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Indian Slough

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 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 Indian Slough from 2006 through 2016. The watershed drains approximately 5,000 total acres with about 36% (1,800 acres) of the watershed devoted to agricultural and commercial land use. The main crops are potatoes, grass hay, blueberries, pasture, and field corn. Indian Slough drains directly into Puget Sound. This watershed provides habitat for Chinook and coho salmon*. The Skagit Valley (including the Indian Slough 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 21 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	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	24	30	7	12
May affect fish survival at sensitive life stages	2,4-D		0.108		0.054		0.045	0.157				0.090			0.136	0.120					0.776	0.445	
	2,6-Dichlorobenzamide	0.154	0.116	0.219	0.181	0.103	0.103	0.183	0.095	0.049	0.081	0.113	0.070	0.078	0.144	0.133	0.133	0.088	0.031	0.028	0.175	0.339	
	4,4'-DDE									0.013													
	Azoxystrobin	0.022	0.026	0.020	0.145	0.015	0.007	0.028					0.005		0.005	0.007	0.008		0.006			0.050	0.024
	Bentazon								0.064														
Additional level of protection for endangered species	Boscalid									0.142													
	Carbaryl						0.088															0.011	
	Chlorpropham				0.104																	0.032	0.049
	Chlorpyrifos														0.043								
May affect invertebrate survival	Chlorsulfuron															0.043							
	Clothianidin																					0.016	
	Cyprodinil																					0.007	
	Diazinon			0.100	0.052																		
Nearing a pesticide state water quality standard	Dicamba		0.020																			0.226	0.158
	Dichlobenil			0.010	0.037	0.007	0.007	0.026		0.017	0.013	0.017	0.012	0.011		0.021						0.047	0.029
	Difenoconazole	0.009	0.009	0.011	0.011	0.014	0.008	0.017															
	Diphenamid															0.021							
May affect fish growth or reproduction with prolonged exposure	Diuron	0.044	0.015	0.027	0.029	0.009	0.009	0.011						0.003	0.058	0.031	0.017	0.012				0.522	0.229
	Fludioxonil			0.045				0.044		0.026		0.025											0.042
	Imazapyr								0.011	0.013						0.010						0.029	0.023
	Imidacloprid	0.007						0.012														0.119	0.044
May affect invertebrate growth or reproduction with prolonged exposure	Isoxaben						0.022															0.011	
	MCPA				0.388		0.829	0.159					0.055					0.071				0.543	0.284
	Mecoprop (MCPP)		0.041					0.034				0.020										0.134	
	Metolachlor	0.055		0.052	0.048	0.031	0.033	0.046				0.033			0.024							0.052	0.050
	Metsulfuron-methyl																					0.062	0.027
May affect aquatic plant growth	Monuron			0.003	0.002	0.003	0.003	0.003															
	DEET																						0.023
	Oxamyl															0.034							
	Pentachlorophenol	0.027		0.021		0.014								0.013	0.022	0.129	0.127		0.031			0.401	0.174
Below all identified criteria	Propiconazole	0.060	0.024	0.047	0.080	0.052	0.044	0.088	0.019				0.013	0.022	0.129	0.127		0.031				0.401	0.174
	Simazine				0.397					0.196													
	Sulfentrazone																					0.029	
	Sulfometuron methyl														0.018								
No published criteria available	Tebuthiuron										0.121					0.060	0.063		0.052	0.039			
	Terbacil									0.099													
	Thiamethoxam	0.027	0.014	0.024	0.021	0.012		0.012	0.009													0.048	0.021
	Triclopyr acid		0.060	0.057	0.048		0.049	0.203				0.088			0.266	0.130						0.376	0.268
Not detected (below detection limit)	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	0.05	3.50	0.17	
	Streamflow	61.53	67.26	34.93	50.10	39.62	43.36	37.48	23.90	17.79	15.43	16.43	20.79	20.04	21.40	14.08	10.74	12.04	13.35	4.80	21.24	2.14	
	Total Suspended Solids	24	6	10	10	5	5	6	5	6	7	6	14	4	8	5	5	4	8	7	3	5	

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 188 total pesticide detections in Indian Slough. Of these, 5 detections 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, chlorpropham, chlorpyrifos, diazinon, diuron, metolachlor, pentachlorophenol, simazine, and sulfometuron methyl are all Pesticides of Concern that were detected in Indian Slough.
- Only chlorpyrifos, diazinon, and simazine were higher than WSDA's assessment criteria at this site. All of these have been detected in Skagit County in the past at concentrations known to affect aquatic life.
- When multiple pesticides are detected simultaneously the effects can combine; twice as many detections per sampling event occurred during the spring and fall pesticide application season as there were detected during the summer.

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