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Lower Big Ditch

Summary of 2016 Surface Water Monitoring Program Results

Washington State Department of Agriculture
Natural Resources Assessment Section

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Introduction

The Washington State Department of Agriculture (WSDA) has monitored pesticide concentrations in surface water throughout Washington since 2003. WSDA staff take surface water samples during the typical pesticide use season (March - September). In 2016, 12 sites were monitored in Washington, 3 of which were in Skagit 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

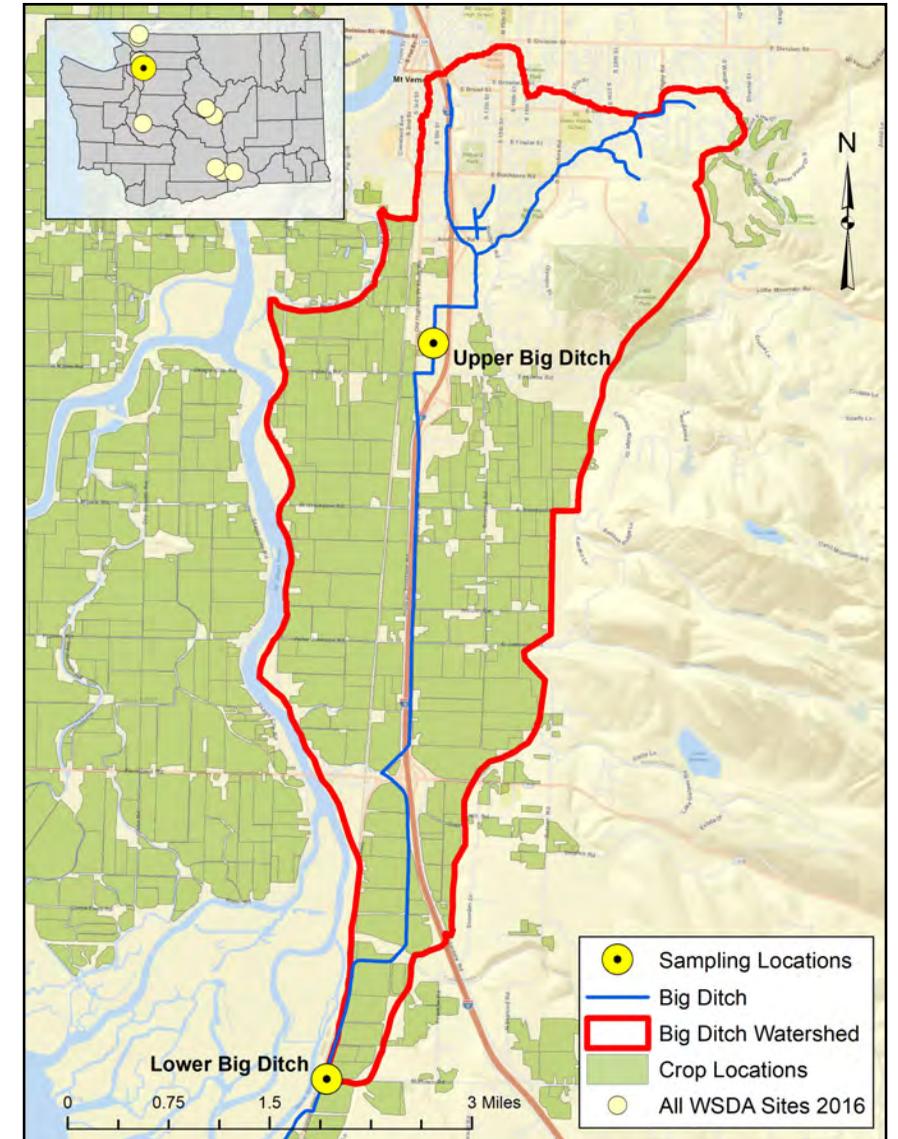
WSDA has sampled water from Lower Big Ditch from 2006 through 2017. The entire Big Ditch watershed drains approximately 8,000 acres and about 51% (4,100 acres) of the watershed is farmland. The main crops include field corn, potatoes, barley, and grass hay. The Big Ditch watershed also contains commercial and urban land cover further upstream near the Upper Big Ditch site. Land use in Upper Big Ditch is primarily non-agricultural while land use in Lower Big Ditch is primarily agricultural.

Big Ditch drains directly into Puget Sound. Lower Big Ditch provides habitat for Chinook, coho, chum, kokanee, and steelhead salmon*. The Skagit Valley (including the Big Ditch watershed) is also a crucial area for migratory waterfowl, including trumpeter swans, tundra swans, snow geese, and other birds.

*Washington State Department of Fish and Wildlife SalmonScape (<http://apps.wdfw.wa.gov/salmonscape/>)

Sampling Details

- WSDA sampled water for 24 weeks in 2016 from March 15 through September 12.
- Water samples were tested for 152 chemicals: current and legacy insecticides, herbicides, fungicides, rodenticides, wood preservatives, and pesticide breakdown products.
- Sample analysis was conducted at Manchester Environmental Laboratory in Port Orchard, Washington.
- Streamflow and total suspended solids were measured at every sampling event.
- Air and water temperature (measured every 30 minutes) were monitored for the entire sampling season.



The table below shows the sample dates and their corresponding detected pesticide concentrations. The detections have been color coded according to assessment criteria, if any, that were surpassed. Assessment criteria for this program are derived by applying a 0.5 safety factor to state and federal water quality criteria. This safety factor is applied to ensure that assessment criteria are protective of aquatic life. Potential water quality issues can be identified early on by using the pesticide data. Watersheds in which detections above assessment criteria occur are a priority for continued monitoring and educational outreach. Please see <http://agr.wa.gov/PestFert/natresources/SWM> for more information.

Assessment Criteria	Month	Mar			Apr			May			Jun			Jul			Aug			Sep					
	Day of the Month	15	23	29	6	12	20	26	4	10	18	25	7	15	21	28	5	13	20	9	15	23	30	7	12
	2,4-D			0.123	0.176		0.050	0.257	0.042			0.070		0.261	0.493	0.143					0.039		0.837	0.152	
	2,6-Dichlorobenzamide	0.053	0.097	0.184	0.123	0.098	0.058	0.088	0.081					0.039		0.057				0.042		0.035	0.046	0.081	
May affect fish survival at sensitive life stages	4,4'-DDE																0.016								
	Atrazine															0.074									
	Azoxystrobin	0.226	0.877	0.507	1.430	0.066	0.161	0.080	0.080	0.012	0.025	0.062	0.005	0.035	0.043	0.066		0.022			0.022		0.058	0.063	
Additional level of protection for endangered species	Bentazon	0.058		0.080																					
	Boscalid		0.098			0.069	0.113		0.140	0.066	0.077	0.090		0.103	0.065	0.054	0.046			0.038	0.059	0.039	0.059	0.073	0.152
	Bromoxynil							0.030																	
May affect invertebrate survival	Chlorpropham		0.145		0.905							0.047													
	Dicamba						0.027	0.082						0.029	0.336	0.053							0.219	0.039	
	Dichlobenil		0.044	0.047	0.025	0.007		0.018								0.014							0.015		
Nearing a pesticide state water quality standard	Difenoconazole	0.023	0.192	0.110	0.152	0.056	0.068	0.054	0.023													0.038		0.035	
	Dinotefuran		0.088	0.062	0.062	0.081	0.075	0.053	0.116	0.016		0.020		0.039	0.024	0.038	0.034	0.011			0.014	0.014	0.020	0.023	
	Diuron	0.025	0.025	0.034	0.024	0.019	0.021	0.040	0.014		0.025	0.007				0.011	0.006							0.005	
May affect fish growth or reproduction with prolonged exposure	Fludioxonil		0.396	0.201	0.358	0.116	0.146	0.109	0.155	0.053	0.082	0.070	0.025	0.063	0.130	0.052	0.039	0.046	0.035	0.034	0.040	0.031	0.037	0.062	0.067
	Imazapyr								0.013							0.064				0.027	0.013	0.005	0.012	0.032	0.017
	Imidacloprid	0.011		0.010			0.013	0.022	0.006			0.016		0.022	0.046	0.077								0.011	0.003
May affect invertebrate growth or reproduction with prolonged exposure	Isoxaben																							0.011	0.003
	MCPA				0.034		0.031	0.057				0.045			0.049										
	Mecoprop (MCP)			0.044	0.048			0.017																	
May affect aquatic plant growth	Metalaxyl															0.241	0.138								
	Metolachlor	0.105	0.051	0.078	0.055	0.052	0.131	0.271		0.032		0.056		0.053		0.130								0.023	
	Metribuzin											0.300													
Below all identified criteria	Monuron			0.003	0.003	0.004	0.006	0.006																	
	DEET							0.041								0.024					0.022		0.026	0.022	
	Oxamyl oxime																				0.035				
No published criteria available	Pentachlorophenol	0.022	0.023	0.043		0.015		0.032				0.007													
	Propiconazole						0.104	0.098	0.025						0.028										
	Sulfentrazone							0.210																	
Not detected (below detection limit)	Sulfometuron methyl									0.010				0.018											
	Tebuthiuron																							0.084	
	Thiamethoxam	0.026					0.057		0.017					0.029	0.012		0.024	0.005			0.017		0.018	0.027	0.043
Units for pesticide detections are in (µg/L), precipitation measurements in (week total inches), streamflow measurements are in (cfs), and total suspended solids in (mg/L). The "--" signifies a sample or measurement was not collected.	Triadimefon														0.207										
	Triclopyr acid			0.074	0.100			0.134	0.043			0.045		0.179	0.269	0.084				0.046	0.053			0.532	0.177
	Precipitation	0.78	0.30	0.92	0.59	0.00	0.08	0.69	0.00	0.09	0.00	0.42	0.09	2.00	0.82	0.39	0.01	0.20	0.00	0.02	0.00	0.00	0.03	0.57	0.14
	Streamflow	40.62	20.51	27.60	18.27	29.91	25.02	34.54	14.01	25.98	16.34	17.35	43.36	16.95	27.40	6.11	24.24	15.73	24.80	1.91	--	10.19	10.24	8.18	2.82
	Total Suspended Solids	22	14	10	9	10	16	27	6	39	23	26	42	25	7	5	11	19	8	4	13	8	62	22	29

Results Summary

- There were 239 total pesticide detections at the Lower Big Ditch site. Of these, 1 detection was above assessment criteria.
- WSDA identifies some pesticides as Pesticides of Concern because they have been found somewhere in the state above WSDA’s assessment criteria. Azoxystrobin, chlorpropham, diuron, metolachlor, pentachlorophenol, and sulfometuron methyl are all Pesticides of Concern that were detected in Lower Big Ditch.
- Detections of DDT and its breakdown products (like 4,4’-DDE) are likely due to contaminated sediment erosion into streams.
- Lower Big Ditch had 56 less detections than Upper Big Ditch. Of the 47 chemicals observed in the entire Big Ditch watershed, 11 were unique to Lower Big Ditch. This is likely due to the very different land use patterns observed at the 2 sites.
- There were a total of 4 detections that exceeded assessment criteria in the whole Big Ditch watershed.
- When multiple pesticides are detected simultaneously the effects can combine; multiple pesticides were detected every week.

Recommendations

- Read and follow label directions to protect water quality.
- Choose less-toxic pesticides whenever possible.
- Calibrate, maintain, and inspect application equipment often.
- Check the weather before application to reduce drift or runoff.
- Use best management practices: buffers, filter strips, sediment basins, ground cover, and setbacks.
- Apply to participate in a WSDA waste pesticide collection event: www.agr.wa.gov/wastepesticide