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Upper 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 the state since 2003. WSDA staff take surface water samples during the typical pesticide use season (March through September). In 2016, 12 sites were monitored across 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

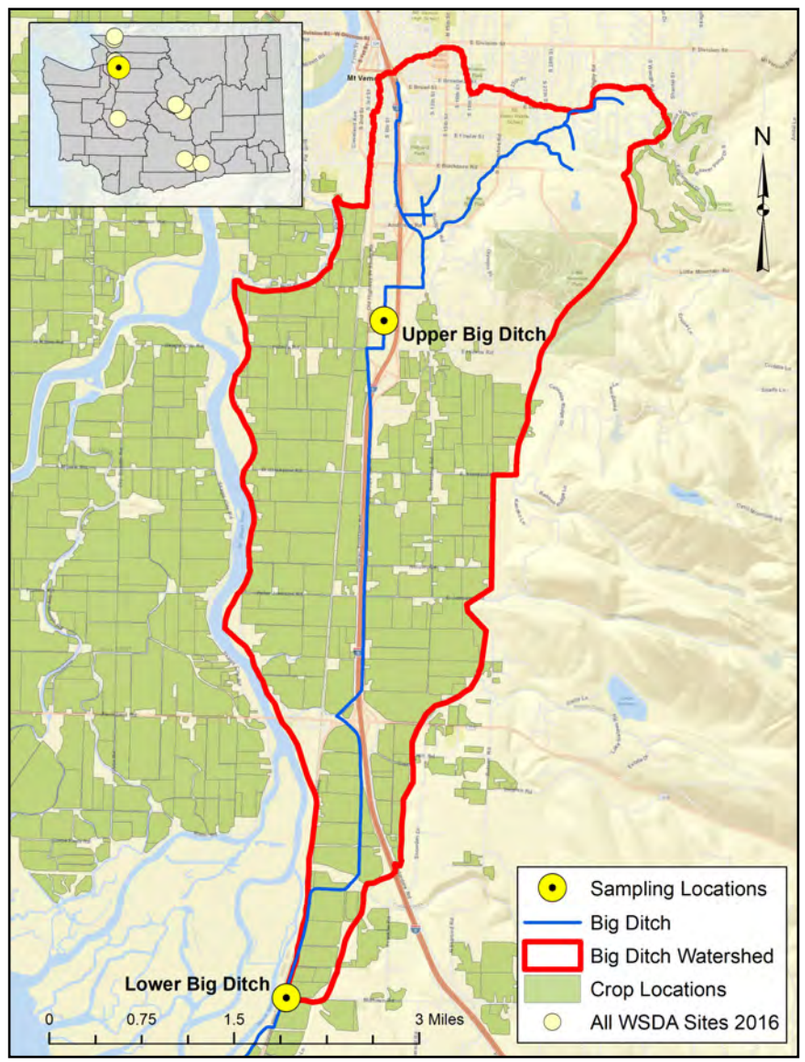
WSDA has sampled water from Upper Big Ditch from 2007 through 2016. The entire Big Ditch watershed, including the Lower Big Ditch sampling location, drains approximately 8,000 total acres and about 51% (4,100 acres) of the watershed is used for agriculture. Land use in Upper Big Ditch is primarily non-agricultural while land use in Lower Big Ditch is primarily agricultural. The Upper Big Ditch site captures drainage mainly from urban, commercial and a small amount of agricultural land.

Big Ditch drains directly into Puget Sound. Upper Big Ditch provides habitat for coho salmon*. The Skagit Valley (including the Big Ditch watershed) is also a major pit stop 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 herbicides, fungicides, insecticides, 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 (collected every 30 minutes) were recorded 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

- 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
- Below all identified criteria
- Not detected (below detection limit)

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	29	5	13	20	9	15	23	30	7	12
2,4-D	0.244	0.159		0.086		0.065	0.111	0.052	0.168		0.066	0.071	0.299	0.130			0.095		0.174	0.067	0.056	0.052	0.237	0.088
2,6-Dichlorobenzamide	0.172	0.155	0.356	0.236	0.047	0.135	0.125	0.123	0.071		0.087	0.074	0.196		0.086	0.096	0.086	0.079	0.070	0.053	0.062	0.065	0.049	0.117
4-Nitrophenol					0.053			0.079																
Azoxystrobin		0.008	0.010	0.549	0.025	0.015	0.005	0.079	0.085	0.067	0.055	0.050	0.006	0.025	0.735		0.231	0.027		0.110	0.058		0.026	0.033
Bifenthrin																			0.034					
Boscalid			0.089	0.598	0.191	0.124		0.194		0.383		0.289		0.035	0.127	0.625	0.265	0.115	0.288	0.262	0.109	0.100	0.060	0.099
Clopyralid												0.074	0.065											
Cyprodinil				0.011																		0.011		
Dicamba	0.023	0.061				0.029	0.044		0.023				0.047	0.048					0.047				0.083	
Dichlobenil	0.037	0.030	0.024	0.019		0.008	0.011	0.008	0.012	0.010		0.009	0.031	0.027	0.015									
Dinotefuran	0.176	0.188	0.514	0.336	0.610	0.304	0.359	0.365	0.792	0.128	0.148	0.157	0.067	0.278	0.176	0.342	0.094	0.162	0.092	0.040	0.039	0.046	0.036	0.033
Diuron		0.009	0.004	0.004	0.005	0.004	0.006							0.009					0.007				0.007	
Ethoprop							0.035																	
Etridiazole				0.111								0.019											0.033	0.104
Fludioxonil		0.086	0.072	0.204	0.109	0.099	0.070	0.181		0.201		0.318	0.062	0.076	0.182	0.461	0.216	0.110	0.328	0.166	0.123	0.136	0.095	0.202
Imazapyr								0.023	0.026	0.024	0.024				0.014				0.012	0.021	0.031	0.027	0.026	0.024
Imidacloprid				0.106			0.007	0.014	0.032	0.017	0.010	0.013		0.012	0.036	0.063	0.018	0.012	0.056	0.096	0.017	0.019		
Isoxaben				0.003																	0.024	0.019	0.003	
Mecoprop (MCPP)	0.180			0.048			0.009		0.022				0.064	0.031					0.050				0.035	
Metalaxyl								0.057						0.087	0.991	0.094								
Methiocarb																			0.124					
Metolachlor									0.047					0.251										
Myclobutanil				0.008				0.006							0.005	0.023			0.012					
DEET							0.031												0.023	0.023				
Oxamyl																		0.373	0.497	0.085	0.006	0.008		
Oxamyl oxime																		0.578	0.204	0.034	0.018			
Pentachlorophenol	0.027				0.014								0.015											
Picloram																	0.165							
Propiconazole															0.011									
Pyraclostrobin				0.035	0.019					0.011						0.043			0.029	0.058	0.005	0.005		
Pyridaben																		0.454						
Tebuthiuron												0.137			0.083	0.079	0.073	0.085	0.088	0.094	0.110	0.118	0.081	0.182
Thiamethoxam				0.405	0.038	0.046		0.081	0.086	0.175	0.121	0.083		0.015	0.075	0.379	0.174	0.043	0.189	0.065	0.060	0.096	0.027	0.038
Triclopyr acid	0.077		0.046	0.055	0.036	0.045	0.091	0.054	0.111		0.057	0.069	0.298	0.090	0.057		0.104		0.127	0.105	0.086	0.067	0.266	0.140
Trifloxystrobin									0.032										0.019					
Precipitation	0.89	0.27	1.35	0.76	0.00	0.21	0.90	0.00	0.14	0.00	0.66	0.13	1.66	0.78	0.44	0.01	0.19	0.00	0.01	0.00	0.00	0.05	3.50	0.17
Streamflow	12.00	3.71	3.88	3.92	2.33	1.96	2.58	1.53	1.26	1.02	1.10	1.03	5.95	2.25	1.17	1.03	1.00	0.91	0.62	0.43	0.34	0.28	0.47	0.60
Total Suspended Solids	10	5	4	4	3	8	5	7	6	6	7	8	6	6	6	6	6	7	21	11	13	8	8	6

Units for pesticide detections are in (µg/L), precipitation measurements in (week total inches), streamflow measurements in (cfs), and total suspended solids in (mg/L).

Results Summary

- There were 295 total pesticide chemical detections in Upper Big Ditch. Of these, 3 were 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, bifenthrin, diuron, methiocarb, metolachlor, pentachlorophenol, and pyridaben are all Pesticides of Concern that were detected in Upper Big Ditch. Only bifenthrin, methiocarb, and pyridaben were higher than WSDA's assessment criteria at this site.
- Upper Big Ditch had 56 more detections than Lower Big Ditch. Of the 47 total chemicals found in the Big Ditch watershed, 13 were unique to the Upper Big Ditch site. This is likely due to the very different land use patterns at the 2 sites.
- When multiple pesticides are detected simultaneously the environmental effects can combine; multiple pesticides were detected every week Upper Big Ditch was sampled. Between 8 and 21 pesticides were detected at the same time.

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