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Brender Creek

Summary of 2015 Surface Water Monitoring Program Results
Washington State Department of Agriculture
Natural Resources Assessment Section
September 2016

Introduction

The Washington State Department of Agriculture has monitored pesticide concentrations in surface water throughout the state since 2003. Water samples were collected during the typical pesticide use season, March through September. In 2015 fourteen sites were monitored in Washington, three of which are in the Wenatchee River Watershed. State and federal agencies use this data to evaluate water quality and make exposure assessments for pesticides registered for use in Washington State.

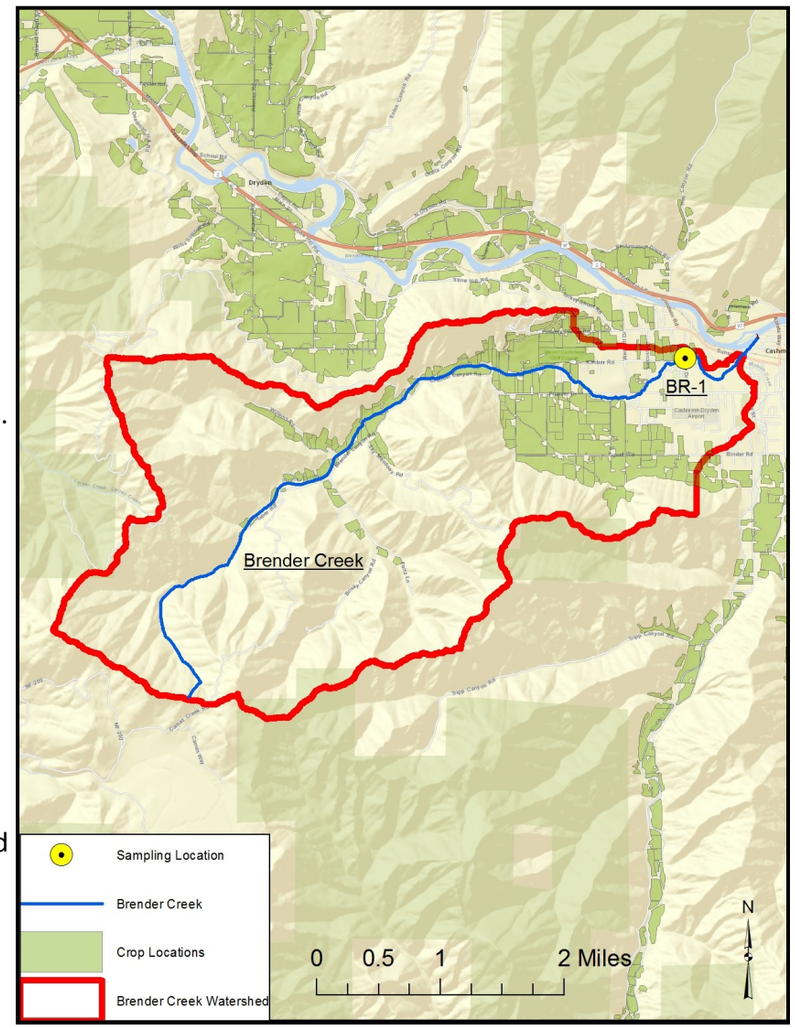
Study Area

Water has been tested from Brender Creek beginning 2007 through 2015. The watershed drains about 6,863 total acres with about 14.1% (971 acres) of the watershed being devoted to agriculture. The main crops are pear, apple, cherry, and pasture. Growers in the watershed try to maintain vegetated cover along the stream and in orchards to reduce DDT loading to streams. Brender Creek below Evergreen Drive provides habitat for spring chinook, and summer steelhead. Brender Creek above Evergreen drive is blocked from fish passage*

* Washington State Department of Fish and Wildlife

Sampling Details

- Samples were collected for 25 weeks, from March 10 through August 25.
- Water samples were tested for 206 chemicals: current and legacy insecticides, herbicides, fungicides, rodenticides, wood preservatives, and pesticide degradates.
- Sample analysis for pesticides and total suspended solids was conducted at Manchester Environmental Laboratory in Port Orchard, WA.
- General water quality parameters; dissolved oxygen, conductivity, pH, water temperature, and streamflow were measured at every sampling event.
- Air and water temperature (measured every 30 minutes) was monitored for the entire sampling season.
- For a short period of time, 5 weeks, additional water samples were collected and analyzed for glyphosate and its degradate, AMPA.



This table shows the pesticides detected, with dates and concentrations. They are color coded to identify which assessment criteria were surpassed. The assessment criteria used here are state and federal water quality criteria, reduced by half for safety. This 0.5 safety factor is used to make sure the criteria protect aquatic life and water quality issues are found early. Watersheds with detections above the criteria are prioritized for more monitoring and educational outreach. See http://agr.wa.gov/PestFert/natresources/SWM for more information.

Assessment Criteria	
May affect fish survival at sensitive life stages	
Additional level of protection for endangered species	
May affect invertebrate survival	
Nearing a pesticide state water quality standard	
May affect fish growth or reproduction with prolonged exposure	
May affect invertebrate growth or reproduction with prolonged exposure	
May affect aquatic plant growth	
May affect aquatic plant growth or reproduction with prolonged exposure	
Below all identified criteria	
No published criteria available	
Not detected (below detection limit)	
No Data	--

Month and Day		Mar				Apr				May				Jun					Jul				Aug			
Analyte Name †	Use‡	10	17	25	31	7	14	21	28	5	12*	19	27	2	9	16	23	30	7	14	21	28	4	11	18	25
2,4-D	H		0.043								--									0.041				0.02		
4,4'-DDD	D-OC							0.021			--								0.004							
4,4'-DDE	D-OC	0.018	0.02	0.011	0.012		0.01	0.06	0.016	0.015	--	0.024	0.008	0.026	0.019		0.027	0.02	0.039	0.015	0.019		0.023	0.014	0.021	0.025
4,4'-DDT	I-OC							0.044	0.022		--	0.029	0.034	0.072					0.004							
AMPA	H	--	--	--	--	--		0.01	0.009		0.01	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Carbaryl	I-C							0.02			0.38															
Chlorpyrifos	I-OP			0.035	0.034	0.03		0.034			--															
Dichlobenil	H									0.014		0.012														
Glyphosate	H	--	--	--	--	--		0.024	0.03	0.015	0.037	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Imidacloprid	I-N								0.017							0.009						0.037	0.015			
DEET	IR										--								0.006							
Norflurazon	H										--									0.056						
Pentachlorophenol	WP		0.017																							
Piperonyl butoxide	Sy		0.14								--															
Simazine	H										--											0.092				
Thiamethoxam	I-N															0.048				0.024						
Temperature	N/A	52.92	52.02	53.49	53.96	52.05	52.97	54.1	54.23	54.25	55.15	58.46	60.1	59.72	63.32	61.63	63.34	**69.39**	**66.96**	**64.33**	**65.95**	**64.04**	**64.99**	**66.4**	63.48	62.67
Dissolved oxygen	N/A	11.38	10.99	11.47	10.77	11.14	11.15	10.16	10.44	10.61	10.06	10.17	9.86	9.78	9.33	9.4	9.62	8.82	8.9	9.71	9.12	9.76	9.06	9.22	9.33	9.7
Percipitation	N/A	0	0.71	0.21	0	0.16	0.01	0	0	0	0.21	0.7	0.06	0	0	0	0	0.09	0.01	0	0	0	0	0	0	0
Streamflow	N/A	0.4	0.6	0.5	0.4	0.4	0.4	4.1	1.8	2.6	2.7	7.2	0.7	4.3	2.1	2.4	0.5	1.3	2.1	0.9	0.6	1.5	1.7	1.1	2.7	1.3
Total suspended solids	N/A	3	12	2	3	3	3	129	15	16	44	51	12	38	21	16.5	17	13	38	8	4	12	31	5	19	41

‡ C: Carbamate, D: Degradate, F: Fungicide, H: Herbicide, I: Insecticide, IR: Insect repellent, L: Legacy pesticide, M: Multiple, N/A: Not applicable, N: Neonicotinoid, OC: Organochlorine, OP: Organophosphate, PY: Pyrethroid, Sy: Syngergist, WP: Wood preservative, *Equipment malfunction. †Units are as follows: pesticides, µg/L; temperature, °F; dissolved oxygen mg/L; percipitation, week total inches; streamflow, cfs; and total suspended solids, mg/L. **Bold**: Indicates a temperature or dissolved oxygen value above state water quality standards.

Results Summary

- There were a total of 58 detections, 33 (56.9%) were at concentrations above an assessment criterion, 29 for DDT and associated degradation products and 4 detections of chlorpyrifos.
- Chlorpyrifos concentrations were found at levels that may have affected invertebrate survival, and above an assessment criterion. Common products containing chlorpyrifos are Lorsban and Dursban.
- Chlorpyrifos is a pesticide of concern in Washington State, and has been detected in past years in Brender Creek at concentrations above aquatic health criteria.
- Samples throughout most of the season showed levels of DDT and associated degradation products, these concentrations are at or nearing a state water quality standard. DDT products are no longer registered for use, but detections such as these are attributed to their persistence in the environment and ability to bind to soil particles.

Recommendations

- Read and follow pesticide label directions to protect water quality.
- Maintain, inspect, and calibrate application equipment.
- Eliminate drift and runoff to adjacent surface water.
- Exhibit care when applying pesticides (e.g. chlorpyrifos) especially in spring before vegetation along streams is leafed out.
- Manage irrigation to prevent runoff, and check the weather forecast before application to prevent runoff due to rainfall.
- Implement BMPs, including conservation buffers, vegetative filter strips, maintain ground cover to reduce erosion, sediment basins, and setbacks from water.
- Detections of DDT and its degradates are closely associated with total suspended solids originating from soil erosion.