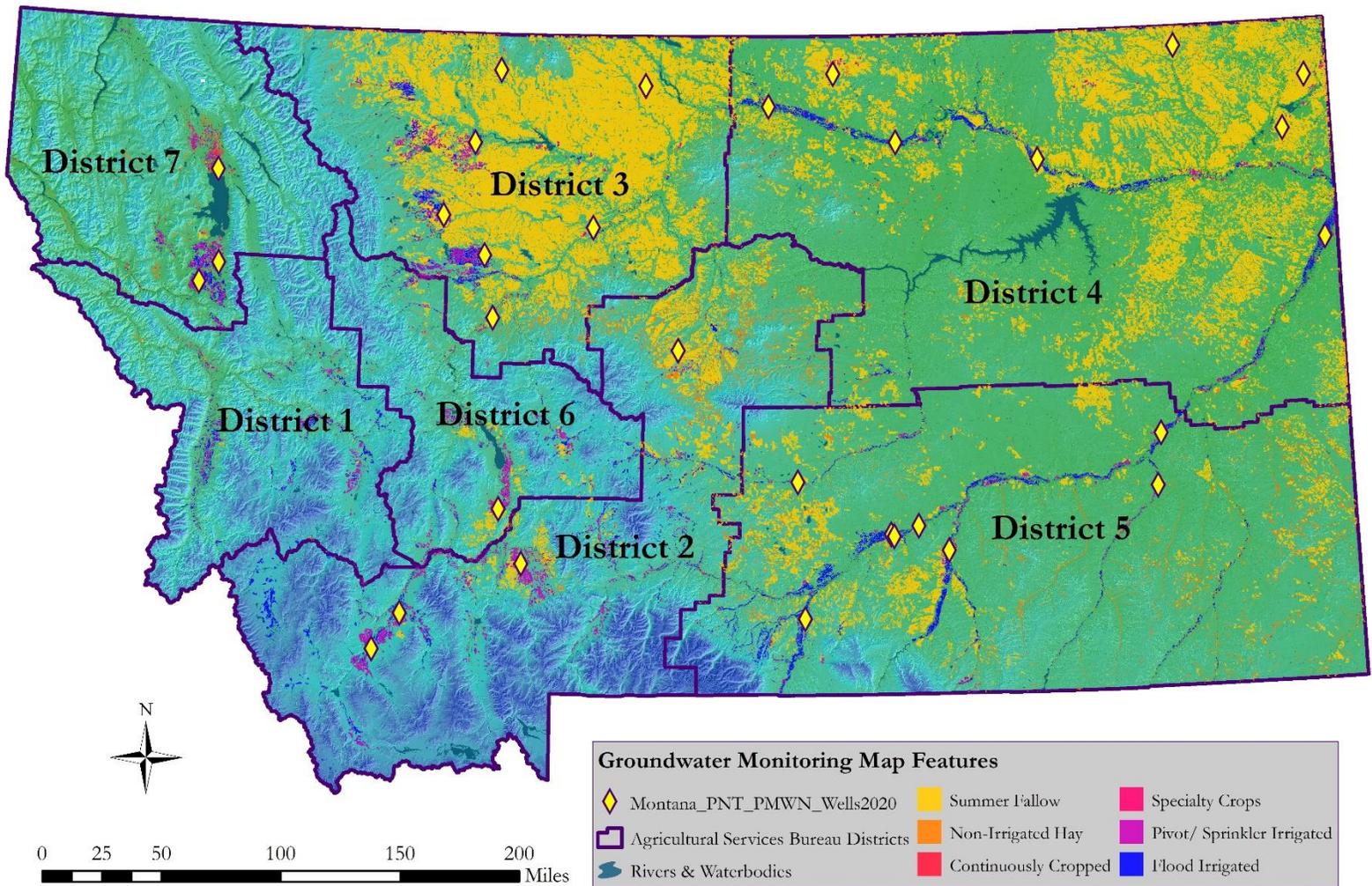


Groundwater Protection Program



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Montana Department of Agriculture, Groundwater Protection Program 2020 Monitoring Locations



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During the 2020 sampling season, the Groundwater Protection Program (GWPP) collected water samples from 26 permanent groundwater monitoring wells and 5 Montana Salinity Control Association groundwater monitoring wells. All wells were sampled in May, June and September. In total, 129 samples were collected and analyzed for up to 108 pesticides and pesticide metabolites. Results are summarized in the following tables by region. No pesticide detections exceeded the respective drinking water standard, or the action threshold of 50% of the respective drinking water standard. In general, most samples were < 5 % of the respective drinking water standard.

District 2

Analyte	Number of Detections	Average Detected Concentration (ppb)	Drinking Water Standard (ppb)
Clothianidin	1	0.016	650
Flucarbazone	3	0.006	3,000 (sum parent + metabolite)
Imazamethabenz	3	0.013	1,700 (sum parent + metabolite)
Imidacloprid	1	0.004	380
Pinoxaden	2	0.007	2,000 (sum parent + metabolite)
Prometon	4	0.005	100
Sulfosulfuron	2	0.006	1,600

District 3

Analyte	Number of Detections	Average Detected Concentration (ppb)	Drinking Water Standard (ppb)
Clopyralid	1	0.220	1,000
Imazamethabenz	6	0.006	1,700 (sum parent + metabolite)
Imidacloprid	3	0.003	380
Pinoxaden	5	0.118	2,000 (sum parent + metabolite)
Prometon	2	0.002	100
Pyrasulfotole	3	0.183	70
Pyroxulam	3	0.024	7,000

District 4

Analyte	Number of Detections	Average Detected Concentration (ppb)	Drinking Water Standard (ppb)
Flucarbazone	5	0.013	3,000 (sum parent + metabolite)
Imazethapyr	2	0.005	17,000
Pinoxaden	2	0.005	2,000 (sum parent + metabolite)

District 5

Analyte	Number of Detections	Average Detected Concentration (ppb)	Drinking Water Standard (ppb)
2,4-D	1	2.400	70 (sum parent + metabolite)
Alachlor	5	0.061	2 (sum parent + metabolite)
Atrazine	3	0.040	3 (sum parent + metabolite)
Bentazon	3	0.006	210
Bromacil	1	0.006	700
Clopyralid	1	2.900	1,000
Clothianidin	8	0.009	650
Fluroxypyr	2	3.575	7,000
Imazethapyr	3	0.004	17,000
Metalaxyl	1	0.009	400
Metolachlor	16	0.030	1,000 (sum parent + metabolite)
Pinoxaden	6	0.519	2,000 (sum parent + metabolite)
Prometon	3	0.002	100
Propiconazole	1	1.200	700
Pyrasulfotole	3	0.038	70
Simazine	2	0.006	4
Thiamethoxam	2	0.035	80

District 6

Analyte	Number of Detections	Average Detected Concentration (ppb)	Drinking Water Standard (ppb)
Atrazine	3	0.018	3 (sum parent + metabolite)
Imazamethabenz	3	0.005	1,700 (sum parent + metabolite)
Imazamox	1	0.009	20,000

District 7

Analyte	Number of Detections	Average Detected Concentration (ppb)	Drinking Water Standard (ppb)
Bentazon	1	0.010	210
Imazamethabenz	3	0.070	1,700 (sum parent + metabolite)
Metolachlor	3	2.873	1,000 (sum parent + metabolite)

Analyte Glossary

2,4-D:

2,4-D is a selective systemic herbicide with a wide variety of uses, which include ornamental lawns and turf, rights-of-way, range and pasture, forest management areas, and several crops including corn and small grains. It is highly soluble in water, non-volatile and has a low potential to leach to groundwater based on its chemical properties. It is non-persistent in soil but may persist in aquatic systems under certain conditions.

Alachlor:

Alachlor is a selective systemic herbicide absorbed by germinating plant shoots. Alachlor is labeled for crop use in beans, corn, and sorghum. It can be applied via soil or water treatment, or aerial application. Alachlor tends to break down easily in the environment and is somewhat mobile; however Alachlor ESA (ethane sulfonic acid) and OA (oxanilic acid) are stable metabolites which easily leach through soils.

Atrazine:

Atrazine is a restricted use selective systemic herbicide that is used on sorghum and corn in foliar and soil applications. It can also be used in some ornamental turf applications and has previously been labeled for use on roadsides. Atrazine and its degradants tend to be persistent in the environment and have moderate to high leachability in soils.

Bentazon:

Bentazon is a contact herbicide that is used for post-emergence control of annual weeds in several crops and can also be used in non-crop areas. Crop sites include beans, peas, sorghum, and corn, and non-crop sites include ornamentals and turf, rights-of-way, and roadsides. Bentazon is stable in water but tends to break down in soils. It is highly soluble in water and moderately mobile in soils.

Clopyralid:

Clopyralid is a pyridine compound and functions as a selective systemic herbicide that is absorbed through plant leaves and roots. It is labeled for non-crop uses, including fallow land, roadsides, rights-of-way, pasture, rangeland, and CRP lands. Clopyralid is a persistent herbicide that may remain active in animal manure or compost and does not break down readily in the environment. It has a high solubility and is highly leachable to groundwater. It can be persistent in both soil and water systems depending upon conditions.

Clothianidin:

Clothianidin is an insecticide used to control sucking and chewing pests. It is registered for use in corn, potatoes, canola, and small grains and may be applied via seed treatment. Clothianidin is also registered for use in some indoor products, some products for use on specific vegetables and fruits, and in some products for use on turf and ornamentals. It is moderately soluble and can accumulate in both soil and water.

Flucarbazone:

Flucarbazone is an herbicide that is absorbed through roots and foliage and can be translocated in plants. Flucarbazone is labeled predominantly for use in wheat but can also be used in ornamental turf and some specific grasses. It is highly soluble and very leachable in soils. It is not persistent in soil, but it can be very persistent in water.

Fluroxypyr:

Fluroxypyr is a post-emergence, foliar herbicide used control broadleaf weeds in cereals, fallow land, and on-farm noncropland. Fluroxypyr is very soluble with moderate leaching potential, and it can be persistent in water.

Imazamethabenz:

Imazamethabenz is a selective, systemic herbicide labeled for use in wheat, barley, and sunflowers. It is highly soluble in water, leachable in soil, and tends to be persistent in both soil and water.

Analyte Glossary

Imazamox:

Imazamox is a post-emergence herbicide used to control broadleaved plants. It is a contact herbicide with residual activity. Imazamox is labeled for use in some crops including small grains, lentils, sunflowers, canola, and alfalfa, and for non-crop applications including rights-of-way, industrial areas, and some aquatic environments. It is highly soluble and leachable and tends to be persistent in most soil and water environments.

Imazethapyr:

Imazethapyr is a systemic herbicide with contact and residual activity. It is registered for use in many crop applications, including beans, peas, alfalfa, lentils, corn, and some grasses. It can be applied soil or foliar treatment at several sites. Imazethapyr is persistent in the environment, highly leachable in soils, and may be subject to particle-bound transport.

Imidacloprid:

Imidacloprid is a synthetic, neonicotinoid insecticide. It is labeled for use with foliar and soil applications and seed treatments in several crops, ornamental plants, turf, trees, and greenhouses. Imidacloprid is very soluble and leachable, and tends to be stable and relatively persistent in most soil and water environments.

Metalaxyl:

Metalaxyl is a systemic fungicide. It is registered for use by foliar and soil treatments to several ornamental plants and in greenhouse and nursery settings. It is also labeled for use in many crop seed treatments and soil applications. Metalaxyl is highly soluble and leachable and tends to be persistent in most soil and water environments.

Metolachlor:

Metolachlor is a selective herbicide that inhibits seed germination and mitosis. Metolachlor can be used on ornamental turf and some containerized plants, but is commonly used in crops such as corn, sorghum, and some beans and peas. Metolachlor ESA (ethane sulfonic acid) and OA (oxanilic acid) tend to be very leachable in soil and more persistent than its parent compound.

Pinoxaden:

Pinoxaden is a post emergence herbicide for the control of several grass weed species in all varieties of spring wheat (excluding durum), winter wheat, and barley. Pinoxaden is persistent and mobile in the environment and has the potential to reach aquatic environments and organisms via sheet and channel run-off, discharged groundwater into surface waters, and spray drift from either ground or aerial spray application.

Prometon:

Prometon is a herbicide used on non-crop land such as industrial sites, railroad rights-of-way, around farm buildings, or other places where long term weed control is desired. Prometon is not persistent in soils but highly persistent in water. It is also highly soluble and highly leachable.

Propiconazole:

Propiconazole is a systemic fungicide with both systemic and curative action. Propiconazole is registered for use on a wide variety of agricultural crops, ornamental and turf, and nursery sites. Crop sites include mint, corn, beans, wheat, oats, cherries, and blueberries. Propiconazole is persistent in both soil and water. It should not readily leach through soil, but it does have a high potential for particle-bound transport in water.

Pyrasulfotole:

Pyrasulfotole is a selective herbicide registered for use on cereal grains and is commonly used in wheat and barley. Pyrasulfotole is more persistent in water than in soil, highly leachable in soils and very mobile in surface water runoff.

Analyte Glossary

Pyroxsulam:

Pyroxsulam is a post-emergence herbicide used to control annual grass and broad-leaved weeds. It is registered for use in wheat, as well as lawns and ornamental areas. It may also be used as a soil treatment in yards and roadways. It is persistent in water, but it has low leachability. It has low residual effect but some potential for building up in populations of prey species, such as insects

Simazine:

Simazine is a systemic triazine herbicide chemically related to atrazine. It is labeled for use in agricultural, nursery, forests, ornamental turf, and non-crop settings. It is commonly used in corn and rights-of-way. Simazine can accumulate in soil over time if applied repeatedly and is somewhat mobile in soils and moderately persistent in water.

Thiamethoxam:

Thiamethoxam is an insecticide used to control a wide range of pests including aphids, whiteflies, thrips, mealybugs, wireworms and ground beetles. It is registered for use on crop and ornamental plants, including wheat, corn, sugar beets, beans, cherries, and turf. Thiamethoxam is highly soluble and leachable and can be persistent in water.