

NCSU Study: Examine 30 forebays in NC

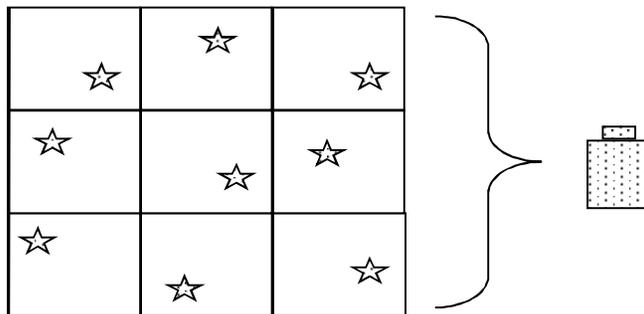
McNett & Hunt 2011



Toxic Forebay Sediment?



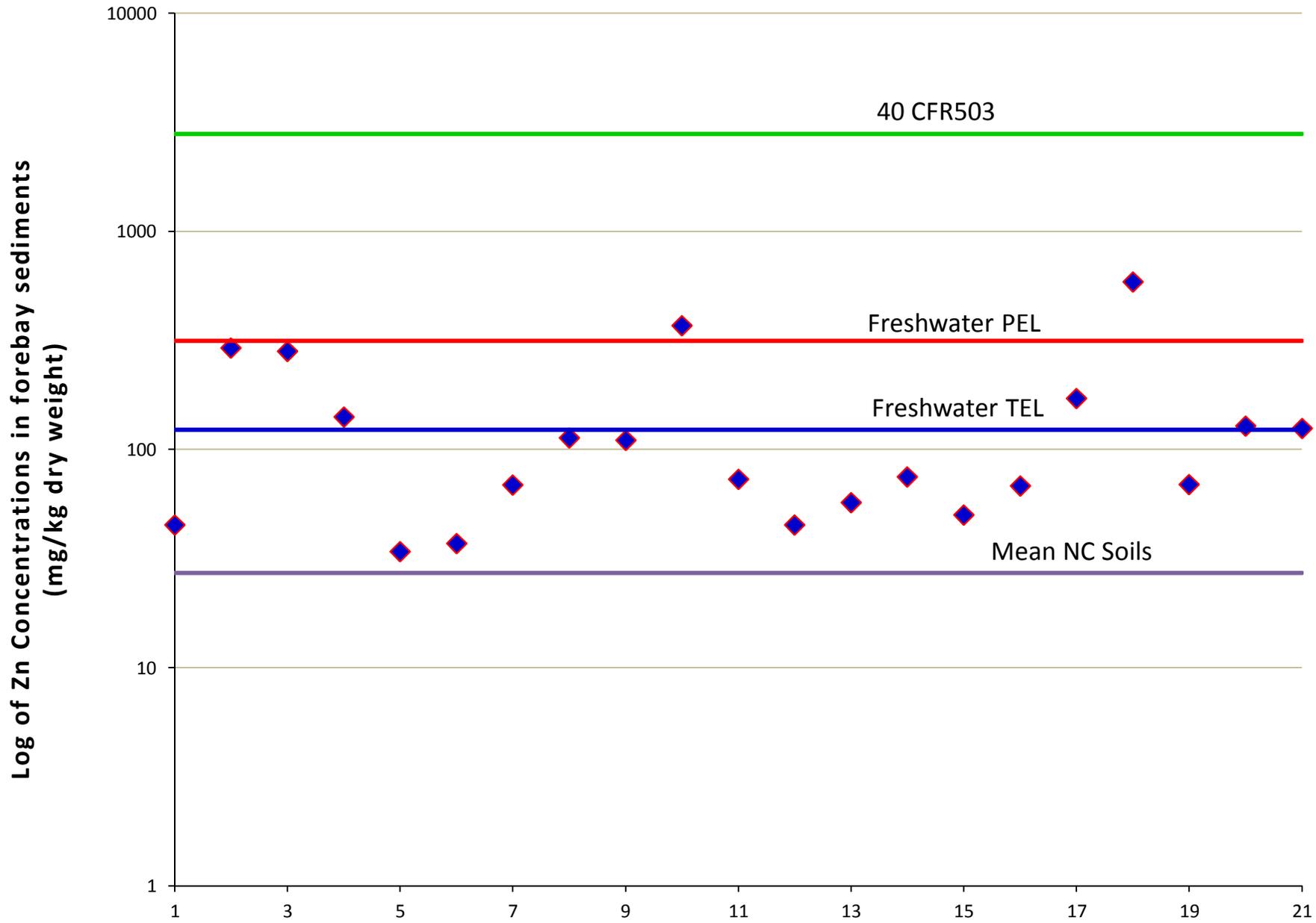
Outlet to Main Pool or Wetland



Inlet to forebay



- Apex, Charlotte, Durham, High Point, and Raleigh
- 20 Commercial Sites & 10 Residential Sites
- Collected Sediment from 9 locations in forebay & composited them
- Toxic Metals Measured: Cd, Cr, Cu, Ni, Zn



Forebays sampled in Commercial Landuse Areas (Youngest to Oldest)

Toxic to Aquatic Organisms? Sometimes.

- McNett and Hunt, 2011

Water Air Soil Pollut (2011) 218:529–538

Toxicity assessment metric	Number of violations per pollutant type				
	Cr	Cu	Ni	Pb	Zn
Reference, metric					
Aquatic health					
Buchman 2008					
TEL	1	8	8	0	9
PEL	0	0	0	0	2
Land application					
40 CFR503	0	0	0	0	0

Toxic Forebays? For Land Disposal: NO

- Of 30 forebays and 5 metals examined...
 - 0 samples were even close to land application limits
 - The worst case scenario had a 2.4 X factor-of-safety

% Surface Area of Forebay?

- Initial Guidance Suggested 10% of Total Wetland S.A. as Standard
- Studied by NCSU-BAE from 2004-2005 and 10-15% found to be a Reasonable Size



Maximum Storage is 12"

Bypass Weir

**First Flush Orifice
(Sets Normal Pool)**

Storage =
Distance from
orifice invert to top
of weir



Must retain portion of Water Quality Volume for at least 48 hours



**This means a potentially
small hole (orifice)**

For Large Systems...



Large System Option from CA





Should orifice holes have a diameter less than 2 inches?



Downturned Elbows Prevent Clogging

Also a Cold Water
Benefit



NC DENR Required Elements

- Flow through wetland – not short-circuited
 - 1.5:1 minimum flow path required
 - 3:1 minimum flow path recommended
- This really is about increasing hydraulic retention time.

NC DENR Required Element

- Maximum infiltration rate of 0.01 in/hr from deep pools or any other portion of the wetland that is intended to be wet

