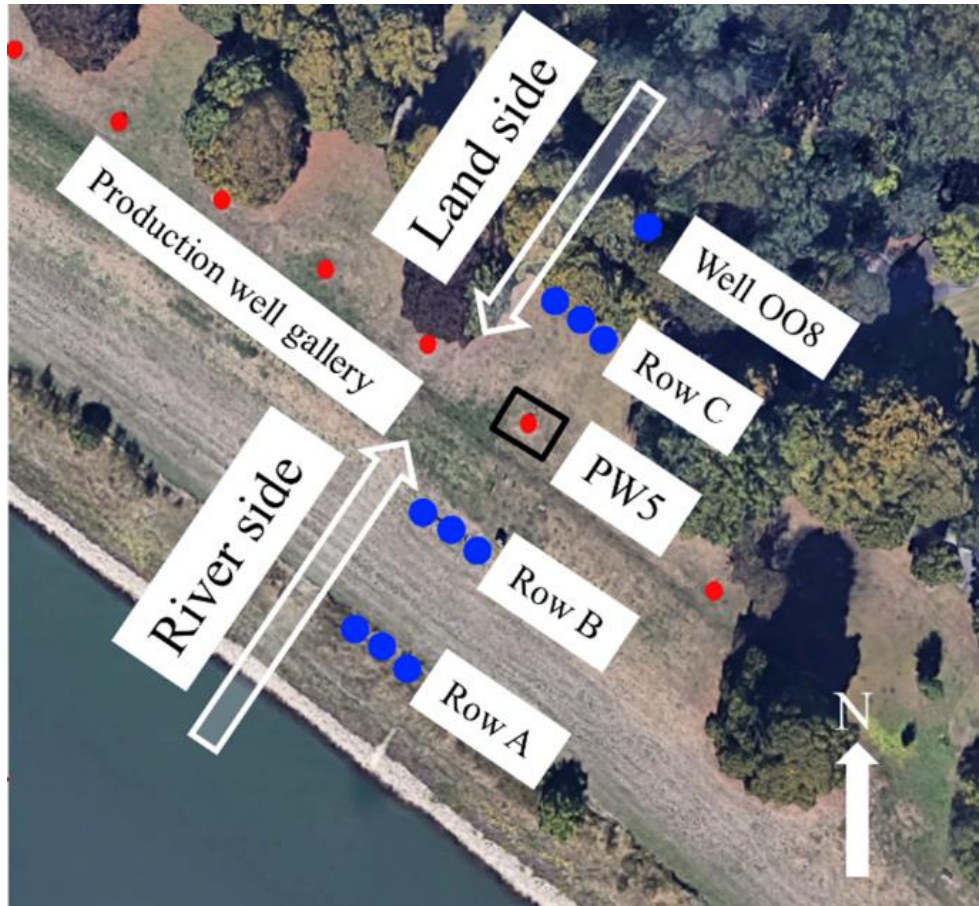
Modified from Schubert (2002)
https://doi.org/10.1016/S0022-1694(02)00159-2

Samples analysis

❑ Water level and water temperature (level senosor and WTW field sensors)

❑ Stable water ísotopes ($\delta^{18}O$, δ^2H)

❑ Total adenovirus (ddPCR)

❑ Coliforms (Colilert-18 method)

❑ *Clostridium perfringens* (membrane method)

❑ *E. coli* (Colilert-18 method)

❑ Infectious F+ coliphage and somatic coliphage (plaque assay)

❑ Total prokaryotic cell counts (TCC, flow cytometry)

❑ Total virus like particle counts (TVPC, flow cytometry)

❑ ATP (BacTiter-Flo Microbial Cell Viability Assay kit)

❑ Major ions

❑ Dissolved organic carbon

❑ pH, electrical condcutivity and dissolved oxygen (WTW field sensors)

Dynamics of water levels, water temperature and stable water isotopes
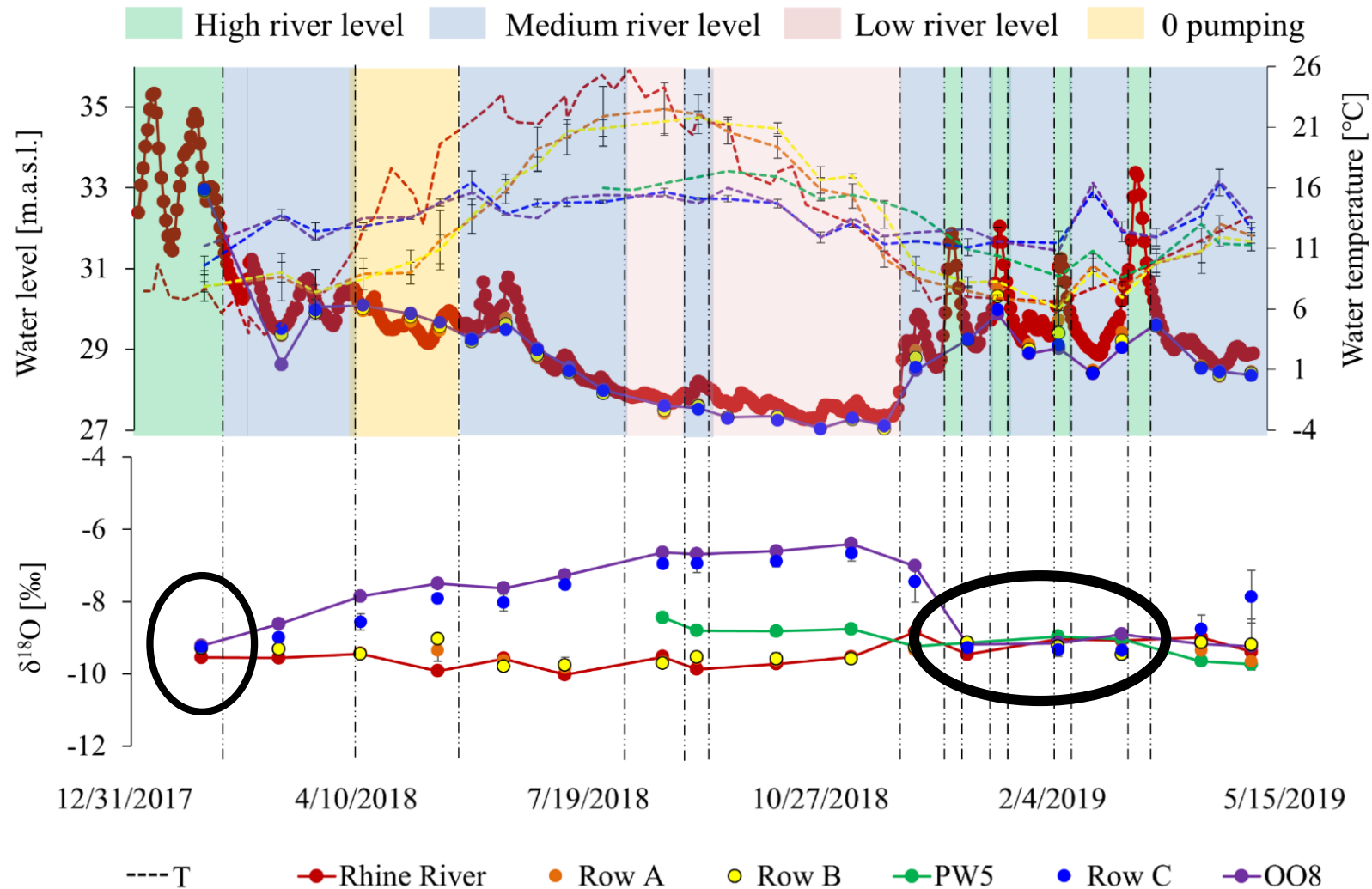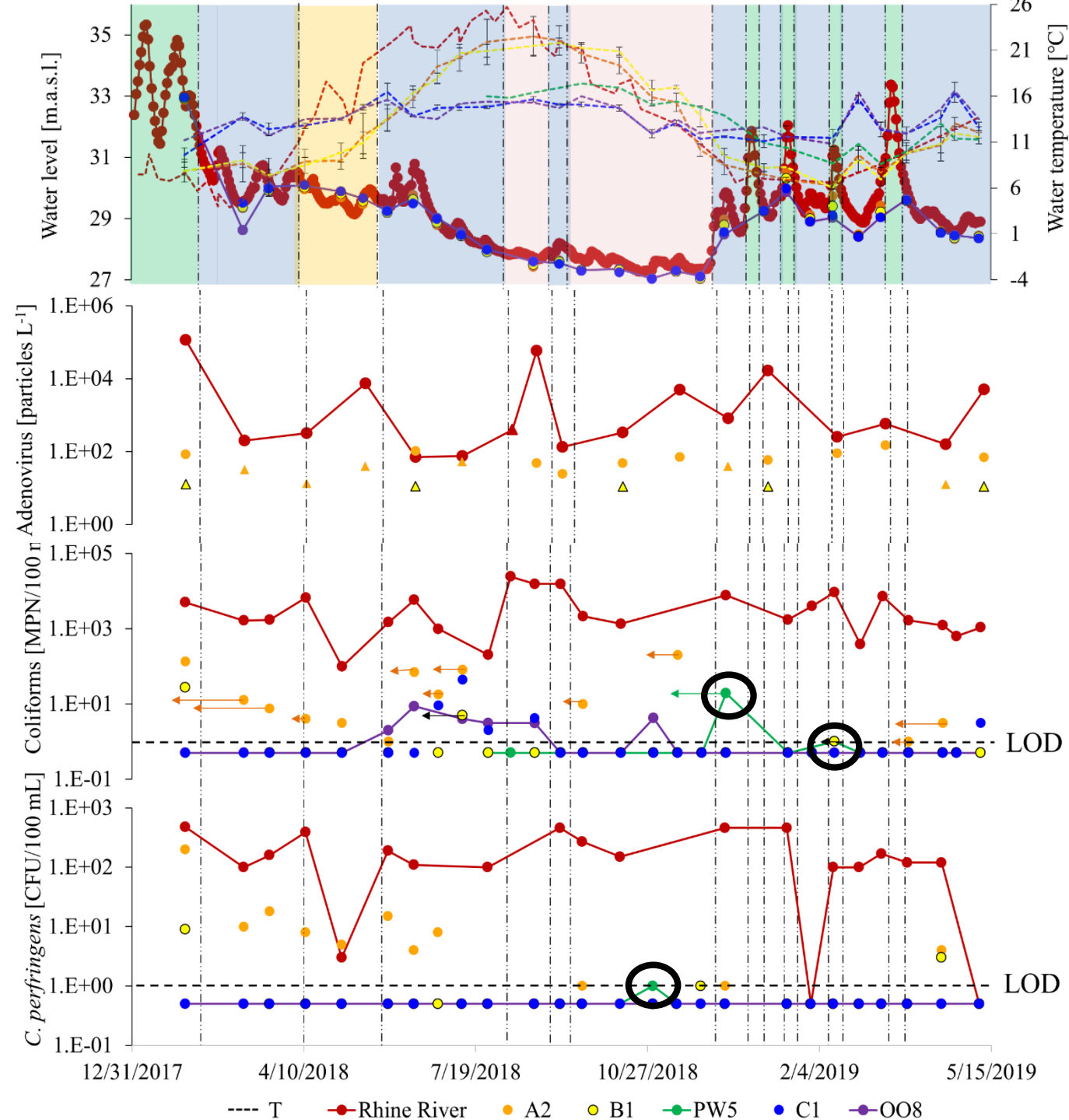
Dynamics of adenovirus

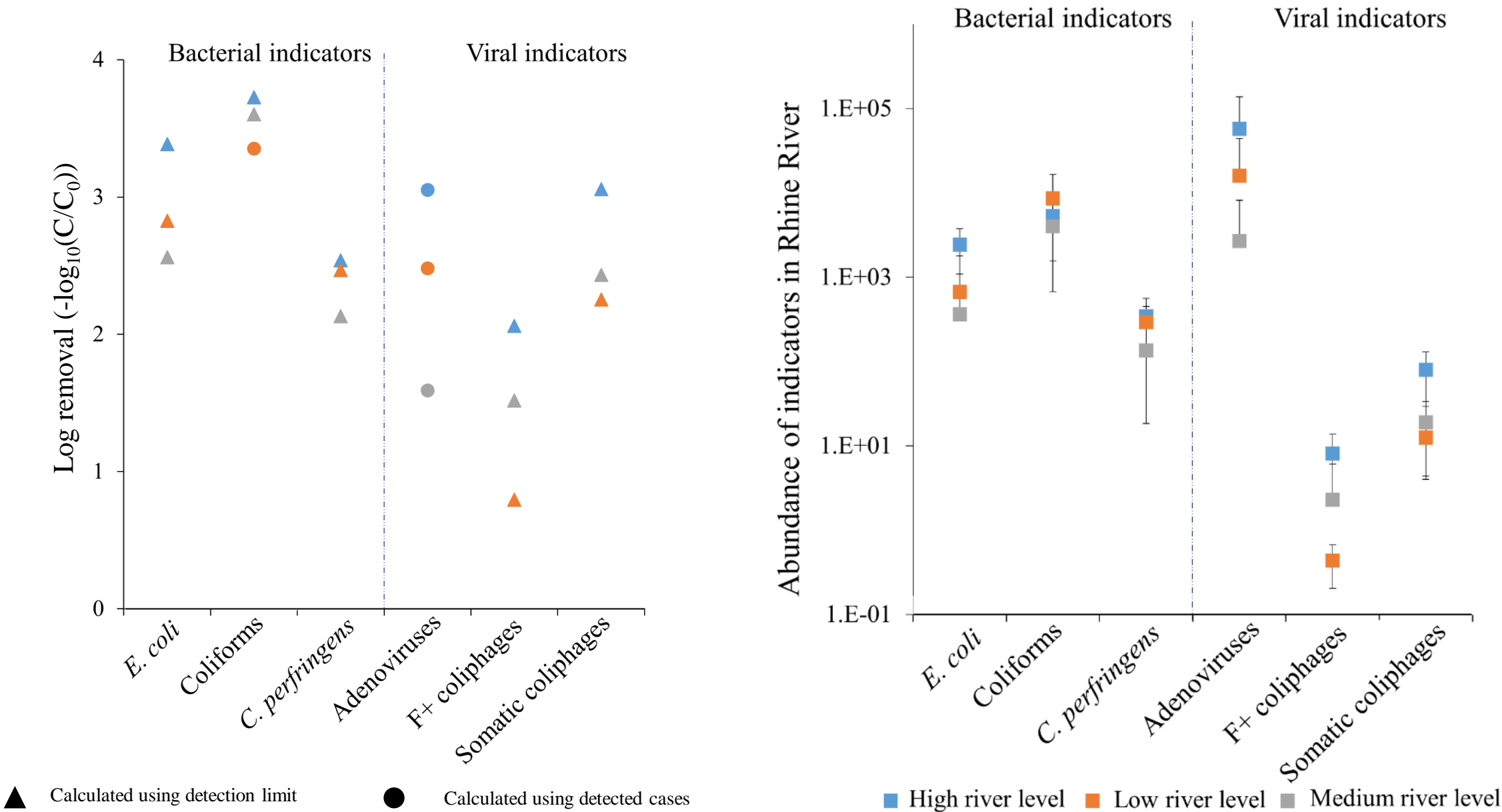High river level

Medium river level

Low river level
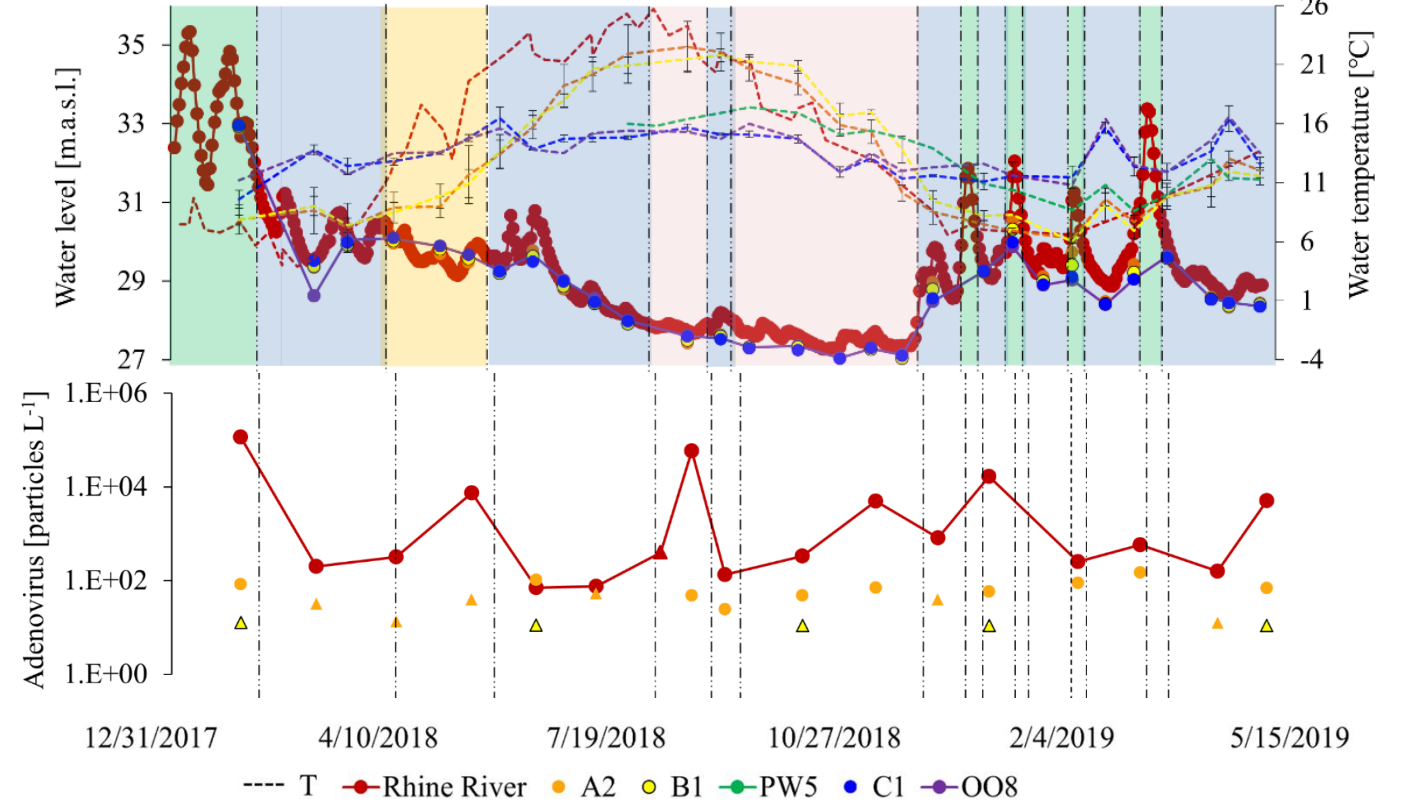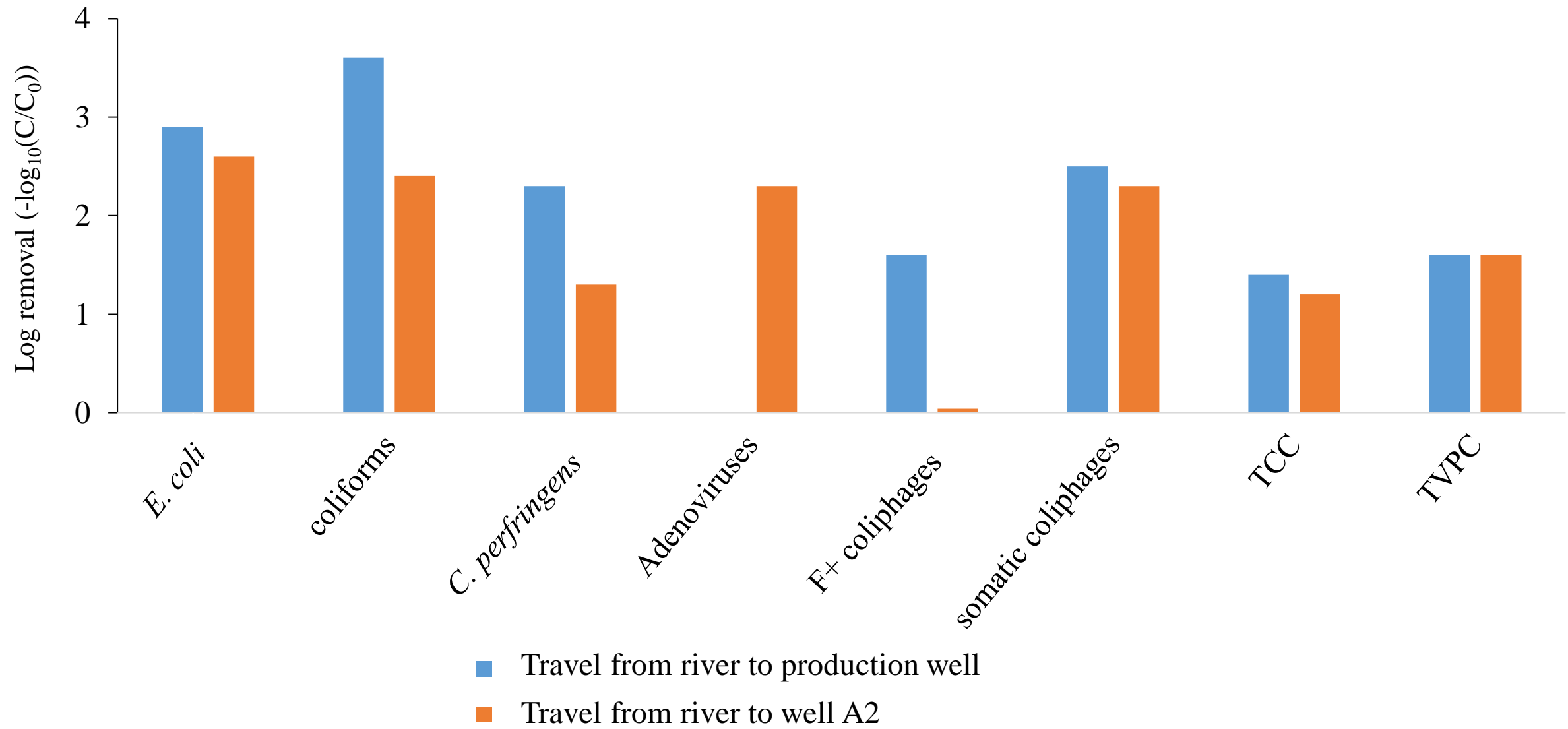
0 pumping

Dynamics of other biological indicators

High river level

Medium river level

Low river level

0 pumping

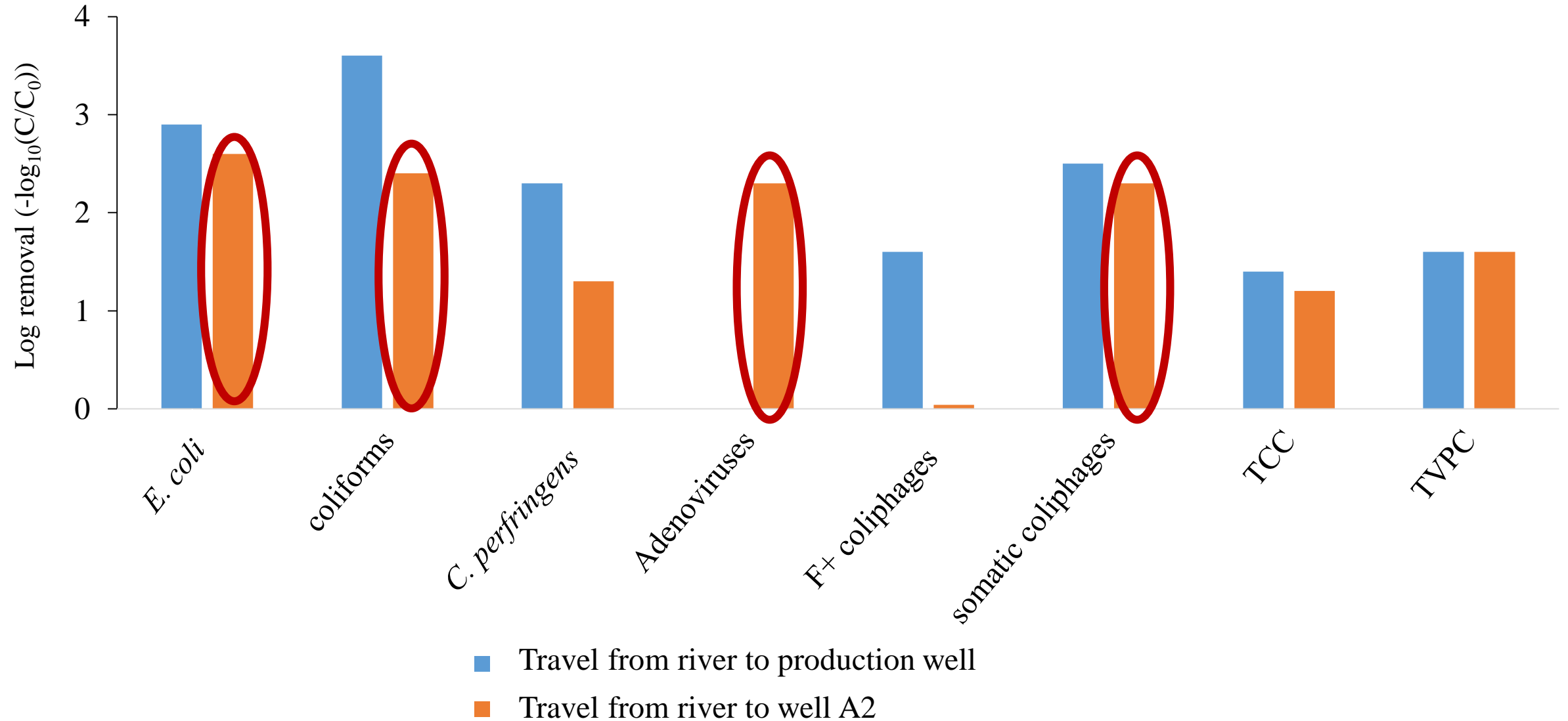# Removal of biological parameters based on different river levels

Removal of biological parameters during whole sampling period

Log removal ($-\log_{10}(C/C_0)$)

E. coli, coliforms, *C. perfringens*, Adenoviruses, F+ coliphages, somatic coliphages, TCC, TVPC

- Travel from river to production well
- Travel from river to well A2

Removal of biological parameters during whole sampling period

Take home messages

❖ **Removal** of adenovirus and fecal indicators during riverbank filtration **was highest during flood events.**

❖ **Most efficient** removal of pathogens takes place in **the early sediment passage**.

❖ **A combination of bacterial and viral indicators** is suitable for risk assessment at different hydrological situations.

❖ **Extreme hydrological events** (floods and droughts) pose a potential **risk to drinking water** production (riverbank filtration)

Dr. Christian Griebler
Sigrid Kaschuba
Dr. Lucas Fillinger
Elisabeth Ramm
Petra Seibel
Jasmin Danzberger

Dr. Hans-Peter Rohns
Dr. Björn Droste
Timo Binder
Konstantin Garidis

Thanks!

wangh92@univie.ac.at

Dr. Irina Engelhardt
Dustin Knabe

Dr. Christine Stumpp

Dr. Johannes Ho