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Upper Bertrand 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 Washington since 2003. Samples are collected during the typical pesticide use season (March through September). In 2015, 14 sites were monitored across Washington, including two in Whatcom County. State and federal agencies use this data to evaluate water quality and make exposure assessments for pesticides registered for use in Washington State.

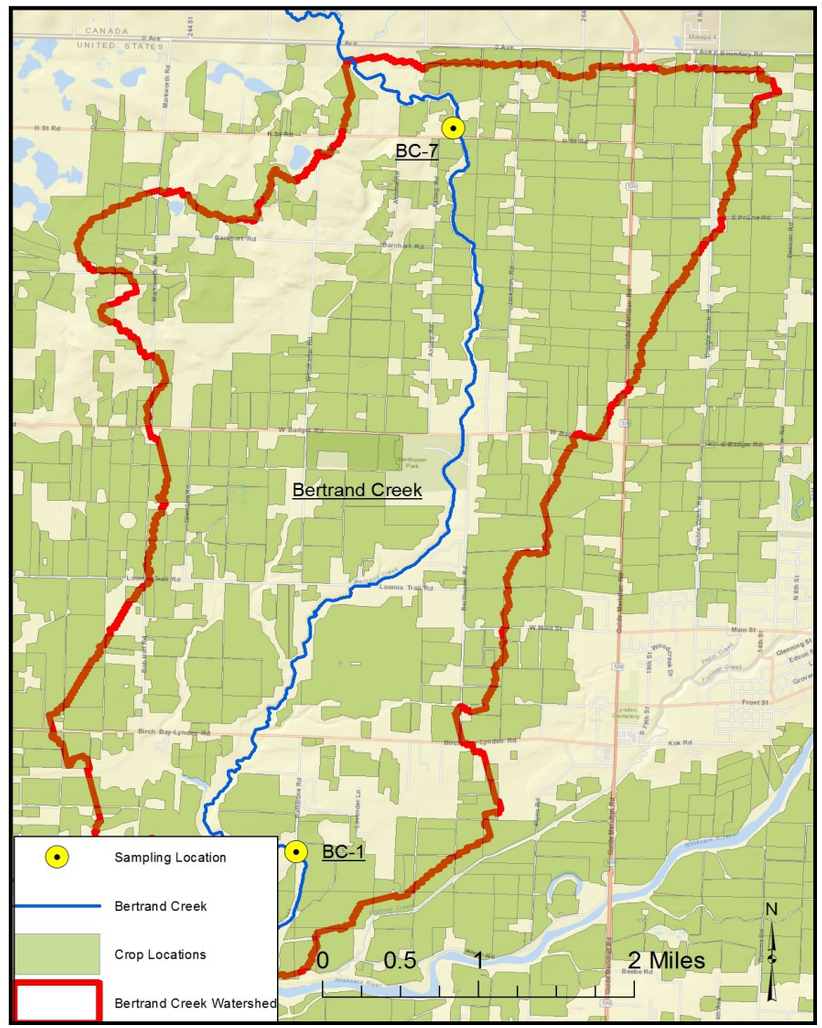
Study Area

Sampling in Bertrand Creek began in 2013. The Bertrand Creek watershed drains approximately 28,000 acres, or 44 square miles, between the United States and Canada. In the United States portion of the watershed, there are 7,745 acres of farmland. The main crops are: grass/hay, caneberries, field corn, blueberries, and potatoes. Bertrand Creek provides important habitat for many threatened species including steelhead, chinook, coho, chum, and sockeye salmon*.

* 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.
- WSDA monitors Bertrand Creek at two locations; Upper Bertrand (BC-7) is located near the Canadian Border, Lower Bertrand (BC-1) is located 6.75 miles downstream. Two sampling locations provides an opportunity to compare potential inputs from Canada, to concentrations downstream.



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	24	31	7	14	21	28	5	12	19	26	1	9	15	23	29	7	14	21	27	4	10	17	24
2,4-D	H			0.055			0.067		0.062																	
4,4'-DDE	D-OC																	0.012						0.01		
AMPA	H	--	--	--	--	--	0.15		0.16		0.16	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bifenthrin	I-Py			0.024																						
Boscalid	F		0.14	0.16	0.11	0.08	0.095	0.064	0.12	0.16	0.091	0.077	0.16	0.15	0.14		0.049	0.045	0.043	0.046	0.04	0.05	0.041	0.033		0.031
Chlorothalonil	F				0.059																					
Cyprodinil	F									0.065																
Dicamba	H		0.022																							
Dichlobenil	H	0.022	0.15	0.1	0.068	0.023	0.029	0.024	0.021	0.017		0.014														
Diuron	H						0.006																			
Etridiazole	F		0.1																							
Fludioxonil	F									0.077																
Glyphosate	H	--	--	--	--	--	0.16	0.054	0.073	0.052	0.05	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Imidacloprid	I-N	0.01					0.02	0.03	0.019	0.02	0.029	0.011	0.02	0.015	0.009		0.007	0.007				0.03	0.014		0.01	
Isoxaben	H			0.012	0.002		0.003	0.005		0.003	0.003															
MCPA	H								0.057			0.41	0.16	0.021												
Malaoxon	D-OP		0.003		0.003																					
Mecoprop (MCPP)	H		0.052	0.057			0.06		0.066																	
Metalaxyl	F			0.3	0.16	0.101		0.052	0.044										0.012							
Metolachlor	H		0.039	0.19	0.045		0.052	0.032	0.034	0.03																
Myclobutanil	F							0.007							0.016	0.008						0.12	0.03			
DEET	IR						0.033								0.035							0.014				
Oxadiazon	H						0.054																			
Oxamyl	I-C	0.059	0.044	0.299	0.157	0.059	0.025	0.099	0.035	0.037	0.044	0.028	0.025	0.012	0.008	0.003						0.037				
Oxamyl oxime	D-C	0.054	0.019	0.053	0.046	0.034	0.022	0.091	0.029	0.039	0.055	0.062	0.071	0.053	0.032	0.034	0.015					0.11				
Propiconazole	F		0.036	0.03	0.077	0.019	0.037		0.018																	
Pyraclostrobin	F								0.027	0.025																
Simazine	H		0.24	0.17	0.15			0.083	0.071			0.11	0.17	0.073	0.077		0.097						0.13	0.06		
Terbacil	H	0.15	0.13	0.15	0.15	0.107	0.11	0.16	0.13	0.11	0.12	0.13	0.14	0.12	0.12							0.072	0.021			
Tetrahydrophthalimide	D-F								0.09																	
Triclopyr acid	H						0.049																			
Streamflow	N/A	10.1	73.8	97.0	87.0	26.7	37.6	12.1	15.0	14.0	6.4	4.5	4.3	3.0	2.7	2.3	1.9	1.9	1.7	1.6	1.0	2.7	0.2	0.3	0.5	0.6
Total suspended solids	N/A	1	6	13	9	4	4	5	3	4	< 2	3	2	2	6	11	2	2	3	11	13	2	3	2	< 2	< 1

‡ 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; streamflow, cfs; and total suspended solids, mg/L.

Results Summary

- There were 176 total detections of 31 unique pesticides at Upper Bertrand Creek in 2015, 3 of which were above assessment criteria.
- Bifenthrin concentrations on March 24 were above WSDA's assessment criterion for endangered aquatic species.
- 4,4'-DDE concentrations on June 29 and August 10 were at levels above an assessment criterion indicating that the detections were nearing a state water quality standard. 4,4'-DDE is a breakdown product of the legacy organochlorine, DDT.
- Boscalid, oxamyl, oxamyl oxime (degradate of oxamyl), terbacil, and imidacloprid were the most commonly detected pesticides. Each being detected in at least 60% of sampling events.
- Bifenthrin, oxamyl, imidacloprid, simazine, metolachlor, diuron, and malathion are pesticides of concern in the state of Washington and were detected in 2015.
- Continued detections of pestcides of concern above assessment criteria could result in label use restrictions. Continue to read and follow labels to minimize exposure to the environment.

Recommendations

- Read and follow label directions to protect water quality.
- Eliminate drift and runoff to adjacent surface water.
- Maintain, inspect, and calibrate application equipment.
- Properly dispose of all pesticides.
- Implement best management practices, including conservation buffers, vegetative filter strips, sediment basins, and setbacks from water.
- Clean equipment according to label instructions.
- Review pest control needs and select appropriate and less toxic pesticides.
- Manage irrigation to prevent runoff, and check the weather forecast before application to prevent runoff due to rainfall.