

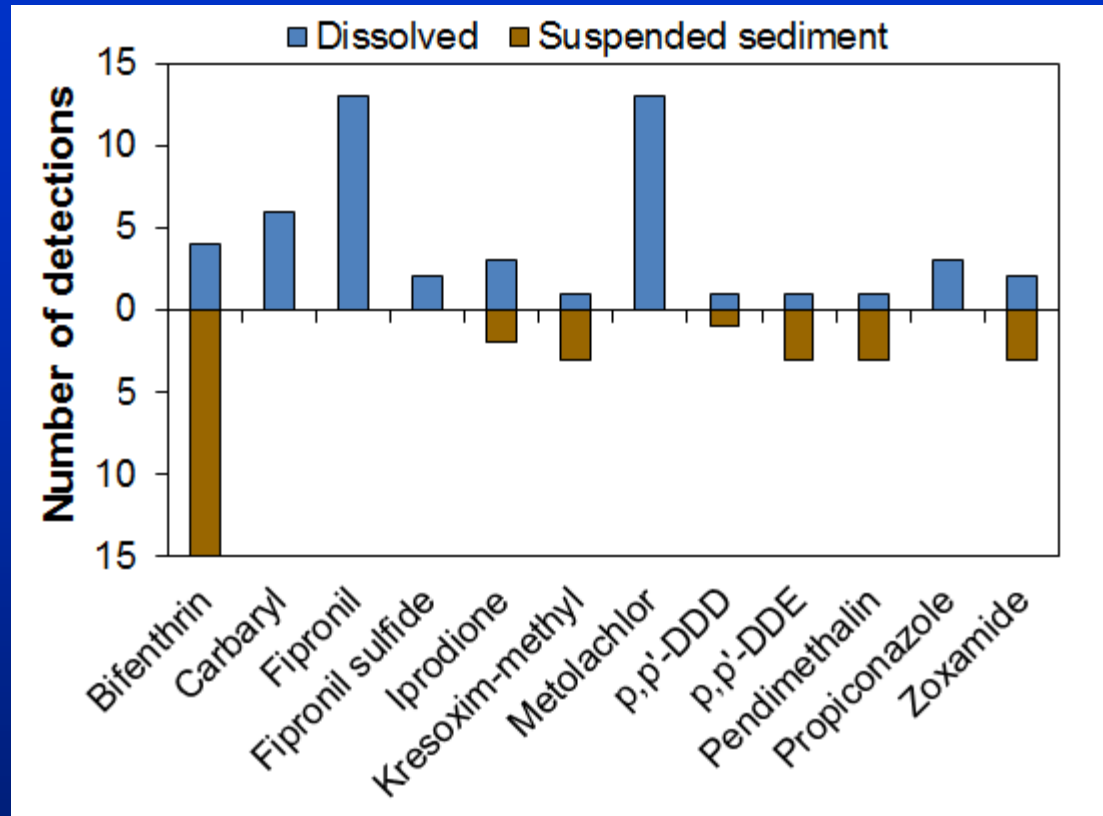
Pesticides in Stormwater: Streams and Outfalls

<u>Pesticide (type)</u>	<u>Urban streams</u> (n=12) ^a		<u>Stormwater outfalls</u> (n=5)	
	<u>Number of detections</u>	<u>Detection frequency</u>	<u>Number of detections</u>	<u>Detection frequency</u>
Bifenthrin (I)	9	75%	4	80%
Boscalid (F)	--	--	1	20%
Carbaryl (I)	4	33%	2	40%
DCPA (H)	1	8%	--	--
Esfenvalerate (I)	--	--	1	20%
Fenbuconazole (F)	--	--	1	20%
Fipronil (I)	9	75%	3	60%
Fipronil desulfanyl (D)	--	--	1	20%
Fipronil sulfide (D)	--	--	2	40%
Flusilazole (F)	--	--	1	20%
Iprodione (F)	1	8%	2	40%
Kresoxim-methyl (F)	1	8%	2	40%
Malathion (I)	1	8%	--	--
Malathion-oxon (I)	1	8%	--	--
Metolachlor (H)	9	75%	3	60%
p,p'-DDD (D)	1	8%	--	--
p,p'-DDE (D)	2	17%	--	--
Pendimethalin (H)	1	8%	--	--
Piperonyl butoxide (S)	--	--	1	20%
Propiconazole (F)	2	17%	--	--
Simazine (H)	1	8%	--	--
Zoxamide (F)	1	8%	2	40%

Data source: <http://nwis.waterdata.usgs.gov/nwis>

Pesticides in Stormwater

- 70% of detections in stormwater were dissolved vs 30% on suspended sediment
- Water solubility and Koc (organic carbon partitioning coefficient) were good predictors of the dominant phase pesticides were found



Data source: <http://nwis.waterdata.usgs.gov/nwis>

SIFT[©] Sediment Devices

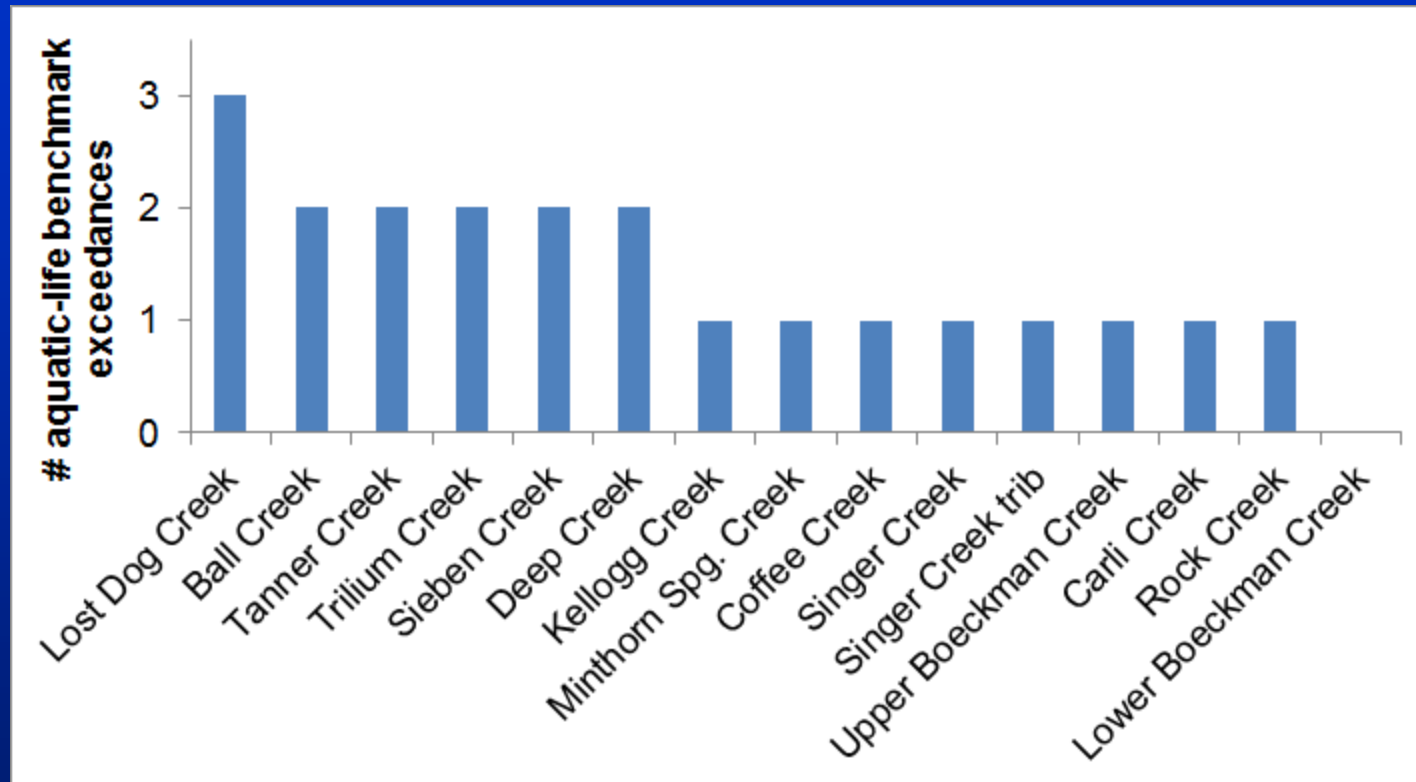
- 9 pesticides detected in 5 SIFT samples
- 4–5 pesticides per sample
- Bifenthrin and pendimethalin occurred in all samples, and at the highest concentrations
- Solid piece of equipment but watch out for plastic bags!



Data source: <http://nwis.waterdata.usgs.gov/nwis>

Aquatic-Life Benchmarks

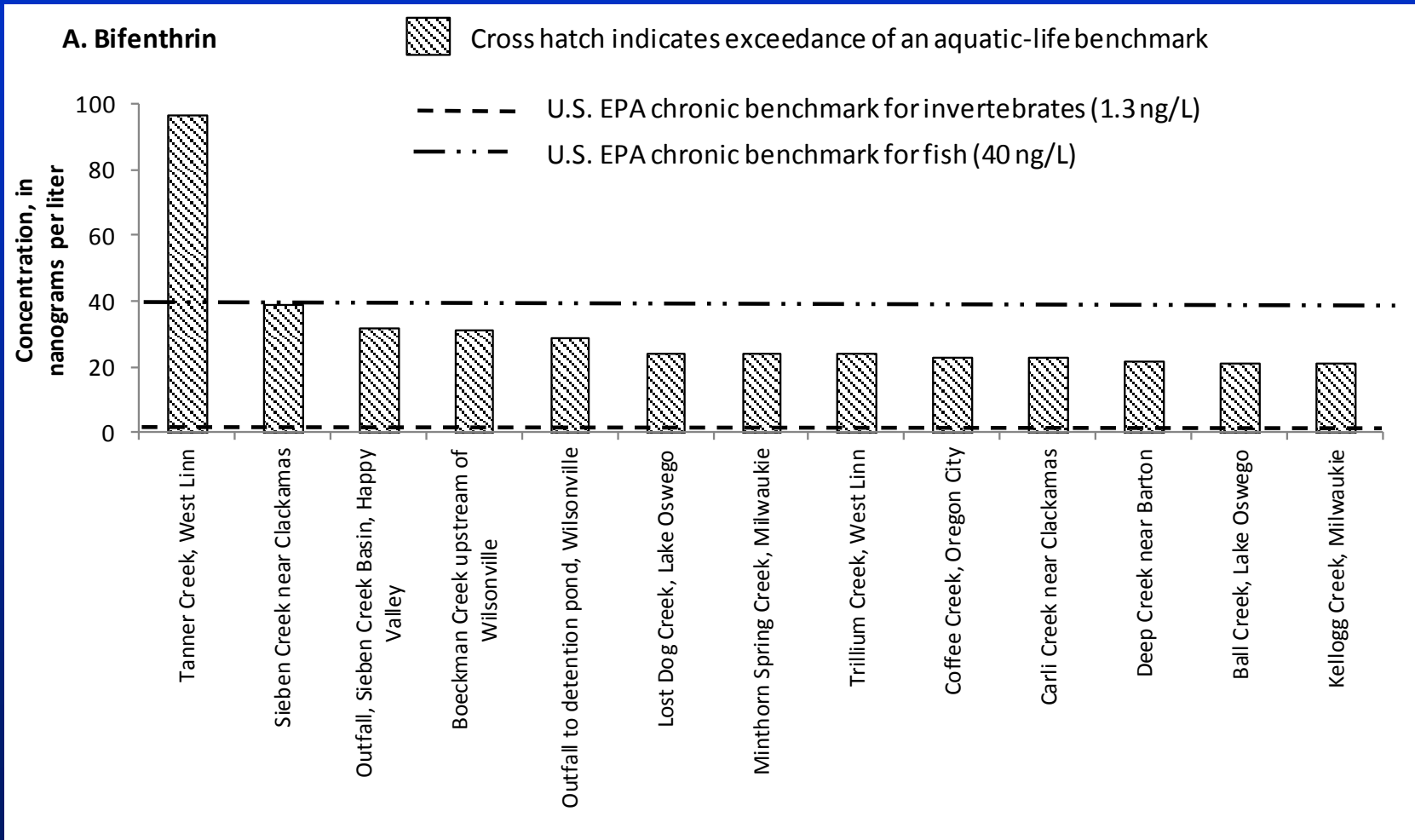
- Every MS4 stream except lower Boeckman Creek had at least one pesticide exceeding an aquatic-life benchmark



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Aquatic-Life Benchmarks

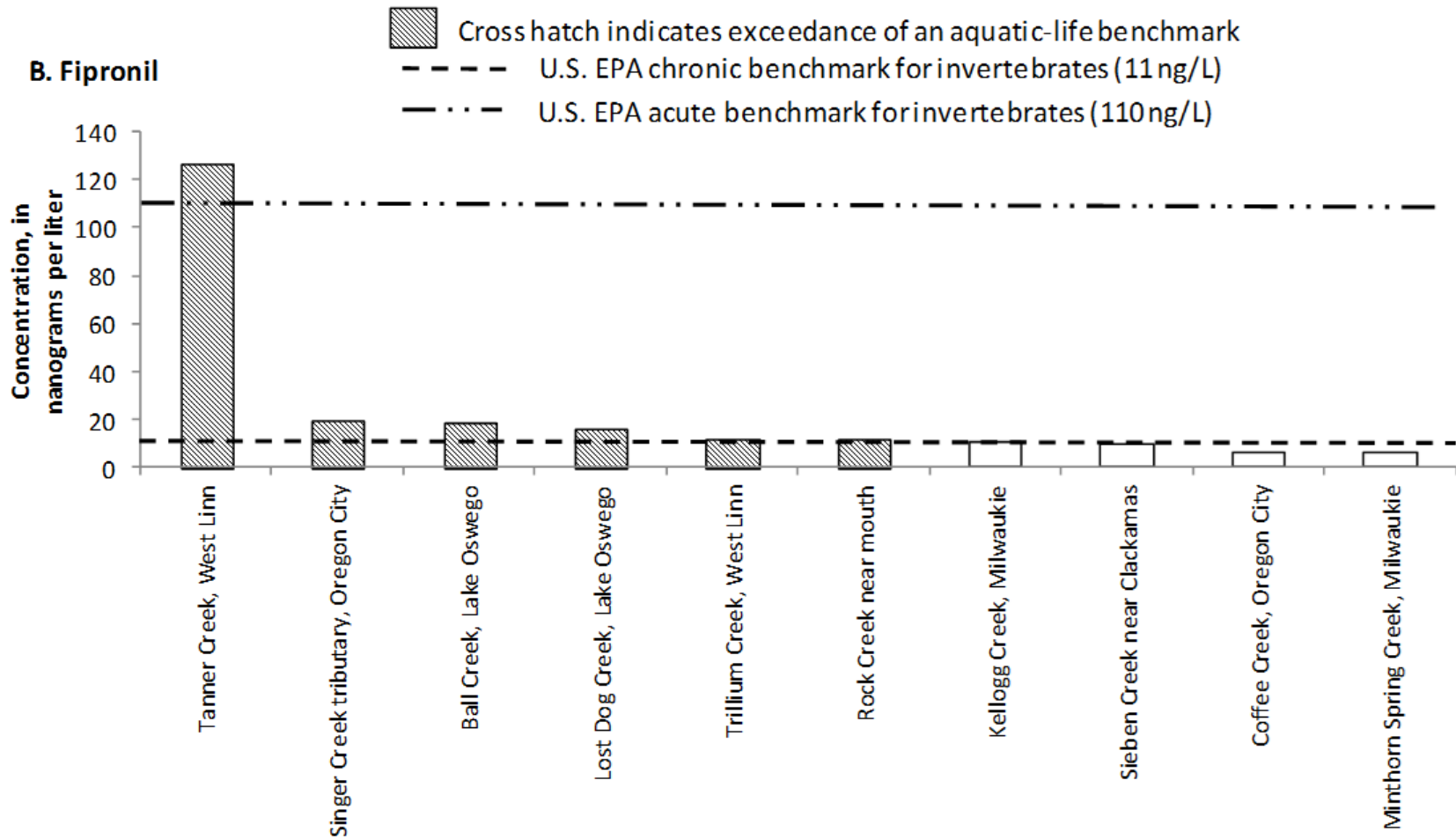
- **Benchmarks were exceeded for Bifenthrin, Fipronil, Malathion, and DDT Degradates**



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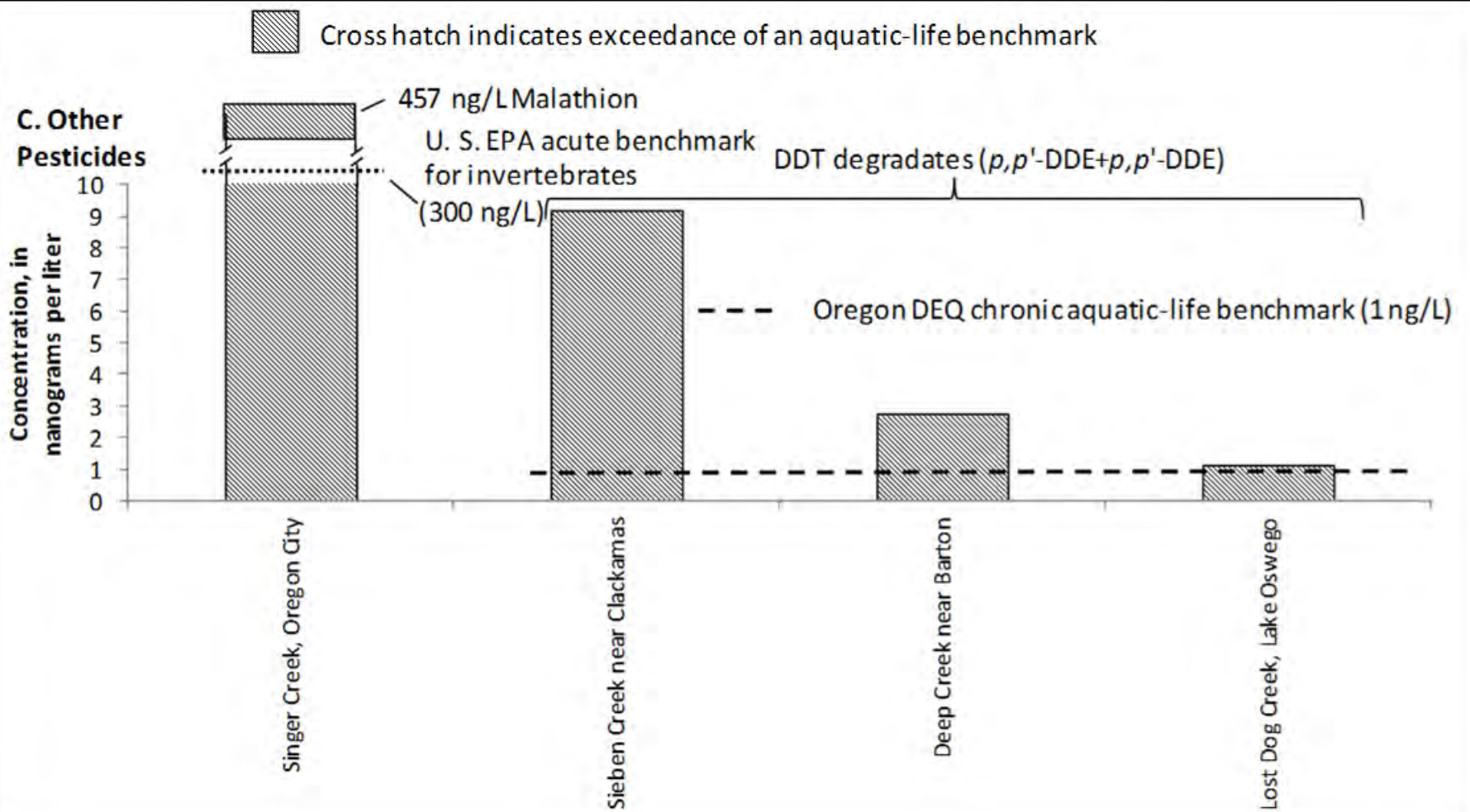
Aquatic-Life Benchmarks

B. Fipronil



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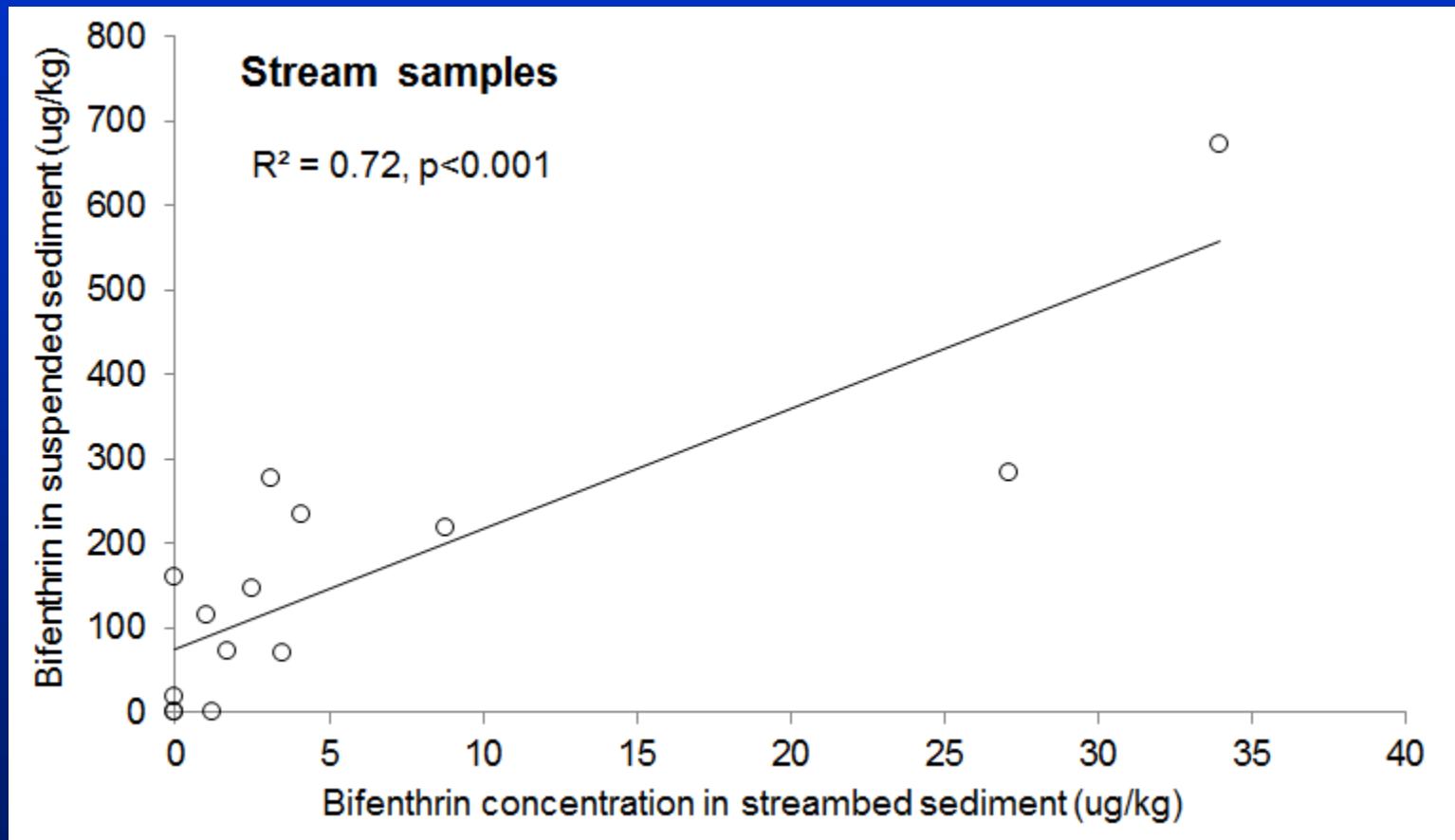
Aquatic-Life Benchmarks



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Bifenthrin

- Bifenthrin concentrations (*m/m*) in stormwater were positively correlated with concentrations in streambed sediments



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Conclusions

- **Pesticide occurrence in the Clackamas Basin and County was widespread during storms, in ag and urban areas, occurring in both dissolved and suspended phases**
- **Streams had multiple simultaneous exceedances of benchmarks, particularly bifenthrin, fipronil, and DDT degradates**
- **Streambed sediments were enriched with pesticides (particularly bifenthrin) at levels that may be affecting aquatic invertebrates**
- **More study is needed to better understand the full impact from pesticides (especially mixtures) as well as other stressors such as temperature and sediment on benthic communities**

References

- Carpenter, K.D. (2004). Pesticides in the lower Clackamas River Basin, Oregon, 2000–01: U.S. Geological Survey Water-Resources Investigations Report 03–4145, 30 p.
- Carpenter, K.D., Sobieszczyk, S., Amsberg, A.J., and Rinella, F.A. (2008). Pesticide occurrence and distribution in the lower Clackamas River basin, Oregon, 2000–2005: U.S. Geological Survey Scientific Investigations Report 2008–5027, 98 p.
- Carpenter, K.D., and McGhee, G. (2009). Organic compounds in Clackamas River water used for public supply near Portland, Oregon, 2003-05: U.S. Geological Survey Fact Sheet 2009-3030, 6 p.
- Kingsbury, J.A., Delzer, G.C., and Hamilton, P.A., 2008, Man-made organic compounds in source water of nine community water systems that withdraw from streams, 2002–05: U.S. Geological Survey Fact Sheet 2008–3094, 6 p.

Contact

Kurt Carpenter
U.S. Geological Survey
(503) 251-3215
kdcar@usgs.gov