An Environment Canada
Atlantic Region Newsletter
Volume 10 • Issue 1
January 2008
ISSN 1206-5455

Toxic Chemicals Update

In This Issue:

EFFECTS OF PESTICIDES ON SAND SHRIMP *CRANGON SEPTEMSPINOSA*

Many of the agricultural fields in PEI discharge runoff directly to estuarine or marine habitats. Since 2001, there has been a reduction in both the amount and sizes of sand shrimp (*Crangon septemspinosa*), being observed in fish stomachs collected in Northumberland Strait. The role that pesticides entering the estuaries of PEI might play in risks to populations of this species is being examined in a Environment Canada Pesticides Science Fund Project which is a collaborative effort between Fisheries and Oceans Canada Moncton (Fairchild) and Environment Canada Moncton (Doe).

Figure 1: Sand shrimp that inhabit coastlines along the Northumberland Strait.

The objective of this project is to determine hazards of high risk in-use pesticides used in potato production to the estuarine crustacean, the sand shrimp (*Crangon septemspinosa*) under short-term exposures, chronic exposures, and field exposure conditions using caged animals. This data will allow realistic risk analysis to be carried out on various pesticides for populations of these animals, and could lead to reduced impacts through mitigative measures like product use pattern modification to reduce overall risk.

High hazard in-use pesticides, endosulfan, deltamethrin, chlorpyrifos, chlorothalonil, mancozeb and methoprene, were chosen for study in the laboratory. Acute tests are 96-h duration and follow closely the published methods described in Burridge and Haya 1993 (Aquaculture 117:9-14). Development of methods for a chronic sublethal assay for this species were started in year one of the project, which were successful, and use small animals about 5mm in length and are 2 weeks duration. The endpoints are effects on survival and growth.

The field program began in year two of the project and employs population surveys, caged animal deployments, sample collection and analysis for pesticides.

Contact Ken Doe, Environment Canada, at 506-851-3486; or Wayne Fairchild, DFO, at 506-851-2056

SEABIRD RESEARCH IN SAGLEK

Environment Canada, Atlantic is partnering with the Royal Military College, the Nunatsiavut Government, Parks Canada, and Memorial University to re-assess the effects of PCB contamination in the marine environment at Saglek, Labrador. In July and August 2007, a field crew led by Environment Canada monitored black guillemots (a seabird) breeding in Saglek Bay and collected 35 black guillemot chicks to measure their response to PCB exposure. PCB contamination of soil and marine sediment at Saglek was first detected in the mid-1990s and came from the former US Air Force radar station and support facilities that operated there from the 1950s to the 1970s. The PCB contaminated soil was remediated from 1998 to 2004 by the Department of National Defence, and this eliminated the source of PCBs to the marine environment. Monitoring in 2006 revealed that sediment PCB levels were decreasing in Saglek Bay, particularly near the former point source at the airstrip beach. The seabird research replicates an earlier

assessment done in 1999 and 2000, which found that high PCB levels in black guillemots near the point source were adversely affecting the immune and endocrine systems and organ development in the chicks. The 2007 study will assess the effectiveness of the PCB remediation at Saglek in lowering the PCB levels in black guillemots and the extent of the adverse impacts on the health of the seabird chicks. The study will also establish a threshold for adverse effects of PCBs in this seabird species that can be applied to assessing environmental impacts of PCBs in other parts of northern Canada and other Arctic countries.

Contact Neil Burgess, Environment Canada at 709 772-4143.

Black guillemot chick (photo: CWS, Neil Burgess)

REPORT ON THE CHARACTERIZATION AND TOXICITY TESTING OF FISH PROCESSING PLANT EFFLUENT IN THE CANADA.

Canada has one of the world's most valuable commercial fishing industries. In 2002, Canada exported 620,231 tonnes of fish products, valued at $4.7 billion. Fish and fish processing is of national importance and there are over 1400 processing plants nationwide. The number of fish processing plants in Canada has grown dramatically over the last few decades from the 460 fish processing plants which were identified in 1990. Most of the fish processing plants (800) are in New Brunswick, Nova Scotia, Prince Edward Island and Newfoundland and Labrador while British Columbia has approximately 200 facilities. The province of Québec has at least 130 fish processing plants. Fish processing facilities in Canada range in size from a few employees to over one thousand employees (with the majority of large facilities located in Atlantic Canada). During 2001, 30,000 workers were employed by fish processors in Atlantic Canada.

Historically, the characterisation of the effluent from fish processing has focused mainly on a few conventional parameters such as biological oxygen demand (BOD), total suspended solids (TSS), nitrogen and oil and grease. Furthermore, only a few studies have looked at the toxicity of this type of effluent and there is virtually no information on receiving environment effects. Therefore, little is known about the overall risks of those wastes to the environment.

To enable a better understanding of fish processing and its potential impacts on the environment in Atlantic Canada, Environment Canada- Atlantic Region conducted an effluent characterization study of fish processing plants in Newfoundland, Nova Scotia, New Brunswick and Prince Edward Island, British Columbia and Québec from 2003 to 2007. Up until June 2007, 22 plants had participated in the study.

Final effluent samples from the fish processing plants were collected for toxicity testing and physical and chemical analyses. Toxicity tests performed on the samples included a Microtox™acute test, a sea urchin fertilization test, a threespine stickleback survival test, a rainbow trout acute lethality test and a seven day growth and survival test using Inland silversides. Physical and chemical analyses included: ammonia, biochemical oxygen demand, total organic carbon (TOC), total solids, TSS, hardness, total nitrogen, nitrate, nitrite, total phosphorus, conductivity, oil and grease, PCBs, organochlorine pesticides, PBDEs and, total mercury.

Comparison of loadings (BOD, TSS, oil and grease) for fish processing revealed that more than half of the samples had higher loadings then the EPA effluent requirements (US EPA 1995). In terms of toxicity, 25% of the samples revealed no toxicity while 18% showed high toxicity. BOD and oil and grease were the best predictors of toxicity using simple regression analysis. Another predictor of toxicity was the level of product processing with tertiary processing (most elaborate processing level - preserved, prepared, refined, and extracted products) having the highest effluent toxicity. Toxicity of the effluent was also linked to the cleaning of the plants (i.e. when no processing was occurring). Finally it was also shown that a dissolved air flotation treatment at one plant decreased but did not eliminate toxicity of the effluent.

For further information on this project, please contact Benoit Lalonde at (902) 426-2295 or benoit.lalonde@ec.gc.ca

STUDY ON MERCURY IN KEJIMKUJIK NATIONAL PARK

The Canadian Rivers Institute at the University of New Brunswick in Saint John and Environment Canada, Atlantic have collaborated on a two-year research study of mercury in aquatic food webs at Kejimkujik National Park, Nova Scotia. The study has two objectives: 1) to determine if mercury concentrations in yellow perch at Kejimkujik have changed since they were first measured 10 years ago, and 2) to assess which environmental factors influence the bioaccumulation of mercury in lake food webs. The study is being carried out by Brianna Wyn, who is a Masters student supervised by Dr. Karen Kidd at the Canadian Rivers Institute. Yellow perch were sampled in 17 Kejimkujik lakes in 2006 and 2007 to measure mercury trends over time. Intensive sampling of entire food webs was done in four acidic lakes. Any changes in mercury concentrations in yellow perch can affect the reproductive success of common loons at Kejimkujik (see journal paper: Burgess, N.M. and

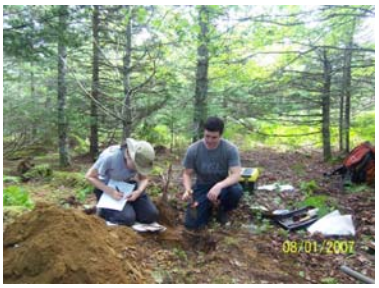
Meyer, M.W. 2008. Methylmercury exposure associated with reduced productivity in common loons. Ecotoxicology, 17: available online at DOI 10.1007/s10646-007-0167-8). Changes in fish mercury concentrations may also impact fish consumption guidelines set by Parks Canada for Kejimkujik National Park and the Nova Scotia government for the rest of the province. Environment Canada and NSERC provided major funding for this study.

Contact Neil Burgess, Environment Canada at 709 772-4143 or Karen Kidd, Canadian Rivers Institute, University of New Brunswick, Saint John at 506 648-5809 or kiddk@unbsj.ca.

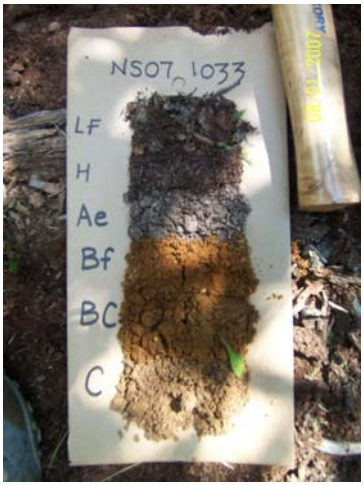
Yellow perch from Kejimkujik National Park (photo: M. Gautreau)

UPDATE RE: NORTH AMERICAN SOIL GEOCHEMICAL LANDSCAPES PROJECT

The need for baseline soil geochemical data to effectively assess and manage natural resources and the risk of environmental hazard is well recognized. This tri-national initiative between US, Canada and Mexico is being designed to understand of the amount and origin of variation in soil geochemistry and establish a consistent methodology for determining these characteristics. For Canada, this project is being lead by Natural Resources Canada (NRCan) with in-kind support being provided by Environment Canada, Health Canada, Agriculture Canada and several provincial departments of natural resources.



A 40 km x 40 km grid has been overlaid on the whole of North America and a single soil sample from a random, pre-selected site within each 1,600 km2 area will be collected, resulting in a total of approximately 10,000 soil samples being collected from the three countries. In the Spring of 2007, collection protocols were finalized and it was decided to implement the program in the 3 Maritime provinces in the summer of 2007. These sampling efforts were led by the Nova Scotia and New Brunswick departments of natural resources with field and technical support provided by NRCan, EC-Atlantic and Agriculture Canada. Soil collection was initiated in June 2007 and ended in September 2007, with more than 180 sites having been sampled. Analytical results are now pending, with preliminary data expected by the end of December, 2007. The analytical results of these samples will also compliment the background soils database that EC-Atlantic is developing for the region.



The data collected through this project will significantly contribute to our ability to identify and quantify changes in soil composition caused by urbanization, industrialization, agriculture, waste disposal, and other natural and anthropogenic activities.

For further information on this project, please contact Rita Mroz at (902) 426-9064 or rita.mroz@ec.gc.ca

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SPRAY ADVISORY IN AN AGRICULTURAL AREA

Project; Conduct a pilot pesticide application spray advisory in an agricultural area of Southern Ontario.

Environment Canada is developing environmental performance standards for the agricultural community through the National Agri-Environmental Standards Initiative (NAESI), a program supported by the federal Agricultural Policy Framework. One such project is the development and demonstration of meteorological standards for pesticide spraying that will serve to reduce the off-target movement of pesticides during, and after, application.

The movement of pesticides from the intended target can be influenced by meteorological factors such as wind speed, temperature and rainfall. Reduction in the off-target movement of pesticides can be achieved by selecting the appropriate time to conduct spraying activities. Reducing the amount of applied pesticide which moves off the target site reduces environmental risk and can improve crop protection.

A set of recommended meteorological standards for pesticide application has been developed based on an evaluation of such standards which are currently in place throughout the world as well as an evaluation of the current knowledge on spray drift behavior. A method for delivering a spray advisory to a selected group of farmers as a pilot demonstration is also being tested.

The Chatham/Kent area of Ontario

has been selected as the appropriate location to conduct a pilot spray advisory because it is a mixed agriculture area where crops such as: corn, wheat, soybeans, and vegetables are cultivated and the agricultural community has been a willing co-operator.

The pilot spray advisory will be delivered in that area by Weather Innovations Incorporated (WIN), a private company with considerable experience in providing meteorological advice to the farming community. Environment Canada, the sponsor of the project, is supplying WIN with some specialized weather forecast information and resources, to create and test a format for a potential advisory service.

In cooperation with AGRIS, the spray advisory is being delivered to approximately 100 growers in the Chatham/Kent area of Southern Ontario via fax, email or direct website contact. The spray advisory describes the conditions over the next three days, broken into three hour intervals, which produce spray categories of poor, fair, good or no spray.

An evaluation will be done through interviews and questionnaires as part of the project to determine how the spray advisory was used to make spraying decisions throughout the growing year.

In addition, five weather stations have been established by WIN within the coverage area and local recorded weather data will be compared with the predicted weather conditions to determine overall accuracy of the forecast.

If this effort proves successful consideration will be give to making such a product more widely available across the country. The feedback from users will also be used to determine whether the proposed standards are appropriate.

Contacts: Bill Ernst, Environment Canada, Dartmouth Nova Scotia
Ken Kwok, Environment Canada, Regina Saskatchewan,
Ron Pitblado, Weather Innovations, Chatham Ontario

Pesticides in Air in Prince Edward Island

Ambient air concentrations of pesticides have been measured in Prince Edward Island periodically, from 1998 to 2005. Those studies revealed high ambient concentrations of some agricultural pesticides, compared with concentrations measured elsewhere in Canada and the United States. While those studies indicated a potential for long-term exposure to low level air concentrations, they did not quantify pesticide air concentrations adjacent to actively sprayed fields, at the time of pesticide application. During the summer of 2006 four separate potato pesticide applications were sampled to measure concentrations of those chemicals in air downwind of application sites. Samples were collected immediately adjacent to the study field (0m) and at 10m, 30m and 100m downwind. Samples were collected before pesticide application, during spray and at 1h, 3h, 10h and 24h post spray. The pesticide active ingredients measured were carbofuran (Furadan®), methamidophos (Monitor®), mancozeb (Dithane™ M-45), diquat dibromide (Reglone®).

None of the pesticides were measured in pre-spray samples likely due to the short sampling times in this study compared with previous, ambient air monitoring programs. Concentrations of carbofuran, methamidophos and diquat measured in this study were higher than some existing 1-hour Canadian or international air quality guidelines and the concentrations of mancozeb were lower. Concentrations ranged from below detection for all pesticides (MDLs: 0.05 to 5.0 µg) in pre-spray samples to 6.37 µg/m^3 for methamidophos at 3h post spray. While concentrations of carborfuran, mancozeb and diquat decreased quickly immediately after the product application, air concentrations of methamidophos increased at 1h post spray and again at 3h post spray. Publication of the data from this study is expected early in 2008.

Contact: Christine Garron at (902) 426-6317 or Christine.garron@ec.gc.ca

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LEGISLATION UPDATE

Chemical Management Plan

On December 8, 2006 , it was announced that Canada's Government intends to commit $300 million over four years to implement the Chemicals Management Plan. To provide Canadians with the latest information about hazardous chemicals, the Government is also launching a new Web portal that can be found at http://www.chemicalsubstances.gc.ca .

The Government of Canada plays a key role in protecting the environment from the risks of chemical substance under a number of laws. Under the *Canadian Environmental Protection Act, 1999* (CEPA 1999), for instance, scientists at Health Canada and Environment Canada assess chemical substances to determine if they pose a risk to human health and/or the environment. The Government of Canada develops regulations and other measures

based on the findings of these assessments.

As part of the Chemicals Management Plan, manufacturers, importers and industrial users of high-priority substances will have to provide Environment Canada and Health Canada with information on batches of 15 to 30 substances every few months. There are 193 substances in total, and the process to address all of them will take about three years.

Canada's Chemicals Management Plan includes: regulations and enforcement;; challenge to industry; restrictions on re-introduction and new uses; rapid screening of lower risk chemical substances; accelerated re-evaluation of older pesticides; mandatory ingredient labelling of cosmetics; regulations to address environmental risks posed by pharmaceuticals and personal care products; enhanced management of environmental contaminants in food; health monitoring, surveillance and research; and good stewardship of chemical substances.

For more information visit; http://www.chemicalsubstanceschimiques.gc.ca/

USED LUBRICATING OILS AND USED OIL FILTERS

Used lubricating oils and used oil filters typically contain quantities of hazardous substances that can pose a risk to the environment and human health. The improper management or handling of used lubricating oil or used oil filters can result in the release of dangerous constituents into the environment which can negatively affect the environment, including water, air, ground, plants and animals, as well as human health.

When released into bodies of water, used lubricating oil forms a thin film on the surface. It takes only one litre of used oil to contaminate a million litres of water. Environment Canada's research over at least the past five years has shown that oil released to surface water can prove to be a fatal hazard for water birds. Once coated and covered with the released used oil, the feathers loose their insulating and water-resistant characteristics, making the birds susceptible to the effects of the cold. The physical and chemical properties of the thin film of oil in the environment result in the decomposition of the used oil components and their by-products by processes of volatilization, emulsification, solubilisation, sedimentation, photodegradation and biological degradation. Used oil releases onto the ground or soil result in the introduction of hazardous substances into the environment by processes of volatilization, adsorption to the solid organic matter, leaching through the soil into the groundwater or streaming into surface waters.

The *Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations* (EIHWHRMR) came into effect November 1st, 2005, pursuant to the *Canadian Environmental Protection Act, 1999* (CEPA, 1999), and brought forth a change in the definition for hazardous wastes and hazardous recyclable materials. One important component of the definitional change was the inclusion of used lubricating oils resulting from internal combustion engines and used oil filters as specifically listed hazardous waste or hazardous recyclable material in Schedule 3 of the EIHWHRMR.

For those who are in possession of used lubricating oils or used oil filters and choose to export them for recycling or for disposal, or wish to import such used oils or filters for disposal or recycling, you will find that used lubricating oils and used oil filters are both a hazardous waste and/or a hazardous recyclable material for the purposes of the EIHWHRMR. Therefore, persons wishing to import, export or convey these substances in transit must comply with the notification and permit provisions of section 185 of the CEPA 1999 and with the EIHWHRMR.

If you have any questions or comments in this regard, please contact Environment Canada (Atlantic) at (902) 426-7231 or by e-mail at 15th.reception@ec.gc.ca, or visit the CEPA Environmental Registry website at www.ec.gc.ca/CEPARegistry. You may also contact Environment Canada's Waste Reduction and Management Division at (819) 997-3377 or by e-mail at TMB@ec.gc.ca or visit its website at www.ec.gc.ca/wmd-dgd/.

USED ELECTRONIC WASTE / SCRAP METAL AND OTHER SIMILAR MATERIALS

Companies associated with the business of collecting, recycling, brokering, importing or exporting used electronic waste / scrap metal and other similar materials, should be aware of the requirements of the *Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations* (EIHWHRMR), pursuant to the *Canadian Environmental Protection Act, 1999* (CEPA, 1999).

Specifically paragraphs 1(1)(*g*) and 2(1)(*g*) of the EIHWHRMR, which include within the definitions of "hazardous waste" and "hazardous recyclable material" any waste or recyclable material where Canada has been informed under the Basel Convention that the waste or recyclable material considered or defined as hazardous under the legislation of the receiving country and the receiving country has also prohibited its import or transit. The definitions of hazardous waste and hazardous recyclable material within the EIHWHRMR fulfill one of Canada's obligations as a Party to the Basel Convention. The export of items that meet paragraphs 1(1)(*g*) or 2(1)(*g*) would be subject to the controls set out in the EIHWHRMR and the conditions set out in the CEPA 1999.

As Canada's competent authority to the Basel Convention, Environment Canada administers a website which

contains fact sheets presenting summaries of information received from the Basel Convention Secretariat, including the definitions of hazardous wastes and hazardous recyclable material in other countries and their import or transit prohibitions. If you are planning to export scrap material, we recommend that you check the Environment Canada website and the Basel Convention website for the latest communications received on a country's specific requirements for import and export of hazardous waste or hazardous recyclable material, such as prohibitions. It is the responsibility of the Canadian exporter to comply with the EIHWHRMR.

Currently, Hong Kong and China have both clearly communicated to the Basel Convention Secretariat, and Parties to the Convention, that specific scrap / wastes / used goods, including specified used electronic scrap, are considered to be "hazardous" in their jurisdictions, and a prohibition has been placed on their import and transit. You are therefore advised not to export such wastes to China or Hong Kong.

Please note there may be some countries that define specified electronic scrap / wastes, or components thereof, as "hazardous" under their own domestic legislation, but may not have prohibited all imports for disposal or recycling purposes. Therefore, we recommend you seek advice from the appropriate competent authorities within those countries, to ensure you follow all their import control requirements, even if the materials you are intending to export do not currently fall within the Canadian definition of "hazardous waste" or "hazardous recyclable material" under the EIHWHRMR.

We would also like to advise you that certain components of electronic scrap may be defined as "hazardous waste" or "hazardous recyclable material" under the EIHWHRMR based on their hazard characteristics. Therefore, the EIHWHRMR may apply to exports of these components from Canada, irrespective of the country of import or transit, in addition to imports of such components into Canada. Examples of components that may be controlled due to hazard characteristics include used batteries, broken or crushed glass from cathode ray tubes, and shredded circuit boards.

If you have any questions or comments in this regard, please contact Environment Canada (Atlantic) at (902) 426-7231 or by e-mail at 15th.reception@ec.gc.ca, or visit the CEPA Environmental Registry website at www.ec.gc.ca/CEPARegistry. You may also contact Environment Canada's Waste Reduction and Management Division at (819) 997-3377 or by e-mail at TMB@ec.gc.ca or visit its website at www.ec.gc.ca/wmd-dgd/.

National Pollutant Release Inventory (NPRI) Update

Reviewed NPRI data for 2006 are now available on the NPRI website (www.ec.gc.ca/npri), together with updated NPRI-Google Earth map layers, website and query site enhancements, an online summary of data, and the *Informing Canadians on Pollution* fact sheet for 2006. A 2006 NPRI National Overview report is currently in development.

The reporting requirements for 2007 were published in the *Canada Gazette*, Part I on March 3, 2007. Quantities of 367 substances released on-site, disposed of on- or off-site, and transferred off-site for recycling by industrial facilities in 2007 must be submitted to Environment Canada on or before June 1, 2008. There are a number of significant changes to reporting requirements for 2007. Ten new substances have been added to the NPRI: total reduced sulphur, and nine new polycyclic aromatic hydrocarbons (PAHs). Previously, dioxins and furans were reported as a total of 17 congeners in grams of toxic equivalents (TEQ). Beginning in 2007, seven dioxin congeners and ten furan congeners are now required to be reported individually, in grams. Previously, particulate matter releases reported to the NPRI did not need to include releases from road dust. Starting in 2007, releases from road dust must be included in particulate matter reports. In 2006, pits and quarries were exempted from reporting to the NPRI. Now, pits and quarries with an annual production threshold of 500,000 tonnes or greater are required to report to the NPRI.

For more information on the NPRI please visit the web site at www.ec.gc.ca/npri/ or contact the Atlantic Region NPRI Office at: NPRI_ATL@ec.gc.ca or (902) 244-6774.

Note to Readers:

In an attempt to reduce waste, Environment Canada is encouraging the use of electronic means to view this newsletter. You may request to receive **an electronic version by email**. If you presently receive a hard copy of this newsletter, and are able to access an electronic copy, please contact Benoit Lalonde at benoit.lalonde@ec.gc.ca to add your name, or any other person to which this newsletter would be useful, to the e-mail list.

Toxic Chemicals Update is published by the Toxics and Inventories Section of Environment Canada, Atlantic Region.

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