

# Appendix E

## Project Team CVs





## Sarah Aitken, B. Sc. Hon., ET Diploma Aquatic Ecologist

### Professional History

2008 - present, AECOM, Aquatic Ecologist

2007 – Kawartha Lake Conservation, Fisheries Technician

2004-2006, Gartner Lee Limited, Environmental Technologist

2004 – Credit Valley Conservation, Water Resources Assistant

### Education

Environmental Technology, Sir Sandford Fleming College Lindsay, ON 2001 – 2004

Environmental Resource Science (Honours) Trent University Peterborough, ON 2006 – 2008

### Years of Experience

With AECOM: 6

With Other Firms: 1

### Training

MTO/DFO/OMNR Fisheries Protocol Training for Consultant Fisheries Specialists – January 2010

Canadian Pleasure Craft Operator

WHMIS Training

Fall Arrest Training

Ontario Benthos Biomonitoring Network Certification Course, Ministry of the Environment, April 2005

Electrofishing Certification Level 2 Backpack, September 2010

Sarah Aitken is an Aquatic Ecologist with AECOM. She has over six years of experience in the environmental field in both the public and private sector. Since joining AECOM in 2004, Sarah has worked on a diverse range of projects including environmental monitoring projects, Renewable Energy projects, transportation projects, environmental impact studies, large-scale dewatering projects, construction monitoring projects and several EEM mining programs and lake management studies. Sarah has coordinated and implemented a variety of ecological and water resource monitoring activities for various projects and also has experience collecting benthic invertebrates, fish sampling and conducting detailed fish habitat information. She has experience in the collection and analysis of water quality data, stream assessments, various lake sampling techniques, installation of a variety of surface water field equipment, and report writing.

### EXPERIENCE

Experience with various lake sampling techniques, including sediment coring, bathymetry, benthic invertebrate sampling, water quality and lake profiling for Brampton Lakes and Fairy Lake.

Completed several Fish community and biomass surveys for various projects including EA's and EIS studies. This included the use of different equipment including; backpack electrofisher, gill nets, hoop nets and minnow traps. Sarah has contributed technical advice to the permitting and approval process of several projects.

Completed several construction monitoring projects including regular site inspection of construction activities near water, fish capture and relocation and turbidity monitoring.

Conducted various water quality sampling programs for both surface water and groundwater systems. Also completed detailed analysis and report preparation with these results.

Sarah has coordinated and implemented several environmental baseline studies and completed Environmental Effects Monitoring (EEM) programs for several mining projects.

### Fisheries and Fish Habitat Assessments

#### **NextEra Wind Energy Centre, Renewable Energy Assessment-Waterbodies (2010-2012)**

Coordinated the water bodies program including field work, reporting and obtaining agency approvals. Preparation of the water bodies report, Bluewater Species at Risk program for Redside Dace sampling and agency consultation with MNR and local Conservation Authorities.

#### **Walpole Island First Nation, Walpole Island Dredge Cut Restoration Project, ON (2009-2010)**

Standard First Aid with CPR Level A,  
March 2012

Gartner Lee Centres of Excellence –  
Fisheries Methods Course, June 2008

Lake Management in a Changing  
Environment, North American Lake  
Management Society Conference,  
November 2008

Taxonomy, Ecology and Control of  
Nuisance Algae, Pre-conference  
Workshop, North American Lake  
Management Society, November 2008

Fish Identification Workshop - Royal  
Ontario Museum (2009)

Conducted a feasibility study that included assessments of sediment and water quality in order to develop a strategy to restore 14 linear kilometres of aquatic habitat around Potawatomi Island.

**Squirrel Island Bridge Replacement, Walpole Island, ON (2009)**

Aquatic investigations were undertaken to aid in the assessment of potential effects of a bridge replacement on Squirrel Island between River Road South and Squirrel Island Road. Detailed background view and fish habitat mapping was conducted.

**Mississauga Road Widening – Huttonville Creek, Mississauga Ontario (2010-Present)**

Sarah contributed technical advice to the permitting and approval process for an ESA required permit. This involved the evaluation of different alternatives and their associated impacts and benefits analysis. Sarah also assisted in developing rationale for the different alternatives and compensation plans.

**City of Guelph, Arkell Springs Creek AMP Monitoring, Eden Mills Ontario (2008-2009)**

Monitored the effects of a long-term pumping project on a coldwater trout stream. Sarah collected data including stream velocities, surface and groundwater interaction, fisheries community information, redd surveys and aquatic habitat assessments.

**Monora Creek, Brook Trout Biomass Survey, Ontario (2004-2009)**

Conducted annual biomass surveys and spawning surveys to determine if there was an impact on fish populations from groundwater extraction. Temperature monitoring and stream flow monitoring was also conducted on a monthly basis. Sarah also coordinated and prepared annual reports for the client.

**City of London, Storm Drainage and Stormwater Management Facility and Servicing - Class Environmental Assessment, White Oak Area, London, Ontario.**

Collected aquatic habitat and reconnaissance level fish species presence data from White Oak drain and tributaries and provided recommendations for stormwater management implications. [2009]

**Blockline Environmental Impact Study, Kitchener, Ontario (2009-Present)**

Sarah collected detailed fish habitat information in Schneider Creek for the Preliminary Design Brief for the extension of Block Line Road from Hanson Avenue to Courtland Avenue East. Sarah assessed the significance of Schneider Creek, the present constraints and opportunities, the potential impacts anticipated as a result of the proposed road extension and provided an Environmental Management Plan for the protection and management of Schneider Creek.

**TTC – 407 Subway Station, Toronto, Ontario (2009)**

Sarah collected detailed fish habitat information according to the MTO/DFO Fish Habitat Protocol. Fish community surveys were also conducted the length of the study reach.

**Waterloo LRT Environmental Impact Study, Region of Waterloo, Ontario (2009-2010)**

Conducted detailed fish habitat assessments of all identified watercrossings in study area, specifically looking at crossing locations and downstream habitat. Sarah conducted fish community surveys by electrofishing and minnow traps and assessed the significance of all the watercourse crossings, the present constraints and opportunities, the potential impacts anticipated and mitigation techniques to protect the watercourses.

### **Environmental and Construction Monitoring**

#### **Design-Build of the Elgin Area Primary Water Transmission Main Twinning, Ontario (2010-Present)**

Sarah played a large role in coordinating and implementing the field work which included detailed assessment of all potential watercourse crossings, collection of fish habitat information and fish community studies. Sarah maintained contact with regulatory agencies and compiled a detailed report submitted for agency approval. She also worked with Transport Canada to obtain Navigable Waters approvals.

#### **York Region Sanitary Sewer Installation – 16th Avenue, Markham, Ontario (2004-2006)**

Sarah coordinated field schedules and implemented field programs for the 16th Avenue Projects, which included stream flows, groundwater levels, maintenance of stream loggers, site investigations, water quality sampling and fish sampling. Sarah was also responsible for peer reviewing data collection from other consulting firms and auditing site selections. She was responsible for organizing high quality field notes for project records, developing rating curves, creating a database for data storage and preparing reports for the client.

#### **York Region Sanitary Sewer Installation – 9<sup>th</sup> Line, Stouffville, Ontario (2004-2006)**

Sarah played a large role in completing a long-term monitoring program which monitored the impacts from dewatering on a coldwater Brook Trout stream. Weekly stream flows, groundwater levels, maintenance of stream loggers, construction monitoring, water quality sampling and fish sampling. She was responsible for data collection and organization, developing rating curves and preparing reports for the client. Sarah also maintained relationships with sub-consultants and the client.

#### **York Region Sanitary Sewer Installation – King Road, King City, Ontario (2004-2006)**

Sarah coordinated and implemented field programs for the King Road sanitary sewer installation, which included stream flows, groundwater levels, construction monitoring, wetland monitoring, and site investigations. She was responsible for the taking and organizing field notes for the project records and preparing reports for the client.

#### **Puslinch Culvert 93 Replacement, Puslinch, Ontario (2010)**

Coordinated and assisted in construction monitoring of silt fencing and channel removal. Helped develop and implement a fish capture and relocation plan during construction phase.

**Huron County Culvert 86-19.7 Bridge Replacement, Huron County, Ontario (2010)**

Coordinated and assisted in construction monitoring of silt fencing and channel removal. Helped develop and implement a fish capture and relocation plan during construction phase.

**Lake Management Studies****Fairy Lake Water Quality Study, Acton, Ontario (2008-2009)**

Sarah coordinated and completed field work analysis of a small urban lake including low flow and rain event sampling, dissolved oxygen lake profiling, water quality measurements and sediment core sampling. She compiled and analysed field data and assisted in the preparation of the final report. Sarah also helped determine options for enhancing the quality of the lake for the client and nuisance geese management options.

**Citywide Lake Assessment/Management Study, Brampton, Ontario (2004-2006)**

Sarah participated in an extensive monitoring program to collect water quality, fish community data and habitat ecology for several urban lakes within the City of Brampton. Sarah assisted in the data organization and report writing, as well as answering client comments.

**West End Community Centre, DFO Compliance Monitoring, Guelph, Ontario (2008-2009)**

Project manager for a pond monitoring study (2008-2009) resulting in management recommendations for improvements to water quality, mitigation of nuisance wildlife and suitability of fish stocking. Sarah conducted pond profiling and captured and re-stocked pond with select species.

**Woodbine Racetrack Water Quality Monitoring, Etobicoke, Ontario (2004-2006)**

Sarah completed monthly surface water quality sampling from various stormwater ponds and the receiving waterbodies.



## **Caroline Boros, Honours B. Env. Sc. Aquatic Ecologist**

### **Professional History**

AECOM

Aquatic Ecologist  
2007 to present

Grand River Conservation Authority  
Water Quality Technician  
Cambridge Ontario  
2006 – 2007

Hamilton Conservation Authority  
Water Resource  
Technologist Assistant  
Ancaster Ontario  
2004 – 2005

### **Education**

Honours Bachelor of  
Environmental Science  
University of Guelph  
2000 – 2004

Ecosystem Restoration  
Graduate Certificate  
Niagara College

### **Years of Experience**

With AECOM: 5

With Other Firms: 2

Caroline is a graduate of the University of Guelph Honours Environmental Science degree program and is currently working as an Aquatic Ecologist for AECOM (formerly Gartner Lee Limited) with over four years experience in the field. She has an excellent background in the aquatic sciences, specifically with ecosystem restoration and habitat assessment.

### **EXPERIENCE**

#### **Ecological Assessment and Monitoring**

##### **NextEra Wind Energy Centre, Renewable Energy Assessment-Waterbodies (2011-2012)**

Acted as lead aquatic field ecologist for waterbodies surveys conducted in Bluewater, Goshen and Jericho study areas under the direction of the Renewable Energy Act (REA) requirements. Involved in the report preparation for the Bluewater Waterbodies REA submission to the Ministry of Environment. Acted as lead aquatic field ecologist for the Species at Risk surveys conducted in Bluewater study area – target species were Redside dace and Black redbhorse.

##### **Walkers Aggregates Inc., Aquatic Ecology Monitoring Program, Thorold (2007 – 2011)**

Collection and management of surface water and aquatic data to assess impacts on streams due to quarry activities. The investigation includes surface water flow monitoring, benthic macroinvertebrate community assessment, and fish community and habitat assessment. Participate in formal responses to various provincial agency technical comments as it pertains to submitted reports for on-going compliance of permits.

##### **Township of Brock, Blackwater Bridge Replacement Environmental Impact Study, Brock (2010 – 2011)**

Conducted fish habitat assessment and fish community survey to document existing conditions and identify potential impacts as a result of the proposed bridge replacement. Ongoing consultation with local conservation authority to determine mitigation and compensation measures for the potential bridge design.

##### **Clean Harbors Canada Inc., Natural Environment Assessment, Petrolia (2011)**

Completed a natural features assessment in support of the Environmental Assessment document for the potential expansion of the landfill. Field investigations included fish habitat and community assessments in surrounding areas, and bird surveys for onsite woodlots.

**Walpole Island First Nations, Dredge Cut Restoration, Walpole Island (2011)**

Assisted in the desktop background research, data compilation and interpretation and summarized the water quality, and fish habitat and community findings in the report.

**Town of Innisfil, Lakeshore Water Treatment Plant Expansion Municipal Class Environmental Assessment (2010)**

Completed fish habitat and fish community assessments, including fish habitat assessment in the lake using live underwater video feed (using scuba divers and a dive boat). Prepared field data results and potential impacts to fisheries in the respective sections in the final report.

**Town of Fort Erie, Bridge Replacement: Fish habitat and community assessment, Fort Erie (2010)**

Completed a fish habitat and fish community assessment as part of an Environmental Assessment for two proposed bridge replacements in the township. Prepared a memo which included the characterization of the relative risk for the proposed works within the DFO Risk Management Framework.

**Walkers Aggregates Inc., Ten Mile Creek Re-alignment Monitoring, Thorold (2007- 2009)**

Conducted post-construction monitoring and reporting of fish habitat and community for a re-aligned stream in order to comply with Department of Fisheries and Oceans (DFO) authorization.

**Walkers Aggregates Inc., Permit to Take Water: Aquatic Ecology Monitoring, Ridgemount (2009)**

As part of the reapplication process for a Permit to Take Water (PTTW) a potential stream re-alignment assessment was completed. The investigation included surface water flow monitoring, temperature monitoring, benthic macroinvertebrate community assessment, and fish community and habitat assessment.

**Surface Water Monitoring****Clean Harbors Canada Inc., Surface Water Investigation, Petrolia (2011)**

Involved in an off-site surface water investigation for a waste transfer facility which includes wet weather sampling events, water level monitoring (using loggers), and sediment sampling. On-going monitoring for 2011 with a final report to be completed at the end of the year.

**Décor, Surface Water and Operations and Maintenance Monitoring, Hamilton (2009- 2010)**

Project Manager. Co-ordinated field investigations and monitoring for the Certificate of Approval for their surface water monitoring, and operations and maintenance monitoring. Prepared quarterly reports for Ministry of Environment review which examined water quality conditions on site.



**Clean Harbors Canada Inc., Assimilative Capacity Study, Mississauga (2010)**

Responsible for collecting the surface water quality samples and stream flow measurements used to assess the assimilative capacity of the onsite discharge to the down gradient stream.

**Groundwater Monitoring****Confidential Private Company, Remediation monitoring, Cambridge (2007 – 2011)**

Site is TCE impacted and has a purge water containment program in place. Assisted in remediation program initiation through groundwater well development, groundwater sampling, hydraulic conductivity testing, water level measurements, and PID measurements. Also participated in the monitoring program during the in-situ chemical oxidant injections.

**Clean Harbors, Compliance monitoring, Facilities- London, Niagara, Sarnia, Mississauga (2007 – 2010)**

Involved in ongoing Certificate of Approval compliance monitoring for each of the facilities. Conducted field work which included: water levels, groundwater sampling, groundwater well development, surface water sampling, well recovery pump test.

**CBM St. Mary's Cement, Permit to take water – Phase 1 pump test, Flamborough (2008)**

Involved in the Permit to Take Water Phase 1 Pump Test conducted in the spring. Assisted in field work co-ordination and preparation for daily on-site meetings with the Ministry of Environment. On-site work included groundwater sampling, slug testing, logger calibration, logger installations, database management, piezometer installation in wetlands.

**City of Guelph - Imico, Groundwater monitoring, Guelph (2007 – 2009)**

Complete bi-annual monitoring on-site for the Certificate of Approval which includes water levels and groundwater sampling.

**City of Guelph, Arkell Springs Aquifer Investigations, Guelph (2007)**

Involved in groundwater investigations including quarterly water levels, groundwater sampling, piezometer installation and monitoring, logger installations and logger data management.





## Andrea Dart Environmental Technician

### Professional History

01/2006 - present, AECOM,  
Environmental Technician  
2005 - 2005, Nulmage  
Landscaping, Crew Member  
2005 - 2005, Ministry of the  
Environment, Nutrient  
Management Specialist  
Assistant  
2004 - 2004, Acorus  
Restorations, Native Wetland  
Nursery Supervisor  
2003 - 2003, Ministry of  
Natural Resources, Surface  
Water Specialist's Assistant

### Education

Diploma, Environmental  
Technology, Sir Sandford  
Fleming College

### Years of Experience

With AECOM: 6  
With Other Firms: 3

### Training and Certifications

40 Hour Hazwoper Training  
RAQS Fisheries Contract  
Specialist  
Certified Inspector of Sediment  
and Erosion Control - CISEC  
Excavation and Trenching  
Safety Awareness  
Asbestos Awareness  
Health and Safety Personal  
Protective Equipment Training  
Working at Heights  
Confined Space Entry  
Confined Space Awareness  
Fall Prevention Training  
WHMIS Training  
CPR and First Aid Training  
Transportation of Dangerous

Ms. Dart is an environmental technician with over six years of experience in the environmental consulting business. She has been the lead field coordinator and team member for many large-scale projects. Ms. Dart has been responsible for managing compliance monitoring, conducting construction monitoring with sediment and erosion control inspections, managing environmental assessments, data evaluation, quality control, and liaison with subcontractors and the public. She has been the deputy project manager on multiple projects. She has written landfill, aggregate, and sections of environmental assessments and monitoring reports, as well as field methodologies. She has worked in headwater streams, rivers, lakes, wetlands, landfills, quarries, and contaminated sites. Ms. Dart is a member of the Woodlot Association, Willow Beach Naturalist Club, Friends of Presqu'île Park, and became an Ontario Stream Steward in 2011. Within her first year at AECOM, Ms. Dart won the Top Contributor award.

### Experience

Regional Municipality of York, Southeast Collection Trunk Sewer, Environmental Assessment.

Conducted amphibian surveys, benthic collection and rapid Ontario stream assessments at multiple locations. Conduct weekly sediment and erosion control inspections at various locations and provided weekly summaries. Conducted extensive water level measurements and wetland monitoring. Compiled data and created the graphical presentation for bi-monthly reports, conducted quality control of data, and contributed to written sections of the bi-monthly monitoring report. [2010-present]

Regional Municipality of York, Reconstruction and Bridge/Culvert Replacement, and Road Improvements - Stouffville Road, Stouffville ON.

Conducted periodic sediment and erosion control inspections and provided weekly summaries to client. Conducted benthic invertebrate collection. [2011-present]

Regional Municipality of York, Reconstruction and Bridge/Culvert Replacement, and Road Improvements – Ressor Road and 16<sup>th</sup> Ave, Markham ON.

Conducted periodic sediment and erosion control inspections and provided weekly summaries to client. [2012-present]

Regional Municipality of York, 16th Avenue Trunk Sewer Phase II, Markham, Ontario.

Lead field coordinator. Conducted and managed all compliance monitoring requirements. Conducted streamflows and electrofishing. Collected surface water samples, field chemistry, wetland moisture measurements, benthic invertebrates. Installed mini

Goods Certificate  
Operator in Training of Water Treatment  
Operator in Training of Wastewater Treatment  
Operator in Training of Water Distribution  
Operator in Training of Wastewater Collection  
Pleasure Craft Operator Certificate  
Ontario Stream Assessment Protocol Certified with Level 1 Fish I.D

piezometers and collected water levels. Worked with the telemetry system uploading data into database and conducting quality control. Compiled data and created the graphical presentation for the monthly reports, created stage discharge curves, and contributed to the writing of the monthly monitoring reports. Organized the extensive field work and coordinated several employees. [2006-2010]

Regional Municipality of York, West Rainbow Creek Sanitary Sewer Project, Markham, Ontario.

Lead field coordinator. Conducted and managed all compliance monitoring requirements. Conducted a mussel rescue, electrofishing, and streamflows. Collected water levels, surface water samples, field chemistry, temperatures, and monitored the discharge water quality. Compiled data and created the graphical presentation for reports, stage discharge curves, and contributed to the writing of the monitoring reports. [2009-2010]

Ministry of Transportation Ontario, 407 East Environmental Assessment and 407 East Foundation Design Study, Markham, Ontario.

Lead field coordinator. Collected streamflows, water levels, field chemistry, temperature, surface/residential water samples, as well as hundreds of residential water well surveys. Conducted stream reconnaissance; installed and set up level loggers and barologgers, which were downloaded regularly and created detailed graphs for reporting. Performed pump and hydraulic conductivity testing; developed boreholes and collected groundwater samples; compiled data and created the graphical presentation for reports; and organized data into spreadsheet and graphs used for the report. [2008-2009]

NextEra, Wind Energy Centre, Natural Heritage Assessment Report, Grand Bend, Ontario.

Team member. Conducted extensive amphibian surveys throughout season and conducted rapid Ontario stream assessments. As well, assisted with Ecological Land Classification assessments. Conducted data management and quality control. Compiled data and created graphical presentation for reports.[2011-present]

Regional Municipality of York, Upper York Sanitary Sewer, Environmental Assessment.

Conducted amphibian surveys at multiple locations. Conducted fish habitat assessments and rapid Ontario stream assessments. Crew member for electrofishing at multiple locations. Weekly temperature logger downloads.[2011-present]

CN Rail, Credit River Expansion Project, Georgetown On.

Liaison with contractor and client. Overseeing restoration planting in accordance with design drawings and making further recommendations if applicable while on site.[2011-2011]

Confidential Client, Groundwater Investigation and Remediation Work, Toronto and Guelph, Ontario.

Field staff that conducted extensive groundwater sampling, water levels, field chemistry, low flow sampling, and LNAPL and DNAPL bailing. [2006-present]

Holcim, Permit To Take Water and Certificate of Approval Monitoring, Mississauga, Colborne, Peterborough, and Port Hope, Ontario.  
Lead field coordinator. Conducted water levels from mini piezometers, boreholes, and residential wells. Collected field chemistry, surface water samples, and sediment samples from Lake Ontario. Collected surface water discharge, residential, and groundwater samples. Also conducted a surface water tracer test in Lake Ontario. Compiled data and created the graphical presentation for reports. Prepared and wrote the quarterly and annual reports. [2006-present]

Township of Georgina, Georgina Landfill, Georgina, Ontario.  
Deputy project manager. Collected gas readings, water levels and groundwater samples from boreholes. Also collected surface water samples, field chemistry, and streamflows. Compiled data and created the graphical presentation for reports. Prepared and wrote the annual monitoring report. Created the annual budgets. [2008-present]

County of Simcoe; Tosorontio, Alliston, Mara and Essa Landfills, County of Simcoe, Ontario.  
Deputy project manager. Managed and completed all required field compliance monitoring, such as groundwater levels, groundwater samples, gas readings, surface water samples, field chemistry, streamflows, residential samples, and leachate seep observations. Liaison with landfill site supervisors. Compiled data and created the graphical presentation for reports. Prepared and wrote the annual monitoring reports. [2010-present]

Bram West Landowners Association, Block 40-3 Environmental Impact Study, Mississauga, Ontario.  
Lead field coordinator. Collected water levels, field chemistry, and streamflows. Conducted a habitat assessment, completed surveying for top of pipe elevations for new mini piezometers, performed pump and hydraulic conductivity testing, developed boreholes, collected groundwater samples, and compiled data and created the graphical presentation for reports. [2009]

### **Awards**

Making a Difference award, 2010 and 2012  
Top Contributor award, 2006  
National Garfield Weston Merit Scholarship  
Pepsico Scholarship  
Millennium Scholarship

### **Volunteer Work**

Nature Conservancy of Canada  
Friends of Presqu'île Park  
Extend-A-Care Retirement Center  
Lower Trent Conservation Area





## Jessica Epp

### Education

B.Sc.,(Honours) Marine & Freshwater Biology, 2006  
Restoration Ecology, Niagara College, 2011

### Years of Experience

With AECOM: 1

With Other Firms: 8

### Training and Certifications

Ontario Freshwater Mussel Identification Workshop, Department of Fisheries and Oceans Canada, 2012

Standard First Aid with CPR A and AED, St. John Ambulance, 2012

ArcGIS Desktop II: Tools and Functionality, ERSI, 2012

Pleasure Craft Operator Card, Boaterexam.com, 2011

Aquatic Renewal - Workshops 1, 2 and 3, University of Guelph, Ontario Government, Wellington and Waterloo Stewardship Councils and Trout Unlimited Canada, 2011

Class 2 Electrofishing Backpack Crew Leader Certification, Niagara College, 2010

Ontario Benthos Biomonitoring Network Certification, Niagara College, 2010

Small Non-pleasure Vessel Basic Safety (MED A3), Georgian College, 2009

Ontario Fish Identification Workshop, Royal Ontario Museum, 2008

Methodology Workshop: Fish,

Ms. Epp is an aquatic ecologist, with AECOM's Ecological services group working in Guelph. She has over five years of fishing experience using seines, dip nets, angling, spring-haul traps, and electrofishing equipment. Ms. Epp has the ability to collect and identify benthic macroinvertebrates and analyze data following the Ontario Benthos Biomonitoring Network (OBBN) protocol. She has experience in ecological field monitoring, including wildlife surveys, habitat assessments and using Ecological Land Classification (ELC) for Southern Ontario, as well as over six years of experience with freshwater mussel identification and relocations. Ms. Epp is capable of identifying flora found in Southern Ontario, choosing appropriate plants and planting strategies for specific ecosystems.

### Project Experience

#### **NextEra Energy Canada, Bluewater, Goshen and Jericho Wind Energy Centres Grand Bend, Ontario.**

Conducted fish habitat assessment, surface water and fish community surveys targeted for Species at Risk to document existing conditions and identify potential impacts as a result of the proposed wind energy centres. Prepared field data results and potential impacts to Species at Risk and water bodies in the respective sections in the final reports.

#### **Regional Municipality of York, Upper York Sewage Solutions, Newmarket, Ontario.**

Conducted fish community surveys to document existing conditions and identify potential impacts as a result of the proposed works.

#### **Municipality of Central Elgin, East Side Development Area Stormwater Management, St. Thomas and Central Elgin, Ontario.**

Conducted fish habitat assessments to document existing conditions and identify potential impacts as a result of the proposed stormwater management improvements. Prepared field data results and potential impacts in a technical memorandum.

#### **City of Mississauga, Sawmill Creek Erosion Control, Mississauga, Ontario.**

Conducted desktop background research and preliminary Species at Risk screenings.

#### **City of Peterborough, Environmental Assessment Parkway Corridor, Peterborough, Ontario.**

Conducted desktop background research and preliminary Species at Risk screenings.

University of Guelph, 2005

**Other Experience:**

*Aquatic Ecology Intern- Royal Botanical Gardens (2011-2012)*

Wetland restoration activities, including marsh replanting and wild species management. Monitoring of water quality, wetland plants, young of the year fish, salmon spawning, and migratory waterfowl. Monitoring involved the operation of boats, YSI meter, spring-haul traps, and electrofishing gear. Seasonal operation of the Cootes Paradise Fishway including fish identification, measurements, gender determination and PIT tagging, as well as, public information and education. Recording, inputting, analyzing and interpreting field data. Writing the Project Paradise Report, encompassing all field data for the 2011 field season and presenting at the annual Project Paradise Workshop. Independent project working with ArcGIS to determine emergent and meadow marsh plant growth areas in Cootes Paradise Marsh and producing a final report.

*Field Technician – Water Systems Analyst (2005-2012)*

Relocation of freshwater mussel Species at Risk in Ontario. Identification of mussel species, marking, measuring and relocating mussels using approved government protocol.

*Research Technician – Environment Canada (2006-2010)*

Supervised and trained new staff and graduate students in a laboratory setting. Field work collecting lake samples for water chemistry and persistent organic pollutants, air, sediment, zooplankton, *Mysids* and *Dioporia* samples aboard a research vessel. Performed GC-MS analysis for environmental pollutants from biota, air, water and sediment samples. Analyzed and organized data using ChemStation software. Performed extractions of historical, new and emerging organic pollutants from biota samples in tight time frames with consistent accuracy. Managed a laboratory, responsibilities included organization, maintaining supply inventories and managing space.

*Research Assistant – University of Guelph (2004-2006)*

Host fish identification of freshwater mussels Species at Risk and propagation and culture of juvenile mussels for recovery. General care and maintenance of fish and mussels in the Hagen Aqualab, including water chemistry, monitoring and feeding. Extensive fieldwork, including fishing (seining, angling, dip nets, electrofishing) and mussel surveys. Successfully managed ongoing projects independently while supervisor was on annual leave. Trained Boy Scouts and Ontario Rangers in mussel identification, techniques for finding mussels and fishing techniques.

*Field Assistant – Gartner Lee Ltd. (2006)*

Participated in the Mill Creek Annual Monitoring Program which monitors the population of Brown Trout (*Salmo trutta*) in Mill Creek after channel diversions and sedimentation. Electrofishing, identification of fish species, weighed, measured and clipped Brown Trout.





## Shelley J. Lohnes Ecologist

### Education

B.Sc. with Honours, Wildlife Biology,  
University of Guelph, 2004

Diploma, Arctic and Boreal Entomology,  
University of the Arctic, 2004

### Years of Experience

With AECOM: <1  
With other firms: 9

### Professional Associations

Canadian Environmental Certification  
Approvals Board, CEPIT  
Society for Ecological Restoration  
Bird Studies Canada  
Ontario Field Ornithologists  
American Fisheries Society

### Languages

English and French (bilingual)

### Training

Fisheries Specialist for the  
MTO/DFO/OMNR Protocol  
Royal Ontario Museum Fish Identification  
Workshop  
MTO/MNR Endangered Species Act  
Training  
OMNR Stream Habitat Assessment  
Protocol  
Pleasure Craft and Zodiac Operator's  
Certification  
Electrofishing Crew Leader Backpack  
St. John's Ambulance Advanced First Aid  
and C.P.R.  
Automated External Defibrillator  
CN Rail Safety  
WHMIS/Transportation of Dangerous  
Goods

Shelley Lohnes has nine years of experience conducting aquatic habitat assessments for freshwater ecosystems, wildlife and vegetation surveys for terrestrial habitats, and completing environmental impact assessment in Canada. She specializes in terrestrial and aquatic species at risk survey protocols and wildlife population assessments. Shelley has excellent working knowledge of current environmental legislation and policies. Her experience in both aquatic and terrestrial ecosystems allows her to provide analysis of impacts to the interactions between these two environments. She also has experience in biodiversity monitoring sampling protocols for freshwater phytoplankton and zooplankton, as well as experience in avian, herpetofauna, mammal, invertebrate and fish identification.

### Project Experience

#### Fisheries Inventory and Assessment

- Highway 11 New Interchange at South Entrance to Powassan From 5.7 km South of Highway 534, northerly 5.0 km Detail Design Study (G.W.P. 323-00-00) (2012)
- Total Project Management/Detailed Design Services for Bridge and Hydrology Engineering for Local Road Board Structures; Replacement of Culverts along Nepewassi Lake Road at Highway 69 and Onaping Lake Road at Highway 144, Sudbury Area, G.W.P. 5022-10-00 & 5023-10-00 (2011-2012)
- Fisheries assessment and impact assessment for rehabilitation of culverts crossing Highway 4 from Kippen to Clinton, W.P. 75-85-00. MTO Assignment # 3008-E-0023 (7) (2010-2011)
- Fisheries assessment and impact assessment for Highway 6, Durham to Dornoch, Grey County Fisheries Assessment, MTO Assignment # 3008-E-0023 (5), DFO Authorization # BU-08-3450 (2010-2011)
- Fisheries assessment for the rehabilitation of culverts crossing Highway 4 from Kippen to Clinton, W.P. 75-85-00 (2010-2011)
- Fisheries assessment and impact assessment for structural culvert rehabilitation at Walden Drain, Walker Drain and Kading Drain on Highway 21, Grand Bend; Woodlawn Drain, Highway 403, Brantford; and McKenzie Creek, Highway 6, Caledonia. MTO Assignment # 3008-E-0023 (6) (2010-2011)
- Total Project Management/Detailed Design Services for the Rehabilitation of Highway 37 from the North Limits of Tweed Northerly to Highway 7, GWP 213-00-00 (2008-2009)
- Total Project Management/Detailed Design Services for the Old Gull River Bridge, Highway 35, Rehabilitation of Sharp's Creek Culverts, Highway 11, Replacement of Portage Creek Culvert, Highway 124, and Rehabilitation of Hurricane Creek Culvert, Highway 118 (2008)
- Total Project Management/Detailed Design Services for Consolidated Central Region Traffic Signals Design Assignment, Agreement # 2004-E-0067, (2005-2009)

- Natural Resources Inventory and Assessment for the Hope Side Road Extension Class Environmental Assessment, City of Ottawa (2008-2009)
- Detail Design for Highway 522 from 32.2 km west of Highway 524 easterly 6 km, Ministry of Transportation (2008)
- Fisheries assessment for the Stoney Creek and Powell Drain Erosion Control Project, City of London (2008)
- Stoney Creek and Powell Drain, City of London (2008)
- Fish Salvage for St. Clair/ Lambton intersection reconstruction, Sarnia (2008)
- Mud Creek Stream Habitat Survey, City of Ottawa (2003)
- Rideau River Fisheries Assessment, City of Ottawa, (2003)
- Freshwater Aquaculture Research Program, Department of Fisheries and Oceans (2003)

### Wildlife Surveys

- Detailed Design Services for the New Interchange and Extension of existing 4-laning, Highway 17 at the west junction of Sudbury Municipal Road 55, from 20.5 km west of Highway 144, easterly for 6.5km , Sudbury, G.W.P. 156-98-00 (2011-2012)
- Terrestrial Assessment for the Highway 401 and Wonderland Road Interchange, MTO Assignment #3008-E-0023 (14), Ministry of Transportation (2011-2012)
- Terrestrial Assessment for Highway 401 and Highway 6 South, Morriston – Speed Change Lane Extension, MTO Assignment #3008-E-0023 (15), Ministry of Transportation (2011)
- Species at Risk Survey for Rehabilitation of Highway 7 from Maberly to Wemyss, WP 4512-02-00 (2010)
- Avian and Wildlife Assessment for the Rehabilitation of Highway 37 from the North Limits of Tweed Northerly to Highway 7, GWP 213-00-00 (2008-2009)
- Avian and Wildlife Assessment for the Old Gull River Bridge Removal – Highway 35, Rehabilitation of Sharpe's Creek Culverts – Highway 11, Replacement of Portage Creek Culvert – Highway 124, and Rehabilitation of Hurricane Creek Culvert – Highway 118 (2008-2010)
- Avian Assessment for the Rehabilitation of Highway 8 from Seaforth East Limits Easterly to Mitchell west Limits excluding 0.94 km in Dublin, GWP (2008-2009)
- Avian and Wildlife Assessment for the Realignment of Italia Lane, Kingston, GWP 4330-04-01 (2008-2009).
- Avian Assessment for the Glen Miller Bridge, Trenton, USL Concrete (2010)
- Avian Assessment for the Fort York Pedestrian Bridge, City of Toronto, AECOM (2010)
- Avian Assessment for the Ken Whillans Drive Extension, City of Brampton, AECOM (2007/2010)
- Avian and Wildlife Assessment for the Stoney Creek Erosion Control Wetland Natural Resource Impact Assessment, City of London (2009-2010)
- Avian and Wildlife Assessment for the Stoney Creek Sanitary Sewer Environmental Impact Assessment, City of London (2009-2010) Avian and Wildlife Survey for 220 Greyabbey Trail Lake Ontario Shoreline Environmental Impact Assessment, IBI Group (2009-2010)
- Avian Inventory and Assessment for Hope Side Road Extension Class Environmental Assessment, City of Ottawa (2008-2009).

### Vegetation Surveys

- Total Project Management/Detailed Design Services for Consolidated Central Region Traffic Signals Design Assignment, Agreement # 2004-E-0067, (2005-2009)
- Total Project Management/Detailed Design Services for the Re-alignment of Italia Lane, Kingston, GWP 4330-04-01 (2008)
- Neyagawa Boulevard Natural Environment Inventory Avian and Vegetation Assessment (2009),
- GO Transit Layover Natural Environment Assessment (2009).
- Hope Side Road Extension Environmental Assessment (2008).
- Highway 8 from Seaforth East Limits Easterly to Mitchell West Limits Excluding 0.94km in Dublin, Ministry of Transportation (2008)
- Stoney Creek and Powell Drain for the City of London (2008)
- Highway 522 from 0.6 km west of Highway 522B in Trout Creek, westerly 19.7 km (2008).
- Dundas Street West Bridge over Humber River Vegetation Removals and Restoration Plan (2008).

**Environmental Monitoring and Construction Administration**

- Highway 401 - Homer Watson Interchange, Post-Construction Monitoring, Ministry of Transportation (2009-2010)
- Highway 6 Post-Construction Monitoring, Ministry of Transportation (2009)
- Highway 8 Bridge Widening, Fisheries Contracts Specialist, Bot Construction (2009-2012)
- Highway 3 from 1.6 km West of Essex County Road 11 Easterly to 0.2 km East of Essex County Road 34, Cont 2009-3005 , Ministry of Transportation (2009-2010)
- Highway 404 Extension from Green Lane to Queensville Sideroad, HCI (2010-2012)
- Windsor Bridges Cont 2009-3017 , LEA Consulting (2009-2010)
- Highway 6 from Arthur to Mount Forest, Cont 2007-3052, Construction Environmental Inspection and Administration (2010)
- Highway 6 from Mount Forest to Durham, Cont 2008-3008, Construction Environmental Inspection and Administration (2010)
- Highway 11 - Emsdale Cont. 2008-5114, Construction Environmental Inspection and Administration (2009)
- Burk's Falls Environmental Inspection, LBC (2009)
- Highway 7 Peterborough, Cont 2007 - 4005, Fisheries Contracts Specialist, LBC, (2008)
- Ceramics Post-Construction Monitoring (2007-2008)
- Highway 40 at Moore Line, Cont 2007-3044, Construction Environmental Inspection and Administration (2008)
- Mercury Experiment To Assess Atmospheric Loading (METAALICUS), Department of Fisheries and Oceans, (2004)
- Ottawa River Seasonal Biological Monitoring Program at Britannia Beach, Mooney's Bay, Westboro Beach, Petrie Island, City of Ottawa, (2003)
- Surface Water Pesticide Monitoring Program, City of Ottawa, (2003).

**Individual Environmental Assessments**

- Environmental Impact Assessment for the Dingman Creek Erosion Control Wetland, City of London (2009-2012)
- Environmental Impact Study for the Stoney Creek Erosion Control Wetland, City of London (2009-2010)
- Environmental Impact Study for the Stoney Creek Trunk Sanitary Sewer and Watermain Crossing, City of London (2009-2010)
- Scoped Environmental Impact Assessment for the Temporary Works Yard at Oxford Road 29, Township of Blandford-Blenheim (2009)
- Greyabbey Trail Environmental Impact Assessment, City of Toronto (2009)
- Natural Resource Assessment for the Intersection Improvements at Winchester and Ritson Road North, Region of Durham (2009)
- Neyagawa Boulevard Natural Resource Assessment, Town of Oakville (2009)
- GO Transit Layover Natural Environment Assessment, Town of Markham (2009).

**EMAN Projects**

- Meteorological Station Daily Monitoring, 2004, Department of Fisheries and Oceans
- Limnological Data Collection for Long Term Ecological Research (LTER) of Boreal Lakes, 2004, Department of Fisheries and Oceans.

**Additional Relevant Experience**

- Environmental Advisory Committee, City of Guelph, Term ending November 2012
- Meteorological Station Daily Monitoring, 2004, Department of Fisheries and Oceans
- Limnological Data Collection for Long Term Ecological Research (LTER) of Boreal Lakes, 2004, Department of Fisheries and Oceans
- Long term purple loosestrife monitoring project vegetation survey, University of Guelph.
- Effects of disturbed boreal forest habitat on ground-dwelling insect populations, University of Guelph.





## Nicola Lower, B.Sc., M.Sc., PhD. Senior Fisheries Biologist

### Professional History

09/2010 - present, AECOM, Senior Fisheries Biologist  
10/2007 - 09/2010, University of Guelph, Post-Doctoral Research Fellow  
01/1998 – 09/2007, The Centre for Environment, Fisheries and Aquaculture Science (cefias), Fisheries Biologist and Project Manager

### Education

PhD, Fisheries Biology, The University of Portsmouth  
MSc (with Distinction), Natural Resource Management, The University of Leicester  
BSc, Environmental Life Science, The University of Nottingham

### Years of Experience

With AECOM: 1.5  
With Other Firms: 13

### Professional Affiliations

City of Guelph River System Advisory Committee  
American Fisheries Society  
Society of Environmental Toxicology and Chemistry  
Winston Churchill Fellow  
British Science Association

### Training

MTO/DFO/OMNR Fisheries Protocol Training for Consultant Fisheries Specialists, January 2011.  
Standard First Aid with CPR A+AED, March 2012.  
Managing AECOM projects, April 2012.

Dr. Lower is a Senior Aquatic Biologist with over 13 years professional experience in fisheries and natural resource management. Nicola contributes technical advice to environmental assessments and monitoring programs, and has experience with natural heritage studies, environmental assessments, environmental impact studies, environmental baseline studies, aquatic habitat assessments, species at risk screening, environmental effects monitoring, fisheries compensation plans, permitting and approvals and technical peer-reviews. Nicola has delivered project reports for a variety of clients and has work experience in the private, public and academic sectors. Dr Lower has published research on a range of factors affecting fish populations, including barriers to migration, water quality, and invasive species in the Great Lakes. Dr Lower has conducted research for the Great Lakes Fishery Commission, and is a member of the City of Guelph River Systems Advisory Committee. Nicola has much practical experience in fisheries management and in the techniques used to assess and monitor habitat and fish populations, including radio-acoustic and PIT telemetry, backpack and boat electrofishing, and netting and trapping. Dr Lower was awarded a prestigious Canadian Commonwealth Post-Doctoral Fellowship to conduct research on the migratory biology of the sea lamprey and native fish species in the Great Lakes. Dr Lower is skilled at coordinating and bringing environmental teams together for the purpose of providing a comprehensive study integrated with all relevant disciplines.

### Experience

**Billiken Management Inc., Project Manager** for mining client in northern Ontario for the proposed dewatering of the mine site. Responsible for delivery of work to time and to budget, as well as the integration of all relevant disciplines to provide a comprehensive work program including environmental regulatory planning and water quality assessments.

**Labrador Iron Mines, Environmental Baseline Studies, Schefferville, Quebec.** Aquatic baseline studies of six sites in Labrador and Quebec, to facilitate the permitting process for proposed mining operations. Senior review for previous habitat assessment conducted on three sites.

**Liberty Mines, Environmental Effects Monitoring (EEM) Cycle One Report, Northern Ontario.** Provided a study report in accordance with Schedule 5, Section 10 – 14 of the 2002 Metal Mining Effluent Regulations of the *Fisheries Act*. Report accepted and met the requirements of Environment Canada with no revisions required.

**Quadra FNX Mining., EEM Cycle One Report Addendum.** Statistical analysis and report update for submission to Environment Canada on behalf of mining operation near Sudbury, Ontario.

**NextEra Energy Canada, wind energy centres.** Aquatic technical lead for Renewable Energy Approval (REA) applications for three large potential wind energy centres. Multi-agency liaison for permitting and approvals for REA, Fisheries Act, Endangered Species Act, and Conservation Agency Regulations.

**Windsor-Essex Mobility Group and Ministry of Transportation.** Fisheries Technical Reviewer for HADD or No-HADD submissions to DFO, fish habitat compensation plans, design drawings, and stormwater management reports related to the Design-Build of the Windsor-Essex Parkway.

**City of London, Stanton Drain Remediation and Stormwater Management Facility.** Aquatic Ecology input for the Detailed Design of stormwater management as outlined in Class EA, including relocation and rehabilitation of existing portions of the Drain. Agency liaison and completion of HADD-Authorization under the Fisheries Act and development of compensation plan.

**City of Peterborough, Class Environmental Assessment for the Jackson Creek Diversion Project.** Natural Environment lead for Class EA diversion project for flood reduction.

**City of Woodstock, Cedar Creek and Southside Park Pond EA,** Aquatic lead for Schedule B Municipal Class EA for rehabilitation of creek and pond.

**Municipality of Chatham-Kent, Thames River Stabilization.** Aquatic lead for the Schedule B Class EA, detailed design and approvals process.

**City of St Thomas, rehabilitation of storm outlet.** Aquatic lead for Schedule B Class EA for rehabilitation of existing storm outlet and erosion control measures.

**City of Hamilton, culvert replacement.** Completed technical assessment and permitting applications with MNR and Conservation Agency for culvert replacement and emergency road repair. Successfully applied for overall benefit permit (17(2)c) under the Endangered Species Act.

**Region of Peel, Road Widening.** Provided technical advice, and liaison with Project Team and MNR on the evaluation of culvert and bridge alternatives in order to protect fish habitat, including the Endangered Redside Dace (Endangered Species Act 2007).

**City of Kitchener, City of London, City of Mississauga, Stream Restorations.** Conducted fish habitat assessments and provided advice on stream rehabilitation and permitting requirements.

**Regional Municipality of York, Upper York Sewage Solutions Environmental Assessment,** Aquatic Ecology input (planning, field assessment, reporting, agency meetings) to the Natural Environment Baseline Conditions Report to aide in selection of preferred alternative.

**Elgin Area Primary Water Supply System (EAPWSS), Authority Regulatory Approvals for the Elgin Area Primary Water Supply System, Elgin County, Ontario.** Provided technical advice to the overall project team, Conservation Agency liaison as well as construction monitoring during a design and build operation for a pipeline twinning to ensure compliance with permits and regulatory requirements.

**Métis Nation of Ontario. Technical review report** on the migratory characteristics of species of interests (mammals, fish, birds) and potential development impacts and mitigation techniques.

**Wek'èezhii Land and Water Board, Technical Review of the Diavik Diamond Mine AEMP Study Design.**

Conducted an evaluation of the Diavik Aquatic Effects Monitoring Program (v3) regarding fish health. Provided recommendations on whether the proposed revisions to AEMP Version 2.0 were adequately supported by the data.

**Taykwa Tagamou Nation, Technical Review** of the Detour Lake Gold Mine Fish Habitat Compensation Plan before submission to DFO.

**Ontario Realty Corporation, Development Potential for land, Orillia.** Conducted site assessments to determine ecological significance and development constraints, and produced the Environmental Impact Study.

**Sifton Properties, Developmental Potential for land, City of London.** Conducted due diligence study and identified environmental constraints and development opportunities.

**Post-doctoral research fellow, University of Guelph, Ontario.**

**Great Lakes Fisheries Commission / Department of Foreign Affairs and International Trade (DFAIT).** Planned and delivered innovative research on the habitat use and migration patterns of sea lamprey that will be applied for practical management initiatives in the Great Lakes. Led research in tributaries throughout the Great Lakes and presented results and recommendations to the binational Government Agency, as well as the International scientific community.

**Fisheries Biologist, The Centre for Environment, Fisheries and Aquaculture Science (cefas), Lowestoft.**

Led multi-disciplinary monitoring and research projects investigating the factors regulating salmonid and freshwater fish populations, and provided advice to government and private clients on fisheries management. Project-manager for 'Diffuse pollution and freshwater fish populations'. Provided recommendations on the management of aquatic contaminants and impacts on survival and migratory behavior of fish for the UK government client, the Department of Environment, Food and Rural Affairs.

**Select Publications**

- Stamplecoskie, K.M., Binder, T.R., Lower, N., Cottenie, K., McLaughlin, R.L., McDonald, D.G. 2012. Response of migratory sea lampreys (*Petromyzon marinus*). North American Journal of Fisheries Management.
- S.J. Landsman, J.Gobin, K.V. Cook, V.M. Nguyen, L.F.G. Gutowsky, T.R. Binder, N.Lower, R.L. McLaughlin, and S.J. Cooke. 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.
- Riley, W.D., Ibbotson, A.T., Lower, N., Maxwell, D.L., Russell, I.C. 2011. The impact of capture, handling, anesthesia and tagging on Atlantic salmon smolt physiology, migratory behavior and subsequent adult return rates. International Council for the Exploration of the Sea – North Atlantic Salmon Working Paper 2011.
- Lower, N., Binder, T., McDonald, D.G. Preferred refuge habitat for spawning-phase sea lamprey (*Petromyzon marinus*). *In submission*.
- Moore, A., Cotter, D., Quayle, V., Rogan, G., Poole, R., Lower, N., Privitera, L. 2008. The impact of a pesticide on the physiology and behaviour of hatchery-reared Atlantic salmon, *Salmo salar*, smolts during the transition from freshwater to the marine environment. Fisheries Management and Ecology, 15, 385-392.
- 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.
- 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.
- 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.

- Riley, W.D., Ibbotson, A.T., Pinder, A.C., Lower, N., Cook, A.C., Beaumont, W.R.C., and Russell, I. 2007. An autumn downstream migration of juvenile Atlantic salmon *Salmo salar* L., in the UK: Possible implications for the assessment and management of stocks. Working Paper for ICES North Atlantic Salmon Working Group, April 2007.
- Lower, N., Moore, A., Scott, A. P., Ellis, T., James, J. D., and Russell, I.C. 2005. A noninvasive 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. & 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.

### Select Conference Presentations

- S.J. Landsman, J. Gobin, K.V. Cook, V.M. Nguyen, L.F.G. Gutowsky, T.R. Binder, N. Lower, R.L. McLaughlin, and S.J. Cooke. A review of fish movement and migration studies in the Laurentian Great Lakes: historical perspectives, management issues, and future research opportunities. Annual Conference on Great Lakes Research, Toronto, May 2010.
- Lower, N. Use of refuge by sea lamprey and implications for control techniques. Sea Lamprey Annual Working Session, Petoskey, Michigan, February 2010.
- Lower, N., McDonald, D.G, McLaughlin, R.L. The use of refuge by sea lamprey *Petromyzon marinus*. Canadian Conference for Fisheries Research, Winnipeg, January 2010.
- Lower, N. Hide and Seek: The refuge-seeking behaviour of sea lamprey and implications for control techniques. The University of Guelph, Loaves and Fishes Seminar Series. November 2009. (Invited).
- Lower, N. Impacts of environmental levels of persistent aquatic contaminants on salmonids, The University of Hull, March 2007. (Invited).
- Lower, N. and Moore, A. The impact of a brominated flame retardant on olfactory function in Atlantic salmon smolts (*Salmo salar* L.) smolts. Chemical Ecology in Aquatic Systems Workshop, Florence, Italy, 16-18 October 2006.
- Lower, N., Riley, W.D., Ellis, T. & Moore, A. The effect of coded wire tagging on stress levels and seawater survival in Atlantic salmon smolts (*Salmo salar* L.) VII International Congress on the Biology of Fish, St John's, Newfoundland, Canada, 18-22 July 2006.
- Lower, N. & Moore, A. Exposure to insecticides inhibits embryo development and emergence in Atlantic salmon (*Salmo salar* L.). Seventh International Symposium on the Reproductive Physiology of Fish, Mie, Japan, 18-23 May, 2003.
- Lower, N. and Moore, A. The effect of environmental levels of freshwater contaminants on juvenile Atlantic salmon: Implications for marine survival. International Congress on the Biology of Fish, Vancouver, Canada, July, 2002.



# Appendix F

Summary of Water Bodies in  
Relation to Project Component  
and Shortest Distance

## Appendix F. Shortest Distance to Project Component (in metres)

REA Water Body Feature ID	Turbine <sup>1</sup>	Collection Line		Access Road		Transmission Line		Meteorological Tower <sup>2</sup>	Breaker Switch Station <sup>2</sup>
		Within 120 m	Crossing	Within 120 m	Crossing	Within 120 m	Crossing		
C5	80.7	-	-	-	-	-	-	-	-
C6	-	98.7	Yes	70.4	Yes	-	-	-	-
C7	35.6	-	-	-	-	-	-	-	-
C11	-	-	Yes	-	-	-	-	-	-
C14	88.7	39.49	Yes	-	-	-	-	-	-
C15	70.8	In disturbance area	Yes	In disturbance area	Yes	-	-	-	-
C33	-	-	Yes	-	-	-	-	-	-
C36	147.6	In disturbance area	Yes	-	-	-	-	-	-
C37	-	123.3	-	119.2	-	-	-	-	-
C42	-	-	Yes	-	-	-	-	-	-
C43	68.5	65.9	Yes	-	-	-	-	-	-
C44	-	-	Yes	-	-	-	-	-	-
C45	-	41.0	-	32.3	-	-	-	-	-
C46	99.4	31.5	-	22.9	-	-	-	-	-
C48	92.8	In disturbance area	Yes	25.4	-	-	-	-	-
C52	125.8	93.3	Yes	74.1	Yes	-	-	-	-
C56	74.4	-	-	-	-	-	-	-	-
C61	-	-	Yes	-	-	-	-	-	-
C62	113.0	112.0	Yes	-	-	-	-	-	-
C63	-	-	-	35.6	-	-	-	-	-
C64	-	-	Yes	-	-	-	-	-	-
C66	-	21.75	-	26.3	-	-	-	-	-
C67	54.8	-	Yes	-	-	-	-	-	-
C68	37.7	-	-	In disturbance area	Yes	-	-	-	-
C73	58.9	In disturbance area	Yes	In disturbance area	Yes	-	-	-	-
C74	31.5	-	Yes	61.7	Yes	-	-	44.8	-
C75	49.6 86.9	21.9	Yes	4.2	Yes	-	-	-	-
C76	45.9	In disturbance area	Yes	In disturbance area	Yes	-	-	-	-
C78	61.5	164.1	-	15.0	Yes	-	-	-	-
C80	100.2	135.8	-	92.9	-	-	-	-	-
C81	-	-	Yes	-	-	-	-	-	-
C82	-	-	Yes	-	-	-	-	-	-
C83	-	-	Yes	-	-	-	-	-	-
C86	37.0	-	-	-	-	-	-	-	-
C89	33.2	90.5	-	90.5	-	-	-	-	-
C96	-	69.2	-	-	-	-	-	-	-
C110	149.6	-	-	-	-	-	-	-	-
C124	30.7	49.4	Yes	16.9	-	-	-	-	-
C137	149.2	19.1	Yes	-	-	-	-	-	-
C139	-	-	Yes	-	-	-	-	-	-
C144	-	98.0	Yes	-	-	-	-	-	-
C208	-	113.3	Yes	78.3	Yes	-	-	-	-

Notes – 1 – Measurements for turbine from tip of blade  
2 – Measurements from disturbance area

## Appendix F. Shortest Distance to Project Component (in metres)

REA Water Body Feature ID	Turbine <sup>1</sup>	Collection Line		Access Road		Transmission Line		Meteorological Tower <sup>2</sup>	Breaker Switch Station <sup>2</sup>
		Within 120 m	Crossing	Within 120 m	Crossing	Within 120 m	Crossing		
C209	-	-	Yes	-	-	-	-	-	-
D01	-	64.7	-	-	-	-	-	-	-
D04	-	76.5	Yes	-	-	-	-	-	-
D05	-	43.2	-	-	-	-	-	-	-
D07	90.8	133.8	-	92.3	-	-	-	-	-
D09	119.3	-	-	-	-	-	-	-	-
D11	-	44.2	Yes	-	-	-	-	-	-
D12	-	In disturbance area	Yes	In disturbance area	Yes	-	-	-	-
D13	-	-	Yes	-	-	-	-	-	-
D14	165	In disturbance area	Yes	1.9	-	-	-	-	-
D15	-	-	-	109.9	-	-	-	-	-
D16	-	-	Yes	-	-	-	-	-	-
D17	195.2	-	Yes	-	-	-	-	135.1	-
D18	-	14.9	Yes	-	-	-	-	-	-
D19	-	5.1	Yes	-	-	-	-	-	-
D20	-	-	Yes	-	-	-	-	-	-
D23	-	-	-	-	-	-	Yes	-	-
D26	-	-	-	-	-	-	Yes	-	-
D27	-	-	-	-	-	-	Yes	-	-
D31	-	-	-	-	-	-	Yes	-	-
D32	-	-	-	-	-	-	Yes	-	131.3
D35	-	-	-	-	-	In disturbance area	Yes	-	-
D36	-	-	-	-	-	-	Yes	-	-
D37	-	-	-	-	-	-	Yes	-	-
D38	-	-	-	-	-	-	Yes	-	-
D39	-	-	-	-	-	11.4	-	-	-
D40	-	-	-	-	-	-	Yes	-	-
D43	-	-	Yes	-	-	-	-	-	-
D44	127.8	94.7	-	-	-	-	-	-	-
D45	-	-	Yes	-	-	-	-	-	-
D46	-	-	Yes	-	-	-	-	-	-
D47	-	-	Yes	124.8	-	-	-	-	-
D48	-	-	-	-	-	-	-	108.4	-
D51	64.4	-	-	-	-	-	-	-	-
D52	83.1	-	-	-	-	-	-	-	-
D53	-	10.9	-	-	-	-	-	-	-
D55	93.6	56.6	-	131.5	-	-	-	-	-
D57	132.7	-	-	-	-	-	-	-	-
P8	-	35.2	-	-	-	-	-	-	-
P11	-	-	-	-	-	103.6	-	-	-
P19	-	107.6	-	88.5	-	-	-	-	-

Notes – 1 – Measurements for turbine from tip of blade  
2 – Measurements from disturbance area