



Washington
State Department of
Agriculture

Pesticide Monitoring in Surface Water

Lower Yakima River WQ & HC
meeting 2021

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Returning adult Chinook salmon at Snipes/Spring Creek

NRAS – Surface Water Monitoring Program (SWMP)



Topic 1:

Yakima Basin Watersheds

Topic 2:

What we analyze for

Topic 3:

Overview of 2019 data

Topic 4:

WSDOT Wet Pond, aka Bubble-Up results

Topic 5:

Marion Drain, Sulphur Creek WW & Snipes Creek

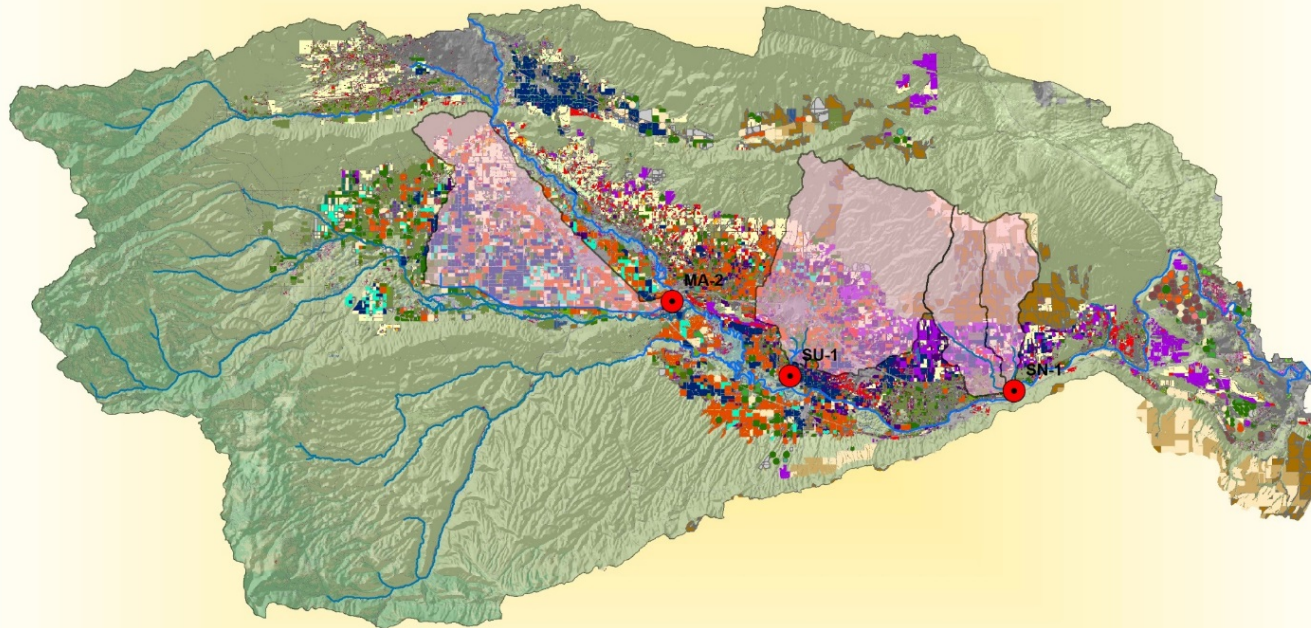
Topic 6:

Chlorpyrifos food and feed tolerances expire Feb. 22, 2022

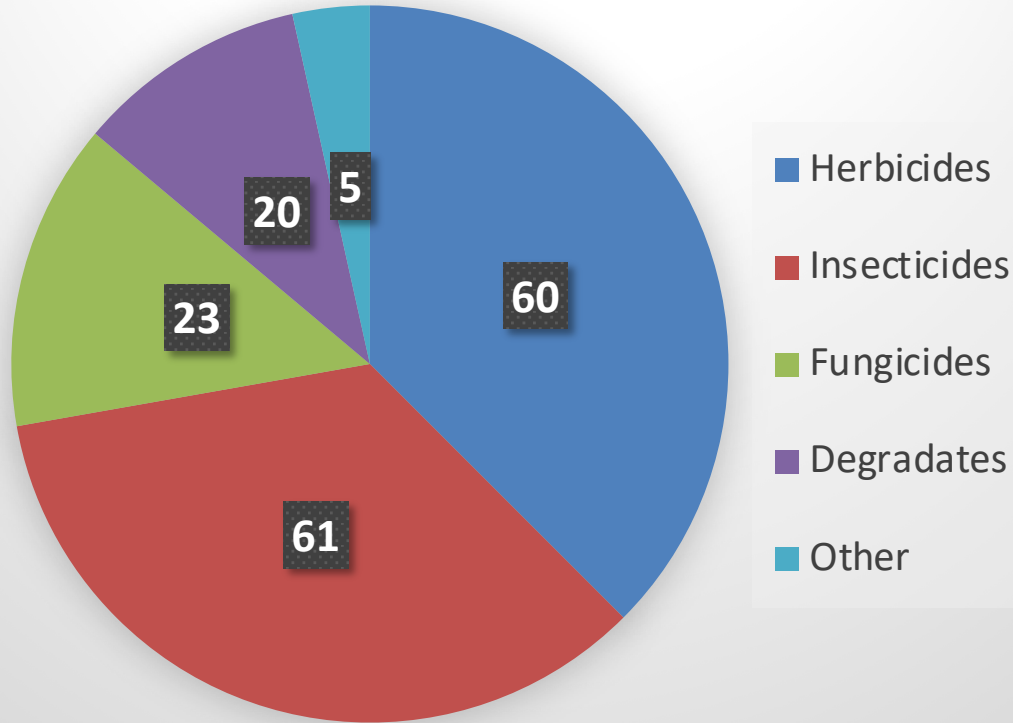
Lower Yakima Sub-Basins



Monitored Watershed	Hydrologic Unit Code (HUC)	County	Watershed Acres	Ag/Urban Acres	Land Use	Years Monitored
Marion Drain	1703000304	Yakima	82,400	57,200	Agriculture	2003-Present
Sulphur Creek WW	1703000309	Yakima	102,300	41,700	Agriculture	2003-Present
Snipes Creek	1703000310	Benton	50,300	31,200	Agriculture	2016-Present



What do we monitor for?

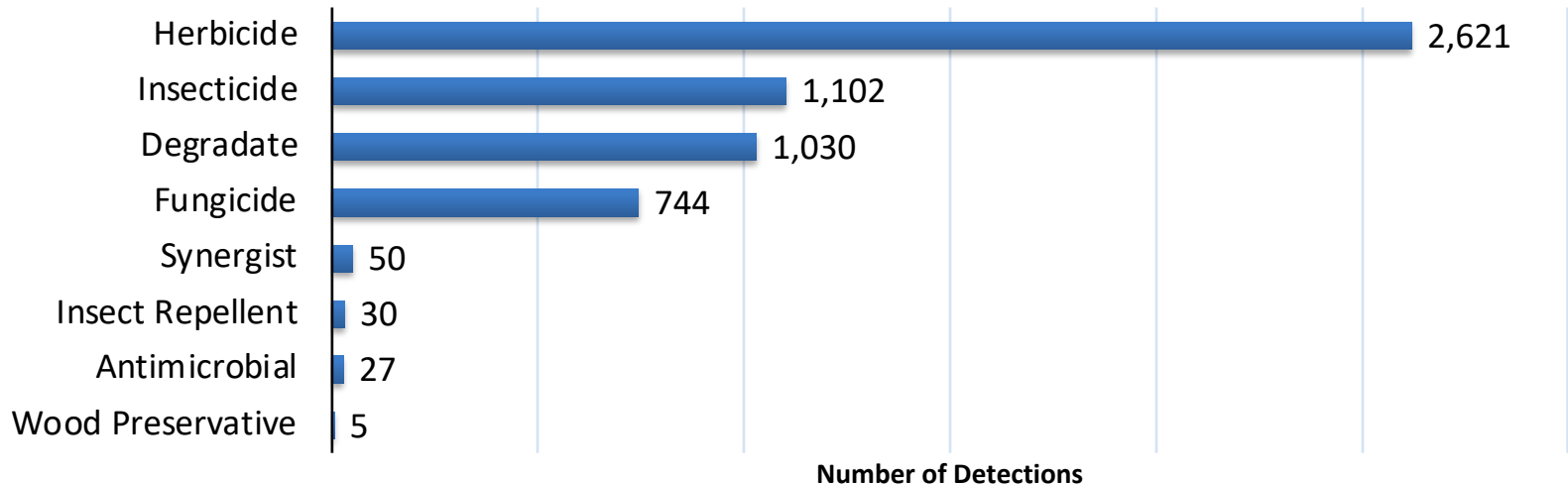


- 169 analytes (excludes nutrients and TSS)
- Physical water quality measurements

2019 Statewide Results (More representative than 2020)



- Out of all samples analyzed, there was a 13% detection frequency
- Detected 123 different pesticides in surface water out of 159
- Herbicides (47%) were the most frequently detected



WSDOT Wet Pond (aka Bubble-Up)



Bubble-Up 2020 & 2021 Results (Monthly Sampling)



- **2020 Sampling (3 sampling events)**
 - August, Sept., Oct.
 - Pesticide Results
 - Detected 16 unique chemicals (12-16 detected/sample)
 - **Herbicides (13)**, **Fungicides (1)**, Degradates (2)
 - All detections well below EPA Aquatic Life Benchmarks
- **2021 Sampling (7 sampling events)**
 - March, April, May, June, July, August, & Sept.
 - Pesticide Results
 - Detected 17 unique chemicals (10-13 detections/sample)
 - **Herbicides (11)**, **Fungicides (3)**, Degradates (3)
 - All detections well below EPA Aquatic Life Benchmarks

Bubble-Up Gen. WQ Results (Monthly Sampling)



- **2020 & 2021 General WQ Parameters**

- Water Temperature = 14.9-19 °C
- Dissolved Oxygen = 9.27-9.97 mg/L, 99.5-101.1%
- Spec. Conductivity = 798-878 μ S/cm
- pH = 7.81-8.28
- Nitrite-Nitrate = 9.4-10.4 mg/L

Bubble-Up 2020 & 2021 Results (Monthly Sampling)



2020 & 2021 Detected Chemicals		2020 Detection # (3 events)	2021 Detection # (7 events)	% of ALB
Degradate of Dichlobenil (Herbicide)	2,6-Dichlorobenzamide	3	7	0.19%-0.31%
Herbicide	Aminocyclopyrachlor	3	7	0.004%-0.05%
Herbicide	Atrazine	3	7	0.4%-0.65%
Fungicide	Boscalid	1	1	0.002%-0.004%
Herbicide	Bromacil	3	7	2.34%-3.04%
Degradate of Atrazine	Desethylatrazine	0	7	1.48%-2.52%
Herbicide	Diuron	3	4	3.08%-12.31%
Fungicide	Fluopicolide	0	1	0.003%
Herbicide	Hexazinone	3	7	0.043%-0.12%
Herbicide	Imazapic	1	1	0.11%
Herbicide	Imazapyr	3	7	0.125%-0.27%
Herbicide	Metolachlor	0	1	0.10%
Herbicide - preemergent	Norflurazon	3	7	0.07%-0.16%
Degradate of Oxamyl (Insect/nematicide)	Oxamyl oxime	0	2	0.09%-0.10%
Herbicide	Prometon	1	0	0.004%
Herbicide	Simazine	1	0	0.06%
Herbicide	Sulfentrazone	3	7	0.02%-0.1%
Herbicide	Sulfometuron methyl	3	1	1.16%-9.87%
Fungicide	Triadimefon	0	1	0.005%
Degradate of Triazine Herbicides	Triazine DEA degradate	3	0	0.002%
Herbicide	Triclopyr acid	3	0	0.0002%

Marion Drain Late Season



Marion Drain 2 (MA-2), 2020 - Freshwater Criteria (pesticides in ug/L, TSS in mg/L)

Month		Oct				Nov				Dec	
Day of the Month	Use	5	13	20	26	2	9	16	23	30	7
2,4-D	H		0.040								
2,6-Dichlorobenzamide	D-M		0.002						0.001		
4,4'-DDD	D-OC				0.001						
4,4'-DDE	D-OC				0.001						0.001
Atrazine	H	0.004	0.005	0.009		0.008	0.008	0.006	0.007	0.007	0.007
Azoxystrobin	F	0.005									
Boscalid	F	0.005	0.006	0.004		0.003	0.003	0.002	0.003	0.002	0.002
Bromacil	H		0.004	0.003							
Carbendazim	F		0.004								
Chlorantraniliprole	I	0.019	0.019	0.022		0.025	0.022			0.023	0.026
Clothianidin	I-N	0.027	0.029	0.047	0.051	0.055	0.050	0.051	0.044	0.054	0.056
Dimethoate	I-OP							0.020	0.004		
Diuron	H		0.004								
Ethoprop	I-OP		0.004								
Fenarimol	F									0.004	
Fludioxonil	F	0.009	0.012	0.005							
Hexazinone	H			0.002		0.002	0.002		0.002	0.002	0.002
Imidacloprid	I-N				0.005					0.073	
Methoxyfenozide	I						0.003			0.003	0.003
N,N-Diethyl-m-toluamide (DEET)	IR									0.002	
Norflurazon	H	0.004	0.004	0.006		0.005	0.005	0.004	0.005	0.004	0.004
Pendimethalin	H	0.003	0.003	0.003				0.002			0.003
Prometon	H	0.002	0.003	0.002		0.002			0.002		
Prometryn	H									0.003	
Pyrimethanil	F	0.009	0.016								
Simazine	H	0.005	0.005	0.009		0.007	0.006	0.005	0.006	0.007	0.006
Sodium Bentazon	H					0.051			0.052	0.051	
Sulfentrazone	H	0.007	0.009	0.006		0.009	0.009	0.006	0.009	0.007	0.008
Terbacil	H	0.218	0.246	0.015		0.007	0.007	0.004	0.005	0.004	0.004
Tetrahydrophthalimide (THPI)	D-F		0.002								
Thiamethoxam	I-N	0.036	0.045	0.067	0.067	0.072	0.056	0.052	0.042	0.039	0.044
Triadimefon	F									0.002	
Triazine DEA degradate	D-H	0.007	0.005	0.007	0.008	0.008	0.009	0.007	0.007	0.008	0.009
Triazine DIA degradate	D-H	0.003		0.004	0.003	0.004	0.004	0.003			
Triazine HA Degradate	D-H	0.002	0.002	0.001			0.001			0.001	
Trifluralin	H										0.004
Total Suspended Solids	N/A	9.0	7.0	14.0	9.0	10.0	12.0	12.0	17.0	20.0	22.0
Detection Count		17	22	17	7	14	14	12	14	19	15



Clothianidin – ALBs

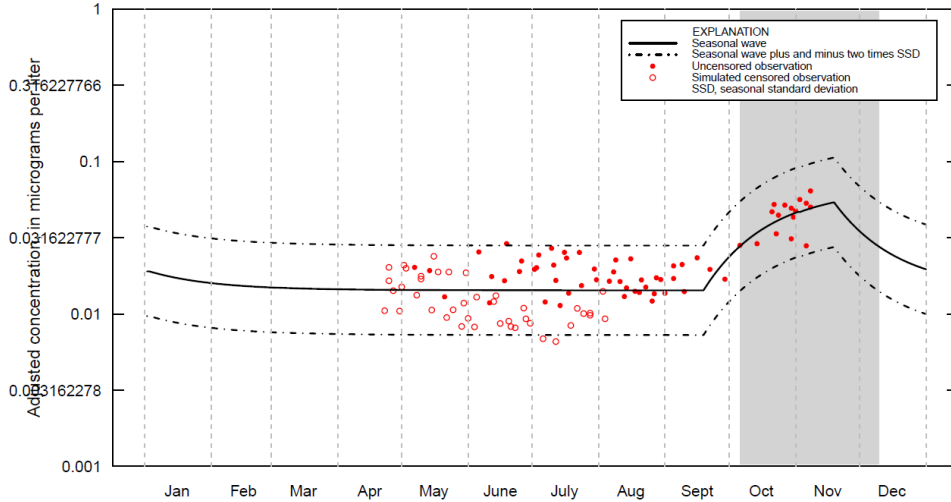
Invert Acute: 11.0

Invert Chronic: **0.05** (21 day expos.)

Marion Drain (Granger WA) – SEAWAVE-QEX analysis for Clothianidin



Shaded region indicates high concentration season(s)



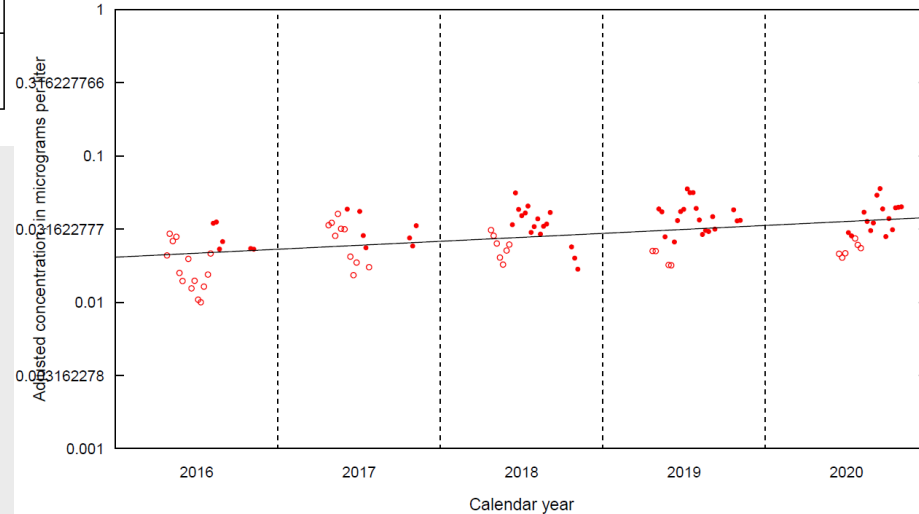
Clothianidin Data – 2016-2020

a) “Seasonal Wave” of Clothianidin detections

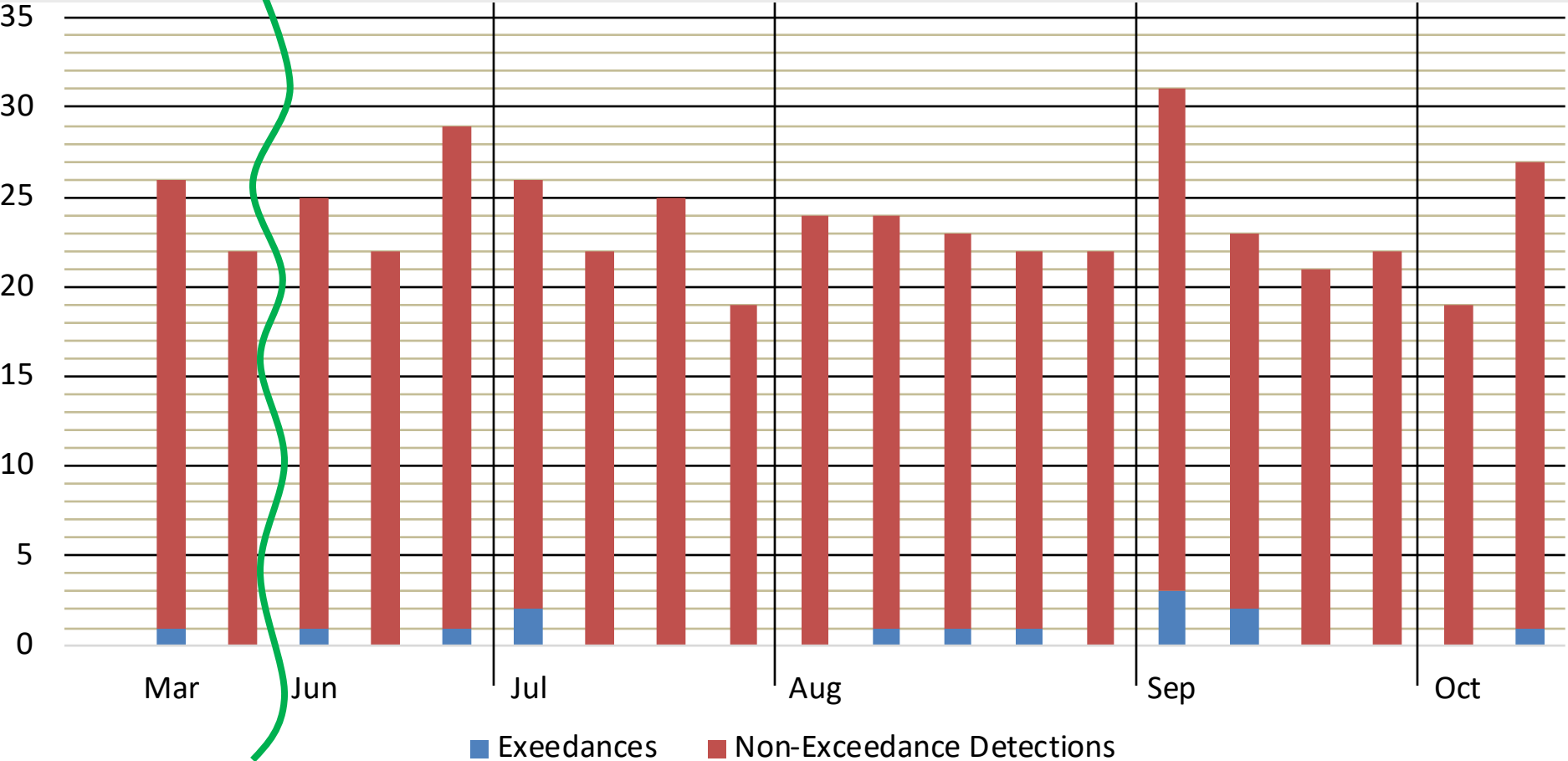
b) Increasing concentration trend

- $p\text{-value} < 0.001$

(coef= 0.054 ,trend = 13.3 pct per year, pval= 0)



Sulphur Creek WW 2020 Detection Count



Snipes Creek Late Season



Snipes Creek 1 (SN-1), 2020 - Freshwater Criteria (pesticides in ug/L, TSS in mg/L)

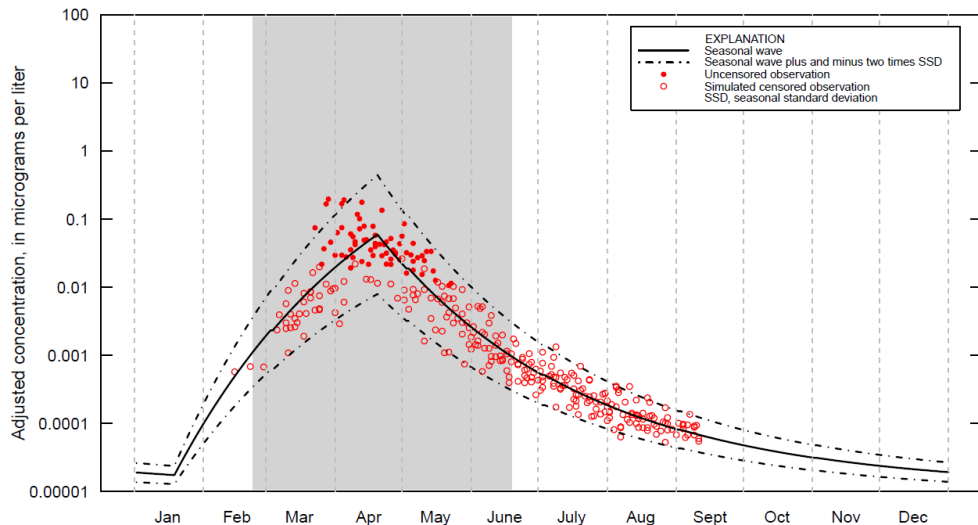
Month		Sep	Oct				Nov	
Day of the Month	Use	28	5	13	20	26	2	9
2,4-D	H	0.168	0.034	0.039				
2,6-Dichlorobenzamide	D-M	0.007	0.010	0.008	0.009	0.022	0.023	0.032
4,4'-DDD	D-OC					0.001		
Atrazine	H	0.004	0.004	0.003	0.003	0.008	0.009	0.010
Boscalid	F	0.004	0.005	0.005	0.005	0.005	0.004	0.004
Bromacil	H	0.003			0.004			0.005
Carbendazim	F			0.004	0.004			
Chlorantraniliprole	I	0.012	0.011				0.013	0.018
Clopyralid	H	0.149						
Clothianidin	I-N					0.004	0.004	0.004
Diazinon	I-OP			0.002				
Dicamba acid	H	0.082						
Diuron	H	0.006		0.007	0.004			
Eptam	H	0.003	0.001	0.002	0.001			0.005
Etoxazole	I							
Fludioxonil	F	0.008	0.008	0.015	0.009			
Hexazinone	H	0.004			0.002	0.002	0.002	0.002
Imazapyr	H	0.004				0.004		
Imidacloprid	I-N			0.005				
Methoxyfenozide	I					0.004	0.004	0.006
Norflurazon	H	0.003	0.004	0.004	0.004	0.009	0.009	0.010
Pendimethalin	H	0.003	0.002	0.003	0.003	0.002	0.002	0.003
Prometon	H	0.002						
Pyrimethanil	F	0.023	0.018	0.018	0.025	0.004	0.002	
Simazine	H					0.004	0.004	0.005
Sulfentrazone	H	0.005	0.004	0.004	0.003	0.009	0.008	0.009
Terbacil	H	0.041	0.014	0.021	0.011			
Tetrahydrophthalimide (THPI)	D-F			0.002				
Thiamethoxam	I-N	0.023	0.006	0.004		0.009	0.007	0.007
Triazine DEA degradate	D-H	0.004	0.004	0.003	0.004	0.013	0.014	0.018
Triazine DIA degradate	D-H					0.003		
Triazine HA Degradate	D-H	0.003	0.002	0.001	0.002	0.001		0.001
Triclopyr acid	H	0.042						
Total Suspended Solids	N/A	11.0	18.0	8.0	20.0	6.0	3.0	2.0
Detection Count		23	15	19	16	17	14	16
Salmon #s		3	5	0	0	10 to 20	10 to 15	most dead



Chlorpyrifos Food Tolerance Revocation (Brender Creek – Tree Fruit)



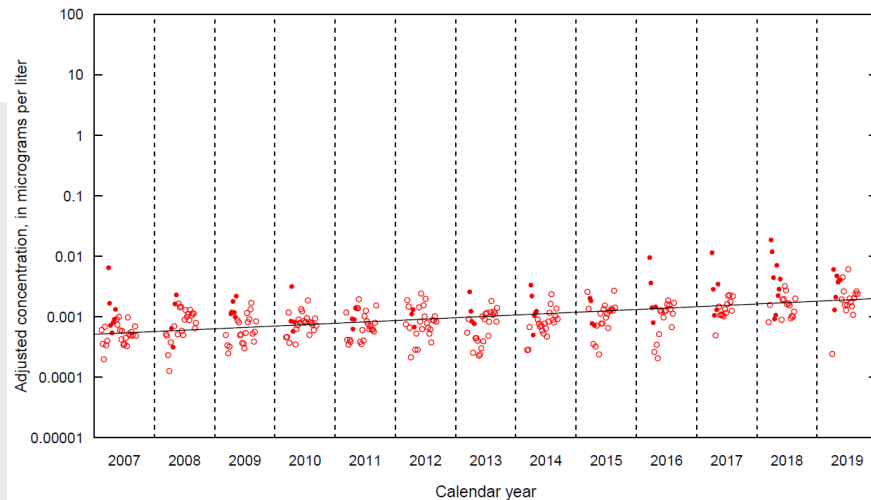
Shaded region indicates high concentration season(s)



Chlorpyrifos Data – 2007-2019

- a) “Seasonal Wave” of Chlorpyrifos detections
- b) Increasing concentration trend
p-value < 0.001

(coef= 0.046 ,trend = 11.1 pct per year, pval= 0)



Some Resources WSDA Provides



Technical Services & Education Program:

Search agr.wa.gov for Technical Services

Waste Pesticide Program:

agr.wa.gov/WastePesticide

Natural Resources Assessment Program:

agr.wa.gov/AgScience





Thanks for listening.

Questions?

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Chlorpyrifos – tolerances expire Feb. 28th 2022



44 Wash. registered products

Half-life = roughly 14 to 200 days

Application Uses

- Berry
- Brassica
- Corn
- Cranberry
- Forest
- Grape
- Grass Seed
- Greenhouse
- Legume
- Nursery
- Onion
- Ornamental
- Residential
- Tree fruit
- Wheat



Malathion

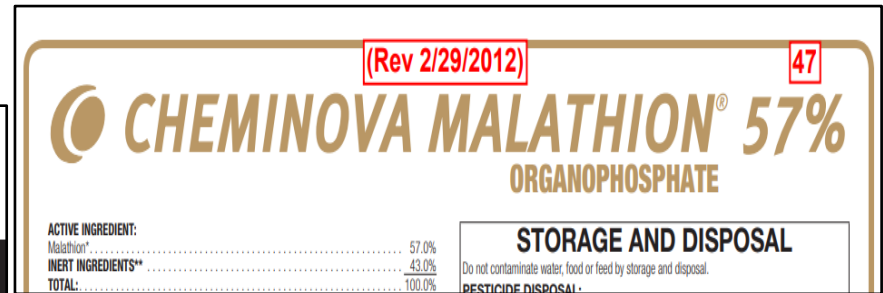


23 Wash. registered products

Half-life = roughly 2 to 107 days

Application Uses

- Berry
- Brassica
- Cereal Grain
- Corn
- Grape
- Legume
- Nursery
- Onion
- Ornamental
- Residential
- Tree fruit



Imidacloprid



422 Wash. registered products
Half-life = roughly 172 to 608 days

Application Uses

- Berry
- Brassica
- Cranberry
- Forest
- Grape
- Greenhouse
- Legume
- Melon
- Nursery
- Ornamental
- Potato
- Residential
- Tree fruit
- Tree nut
- Soybean
- Turf

