Idaho State Department of Agriculture

Pesticide Residue Source Evaluation

Mason Creek 2012

ISDA Technical Report No. W-45

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ISDA

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Introduction

In 2012, the Idaho State Department of Agriculture (ISDA) conducted a pesticide monitoring program at five locations on Mason Creek (Figure 1 and 2). Bi-weekly samples were collected from April 18 through September 19, 2012. Mason Creek originates near the New York canal in Ada County, flows northwest, west and confluences with the Lower Boise River near Caldwell, Idaho. Agricultural acreage makes up approximately 53% of Mason Creeks Subwatershed. Previous water quality studies by ISDA in 2010 and 2011, indicated that Mason Creek, along with major drains that enter Mason Creek, are contributing pesticide residues into the Lower Boise River.

ISDA located the five monitoring stations, on Mason Creek, in an attempt to delineate the affects of three major drains (Solomon, Noble and Purdum) that historically have transported pesticide residues into Mason Creek (Table 1).

Table 1. Monitoring Site Locations.

Site I.D.	Site Locations
MC-1	Polk St. at USGS Gauge, site includes all drains to Mason Creek
MC-2	Ward Rd. upstream of Noble and Solomon Drains
MC-3	Ustick just W. of Northside Rd., downstream of Purdum Gulch Drain
MC-4	Madison Rd. upstream of Purdum Gulch Drain
MC-5	Powerline Rd. W. of Happy Valley Rd. furthest upstream site.

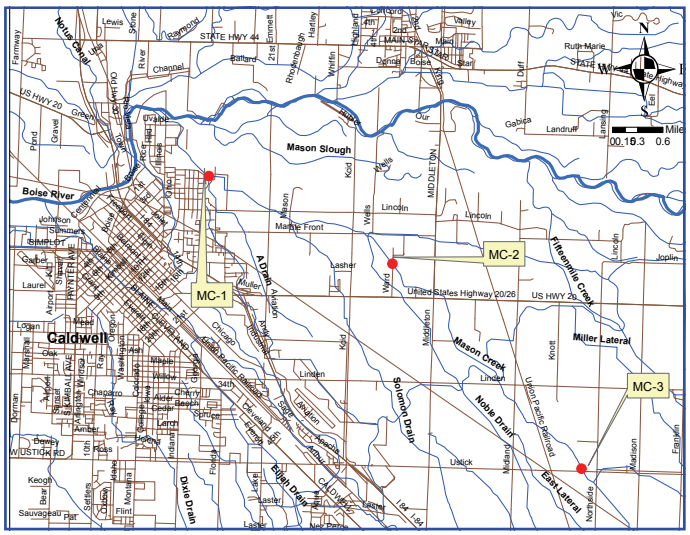

Figure 1. Monitoring sites MC-1, MC-2, and MC-3.

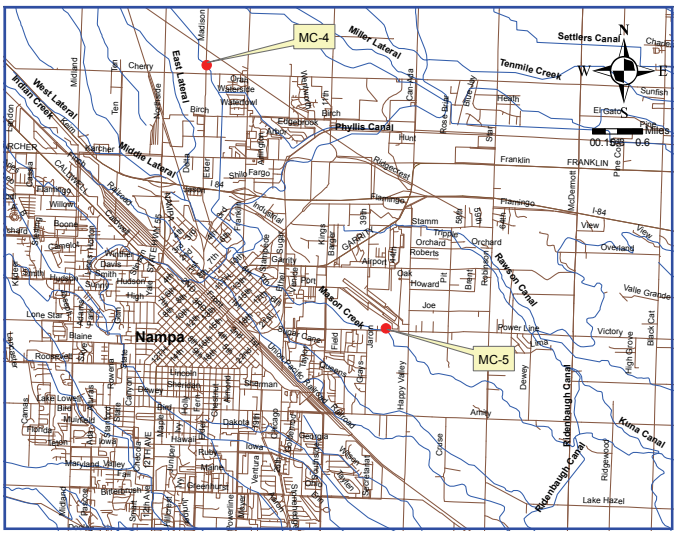

Figure 2. Monitoring sites MC-4 and MC-5.

Results

During this study, there were 24 total pesticides identified. They consisted of 17 herbicides, five insecticides, one degradate of atrazine (desethyl atrazine), and one fungicide. Of these 24 pesticides, there were a total of 250 detections with 182 herbicides, 14 insecticides, 52 atrazine degradate, and two fungicides (Table 2).

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

Pesticide	Type	*Trade Name	#Detects	Pesticide	Type	*Trade Name	#Detects
2,4-D	H	Curtail	33	ethoprop	I	Mocap	2
atrazine	H	Aatrex	1	hexazinone	H	Velpar	17
azoxystrobin	F	Avaris	2	malathion	I	Fyfanon	2
bentazon	H	Basagren	2	MCPA	H	Banlene	7
bromacil	H	Krovar	20	methiocarb	I	Mesurol	1
bromoxynil	H	Buctril	16	methomyl	I	Lannate	5
chlorpyrifos	I	Lorsban	4	metolachlor	H	Dual	18
desethyl atrazine	D	—	52	metribuzin	H	Sencore	4
dicamba	H	Brushmaster	4	oxyfluorfen	H	Goal	2
dimethoate	I	Dimethoate 4E	1	pendimethalin	H	Prowl	18
diuron	H	Karmex	7	pronamide	H	Kerb50-W	1
EPTC	H	Eptam	2	terbacil	H	Sinbar	29
H=herbicide, I=insecticide, D=degradate of atrazine F=fungicide-*Other trademark names may apply							

The number of pesticide detections increased by approximately 55% between MC-4 and MC-3. MC-3 is just downstream of where Purdum Gulch enters Mason Creek (Figure 3). There was also a 34% increase in pesticide detections between station MC-3 and MC-2 (Figure 3). The number of pesticide compounds detected also increased by 50% between MC-4 and MC-3 (Figure 4). The number of pesticide compounds identified between MC-3 and MC-2 only increased by 20% (Figure 4).

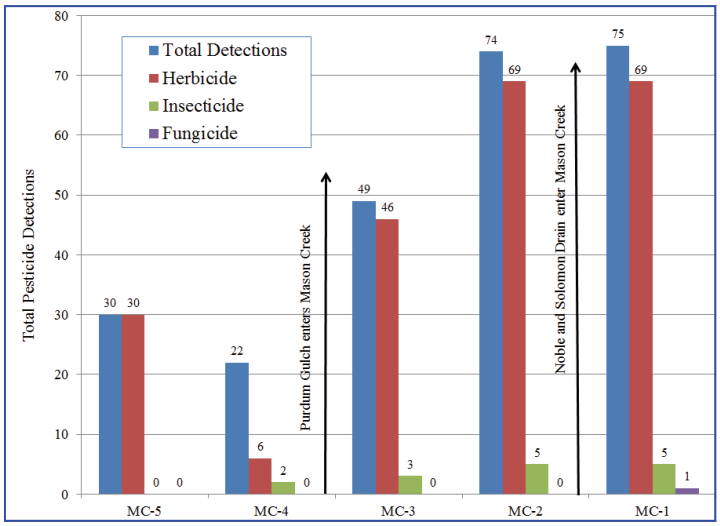

Figure 3. Total pesticide detections between stations.

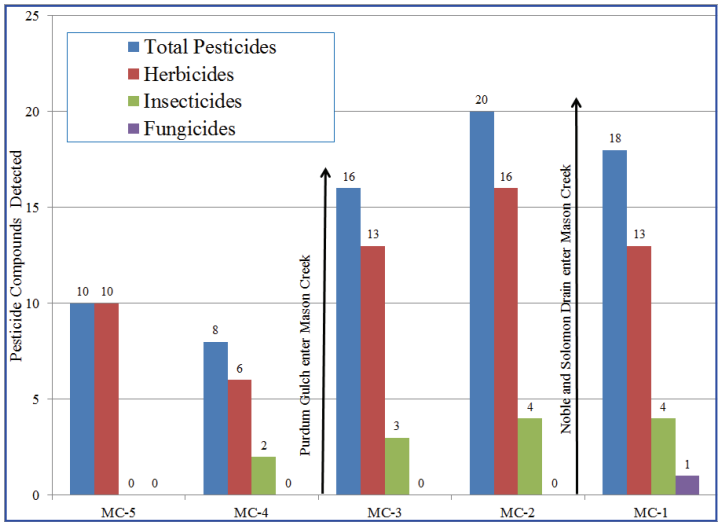

Figure 4. Identified pesticide compounds between stations.

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 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 levels of exposure. Each Aquatic Life Benchmark is based on the most sensitive, scientifically acceptable, toxicity endpoint available for various fresh water fish, and invertebrates for all scientifically acceptable toxicity data available to EPA. All of the pesticides identified as POCs during this study were insecticides (Table 3).

Table 3. Pesticides of concern for Mason Creek 2012.

Site	POC	Concentrations ug/L	Fish Acute	Fish Chronic	Inverts Acute	Inverts Chronic	NonVascular Acute	Vascular Acute
MC-1	chlorpyrifos	0.028	0.9	0.57	0.05	0.04	140	—
	chlorpyrifos	0.05	0.9	0.57	0.05	0.04	140	—
	malathion	0.086	16.4	8.6	0.3	0.035	2,400	—
MC-2	chlorpyrifos	0.076	0.9	0.57	0.05	0.04	140	—
	malathion	0.075	16.4	8.6	0.3	0.035	2,400	—
MC-3	chlorpyrifos	0.032	0.9	0.57	0.05	0.04	140	—
MC-4	methiocarb	0.051	218	50	3.5	0.1	—	—
MC-5	ND	—	—	—	—	—	—	—

Conclusions

The purpose of this study was to determine the amount of pesticide residues that enter Mason Creek from three major drainages. Historical data has shown that Purdum Drain, Solomon Drain, and Noble Drain are all major contributors of pesticides to Mason Creek. As can be seen in figures three and four, the number of detections and pesticides identified increased approximately 50% between stations MC-4 and MC-3. MC-3 was just downstream of Purdum Gulch and has a significant impact on the increased amount of pesticide residues entering Mason Creek.

There are concerns and questions on why there is a 34% increase in total detections between stations MC-3 and MC-4; and a 20% increase in identified pesticide compounds. There may be other unidentified drainages between these two stations (Maddens Spur Drain) that need to be identified and evaluated. There also could be differences in crop acres, crop type, pesticide usage and irrigation scheduling, that influence the transport of pesticides. There was little, if any, difference between the overall detections and pesticides identified between station MC-2 and MC-1 (Figure 3 and 4). Solomon Drain and Noble drain enter Mason Creek between these two stations but appeared to have little overall effect during this monitoring program. Sampling at MC-1, located at Polk Road, had the second lowest number of detections since 2009 (Table 5).

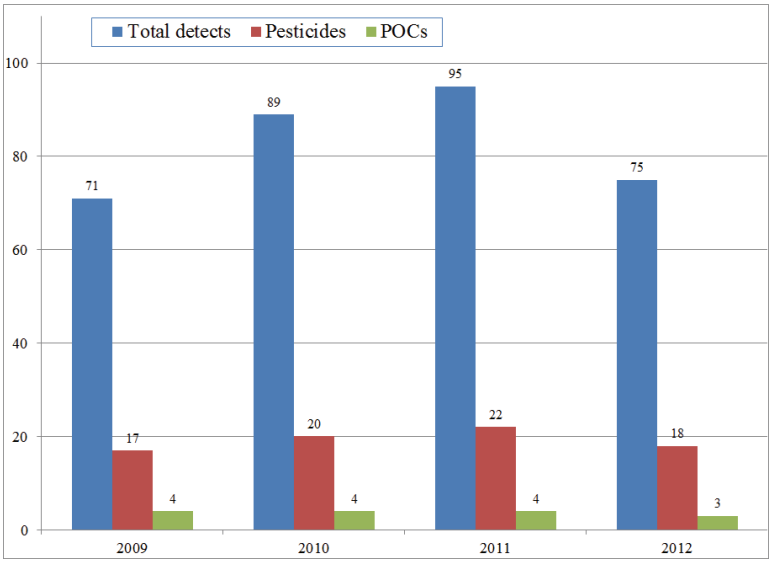

Figure 5. Total detection and pesticides identified at MC-1 over four years.

This evaluation of Mason Creek indicated that there was a major increase in pesticide detections and pesticide compounds immediately downstream of where Purdum Gulch enters Mason Creek (Site MC-3). Total detections went from 22 at MC-4 to 49 at MC-3 (+53%), and pesticide compounds increased from eight at MC-4 to 16 at MC-3 (+50%). Another increase in pesticide detections (34%) occurred between station MC-3 (49) and MC-2 (74). This increase occurred along a distance of approximately 3.6 creek miles between these two stations. This stretch of creek between MC-3 and MC-2 needs to have further evaluation to identify potential source inputs into Mason Creek.

ISDA will continue to monitor and evaluate pesticides and their usage within the Lower Boise River watershed. We will continue to work and educate applicators and cooperators on proper application of pesticides and BMPs to keep pesticide residues out of surface and ground water. ISDA's pesticide inspectors are currently gathering data on sales, handling, and usage areas for identified pesticides of concern (POC) within the Lower Boise River watershed.

References

Environmental Protection Agency, 2012. Office of Pesticide Programs' Aquatic Life Benchmarks.

Idaho State Department of Agriculture, 2009. Pesticide Residue Water Quality Report Lower Boise River Tributaries.

Idaho State Department of Agriculture, 2010. Pesticide residue Evaluation Second Year Synoptic Evaluation Lower Boise River and Tributaries.

Idaho State Department of Agriculture, 2011. Pesticide Residue Evaluation for Mason Creek, Noble Drain, Solomon Drain, and Purdum Drain.