

Use of the XRF-method to measure metals on boat hulls and proposal for a model for certification

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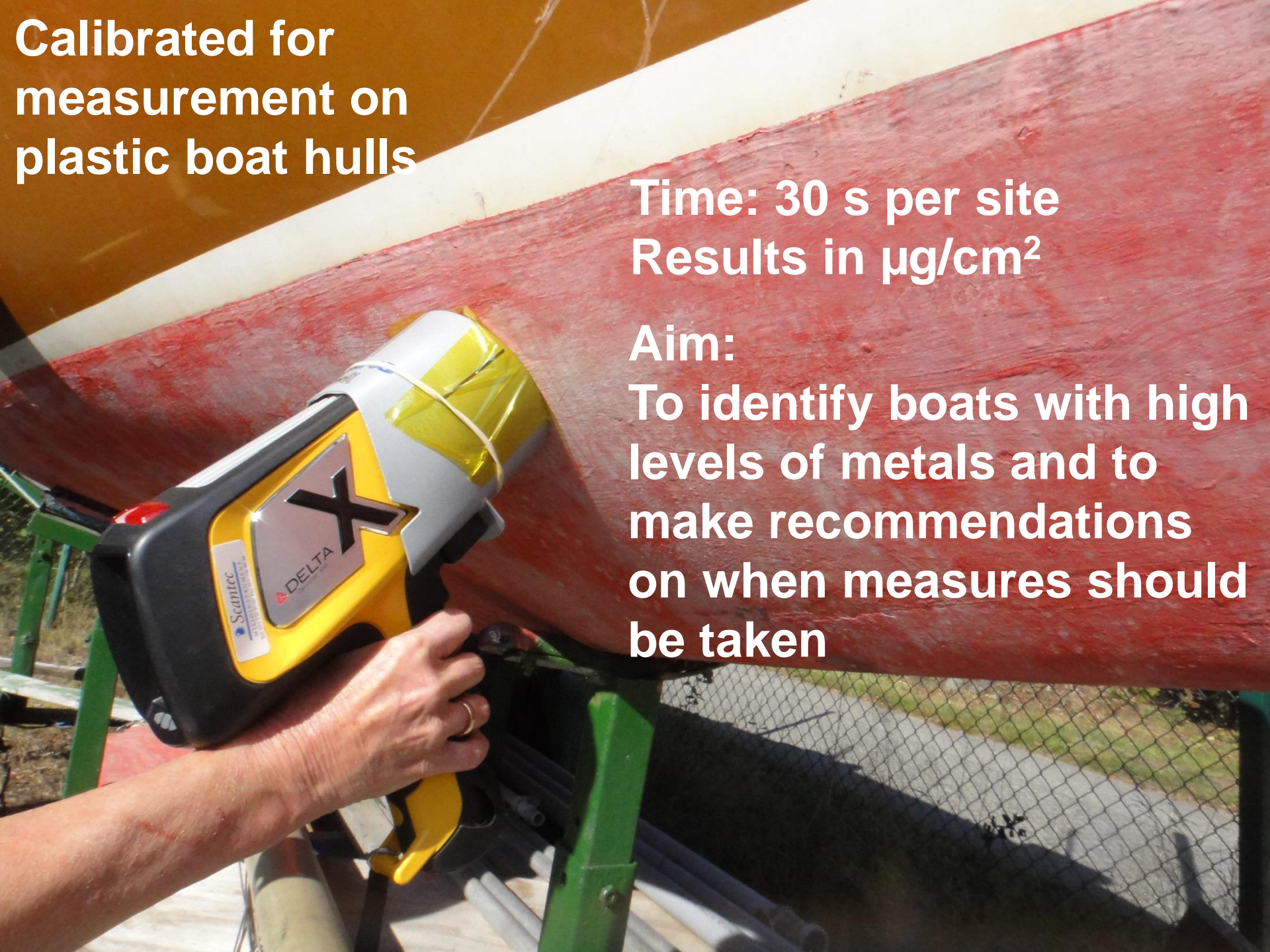
Co-workers

Lennart Lundgren, Erik Ytreberg,
Maria Bighiu and Maria Lagerström

**Calibrated for
measurement on
plastic boat hulls**

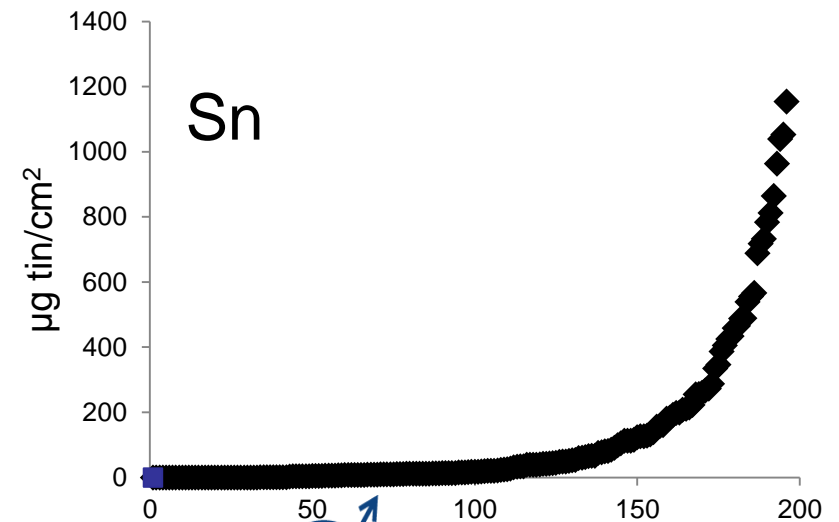
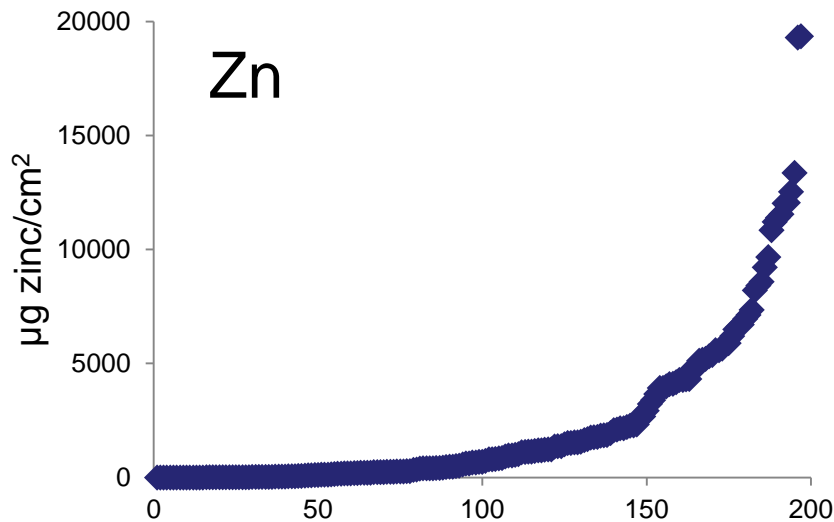
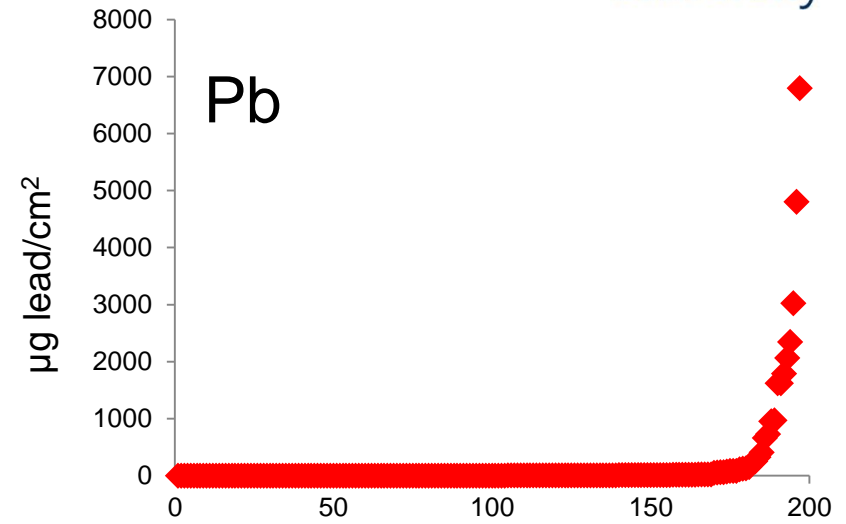
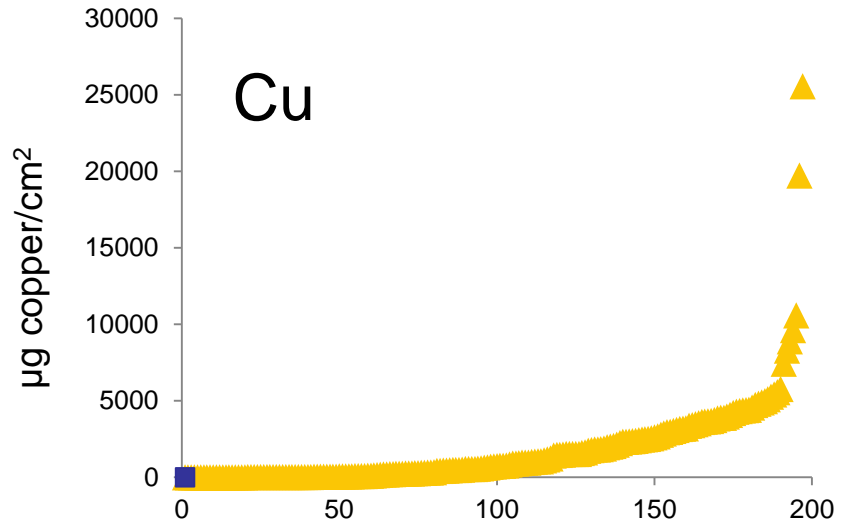
**Time: 30 s per site
Results in $\mu\text{g}/\text{cm}^2$**

**Aim:
To identify boats with high
levels of metals and to
make recommendations
on when measures should
be taken**



XRF screening av metals on boat hulls

197 boats. Values given in $\mu\text{g}/\text{cm}^2$



Large variations among boats

Examples on metals on boat hulls, $\mu\text{g}/\text{cm}^2$

Copper (Cu)	Zinc (Zn)	Tin (Sn)	Lead (Pb)
25 547	6 949	75,5	4,3
3 104	19 352	13,3	5,4
19 719	5 656	3 014	151,5
110	470	44,8	6 798

Would be good to just have ONE value

Weighted hazard of metals on boat hulls based on sensitive use of land

Metals	Sensitive land mg/kg TS
Copper (Cu)	80
Zinc (Zn)	250
Tin (Sn)	1*
Lead (Pb)	50

* Finnish guidance value

Assumption that 50 % of the tin is in organic form.

Proposal:

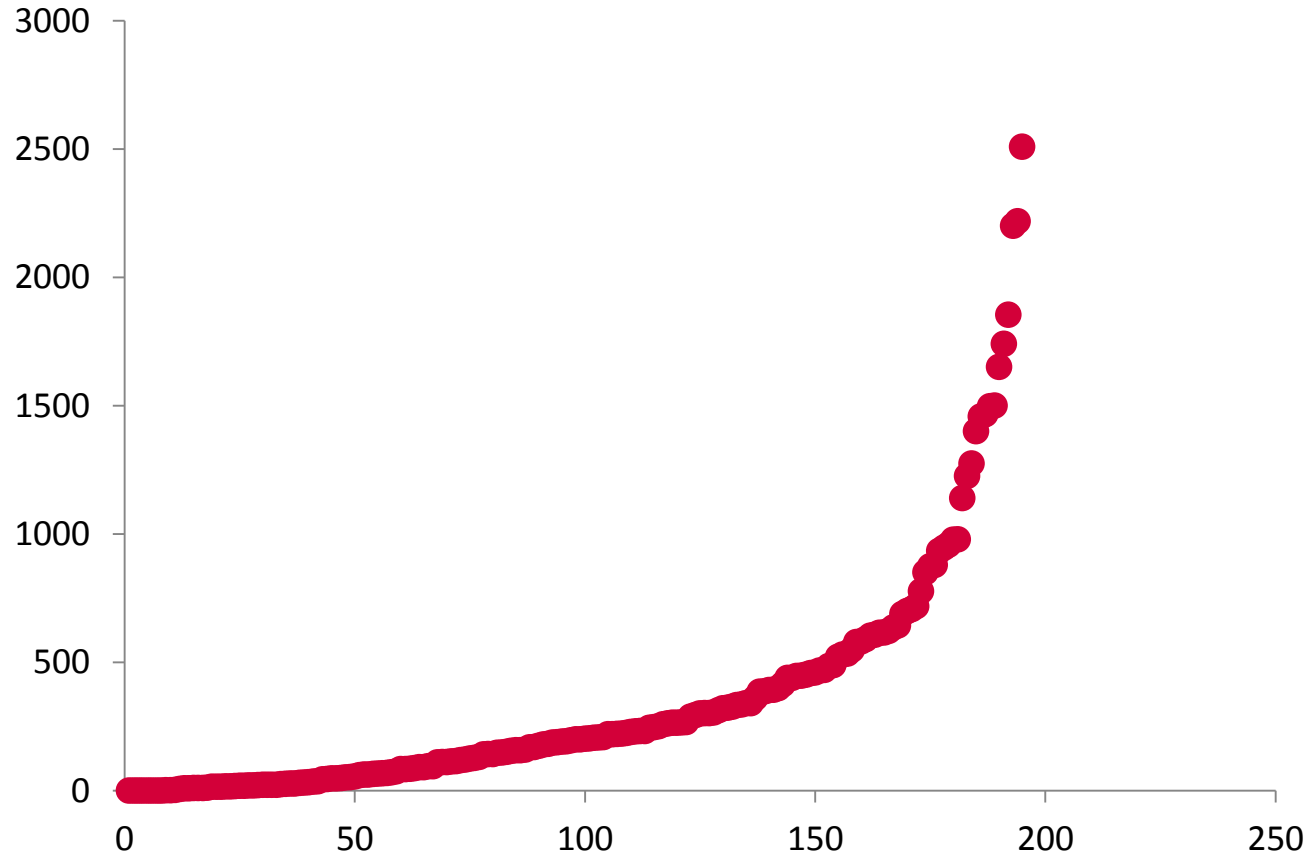
Weighted hazard of metals on boat hulls based on sensitive use of land

Metals	Sensitive land mg/kg TS	Used weighing coefficient
Copper (Cu)	80	0,048
Zinc (Zn)	250	0,015
Tin (Sn)	1*	1,905#
Lead (Pb)	50	0,076

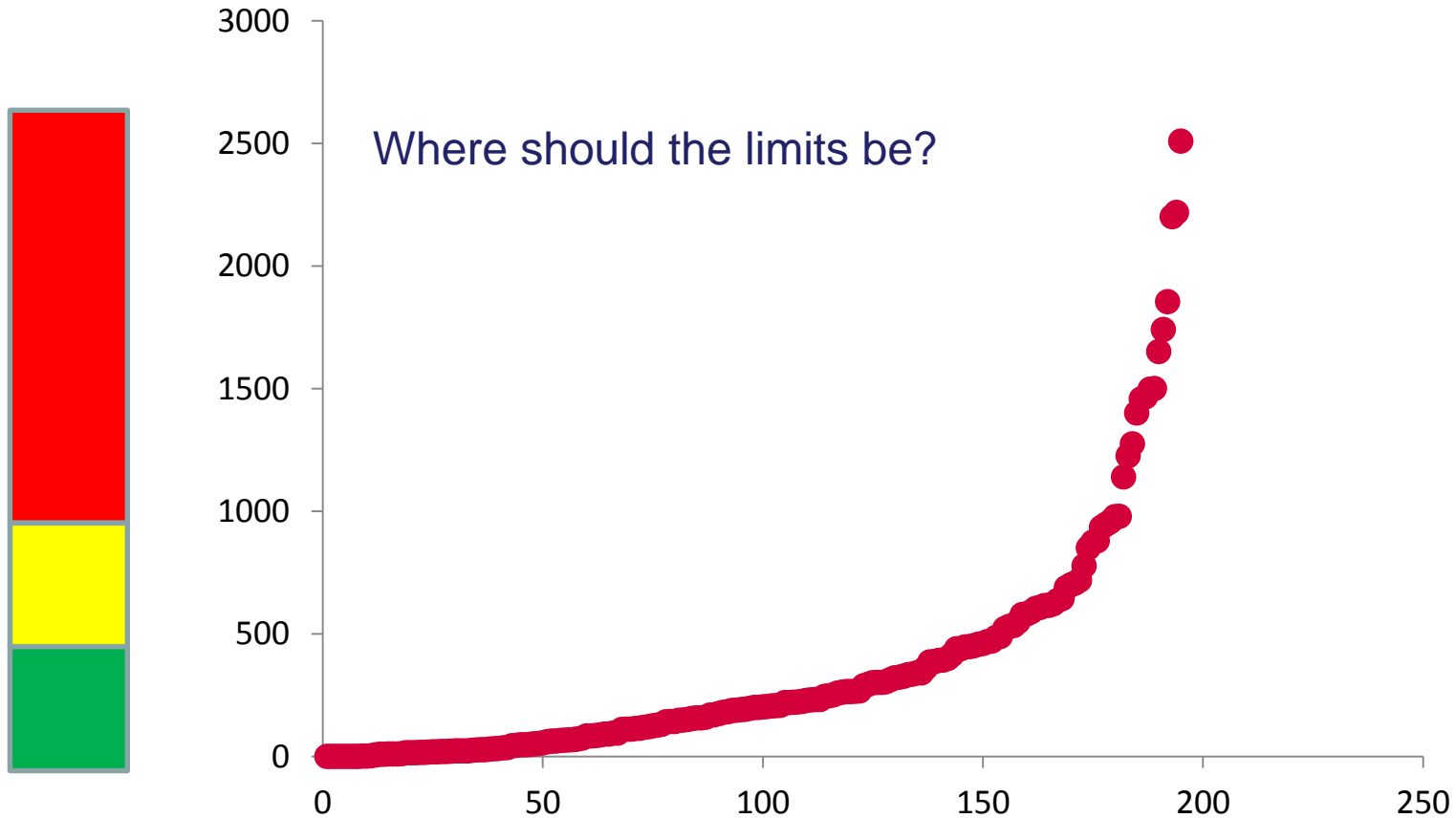
* Finnish guidance value

Assumption that 50 % of the tin is in organic form.

Total weighted hazard of metals (Cu, Zn, Sn, Pb) (197 boats)



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Conclusions

- The calibrated XRF-model for use on boat hulls works well and has potential to become a valuable tool for environmental authorities.
- Large variations of amounts of toxic metals on boat hulls
- We want to, in co-laboration with authorities, propose a model for certification of boat hulls on basis of the amount of dangerous metals.