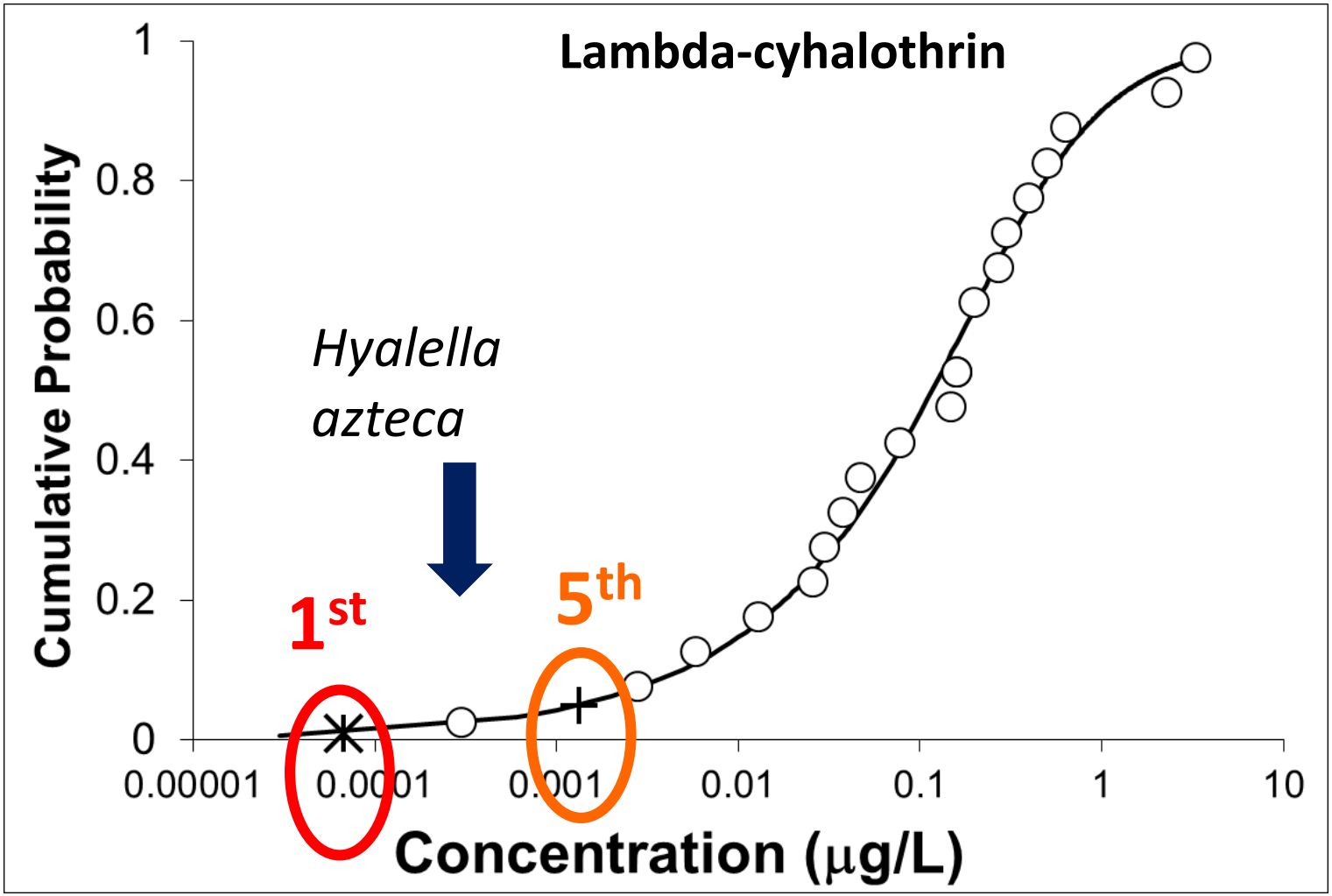
Pyrethroids Numeric Trigger Discussion

5 October 2016

8:30-10:30 am

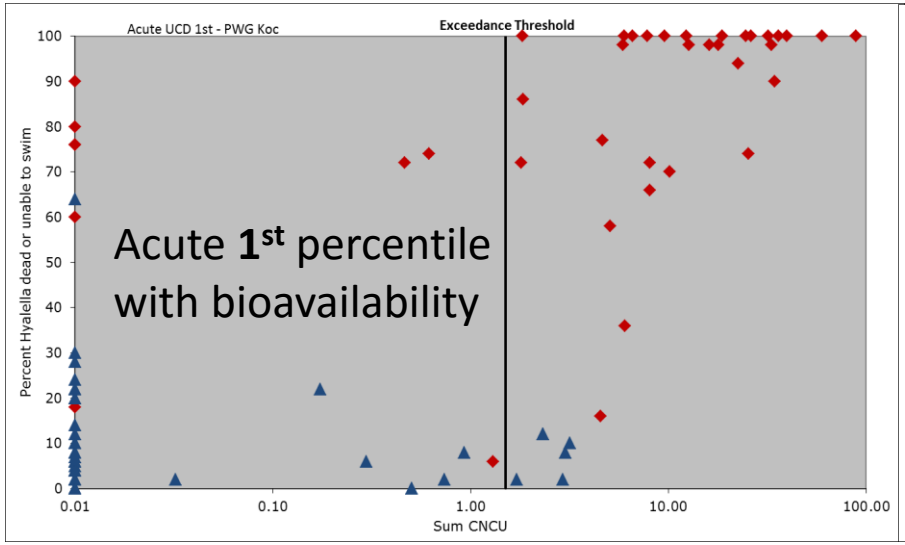
Species Sensitivity Distribution

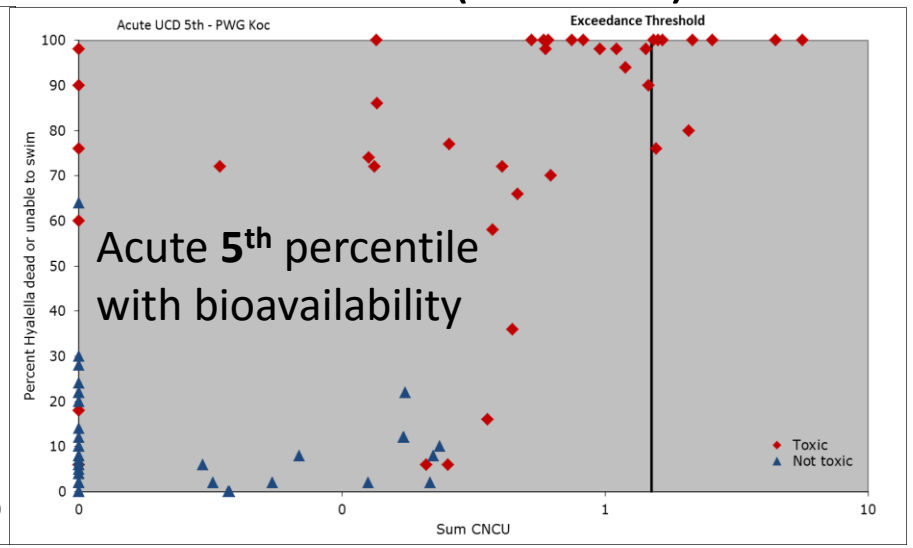


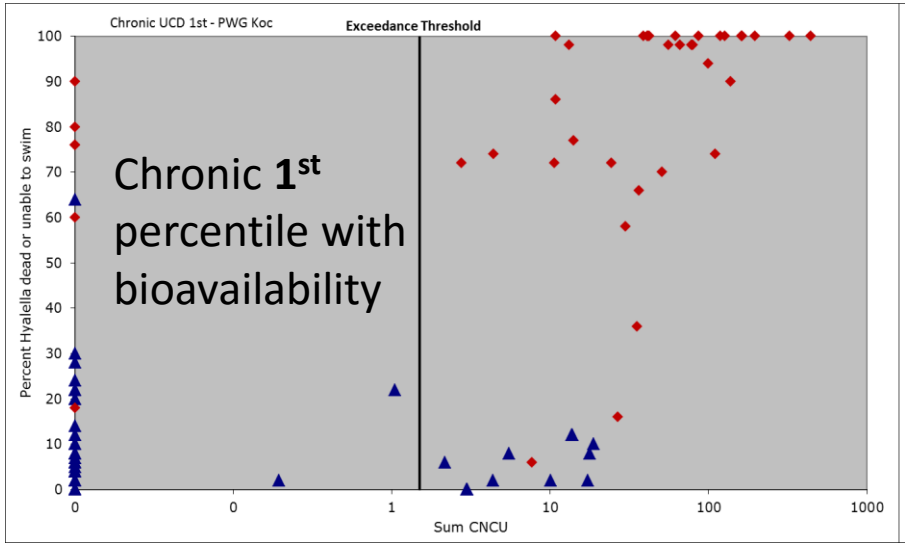
Water Quality Criteria

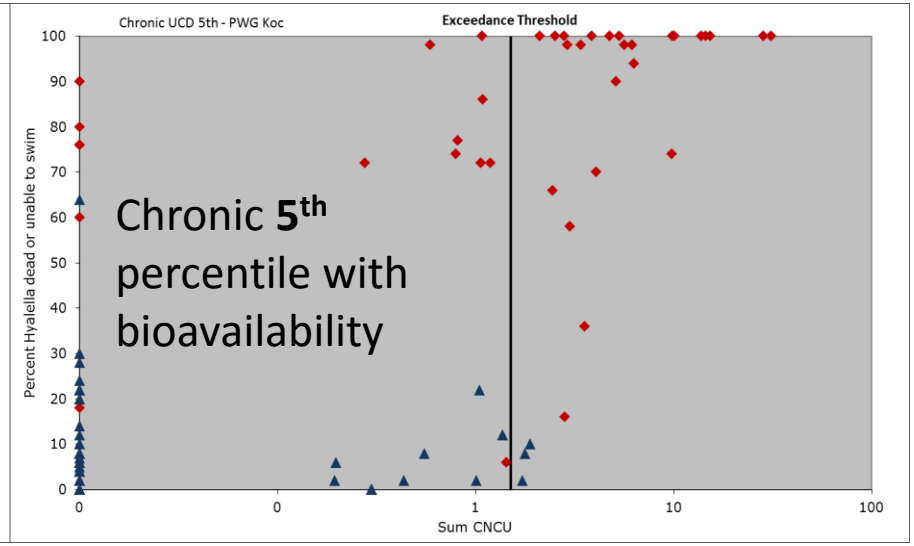
UCD Criteria	1st percentile		5th percentile		Basin Plan
	Acute (ng/L)	Chronic (ng/L)	Acute (ng/L)	Chronic (ng/L)	1/10 LC_{50} (ng/L)
Bifenthrin	**0.06**	**0.01**	**0.8**	**0.1**	**0.05**
Cyfluthrin	**0.07**	**0.01**	**0.8**	**0.2**	**0.055**
Cypermethrin	**0.04**	**0.01**	**1**	**0.3**	**0.056**
Esfenvalerate	**0.2**	**0.03**	**2**	**0.3**	**0.085**
Lambda-cyhalothrin	**0.03**	**0.01**	**0.7**	**0.3**	**0.03**
Permethrin	--	--	**6**	**1**	**0.7**

Ambient Data from the Delta and Tributaries (Weston)



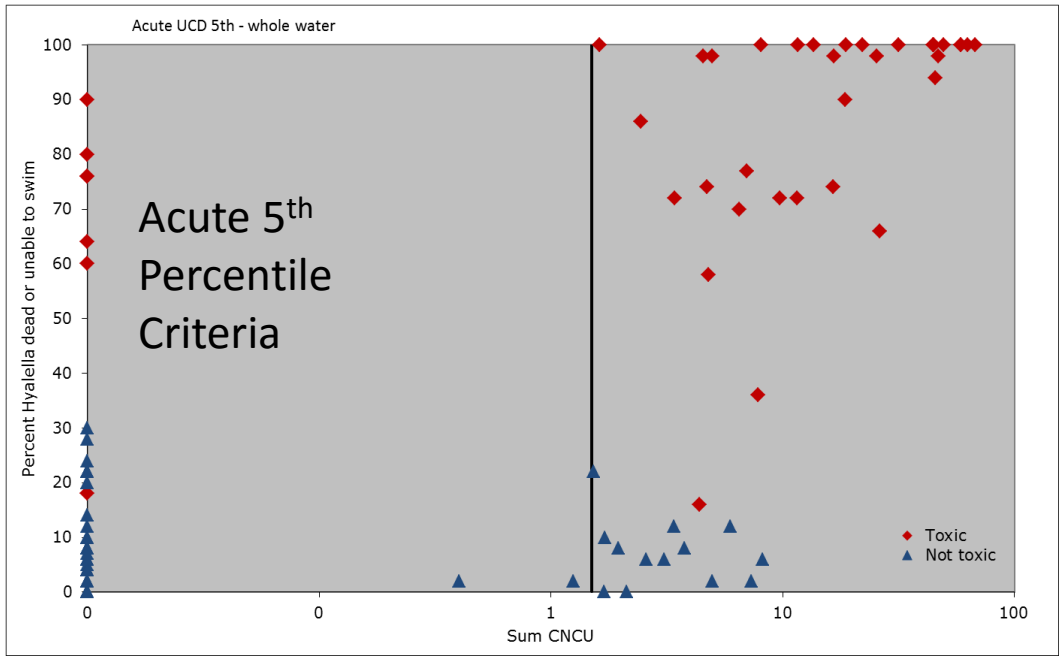


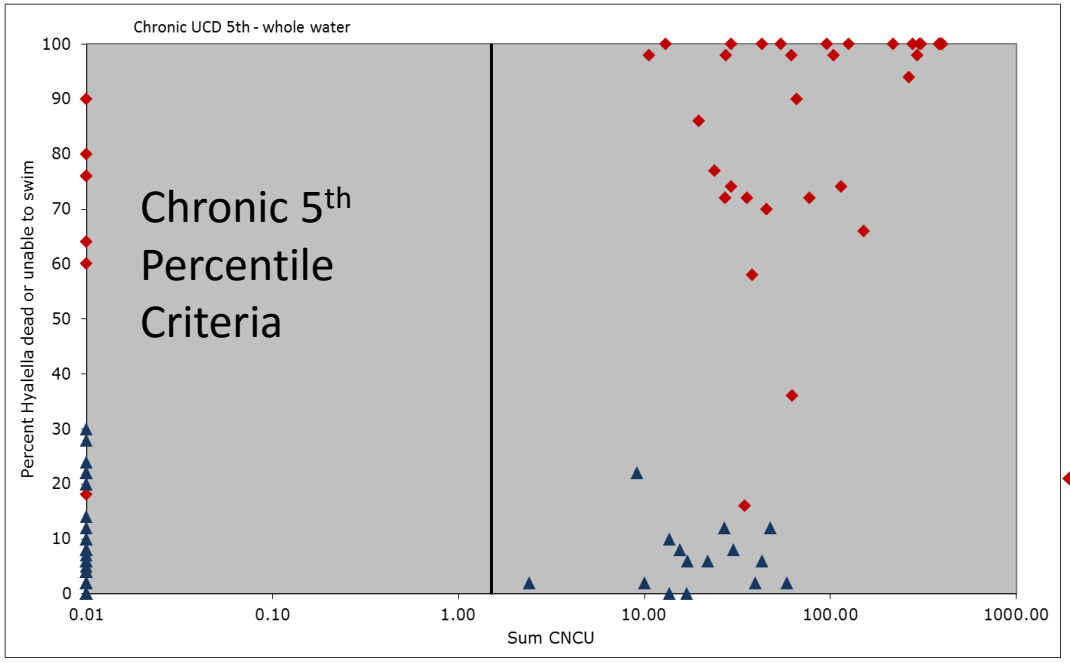




Toxic

Not toxic





Whole Water concentrations - Without bioavailability calculation

Toxic

Not toxic

Expected Sediment Concentration

- $Koc = C_{sediment}/C_{water}$
- $C_{sediment} = Koc*C_{water}$
- $C_{sediment} = Koc*(\text{potential water quality criteria})$
- Compare $C_{sediment}$ to sediment toxicity values

Expected Sediment Concentration

	Bif	Cyf	Cyp	Esf	L-Cy	Per
Koc (L/kg)	4,228,000	3,870,000	3,105,000	7,220,000	2,056,000	6,075,000
1st Chronic WQC (ng/L)	0.01	0.01	0.01	0.01	0.03	1
5th Chronic WQC (ng/L)	0.1	0.2	0.3	0.3	0.3	1
1st - $C_{sediment}$ (ug/g OC)	0.042	0.039	0.031	0.072	0.062	6.075
5th – $C_{sediment}$ (ug/g OC)	0.423	0.774	0.932	2.166	0.617	6.075
Sediment LC_{50} (ug/g OC)	0.43	1.08	0.34	1.53	0.45	8.68
Sediment MATC (ug/g OC)	0.03	0.015	0.25	0.24	0.054	0.43

Other Percentile Acute Criteria

	1st perc Acute WQC (ng/L)	2nd perc Acute WQC (ng/L)	2.5 perc Acute WQC (ng/L)	3rd perc Acute WQC (ng/L)	5th perc Acute WQC (ng/L)	*H. azteca* LC50 (ng/L)
Bifenthrin	0.06	0.2	0.3	0.4	0.8	0.5
Cyfluthrin	0.07	0.2	0.3	0.4	0.8	0.55
Cypermethrin	0.04	0.2	0.3	0.5	1	0.56
Esfenvalerate	0.2	0.5	0.7	0.9	2	0.85
Lambda-cyhalothrin	0.03	0.1	0.2	0.3	0.7	0.3
Permethrin		-	-	-	6	7

Other Considerations

- Peer Review
  - Armbrust
    - 1st percentile appears overly protective based upon conservatism already in the method (e.g., 3 year exceedance frequency, 4-day averaging period)
    - Use of 5th percentile is equally justified scientifically as the 1st, consistent with other methods, and would likely provide adequate protection of beneficial uses
  - Coats
    - The 1st percentile criteria developed for the pyrethroids will protect the beneficial uses of the waterways; they will also be protective of sensitive species, without being unnecessarily conservative.
  - Jenkins
    - Use of 1st percentile is inconsistent with the derivation of other acute and chronic criteria for which there is sufficient data to use the SSD approach
    - The premise for using the SSD approach is a robust statistical analysis using all of the available toxicity values that meet data quality criteria. It seems arbitrary to use the 1st percentile for the sole purpose of deriving a toxicity value that is less a single value of unknown significance.
    - The 5th percentile is appropriate to reduce the probability of both Type I and Type II error in estimating the acute value.

Other Considerations

- Temperature effects are not accounted for
  - Pyrethroids are more toxic at lower temps
- Uncertainties in partition coefficients
- Other species have similar sensitivity to *Hyalella*
  - Mysid shrimp
  - Gammarus species
  - Sublethal effects on fish

Schedule

- Oct: Notice & materials for December Board Meeting
- Dec 5/6: Board comment hearing
- Dec: Official Comments Due
- Jan: Responses to comments posted
- Feb: Board adoption hearing