

Colin R. Macdonald, B.Sc, M.E.Sc, Ph.D.**Northern Environmental Consulting & Analysis (NECA), Inc.**

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e-mail: northern@granite.mb.caGoogle Scholar Listing: <http://scholar.google.ca/citations?user=Ogc2wGYAAAAJ>

Total number of citations = 1729

Citations since 2014 = 368

Bus. No.: 84295 4208 RT0001**Summary**

Dr. Colin Macdonald has over thirty years of experience in environmental research and study design, data analysis and ecological risk assessment. His primary area of expertise is in the field of ecological risk assessment and toxicology, with most project in Canada's Northwest Territories. Recent projects have involved radiological risk assessment to humans and the environment from uranium in groundwater and phosphate mining. His experience in study design, monitoring and statistical analysis has led to strategic program reviews and assessments to evaluate monitoring program performance and the ability of a monitoring program to meet its objectives. Projects since 1998 have involved the analysis of contaminants in wildlife and traditional foods near contaminated sites in northern Canada. Currently, he is Science Advisor to the ʔehdzo Got'ıne ʔots'ę Nákedı (Sahtu Renewable Resources Board) in Tulit'a NT.

Dr. Macdonald has worked extensively with private companies, federal departments (Environment and Climate Change Canada, Fisheries and Oceans, Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC), territorial agencies (NWT's Environment and Natural Resources, Nunavut Dept. of Health) and aboriginal organisations to design science-based field sampling programs to ensure safe food, water and soils at northern contaminated sites and communities. He has contributed major sections of state of the environment reports for the GNWT (2005, 2010, 2015) and to reports for several NWT regional groups, such as the Protected Area Strategy. In 2004, he was commissioned by CIRNAC to assess the effects of oil and gas development on terrestrial wildlife for the Arctic and Monitoring Assessment Program (AMAP - www.amap.no).

Since 2000, northern projects have included the design, sampling, analysis and interpretation of aquatic and terrestrial environments for CIRNAC's Contaminants and Remediation Directorate at several abandoned NWT mines, including the Colomac gold mine, Port Radium, Echo Bay Properties, Silver Bear Mines, Contact Lake, El Bonanza, and others. He has earned the qualification of Environmental Professional through ECOCanada and is the author of over 60 journal papers and reports.

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Education

1976 University of Guelph (B.Sc. Honours Fish and Wildlife Biology)
1979 University of Western Ontario (Masters of Engineering Science)
1986 University of Guelph (Ph.D. Zoology)

Work Experience

1998-pres. Principal Consultant/analyst with Northern Environmental Consulting & Analysis, Inc.
1996-1998 Adjunct faculty, Soil Science Department, University of Manitoba, Winnipeg, MB.
1991-1998 Research Scientist (Ecology/Environmental Toxicology), Whiteshell Laboratories, Atomic Energy of Canada (AECL), Pinawa, Manitoba.
1989-1991 Consultant/term biologist; National Wildlife Research Centre, Canadian Wildlife Service, Hull, Qc.
1986-1989 Post-doctoral fellow/adjunct professor, Environmental and Resource Studies, Trent University, Peterborough, Ont.

Professional Memberships and Experience

- Science Advisor to the ʔehdzo Got'ine Gots'ę Nákedı (Sahtú Renewable Resource Board), Tulit'a, NT
- Member of the Technical Review Panel for the Northern Contaminants Program for Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC)
- Former member of the American Chemical Society (ACS) (1998-2016).
- Former member of the Arctic Institute of North America (1996-2014).
- Former member of the Society of Environmental Toxicology and Chemistry (SETAC)(1989-2016).
- Environmental Professional (Research and Development) designation through Eco Canada
- Author and co-author of over 60 scientific papers, reports, conference papers.

Primary Areas of Expertise

- Ecological risk assessment with radioactivity and stable elements
- Northern community science liaison
- Toxicology and environmental distribution of metals, organochlorine pesticides and radionuclides
- Statistical analysis and design of environmental surveys
- Coordination and delivery of collections for environmental quality surveys
- Report and publication preparation and program review

Recent Clients

- Environment and Natural Resources, Government of the Northwest Territories (Yellowknife, NT)
- Oil and Gas Branch, Aboriginal Affairs and Northern Development Canada (Ottawa)
- Department of Health (Nunavut)
- Arctic Monitoring and Assessment Programme (AMAP), Oslo, Norway
- Northern Contaminants Program, Crown-Indigenous Relations and Northern Affairs Canada (Ottawa)
- Subcontracting with Shared Value Solutions (Guelph), SENES/Arcadis Consultants (Richmond Hill, ON), AECOM (Winnipeg, Calgary), Dillon Consulting (Calgary), Intrinsik (Halifax) and Knight Piésold Limited (North Bay).

Project Experience

The following projects outline some specific examples of projects that Dr. Macdonald has completed during his career in environmental research (since 1982) and consulting (since 1998). Many of the projects overlap in the areas of monitoring and assessment in the terrestrial environment and evaluation of the spatial and temporal trends of chemicals of potential concern in the aquatic and terrestrial environments.

Program Performance Assessment and Review

Science Advisor to the Sahtú Renewable Resource Board (SRRB; ?ehdzo Got'ine Gots'é Nákedı) (2016-present; ongoing). The SRRB was formed in 1993 under the Sahtú Dene Métis Comprehensive Land Claim Agreement as a body to protect resources, including wildlife management, and resource users in the Sahtú. Northern Environmental conducts environmental assessments by reviewing annual reports from water licenses and land use permits and has provided expertise on matters relating to western science information on barren-ground, boreal and mountain caribou, moose and muskox which the Board considers with traditional knowledge holders.

Review of the Closure Program for Agrium Phosphate Operation in Ontario (2017)

Assisted the Taykwa Tagamou Nation (Kapuskaing First Nation) with their review of the environmental surveys of the Agrium Phosphate Operation showing elevated levels of uranium in waste rock and tailings areas. Gamma surveys showed significant uranium levels in some areas of the waste rock pile due to uranium in the phosphate source material.

Review of the Final Environmental Impact Statement for the Kiggavik Uranium Mine on behalf of the Nunavut Department of Health and Department of the Environment (2014). Northern Environmental and Intrinsic Environmental Sciences were retained to review the human health and ecological risk assessment and cumulative effects relating to the dispersion of material from the Kiggavik mine through air and water during the proposed operation. Also, the team reviewed the human health and ecological risk assessment. Northern Environmental was responsible for the review of the radiological components of the EIS and the potential impacts to humans and non-human species. A follow-up report detailed what is known of radioactivity in barren-ground caribou in Canada's North.

Performance assessment of temporal trend monitoring data for the Northern Contaminants Program (NCP). Client: Aboriginal Affairs and Northern Development Canada (2014). This project evaluated the performance of the NCP to meet its objectives of detecting a 5% change in the concentrations of organochlorine pesticides in traditional food in the Canadian Arctic. The program objective is to eliminate man-made pesticides from traditional foods in northern Canada. This project examined the long-term monitoring programs for 5 representative compounds (DDE, α HCH, PCB153, PFOS and PBDE 47) in marine mammals, fish and birds in the Arctic. Power analysis was used to determine monitoring program performance relative to program goals.

High-level strategic review and gap analysis of research priorities for the Arctic Monitoring and Assessment Program. Client: Aboriginal Affairs and Northern Development Canada. Under the Arctic Council, AMAP is developing a work plan for 2013-2015 based on the last 10 years of assessments on contaminant distribution (e.g., mercury, organic pollutants, and radiation), effects to human health and the environment, and climate change in the Arctic. Dr. Macdonald provided recommendations to AMAP for consideration on future comprehensive assessments after a review of technical assessments since 2001.

Comprehensive review of climate change impacts in the Canadian Arctic Archipelago, including Baffin Island (2012). Client: Fisheries and Oceans Canada. A comprehensive review of changes to the physical, chemical and biological systems in the central Canadian Arctic with the changing climate was conducted by C.

Macdonald for Fisheries and Oceans Canada. The goal was to highlight observed changes and to demonstrate gaps of knowledge. Positive changes could improve fisheries and shipping. Areas of emphasis included changes to sea-ice, surface water chemistry and productivity, glacier and ice field melts, weather patterns, and the biological environment. Gaps in knowledge and areas of greatest uncertainty were identified.

The Environmental Effects of Oil and Gas Development in the Arctic. 2004-2007. Client: Oil and Gas Branch, AANDC. AMAP conducted an assessment of oil and gas activity in the Arctic in response to a request from the Arctic Council. The assessment provided advice to the Ministers regarding the extent of oil and gas development, the socioeconomic costs and benefits and the environmental effects of development. Dr. Macdonald was co-lead author of the section of the report on environmental effects to the terrestrial ecosystem, the marine/freshwater systems and human health.

Phase 1 Assessments for the NWT's Protected Area Strategy. Client: Aboriginal Affairs and Northern Development Canada, Yellowknife. Phase 1 assessments were conducted on several areas that were selected for consideration of Protected Areas status. Data collection and initial assessments were conducted for the Łue Túé Súlái Area of Interest (Five Fish Lakes near Jean Marie River) and Thaidene Néné National Park Reserve near Lutsel K'e, NT. Northern Environmental also worked with the community of Kakisa to collect ecological data for a proposal to the Protected Area Strategy Program.

Assessment of environmental liabilities at a mine in northern Manitoba. 2011. Client: AECOM. Dr. Macdonald reviewed several years of monitoring data and provided an assessment of environmental liabilities at a major mine site in northern Manitoba prior to the potential development of new projects. The review included the critical evaluation of 50 years of monitoring and research studies at the site by government and industry, and an assessment of the potential for long-term environmental issues after remediation. Continuing concerns included acid mine drainage and long-term contamination of surface waters.

Program review of aquatic and terrestrial assessment and monitoring programs at Colomac mine, NWT (2001, 2003, 2012). Client: AANDC. Macdonald designed and implemented programs to assess contamination in the aquatic and terrestrial receiving environments at Colomac, NT in relation to CCME guidelines and contaminated sites criteria. Aquatic programs were designed to test metals and hydrocarbons in traditional foods of the Tlicho near Colomac. In 2012, Northern Environmental reviewed the monitoring program results in terms of site-specific objectives after remediation for cost efficiency and identified areas that needed improvement.

Development of a statistical guide for the design of environmental assessment and effectiveness monitoring studies (2010). Client: Parks Canada Parks Canada required a statistically rigorous guide for the design of field studies to support program objectives of documenting ecological integrity and environmental assessments in national parks. The guide provided detailed advice on sampling protocols to allow the agency to detect changes in environmental conditions and to determine if management objectives were being met.

Impact/Risk Assessment

Tier 2 human health and ecological radiological risk assessment for a phosphate mine in Africa. Client: Knight Piésold Consulting. A Tier 2 risk assessment was conducted for a phosphate mine in a developing country to identify potential risks due to elevated levels of uranium and other nuclides in phosphate ore and tailings. Risks were estimated for an agrarian lifestyle with vegetable crops and livestock. The ERICA assessment tool was used to estimate risk for a generic group of plants and wildlife from the U-238 decay chain series of nuclides (e.g., Ra-226, Pb-210, Po-210).

Contaminants in the Port Radium and Great Bear Lake environment (1998-2016). Client: AANDC. Radionuclides and metals in sediments, fish, water, vegetation and soil from Port Radium on Great Bear Lake were analysed to characterize contamination from the mine site, prior to and after remediation. Dr. Macdonald worked with members of Déline First Nation in 1998 to collect water and sediments at the mine site, then worked with SENES consultants on a comprehensive site assessment prior to remediation and post-remediation monitoring. Dr. Macdonald sampled soils and plants and conducted fisheries surveys for evidence of contamination by radionuclides and stable elements. The projects also included several summary reports to the community of Déline on the levels of chemicals of concern in the Great Bear Lake environment.

Ecological risk assessment of radioactivity at the Stark Lake mine. NWT. 2013. Client: AANDC and Dillon Consulting. An ecological risk assessment was conducted on an abandoned mine site to the east of Lutsel K'e, NT. The mine consisted of waste rock with elevated gamma radiation, and surface waters with elevated uranium. The ecological risk assessment indicated significant risk to small mammals due to background radiation and elevated U-238 chain nuclides in vegetation adjacent to the waste rock.

Statistical and chemical analysis of environmental contaminants in northern large mammal populations (2012 - present). Client: Environmental and Natural Resources, GNWT. Clients include regional and headquarters biologists with Environment and Natural Resources. The studies consisted of the statistical analysis of metals, primarily cadmium and mercury, and radionuclides and stable isotopes (diet) in woodland caribou, moose, mountain goats, and Dall's sheep in the DehCho region of the NWT. Other projects were initiated to explain high cadmium levels in moose in the south Mackenzie mountains which led to a food advisory by GNWT Health. Outcome of one project has been a conference presentation, a journal paper and several ENR manuscript reports. Other projects included an analysis and plain language summary of metals, hydrocarbons and radionuclides in moose, woodland caribou and barren-ground caribou from the South Slave and Sahtu regions of the NWT.

Tier III risk assessment of human health and the environment at a small contaminated site in Manitoba. 2013. Client: Atomic Energy of Canada, Ltd (AECL). Monitoring programs indicated high levels of naturally-occurring uranium in surface soils due to the release of holding pond waters. This project evaluated the risk of adverse health effects in humans and non-human species from contact with the soil with elevated uranium. Risk to human health was assessed with Health Canada exposure models while exposure in non-human species (plants, birds, small and large mammals) were assessed using the ERICA model framework from the IAEA.

Detailed multi-element analysis of the elemental composition of tissues and faecal ash in a moose (*Alces alces*) exposed to tailings at the abandoned Colomac gold mine, NWT. 2007. Client: Environmental and Natural Resources, GNWT. The study involved the detailed analysis of a moose trapped in the tailings area of the Colomac mine. The data were used to support the ecological and human health risk assessment for the mine.

Research on the distribution and dosimetry of naturally-occurring radionuclides in caribou in the NWT and Nunavut (1992-ongoing). Client: Environmental and Natural Resources, GNWT. A research project was conducted in conjunction with GNWT's Environment and Natural Resources to determine the concentrations of naturally-occurring radionuclides (Ra-226, Pb-210, Po-210) and cesium-137 in caribou tissues. Activities involved analysis of muscle, liver and kidney for alpha and gamma-emitting nuclides, estimation of dose to the animals, and statistical analysis of trends. The research concluded with a paper published in Science of the Total Environment (1996) and several reports to the Northern Contaminants Program (1996-2013). An additional paper on the accumulation of cesium-137 in Canadian and Alaskan caribou herds since the 1960's was published through Health Canada.

Multielement analysis of barren ground caribou faecal pellets from Colomac mine and near diamond mines

in NWT. 2004. Client: Environmental and Natural Resources, GNWT. A research project was conducted with Environment and Natural Resources scientists on the levels of individual elements in the faecal pellets of caribou near major industrial developments as a means of identifying contamination of food sources.

Ingestion rates and radionuclide transfer in birds and mammals of the Canadian Shield. 1997. A review of ingestion rates for wildlife species was conducted to determine suitable parameters to model the uptake and exposure of major species like white-tailed deer and moose at mine sites. The data were used for ecological risk assessments at mines on the Canadian Shield.

Contaminants in ecologically relevant samples at Contact Lake, Indore Hottah, North Inca, Silver Bear Mines, El Bonanza mines in the NWT (2001-2013). Client: AANDC. As part of Phase 1 and 2 assessments by SENES Consultants at these abandoned mines in the NWT, Dr. Macdonald designed and implemented soil/plant collection program to delineate spatial trends of contaminants at the respective mines to support human health and ecological risk assessments. Fisheries assessments were also conducted at several sites. Tasks involved sample collection, coordinating analysis for metal and radionuclide analysis, QA/QC, fish aging, statistical analysis and data interpretation mine and report submission.

Report of contaminants in traditional foods in Déline, NT. Client: Déline Renewable Resources Council. 2002/03 and 2011, 2012. Traditional foods were obtained from members of the community of Déline and analysed for radionuclides and stable elements. The data were used to determine if people in the community were exposed to higher levels of chemicals through the consumption of traditional foods. During the course of the program all major food types (barren ground and woodland caribou, fish, waterfowl) were sampled and analysed. The studies supported the view that traditional foods remain the best healthy option for people in Déline. The project was repeated in 2011 and 2012 as part of a long-term monitoring program.

Radiological assessment of foods and the environment in Lutsel K'e and Baker Lake, NU (1998, 1999). Client: AANDC. Radiological exposure was estimated in two communities as part of an assessment of contaminants in traditional foods in the north. The community of Lutsel K'e was concerned about radiation from the COSMOS satellite which deposited radiation over Great Slave Lake in the late 1970s, and a local uranium exploratory mine (the Stark Lake mine). Background gamma radiation was measured in the communities, radon in some houses and community buildings and radionuclide levels in traditional foods.

Supplemental Services

Technical review of research and monitoring projects in the NWT and Nunavut for the Northern Contaminants Program (NCP). 2009 – present; ongoing. Client: AANDC. C. Macdonald is a member of a technical review committee that evaluates research projects for the NCP to ensure technical suitability. The objective of the NCP is to reduce or eliminate chemicals in traditional foods in Canada's North. Individual projects involve major issues such as climate change, mercury transport, toxicant levels in traditional foods like caribou, marine mammals (beluga, narwhal, ringed seal, polar bear), waterfowl and fish.

Review of environmental programs in the Fort McMurray region of Alberta for the Athabasca Tribal Council. 2003. Client: Athabasca Tribal Council. A program to communicate the results from monitoring programs of hydrocarbons in water, air and terrestrial monitoring programs of hydrocarbons was assembled for presentation to First Nations in the Fort McMurray area in conjunction with oil producers and First Nations in the region.

Country food monitoring workshop. 2001. Dr. Macdonald reported on the results of a Health Canada workshop on monitoring the safety and quality of country foods in Canada. Report for the Office of Ecosystem Initiatives

and Health, Arctic Section, Ottawa, ON. February 2001.

Background documentation for Priority Substances List (PSL 2) assessment of uranium. 1998-2000. Dr. Macdonald extensively reviewed the literature on the toxicity of uranium to mammals, birds and fish to provide background data for the assessment of uranium toxicity. The review included the development of tolerable doses, hazard and risk to wildlife.

Examples of Recent Reports

Larter, N.C., **C.R. Macdonald**, B.T. Elkin, D.C.G. Muir and X. Wang. 2018. Analysis of cadmium, mercury and other elements in Mackenzie Valley moose tissues collected from 2005 to 2016. Environment and Natural Resources, Yellowknife. Manuscript Report No. 152. 67 pp.

Larter, N.C., **C.R. Macdonald** and N. Jane Harms. 2018. Comparing kidney histology: moose harvested in the Mackenzie Valley versus the Mackenzie Mountains. Environment and natural Resources, Yellowknife, NT. Manuscript Report No. 272. 18 pp.

Macdonald, C.R. 2016. Contaminant survey of Sahtu and South Slave moose, Sahtu mountain caribou and barren-ground caribou - a plain language summary. Report submitted to Environment and Natural Resources, Yellowknife. 42 pp

Larter, N.C. and **C.R. Macdonald**. 2015. Multi-element and stable isotope analysis of kidney, muscle and *Trichinella* presence in mountain goat (*Oreamnos americanus*) from the south Mackenzie Mountain region of the NWT. Environment and Natural Resources, Yellowknife, NWT. Manuscript Report 249. 41 pp.

Macdonald, C.R. 2015. Radiological assessment of risk to human health and the environment at the Farim phosphate Project. Report submitted to Knight Piésold Limited, North Bay.

Macdonald, C.R. 2015. Radionuclides and cadmium in caribou in Nunavut, Northern Saskatchewan and other northern jurisdictions, and human health risks related to consumption: a literature review (submitted section on natural radioactivity). Submitted to the Nunavut Department of Health in conjunction with Intrinsic Environmental Sciences, Inc. Iqaluit, NU. 68 pp.

Macdonald, C.R. 2014. Performance assessment of temporal trend monitoring data for the Northern Contaminants Program. Report submitted to the Northern Contaminants Program, Ottawa, ON.

Macdonald, C.R. 2014. Multi-element of wildlife and wetland plants at Colomac mine, NWT. Report submitted to AECOM, Calgary for site monitoring report.

Macdonald, C.R. 2014. Multi-element, radionuclide and stable isotope analysis of kidney and muscle in mountain goat (*Oreamnos americanus*) from the south Mackenzie Mountain region of the NWT. Report submitted to Environment and Natural Resources, Government of the Northwest Territories.

Macdonald, C.R. 2013. Activity report for the collection of wildlife at Colomac, September 2013. Report submitted to AECOM, Calgary as part of the summary of field activities.

Macdonald, C.R. 2013. Draft screening ecological risk assessment for Stark Lake mine. Assessment submitted to Dillon Consultants, Calgary for inclusion with Remedial Action Plan (RAP).

Macdonald, C.R. 2013. Metal and radionuclide concentrations in lake whitefish, lake trout and herring collected near Déline, NT in 2012. Report submitted to the Déline Renewable Resource Council. 36 pp.

Macdonald, C.R. 2013. Tier III risk assessment of human health and environmental protection in the URL holding pond discharge path. Project report submitted to ACSION Industries. 53 pp.

- Macdonald, C.R.** 2013. Strategic review of the environmental programs at the Colomac Mine site, NT 1999 – 2012. 71 pp.
- Macdonald, C.R.** 2012. Synthesis of climate change effects on the Canadian Arctic Archipelago (CAA) sub-basin. Submitted to Fisheries and Oceans Canada, Winnipeg. 41 pp.
- Macdonald, C.R.** 2012. Strategic review of priorities and emerging issues for the AMAP work plan 2013-2015. Report submitted to the Arctic Monitoring Assessment Program. Oslo, Norway. 81 pp.
- Macdonald, C.R.** 2011. Statistical analysis of physical parameters and potential chemicals of concern in sediment and surface waters at several sites near Snow Lake, Manitoba. Report prepared for AECOM, Winnipeg. 30 pp.
- Macdonald, C.R.** 2011. Assessment of environmental liabilities at a mine in northern Manitoba. Report prepared for AECOM (Winnipeg).
- Macdonald, C.R.** 2011. Organochlorine, metal and radionuclide concentrations in lake whitefish, lake trout and herring collected near Déline, NT in 2009 and 2010. Report submitted to the Déline Renewable Resource Council.
- Macdonald, C.R.** 2010. Terrestrial environment. Review and status report submitted to SENES Consultants as part of the NWT Environmental Audit and State of the Environment Report. July 2010.
- Macdonald, C.R.** 2010. Guide on the design of environmental assessment follow-up and effectiveness monitoring studies. Final report and Powerpoint Presentation submitted to Ecological Integrity Branch, Parks Canada, Ottawa.
- Macdonald, C.R.** 2010. Field sampling in support of environmental risk assessment at abandoned mines in the NWT. Federal Contaminated Sites Workshop. Montreal Québec. May 11, 2010.
- Macdonald, C.R.** 2010. Phase 1 environmental assessment for the Five Fish Lakes area of the Deh Cho, NT. Submitted to SENES Consultants as part of the combined Phase 1 Ecological and Renewable Resource assessment for the Protected Area Strategy.
- Macdonald, C.R.** 2009. Organochlorine, metal and radionuclide concentrations in herring (*Coregonus artedii*) and lake trout (*Salvelinus namaycush*) collected near Déline, NT in February 2009. Submitted to the Déline Renewable Resource Council. Déline, NT.
- Macdonald, C.R.** 2009. Review of the terrestrial and aquatic environment near Giant Mine in the NWT. Submitted to SENES Consultants as part of an environmental submission to Indian and Northern Affairs Canada.
- Macdonald, C.R.** 2008. Monitoring of the terrestrial system around the Prairie Creek Mine. Submitted to SENES Consultants as part of review of the cumulative effects of the Prairie Creek Mine near Nahanni Park, NT.
- Macdonald, C.R.** 2008. Cumulative effects of oil and gas activities near Norman Wells, NT. Submitted to SENES Consultants as part of a review of the cumulative impacts in Bosworth Creek watershed near Norman Wells, NT.
- Macdonald, C.R., B. Elkin and A. Gunn.** 2005. Analysis of the elemental composition of tissues and faecal ash in a moose (*Alces alces*) exposed to tailings at the abandoned Colomac Gold mine, NWT. Resources, Wildlife and Economic Development, GNWT. Manuscript Report No. 162. 39 pp.

Examples of Recent Published Papers and Conference Presentations

- Larter, N., C.R. Macdonald, B. Elkin, D.C.G. Muir and X. Wang.** 2017. Analysis of cadmium, mercury and other elements in Mackenzie Valley moose tissues collected from 2005 to 2016. Report submitted to Environment and Natural Resources. Yellowknife NT.
- Macdonald, C.R.** 2014. A critical review of the effects of oil and gas activity on caribou. U.S. – Canada Northern Oil and Gas Research Forum. Yellowknife, NT. Canada.

- Larter, N.C., **C.R. Macdonald**, B.T. Elkin, X. Wang, N.J. Harms, M. Gamberg and D.C.G. Muir. 2016. Cadmium and other elements in tissues from four ungulate species from the Mackenzie Mountain region of the Northwest Territories, Canada. *Ecotoxicology and Environmental Safety* 132:9-17.
- Larter, N., **C.R. Macdonald**, D. Muir and B.T. Elkin. 2014. Multi-element, radionuclide and stable isotope analyses of kidney and muscle tissue from mountain goats in Northwest Territories. Northern Wild Sheep and Goat Council's Proceedings.
- Larter, N.C., **C.R. Macdonald**, B.T. Elkin, X. Wang, M. Gamberg and D.C.G. Muir. 2013. Elemental and radionuclide concentrations in tissues from four ungulate species from the southern Mackenzie Mountains, NT. Prepared for Northern Contaminants Program Conference, Ottawa, Sept. 2013.
- Larter, N.C., J.A. Nagy, B.T. Elkin and **C. Macdonald**. 2010. Differences in radionuclide and heavy metal concentrations found in the kidneys of barren-ground caribou over time. *Rangifer* 30: 61-66.
- Macdonald, C.R.** 2010. Radionuclide accumulation in barren-ground caribou in northern Canada: a review. 13th North American Caribou Workshop. Oct 25-28, 2010. Winnipeg, Manitoba.
- Gunn, A and **C. Macdonald**. 2010. Site-specific variability in dust uptake by caribou: an issue for environmental assessments. 13th North American Caribou Workshop. Winnipeg, Manitoba.
- Macdonald, C.R.** 2010. Field sampling in support of environmental risk assessment at abandoned mines in the NWT. Federal Contaminated Sites Workshop, Montreal, QC. May 2010.
- C.R. Macdonald**, B.T. Elkin and B.L. Tracy. 2007. Radiocesium in caribou and reindeer in northern Canada, Alaska and Greenland from 1958 to 2000. *Journal of Environmental Radioactivity* 95:1-25.
- Norstrom, R.J., Clark, T.P., Enright, M., Leung, B., Drouillard, K.G. and **C.R. Macdonald**. 2007. ABAM, a model for bioaccumulation of POPs in birds: validation for adult herring gulls and their eggs in Lake Ontario. *Environ. Sci. Technol.* 41:4339-4347.
- G.A. Stern, **C.R. Macdonald**, B. Dunn, C. Fuchs, L. Harwood, B. Rosenberg, D.C.G. Muir, D. Armstrong. 2005. Spatial trends and factors affecting variation of organochlorine contaminant levels in Canadian Arctic beluga (*Delphinapterus leucas*). *The Science of the Total Environment* 351-352:344-368.
- Gamberg, M., B. Braune, E Davey, B. Elkin, P.F. Hoekstra, D. Kennedy, **C. Macdonald**, D. Muir, A. Nirwal, M. Wayland and B. Zeeb. 2005. Spatial and temporal trends of contaminants in terrestrial biota from the Canadian Arctic. *Science of the Total Environment* 2005: 148-164.
- Hebert, C.E., R.J. Norstrom, J. Zhu and **C.R. Macdonald**. 1999. Historical changes in PCB patterns in Lake Ontario and Green Bay, Lake Michigan, 1971 to 1982, from herring gull egg monitoring data. *Journal of Great Lakes Research.* 25(1):220-233.
- Berti, P.R., H.M. Chan, O. Receveur and **C.R. Macdonald**. 1998. Population exposure to radioactivity from consumption of barrenland caribou in the Dene/Métis of the western Northwest Territories. *Journal of Exposure Analysis and Environmental Epidemiology.* Vol 8 (2):145-158.
- Sheppard, S.C., W.G. Evenden and **C.R. Macdonald**. 1998. Variation among chlorine concentration ratios for native and agronomic plants. *J. Environ. Radioact.* 43:65-76.
- Macdonald, C.R.** and M.J. Laverock. 1998. Radiation exposure and dose in small mammals in radon-rich soils. *Archives of Environmental Contamination & Toxicology.* 35: 109-120.
- Macdonald, C.R.**, L.L. Ewing, B. Elkin and A.M. Wiewel. 1996. Regional variation of radionuclides and radiation dose in caribou (*Rangifer tarandus*) in the Canadian Arctic. *Sci. Total Environ.* 182: 53-73.