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National Pesticides Monitoring and Surveillance Network

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Program Overview

Canadian's are universally concerned about the quality of our water resources. Pesticides have been identified as one of the fifteen key threats ([Threats to Sources of Drinking Water and Aquatic Ecosystem Health in Canada](#)) to Canadians freshwater quality, with a National pesticides surveillance and monitoring program identified as a key need. The National Pesticides Monitoring and Surveillance Network was established in 2003 to study, evaluate and report on pesticides and their transformation products to support Environment Canada's freshwater ecosystem approach to watershed management. The Program also generates relevant data, information and advice that are considered by the Pesticide Management Regulatory Agency in carrying out its regulatory mandate for pest control products under the *Pest Control Products Act*.



Acts ([Environment Canada Acts, Regulations and Agreements](#)) administered by Environment Canada that have the potential to be affected by or overlap with the *Pest Control Products Act* include: the [Canadian Environmental Protection Act, 1999](#); the [Migratory Birds Convention Act](#); the [Canada Wildlife Act](#); the [Wild Animal and Plant Protection and Regulation of International and Interprovincial Trade Act](#); the [Canada Water Act](#); the [Species at Risk Act](#); and, the [Fisheries Act](#) (Section 36(3) as well as the other pollution prevention provisions of that Act). Environment Canada is therefore interested in pest management regulatory decisions as they affect its responsibilities for environmental conservation and protection, and sustainable development.



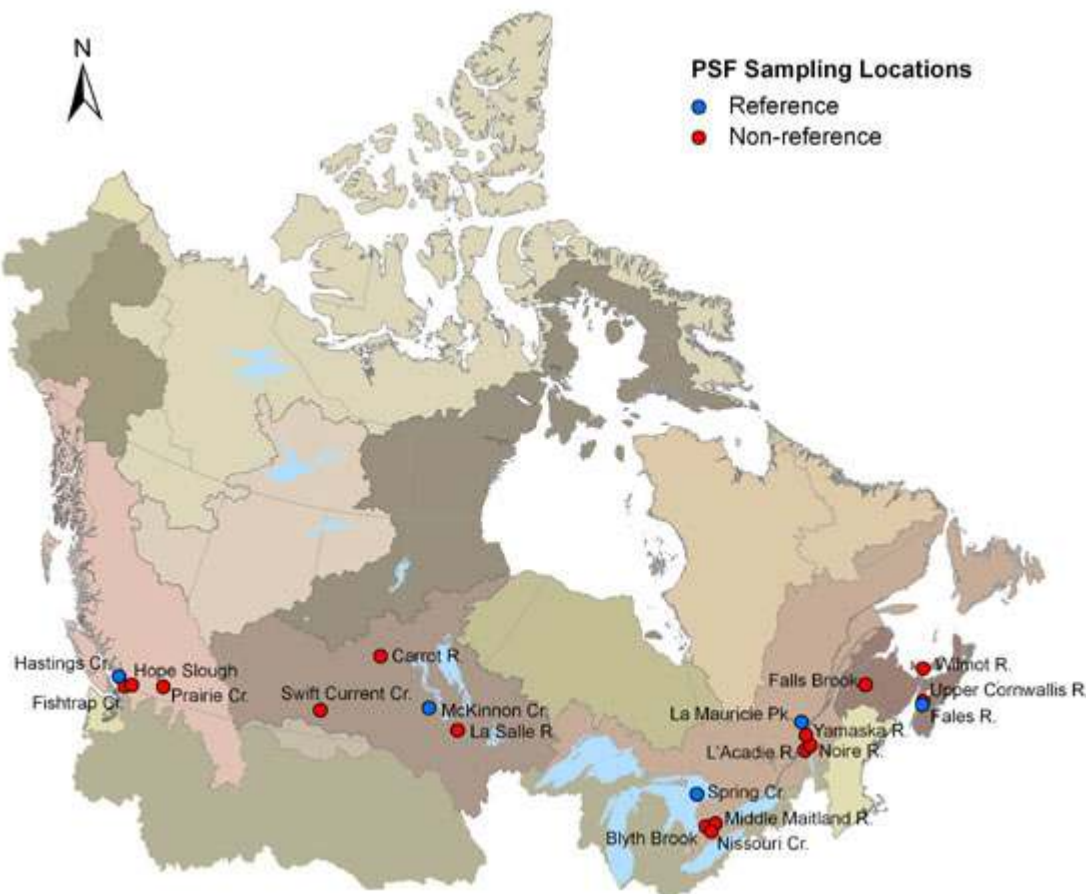
The Network operates on a rotational basis in high risk priority watersheds, and focuses on: (i) current-use pesticides undergoing risk assessment; (ii) pesticides those that have been the subject of risk management decisions; as well as, (iii) selected current-use pesticides of emerging concern. The Network is designed to be flexible, allowing for changes to site selection, parameters measured, and frequency of sampling as program results are evaluated and regulatory needs redefined.

The Program provides comprehensive, systematic and detailed information on an agreed-upon list of current-use pesticides from a national perspective, complemented by information on additional, specific pesticides of interest in selected watersheds.

During the 2010 sampling season there were twenty sites in the National Pesticides Monitoring and Surveillance Network (including five reference sites), strategically located in key watersheds across Canada (see map).

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Map of National Pesticides Surveillance sites, showing reference and non-reference locations in key watersheds across Canada for 2010 sample collections



National Pesticides Surveillance stations visited in 2010. Reference stations (Hasting Creek (BC), McKinnon Creek (MB), Spring Creek (ON), La Mauricie National Park (QC), Fales River (NS)) are shown in blue; non-reference stations (Fishtrap Creek(BC), Hope Slough (BC), Prairie Creek (BC), Swift Current River (SK), Carrot River (SK), La Salle River (MB), Blyth Brook (ON), Middle Maitland River (ON), Nissouri Creek (ON), L'Acadie River (QC), Noire River (QC), Yamaska River (QC), Falls Brook (NB), Wilmot River (PE), Upper Cornwallis River (NS)) are shown in red.

Information Management

The data are stored in a distributed system of Envirodat databases. Please refer to the Data and Products Section for information on how to access these data.

Objectives

The National Pesticides Monitoring and Surveillance Network provides information for:

- determining spatial and temporal trends of pesticides;
- evaluating pest management strategies and pest control product risk reduction measures;
- evaluating impacts to the environment of pest control products, which also contributes to environmental assessments;
- ensuring the compatibility of federal and provincial measurements;
- developing national environmental quality guidelines for current-use pest control products.

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Monitored Parameters

- **Acidic Herbicides:** Mecoprop, 2,4-D, Dicamba, Dichlorprop, MCPA, Clopyralid, Bromoxynil, Dichlorprop
- **Neutral Herbicides:** Butylate, Trifluralin, Diallylate I, Diallylate II, Simazine, d-Simazine, Atrazine, d-Atrazine, Triallate, Metribuzin, Metolachlor, Diclofop-methyl, Benzoylprop-ethyl, Ethalfluralin
- **Glyphosate and Metabolites:** Glyphosate, Glufosinate, Aminomethylphosphonic Acid [AMPA]
- **Carbamates:** Aldicarb, Carbaryl, Carbofuran, Metalaxyl, Methomyl, Oxamyl, Pirimicarb
- **Organophosphorus Pesticides:** Dibrom, Phorate, Dimethoate, Diazinon, Terbufos, Fonofos, Malathion, Chlorpyrifos, Parathion, Ethion, Phosmet, Azinphosmethyl, Disulfoton
- **Sulfonylurea and Related Herbicides:** Acifluorfen, Bensulfuron-methyl, Chlorimuron-ethyl, Chlorsulfuron, Clomazone, Diurion, Flumetsulam, Fomesafen, Linuron, Metsulfuron-methyl, Nicosulfuron, Primisulfuron-methyl, Prosulfuron, Rimsulfuron, Thifensulfuron-methyl
- **Neonicotinoids:** Imidacloprid
- **Methoprene**

The herbicides 2,4-D, mecoprop, dicamba, glyphosate and its major metabolite AMPA were most frequently detected. Using either herbicide concentrations upstream/downstream of urban centres or bromoxynil and clopyralid as surrogates for agricultural input of herbicides to streams, it was clear that environmental levels of these herbicides in urban areas were closely linked to urban use in Canada. None of the herbicides measured exceeded existing guidelines for the protection of aquatic life.

This is the first time a national survey of pesticides in urban rivers has been carried out in a consistent fashion across the country. Although it was determined that 2,4-D, mecoprop, dicamba, glyphosate and AMPA were frequently detected and linked to urban use there were some geographical differences suggesting differences in usage patterns. Some jurisdictions in Canada have recently restricted cosmetic use of pesticides and such restrictions may lead to reduced pesticide concentrations in surface waters.

Recent Publications

2010

Kuo JN, Buday C, van Aggelen G, Ikonomou MG, Pasternak J (**2010**) Acute toxicity of emamectin benzoate and its desmethyl metabolite to *Eohaustorius estuarius*. *Environ Toxicol Chem* 29, 1816-20

Kuo JN, McPherson B, Soon A, Pasternak J, Garrett C (**2010**) Environmental concentrations of methoprene and its transformation products after the treatment of Altosid(R) XR Briquets in the city of Richmond, British Columbia, Canada. *Environ Toxicol Chem* 29, 2200-5

Kurt-Karakus PB, Bidleman TF, Muir DC, Struger J, Sverko E, Cagampan SJ, Small JM, Jantunen LM (**2010**): Comparison of concentrations and stereoisomer ratios of mecoprop, dichlorprop and metolachlor in Ontario streams, 2006-2007 vs. 2003-2004. *Environ Pollut* 158, 1842-9

Kurt-Karakus PB, Muir DC, Bidleman TF, Small J, Backus S, Dove A (**2010**): Metolachlor and atrazine in the Great Lakes. *Environ Sci Technol* 44, 4678-84

2009

Gaultier J, Farenhorst A, Kim S, Saiyed I, Messing P, Cessna A, Glozier N (**2009**): Sorption-desorption of 2,4-dichlorophenoxyacetic acid by wetland sediments. *Wetlands* 29, 837-844

Woudneh MB, Ou Z, Sekela M, Tuominen T, Gledhill M (**2009a**): Pesticide multiresidues in waters of the Lower Fraser Valley, British Columbia, Canada. Part I. Surface water. J Environ Qual 38, 940-7

Woudneh MB, Ou Z, Sekela M, Tuominen T, Gledhill M (**2009b**): Pesticide multiresidues in waters of the Lower Fraser Valley, British Columbia, Canada. Part II. Groundwater. J Environ Qual 38, 948-54

2008

Byer JD, Struger J, Klawunn P, Todd A, Sverko E (**2008**): Low Cost Monitoring of Glyphosate in Surface Waters Using the ELISA Method: An Evaluation. Environmental Science & Technology 42, 6052-6057

Kurt-Karakus PB, Bidleman TF, Muir DCG, Cagampan SJ, Struger J, Sverko E, Small JM, Jantunen LM (**2008**): Chiral Current-Use Herbicides in Ontario Streams. Environmental Science & Technology 42, 8452-8458

McDaniel TV, Martin PA, Struger J, Sherry J, Marvin CH, McMaster ME, Clarence S, Tetreault G (**2008**): Potential endocrine disruption of sexual development in free ranging male northern leopard frogs (*Rana pipiens*) and green frogs (*Rana clamitans*) from areas of intensive row crop agriculture. Aquat Toxicol 88, 230-42

Struger J, Thompson D, Staznik B, Martin P, McDaniel T, Marvin C (**2008**): Occurrence of Glyphosate in Surface Waters of Southern Ontario. Bulletin of Environmental Contamination and Toxicology 80, 378-384

Tierney KB, Sampson JL, Ross PS, Sekela MA, Kennedy CJ (**2008**): Salmon olfaction is impaired by an environmentally realistic pesticide mixture. Environ Sci Technol 42, 4996-5001

2007

Donald DB, Cessna AJ, Sverko E, Glozier NE (**2007**): Pesticides in Surface Drinking-Water Supplies of the Northern Great Plains. Environ Health Perspect 115

King KC, McLaughlin JD, Gendron AD, Pauli BD, Giroux I, Rondeau B, Boily M, Juneau P, Marcogliese DJ (**2007**): Impacts of agriculture on the parasite communities of northern leopard frogs (*Rana pipiens*) in southern Quebec, Canada. Parasitology 134, 2063-2080

Struger J, Sverko E, Grabuski J, Fletcher T, Marvin C (**2007**): Occurrence and fate of methoprene compounds in urban areas of southern Ontario, Canada. Bull Environ Contam Toxicol 79, 168-71

Woudneh MB, Sekela M, Tuominen T, Gledhill M (**2007**): Acidic herbicides in surface waters of Lower Fraser Valley, British Columbia, Canada. Journal of Chromatography A 1139, 121-129

Recent Reports

Presence and Levels of Priority Pesticides in Selected Canadian Aquatic Ecosystems, 2009.

Related Links

[Chemicals Management Plan](#)

[U.S. Geological Survey: National Water-Quality Assessment Program](#)

[Health Canada's Pest Management Regulatory Agency](#)

[European Commission Environment](#)

[United States Environmental Protection Agency: Pesticides](#)

[Commission for Environmental Cooperation of North America](#)

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