

# Nicola Lower, Ph.D., R.P.Bio

Principal Consultant

Dr. Lower is skilled in managing complex environmental programs, and contributes technical and strategic advice to impact assessments, environmental permitting, compensation plans, and baseline programs. Nicola has led multi-disciplinary environmental programs for the mining industry across Canada and internationally, at all stages from exploration to post-closure. In Canada, Nicola has experience working with environmental legislation and regulations at the federal, territorial and provincial level. Nicola is passionate about promoting sustainable mining that provides benefits to local communities and Indigenous groups. Nicola has developed environmental monitor training and capacity-building programs for Inuit and First Nation field assistants, as well as a strategy to help build expertise alongside environmental compliance and management plans.



**Experience:** 20 years' experience in natural resource management.

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## Education

- Post-Doctoral Fellow, University of Guelph, Canada, 2007 – 2010
- Ph.D. Fisheries Biology, University of Portsmouth, UK, 2007
- M.Sc. (w Distinction). Natural Resource Management, University of Leicester, UK, 1998
- B.Sc. Environmental Life Science, University of Nottingham, UK, 1996

## Professional Affiliations and Registrations

- Registered Professional Biologist of British Columbia (College of Applied Biology, 2016 – present)

## Languages

- English, native speaker

## Fields of Competence

- Environmental permitting
- Impact assessment
- Indigenous Consultation and Engagement
- Capacity-building
- The *Fisheries Act*
- Project management

## Key Industry Sectors

- Mining and Metals
- Oil and Gas
- Power
- Natural Resources
- Transportation

## Honors and Awards

- City of Guelph, River Systems Advisory Committee (2011-2019)
- Canadian Commonwealth Post-Doctoral Fellowship from Department of Foreign Affairs and International Trade (2007-2008)
- Winston Churchill Memorial Trust Travel Fellowship (2004), on aquaculture industry. Churchill Medallion from HM The Queen (2006)
- British Association Media Fellowship (2002). Media-trained and two-month secondment to BBC television program 'Countryfile'

## Key Projects

### **Amaruq Whale Tail Project, Nunavut**

(2018- present). Project Manager and Permitting Lead for proposed amendment to Schedule 2 of the Metal and Diamond Mining Effluent Regulations (MDMER). Led Alternatives Assessment process and report according to federal guidelines; completed two years of community engagement on the alternatives process and fish offsetting options; regulatory engagement with Fisheries and Oceans Canada (DFO) and Environment and Climate Change Canada (ECCC).

### **Saramacca Project, Suriname.**

(2018 - present). Project Manager for successful approval for an Environmental and Social Impact Assessment for a mine expansion and new road in South America, operated by a Canadian company. The ESIA satisfied contractual obligations, national guidelines, draft regulations and international and corporate standards. Managed a multi-national team from across Canada, US, and in-country local subs to provide local technical expertise with industry-leading impact assessment process. ESIA was successful approved within Project development timeline. The approved-project is currently in construction phase, and continue to provide environmental leadership and capacity building to the in-country team, and on-site environmental monitoring to remain in compliance with ESIA commitments.

### **Loma Larga Project, Ecuador.**

(2018-2019). Project Manager for a draft Environmental Impact Assessment to meet Ecuadorian standards and select International Finance Corporation principles for a proposed new mine owned by a Canadian company. Managed a multi-national team from across Canada, US, Peru and Ecuador including baseline collection, reporting, impact assessment, and project alternatives.

### **Hope Bay, Nunavut.**

(2019-present). Project lead for capacity-building program for Inuit environmental monitors.

### **Technical Reviewer, Inuit Association, Nunavut**

(2014-2017). Fisheries Technical Reviewer of development projects within IA lands. Participated in Nunavut Impact Review Board Hearings for two mine development projects.

### **Cullaton Lake Closed Mine Site, Nunavut**

(2014-2017). Lead Project Biologist. Reviewed existing closure plan and provided a technical assessment on existing ecological risk at the site; designed an adaptive monitoring plan to maintain low level of aquatic ecological risk; input to regulatory consultation; senior review of updated Closure and Reclamation Plan in support of Water Licence Amendment.

### **Blackwater Project, British Columbia**

(2015-2017). Fisheries Technical Lead for the updated effects assessment for the EA and *Fisheries Act* Offsetting Plan. Completed technical responses on fisheries impacts and mitigation measures to government Information Requests. Lead author on the fisheries offsetting plan submitted with the Environmental Impact Statement.

### **Lake Koocanusa Monitoring, British Columbia**

(2017) Senior Reviewer on Study Design for next 3-year cycle of monitoring on the Canadian portion of Lake Koocanusa.

### **Red Mountain Gold Project, British Columbia**

(2016-2017). Fisheries Discipline Lead. EA Effects Assessment writing for EIS Application, including links with indigenous and socio-economic effects related to fisheries.

### **Coffee Gold Project, Yukon**

(2014-2016). Senior Fisheries Biologist. Input to baseline program and senior review of aquatic baseline report in support of project development, EA and permitting.

### **Borden Gold Project, Ontario**

(2011-2015). Environment Project Manager. Led multi-disciplinary baseline program to de-risk project development, and support eventual EA and permitting. Delivered presentations to Indigenous communities, and designed and delivered environmental monitoring training program for First Nation monitors. Developed Environmental Management Plan for exploration, and obtained Permits to Take Water (*Water Resources Act*) for exploration activities.

### **Casino Project, Yukon**

(2014-2016). Senior Fisheries Biologist. Input to baseline aquatic report, and relevant sections of the EA. Provide advice on data gaps and permitting plans related to the *Fisheries Act*.

### **Thierry Mine, Ontario,**

(2011-2015). Environment Project Manager for proposed dewatering activities at the closed site, including aquatic baseline studies and working with engineers on dewatering plan. Regulatory engagement and environmental compliance monitoring.

### **Labrador Irons Mines, Labrador/Quebec**

(2011-2013). Aquatic Discipline Lead for baseline field studies and reporting on three greenfield properties.

### **Goshen, Bluewater and Jericho Wind Energy Centres, Ontario**

(2011-2014). Aquatics technical lead. Led all field surveys and reporting to meet the requirements of the Renewable Energy Approval requirements for waterbodies assessment, including agency consultation for REA, and to meet concurrent permit requirements for the *Fisheries Act*, *Endangered Species Act*, and Conservation Agency Regulations.

### **East Rail Maintenance Facility, Ontario**

(2013-2014). Lead Biologist on a creek rehabilitation, wetland creation, and channel realignment project as part of the *Fisheries Act* compensation plan,

including regulatory agency consultation and design of the monitoring plan.

### **Barrie Rail Corridor Track Expansion, Ontario**

(2013). Lead Biologist. Assessment of watercourse crossings in support of both federal and provincial permitting process. Coordinated assessments across ecological disciplines, including species at risk screenings and tree preservation plans. Contributed to regulatory agency consultation and developed mitigation and restoration plans. *Fisheries Act* approval and Conservation Authority Regulations permit.

### **Rt. Hon. Herb. Grey Parkway, Windsor, Ontario**

(2011-2013). Technical Reviewer for the owner on regulatory submissions to DFO, including fish habitat compensation plans, design drawings, and stormwater management reports related to the Design-Build of the Parkway.

### **Stanton Drain Remediation and Stormwater Management Facility, Ontario**

(2013-2014). Senior Fisheries Biologist. *Fisheries Act* Authorization and fish compensation plan for channel relocation, and rehabilitation of fish habitat.

### **Upper York Sewage Solutions EA, Ontario**

(2013-2014). Aquatic Discipline Lead for the Individual EA. Planned field assessments and led reporting to aid in the selection of the preferred alternative. Provided technical expertise on the potential impacts of the water reclamation centre outfall on fish and fish habitat, and agency meetings.

### **Queen Street (Detail Design between Mississauga and Chinguacousy Roads) and Mississauga Road (Municipal Class EA between Bovaird to Mayfield Road) Improvements, Ontario**

(2013-2014). Species at Risk Permitting Lead. Led the development of permit applications for complex permitting for multiple watercourses crossings in redbreasted dace habitat (protected under the provincial *Endangered Species Act*). Included Alternatives Assessment, regulatory agency

consultation, and development of 'Overall Benefit' permit applications.

## Publications

- Van Rossum, T., Pylatuk, M.M., Osachoff, H.L., Griffiths, E.J., Lo, R., Quach, M., Palmer, R., Lower, N., Brinkman, F., Kennedy, C.J. 2015. Microbiome analysis across a natural copper gradient at a proposed northern Canadian mine site. *Frontiers in Env. Science*, vol.3 (84).
- Lower, N., Quach, M. and Marsland, R. The role of aquatic ecological risk assessment to guide effluent management from mine waste. *Mine Closure 2015*. A.B. Fourie, M. Tibbett., L. Sawatsky, and D. van Zyl (eds).
- Stamplecoskie, K.M., Binder, T.R., Lower, N., Cottenie, K., McLaughlin, R.L., McDonald, G.D., 2012. Effect of artificial lighting on the catchability of sea lamprey (*Petromyzon marinus*) in portable traps. *North American Journal of Fisheries Management*, 32: 563-572.
- Landsman, S.J., Gobin, J., Cook, K.V., Nguyen, V.M., Gutowsky, L.F.G., Binder, T.R., Lower, N., McLaughlin, R.L., Cooke, S.J., 2011. A review of fish movement and migration studies in the Laurentian Great Lakes: historical perspectives, management issues, and future research opportunities. *Journal of Great Lakes Research*, 37-2.
- Lower, N. and Moore, A. 2007. The impact of a brominated flame retardant on smoltification and olfactory function in Atlantic salmon (*Salmo salar* L.) smolts. *Marine and Freshwater Behaviour and Physiology*, 40(4), 267-284.
- Riley, W.D., Ibbotson, A.T., Lower, N., Cook, A.C., Moore, A., Mizuno, S., Pinder, A.C., Beaumont, W.R.C, and Privitera, L. 2008. Physiological seawater adaptation in juvenile Atlantic salmon, *Salmo salar* L., autumn migrants. *Freshwater Biology* 53, 745-755.
- Moore, A. Lower, N. Mayer, I. Greenwood, L. 2007. The impact of a pesticide on migratory activity and olfactory function in Atlantic salmon (*Salmo salar* L.) smolts. *Aquaculture* 273 (2-3), 350-359.
- Lower, N., Moore, A., Scott, A. P., Ellis, T., James, J. D., and Russell, I.C. 2005. A non-invasive method to assess the impact of electronic tag insertion on stress levels in fish. *Journal of Fish Biology* 67, 1202-1212.
- Lower, N., Scott, A. P., & Moore, A. 2004. Release of sex steroids into the water by roach (*Rutilus rutilus* L.). *Journal of Fish Biology* 64, 16-33.
- Lower, N. & Moore, A. 2003. Exposure to insecticides inhibits embryo development and emergence in Atlantic salmon (*Salmo salar* L.). *Fish Physiology and Biochemistry* 28: 431-432
- Moore, A., Scott, A.P., Lower, N., Katsiadaki, I. & Greenwood, L. 2003. The effects of 4-nonylphenol and atrazine on Atlantic salmon (*Salmo salar* L.) smolts. *Aquaculture*.222, 253-263.
- Moore, A., Olsen, K.H., Lower, N. & Kindahl, H. 2002. The role of F-series prostaglandins as reproductive priming pheromones in the brown trout (*Salmo trutta* L.). *Journal of Fish Biology* 60, 613-624.
- Moore, A. & Lower, N. 2001. The impact of two pesticides on olfactory-mediated endocrine function in mature male Atlantic salmon (*Salmo salar* L.) parr. *Comparative Biochemistry and Physiology Part B*, 129, 269-276.
- Seppa, T., Laurila, A., Peuhkuri, N., Piironen, J. & Lower, N. 2001. Early familiarity has fitness consequences for Arctic charr (*Salvelinus alpinus*) juveniles. *Canadian Journal of Fisheries and Aquatic Sciences* 58, 1380-1385.
- Lahti, K. & Lower, N. 2000. Effects of size asymmetry on aggression and food acquisition in Arctic charr (*Salvelinus alpinus*). *Journal of Fish Biology* 56, 915-922.