

## **RESUME**

Shannon Shaw, B. Sc., M.Sc., P.Geo (BC)  
Senior Geochemist

Ms. Shaw is a senior geochemist with approximately 18 years of experience in environmental consulting for the mining industry. Her areas of specialization are in acid rock drainage and metal leaching prediction, mine waste management, alternative evaluations, risk assessments and multi-stakeholder consultations.

### **Education:**

B.Sc. (Geological Sciences and Chemistry), Queen's University, Kingston, Ontario, Canada  
M.Sc. (Geological Sciences), University of British Columbia, B.C., Canada

### **Summary of Experience:**

Apr. '09 to present: President and Senior Geochemist, pHase Geochemistry Inc.  
Aug. '05 to Mar. '09: Senior Geochemist, MESH Environmental Inc.  
Feb. '05 to Jul. '05: Geochemist/Mineralogist, Mehling Environmental Management Inc.  
Oct. '96 to Jan. '05: Geochemist, Robertson GeoConsultants Inc.  
1996: Small scale mineralogical consulting contracts  
1994 to 1995: Teaching Assistant, University of British Columbia, B.C., Canada.  
1993 to 1994: Teaching and Research Assistant, Queen's University, Kingston, Ontario, Canada.

### **Affiliations:**

Association of Professional Engineers and Geoscientists of British Columbia (APEGBC)  
Society for Mining, Metallurgy and Explorations (SME)  
Canadian Institute of Mining (CIM)  
International Mine Water Association (IMWA)

### **Awards:**

Recipient of Business in Vancouver's Forty Under 40, 2010

### **Areas of Expertise:**

- Assessment of acid rock drainage (ARD) and metal leaching (ML) potential for mine site components and wastes.
- Prediction of surface and ground water quality and impacts.
- Development of ARD/ML prevention, control and closure strategies.
- Alternative evaluations
- Risk assessments

**Select & Recent Project Experience:**

- Gold Fields La Cima, Cerro Corona Mine, Peru – Geochemical specialist for ARD/ML evaluations including a field barrel program of more than 100 barrels, waste management planning, water monitoring auditing and delineation of associated risks.
- Selwyn Chihong Mining Ltd., Selwyn Project, Yukon, Canada – Geochemical characterization of waste rock, tailings and mine infrastructure associated with the proposed Selwyn Project.
- AATA, La Colosa Project, Colombia – Geochemical characterization of drill core and metallurgical tailings project including a comprehensive lab-based and field-based evaluation program to support feasibility studies and environmental impact assessment applications.
- AngloGold Ashanti, Gramalote Project, Colombia – Geochemical characterization of drill core and metallurgical tailings project including a comprehensive lab-based and field-based evaluation program to support feasibility studies and environmental impact assessment applications.
- Victoria Gold Corporation, Eagle Gold Project, Yukon, Canada – Geochemical characterization of drill core to support feasibility studies and permitting applications.
- Avanti Mining Inc., Kitsault Project, BC, Canada - Geochemical characterization of drill core to support feasibility studies and permitting applications.
- Niblack Project LLC., Niblack Project, Alaska, USA – Geochemical characterization testing of drill core, development of operational verification testwork program, QA/QC testing and reporting in support of exploration program and drift development.
- North American Tungsten Corporation, Cantung Mine, NWT, Canada – Geochemical characterization of waste rock, pit walls, historic and recent tailings, participation in Water License hearings, contributions to the Abandonment and Restoration Plan.
- Minera Alumbrera Ltda., Alumbrera Mine, Argentina – Geochemical characterization and modelling to predict current and future pore water concentrations associated with the tailings.
- Eldorado Gold, Sao Bento Mine, Brazil – Field reconnaissance, sampling and geochemical characterization of waste rock, underground wall rock and tailings for closure planning.
- Newcrest Mining Ltd, Cadia East Project, Australia – Geochemical characterization of drill core and metallurgical tailings for the Environmental Assessment of the Cadia East expansion project.
- St. Ives Gold Mine Co Pty Ltd, Western Australia – Sampling of existing waste rock piles for characterization of ARD/ML potential by location and rock type, interpretation of data to assist in future waste management planning, including consideration of salinity and reclamation aspects; assessment of residual cyanide species and long term leaching potential for waste and spent ore associated with a proposed heap leach expansion.
- Newcrest Mining Ltd, Telfer Gold Mine, Australia – Assessment of the adequacy of existing physical and chemical characterization of tailings and waste materials to support the Telfer Sustainable Mine Closure Plan, in assoc. with Fawcett Mine Rehabilitation Services Pty Ltd.

- Bolivar Gold Corp., Choco Project Expansion, Venezuela – Gap analysis for expansion scoping study, covering ARD/ML, cyanide management, tailings supernatant quality and water management aspects.
- Goldcorp Inc., Peak Gold Mine, NSW, Australia – Review and gap analysis of tailings geochemical data, including identification of closure issues and considerations; follow up analyses in support of a closure cover design by O’Kane Consulting Pty Ltd.
- Newmont Jundee Operations, W.A., Australia – Site wide characterization programme for waste rock and pit walls with interpretation and implications for long term waste management and void water quality.
- Freeport McMoran Copper & Gold, Inc., Grasberg Mine – Development of site-wide closure plan for the mine and related infrastructure.

### Publications:

- Shaw, S.C. and Jamieson, H.E. (1994): Attenuation of Metals by Secondary Minerals in Tailings from the Geco Mine, Ontario, Canada. In *Geological Society of America Annual Meeting Program with Abstracts*, Seattle, Washington, pp. 126.
- Jamieson, H.E., Shaw, S.C. and Clark, A.H. (1995): Mineralogical Factors Controlling Metal Release From Tailings at Geco, Manitouwadge, Ontario. In: *Sudbury '95, Mining and the Environment* CANMET, vol 1, pp. 405-413.
- Shaw, S.C., Groat, L.A., Jambor, J.L., Blowes, D.W., Hanton-Fong, C.J. and Stuparyk, R.A. (1996): Comparative Mineralogical Study of Base Metal Tailings With Various Sulfide Contents, Oxidized in Laboratory Column Oxidation and Field Lysimeter Studies. *Environmental Geology*, vol 33 (2/3), pp. 209-217.
- Robertson, Andy MacG. and Shaw, Shannon C. (1998). *Alternatives Analysis for Mine Development and Reclamation*. In *Mine Reclamation and Remediation*, Proceedings of the Twenty-second Annual British Columbia Mine Reclamation Symposium, Penticton, B.C., Sept. 14-17, pp. 51-62.
- Robertson, Andy MacG., Shaw, Shannon C. and Devenny, David (1998). *Post Mining Sustainable Use Plans vs Closure Plans*. In *Mine Reclamation and Remediation*, Proceedings of the Twenty-second Annual British Columbia Mine Reclamation Symposium, Penticton, B.C., Sept. 14-17, pp. 95-110.
- Robertson, Dr. A. MacG., Broughton, Linda and Shaw, Shannon (1998). *Acid Rock Drainage; Its Assessment, Prediction and Control*. Short Course Presented to the United States Environmental Protection Agency, Region 10, Seattle, WA, October 14-15.
- Robertson, A. MacG. and Shaw, S.C. (1999). The Concept of Custodial Transfer of Mined Land. In *Proceedings of Mine, Water & Environment*, Seville Spain, September 13-17, 1999. Vol 1, pp 765-771.
- Shaw, S., Robertson, A. MacG., and Maehl, W.C. (1999). Material Characterization and Prioritization of Remedial Measures at the Zortman/Landusky Mine Sites. In *Proceedings of*

- 
- the 2000 Billings Land Reclamation Symposium, Billings, Montana, March 20-24, 2000, pp. 346-358.
- Robertson, A. MacG. and Shaw, S.C. (1999). A Multiple Accounts Analysis for Tailings Site Selection. In Proceedings of Sudbury '99 Mining and the Environment, Vol. 3, pp. 883-892.
- Shaw, S. (2000). Geochemical Characterization and Water Quality Predictions for the Zortman/Landusky Reclamation Project. In Proceedings of the Eight Annual Mine Design, Operations & Closure Conference, Montana, April 16-20, 2000.
- Wels, C., Shaw, S. and Royle, M (2000). A Case History of Intrinsic Remediation of Reactive Tailings Seepage for Questa Mine, New Mexico. In Proceedings from the Fifth International Conference on Acid Rock Drainage, Vol. 1, pp. 441-462.
- Shaw, S.C, Robertson, A. MacG., Maehl, W.C., Kuipers, J. and Haight, S. (2001). *Review of the Multiple Accounts Analysis Alternatives Evaluation Process Completed for the Reclamation of the Zortman and Landusky Mine Sites*. Paper submitted for presentation at the National Association of Abandoned Mine Lands Annual Conference, August 19-22, 2001, Athens, Ohio.
- Shaw, S.C. and Robertson, A. MacG. (2001). *Geochemical Predictions of the Landusky Spent Ore Heap Leach Pads and Implications for Water Management*. Presented at the British Columbia ARD Workshop, November, 2001.
- Shaw, S., Wels, C., Robertson, A. and Lorinczi, G. (2002). *Physical and Geochemical Characterization of Mine Rock Piles at the Questa mine, New Mexico*. In Tailings and Mine Waste '02, proceedings of the Ninth International Conference on Tailings and Mine Waste, Fort Collins, Colorado, USA, 27-30 January 2002, pp. 447-458.
- Adams, D. J., T. Pickett, and S. Shaw. (2002). *Water Treatment Issues and Biotreatment Solutions for the Spent Ore Heap Leach Pads: Landusky Mine, Montana*. Presented/Published at the American Society of Mining and Reclamation. Lexington, KY. June 9-13, 2002.
- Shaw, S., Wels, C., Robertson, A., Fortin, S., and B. Walker (2003). *Background characterization study of naturally occurring acid rock drainage in the Sangre de Cristo Mountains, Taos County, New Mexico*. In Proceedings of the Sixth International Conference on Acid Rock Drainage, Cairns, Queensland, Australia, 14-17 July, 2003, pp. 605-616.
- Robertson, A. MacG., and Shaw, S. (2004): "*Use of the Multiple Accounts Analysis Process for Sustainability Optimization*". In Proceedings of the SME Annual Meeting, Denver, Colorado, USA, 23-25 February, 2004.
- Robertson, A. MacG. and Shaw, S. (2004): *The Multiple Accounts Analysis of Pit Backfilling*. Presentation published in Proceedings of the 12<sup>th</sup> Annual Mine Design, Operations & Closure Conference, Polson, Montana, USA, 25-29 April, 2004.
- Wels, C., Findlater, L, Shaw, S. and Laurencont, T. (2004). Mt. Morgan Mine – a case study of ARD impacted groundwater. In proceedings of Mine Water 2004 – Process, Policy and Progress; International Mine Water Association, pp. 235-246.

- S. Shaw, S. Dunlap and B. Maehl (2004). Evaluating the relative risks of pit reclamation alternatives at the Golden Sunlight Mine (Montana, USA); a multiple accounts analysis. In proceedings of Mine Water 2004 – Process, Policy and Progress; International Mine Water Association, pp. 77-84.
- Shannon Shaw, Jason Martin, Greg Meiers, Mike O’Kane, Christoph Wels (2006). Characterization of the Waste Rock and Pit Walls and the Jundee Mine Site in Western Australia and Implications for Long-term Issues. Paper presented at the 2006, 7<sup>th</sup>ICARD, March 26-30, 2006, St. Louis MO. Published by ASMR.
- International Atomic Energy Agency (2008). Co-author of an IAEA technical document: Best Practice in Environmental Management of Uranium Mining, currently in press.
- Williams, D.R., Shaw, S., Jepson, W., Gammons, C. And Kill Eagle, J. (2009). Zortman-Landusky: Challenges in a Decade of Closure, Paper submitted to the 2009, Securing the Future and 8<sup>th</sup>ICARD, June 22-26, 2009, Skellefteå, Sweden.
- Shannon Shaw, Julian Misiewicz, Laura Gutierrez and Luis Alberto Sanchez (2013). The geochemical field barrel program developed to support waste planning, engineering and permitting needs at the Cerro Corona Mine, Peru; in: The First International Conference on Mine Water Solutions in Extreme Environments, April 15 – 17, 2013, Lima, Peru.

**Workshops/Short Courses:**

- Robertson, A., Broughton, L and Shaw, S. (1998). Acid Rock Drainage: Its Assessment, Prediction and Control. Short course presented to U.S. Environmental Protection Agency, Region 10, Seattle, WA, October 1998.
- O’Kane, M., Wels, C., Shaw, S., Newman, G., Fawcett, M. and Ayres, B. (2003). Closure of Mine Waste Storage Facilities - Linking Cover System Performance to Impacts on Groundwater and Surface Water Receptors. Short course presented at the 6th International Conference on Acid Rock Drainage (ICARD) Cairns, Australia, July, 2003.
- Robertson, A. and Shaw, S. (2003). Predicting and Managing ARD in Mining. Short course delivered at UBC Mining Studies – Summer Institute, Vancouver, BC, July 2003.
- Robertson, A. and Shaw, S. (2004). Predicting and Managing ARD in Mining. Short course presented at UBC Mining Studies – Summer Institute, Vancouver, BC, June 2004.
- O’Kane Consultants Inc., Mehling Environmental Management Inc. and Robertson GeoConsultants Inc. (2005). Closure of Mine Waste Storage Facilities – Linking Cover System Performance to Impacts on Groundwater and Surface Water Receptors. Workshop for The Canadian Institute, Best Practices for Mine Waste Management Vancouver, BC, Canada, June 6-7, 2005
- Robertson, A. and Shaw, S. (2006). Predicting and Managing ARD in Mining. Short course presented at UBC Mining Studies – Summer Institute, Vancouver, BC, May 2006.
- Robertson, A. and Shaw, S. (2007). Predicting and Managing ARD in Mining. Short course presented at UBC Mining Studies – Summer Institute, Vancouver, BC, May 2007.



## Background

---

Hutchinson Environmental Sciences Ltd. was formed in November of as a consulting firm specializing in aquatic and environmental science, technical facilitation and peer review services.

Dr. Neil Hutchinson was the Canadian Practice Area Lead in Water and Natural Resources for AECOM Canada (formerly Gartner Lee Limited) from June of 2008 until his resignation in November of 2009. From 1998-2008 he was the Senior Aquatic Scientist at Gartner Lee Limited; appointed as a shareholder in 2000 and a Principal in 2006. He received his B.Sc. in Honours Ecology from the University of Guelph in 1978 and his Ph.D. in Zoology (Aquatic Toxicology) at the University of Guelph in 1985. He spent 3 years in post-doctoral studies and 11 years as a scientist at the Dorset Environmental Science Centre of the Ontario Ministry of the Environment. He brings over 35 years of postgraduate experience in limnology and watershed studies to the study team. His professional career has focussed on pollutants and stressors of aquatic systems, with a focus extending from geochemical to laboratory to whole-watershed levels of investigation and a specialization in PreCambrian Shield systems.

## Professional History

**Hutchinson Environmental Sciences Ltd.**  
President & Principal Scientist  
Bracebridge, ON  
2009 – Present

**AECOM**  
(formerly Gartner Lee Limited)  
Senior Aquatic Scientist  
Bracebridge, ON  
2000 – 2009

**Gartner Lee Limited**  
Senior Surface Water Specialist  
Markham, ON  
1998 – 2000

**Dorset Environmental Science Centre**  
Lake Scientist  
Ontario Ministry of the Environment  
Standards Development Branch  
1992 – 1997

**Dorset Environmental Science Centre**  
Ontario Ministry of the Environment  
Field Operations Planner  
Lake Management Studies Unit  
1987 – 1992

**Dorset Environmental Science Centre**  
Ontario Ministry of the Environment  
Post-Doctoral Research:  
Aquatic Toxicology  
1984 – 1987

**University of Guelph**  
Department of Zoology  
Graduate Research  
1979 – 1984

## Mining and Northern Environmental Management

---

Neil's experience in Northern Canada has been largely focused on the mining sector, particularly on Canada's rapidly emerging diamond mining industry, which has been characterized by detailed technical analysis and review, industry cooperation, engagement of a wide and diverse group of stakeholders and focused followup on commitments and agreements. Since 1998, Neil has provided a leadership and technical role in the regulatory review, development of the Report on the Environmental Assessment and development of the resultant Water Licences for the Diavik (for INAC-Yellowknife), Ekati and Snap Lake (for MVEIRB/MVLWB) diamond projects in the Northwest Territories, review of the EAs for the Victor diamond mine in the James Bay Lowlands of Northern Ontario (for the Attawapiskat First Nation) and technical review of the Jericho Diamond Project in Nunavut (for NIRB). He is currently retained by the Mackenzie Valley Land and Water Board and the Wek'eezhi Land and Water Board as technical advisor on water quality for mining projects. Neil has worked on various other mining projects in the NT, NU, YT and ON and provided technical input to the development of various water and effluent management policies and frameworks to guide development in the north.

***His expertise therefore covers technical assessment and policy development for a wide range of aquatic environments and activities specific to Canada's northern waters and the mining sector.***

**\* Education****\* Adjunct Faculty**

\* Department of Biology  
\* University of Waterloo  
\* 1994 – 1997

**\* Ph.D. Aquatic Toxicology**

\* Department of Zoology,  
\* University of Guelph,  
\* Supervisor: Prof J. B.  
\* Sprague  
\* Degree conferred  
\* February 1985; “Studies  
\* of trace metal mixtures  
\* and factors modifying  
\* their lethality to  
\* American flagfish  
\* (*Jordanella floridae*) in  
\* soft, acid water.” 1979  
\* – 1985

**\* B.Sc., Honours Ecology**

\* University of Guelph  
\* 1974 – 1978

**Specific Experience in Northern Mining and Water Management**

- \* Technical Advisor for surface water quality, fisheries and aquatic effects monitoring; and facilitation of technical workshops for development of the Water Licence for DeBeers Canada Gahcho Kué Diamond Project For Mackenzie Valley Land and Water Board. (2014).
- \* Technical Advisor for Fortune Minerals NiCo project Water Licence Hearings. For Wek’eezhi Land and Water Board. 2014.
- \* Technical Advisor and Facilitation for Imperial Oil Norman Wells production Facility Water Licence Renewal Water Licence Application. For Sahtu Land and Water Board. 2014.
- \* bWater quality review of draft Environmental Compliance Approval of the Wallbridge Mining Company Ltd. Broken Hammer Mine Operation, Sudbury ON. For Shared Value Solutions, on behalf of Atikameksheng Anishnawbek First Nation (October 2013).
- \* Water quality review of draft Advanced Exploration Closure Plan and supporting documents for the FNX Mining Company Inc.’s Victoria Project, Sudbury ON. For Shared Value Solutions, on behalf of Atikameksheng Anishnawbek First Nation (December, 2013).
- \* Water quality and aquatic ecological baseline and impact assessment for Argonaut Gold Magino Project, Wawa ON. SLR Consulting (2013-ongoing).
- \* Water Quality Review of Areva Kiggavik Uranium Project EIS. For Kivalliq Inuit Association (2011-ongoing)
- \* Water Quality Review of AEM Meliadine Gold Project EIS. For Kivalliq Inuit Association (2011-ongoing)
- \* Ongoing water quality assessment and guidance on the AEM Meadowbank Gold Project. For Kivalliq Inuit Association (2013-ongoing)
- \* Technical Advisor for Canadian Zinc Prairie Creek Mine Water Licence Application, Hearings and Development. For Mackenzie Valley Land and Water Board (2012-2013).
- \* Senior Water Quality and Strategic Advisor to MMG Minerals for the Izok Corridor Project of two base metals mines, a 250 km all season road and Arctic Ocean port facility in Nunavut (2012-ongoing).
- \* Aquatic effects baseline and impact assessment lead for High Lake Mine in the Izok Corridor Project for MMG Minerals (2012-ongoing).
- \* Preparation, filing and cross examination of affidavit respecting potential aquatic effects and EA process regarding Cliffs Chromite Project. For Olthuis, Kleer, Townsend representing Matawa First Nation (2011-2013).
- \* Development of Guidelines for Mixing Zones and General Objectives for Effluent Discharges. For Mackenzie Valley Land and Water Board (2011).
- \* Technical Advisor and Facilitation for Snap Lake Diamond Project Water Licence Renewal. For Mackenzie Valley Land and Water Board. (2011-2012)
- \* Review and Guidance for Three-Year Review of Diavik Diamond Mine Aquatic Effects Monitoring Program. For Wek’eezhi Land and Water Board (2011-2012).
- \* Water Quality Review of Newmont Gold Hope Bay Mining Project. For Kitikmeot Inuit Association (2011-ongoing)

- \* Technical input into the development of the Water Licence for the Diavik Diamond Mine through DIAND's intervention to the NWT Water Board and development and review of the resultant monitoring program and effluent limits (1999-2000).
  - o ***Neil's contribution to DIAND's Diavik Project Team was recognized by the inclusion of himself and the rest of the Gartner Lee Team for receipt of an Award of Excellence from the President of the Treasury Board of Canada in 2001.***
- \* Technical evaluation, prehearing submissions and preparation of the Environmental Assessment Report of the Snap Lake Diamond Project by DeBeers Limited, on behalf of the MVEIRB (2003).
- \* Development of the Water Licence for the Snap Lake Diamond Project (Mackenzie Valley Land and Water Board (MVLWB) in 2003).
- \* Assembly of the entire technical review team and technical review of water quality of the EA submission for the Victor Diamond Project of DeBeers Canada in the James Bay Lowlands of Ontario, on behalf of the Attawapiskat First Nation in 2002-2003. Ongoing review of licences and permits for the Victor Mine on behalf of the Attawapiskat First Nation (2003-2008).
- \* Technical screening of the EA submission for the Jericho Diamonds Project by Tahera Corp., on behalf of DIAND, Nunavut (2001).
- \* Technical review of the Aquatic Effects Monitoring Program (AEMP) Report of Diavik Diamond Mines Inc. on behalf of the Environmental Monitoring and Assessment Board of the Diavik Project (2004, on behalf of EMAB).
- \* Technical review of various documents submitted by Diavik Diamond Mines Inc. in support of amendment and renewal of their Water Licence (2005-2008). Development of Terms of Reference for Revised Aquatic Effects Monitoring Plan for Diavik Diamond Mines Inc. (2007), coordination of review of draft and final AEMP submissions by DDMI, including facilitation of AEMP design workshop in March 2007, and follow up on technical elements in Water Licence and AEMP, all for Wek'eezhi Land and Water Board (2006-2008).
- \* Development of remedial plans for CN-contaminated tailings water at the Colomac Mine on behalf of DIAND Royal Oak Project Team (2000).
- \* Environmental Monitoring, synthesis and reporting of aquatic environmental surveys at the Discovery Mine Site, on behalf of DIAND, Yellowknife (2000).
- \* Review of Municipal Water Management policies and approaches in Nunavut (2000).
- \* Development of a Water Management and Pricing Framework for surface waters on Inuit Owned Lands in Nunavut, for Nunavut Tunngavik Inc in 2000.
- \* Preparation of the water quality input to the Environmental Assessment Report for the Anvil Range Mine Maintenance Program, Faro, YT (for Deloitte and Touche – Interim Receiver, 2003).
- \* Development of draft site-specific water quality objectives for final closure of the Anvil Range Mine, Faro, YT (for Deloitte and Touche – Interim Receiver, 2003).
- \* Technical Peer Review of The NWT Transboundary Water Quality Agreement with Alberta, on behalf of DIAND Water Resources Division, Yellowknife (2002).
- \* Technical review of DIAND technical report and analysis of receiving water quality at the Prairie Creek Mine, on behalf of DIAND, Water Resources Division, Yellowknife (2002).
- \* Technical screening of the EA submission for the Doris North Gold Mine, Nunavut (Miramar Corp.), on behalf of INAC, Nunavut and presentation and attendance at pre-hearings for the mine in four Nunavut communities in April 2003 and participation at the hearings in July 2004.
- \* Review of proposed effluent quality and receiving water assessment for renewal of the Water Licence for the Ekati Diamond Mine (2004, on behalf of DFO).



## \* Summary of Related Experience

---

### Neil has:

- Published 13 papers and a book chapter on acidification and nutrient management in the primary scientific literature.
- Conducted scientific peer review for eight scientific journals.
- Served as Associate Editor for the Scientific Journal “Lake and Reservoir Management” from 2004 – 2011.
- Supervised and examined numerous graduate students.
- Made over 40 presentations of original research on acidification, nutrient management and remote sensing to scientific conferences;
- Served as the Program Chair for “Aquatic Ecosystem Stewardship”. 15th Annual Symposium of the North American Lake Management Society. Toronto, Ontario. November 6 – 11, 1995
- Written numerous scientific reports on nutrient management for the provincial government;
- Given invited talks and keynote addresses to scientific gatherings on acidification, lake and nutrient management and watershed ecology;
- Given numerous invited lectures to senior undergraduate and graduate classes, cottager’s associations and the general public; and
- Provided scientific peer review and technical assistance to practitioners of lakeshore capacity planning in provincial and municipal governments, the consulting industry and the Federation of Ontario Cottager’s Associations.

### Served as an invited expert for:

- United States National Acid Precipitation Assessment Program. “Critical Values for Effects of Acidification on Fish Populations”, April 1989.
- Natural Sciences and Engineering Research Council of Canada (NSERC). Grant Selection Committee 18 – Ecology and Evolution.: 2000 – 2002.
- Natural Sciences and Engineering Research Council of Canada (NSERC). Strategic Project Grants Selection Committee. Panel A “Healthy Environment and Ecosystems” : 2007 – 2009. Panel Chair – 2008, 2009.
- Natural Sciences and Engineering Research Council of Canada (NSERC). Vanier Graduate Scholarship Selection Committee. 2012-2014.

### Been Qualified as an expert witness for:

- Aquatic toxicology of acid and trace metals, Provincial Court of Ontario, April 1991,
- Limnology, water quality and eutrophication. Ontario Municipal Board. November 1993, September 1996, October, 2005, March 2006, October 2007.
- Water Quality – Northwest Territories Water Board. December, 1999, Mackenzie Valley Environmental Impact Review Board. April 2003, Nunavut Impact Review Board, June 2004, Wek’eezhi Land and Water Board, November 2006.

## Professional Memberships

---

- North American Lake Management Society (1987 – Present)
- Board of Directors – Muskoka Heritage Foundation (2000 – 2006)
- Executive Committee – Muskoka Watershed Council (2001 – 2004)