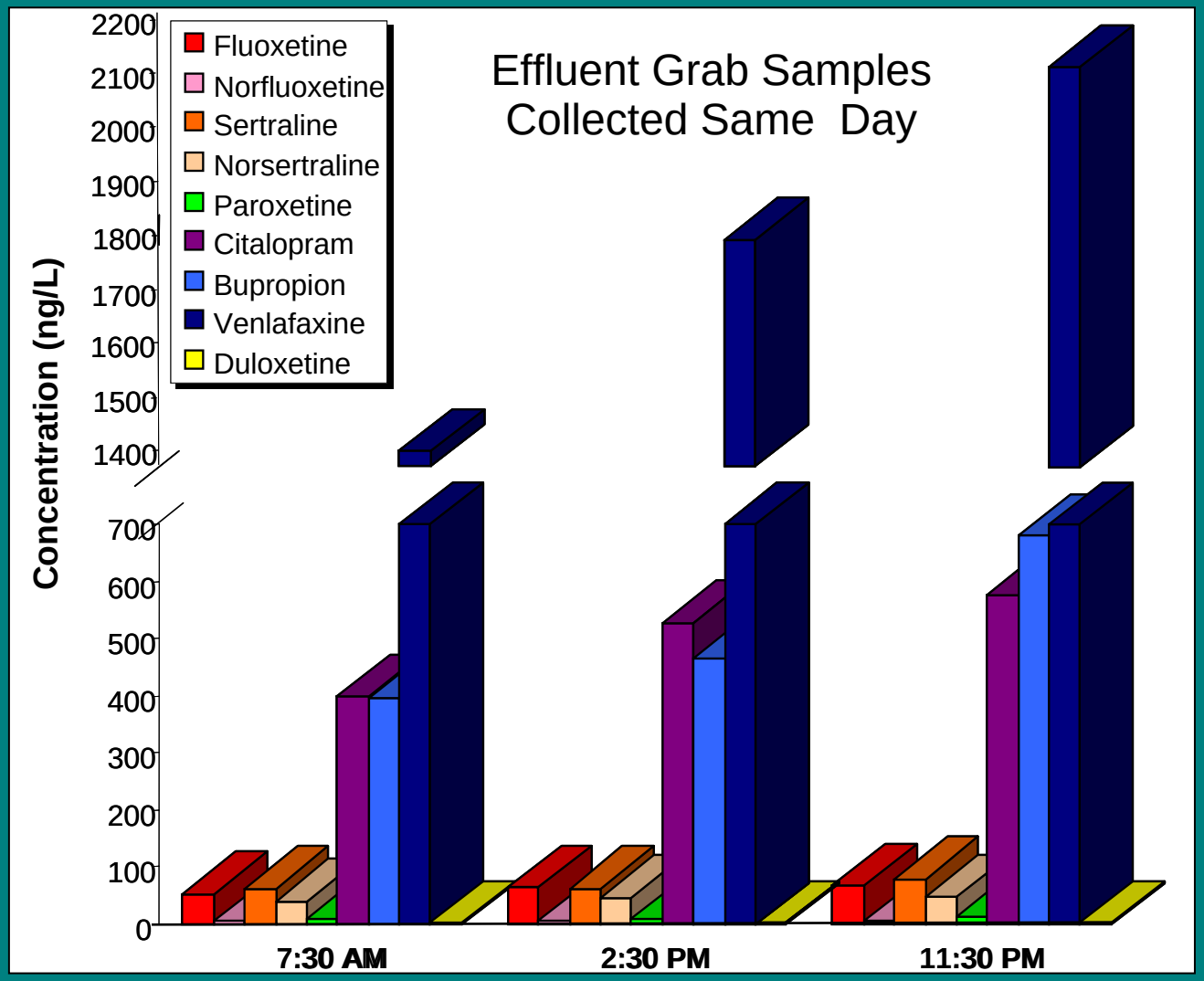
SSRIs in WW Effluent, Minnesota



251 MGD,
Population
1.8 million

Paroxetine Metabolite & Fluvoxamine not detected.

Presented by: Herb Buxton

NJ Water Monitoring Council Meeting

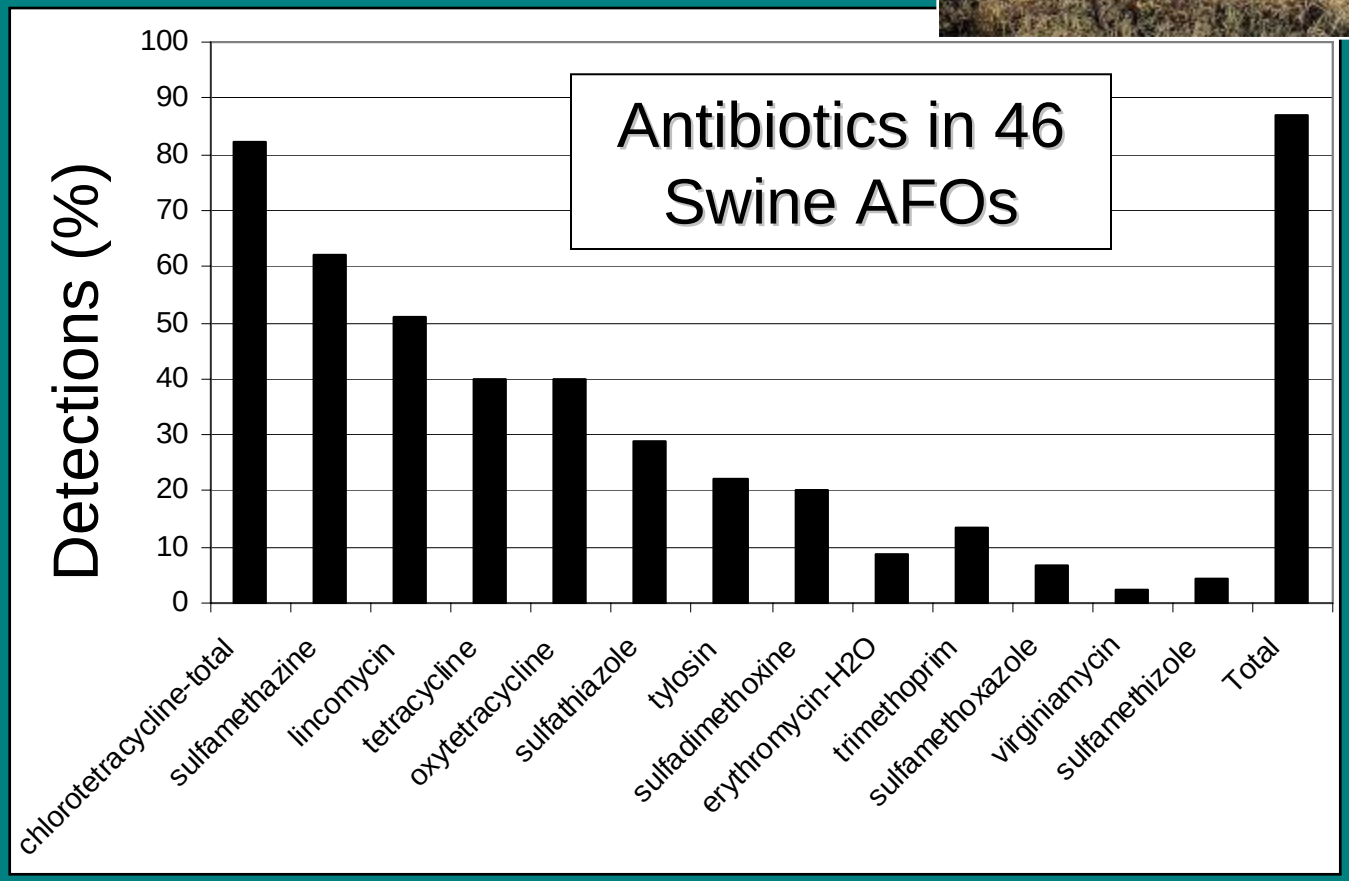
January 21, 2009

USGS

Results Provisional

Sensitive Env'l Settings?

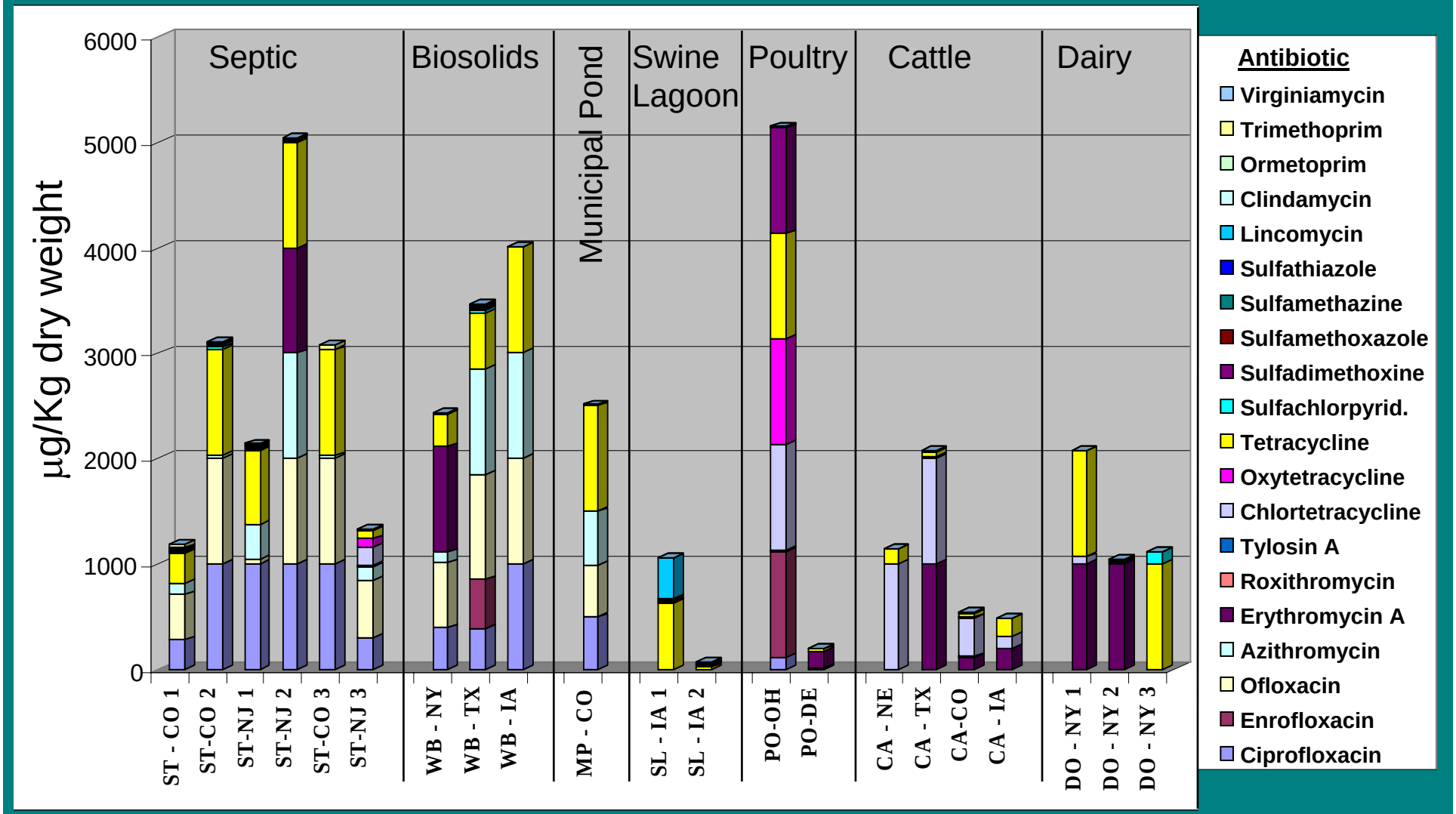
Animal Feeding Operations



USGS

Meyer et al., 2003

Antibiotics in Manure and Biosolids



USGS

Results Provisional

Hormones in Solid Wastes

TOTAL (ng/g)	Swine	Dairy	Poultry	WWTP	Septic
Estrogens	1102	171	229	13*	18
Androgens	1473	48	322	9	152
Progest.	460	-	-	-	36

*Only site ethynyl estradiol detected.

Results Provisional

USGS

Sensitive Env'l Settings?

Soils amended with biosolids and manures

Biosolids from 9 locations across the US

	Concentration (μg/kg)	
	Range	Median
Carbemazepine	15-1,200	68
Diphenhydramine	32-22,000	340
Fluoxetine	100-4,700	370
Triclosan	1,170-32,900	10,200

USGS

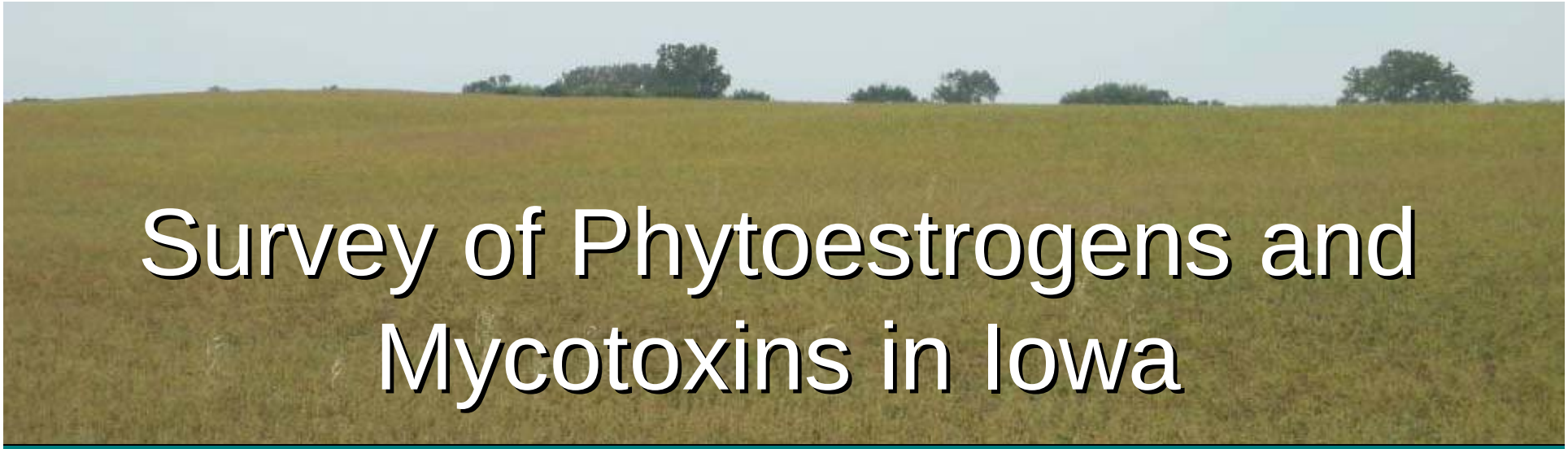
Kinney et al., 2006

National AFO Survey

- Nutrients.
- Pathogens.

} *Traditional Issues*

- Endocrine Disruption.
- Antimicrobial Resistance.
- Other Effects.



Survey of Phytoestrogens and Mycotoxins in Iowa

Are soybeans a source of phytoestrogens to streams?

- *biochanin A, coumestrol, daidzein, equol, formonontein, genistein*

Is corn is a source of mycotoxins to streams?

- *deoxynivalenol (DON), zearalenone (ZON)*

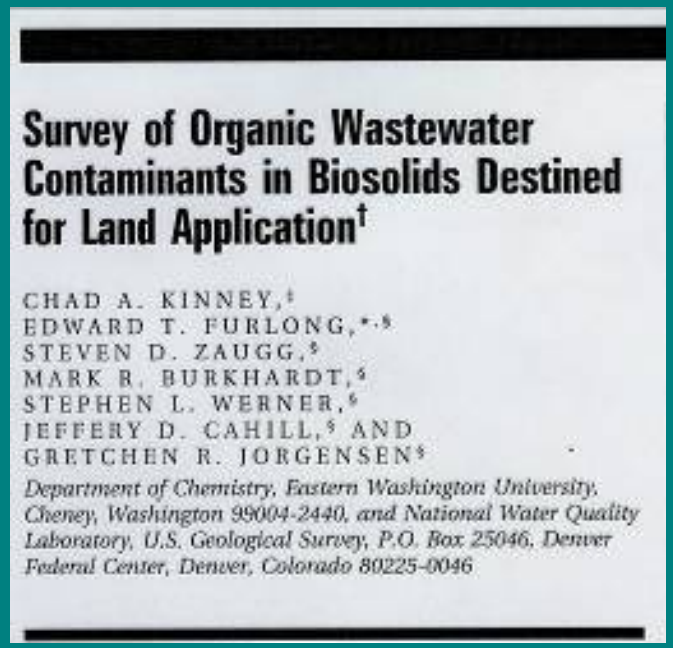
Sampling 15 stream sites 5 times through a year.

USGS

Result Summary - Biosolids

- 53 ECs detected; 30 to 45 in each sample; 25 in all samples.
- ppm levels (64 to 1811 mg/kg dry wt. total)

Compound	Max Conc (µg/kg)
1,7-dimethylxanthine	6200
diethylhexyl phthalate	20000
3-beta-coprostanol	91000



Survey of Organic Wastewater Contaminants in Biosolids Destined for Land Application†

CHAD A. KINNEY,[‡]
EDWARD T. FURLONG,[*,§]
STEVEN D. ZAUGG,[§]
MARK R. BURKHARDT,[§]
STEPHEN L. WERNER,[§]
JEFFERY D. CAHILL,[§] AND
GRETCHEN R. JORGENSEN[§]

Department of Chemistry, Eastern Washington University, Cheney, Washington 99004-2440, and National Water Quality Laboratory, U.S. Geological Survey, P.O. Box 25046, Denver Federal Center, Denver, Colorado 80225-0046

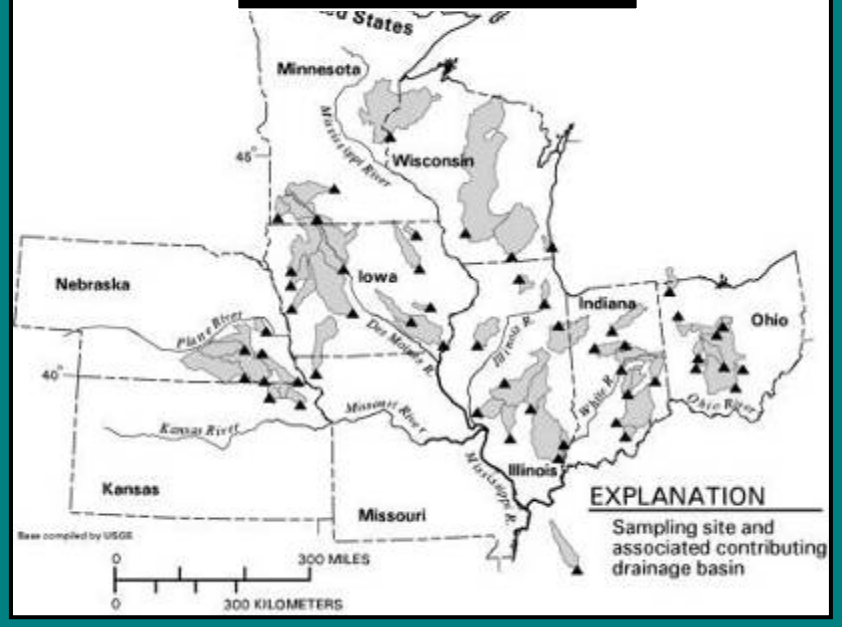
USGS

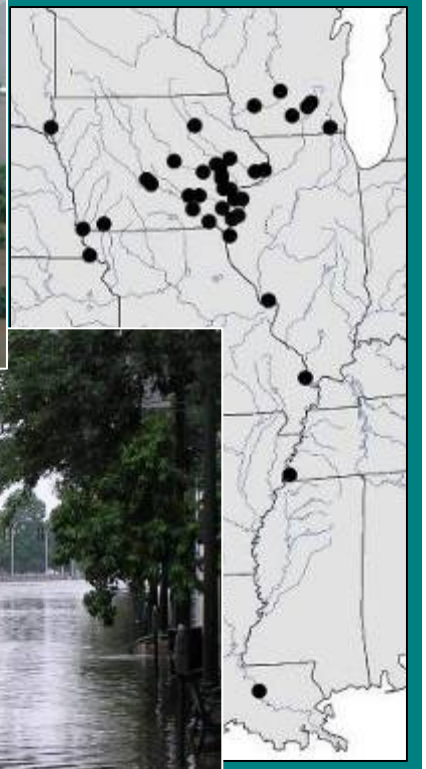
Kinney et al., 2006, ES&T, v. 40

Sensitive Env'l Settings?

Hydrologic Events

Spring Flush





Midwest Floods, Spring '08

40 Stream Sites: 75 water and 10 sediment samples.

51 Midwest Streams: 21 herbicides, 27 degradates, 36 antibiotics.

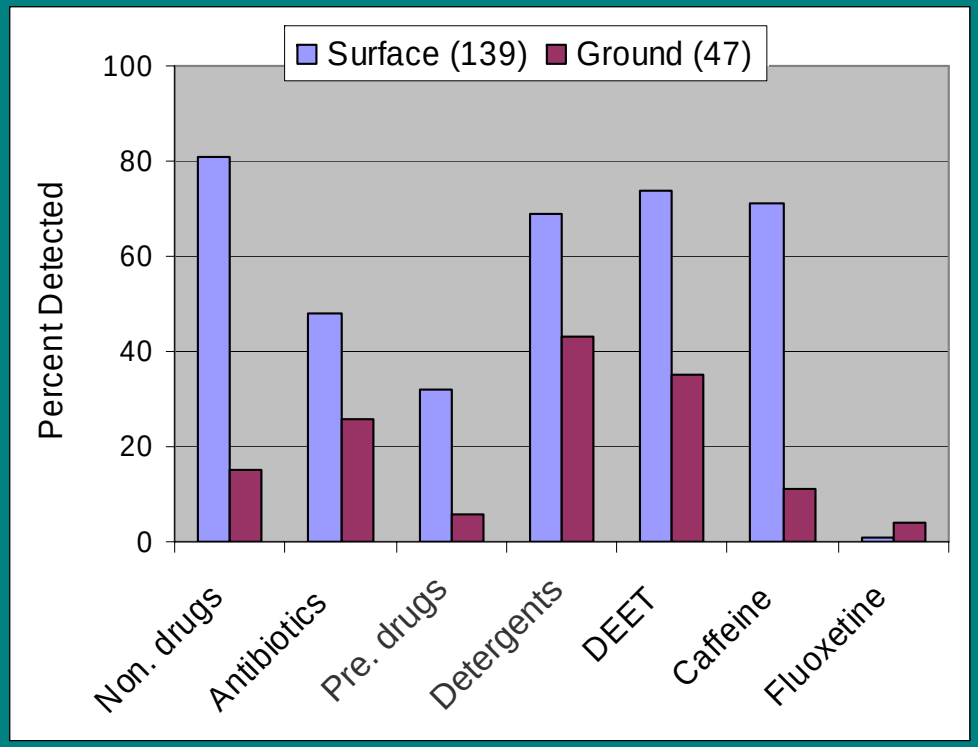
USGS

Scribner et al., 2003

Are PPCP's entering our environment?

Results of National Stream & Groundwater Surveys

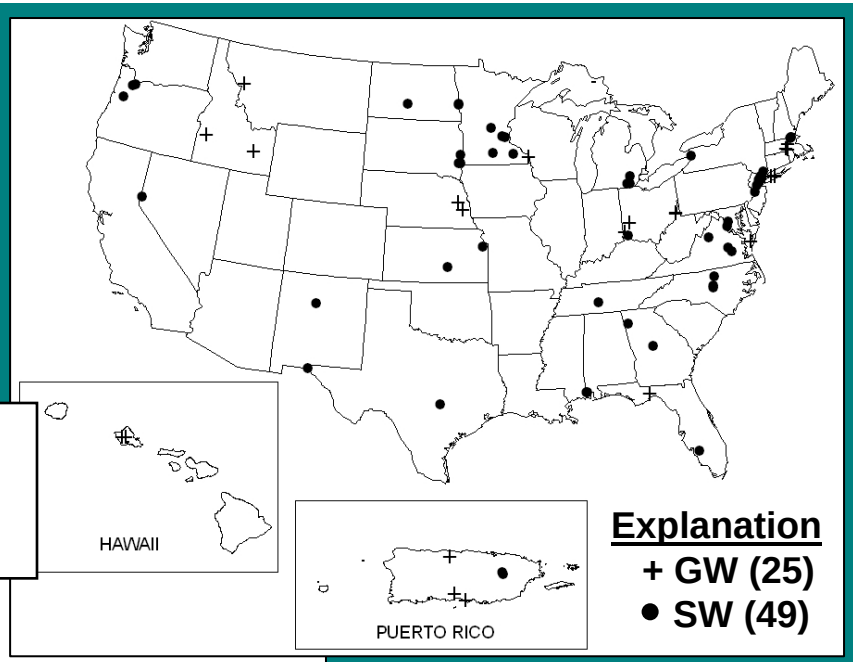
- Present in water at *sub-ppb conc.'s*.
- Present in *mixtures*.
- Greater levels in streams than wells



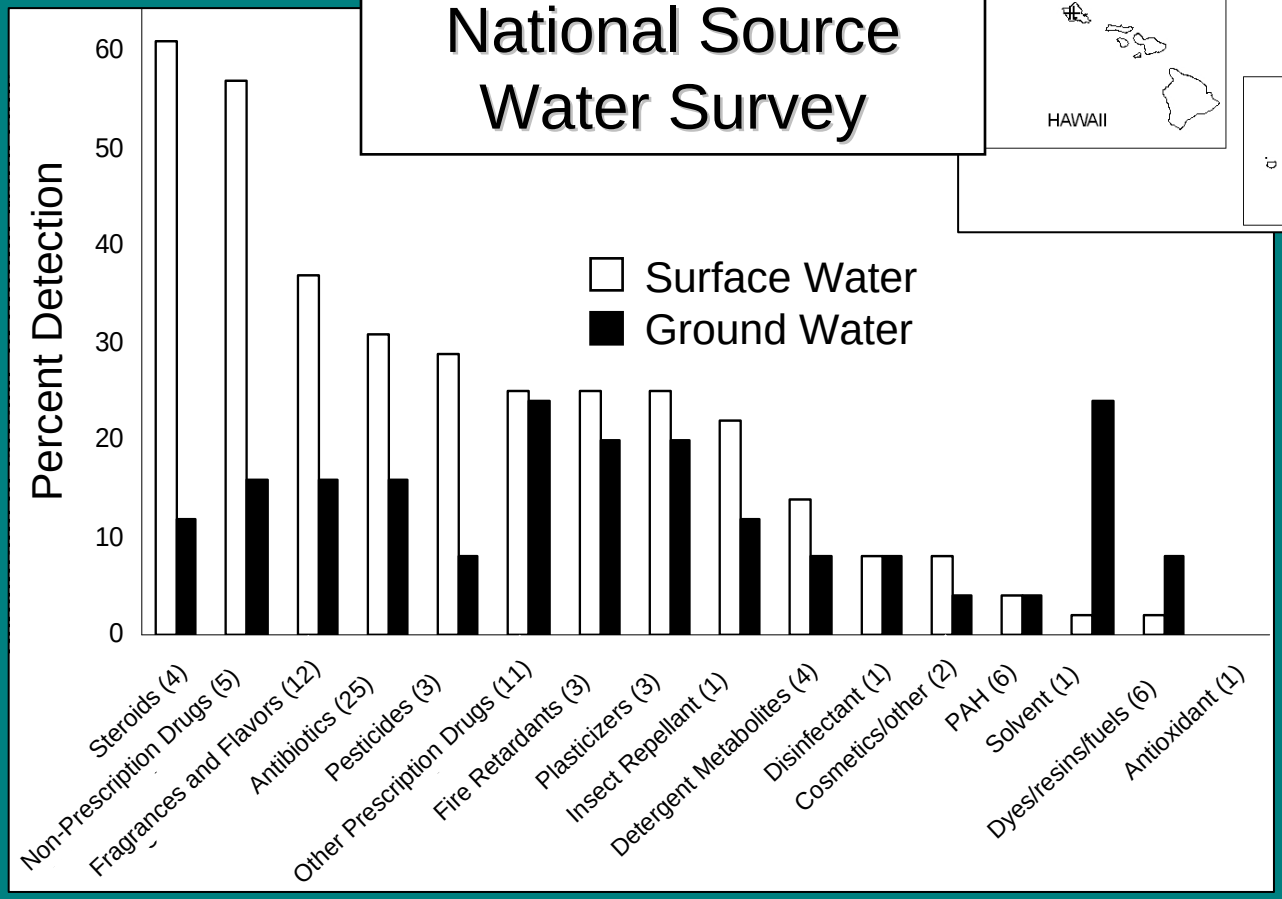
USGS

Kolpin, et al., 2002; Barnes et al., 2008

PPCPs in Source Waters



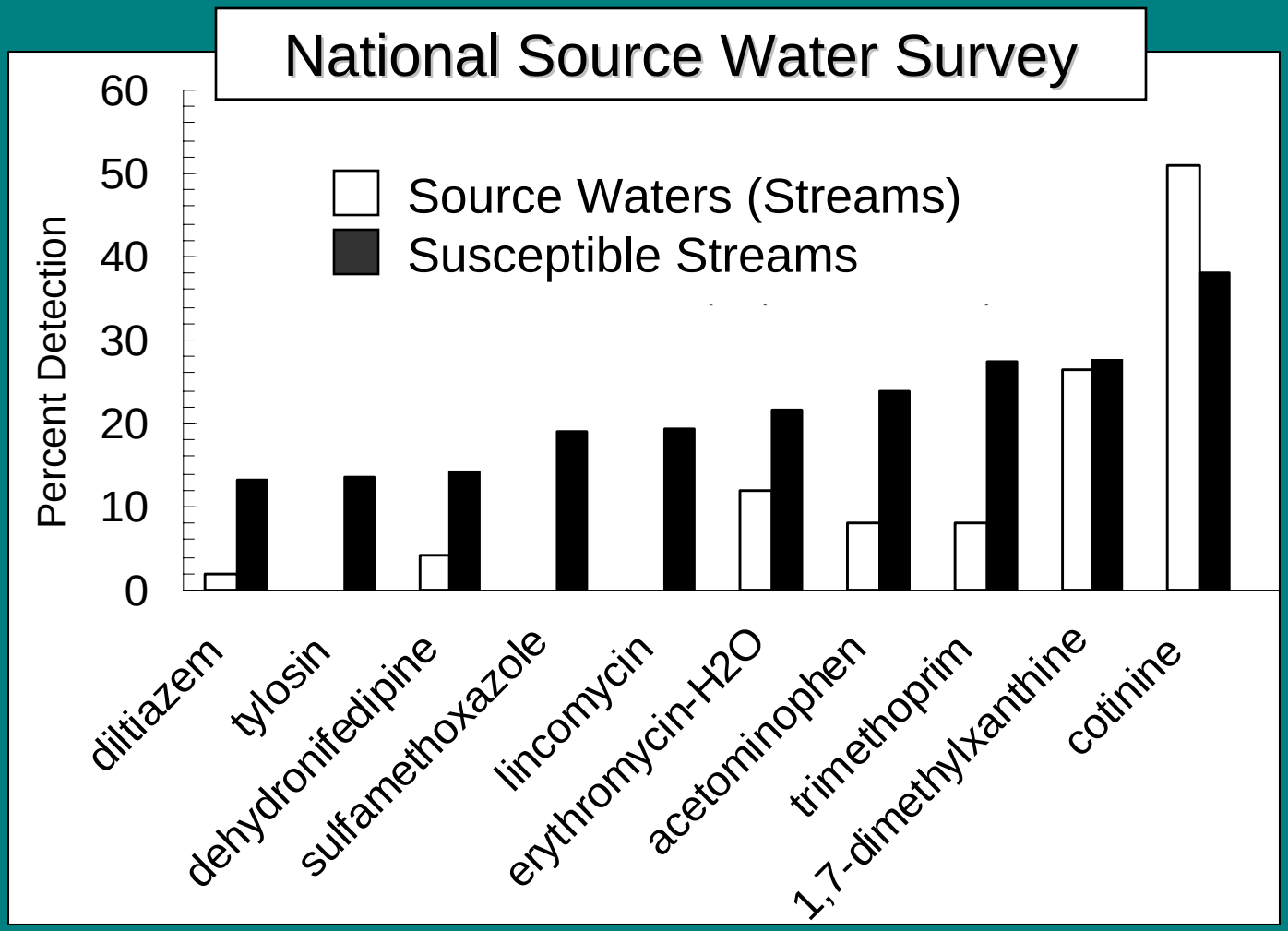
National Source Water Survey



USGS

Focazio et al., 2008

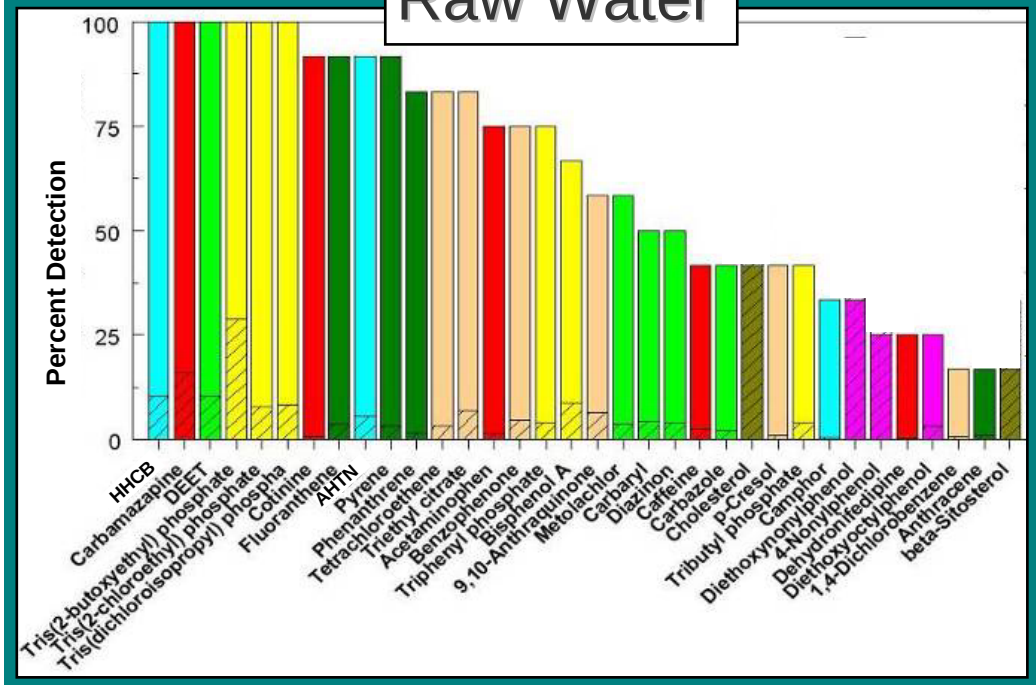
Natural Dilution and Degradation

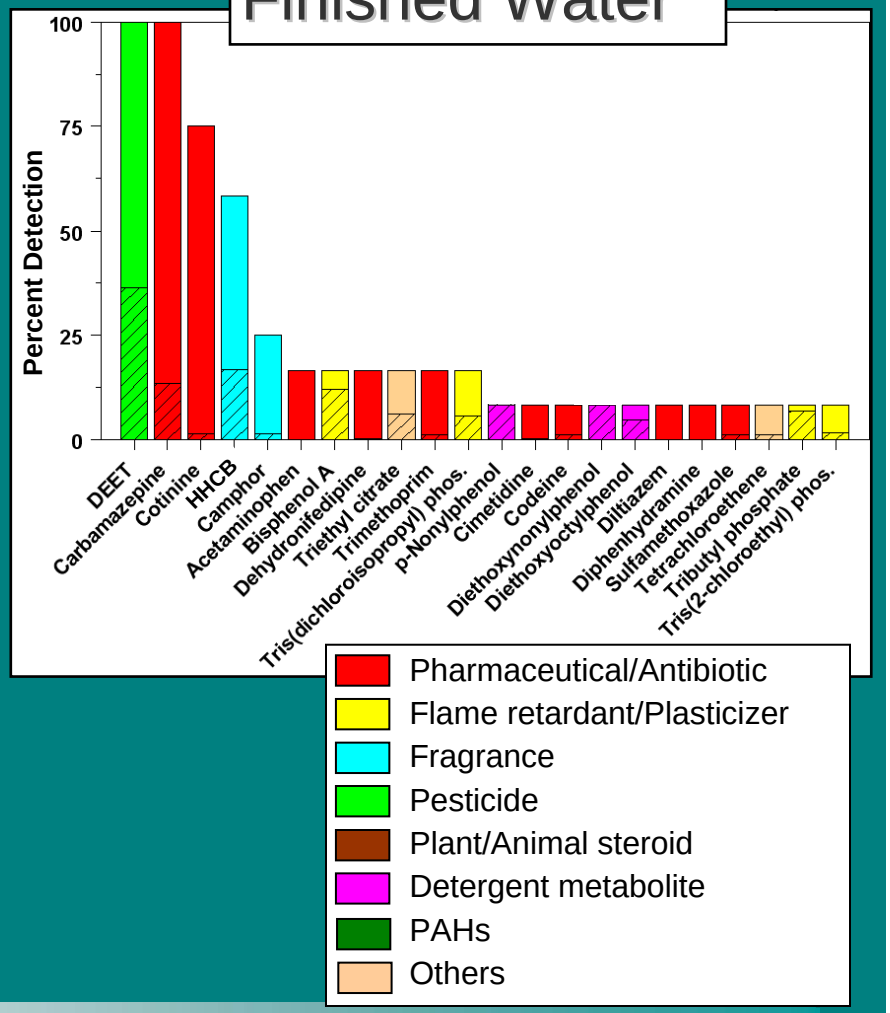


USGS

Focazio et al., 2008

Removal in Treatment, NJ Facility





Levels Generally Reduced by Treatment with GAC Filters

USGS

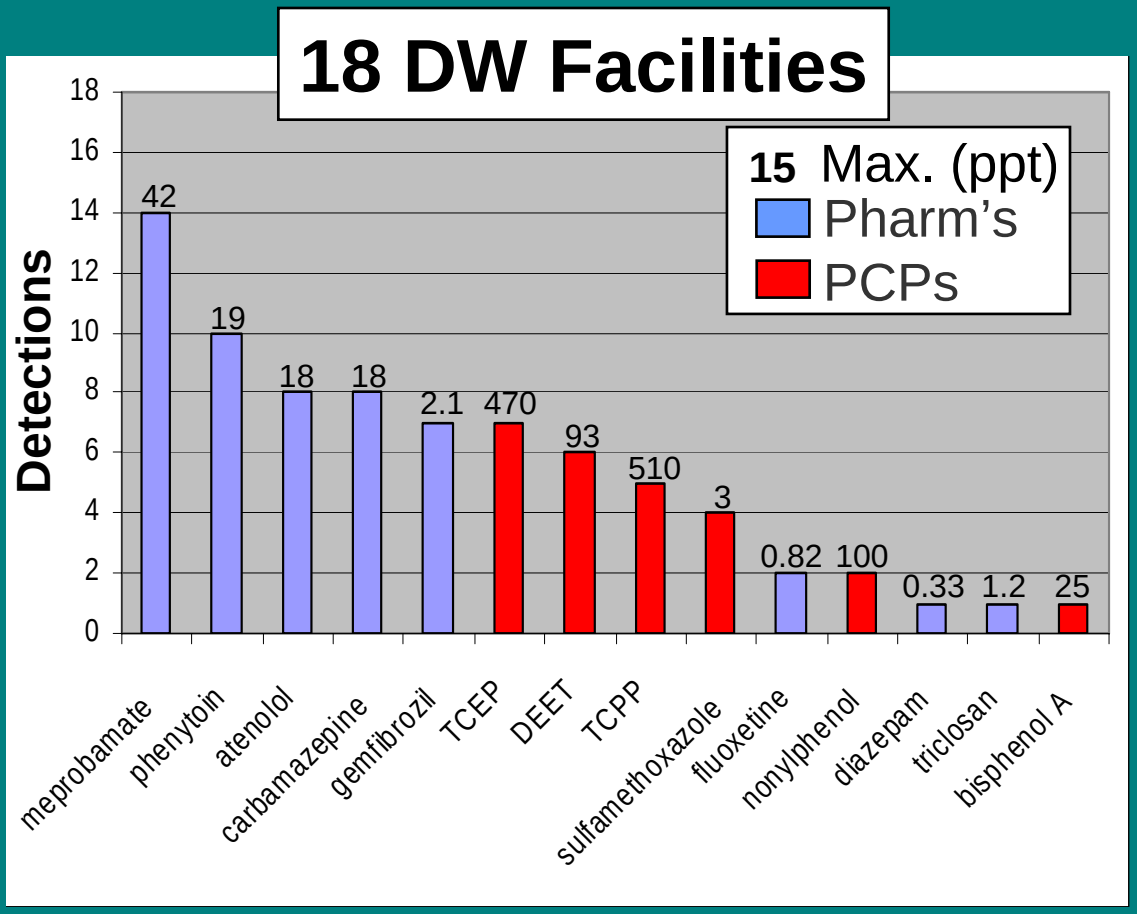
Stackelberg et al., 2004 & 2007

PPCPs in Finished Drinking Water

*12 of 20 Pharm's not detected

Conducted by Southern Nevada Water Authority

Supported by AWWA Research Fnd. & WateReuse Fnd.



USGS

Benotti et al. 2008

Finished Drinking Water Survey: 2007-Present, USEPA & USGS

- Varied locations across the Nation.
- Paired source/finished water samples.
- Varied treatment types.
- Significant QA/QC to ensure reliability
- *Working with water suppliers*