Statewide Endocrine Disrupting Compound Monitoring Study, 2007 - 2008

Addendum

January, 2010

tdr-g1-08a

This Addendum provides data on pesticide samples that were collected from the four rivers that were included in the Statewide Endocrine Disrupting Chemical Study. This data was collected as part of the Minnesota Department of Agriculture's routine surface water monitoring program. The data shown in Table MDA1 includes samples collected from the Redwood River, the Little Cobb River, the Le Sueur River, and Seven Mile Creek. Table MDA2 presents summary statistics for the chloroacetanilide degradates which were collected from the Le Sueur River and Seven Mile Creek. The pesticide data is separated into base flow and storm flow sample collection periods. The majority of the samples collected from the rivers targeted storm flow conditions since pesticide concentrations are often higher during storm flow periods. The Little Cobb and Redwood Rivers were sampled with grab samples in May and June whereas the Le Sueur River and Seven Mile Creek locations were monitored year-round in 2008 with a mixture of grab, equal-time increment composite, and equal-flow increment composite samples. For the complete dataset and further discussion, please refer the *Minnesota Department of Agriculture 2008 Water Quality Monitoring Report* available at http://www.mda.state.mn.us/monitoring.

Common Name	Туре	MRL (ug/L)
Acetochlor	Herbicide	0.05
Alachlor	Herbicide	0.05
Atrazine	Herbicide	0.05
Boscalid	Fungicide	0.30
Chlorpyrifos	Insecticide	0.04
Cyanazine	Herbicide	0.20
De-ethyl Atrazine	Metabolite	0.05
De-isopropyl atrazine	Metabolite	0.20
Diazinon	Insecticide	0.12
Dimethenamid	Herbicide	0.05
Dimethoate	Insecticide	0.22
EPTC	Herbicide	0.23
Fonofos	Insecticide	0.10
Malathion	Insecticide	0.09
Metolachlor	Herbicide	0.07
Metribuzin	Herbicide	0.10
Metribuzin DA	Metabolite	1.00
Metribuzin DADK	Metabolite	1.00
Metribuzin DK	Metabolite	1.00
Methyl Parathion	Insecticide	0.12
Myclobutanil	Fungicide	0.20
Pendimethalin	Herbicide	0.08
Phorate	Insecticide	0.12
Propiconazole	Fungicide	0.20
Tebucanazole	Fungicide	0.20
Tebuprimiphos	Fungicide	0.10
Terbufos	Insecticide	0.19
Tetraconazole	Fungicide	0.15
Trifluralin	Herbicide	0.17

Appendix A1: Base Neutral Pesticide List.

Appendix A2: Chloroacetanilide Degradates Analyte List.

Compound	Туре	MRL (ug/L)
Acetochlor ESA	Acetochlor Degradate	0.07
Acetochlor OXA	Acetochlor Degradate	0.07
Alachlor ESA	Alachlor Degradate	0.07
Alachlor OXA	Alachlor Degradate	0.07
Dimethenamid ESA	Dimethenamid Degradate	0.07
Dimethenamid OXA	Dimethenamid Degradate	0.07
Metolachlor ESA	Metolachlor Degradate	0.07
Metolachlor OXA	Metolachlor Degradate	0.07

Redwood River 2008 Base Neutral Pesticides	Total n	Total Detects	Total % Detects	Total Max (ug/L)	Total Median (ug/L)	Base flow n	Base flow Detects	Base flow % Detects	Base flow Max (ug/L)	Base flow Median (ug/L)	Storm flow n	Storm flow Detects	Storm flow % Detects	Storm flow Max (ug/L)	Storm flow Median (ug/L)
Acetochlor	4	4	100	0.21	Р	2	2	100	Р	Р	2	2	100	0.21	0.11
Atrazine	4	4	100	Р	Р	2	2	100	Р	Р	2	2	100	Р	Р
Boscalid	4	1	25	Р	nd	2	0	0	nd	nd	2	1	50	Р	Р
Deethylatrazine	4	4	100	Р	Р	2	2	100	Р	Р	2	2	100	Р	Р
Metolachlor	4	3	75	Р	Р	2	1	50	Р	Р	2	2	100	Р	Р
Little Cobb River 2008 Base Neutral Pesticides	Total n	Total Detects	Total % Detects	Total Max (ug/L)	Total Median (ug/L)	Base flow n	Base flow Detects	Base flow % Detects	Base flow Max (ug/L)	Base flow Median (ug/L)	Storm flow n	Storm flow Detects	Storm flow % Detects	Storm flow Max (ug/L)	Storm flow Median (ug/L)
Acetochlor	3	2	67	0.38	Р	-	-	-	-	-	3	2	67	0.38	Р
Atrazine	3	1	33	0.08	nd	1	-	-	-	-	3	1	33	0.08	nd
Deethylatrazine	3	2	67	Р	Р	1	-	-	-	-	3	2	67	Р	Р
Dimethenamid	3	2	67	Р	Р	-	-	-	-	-	3	2	67	Р	Р
Metolachlor	3	2	67	Р	Р	-	-	-	-	-	3	2	67	Р	Р
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2008 Base Neutral Pesticides	Total n	Total Detects	Total % Detects	Max (ug/L)	Median (ug/L)	flow n	flow Detects	Base flow % Detects	flow Max (ug/L)	flow Median (ug/L)	Storm flow n	flow Detects	flow % Detects	flow Max (ug/L)	flow Median (ug/L)
2008 Base Neutral Pesticides Acetochlor	Total n 21	Total Detects	I otal % Detects 67	I otal Max (ug/L)2.05	P P P P P P P P P P P P P P P P P P P	flow n 7	Base flow Detects	Base flow % Detects	flow Max (ug/L) nd	flow Median (ug/L) nd	Storm flow n	flow Detects	flow % Detects	flow Max (ug/L) 2.05	flow Median (ug/L) 0.17
Le Sueur River 2008 Base Neutral Pesticides Acetochlor Atrazine	Total n 21 21	Total Detects	I otal % Detects	I otal Max (ug/L) 2.05 0.66	P P	flow n 7 7	Base flow Detects 0 4	Base flow % Detects 0 57	flow Max (ug/L) nd 0.1	flow Median (ug/L) nd P	Storm flow n 14 14	StormflowDetects1414	Stormflow %Detects100100	flow Max (ug/L) 2.05 0.66	flow Median (ug/L) 0.17 P
Le Sueur River 2008 Base Neutral Pesticides Acetochlor Atrazine Deethylatrazine	Total n 21 21 21	Total Detects141817	I otal % Detects 67 86 81	I otal Max (ug/L) 2.05 0.66 0.16	P P P	Base flow n 7 7 7	Base flow Detects 0 4 3	Baseflow %Detects05743	flow Max (ug/L) nd 0.1 0.16	flow Median (ug/L) nd P nd	Storm flow n 14 14 14	StormflowDetects141414	Storm flow % Detects 100 100 100	flow Max (ug/L) 2.05 0.66 0.06	flow Median (ug/L) 0.17 P P
Le Sueur River 2008 Base Neutral Pesticides Acetochlor Atrazine Deethylatrazine Dimethenamid	Total 21 21 21 21 21	Total Detects 14 18 17 13	Iotal % Detects 67 86 81 62 62	Iotal Max (ug/L) 2.05 0.66 0.16 0.21	P P P P P	Base flow n 7 7 7 7 7 7 7	Base flow Detects 0 4 3 0	Base flow % Detects 0 57 43 0	flow Max (ug/L) nd 0.1 0.16 nd	flow Median (ug/L) nd P nd nd	Storm flow n 14 14 14 14 14 14	Storm flow Detects 14 14 14 14 13	Storm flow % Detects 100 100 100 100 93 93	flow Max (ug/L) 2.05 0.66 0.06 0.21	flow Median (ug/L) 0.17 P P P
Le Steur River 2008 Base Neutral Pesticides Acetochlor Atrazine Deethylatrazine Dimethenamid Metolachlor	Total n 21 21 21 21 21 21 21	Total Detects 14 18 17 13 19	Iotal % Detects 67 86 81 62 90	Iotal Max (ug/L) 2.05 0.66 0.16 0.21 1.54	P P P P P P P 0.10	Base flow n 7 7 7 7 7 7 7 7 7	Base flow Detects 0 4 3 0 5	Base Base flow % Detects 0 57 43 0 71 1	flow Max (ug/L) nd 0.1 0.16 nd	flow Median (ug/L) nd P nd nd P	Storm flow n 14 14 14 14 14 14 14 14	Storm flow flow Detects 14 14 14 13 14 14	Storm flow % Detects 100 100 100 100 93 100	flow Max (ug/L) 2.05 0.66 0.06 0.21 1.54	flow Median (ug/L) 0.17 P P P 0.15
Le Steur River 2008 Base Neutral Pesticides Acetochlor Atrazine Deethylatrazine Dimethenamid Metolachlor Prometon	Total n 21 21 21 21 21 21 21 21	Total Detects 14 18 17 13 19 1	Iotal % Detects 67 86 81 62 90 5 5	Iotal Max (ug/L) 2.05 0.66 0.16 0.21 1.54 P	P P P P O.10 nd	Base flow n 7 7 7 7 7 7 7 7 7 7 7	Base flow Detects 0 4 3 0 5 1 1	Base Base flow % Detects 0 57 43 0 71 14	flow Max (ug/L) nd 0.1 0.16 nd P P P	flow Median (ug/L) nd P nd nd P nd	Storm 14 14 14 14 14 14 14 14 14 14	Storm flow flow Detects 14 14 14 13 14 0	Storm flow % Detects 100 100 100 100 93 100 0 0 0	flow Max (ug/L) 2.05 0.66 0.06 0.21 1.54 nd	flow Median (ug/L) 0.17 P P P 0.15 Nd
Le Steur River 2008 Base Neutral Pesticides Acetochlor Atrazine Deethylatrazine Dimethenamid Metolachlor Prometon Seven Mile Creek 2008 Base Neutral Pesticides	Total n 21 21 21 21 21 21 21 21 21 21 21 21 21	Total Detects 14 18 17 13 19 1 Total Detects	Iotal % Detects 67 86 81 62 90 5 Total % Detects	Iotal Max (ug/L) 2.05 0.66 0.16 0.21 1.54 P Total Max (ug/L)	Median (ug/L) P P P 0.10 nd Total Median (ug/L)	flow n 7 7 7 7 7 7 7 7 8 ase flow n	Base flow Detects 0 4 3 0 5 1 Base flow Detects	Base flow % Detects 0 57 43 0 71 14 Base flow % Detects	flow Max (ug/L) nd 0.1 0.16 nd P P Base flow Max (ug/L)	flow Median (ug/L) nd P nd P nd Base flow Median (ug/L)	Storm flow n 14 14 14 14 14 14 14 14 14 14 14 14 14 14 14 14 14 14 14 14 14 14	Storm flow flow Detects 14 14 13 14 0 Storm flow Detects	Storm flow % Detects 100 100 100 100 93 100 0 Storm flow % Detects	flow Max (ug/L) 2.05 0.66 0.21 1.54 nd Storm flow Max (ug/L)	flow Median (ug/L) 0.17 P P 0.15 Nd Storm flow Median (ug/L)
Le Stieur River 2008 Base Neutral Pesticides Acetochlor Atrazine Deethylatrazine Dimethenamid Metolachlor Prometon Seven Mile Creek 2008 Base Neutral Pesticides	Total n 21 21 21 21 21 21 21 21 21 21 21 21 21 21 21 21 15	Total Detects 14 18 17 13 19 1 Total Detects 9	Iotal % Detects 67 86 81 62 90 5 Total % Detects 60 60	Iotal Max (ug/L) 2.05 0.66 0.16 0.21 1.54 P Total Max (ug/L) 0.12	Iotal Median (ug/L) P P P 0.10 nd Total Median (ug/L) P	Base flow n 7 7 7 7 7 7 7 8ase flow n 6	Base flow Detects 0 4 3 0 5 1 Base flow Detects 0	Base Base flow % Detects 0 57 43 0 71 14 Base flow % Detects 0	flow Max (ug/L) nd 0.1 0.16 nd P Base flow Max (ug/L) nd	flow Median (ug/L) nd P nd P nd Base flow Median (ug/L) nd	Storm flow n 14 14 14 14 14 14 14 14 14 14 14 9	Storm flow flow Detects 14 14 13 14 0 Storm flow Detects 9 9	Storm flow % Detects 100 100 100 93 100 0 Storm flow % Detects 100	flow Max (ug/L) 2.05 0.66 0.06 0.21 1.54 nd Storm flow Max (ug/L) 0.12	flow Median (ug/L) 0.17 P P P 0.15 Nd Storm flow Median (ug/L) P
Le Steur River 2008 Base Neutral Pesticides Acetochlor Atrazine Deethylatrazine Dimethenamid Metolachlor Prometon Seven Mile Creek 2008 Base Neutral Pesticides Acetochlor Atrazine	Total n 21 21 21 21 21 21 15 15	Total Detects 14 18 17 13 19 1 Total Detects 9 14	Iotal % Detects 67 86 81 62 90 5 Total % Detects 60 93	Iotal Max (ug/L) 2.05 0.66 0.16 0.21 1.54 P Total Max (ug/L) 0.12 0.09	Iotal Median (ug/L) P P P O.10 nd Total Median (ug/L) P P	Base flow n 7 7 7 7 7 7 7 8ase flow n 6 6 6	Base flow 0 4 3 0 5 1 Base flow Detects 0 5 1 Base flow 0 5 1	Base Base flow % Detects 0 57 43 0 71 14 Base flow % Detects 0 833 0	flow Max (ug/L) nd 0.1 0.16 nd P P Base flow Max (ug/L) nd P	flow Median (ug/L) nd P nd P nd Base flow Median (ug/L) nd P	Storm flow n 14 14 14 14 14 14 14 14 14 9 9 9 9 9	Storm flow flow Detects 14 14 13 14 0 Storm flow Detects 9 9 9 9	Storm flow % Detects 100 100 100 100 93 100 0 Storm flow % Detects 100 0 Storm flow % Detects 100 100 100	flow Max (ug/L) 2.05 0.66 0.21 1.54 nd Storm flow Max (ug/L) 0.12 0.09	flow Median (ug/L) 0.17 P P P 0.15 Nd Storm flow Median (ug/L) P P
Le Stieur River 2008 Base Neutral Pesticides Acetochlor Atrazine Deethylatrazine Dimethenamid Metolachlor Prometon Seven Mile Creek 2008 Base Neutral Pesticides Acetochlor Atrazine Deethylatrazine	Total n 21 21 21 21 21 21 21 15 15 15	Total Detects 14 18 17 13 19 1 Total Detects 9 14 13	Iotal % Detects 67 86 81 62 90 5 Total % Detects 60 93 87	Total Max (ug/L) 2.05 0.66 0.16 0.21 1.54 P Total Max (ug/L) 0.12 0.09 P	Total Median (ug/L) P P P 0.10 nd Total Median (ug/L) P P	Base flow n 7 7 7 7 7 7 8 flow n 6 6 6 6	Base flow 0 4 3 0 5 1 Base flow Detects 0 5 1 Base flow Detects 0 5 5 5	Base flow % Detects 0 57 43 0 71 14 Base flow % Detects 0 83 83	flow Max (ug/L) nd 0.1 0.1 nd P Base flow Max (ug/L) nd P nd P	flow Median (ug/L) nd P nd P nd Base flow Median (ug/L) nd P nd	Storm 14 14 14 14 14 14 14 14 14 9 9 9 9 9 9 9 9	Storm flow Detects 14 14 14 13 14 0 Storm flow Detects 9 9 8 8	Storm flow % Detects 100 100 100 100 93 100 93 100 0 Storm flow % Detects 100 0 89	flow Max (ug/L) 2.05 0.66 0.21 1.54 nd Storm flow Max (ug/L) 0.12 0.09 P	flow Median (ug/L) 0.17 P P P 0.15 Nd Storm flow Median (ug/L) P P P
Le Steur River 2008 Base Neutral Pesticides Acetochlor Atrazine Deethylatrazine Dimethenamid Metolachlor Prometon Seven Mile Creek 2008 Base Neutral Pesticides Acetochlor Acetochlor Dimethenamid Dimethenamid	Total n 21 21 21 21 21 21 5 15 15 15 15 15	Total Detects 14 18 17 13 19 1 Total Detects 9 14 13 8	Total % Detects 67 86 81 62 90 5 Total % Detects 60 93 87 53	Total Max (ug/L) 2.05 0.66 0.16 0.21 1.54 P Total Max (ug/L) 0.12 0.09 P 0.05	Total Median (ug/L) P P P 0.10 nd Total Median (ug/L) P	Base flow n 7 7 7 7 7 7 7 8ase flow n 6 6 6 6 6 6 6	Base flow 0 4 3 0 5 1 Base flow Detects 0 5 1 Base flow Detects 0 5 1	Base flow % Detects 0 57 43 0 71 14 Base flow % Detects 0 83 83 17 17 14	flow Max (ug/L) nd 0.1 0.16 nd P Base flow Max (ug/L) nd P P P P P	flow Median (ug/L) nd P nd P nd Base flow Median (ug/L) nd P nd P nd	Storm 14 14 14 14 14 14 14 14 14 9 9 9 9 9 9 9 9 9 9 9 9	Storm flow Detects 14 14 14 13 14 0 Storm flow Detects 9 9 8 7	Storm flow % Detects 100 100 100 93 100 93 100 93 100 93 100 93 100 0 Storm flow % Detects 100 100 89 78	flow Max (ug/L) 2.05 0.66 0.21 1.54 nd Storm flow Max (ug/L) 0.12 0.09 P 0.05	flow Median (ug/L) 0.17 P P 0.15 Nd 0.15 Nd Storm flow Median (ug/L) P P P P

Table MDA1. Summary statistics for base neutral pesticide compounds detected at each site.

*P (present) indicates compound detected at levels below method reporting limit (Appendix A1). *nd indicates compounds were not detected

Le Sueur River 2008 Chloroacetanilide Degradates	Total n	Total Detects	Total % Detects	Total Max (ug/L)	Total Median (ug/L)	Base flow n	Base flow Detects	Base flow % Detects	Base flow Max (ug/L)	Base flow Median (ug/L)	Storm flow n	Storm flow Detects	Storm flow % Detects	Storm flow Max (ug/L)	Storm flow Median (ug/L)
Acetochlor ESA	15	13	87	1.10	0.54	6	4	67	0.29	0.18	9	9	100	1.10	0.63
Acetochlor OXA	15	13	87	1.08	0.37	6	4	67	0.14	0.09	9	9	100	1.08	0.44
Alachlor ESA	15	15	100	0.31	0.16	6	6	100	0.23	0.15	9	9	100	0.31	0.17
Alachlor OXA	15	1	7	0.16	nd	6	0	0	nd	nd	9	1	11	0.16	nd
Dimethenamid ESA	15	1	7	0.10	nd	6	0	0	nd	nd	9	1	11	0.10	nd
Dimethenamid OXA	15	1	7	0.08	nd	6	0	0	nd	nd	9	1	11	0.08	nd
Metolachlor ESA	15	15	100	1.29	0.95	6	6	100	0.81	0.49	9	9	100	1.29	1.12
Metolachlor OXA	15	12	80	0.90	0.24	6	3	50	0.13	Р	9	9	100	0.90	0.31
Seven Mile Creek 2008 Chloroacetanilide Degradates	Total n	Total Detects	Total % Detects	Total Max (ug/L)	Total Median (ug/L)	Base flow n	Base flow Detects	Base flow % Detects	Base flow Max (ug/L)	Base flow Median (ug/L)	Storm flow n	Storm flow Detects	Storm flow % Detects	Storm flow Max (ug/L)	Storm flow Median (ug/L)
Acetochlor ESA	6	4	67	0.43	0.12	5	3	60	0.25	0.10	1	1	100	0.43	0.43
Acetochlor OXA	6	2	33	0.19	0	5	1	20	0.07	nd	1	1	100	0.19	0.19
Alachlor ESA	6	6	100	0.38	0.27	5	5	100	0.38	0.28	1	1	100	0.19	0.19
Metolachlor ESA	6	6	100	1.68	1.16	5	5	100	1.68	0.98	1	1	100	1.52	1.52
Metolachlor OXA	6	3	50	0.24	Р	5	2	40	0.09	nd	1	1	100	0.24	0.24

Table MDA2. Summary statistics for chloroacetanilide pesticide compounds detected at each site.

*P (present) indicates compound detected at levels below method reporting limit (Appendix A2).

*nd indicates compounds were not detected

Minnesota Rule Chapter 7050 includes water quality standards (acute and chronic standards) for protection of aquatic life and human health for acetochlor, atrazine, and metolachlor. None of the measured concentrations of pesticides exceeded water quality standards during this study. However, the LeSueur River is listed as impaired for acetochlor due to high concentrations in previous years. For more details, please see Minnesota Impaired Waters and Total Maximum Daily Loads Web page at http://pca.state.mn.us/water/tmd//index.html)