



Apr 6th, 10:30 AM - 10:45 AM

Is stormwater harming our streams? Long-term monitoring of metals in stream stormflow

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Nidzgorski, Daniel; Grassley, James M.; Lester, Debora; and Bouchard, Debra, "Is stormwater harming our streams? Long-term monitoring of metals in stream stormflow" (2018). *Salish Sea Ecosystem Conference*. 501.

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Is
STORMWATER
harming our
STREAMS?



urbanized watersheds





stormwater

METALS



Long-term stream monitoring



King County, WA

Toxicity

Toxicity

Baseflow comparison

Toxicity

Baseflow comparison

Trends over time

Toxicity

Baseflow comparison

Trends over time

Pollutant sources

33 sites

Seattle ●

Tacoma ●



1993-2010

grab
samples



2-6x/yr

after 24h dry & 1/4" rain



24 metals

total & dissolved

ICP-MS



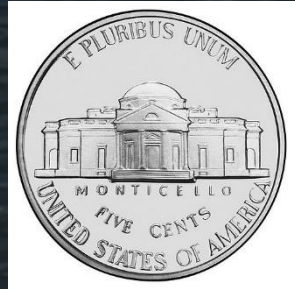
Toxicity

Human health (WA Water Quality Stds)



Human health (WA Water Quality Stds)

rare:



Nickel

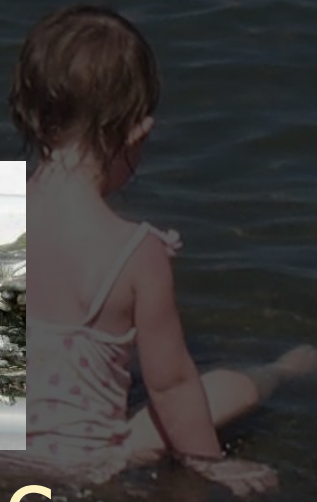


Thallium

widespread:



Arsenic



Aquatic life (WA Water Quality Stds)



Aquatic life (WA Water Quality Stds)

rare:



Copper



Lead

common:



Mercury

Salmonids (draft screening values)



Salmonids (draft screening values)

common to
widespread:



Copper



Lead



Zinc

???:



Cadmium



Silver

Baseflow

comparison

Baseflow comparison

2001-2003

Total concentrations
higher in stormflow:

Toxics:

As Cd Cr Cu
Ni Pb Sb V Zn

Others:

Ba Be Co Fe

Total concentrations and dissolved
higher in stormflow:

Toxics:

As Cd Cr Cu
Ni Pb Sb V Zn

Others:

Ba Be Co Fe

Trends

Some toxics decreased

Cr Cu Ni Pb Zn

Some toxics decreased

Cr Cu Ni Pb Zn

Hardness increased

Ca Mg

protective

Sources



Ivars
FISH BAR

ING

RESTAURANT
BISTRO CHERRY

DO NOT
ENTER

P
4
Hour Max

P

weathering



30 South from Marion
2/28 07 S.P.C.

weathering

Iron as tracer



30 South from Marion
2/28 07 S.P.C.

weathering

most metals

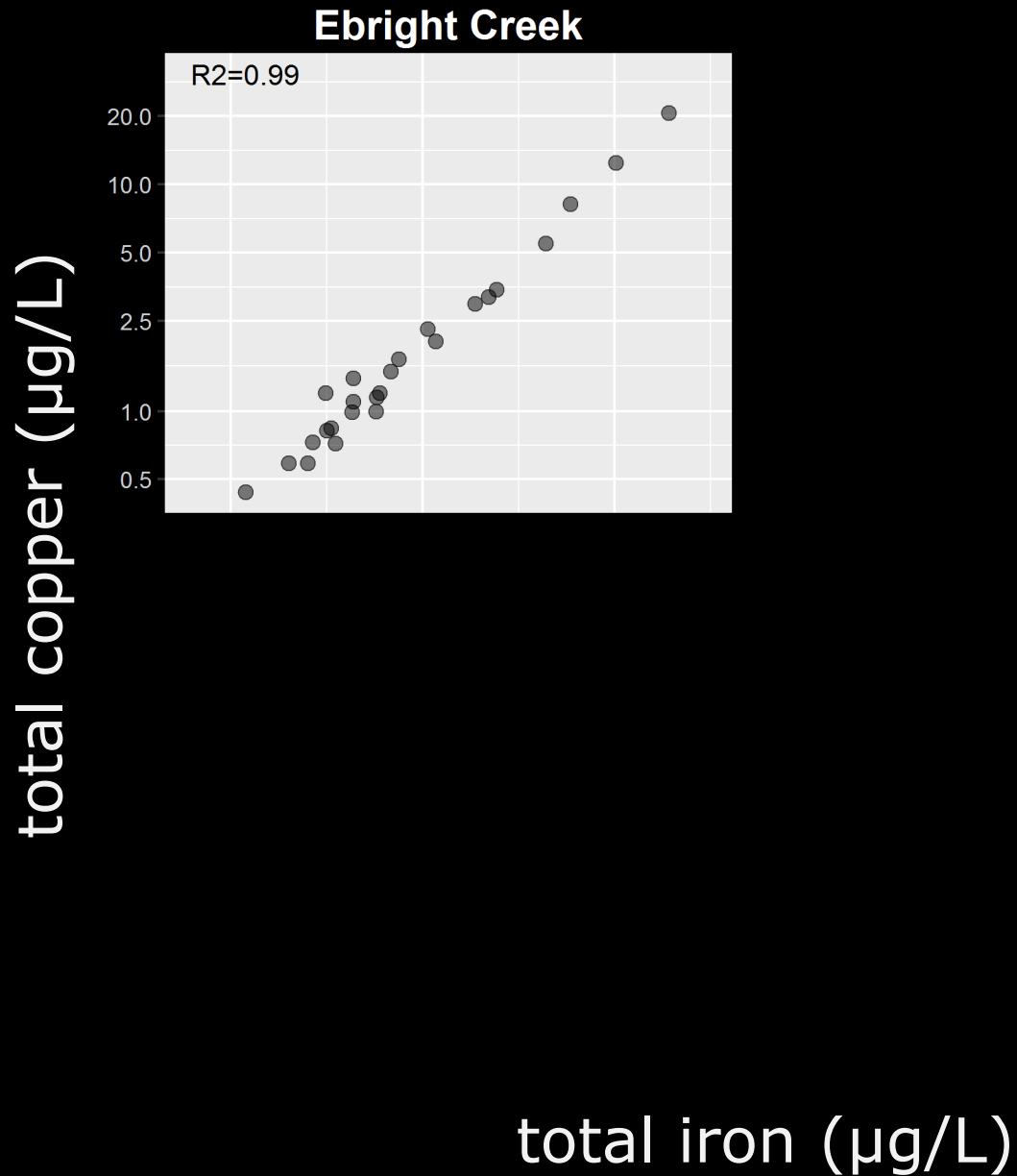
most streams



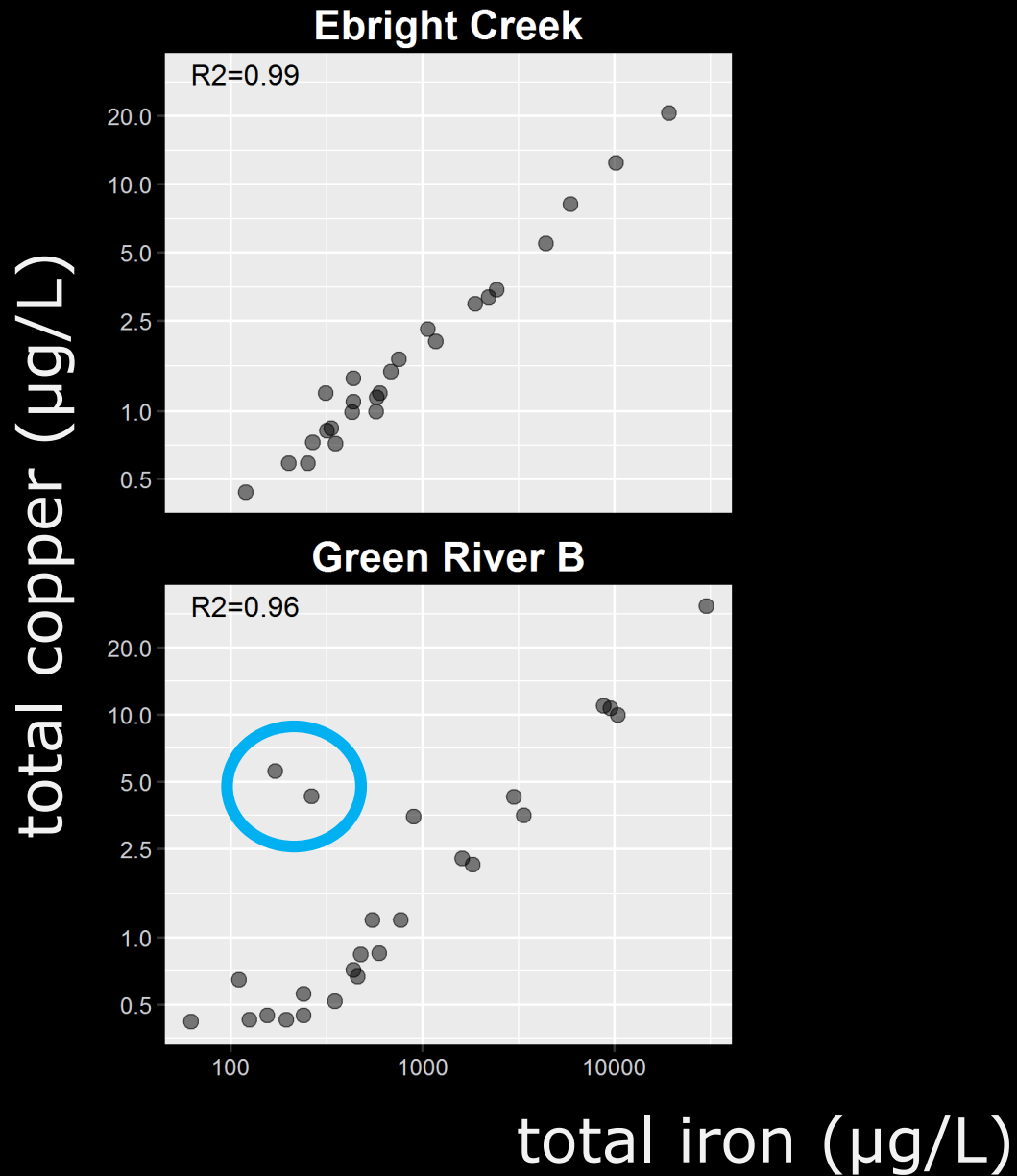
total

dissolved

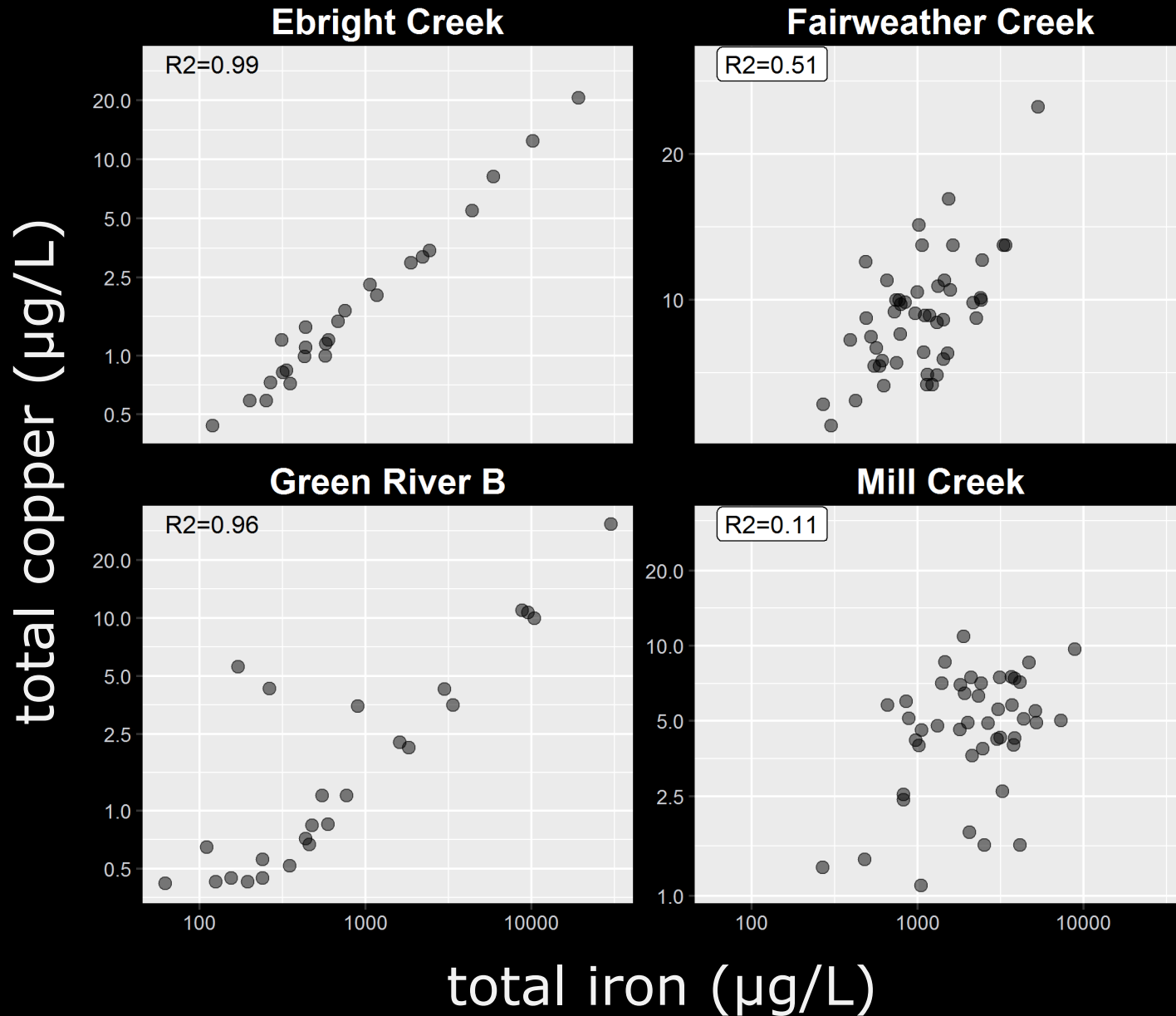
Iron correlations



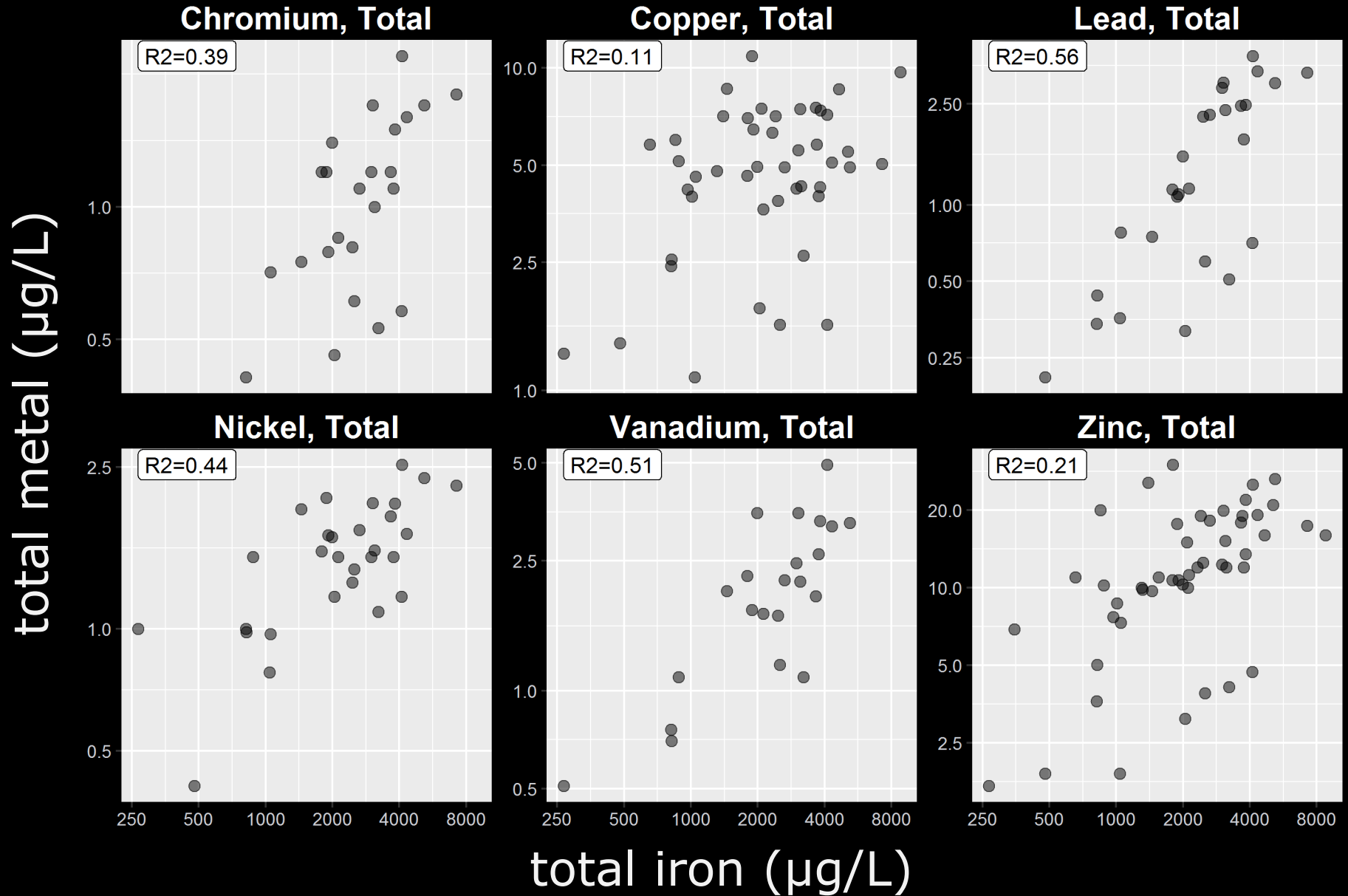
Iron correlations



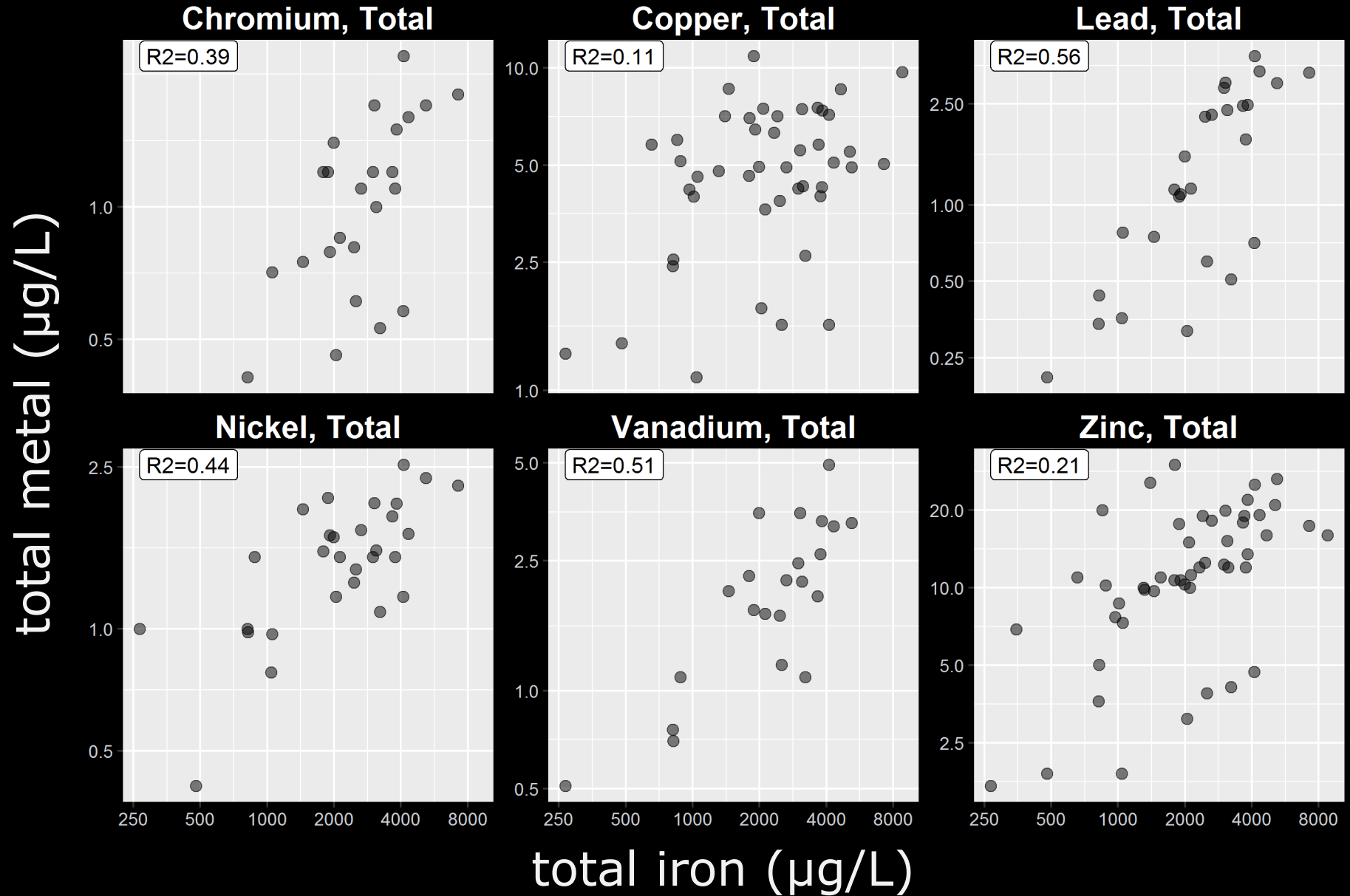
Iron correlations



Mill Creek:



Mill Creek: **Old industrial dump**



Toxicity concerns:
mercury
copper, lead, zinc

Trends were improving.

Weathering was a
major source.

patterns





PROOF

BE UNBEATABLE 2011



stormwater

road runoff



industrial



airborne



mining



weathering & erosion



30 South from Marion
2/28 07 S.P.C.

24 metals

total & dissolved

ICP-MS

toxics

hardness

tracers



1993-2010

sites

methods

funding

questions