Pesticides in Swedish surface and groundwater – results from a comprehensive screening study 2015

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CKB Center for Chemical Pesticides

Background

- The long-term Swedish national pesticide monitoring program includes 4 smaller catchments and 2 rivers – started in 2002
- In 20015 the Swedish EPA was commission by the government to conduct a comprehensive screening of pesticides (and PFASs)
- The aim was a spatial extension of the national monitoring program for both surface and groundwater
  - With focus on agriculturally intensive areas and, for groundwater, potentially vulnerable drinking water wells
- Regional authorities were invited to add sampling sites, at their own expenses, to extend the national screening program
- CKB at SLU executed the screening program

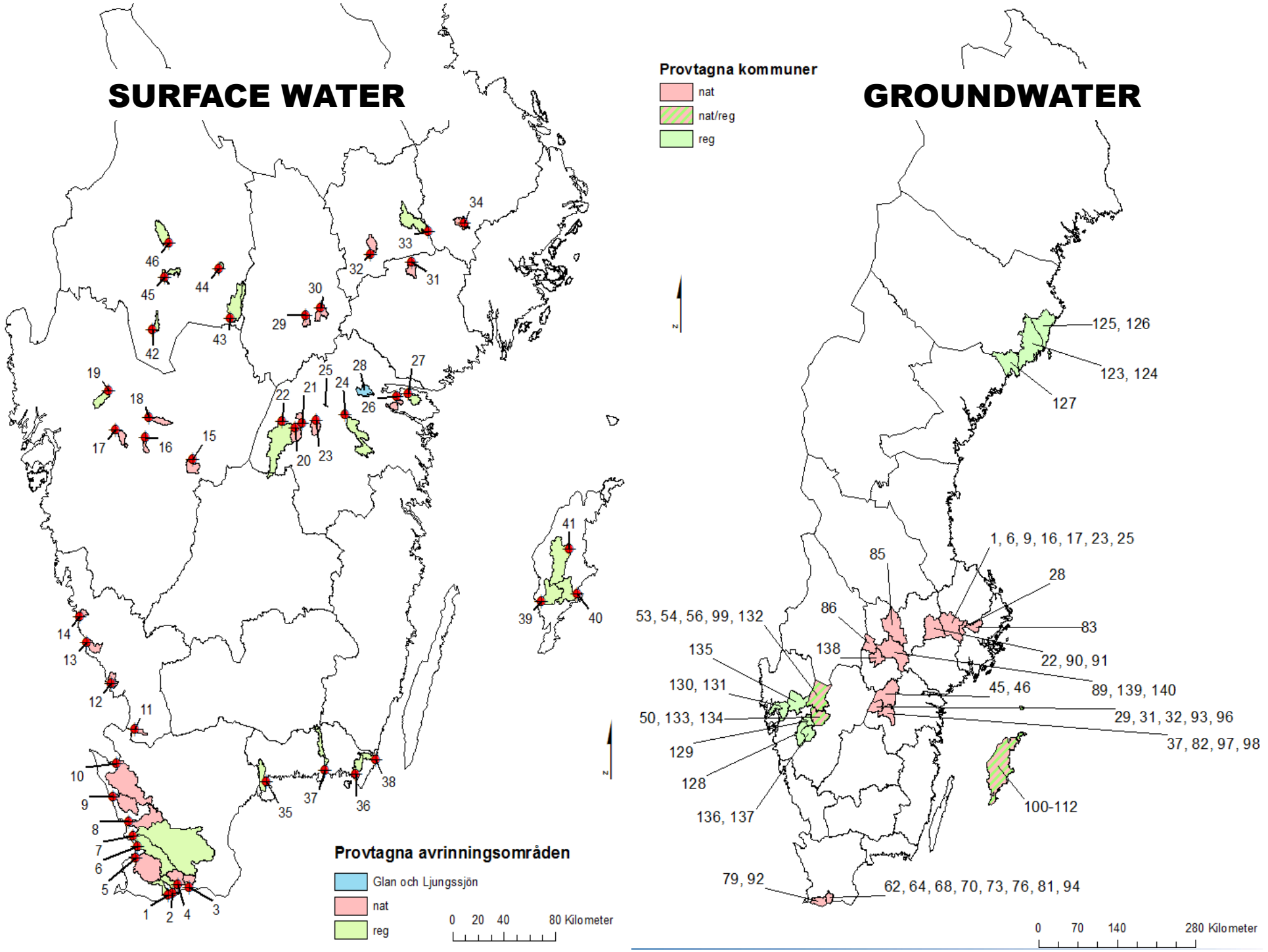
Overview

Surface water

- 46 rivers (incl. regional)
- Medium sized catchments (ca 20-100 km^2)
- > 40% arable land (typically)
- 1 - 5 samples/location
- May - October
- 131 substances analysed, LOD ca 0.1 - 10 ng/L

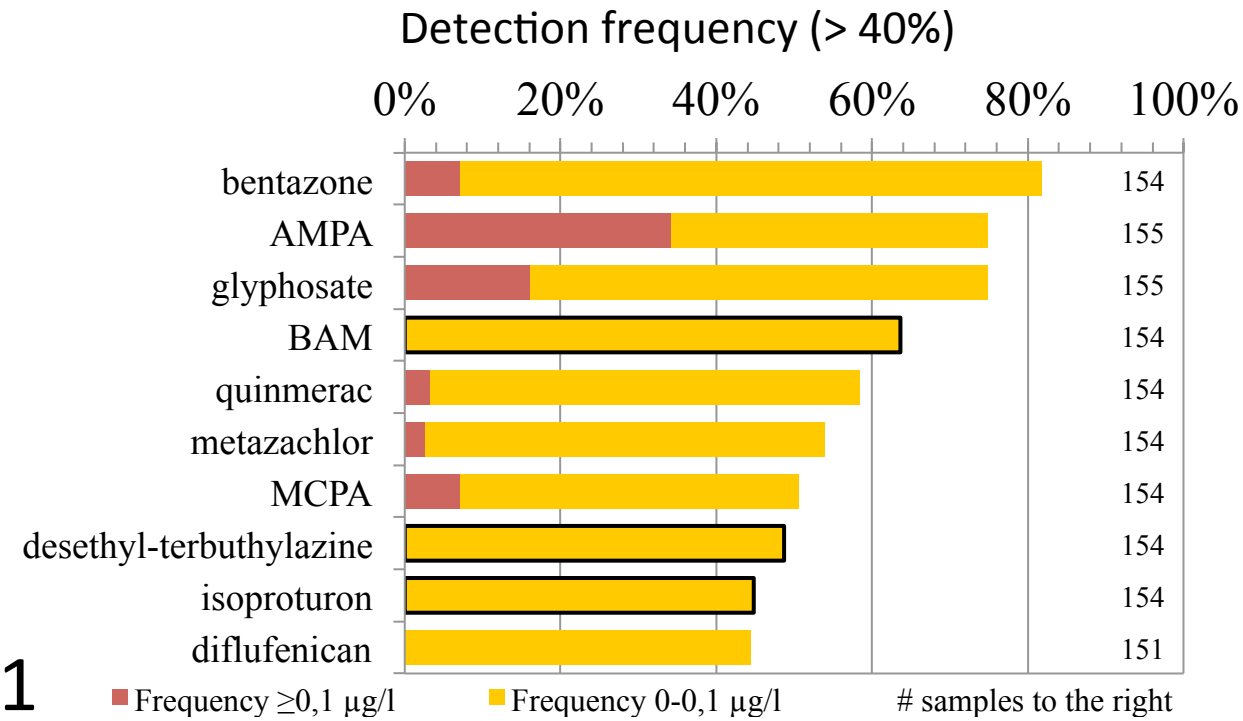
Groundwater

- 54 private drinking water wells
- 18 municipal ground-water works (regional)
- 1 sample/location
- July - October
- 108 substances analysed, LOD ca 1 - 10 ng/L (plus nutrients and microbes)


SURFACE WATER
GROUNDWATER
Provtagna kommuner
nat
nat/reg
reg
Provtagna avrinningsområden
Glan och Ljungssjön
nat
reg
0 20 40 80 Kilometer
0 70 140 280 Kilometer
1, 6, 9, 16, 17, 23, 25
28
83
22, 90, 91
89, 139, 140
45, 46
29, 31, 32, 93, 96
37, 82, 97, 98
100-112
62, 64, 68, 70, 73, 76, 81, 94
79, 92
136, 137
128
129
50, 133, 134
130, 131
135
53, 54, 56, 99, 132
86
85
138
125, 126
123, 124
127

Results surface water

- Widely used herbicides dominated
- Overall 72 different substances detected
- At least one substance ≥ 0.1 µg/l in 45 % of samples



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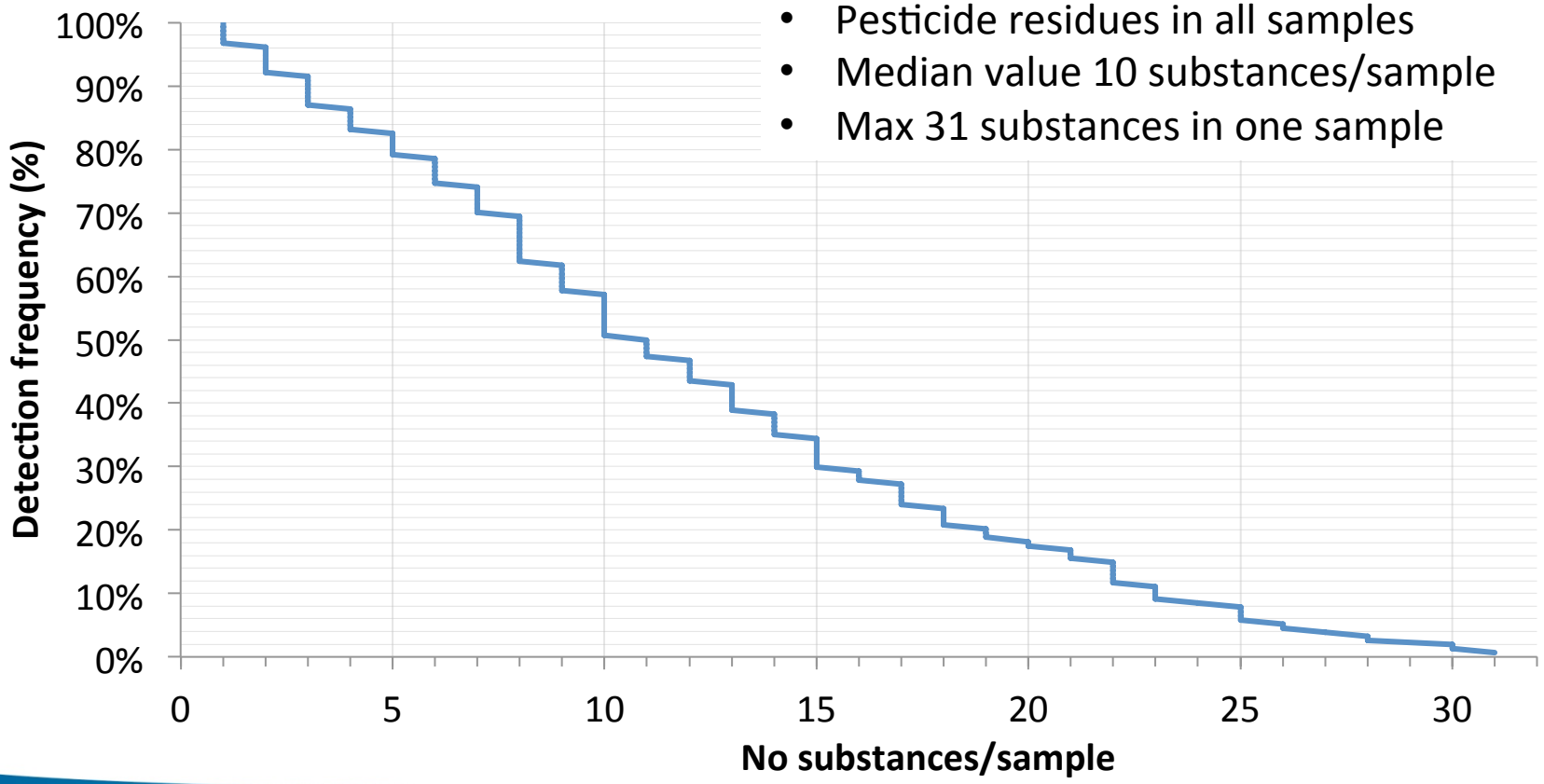
Results surface water

- Pesticide residues in all samples
- Median value 10 substances/sample
- Max 31 substances in one sample



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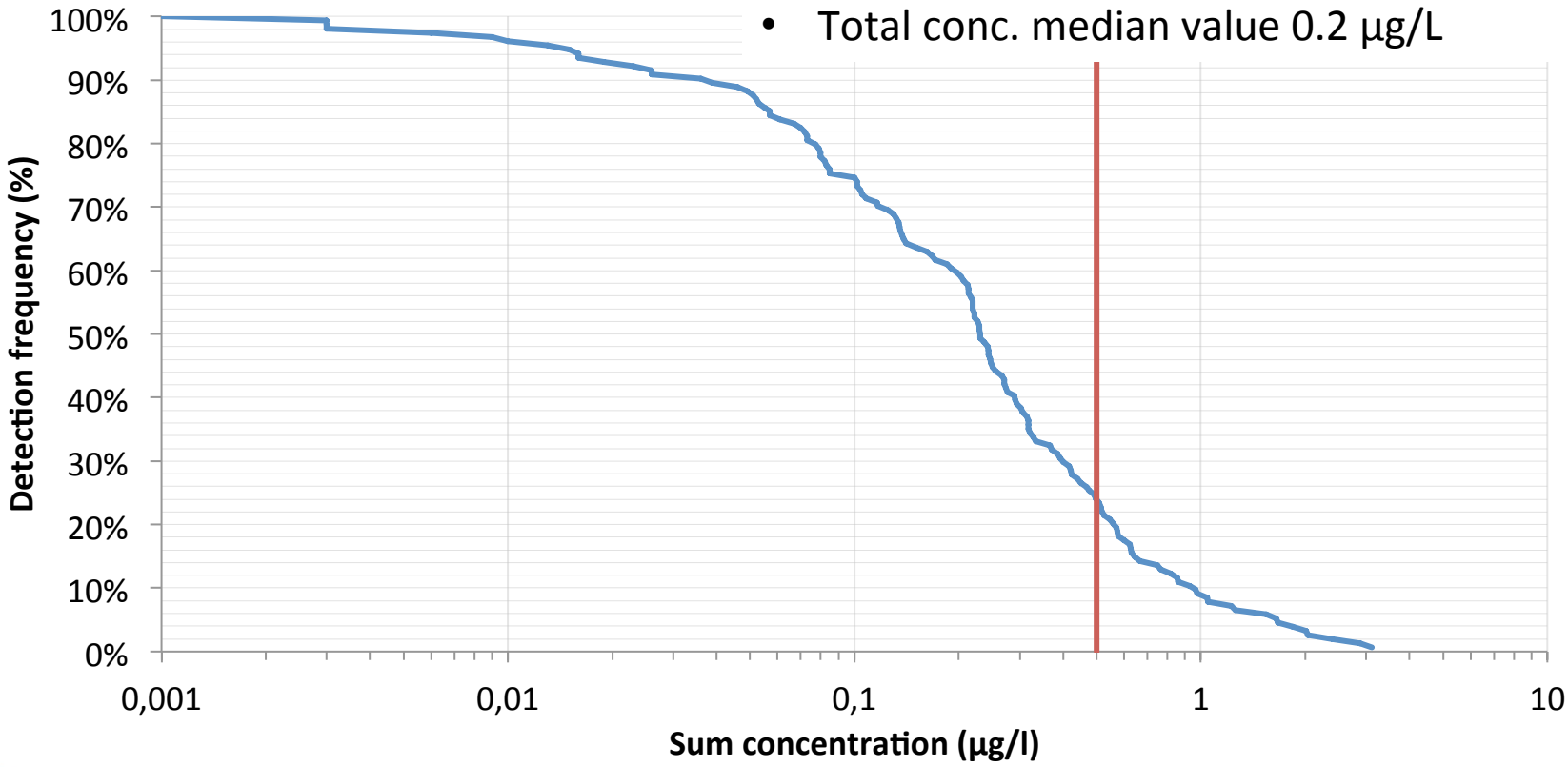
Results surface water

- Total conc. ≥ 0.5 µg/l in 25 % of the samples
- Total conc. median value 0.2 µg/L



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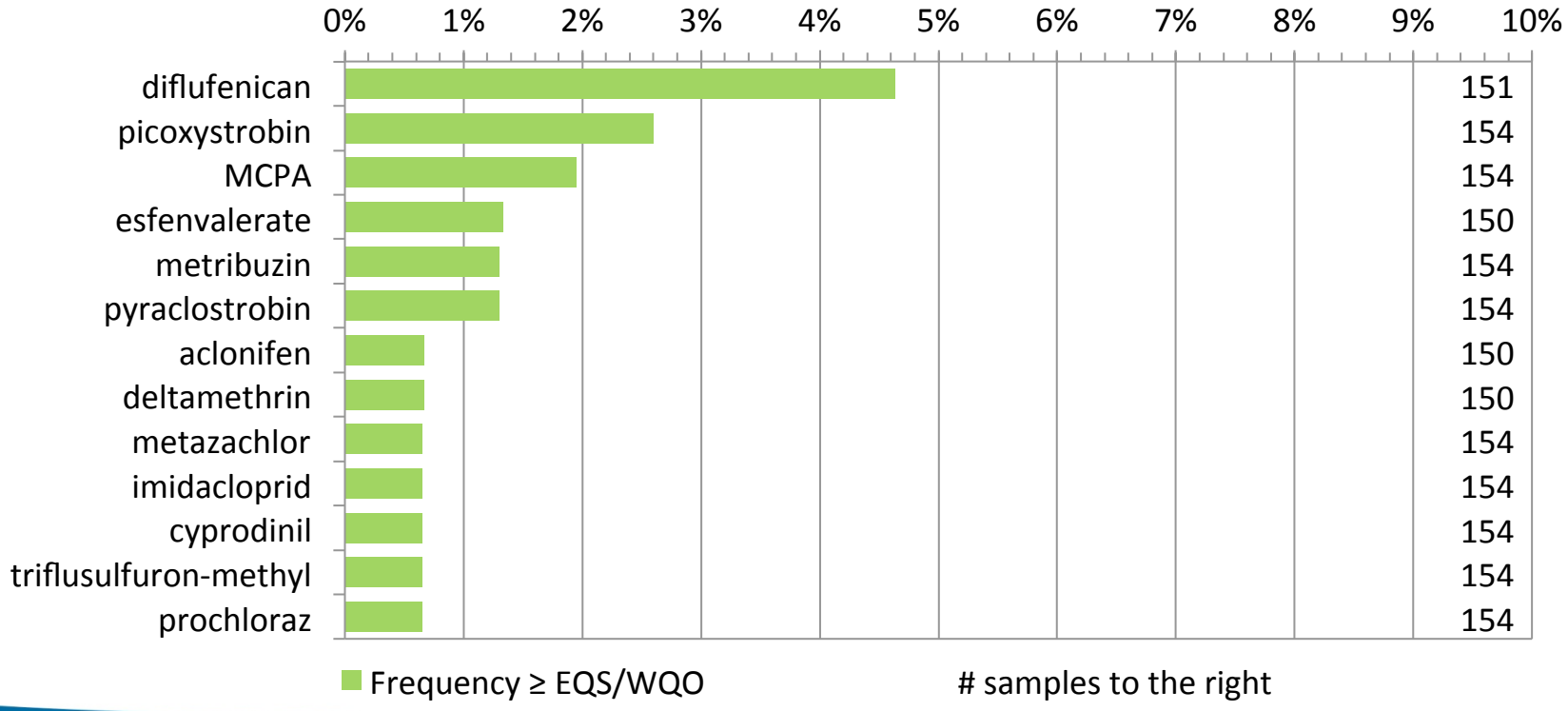
Results surface water

- Fewer detects ≥ EQS/WQO than the national program
- Not only herbicides dominating
- At least one substance ≥ EQS/WQO in 10 % of the samples



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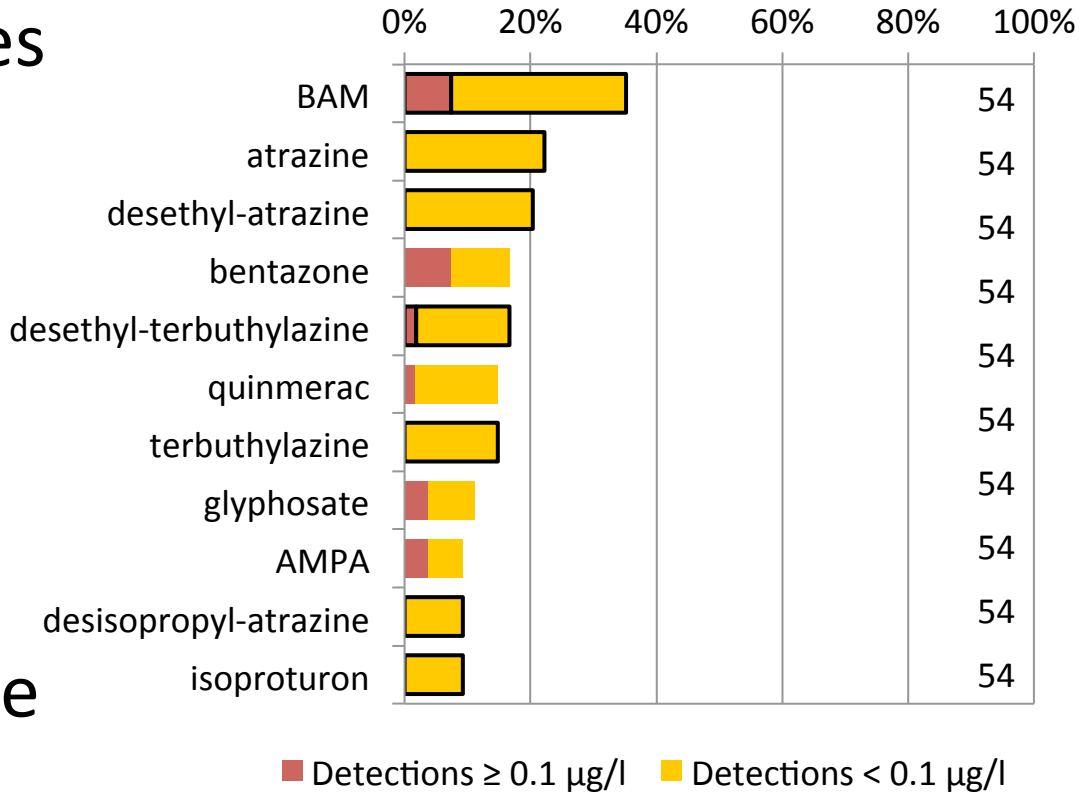
Results private drinking water wells

- Banned herbicides dominated
- Overall 42 different substances detected
- At least one substance ≥ 0.1 µg/l in 20 % of the wells



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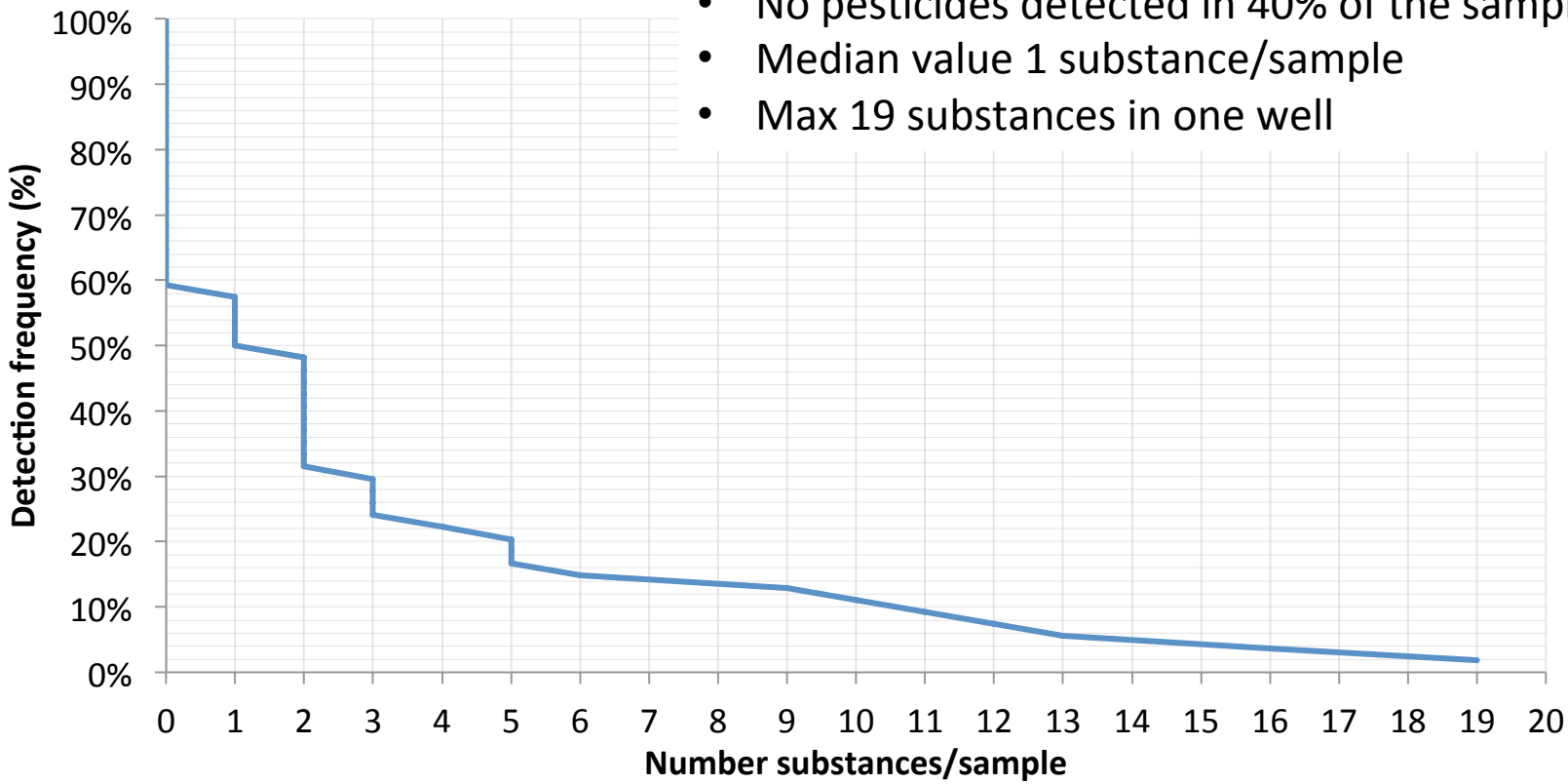
Results private drinking water wells

- No pesticides detected in 40% of the samples
- Median value 1 substance/sample
- Max 19 substances in one well



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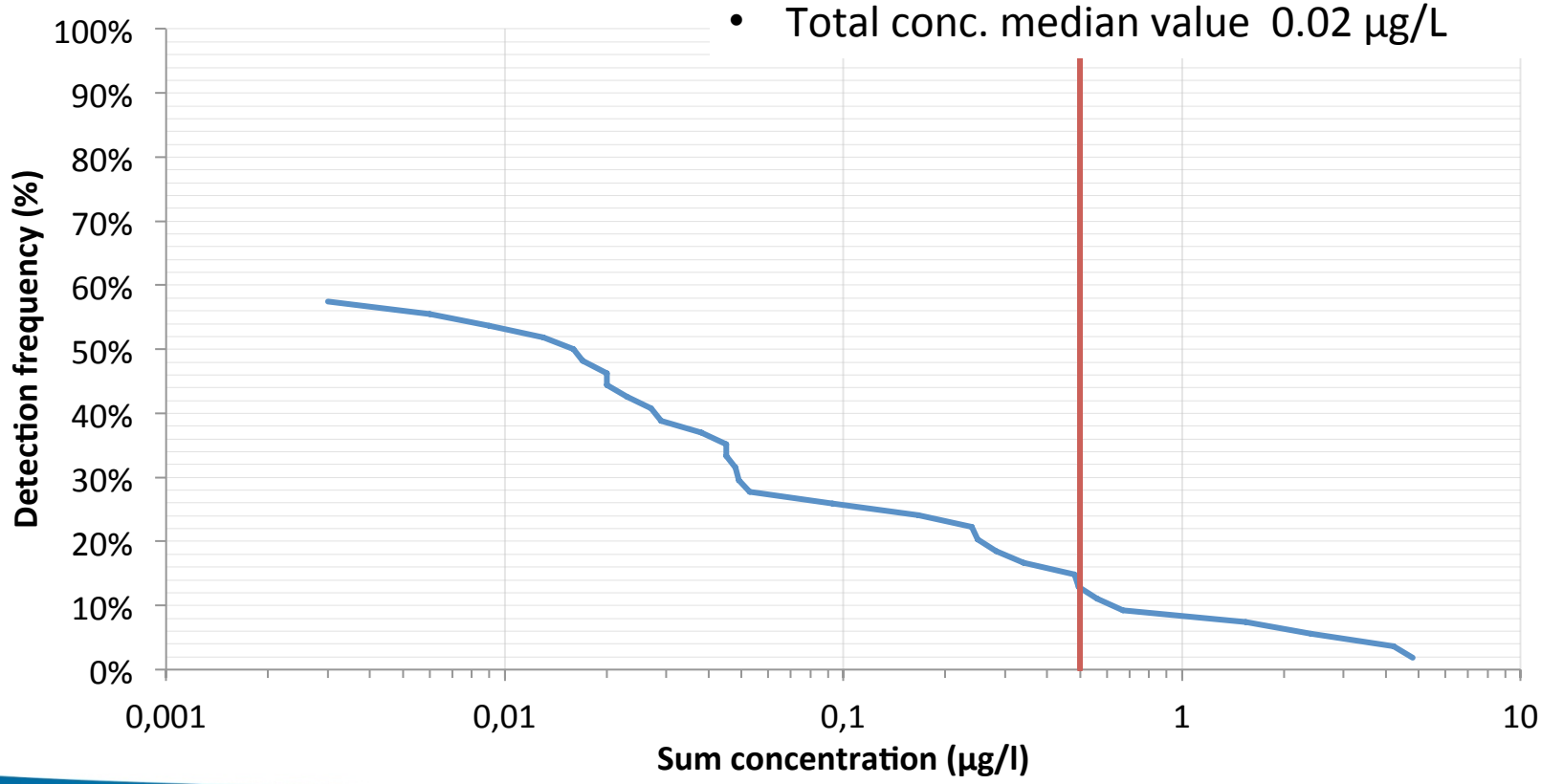
Results private drinking water wells

- Total conc. ≥ 0.5 µg/l in 11 % of the samples
- Total conc. median value 0.02 µg/L



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Results private drinking water wells

- 39 % of the wells had unsuitable water due to high levels of bacteria (E. coli and/or coliform bacteria) and nitrate
- Wells owners with findings ≥ 0.1 µg/l (i.e. 20 % of the wells) were offered a new analysis (9 out of 11 accepted)
- Results were in most cases altered
  - In 3 wells total conc. increased
  - In 5 wells total conc. decreased
  - In 2 wells additional substances ≥ 0.1 µg/l
  - Only in 1 well no longer any exceedances of a limit value (glyphosate conc. of 0.24 µg/l in first sample now < LOD)

Conclusions

- Screening results 2015 were consistent with the results from the long-term national monitoring programme, though generally lower concentrations and fewer findings above EQS/WQO (ecotox) values
  - Larger catchments and less arable land in the screening study vs the long-term monitoring program
- In surface water mainly currently used herbicides with widespread agricultural applications
  - Median 10 substances/sample
- In private drinking water wells mainly banned pesticides – originating from non-agricultural applications
  - Median 1 substance/sample

Thank you for your attention!

- The report (in Swedish, with English summary) can be downloaded from www.slu.se/ckb
  - (headline: Publikationer/Rapporter från CKB)
- Funding from the Swedish Environmental Protection Agency is gratefully acknowledged

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