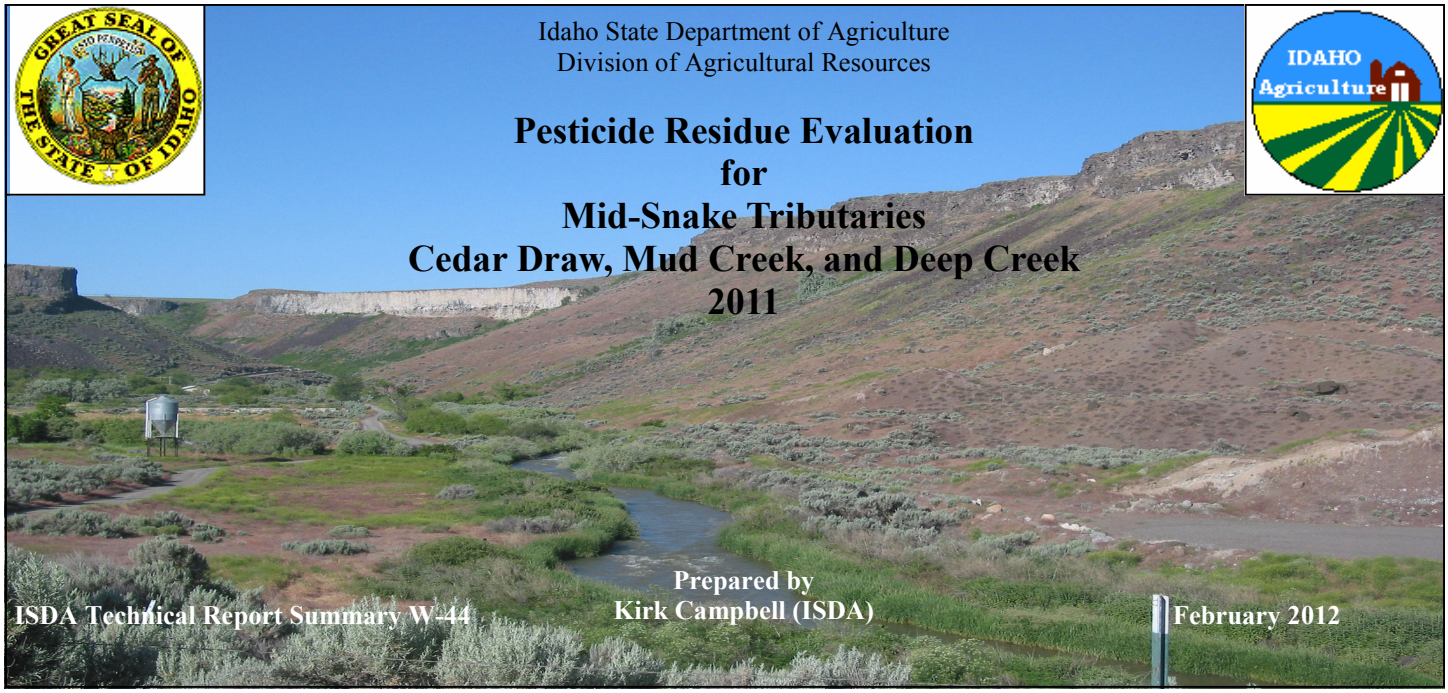

Idaho State Department of Agriculture
Division of Agricultural Resources

Pesticide Residue Evaluation for Mid-Snake Tributaries Cedar Draw, Mud Creek, and Deep Creek 2011

ISDA Technical Report Summary W-44

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Introduction

The Idaho State Department of Agriculture (ISDA) conducted pesticide residue monitoring in 2011 on three tributaries that discharge into the Middle Snake River. The creeks monitored were Deep Creek, Mud Creek, and Cedar Draw (Figure 1). Deep Creek drains approximately 147,891 acres with 39,931 acres (27%) designated as agricultural lands. Mud Creek's drainage is approximately 42,323 acres with 35,298 acres (83.4%) in agricultural lands, and Cedar Draw consists of approximately 74,125 acres with 31,874 acres (43%) designated as agricultural acreage (USGS StreamStat).

Deep Creek and Mud Creek originate from springs and seeps near Buhl, Idaho while Cedar Draw originates near Filer, Idaho (DEQ, 1998).

Monitoring for this project was conducted on a bi-weekly schedule starting from April 7, 2011 through September 21, 2011. A total of 12 pesticide samples were collected from each monitoring site during this program.

Analytical Quality Assurance

All analytical testing was conducted by the University of Idaho Analytical Science Laboratory (ASL) and followed EPA approved methods. All analyte spikes and surrogate standard recoveries were within acceptable ranges (70-130%) indicating that pesticide residues were accurately recovered. There were holding time issues (between extraction and instrumental analysis) for carbamate and phenylurea pesticide analyses. Due to instrument failure samples collected on August 10, 25, and September 7, and 21, 2011 missed their holding times. The extraction

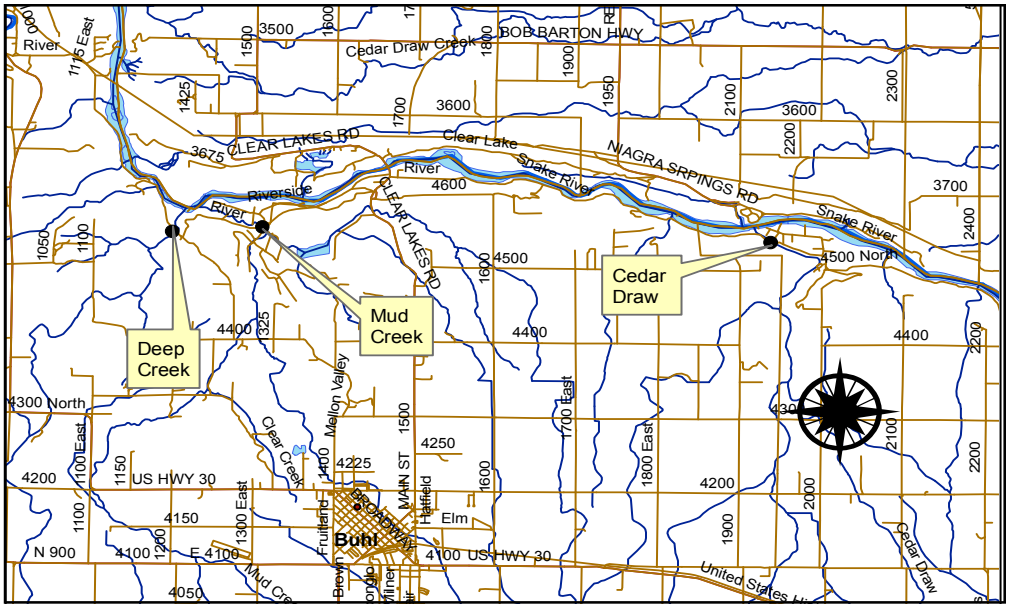

Figure 1. Deep Creek, Mud Creek and Cedar Draw sampling sites.

solutions were frozen while the instrument was being replaced and after analysis all of the standard recoveries were within acceptable ranges.

All field monitoring techniques followed the protocols outlined in the Quality Assurance Project Plan (QAPP) for the Mid-Snake Tributary Pesticide Evaluation, April 2011 (on file at ISDA). All bottle blanks and equipment blanks prepared in the field were non-detectable for pesticides indicating that both the field and laboratory activities were free from contamination.

Overall Results

For the 2011 assessment there were a total of nine pesticide compounds identified with six herbicides, two insecticides and one desethyl atrazine a degradate of atrazine (Table 1).

Table 1. Pesticides detected and trade names in 2011 for Deep Creek, Mud Creek, and Cedar Draw.

Detected Pesticide	Pesticide Type	Trade Name
Atrazine	H	Aatrex
Bromacil	H	Krovar
Carbaryl	I	Sevin
Desethyl Atrazine	D	—
Dicamba	H	Brushmaster
Diuron	H	Karmex
Hexazinone	H	Velpar
2,4-D	H	Curtail
Methomyl	I	Lannate

There were a total of 49 pesticide detections during the 2011 program that consisted of 23 desethyl atrazine detections, 20 herbicide detections, and six insecticide detections (Figure 2).

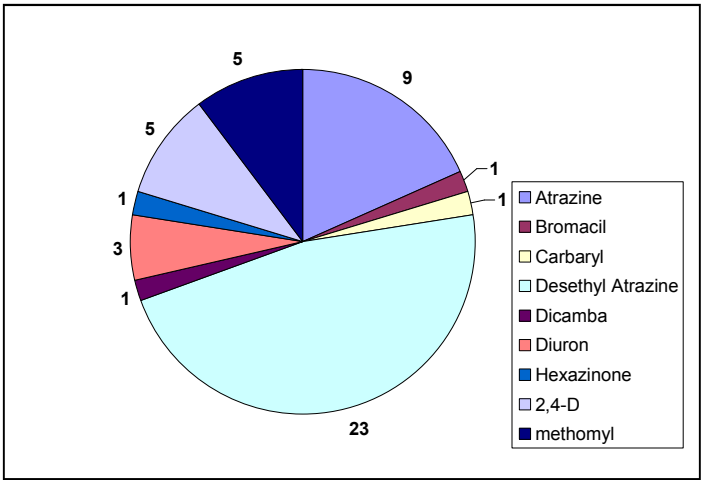

Figure 2. Total pesticide detections for Deep, Mud, and Cedar Draw Creek in 2011.

Monitoring Results

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 aquatic benchmarks are established for pesticide effects on fish and aquatic invertebrates at acute and chronic levels and non-vascular and vascular plants at acute levels. 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 exposure or repeated low level exposures.

Cedar Draw

There were a total of nine pesticide compounds detected at Cedar Draw with four desethyl atrazine detections, three detections of the insecticide methomyl and two detections of the herbicide 2,4-D (Table 2). There were no POC identified and all detections were below any aquatic benchmark.

Table 2. Cedar Draw pesticide detections.

Cedar Draw	2011			EPA Aquatic Life Benchmarks (ug/L)			
Pesticides	Pesticide	Number of	Highest	Fish	Fish	Inverts	Inverts
Detected	Type	Detections	Detection	Acute	Chronic	Acute	Chronic
Desethyl Atrazine	D	4	0.053	2,650	65	360	60
Methomyl	I	3	0.089	160	12	2.5	0.7
2,4-D	H	2	0.23	12,075	14,200	12,500	16,050

Mud Creek

Mud Creek had a total of six pesticide compounds identified with four herbicides, one insecticide and one degradate (desethyl atrazine). Mud Creek had the overall largest number of detections with 22. Of those detections 12 were the degradate of atrazine (desethyl atrazine), followed by the herbicide atrazine (6). There was only one insecticide (methomyl) which was below the aquatic benchmark levels for fish and invertebrates. There was no pesticide of concern identified in Mud Creek.

Table 3. Mud Creek pesticide detections.

Mud Creek	2011			EPA Aquatic Life Benchmarks (ug/L)			
Pesticides	Pesticide	Number of	Highest	Fish	Fish	Inverts	Inverts
Detected	Type	Detections	Detection	Acute	Chronic	Acute	Chronic
Atrazine	H	6	0.033	2,650	65	360	60
Bromacil	H	1	0.058	18,000	3,000	60,500	8,200
Desethyl Atrazine	D	12	0.065	2,650	65	360	60
Diuron	H	1	0.026	200	26	80	200
2,4-D	H	1	0.24	12,075	14,200	12,500	16,050
Methomyl	I	1	0.074	160	12	2.5	0.7

Deep Creek

Deep Creek had a total of eight pesticides identified with seven degradates of atrazine (desethyl atrazine) followed by three detections of the herbicide atrazine. Two pesticide detections for carbaryl and methomyl were below any acute or chronic benchmarks (Table 4). ISDA did not identify any POC within Deep Creek.

Table 4. Deep Creek pesticide detections.

Deep Creek	2011			EPA Aquatic Life Benchmarks (ug/L)			
Pesticides	Pesticide	Number of	Highest	Fish	Fish	Inverts	Inverts
Detected	Type	Detections	Detection	Acute	Chronic	Acute	Chronic
Atrazine	H	3	0.032	2,650	65	360	60
Carbaryl	I	1	0.079	110	6.8	0.85	0.5
Desethyl Atrazine	D	7	0.062	2,650	65	360	60
Dicamba	H	1	0.41	14,000	—	>50,000	—
Diuron	H	2	0.082	200	26	80	200
Hexazinone	H	1	0.18	137,000	17,000	75,800	20,000
Methomyl	I	1	0.063	160	12	2.5	0.7
2,4-D	H	2	0.24	12,075	14,200	12,500	16,050

Observation/Conclusions

Overall the lack of pesticides of concern, that are ≥50% of an established EPA aquatic benchmark, is a good indicator that the pesticides that are present will not contribute significantly to the aquatic degradation of the three creeks in this study. The dominate pesticide identified during this study is desethyl atrazine a degradate of atrazine. Out of a total of 49 detections, desethyl atrazine made up 23 of those detections. Numerous studies have indicated that atrazine along with desethyl atrazine has been detected in both surface and ground water throughout the country. Deep Creek, Mud Creek, and Cedar Draw all originate through springs and ground water seeps near their headwaters and are recharged from additional ground water and surface water sources. The presence and transport of desethyl atrazine through both ground water and surface water is a logical route for this degradate of atrazine. Atrazine, once applied to soils, can enter the environment by direct runoff, or soil infiltration into ground water.

There are several steps that can be taken by applicators to reduce the availability of pesticides to surface and ground water.

- ◊ Read and follow pesticide labels, especially the precautionary statements, directions for use, storage, disposal, and environmental hazards.
- ◊ Incorporate pesticides to reduce the amount vulnerable to runoff.
- ◊ Delay application when the soil is saturated or wet weather is expected.
- ◊ Use band application on crops to reduce volume of pesticides applied.
- ◊ Use integrated pest management strategies.
- ◊ Establish buffers zones.
- ◊ Mix, load and dispose of pesticides properly.
- ◊ Establish water and sediment basins to reduce sediment movement.
- ◊ Avoid windy conditions to limit drift.

References

Environmental Protection Agency, 2011. Office of Pesticides Programs' Aquatic Life Benchmarks.

Idaho State Department of Environmental Quality, 1997. The Middle Snake River Watershed Management Plan, Phase 1 TMDL.

United States Geological Survey, 2007. StreamStats. http://streamstats.usgs.gov/