

The Distribution and Extent of Heavy Metal Accumulation in Song Sparrows of the Upper Santa Cruz River Watershed, Arizona

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2013



Background

- Riparian woodlands
 - Critical habitat
 - Often degraded
 - Runoff
- Risk to wildlife
- 1997 USFWS study
 - Killdeer



National Geographic / Annie Griffiths

Study Species

- Song Sparrow

Melospiza melodia

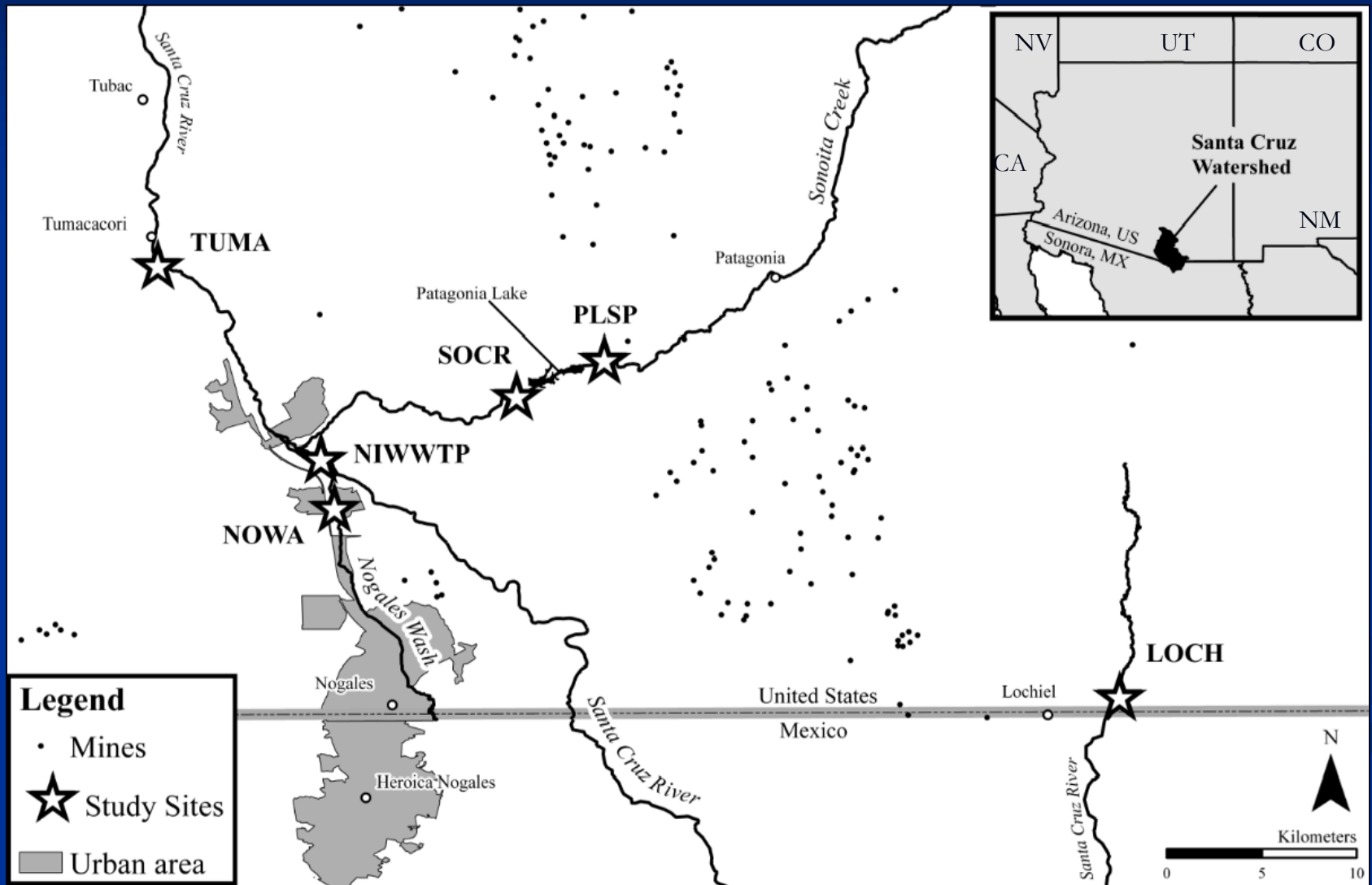
- Resident
- Abundant
- Ground feeding



Objectives

- Quantify heavy metal concentrations and distribution
 - Blood
 - Feathers
- Compare to previous studies in the region
 - 1997: King et al. (1999)
 - 2008/9: Kirkpatrick et al. (2010)
- Assess avian condition
 - Hematocrit value
 - Body mass residuals
 - Leukocyte count

Study Area



Methods

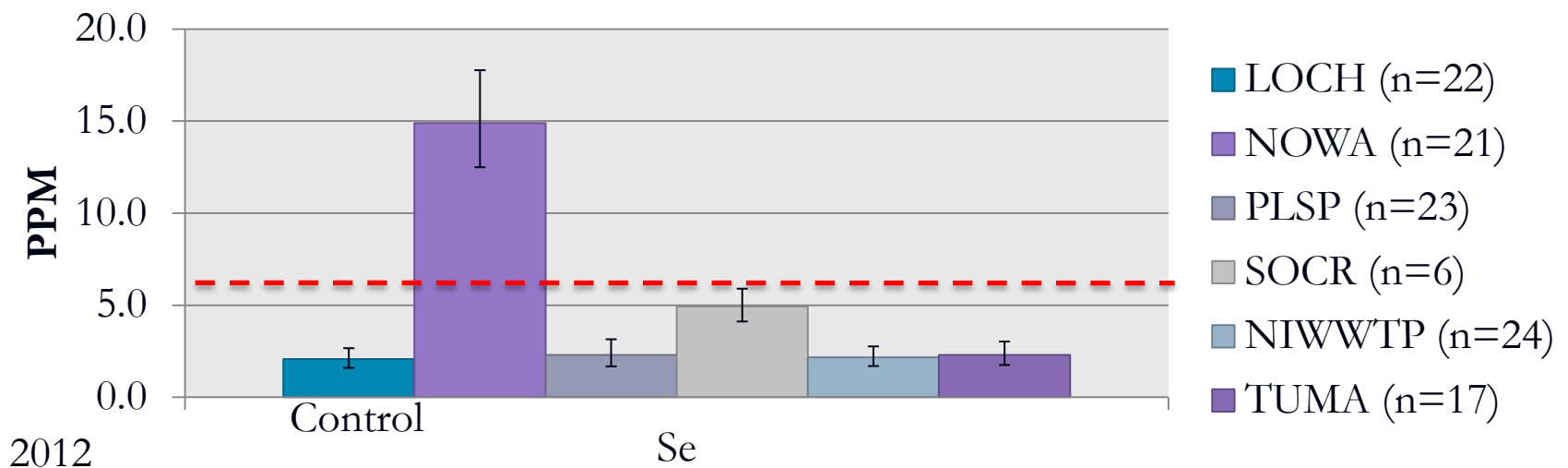
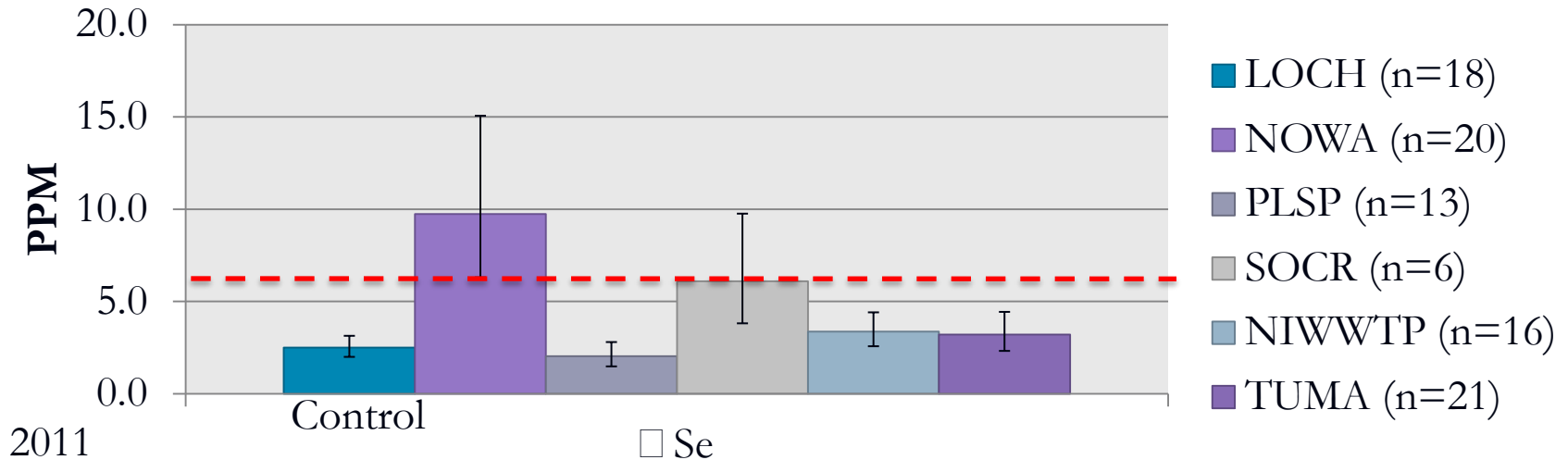
- Targeted capture with mist-nets
 - 2011 & 2012
- Removed outer tail feathers
- Sampled blood (brachial vein)
- Analyzed via ICP-MS



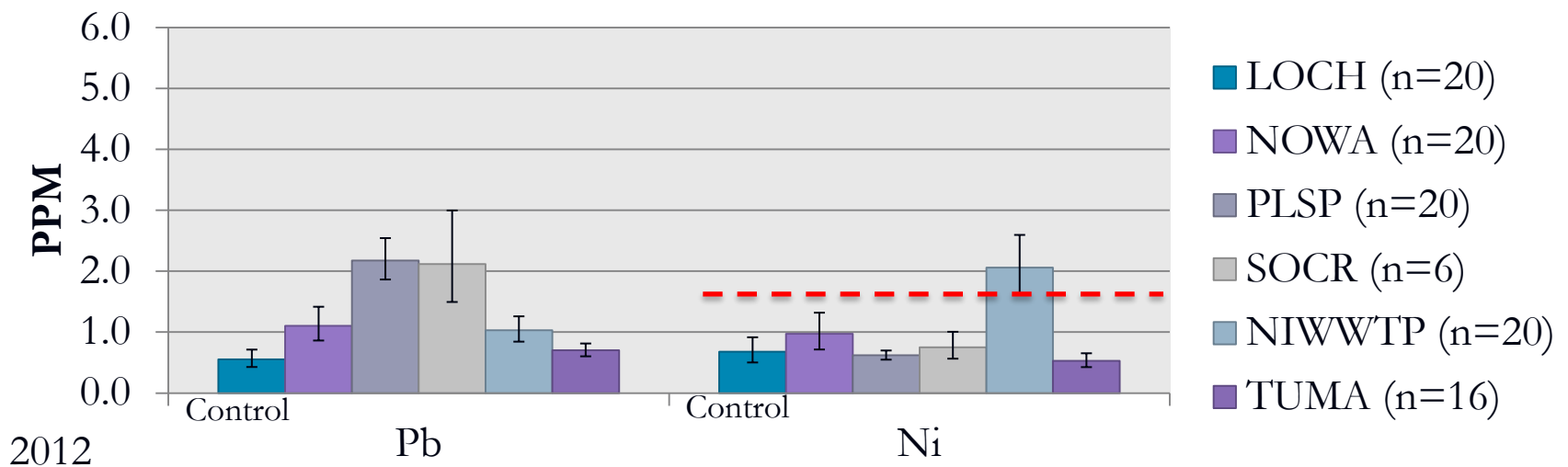
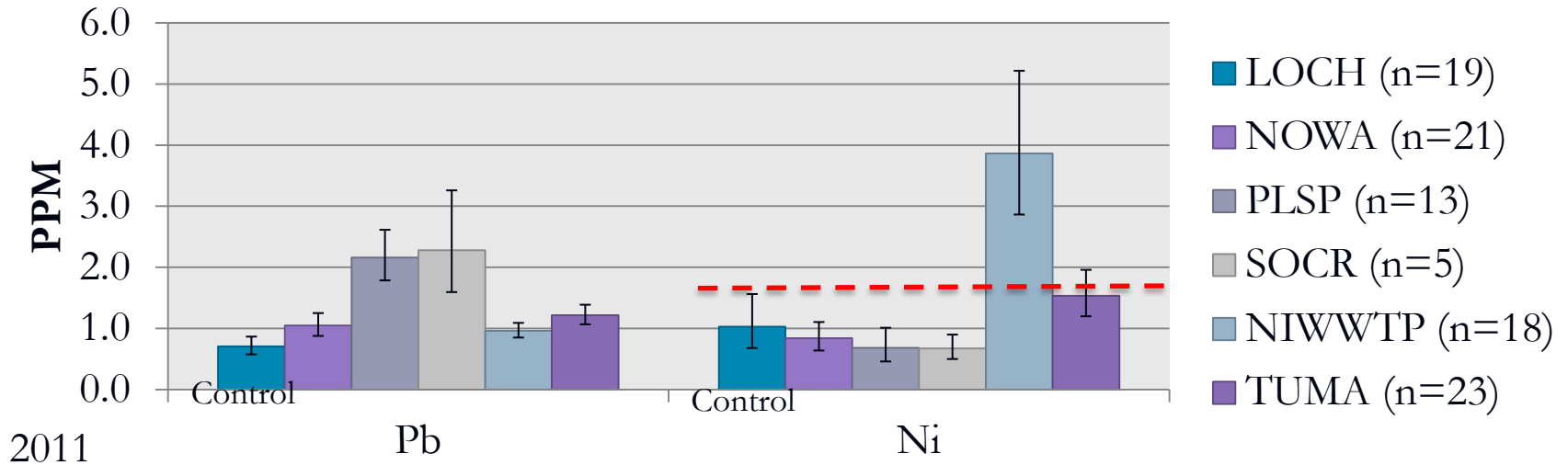
Results

- Blood: Represents diet contaminant levels
 - 2 week window
 - Immediate
 - May accumulate in organs (e.g. Liver)
- Feathers: Represents blood contaminant levels
 - Accumulates metals when feather is growing
 - 1 month window
 - Molt occurs post-breeding

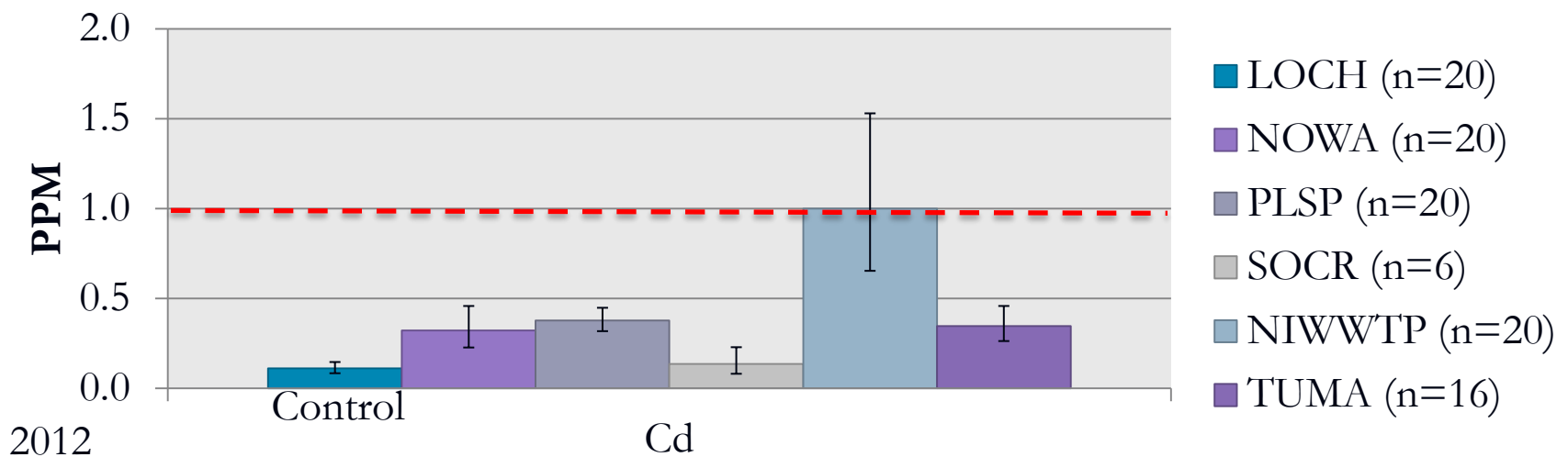
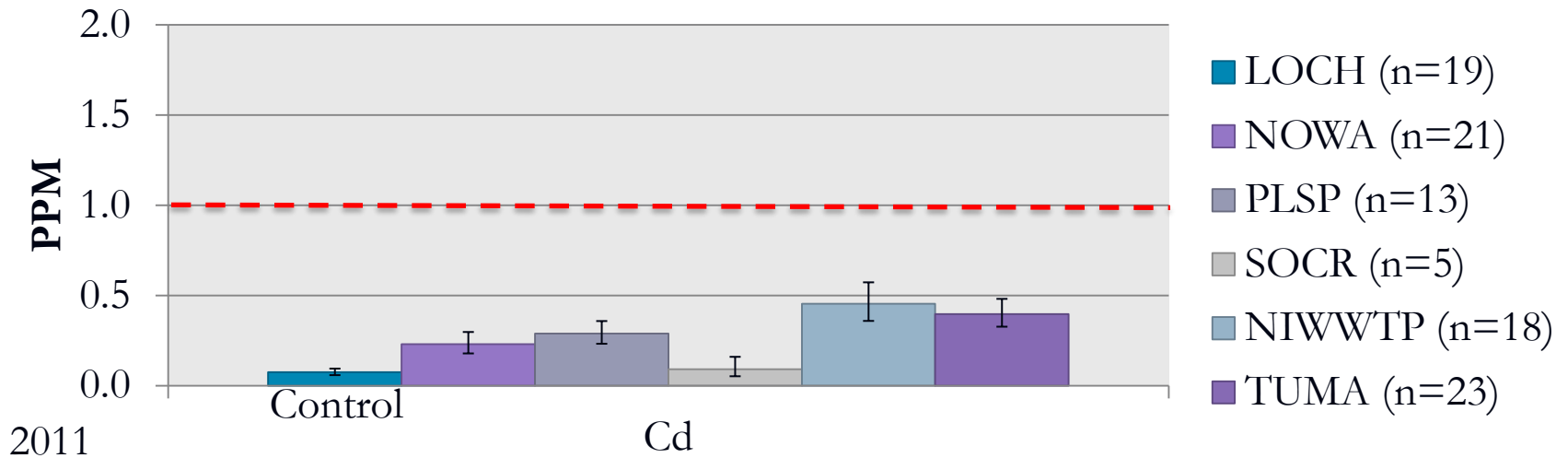
Results: Blood



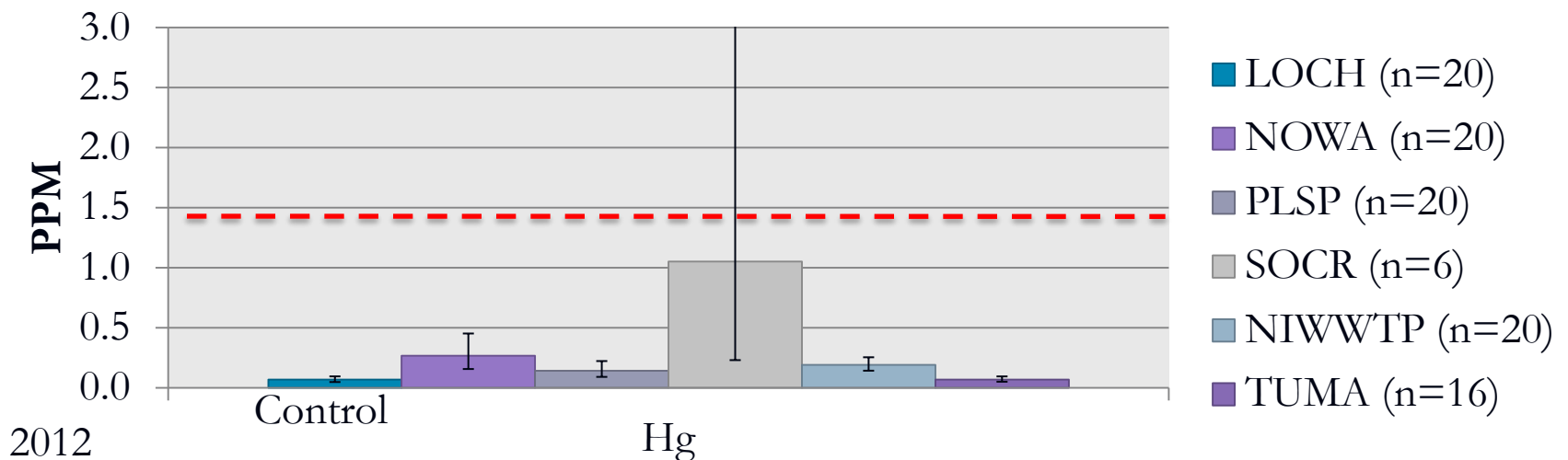
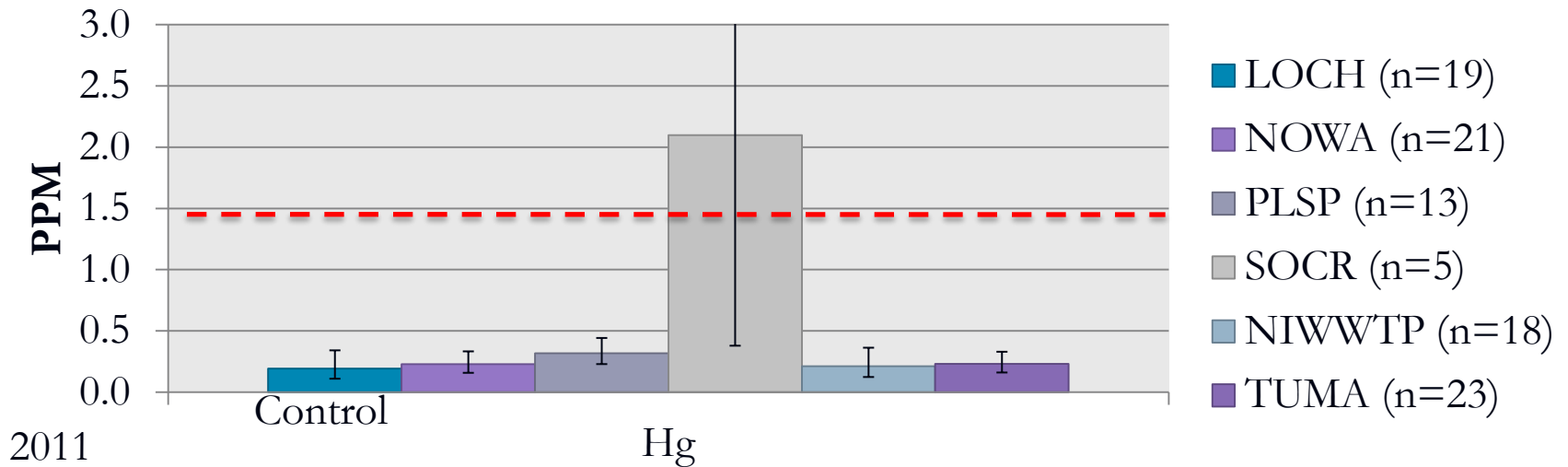
Results: Feathers



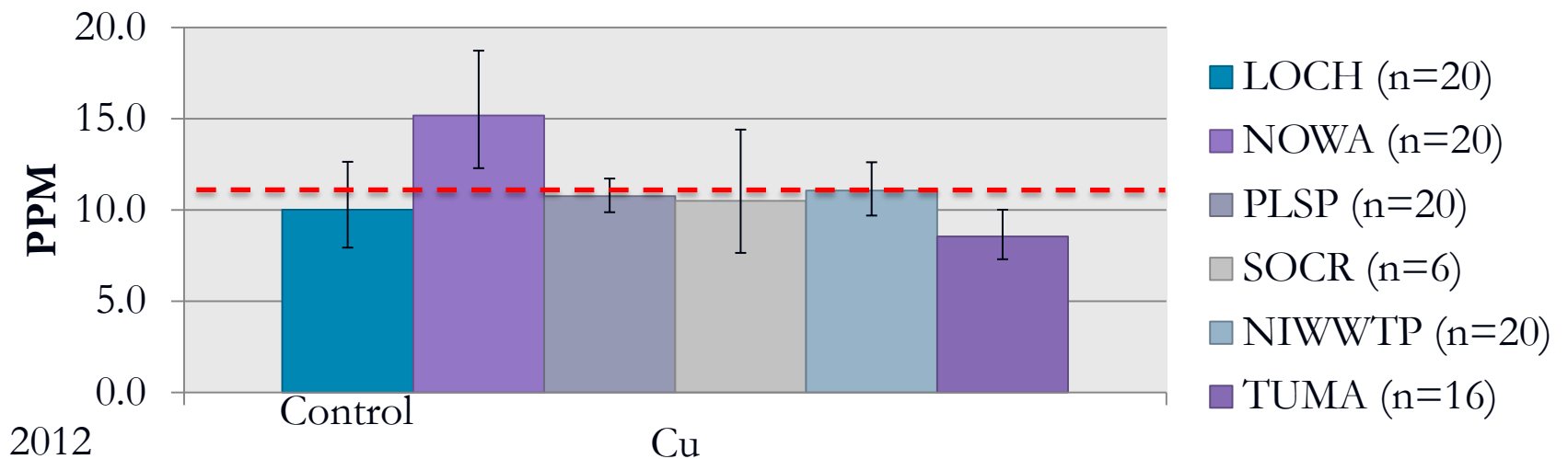
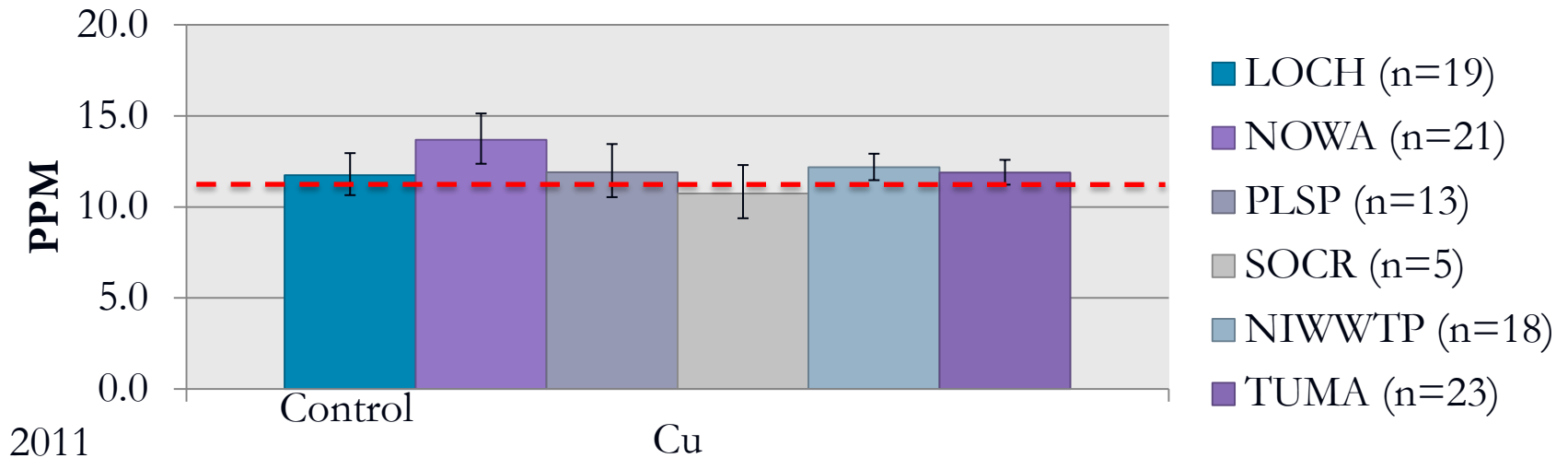
Results: Feathers



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Results: Feathers

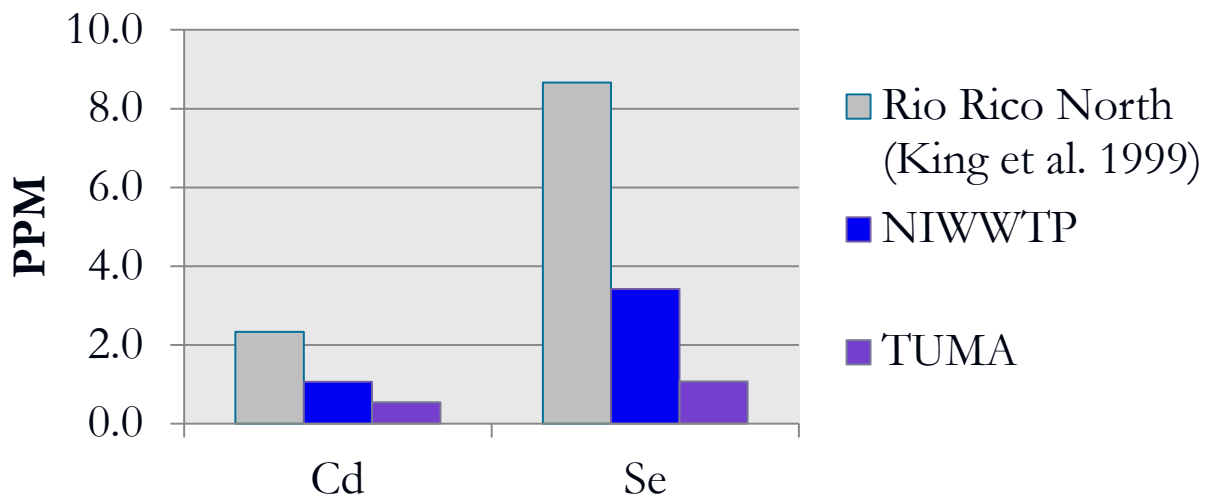
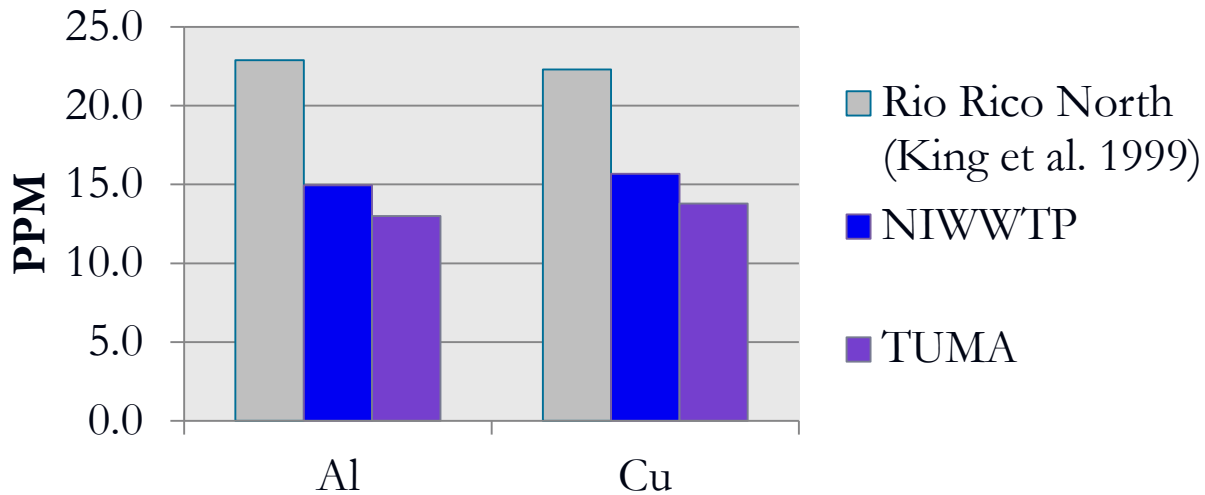


Comparisons

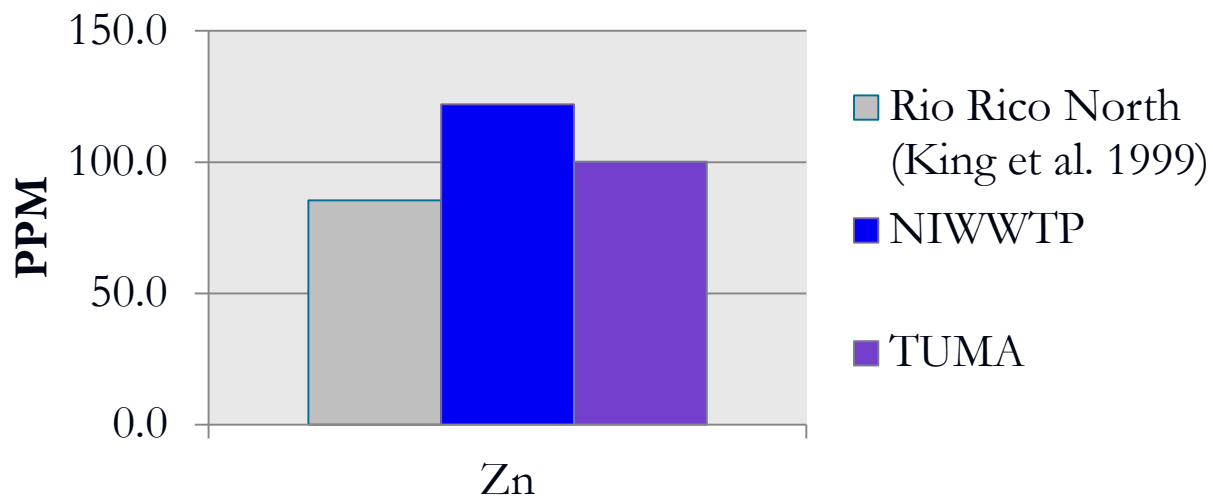
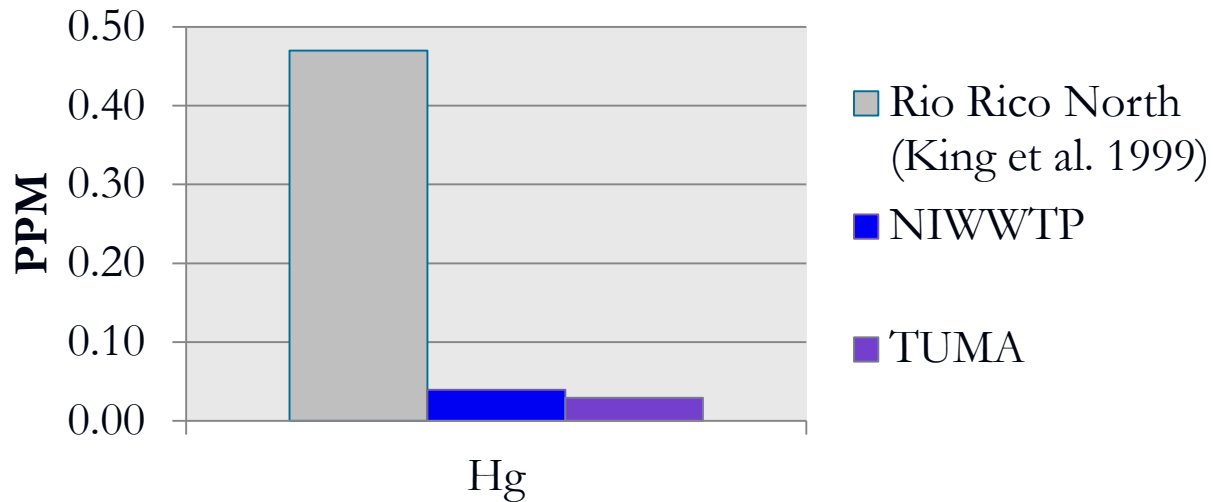
- 1997 King et al. (1999) Study: Killdeer Livers



King et al. (1999)



King et al. (1999)



Comparisons

- Kirkpatrick et al. (2010): Towhee and Chat blood
 - 2008 & 2009 at Tumacacori NHP

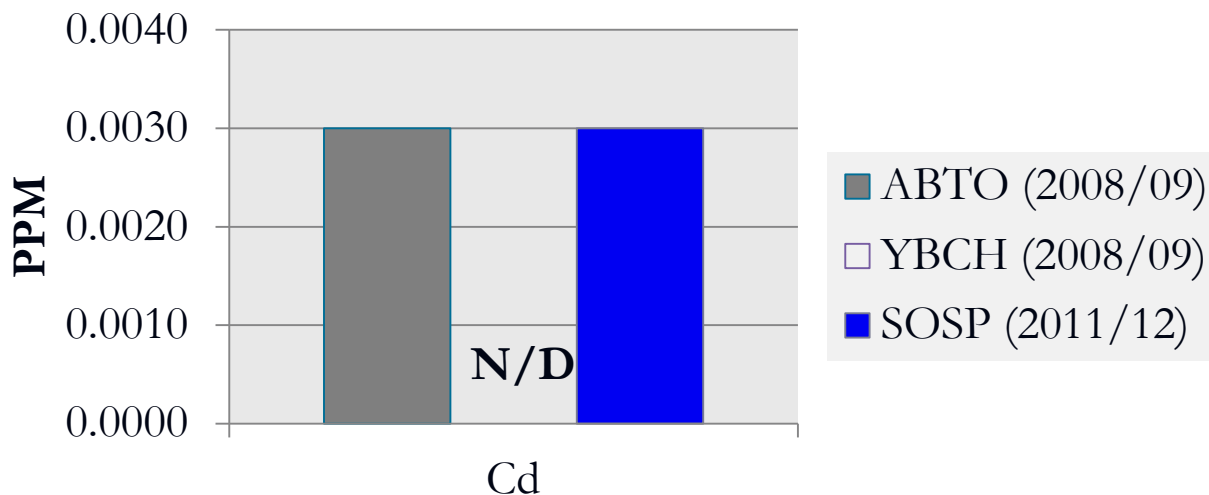
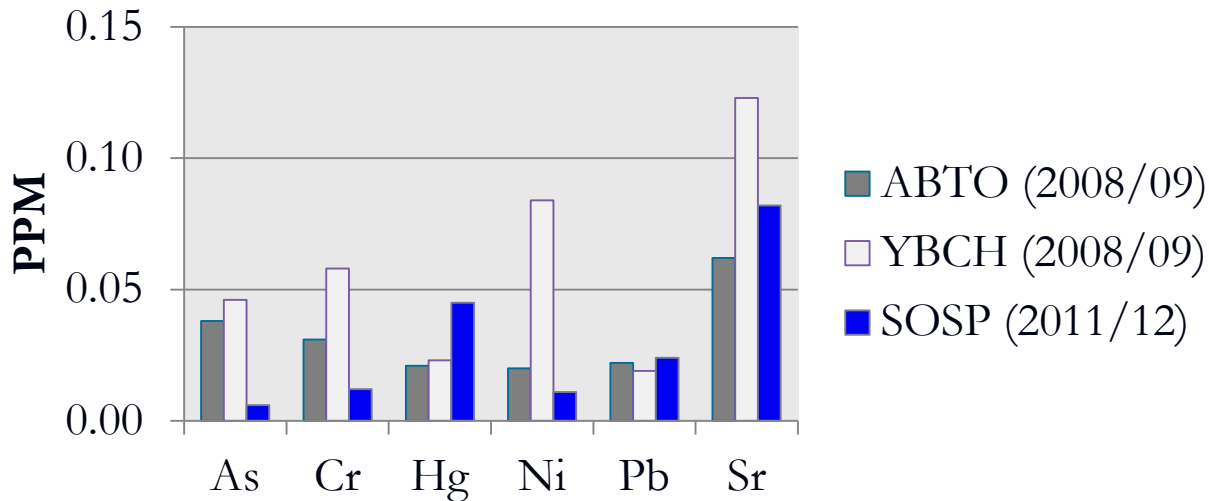


<http://www.roysephotos.com>

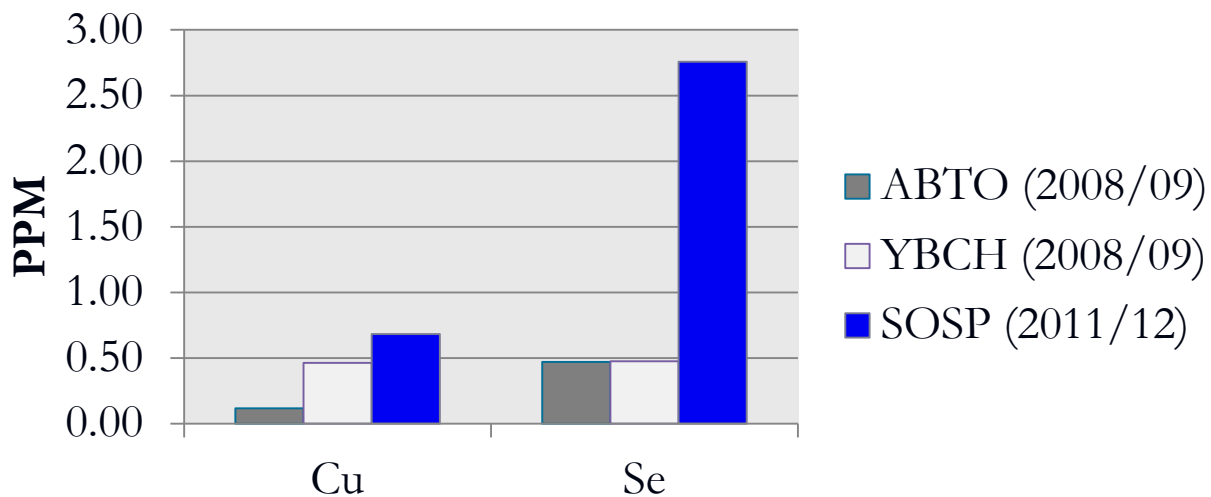
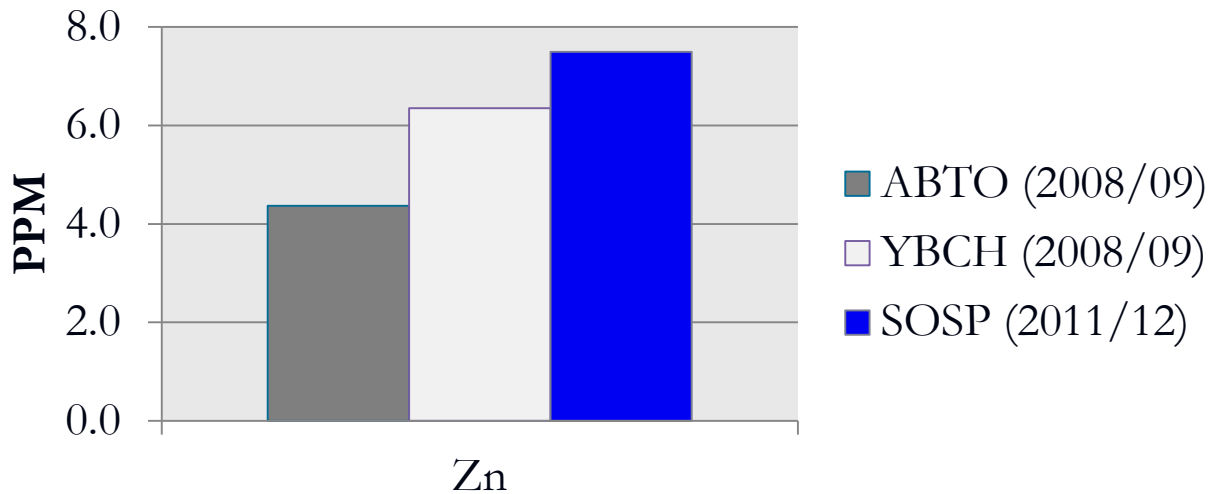


F. Massarotto

Kirkpatrick et al. (2010)

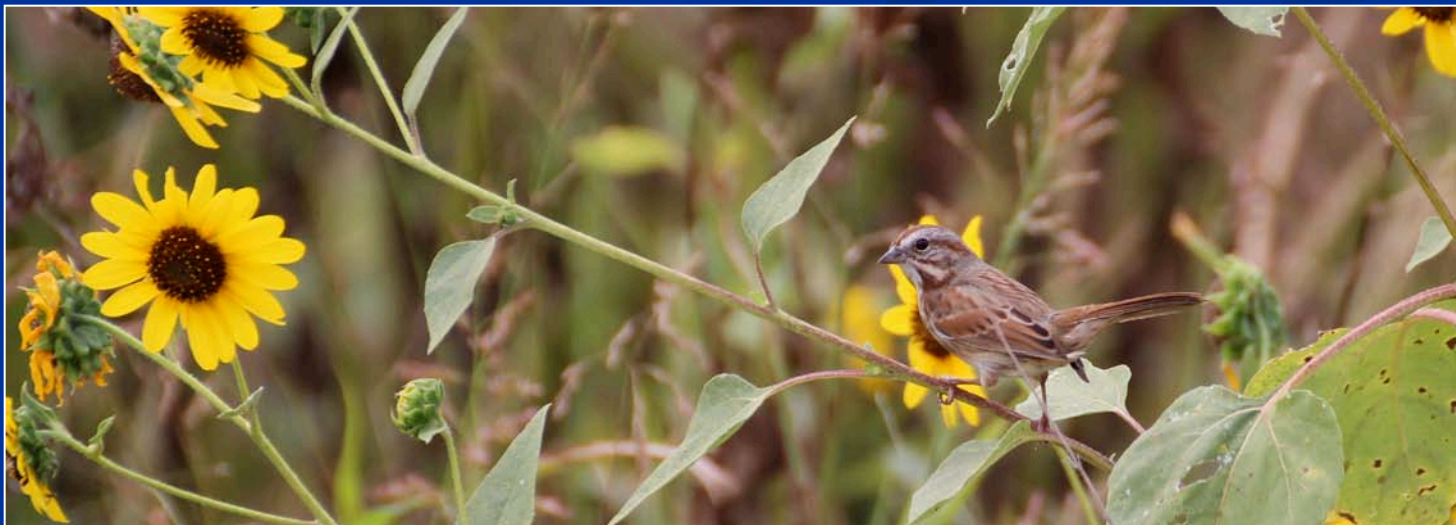


Kirkpatrick et al. (2010)



Conclusion

- Cd, Ni, Cu, Hg, and Se exceed background concentrations at NOWA, NIWWTP, & SOCR
- Concentrations are similar to or lower than pre-upgrade levels



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