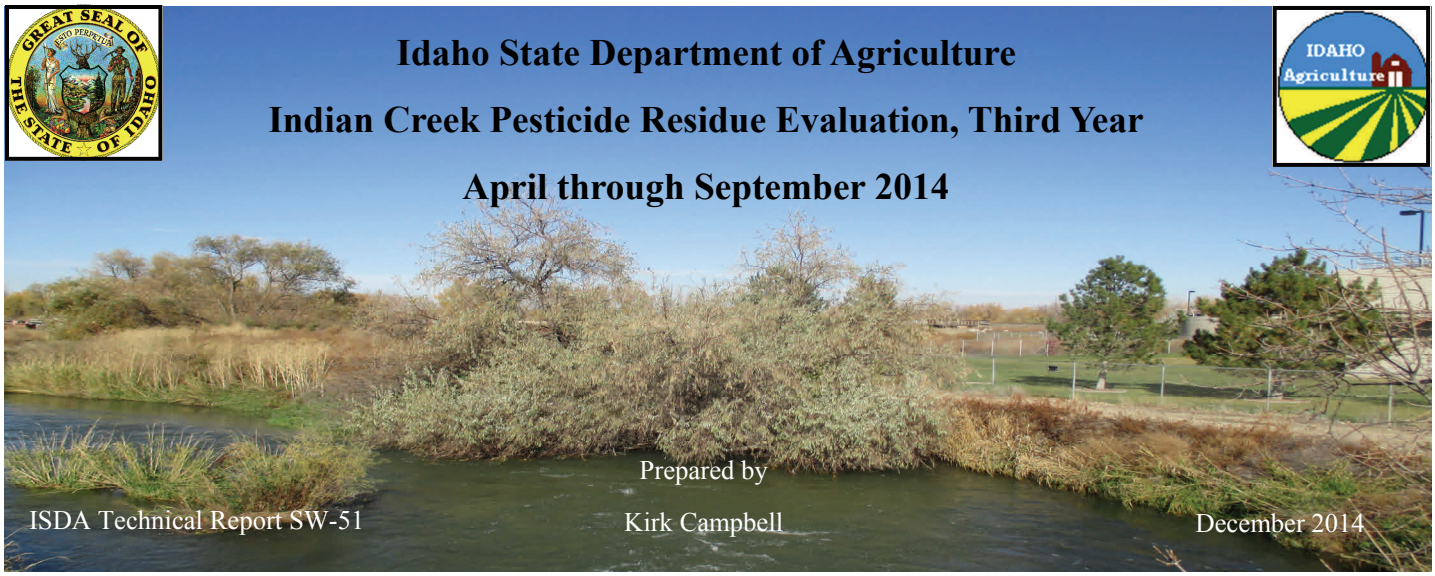

Idaho State Department of Agriculture

Indian Creek Pesticide Residue Evaluation, Third Year

April through September 2014

Prepared by

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ISDA Technical Report SW-51

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Introduction

In 2014, the Idaho State Department of Agriculture (ISDA) conducted a third year of pesticide residue monitoring at five locations on Indian Creek (Figure 1). For the 2014 season, the station identified as IC-4, located on N. Middleton Rd. near Cherry Lane, was dropped from the program. Over the two previous monitoring years (2012 and 2013) there were no identified pesticides of concern (POC) by ISDA at this location. All of the other monitoring stations for 2014 remained the same as during the 2013 monitoring season (Figure 1).

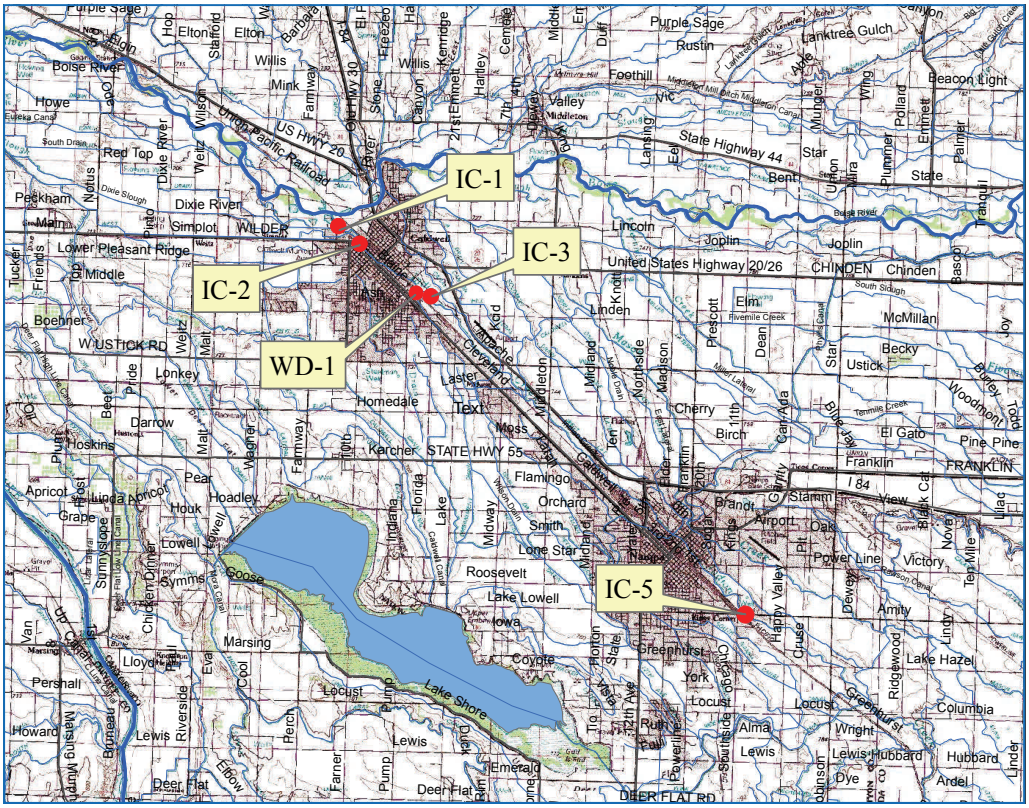

Figure 1. Indian Creek monitoring locations in the vicinity of Caldwell and Nampa, Idaho.

Samples were collected on a bi-weekly schedule starting April 22, 2014 through September 23, 2014. A total of 60 samples (12 per site) were collected during this program. Samples were shipped on ice, overnight and analyzed by the University of Idaho Analytical Science Laboratory (ASL) located in Moscow, Idaho.

This was the third year of pesticide monitoring on Indian Creek. Data collection requires numerous samples over a long period of time (five years or more) to accurately assess pollution concerns. As with most constituents in water, the occurrence of pesticides varies with factors, such as:

- Spatial pesticide use patterns, crop and management practices, and soil and hydrologic vulnerabilities.
- Intensity and timing of pesticide applications and coincident of rainfall events.
- Year-to-year temporal patterns at any given location reflecting changes in cropping patterns, pesticide products used, and variations in rainfall from year to year.

Figure 2 illustrates the variability in pesticide detections possibly due to some of the above mentioned factors.

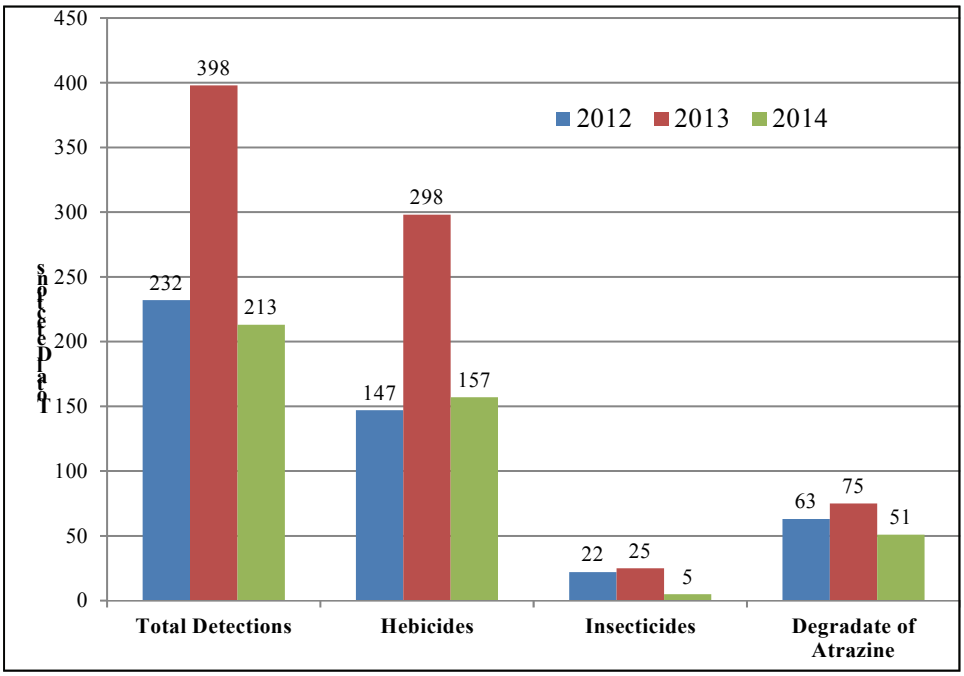

Figure 2. Overall pesticide detections for 2012, 2013, and 2014.

Pesticides of Concern

ISDA defines a pesticide of concern (POC) as any pesticide that is detected at a concentration that is greater than or equal to fifty percent (≥50%) of an established Environmental Protection Agency (EPA) Aquatic Life Benchmark. These benchmarks are developed for acute and chronic effects on fish and aquatic invertebrates and acute effects on vascular and nonvascular plants. Acute toxicity of a pesticide refers to the effects from a single dose or repeated exposure over a short period of time (i.e. a few hours or a day). Chronic toxicity is the ability of a substance to cause adverse health effects resulting from long-term or repeated low levels of exposure.

The POC previously detected was the insecticide chlorpyrifos, with nine detections in 2012 and ten in 2013. Two other POC's were detected in 2013 and consisted of the insecticides, malathion (three detections) and bifenthrin (five detections). Chlorpyrifos was detected again in 2014 with one detection per station (Table 1).

Table 1. Chlorpyrifos concentrations compared to EPA Aquatic Benchmarks.

Site	POC	Concentration ug/L	Fish Acute	Fish Chronic	Inverts Acute	Inverts. Chronic	Nonvascular Acute	Vascular Acute
IC-1	Chlorpyrifos	0.025	0.9	0.57	0.05	0.04	140	—
IC-2	Chlorpyrifos	0.040	0.9	0.57	0.05	0.04	140	—
WD-1	Chlorpyrifos	0.038	0.9	0.57	0.05	0.04	140	—
IC-3	Chlorpyrifos	0.037	0.9	0.57	0.05	0.04	140	—
IC-5	Chlorpyrifos	0.090	0.9	0.57	0.05	0.04	140	—

Overall results

There were a total of 15 pesticide compounds identified during this study. They consisted of 13 herbicides, one insecticide, and one degradate of atrazine (desethyl atrazine) (Table 2). Of these 15 pesticides, there were a total of 214 detections, with 158 herbicide detections, 5 insecticide detections, and 51 desethyl atrazine detections. Desethyl atrazine, which is a degradate of atrazine, had the highest number of detections (51) followed by the herbicide 2,4-D (44). The insecticide, chlorpyrifos, had only five detections when compared to the 11 detections in 2013. There were no other insecticides detected during the 2014 monitoring (Table 2).

Table 2. Pesticide name, type, trade names, and number of detections.

Pesticide	Type	Trade Name	# of Detects	Pesticide	Type	Trade Name	# of Detects
2,4-D	H	Weedar 64	44	desethyl atrazine	D	–	52
alachlor	H	Lasso	1	dicamba	H	Dicamba 4	5
atrazine	H	Aatrex	8	diuron	H	Karmex	11
bromacil	H	Hyvarx	13	hexazinone	H	Velpar	13
bromoxynil	H	Buctril	11	MCPA	H	Rhomene	7
chlorpyrifos	I	Lorsban	5	metolachlor	H	Dual	17
dacthal	H	Dacthal W-75	3	pendimethalin	H	Prowl	14
H =herbicide	**I = Insecticide**	**D= degradate of atrazine**		terbacil	H	Sinbar	10

Figure 2 shows the total detections, at each station, working from the furthest downstream station Indian Creek-1 to the furthest upstream station Indian Creek-5.

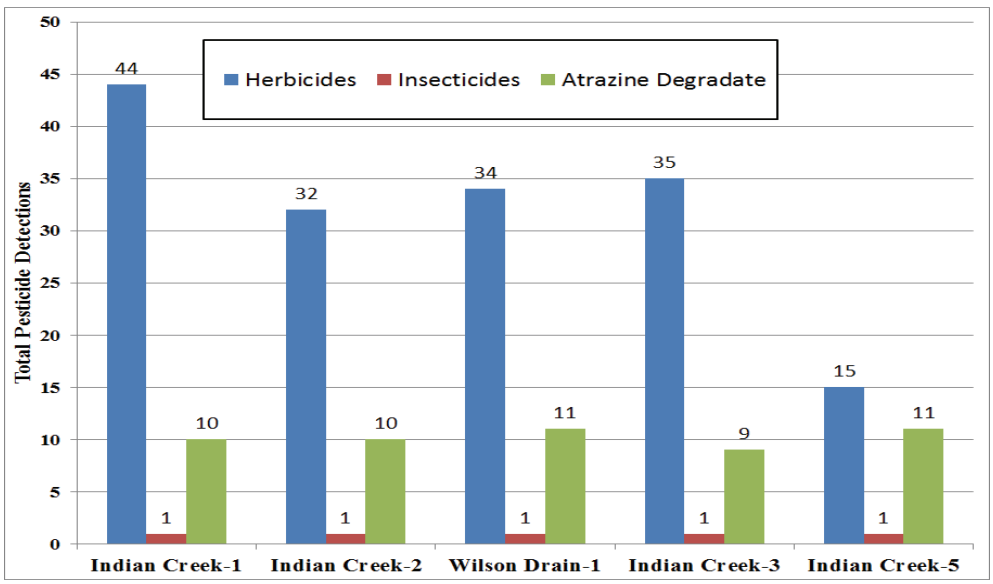

Figure 2. Total pesticide detections for Indian Creek's monitoring stations.

Conclusions

After three years of evaluating Indian Creek, the variation in detections and types of pesticides identified shows the complexity of the Indian Creek sub-watershed and the difficulty in determining a cause and effect for pesticides. Herbicides are prevalent throughout the system, while insecticides vary widely when comparing year to year data. ISDA will continue to monitor and evaluate pesticides within the Lower Boise River watershed and will continue to work with applicators and cooperators on education and BMP practices. ISDA's pesticide inspectors will continue to evaluate the sales, handling and usage areas for pesticides of concern.

References

U.S. Environmental Protection Agency, March 2004. Evaluation and Use of Water Monitoring Data in Pesticide Aquatic Exposure Assessments.

Environmental Protection Agency, 2014. Office of Pesticide Programs' Aquatic Life Benchmarks