Idaho State Department of Agriculture
Surface Water Pesticide Fact Sheet
Lower Boise River, 2017

ISDA Surface Water Fact Sheet

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In 2017, the Idaho State Department of Agriculture (ISDA) conducted a pesticide residue-monitoring program at five locations on the Lower Boise River (Figure 1). Three locations on the Lower Boise River were at bridges near Parma at Hexon Road (LBR-1), near Notus at Notus Road (LBR-2), and in Caldwell at Chicago Street (LBC-1). There were two riverbank locations at Veteran's Memorial Park (LVM-1) and at Barber Park near Eckert Road (LCK-1). Due to flooding in the Boise River, monitoring was scheduled to begin on May 15, 2017, but was not initiated until June 27, 2017, after discharges decreased to below flood-stage. Samples were collected through October 18, 2017. Monitoring occurred on nine sample dates on an every-other week schedule. The samples were shipped to and analyzed by the Idaho Food Quality Assurance Laboratory (IFQAL), located in Twin Falls, Idaho. Pesticide monitoring in the Lower Boise River watershed has been ongoing since 2009.

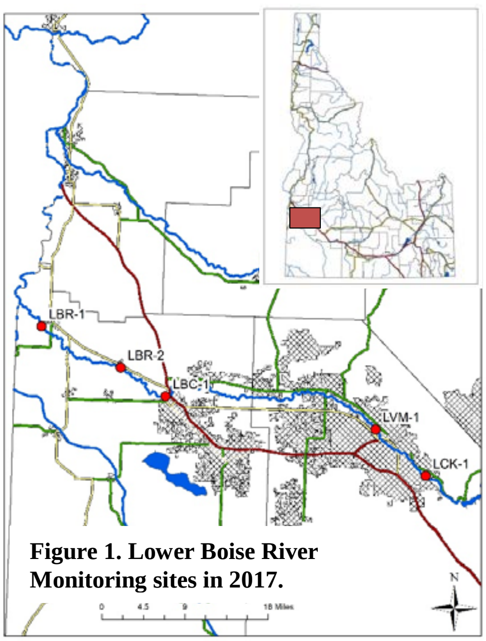

Figure 1. Lower Boise River Monitoring sites in 2017.

The Lower Boise River is considered to initiate at Lucky Peak dam, and flows approximately 64-miles through the Treasure Valley and a mix of urban and rural land-uses before terminating at the confluence with the Snake River, near Parma, Idaho. The Lower Boise River Watershed is approximately 825,600 acres and has multiple impairments to the water quality from several factors, including sediment, total phosphorus and bacteria.

This monitoring project was designed to determine if there were significant pesticide sources to the mainstem of the Boise River. Locations were selected to identify potential input source areas by comparing upstream-downstream differences. The second goal was whether there were significant urban pesticide sources between the LCK-1 and LVM-1 locations.

At the two monitoring locations within the Boise city area (LVM-1 and LCK-1), no pesticide compounds were identified during this study. The LCK-1 site was assumed not to have significant contributions upstream of this location and was monitored as the baseline location for downstream locations.

Of the six pesticide compounds identified, no pesticide was measured at high levels (Table 1 and Figure 2). The greatest concern is with Chlorpyrifos; even low-level detections can have a negative effect on aquatic insects. Chlorpyrifos concentrations were not identified at either the LBR-1 or LBR-2 locations, as was the case in 2016. This was a low level detection (0.026 µg/L – or 0.026 parts per billion) on August 23, 2017, but it was greater than half the chronic invertebrate benchmark.

Table 1. Overall Detections.

Location	Herbicide	Insecticide	Total
LBR-1	13	0	13
LBR-2	9	0	9
LBC-1	11	1	12
LVM-1	0	0	0
LCK-1	0	0	0
Total	33	1	34

The pesticide with the highest number of detections was the herbicide 2,4-D with 19. Chlorpyrifos was the only detection that was not an herbicide. 2,4-D is typically the most detected pesticide in the surface waters of Idaho. The greatest detection in the Lower Boise River Creek was 2,4-D at the LBR-1 location. This detection was at 0.29 µg/L (approximately 0.29 parts per billion), but the reference point is 299.2 µg/L and is directed at aquatic vascular plants, being that 2,4-D is an herbicide and most detrimental to vascular plants when detected in surface waters. Additionally, 2,4-D has a Drinking Water Standard (also known as a Maximum Contaminant Level [MCL]) set at 70 µg/L.

Assessment of potential impacts to the aquatic life and habitat was beyond the scope of this study. Based on the extended duration of flood-stage discharges in the Boise River in the spring of 2017, there may have been dilutional flows that led to pesticides typically identified in the river in past years not being at measurable concentrations. However, there are sufficient data to identify sub-watersheds to concentrate future monitoring.

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 US EPA Aquatic Life Benchmark. Table 2 lists the pesticides detected in 2017, the number of detections, POC detections, and whether those pesticides have historically been considered a POC in the surface waters of Idaho. The benchmarks are developed for acute and chronic effects on fish, 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.

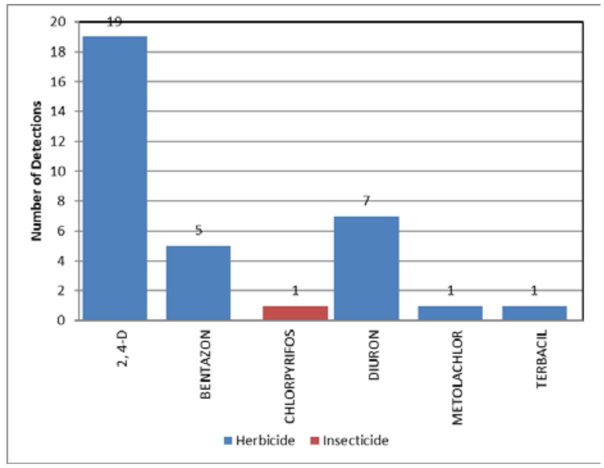

Figure 2. Pesticide detections and type.

Table 2. Lower Boise River Detections-ISDA historically identified pesticides of Concern; red font indicates POC detections in 2017.

Pesticide	Number of Detections	Type	Maximum Detection (µg/L)	ISDA POC
2, 4-D	19	Herbicide	0.290	
BENTAZON	5	Herbicide	0.170	
CHLORPYRIFOS	1	Insecticide	0.026	POC
DIURON	7	Herbicide	0.120	
METOLACHLOR	1	Herbicide	0.052	POC
TERBACIL	1	Herbicide	0.056	

Conclusions

There was one POC detection at a riverine monitoring station during this study. Chlorpyrifos is of special interest as it can be toxic to freshwater fish, and is highly toxic to aquatic invertebrates. The Chlorpyrifos insecticide was detected above the POC level, but below the chronic benchmark for invertebrates. This insecticide has been detected in the mainstem of the Boise River in previous years and is being closely monitored.

Of additional note, there were detections of Bentazon, Diuron and Metolachlor herbicides. While these detections were at levels well below any aquatic life benchmarks, these detections indicate that there is opportunity to improve the retention of these pesticides in the locations they were intended. However, these are herbicides that are regularly detected in the Boise River and are therefore of interest. Transport of pesticides from their applied location not only decreases their effectiveness, but also represents an economic loss.

There were no indications in 2017 that the Boise Urban area was a significant contributor to the overall pesticide load in the Boise River. However, snowmelt driven flood stage in the river could have diluted concentrations to below laboratory detection levels. In 2018, it is recommended that monitoring be focused to the contributing watershed between the 2017 LVM-1 and the LBC-1 locations. It is recommended that these be in the smaller tributaries to better identify potential sources and contributions to the Boise River.

There is concern that increased concentrations may lead to additional impairments to the Lower Boise River habitat and beneficial uses. However, assessment of impacts to the aquatic life and habitat was beyond the scope of this study.

Recommendations

The following items are several precautions that can be taken when applying pesticides:

- Read and follow label directions – Always follow label directions for water quality protection.
- Conduct maintenance and calibration of application equipment, match application rates to pest problem.
- Implementation of management strategies – Field scouting, evaluation of pest control needs selection of proper pesticide, irrigation management, etc.
- Implement BMPs, including conservation buffers, vegetative filter strips, sediment basins, and pump back systems.
- Avoid runoff due to weather events, excessive irrigation and check the forecast prior to pesticide applications.
- Avoid overspray and drift, do not mix and load near water.

This work could not have been completed without the support of ISDA and the US EPA, their contributions to this report were essential. A special thanks to Daniel Sandoval for his efforts to complete this project, and Elizabeth Palmateer for her review.

For additional information about this program or projects, please contact Curtis Cooper, Idaho State Department of Agriculture at (208) 332-8597 or email at WaterQuality@isda.idaho.gov