Jump Creek and Succor Creek Pesticide Residue Evaluation
Owyhee County
April 2009 through September 2009

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Introduction

In 2009 the Idaho State Department of Agriculture (ISDA) conducted a surface water quality monitoring program for pesticide residue within the Succor Creek and Jump Creek watershed. Three creeks, Succor (SC-1) and Sage Creek (SGC-1) near Homedale, Idaho and Jump Creek (JC-1) near Marsing, Idaho were monitored for pesticide residues (Figure 1). In addition, Coates Drain (CD-1) and upper Succor Creek (SC-2) were monitored to evaluate any potential pesticide residues entering Idaho from Oregon (Figure 1).

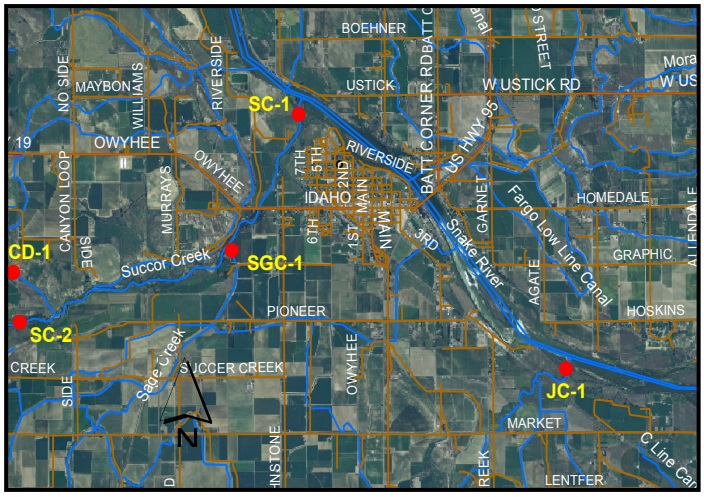

Figure 1. Station location map.

The two lower portions of the watersheds (Jump Creek and Succor Creek) are located within Owyhee County and discharge into the Snake River. Jump Creek is 25.6 miles long and Succor Creek is 67.3 miles long with the lower portion of the two watersheds consisting of rangeland and agricultural related activities. Both watersheds are within the Hydrological Unit Code (HUC) 17050103.

This area has been evaluated by the ISDA Ground Water Section with results indicating detections of several pesticides in a few domestic wells. These two watersheds were shown in previous surface water studies by ISDA to be major contributors of sediment, phosphorus and bacteria into the Snake River. Both Jump and Succor Creek are currently listed on the State of Idaho's §303(d)/§305(B) list for water bodies not meeting their beneficial uses. Succor Creek has a total maximum daily load (TMDL) for sediment and bacteria while Jump Creek's TMDL lists only sediment as a pollutant of concern.

Monitoring was conducted on a bi-weekly schedule from April through September 2009. There were a total of 12 pesticide samples (n=12) collected from each location.

Analytical and Sampling Methods

Analytical methods and techniques used for this study consisted of the following: EPA method 507/508 Pesticides by Gas Chromatography Mass Selective Detector (GC/MSD) and Gas Chromatography Flame Photometric Detector (GC/FPD), EPA method 632 pesticides by Liquid Chromatography Mass Selective Detector (LC/MSD), and EPA method 515.2 herbicides by Gas Chromatography Electron Capture Detector (GC/ECD) and GC/MSD. Analytical testing for this study was completed by the University of Idaho's Analytical Science Laboratory (UIASL) Moscow, Idaho.

All samples collected for this project were collected utilizing a depth integrated suspended sediment sampler (DH-81). The DH-81 was used while wading and was equipped with a one-liter glass sample container and Teflon cap.

Discrete samples from each site were composited into a clean 2.5 gallon glass carboy. The resultant composite was then poured off into three laboratory cleaned one-liter amber sample bottles. All sampling equipment was thoroughly cleaned between sample locations as follows: thorough scrubbing with deionized water and Liqui-Nox detergent, deionized water rinse, acetone (high resolution chromatography grade) rinse, followed by a deionized water rinse. The equipment was then rinsed with source water just prior to sample collection.

Results

Thirteen pesticides were detected including 10 herbicides, two insecticides, and one degredate of the herbicide atrazine. There were a total of 123 detections of the 13 identified pesticides. Of the 123 detections 115 were herbicides and eight were insecticides (Figure 2).

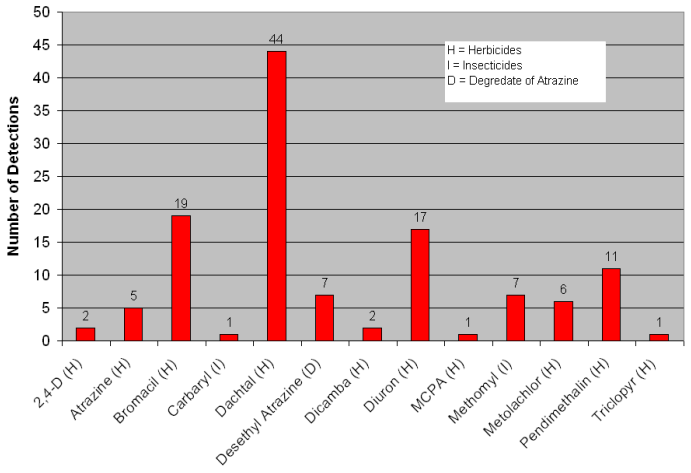

Figure 2. Pesticides detected and number of detects.

Tables 1 through 5 lists the pesticides detected, its highest concentration, and how the concentration compares to aquatic benchmarks established by the Environmental Protection Agency (EPA) for acute and chronic effects of pesticides on fish and macroinvertebrates. Overall the pesticide concentrations detected, during this study, were well below any EPA established aquatic benchmarks.

The lower Jump Creek site (JC-1) had the largest number of detections followed by Sage Creek (SGC-1) and the lower Succor Creek site (SC-1) (Tables 1, 2, and 3).

Coates Drain (CD-1) just downstream from the Oregon boarder and Succor Creek Upstream (SC-2) also just downstream of the Oregon boarder had the fewest detections (Table 4 and 5).

Table 1. Jump Creek detections (JC-1)

Site		Highest	Acute	Chronic	Acute	Chronic
JC-1		Detection ug/L	Fish ug/L	Fish ug/L	Invert. ug/L	Invert. ug/L
Atrazine	3	0.31	2650	62	360	62
Bromacil	9	0.2	18,000	—	60,500	—
Dacthal	11	1.5	15,000	—	13,500	—
Desethyl Atrazine	6	0.062	—	—	—	—
Diuron	5	0.13	355	26	80	160
Methomyl	1	0.052	265	57	4.4	0.4
Pendimethalin	3	0.19	69	6.3	140	14.5
Total detections	38					

Table 2. Sage Creek detections (SGC-1)

Site		Highest	Acute	Chronic	Acute	Chronic
SGC-1		Detection ug/L	Fish ug/L	Fish ug/L	Invert. ug/L	Invert. ug/L
Atrazine	1	0.053	2650	62	360	62
Bromacil	4	0.58	18,000	—	60,500	—
Dacthal	12	1.2	15,000	—	13,500	—
Desethyl Atrazine	1	0.027	2650	62	360	62
Diuron	5	0.47	355	26	80	160
Methomyl	2	0.23	265	57	4.4	0.4
Metolachlor	4	0.07	1,950	780	12,550	—
Pendimethalin	4	0.14	69	6.3	140	14.5
Total detections	33					

Table 3. Succor Creek downstream detections (SC-1)

Site		Highest	Acute	Chronic	Acute	Chronic
SC-1		Detection ug/L	Fish ug/L	Fish ug/L	Invert. ug/L	Invert. ug/L
2,4-D	2	4.4	50,500	14,200	12,500	16,400
Atrazine	1	0.049	2650	62	360	62
Bromacil	4	0.31	18,000	—	60,500	—
Dacthal	9	0.66	15,000	—	13,500	—
Diuron	5	0.28	355	26	80	160
MCPA	1	0.22	380	12,000	90	11,000
Methomyl	2	0.24	265	57	4.4	0.4
Metolachlor	2	0.084	1,950	780	12,550	—
Pendimethalin	3	0.13	69	6.3	140	14.5
Total detections	29					

Table 4. Coates Drain detections (CD-1)

Site		Highest	Acute	Chronic	Acute	Chronic
CD-1		Detection ug/L	Fish ug/L	Fish ug/L	Invert. ug/L	Invert. ug/L
Bromacil	1	0.76	18,000	—	60,500	—
Dacthal	4	0.22	15,000	—	13,500	—
Dicamba	2	4.7	14,000	—	17,300	—
Diuron	2	0.64	355	26	80	160
Methomyl	1	0.15	265	57	4.4	0.4
Pendimethalin	1	0.16	69	6.3	140	14.5
Triclopyr	1	0.14	180	104,000	850	80,700
Total detections	12					

Table 5. Succor Creek upstream detections (SC-2).

Site		Highest	Acute	Chronic	Acute	Chronic
SC-2		Detection ug/L	Fish ug/L	Fish ug/L	Invert. ug/L	Invert. ug/L
Bromacil	1	0.055	18,000	—	60,500	—
Carbaryl	1	0.069	125	210	2.55	1.5
Dacthal	8	0.56	15,000	—	13,500	—
Methomyl	1	0.14	265	57	4.4	0.4
Total detections	11					

Conclusions

Of the 123 detections the herbicide Dacthal had the highest number of detections (44) which indicates its ability to migrate from the area of application into surface waters. It also has been detected by ISDA in ground water within the study area. Dacthal is considered relatively non-toxic to fish and invertebrates. The presence of Dacthal may indicate that other more toxic pesticide may find their way into surface water and care must be exercised when applying pesticides.

Methomyl, which is an insecticide, was detected at SGC-1 and SC-1 at a level that was greater than fifty percent of the recommended chronic invertebrate concentration. Given the toxicity of Methomyl, levels at fifty percent of the chronic invertebrate concentration could lead ISDA to consider this insecticide as a pesticide of concern (POC).

Although the number of detections (123) were high, the majority of the pesticides found were herbicides which have a much higher fish and macroinvertebrate toxicity concentration threshold than insecticides.