



KALMAR SOUND WWTP

# Effluent polishing with UF and GAC

## Seminar 2017-03-09 Lund

# Content

1. Project Kalmarsound WWTP
2. New technology i membrane filtration
3. (Criteria for) choice of treatment system
4. Reduction of micro pollutants
5. Kalmar pilot

# Project Kalmar Sound WWTP



# **New technology in membrane filtration**

# New technology....

1. EU Water Directive in Sweden:  
=>  $0.1 \text{ mgP}_{\text{tot}}/\text{l}$  for WWTP
2. Microplastics
3. Stockholm Water chooses MBR-technology
4. GRYAAB implements UF for potable water production
5. Micropollutants

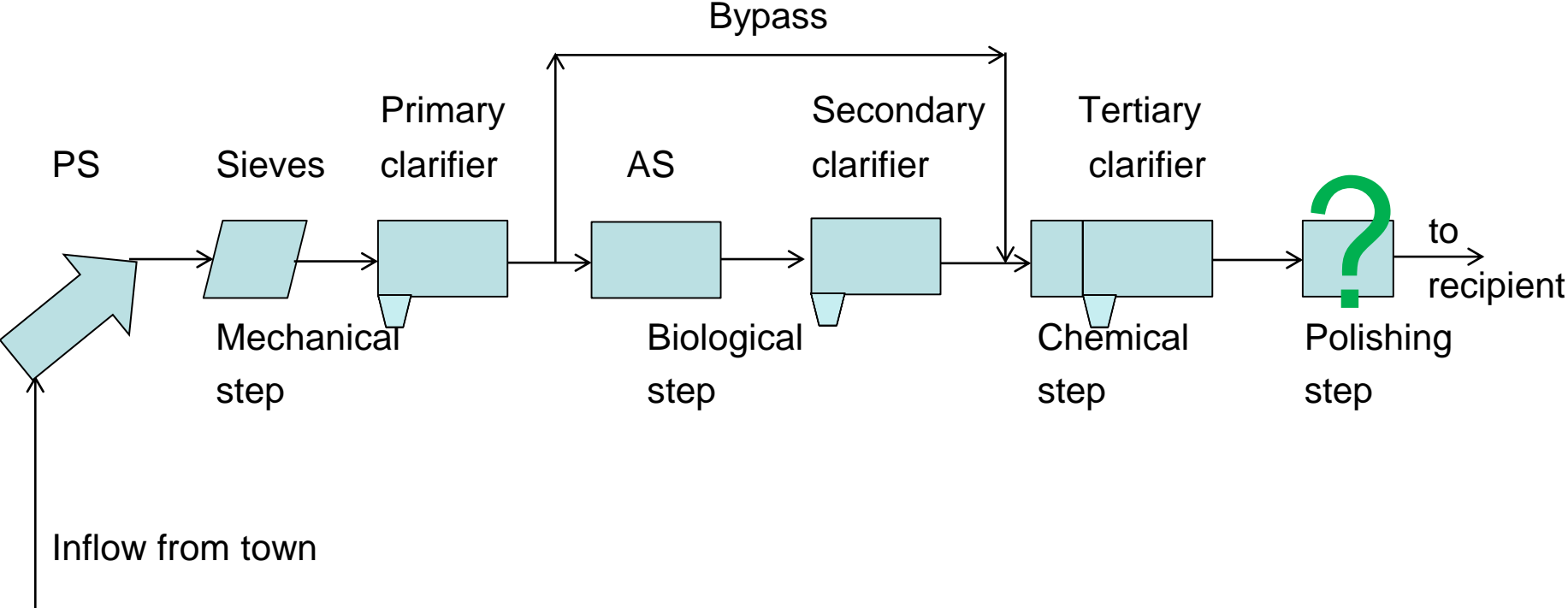
# Criteria for choice of treatment system

# Criteria with weighting

1. Chemical consumption	40
2. Energy	40
3. Emissions to water	100
4. Emissions to air	10
5. Recycling	40
6. Vulnerability	80
7. Flexibility regarding expansion	60
8. Flexibility regarding additional treatment requirements	60
9. Infectivity	100
10. Costs	50



# Choice of treatment system



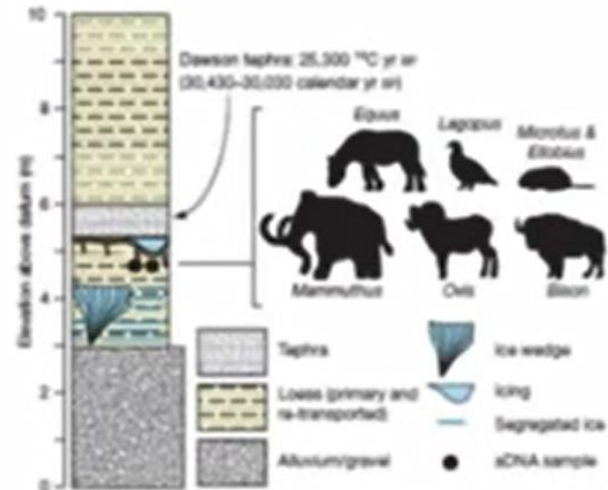
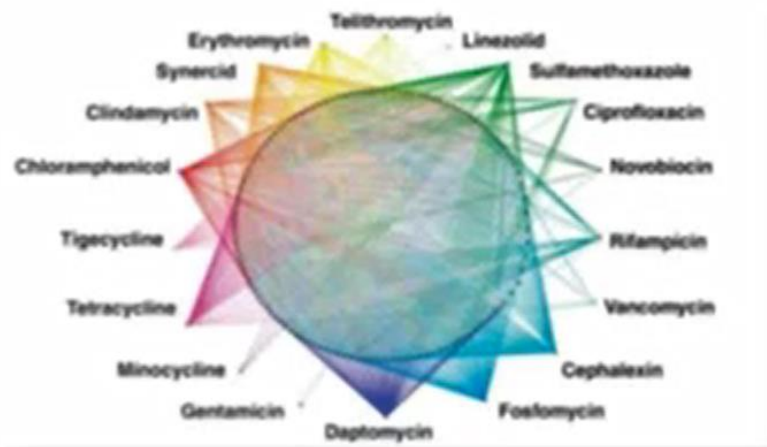
# Categorizing UF-filtration

	MBR	UF-polishing
Flux	15lmh	35lmh
Type of membrane	0,04µm expensive	0,02µm less expensive
Design	For normal maximum flows	For any partial flow
Cost efficiency	Less due to large variation in flows	Stable flow results in good efficiency
Water temperature	8°C lasting two consecutive weeks requires large extra membrane area	
Reduction of micropollutants	PAC => in sludge GAC => ok	PAC => separate removal possible GAC => ok

# Antibiotic resistance

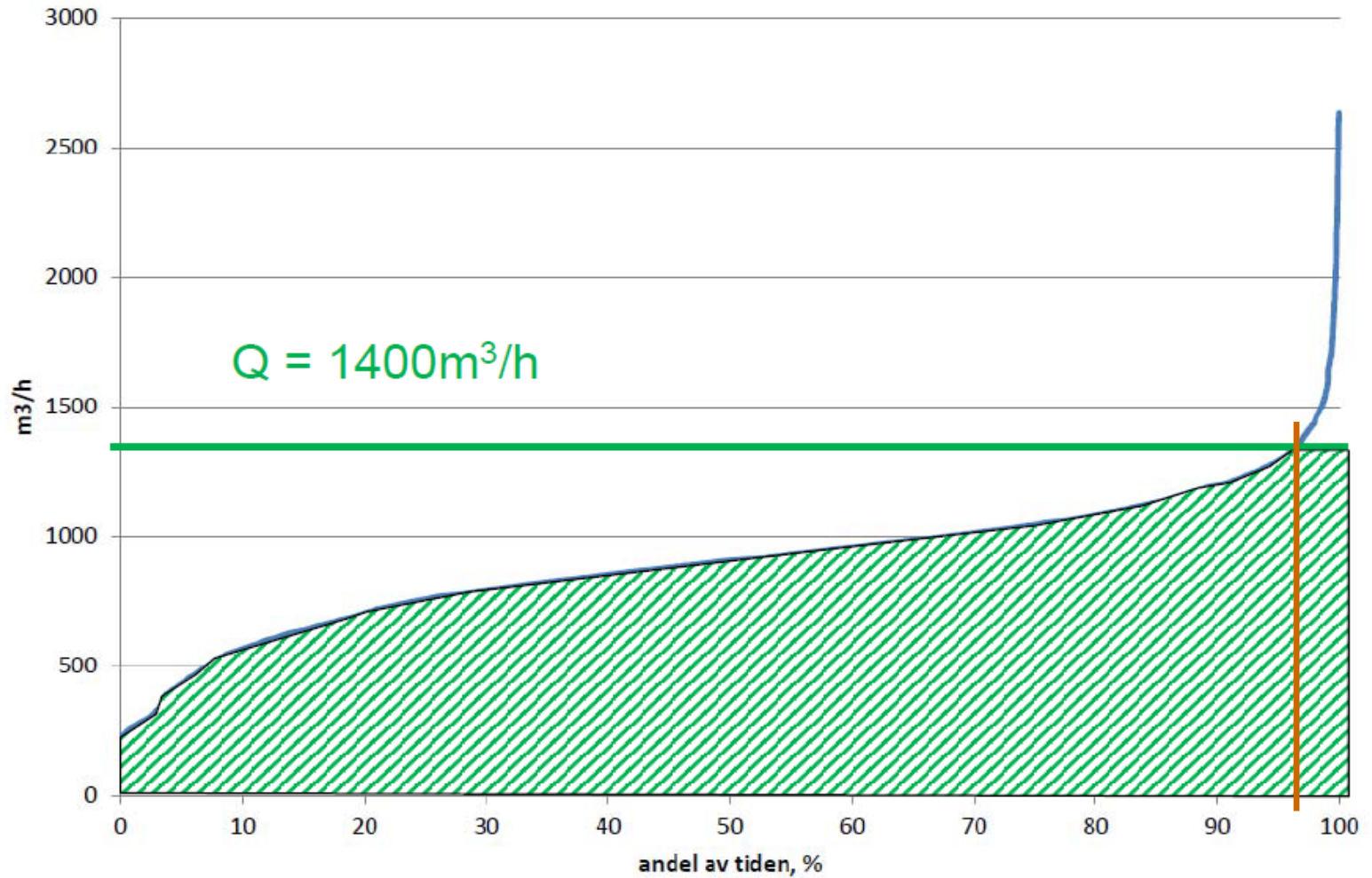
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## The environmental resistome



- Soil-dwelling bacteria (eg. actinomycetes) produce and encounter a myriad of antibiotics
- They constitute a "complete library" of antibiotic resistance genes that could be mobilized into the microbial community including human associated commensal and pathogenic bacteria

# Design of UF-polishing step for Kalmar Sound WWTP



>95% of total volume

# Reduction of micropollutants

# Reduction of micropollutants

1.  $O_3$  => additional biological process required
2. PAC => difficult working environment?  
=> sludge handling?
3. GAC => appears to be an easy complement

# Kalmar pilot

# UF-pilot from GE

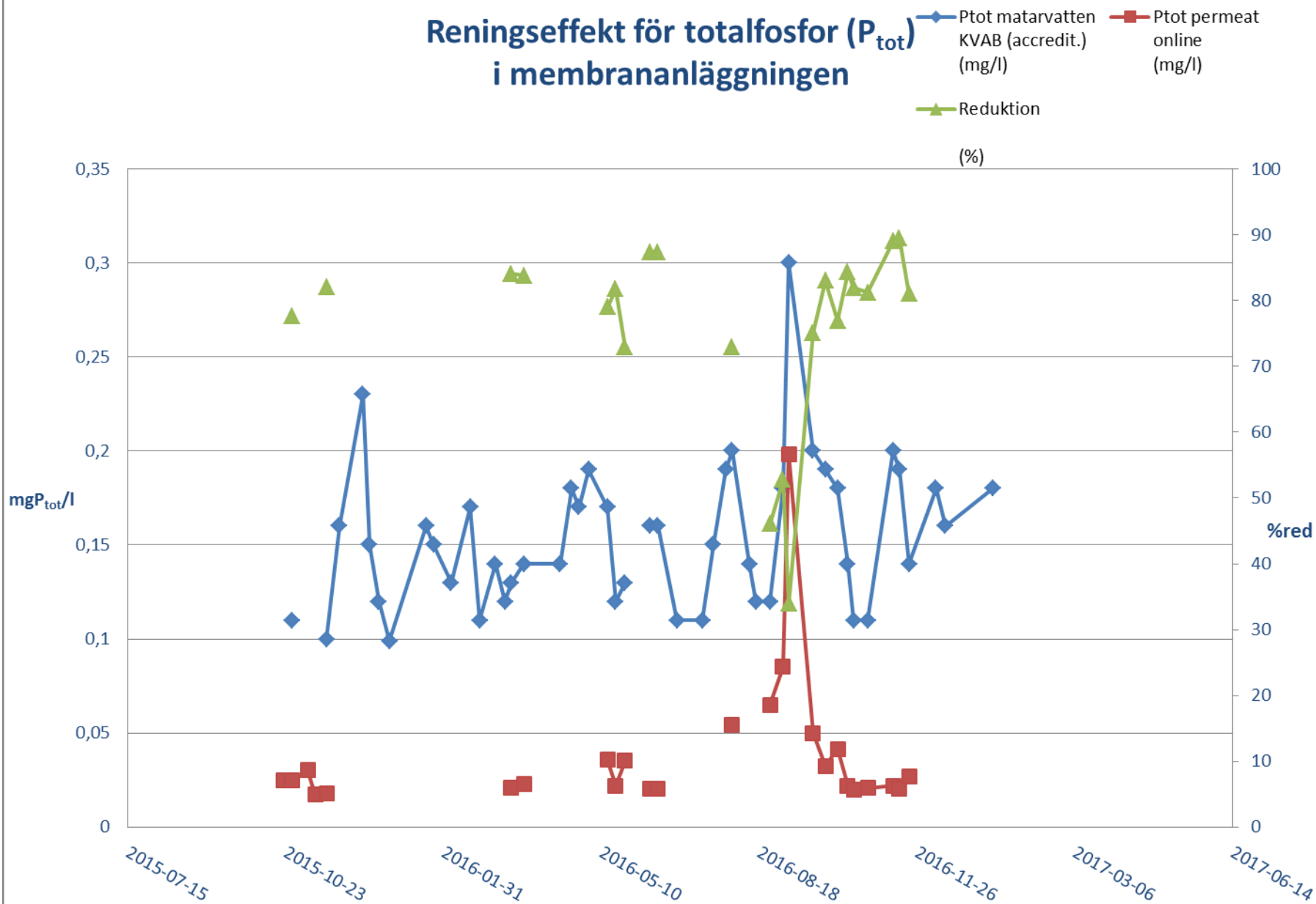




# GAC-pilot à la Kalmar

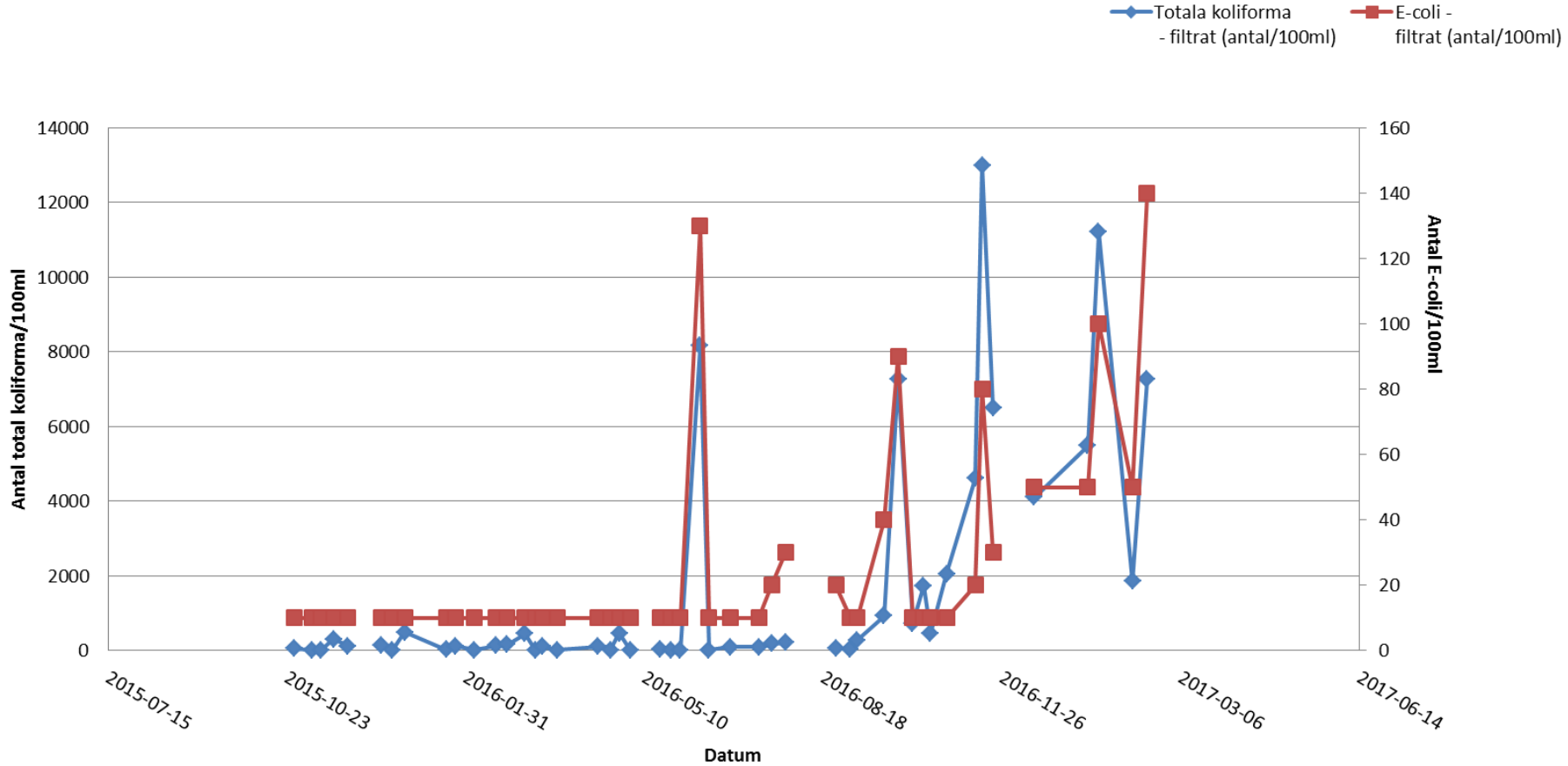


# Reningseffekt för totalfosfor ( $P_{tot}$ ) i membranläggningen

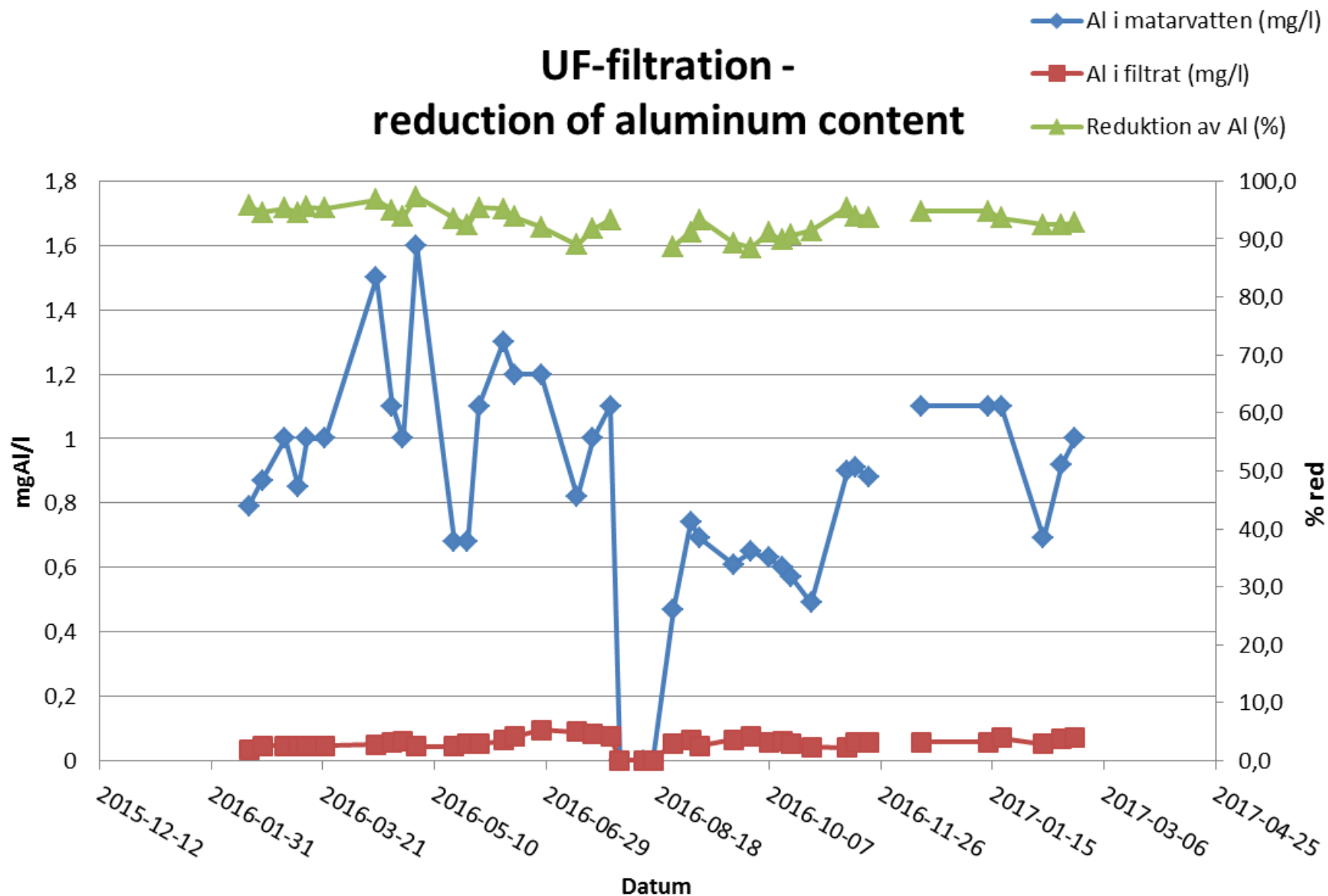


Analysis result t <10 converted to 10

## Number of bacteria in permeate

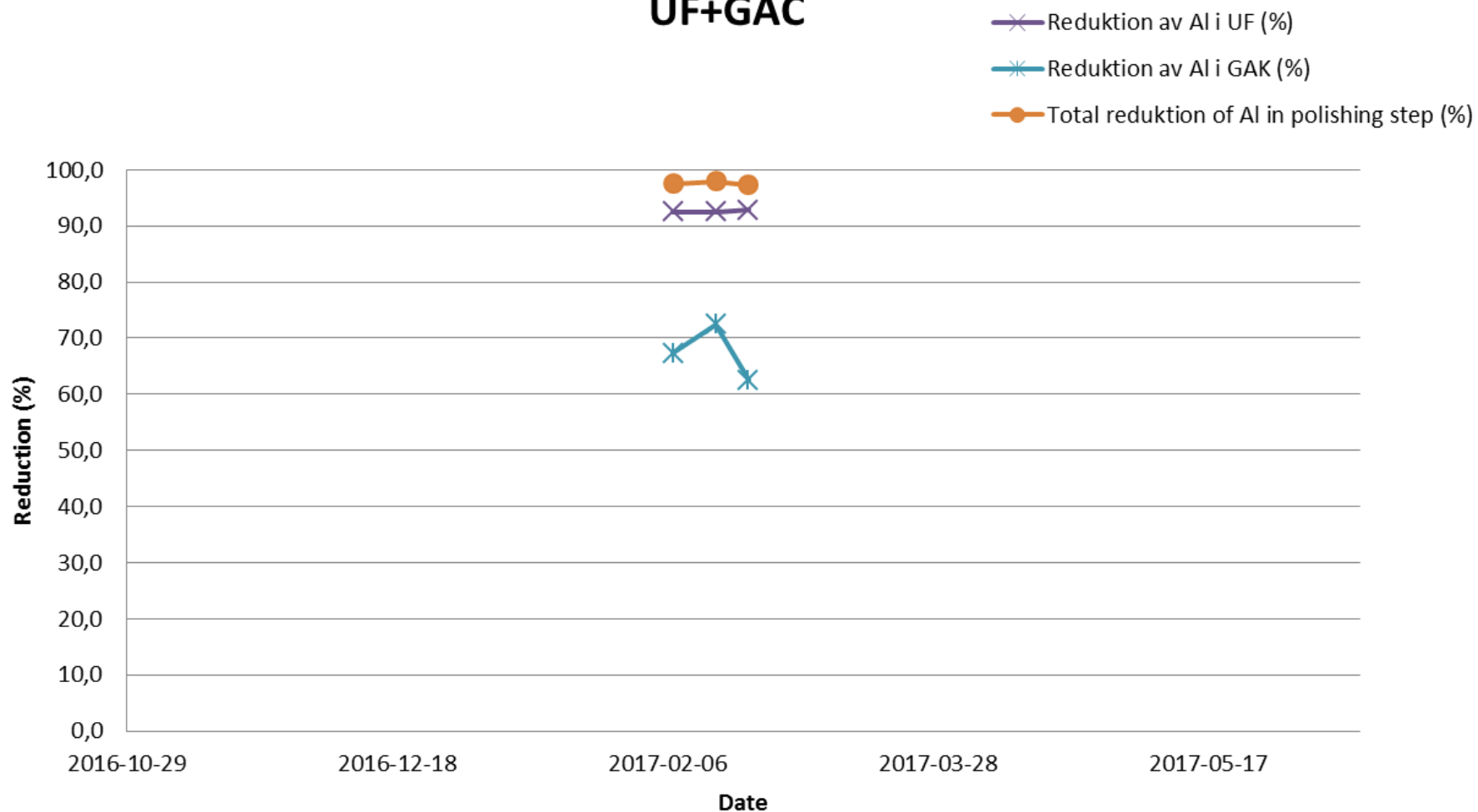


# UF-filtration - reduction of aluminum content



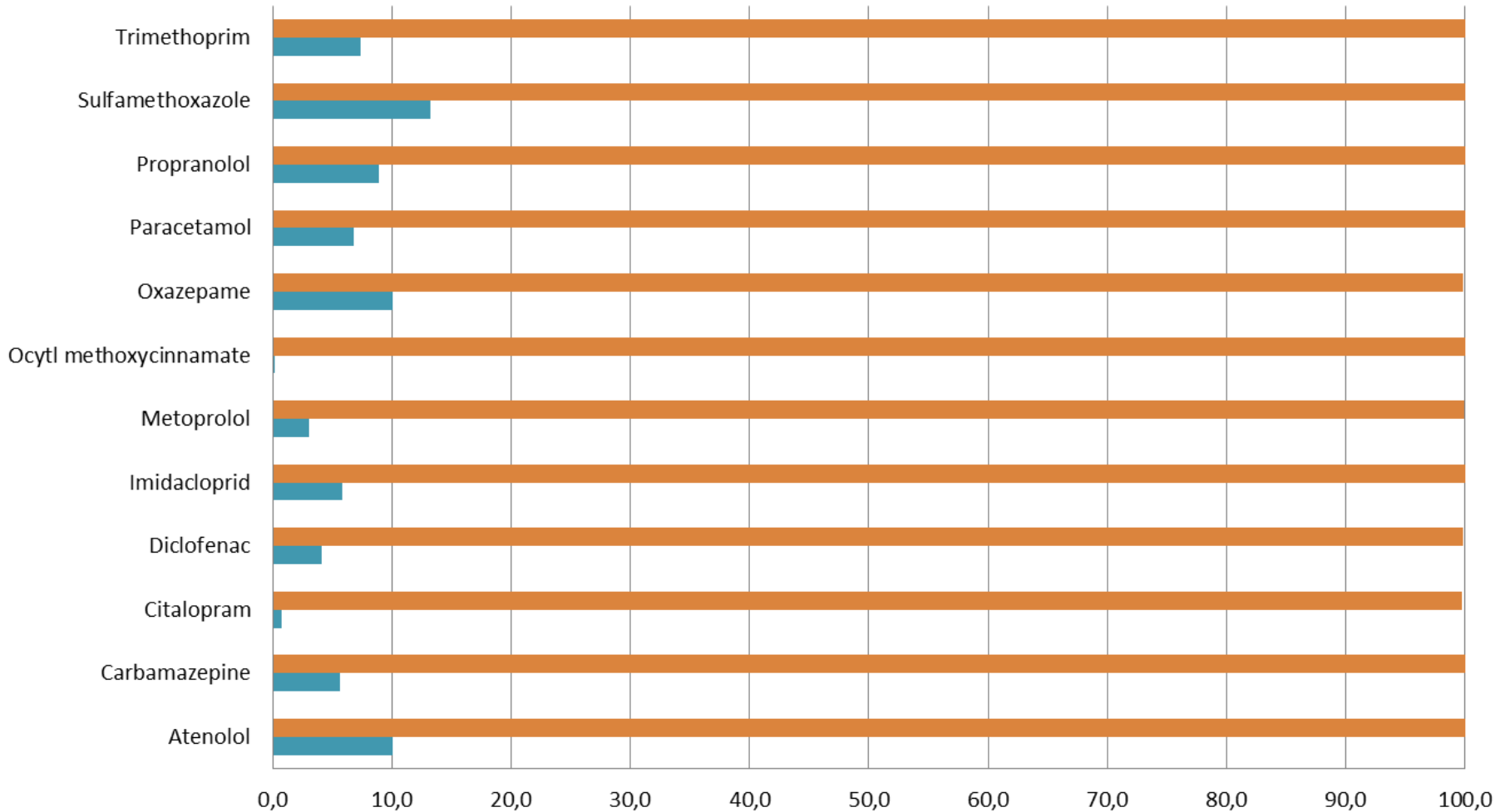
# Reduction of Al in polishing treatment

## UF+GAC



# Reduction of micropollutants in polishing step - one sample

After GAC  
After UF



**Thanks for your  
attention!**

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