Threats to ecosystem services of perialpine lakes induced by manufactured nanoparticles?

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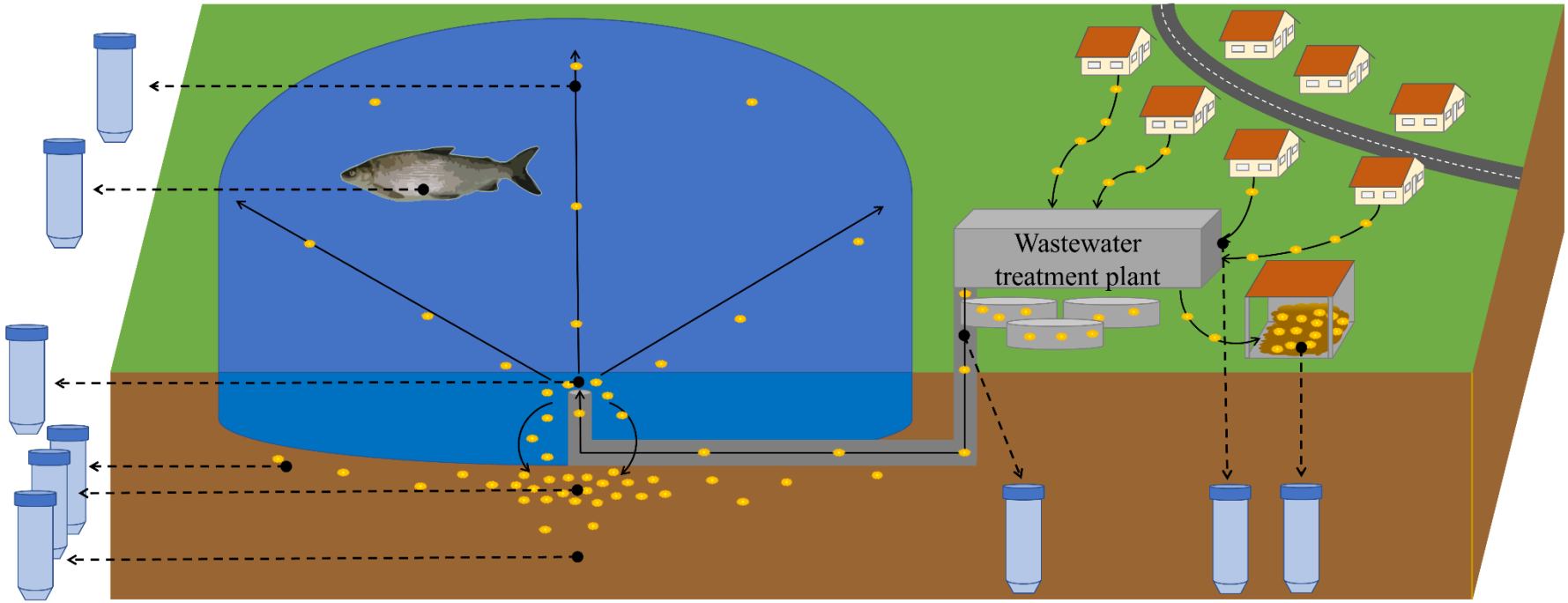
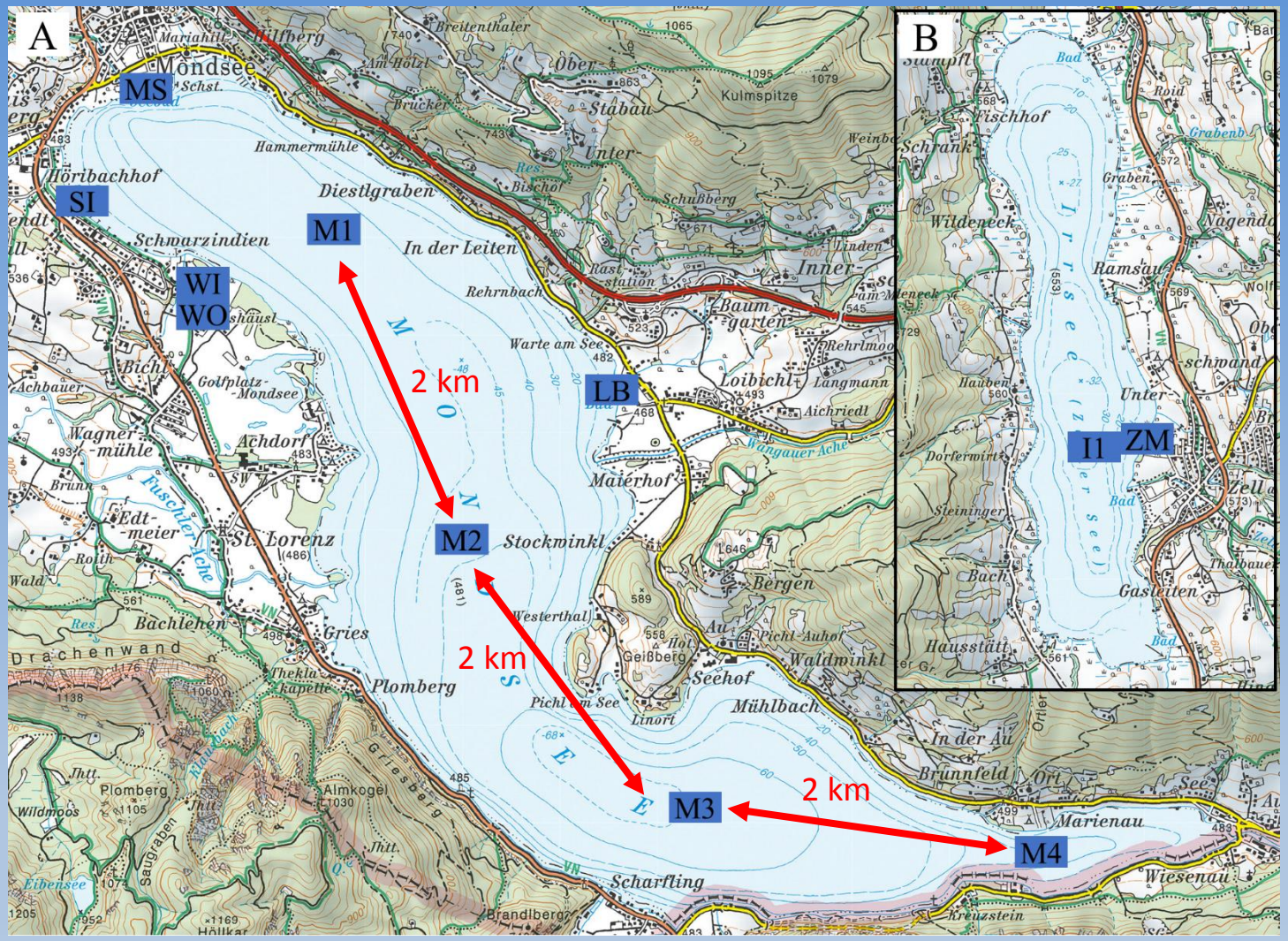
Pathway of manufactured nanoparticles



Study Site



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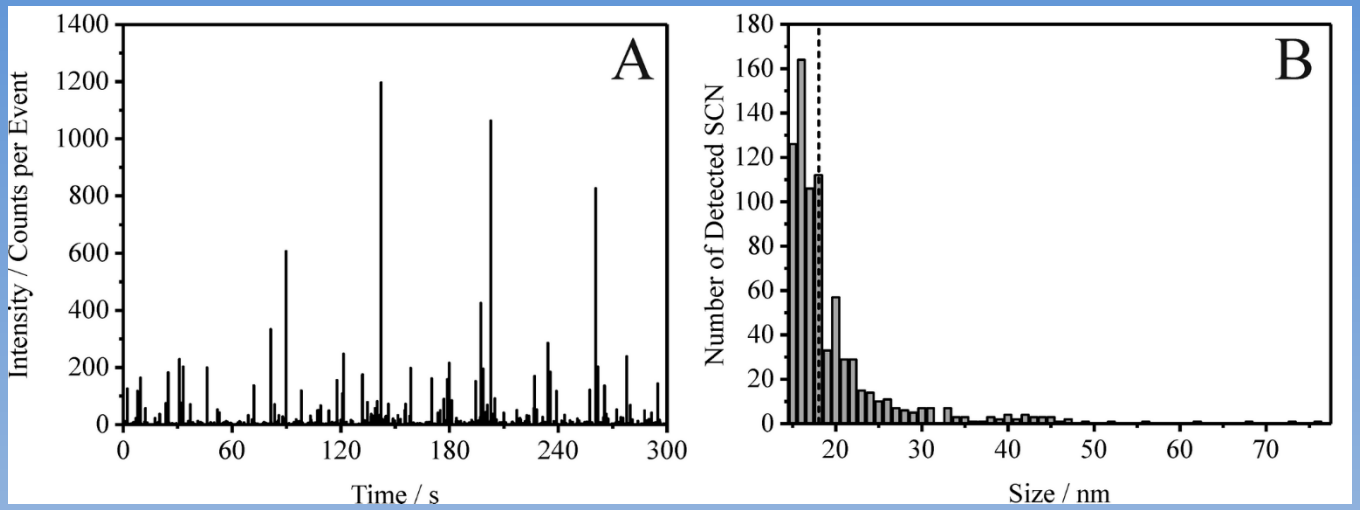
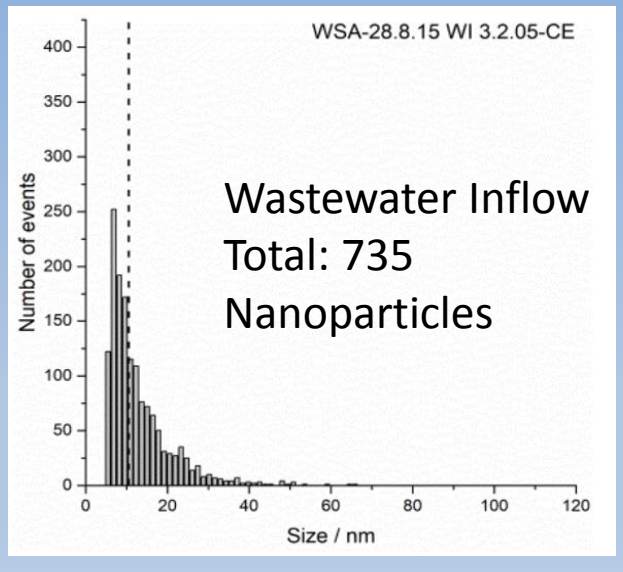
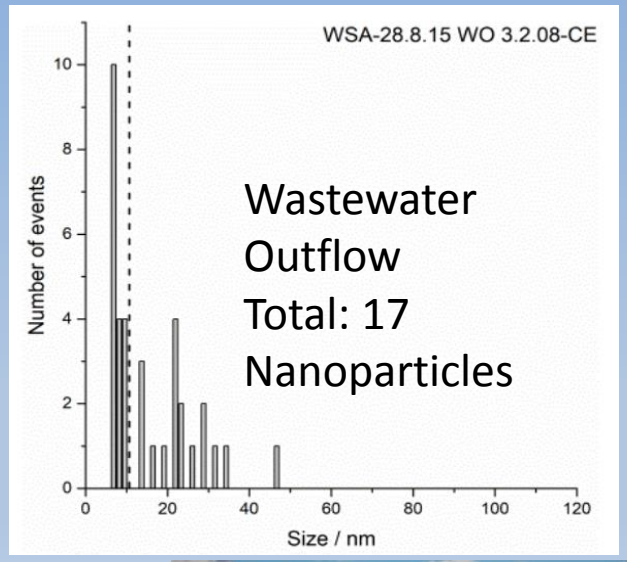
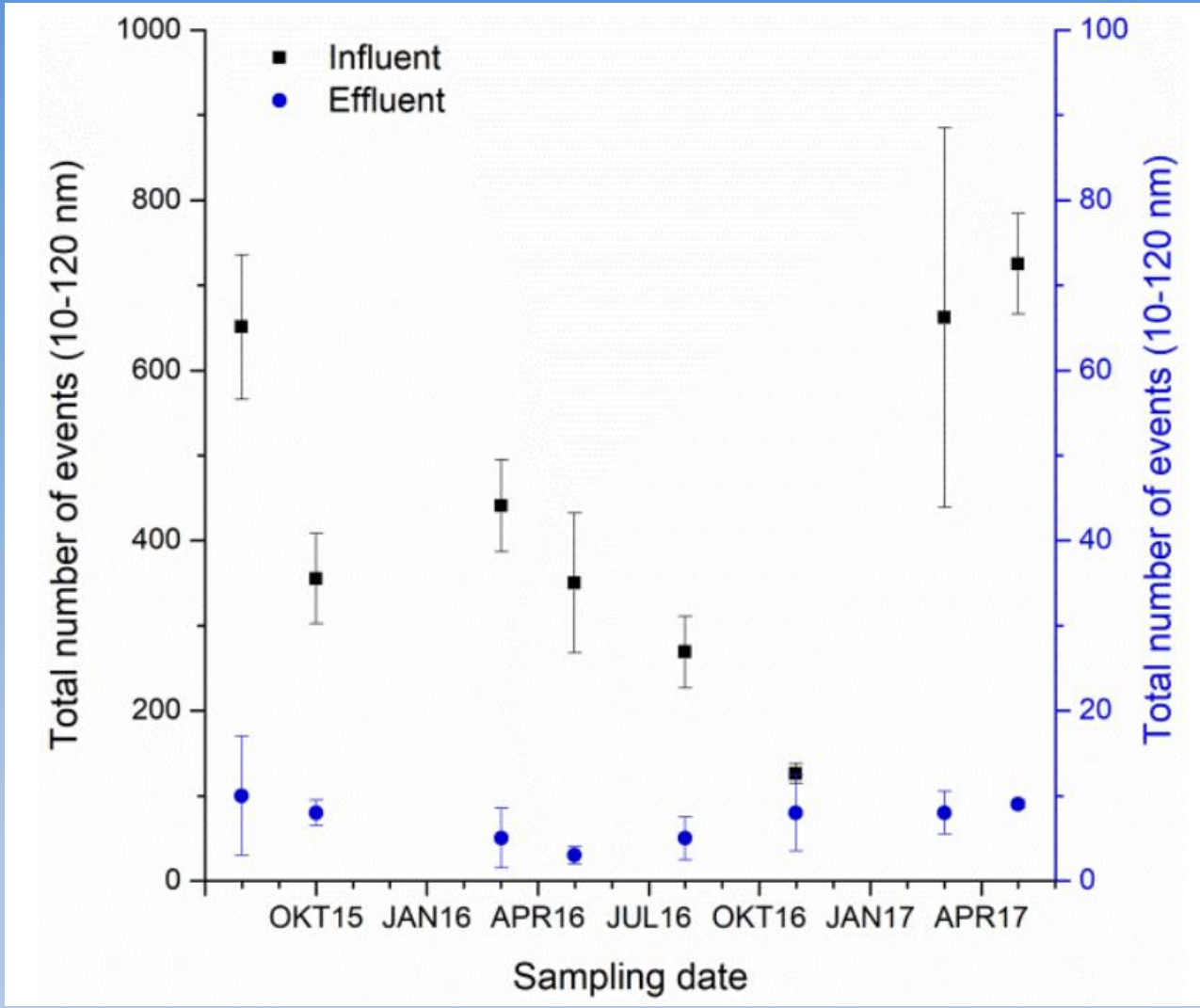
Results


A
Intensity / Counts per Event
Time / s
B
Number of Detected SCN
Size / nm

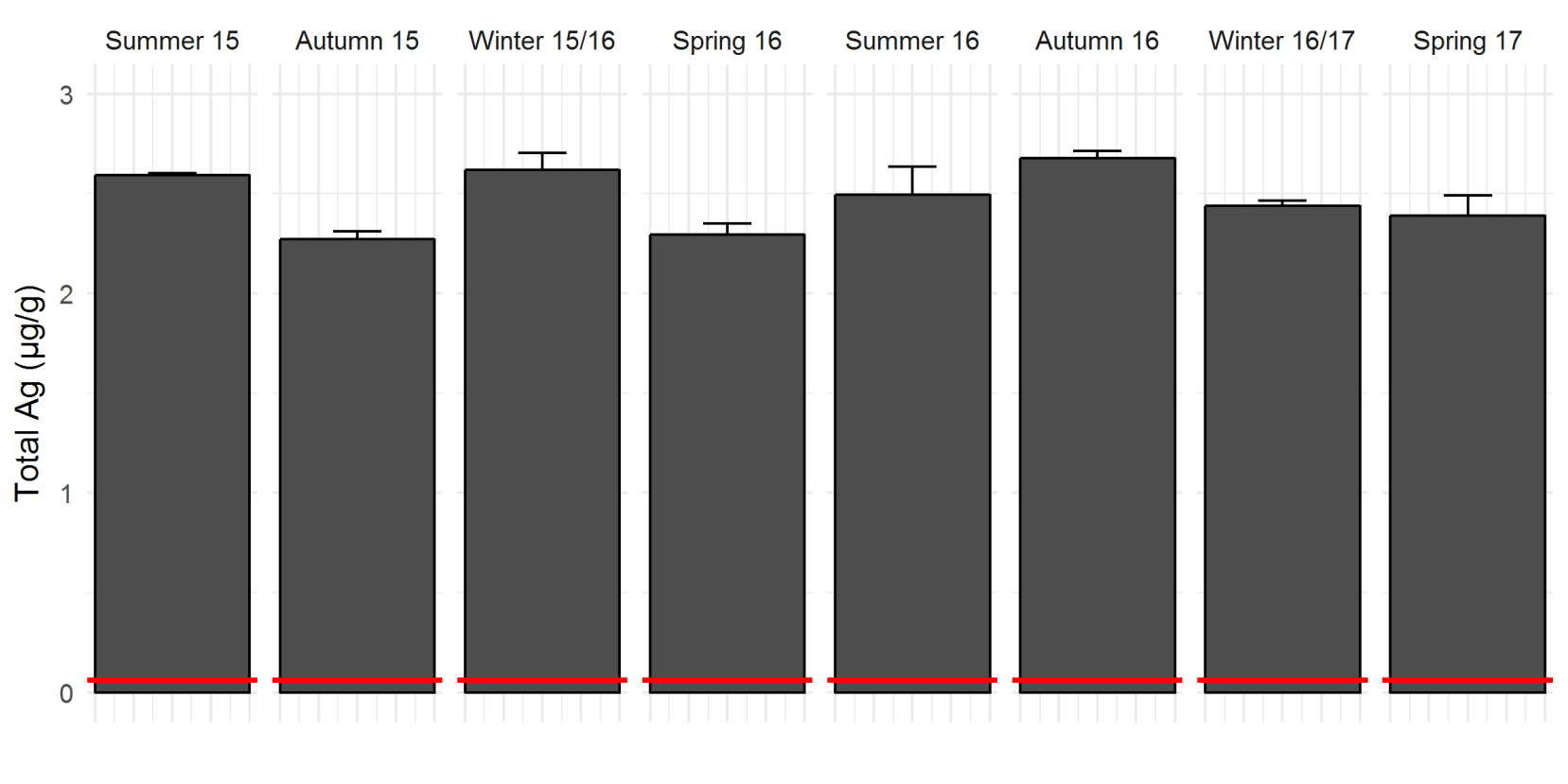

WSA-28.8.15 WI 3.2.05-CE
Number of events
Size / nm
Wastewater Inflow
Total: 735
Nanoparticles


WSA-28.8.15 WO 3.2.08-CE
Number of events
Size / nm
Wastewater
Outflow
Total: 17
Nanoparticles

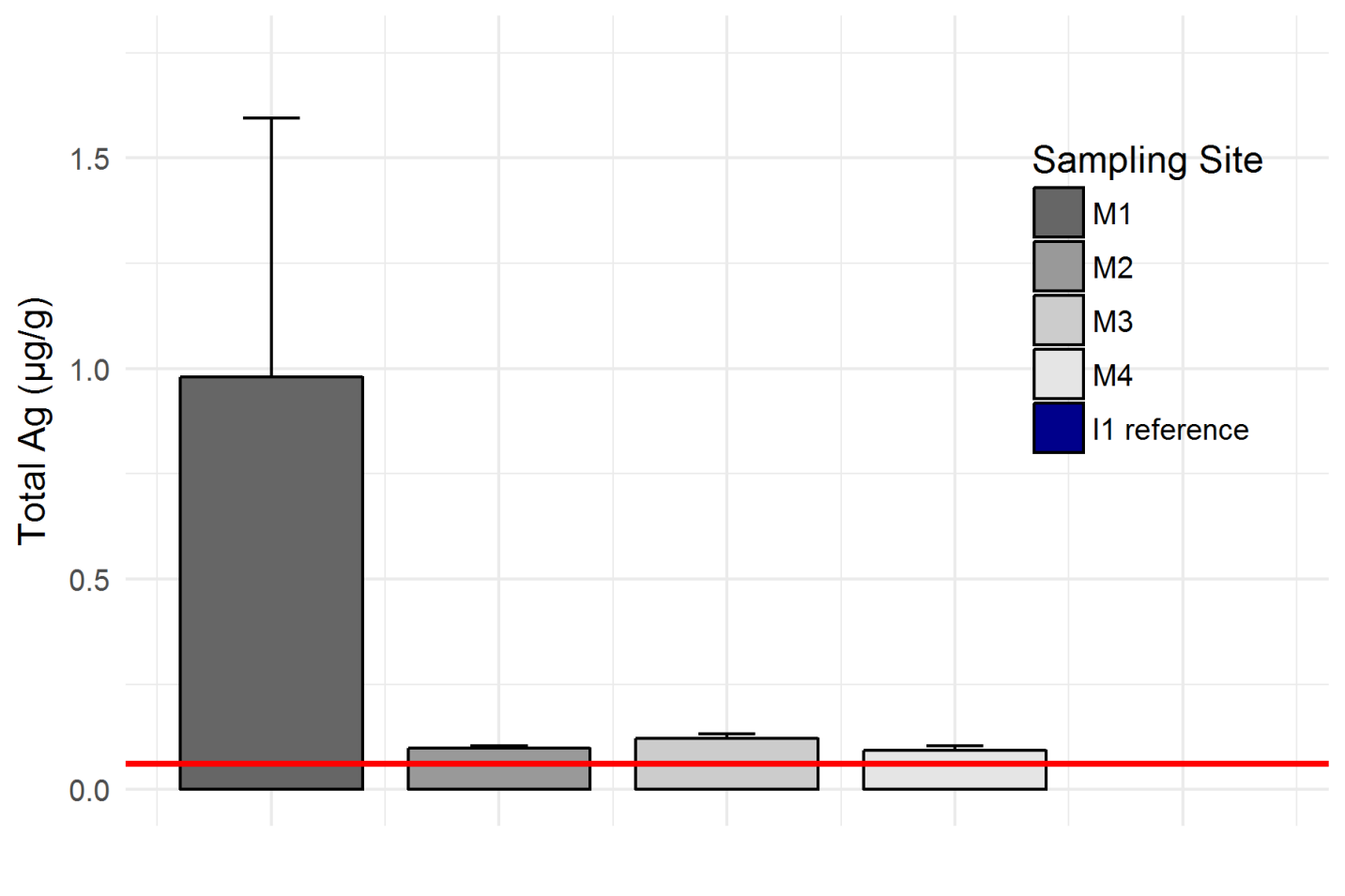
Results


Influent
Effluent
Total number of events (10-120 nm)
Total number of events (10-120 nm)
1000
800
600
400
200
0
100
80
60
40
20
0
OKT15
JAN16
APR16
JUL16
OKT16
JAN17
APR17
Sampling date

Results


Summer 15
Autumn 15
Winter 15/16
Spring 16
Summer 16
Autumn 16
Winter 16/17
Spring 17
Total Ag (µg/g)
0
1
2
3

Results



Conclusions

- The present study showed for the first time the potential of a newly modified SP-ICP-MS with microsecond time resolution as a future sophisticated screening tool to detect SCN in environmental samples. Applying this novel method confirmed the presence of SCN in the influent of the WWTP.
- Results suggest that total silver and SCN enter the municipal WWTP at comparable ratios throughout the seasons but are effectively removed during wastewater treatment. As a consequence, silver and SCN were barely detected in the lake water.
- However, the constant discharge of low silver doses into Lake Mondsee via purified wastewater resulted in an accumulation in the sediment at the discharge area and was even measurable in the sediment up to 6 km distance from the wastewater discharge point.
- Silver concentrations in Lake Mondsee were always at the lower end of previously reported studies and no silver was detected in any fish organ and the reference lake.
- The investigated lake ecosystem is currently not at risk, but due to the high accumulation in the sediments, future risk cannot be excluded.

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