Idaho State Department of Agriculture
Weiser Flat Pesticide Residue Evaluation
Hog, Warm Springs, Scott, and Jenkins Creeks
April through September 2013

Prepared by

Kirk Campbell

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Introduction

The Idaho State Department of Agriculture (ISDA) conducted a pesticide residue evaluation on four creeks that are located in an agricultural area east of the city of Weiser, Idaho located within the Weiser Flat area (Figure 1). The four creeks: Hog Creek (HC-1), Warm Springs Creek (WS-1), Scott Creek (SC-1), and Jenkins Creek (JC-1) were monitored for pesticides on a bi-weekly schedule from April 17 through September 17, 2013.

ISDA evaluated these four creeks in 2007, which resulted in Warm Springs, Scott, and Jenkins Creeks being listed on the Idaho Department of Environmental Quality's 2012 Integrated Report: Category 5 (§303(d)) list for pesticides. The 2012 Integrated report lists Jenkins Creek for chlorpyrifos, Scott Creek for methyl parathion, and Warm Springs Creek for methyl parathion. These pesticides are organophosphate insecticides and are highly toxic to aquatic species. Methyl parathion is no longer registered by the EPA for use, end use products will not be sold after August 31, 2013 and end-use products cannot legally be used after December 31, 2013.

During the 2013 study, there were a total of 178 pesticide detections for 20 different pesticides. The herbicide 2,4-D had the most detections at 36, followed by the herbicide pendimethalin with 33. The insecticide chlorpyrifos had nine detections and the insecticide methiocarb had two. There were no detections of methyl parathion, which is probably due to product cancellation.

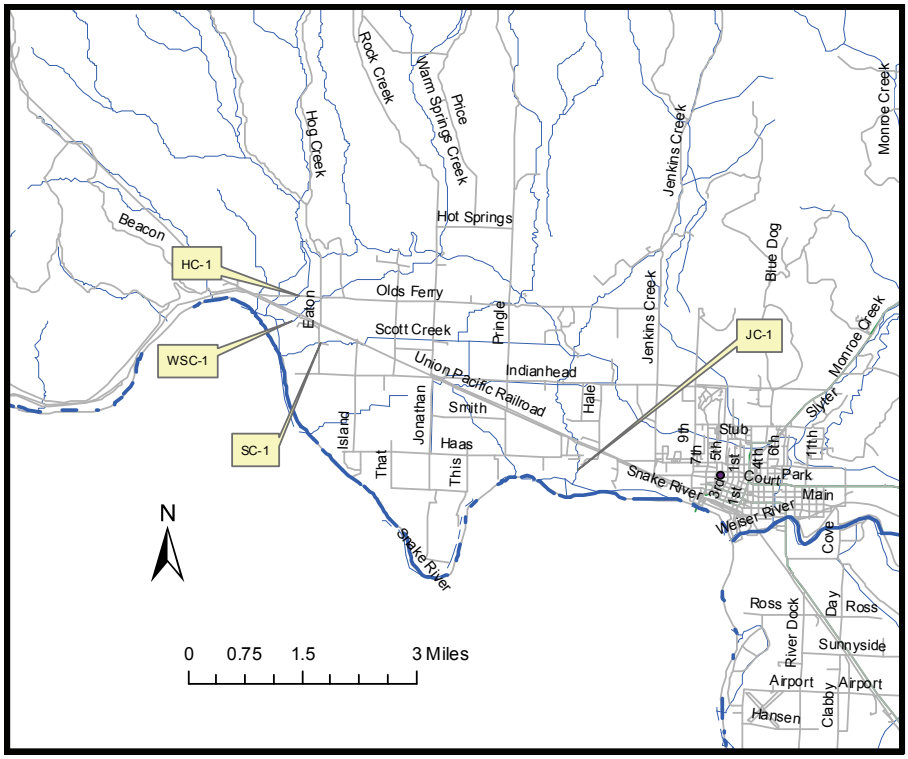

Figure 1. Hog Creek, Warm Springs Creek, Scott Creek and Jenkins Creek monitoring locations.

Pesticides of Concern (POC)

ISDA, under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) has primary authority for compliance monitoring and enforcement of pesticide use within the State of Idaho. ISDA's surface water program's prime responsibility is to evaluate surface waters throughout Idaho for potential pesticide issues that could compromise aquatic species health. ISDA considers a potential Pesticide of Concern (POC) as any pesticide detection that is greater than or equal to fifty percent (≥ 50%) of an established Environmental Protection Agency (EPA) Aquatic Life Benchmark. These established EPA Aquatic Life Benchmarks list pesticide concentrations that could have acute or chronic effects on fish and invertebrates and acute effects on both nonvascular and vascular plants.

Results

In 2013, there were a total of 178 total detections compared to 150 detections in 2007 (Figure 2). There were more herbicide detections (156) in 2013, when compared to 2007 (109), but there was a decrease in insecticide detections from 2007 (35) to 2013 (13). Pesticides detected in 2013, along with type and trade names, are listed in Table 1.

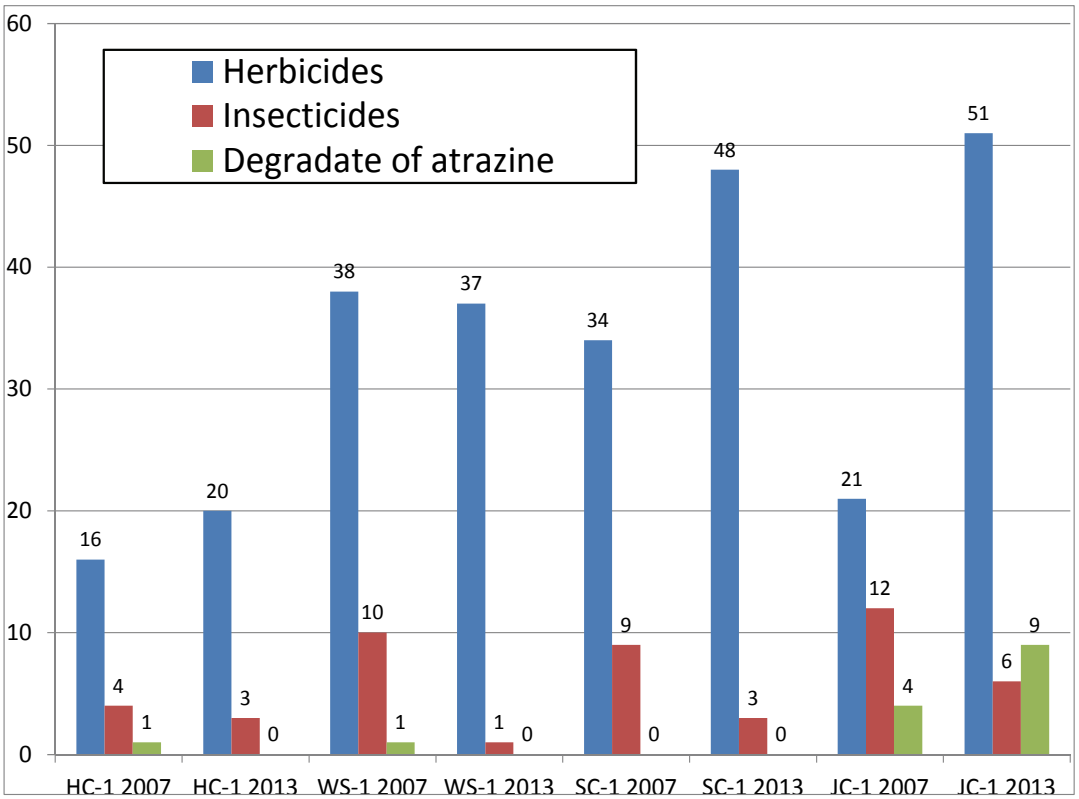

Figure 2. Pesticide type and total detections in monitoring years 2007 and 2013.

Table 1. List of detected pesticides in 2013, those in red are insecticides.

Detected Pesticides	# Detects	Type	*Trade Name	Detected Pesticides	# Detects	Type	*Trade Name
2,4-D	36	H	Curtail	hexazinone	6	H	Velpar
bentazon	2	H	Basagran	lamda-Cyhalothrin	1	I	Demand
bromacil	9	H	Krovar	MCPA	10	H	Banlene
bromoxynil	17	H	Buctril	metalaxyl	2	F	Subdue
chlorpyrifos	9	I	Lorsban	methiocarb	2	I	Mesurol 75-W
desethyl atrazine	9	D	degradate of atrazine	metolachlor	12	H	Dual
dicamba	10	H	Banvel	oxyfluorfen	7	H	Goal
dimethoate	1	I	Cygon	pendimethalin	33	H	Prowl
diuron	7	H	Karmex	propiconazole	3	F	AmTide
EPTC	1	H	Eptam	H = herbicide, I = Insecticide, D = degradate of atrazine, F = fumigant			
ethalfluralin	1	H	Sonalan	* Other Trade Names may apply			

Results

Hog Creek had eight pesticide detections, with seven herbicides and one POC insecticide (Table 2). There were a total of 23 detections with 20 herbicides and 3 insecticides. The three insecticide detections were for the organophosphate pesticide chlorpyrifos. All three detections are considered a POC by ISDA with one detection (0.074 ppb) exceeding both the acute and chronic levels for invertebrates. The other two were ≥ 50% of an established EPA Aquatic Benchmark. The majority of detections were the herbicides 2,4-D, and pendimethalin.

Table 2. Pesticide results for Hog Creek (ppb).

Pesticides Detected	Pesticide Type	Number of Detections	Highest Detection	Fish Acute	Fish Chronic	Inverts Acute	Inverts Chronic	NonVascular Acute	Vascular Acute
2,4-D	H	7	2.2	12,075	14,200	12,500	16,050	3880	13.1
bromacil	H	1	0.13	18,000	3,000	60,500	8,200	6.8	45
bromoxynil	H	2	0.19	26.5	18	48	2.5	51	—
chlorpyrifos	I	1	0.025	0.9	0.57	0.05	0.04	140	—
chlorpyrifos	I	1	0.048	0.9	0.57	0.05	0.04	140	—
chlorpyrifos	I	1	0.074	0.9	0.57	0.05	0.04	140	
dicamba	H	2	1.2	14,000	—	17,300	—	61	>3,250
hexazinone	H	2	0.058	137,000	17,000	75,800	20,000	7	37.4
MCPA	H	1	0.27	48,000	12,000	41,000	11,000	160	130
pendimethalin	H	5	0.34	69	6.3	140	14.5	5.2	12.5

Warm Springs Creek had a total of 38 detections with 37 herbicides detected and one insecticide (Table 3). The carbamate insecticide methiocarb had one detection that exceeded the chronic invertebrate criteria. Overall, there were nine pesticides detected with eight herbicides and one insecticide. The herbicide metolachlor had two detections that exceeded the invertebrate chronic criteria and the herbicide oxyfluorfen had one detection that was ≥ 50% of the acute criteria for both vascular and nonvascular plants.

Table 3. Pesticide results for Warm Springs Creek (ppb).

Pesticides Detected	Pesticide Type	Number of Detections	Highest Detection	Fish Acute	Fish Chronic	Inverts Acute	Inverts Chronic	NonVascular Acute	Vascular Acute
2,4-D	H	10	2.5	12,075	14,200	12,500	16,050	3880	13.1
bromacil	H	4	0.091	18,000	3,000	60,500	8,200	6.8	45
bromoxynil	H	4	0.86	26.5	18	48	2.5	51	—
dicamba	H	3	0.48	14,000	—	17,300	—	61	>3,250
diuron	H	2	0.082	200	26	80	200	2.4	15
MCPA	H	1	0.38	48,000	12,000	41,000	11,000	160	130
methiocarb	I	1	0.19	218	50	3.5	0.1	—	—
metolachlor	H	4	1.4	1,600	1,000	550	1	8	21
metolachlor	H		1.4	1,600	1,000	550	1	8	21
oxyfluorfen	H	1	0.24	102	1.3	40	13	0.29	0.35
pendimethalin	H	8	69	6.3	140	14.5	5.2	12.5	—

Scott Creek had 12 pesticides identified with 11 herbicides and one insecticide (Table 4). There was a total of 51 detections with 48 herbicides and three insecticides. The organophosphate chlorpyrifos had three detections that exceeded ISDA's POC criteria for both acute and chronic invertebrates. Oxyfluorfen, a herbicide, had one detection that was ≥ 50% of the nonvascular acute criteria.

Table 4. Pesticide results for Scott Creek (ppb)

Pesticides Detected	Pesticide Type	Number of Detections	Highest Detection	Fish Acute	Fish Chronic	Inverts Acute	Inverts Chronic	NonVascular Acute	Vascular Acute
2,4-D	H	11	1.7	12,075	14,200	12,500	16,050	3,880	13.1
bromacil	H	1	0.160	18,000	3,000	60,500	8,200	6.8	45
bromoxynil	H	6	0.89	26.5	18	48	2.5	51	—
chlorpyrifos	I	1	0.028	0.9	0.57	0.05	0.04	140	—
chlorpyrifos	I	1	0.029	0.9	0.57	0.05	0.04	140	—
chlorpyrifos	I	1	0.03	0.9	0.57	0.05	0.04	140	—
dicamba	H	4	0.23	14,000	—	17,300	—	61	>3,250
diuron	H	1	0.095	200	26	80	200	2.4	15
hexazinone	H	4	0.17	137,000	17,000	75,800	20,000	7	37.4
MCPA	H	4	0.88	48,000	12,000	41,000	11,000	160	130
metalaxyl	F	2	0.072	65,000	9,100	14,000	100	140,000	92,000
metolachlor	H	4	0.42	1,600	1,000	550	1	8	21
oxyfluorfen	H	1	0.16	102	1.3	40	13	0.29	0.35
pendimethalin	H	10	69	6.3	140	14.5	5.2	12.5	—

Jenkins Creek (Table 5) had the highest number of pesticide detections (66) with 44 herbicides, nine detections of desethyl atrazine, which is a degradate of atrazine, six insecticides, and three fungicides (Table 5). There were a total of 18 pesticides identified with 12 herbicides, four insecticides, one fungicide, and one desethyl atrazine. There were three detections of chlorpyrifos that all exceeded the POC criteria of ≥ 50% of the acute and chronic concentrations for invertebrates. Dimethoate, which is also an organophosphate pesticide, exceeded the chronic value for invertebrates. The insecticide lamda-Cyhalothrin is a pyrethroid that was ≥ 50% of the acute fish concentration and exceeded the fish chronic, invertebrate acute, and invertebrate chronic benchmark levels. Metolachlor and oxyfluorfen are both herbicides that are used to control broadleaf and annual grassy weeds. Metolachlor had one detection that was greater than the chronic invertebrate concentration and oxyfluorfen was at a level that was ≥ 50% of the acute value for both vascular and non-vascular plants.

Table 5. Pesticide results for Jenkins Creek (ppb).

Pesticides Detected	Pesticide Type	Number of Detections	Highest Detection	Fish Acute	Fish Chronic	Inverts Acute	Inverts Chronic	NonVascular Acute	Vascular Acute
2,4-D	H	8	0.67	12,075	14,200	12,500	16,050	3,880	13.1
bentazon	H	2	0.36	>50,000	—	>50,000	—	4,500	5,350
bromacil	H	3	0.17	18,000	3,000	60,500	8,200	6.8	45
bromoxynil	H	5	0.92	26.5	18	48	2.5	51	—
chlorpyrifos	I	1	0.04	0.9	0.57	0.05	0.04	140	—
chlorpyrifos	I	1	0.027	0.9	0.57	0.05	0.04	140	—
chlorpyrifos	I	1	0.025	0.9	0.57	0.05	0.04	140	—
desethyl atrazine	D	9	0.048	2,650	65	360	60	1	37
dicamba	H	1	0.45	14,000	—	17,300	—	61	>3,250
dimethoate	I	1	2.3	3,100	430	21.5	0.5	84	—
diuron	H	4	0.12	200	26	80	200	2.4	15
ethalfluralin	H	1	0.15	16	0.4	30	24	25	—
EPTC	H	1	0.77	7,000	—	3,245	810	1,400	5,600
lamda-Cyhalothrin	I	1	0.057	0.105	0.031	0.0035	0.002	>310	—
MCPA	H	4	0.64	48,000	12,000	41,000	11,000	160	130
methiocarb	I	1	0.087	218	50	3.5	0.1	—	—
metolachlor	H	4	2.5	1,600	1,000	550	1	8	21
oxyfluorfen	H	5	0.31	102	1.3	40	13	0.29	0.35
pendimethalin	H	10	0.44	69	6.3	140	14.5	5.2	12.5
propiconazole	F	3	0.056	425	95	650	260	21	4,828

Conclusions

There were four different insecticides and two herbicides identified as POC compounds during this study (Table 6). Overall, there were a total of 20 pesticide compounds identified which resulted in a total of 178 total detections. Jenkins Creek had the largest number of detections with 66 and the greatest number of POC pesticides (Table 6).

Table 6. Pesticides of Concern Weiser Flat, Idaho.

Site	POC insecticides	POC herbicides
Hog creek	chlropyrifos	None
Warm Springs Creek	methiocarb	metolachlor, oxflurofen
Scotts Creek	chlopryrifos	oxyflurofen
Jenkins Creek	chlorpyrifos, dimethoate, methiocarb, lamda-Cyhalothrin	metolachlor, oxflurofen

Herbicides had the greatest number of detections (156) which indicates that multiple uses of different herbicides are making their way into waterways within Weiser flat. The insecticides detected (10 detections) are toxic, at various levels, to both fish and aquatic invertebrates. Pesticide applicators must adhere to label requirements and apply pesticides according to federal and state law. Every effort should be made to prevent pesticides from leaving the application area and entering live water. Use of alternative less toxic or more stable pesticides may be an option.

References

Environmental Protection Agency, 2014. Office of Pesticide Programs' Aquatic Life Benchmarks
Koberg, S., 2004. Weiser Flat TMDL Implementation Plan.