

KEN OAKES

26 Pacific Ave.
P.O. Box 668
Milverton, ON
N0K 1M0
(519) 595-3430

EDUCATION and TRAINING

Completed a Ph.D. in the Department of Zoology, University of Guelph in January 2004. Thesis Title: *Oxidative Stress and Bioindicators of Reproductive Function in Fish Exposed to Pulp and Paper Mill Effluent*. (Supervisor: Prof. Glen Van Der Kraak)

Completed a specialised honours B.Sc. at the University of Guelph in December, 1995, with a major in Fisheries Biology.

Graduated from Sir Sandford Fleming College in Lindsay, Ontario with a Fish and Wildlife Technician Diploma in May, 1990 and a Fish and Wildlife Technologist Diploma in May, 1991.

WORK EXPERIENCE

2013-Present **Industrial Research Chair in Environmental Remediation, Verschuren Centre for Sustainability in Energy & the Environment, and Assistant Professor, Dept of Biology, Cape Breton University**

2013-Present **Adjunct Faculty, Department of Biology, Faculty of Science, University of Waterloo.**

2011-Present **Adjunct Faculty, Department of Environment and Resource Studies, Faculty of the Environment, University of Waterloo.**

2011-2012 **Lecturer, Department of Biology, Faculty of Science, University of Waterloo**

2009-2011 **Sessional Lecturer (Sept-Dec), Department of Biology, University of Waterloo.** Responsible for all aspects of a third year ecology (90 students) course (BIOL 350), including delivery of all lectures and preparation of all tutorials and examination materials.

2004-2011 **Post-doctoral Fellow/Research Associate, Department of Biology, University of Waterloo** (Supervisors: Prof. Mark Servos, Prof. George Dixon (2004-2005))
Investigate reproductive and oxidative stress responses in fish exposed to oil sand process-affected waters, and municipal wastewater effluents. Supervise

and assist undergraduate and graduate students with their research projects, setup a new laboratory and establish new laboratory techniques including production of polyclonal antibodies.

- 2007 **Sessional Lecturer (Sept-Dec), Department of Biology, University of Waterloo**
Responsible for all aspects of a second year ecology (380 students) course (BIOL 250), including delivery of all lectures and preparation of examination materials.
- 2004-2006 **Canadian Water Network Fellow (PT) - Develop Highly Qualified Personnel (HQP) Programs, coordinate aspects of national symposium.**
Activities included development and implementation of a field-based graduate level course and symposium organization.
- 2003 **Sessional Lecturer (Sept.-Dec.), Department of Zoology, University of Guelph**
Deliver lectures, administer laboratory sessions, prepare assignments/exams for the third year limnology course (BIOL3450).
- 2002-2003 **Tutor, Centre for Students With Disabilities (Casual Work, 5 hrs/week)**
Assist disabled students with course work.
- 2002-2003 **Assistant, Progressive Instrumentation (Casual Work)**
Help calibrate and service electronic instrumentation
- 2002-2004 **Assistant to the Editors, Canadian Journal of Fisheries and Aquatic Sciences (CJFAS) (Casual work, 10 hrs/week)**
Edit manuscripts for style and length; assess compliance to journal format. Compare revised to original manuscripts, evaluate rebuttals to referee comments and ensure stated revisions have been implemented. Assess overall degree of compliance and make recommendations to editor on manuscript acceptability. Locate information on potential referees, occasionally providing suggestions.
- 2001-2004 **Field Technician - ESG International (Casual work)**
Completing aquatic and terrestrial environmental impact assessments for aggregate and pipeline developments. Activities included GPS locating and mapping potential areas of impact, mapping and electrofishing aquatic habitats.
- 1996-2002 **Research Assistant - Department of Zoology, University of Guelph (Full-Time: Jan. 1996 - Sept. 1997; Part Time Sept. 1997 - Sept 2002)**
Prepared plasma for and performed steroid hormone analysis in fish, birds, reptiles, and mammals in support of various research initiatives. In particular, I processed the samples and statistically analysed the steroid levels in fish exposed to Swedish pulp mill effluent over a 11 year period. Also analysed

plasma vitellogenin using Enzyme Linked Immunosorbant Assay (ELISA) in various fish species.

1991-1995 **COSEP Student Contaminants Surveillance Technician
Department of Fisheries & Oceans, Burlington, ON (May - Sept.)**
Activities included: x-raying fish to determine vertebral anomalies, diet analysis, haematocrit sampling, lipid extraction, fin ray asymmetry counts, preparation for field trips and maintenance of gear. Extensive field sampling all five years aboard survey launch CSL SHARK.

1993 **Contract Laboratory Technician - DFO (Sept. - Dec.)**
Involved with setting up a methodology for the mechanical and biochemical testing of fish vertebrae and running subsequent samples. The mechanical aspect involved the configuration of a materials testing machine, while the biochemical component elaborated on an existing methodology analysing hydroxyproline and collagen concentrations.

1987-1990 **Ontario Ministry of Natural Resources (May-Aug.)
(Kapuskasing, Wawa, Geraldton, & Bancroft Districts)**
Participated in a wide variety of field activities including: a multi-lake habitat mapping and development assessment project, creel census, a black bear baiting study, index netting, 3 independent full lake surveys, snowshoe hare population surveys, live adult walleye transfer, assessment of spawning sites, and a study preventing moose road kills. Additionally, compiled two district annual reports, calculated sturgeon quotas on two northern rivers, and on days off accompanied a Conservation Officer on his rounds. There was also a limited amount of supervision of Junior Rangers.

Miscellaneous Work Experience

I have also been employed through high school, college, and university at Toys R Us in Kitchener where I held various positions culminating in Department head requiring supervision of up to 6 people. I have also worked in a variety of retail stores and have been employed as a labourer in construction of industrial units.

Scholarships and Other Awards Received:

Name of Award	Value	Type	Period Held
D.F. Forster Medal	N/A	Institutional	Nominated March 2005
NSERC Industrial Post-doctoral Fellowship	\$30 000/yr	National	Declined
Department Of Fisheries &	\$4500	National	January 2002

Oceans (DFO) Scholarship			
Department Of Fisheries & Oceans (DFO) Travel Scholarship	\$500	National	January 2002
M.A. Ali Graduate Chair Award	\$500 Travel	Institutional	October 2001
Middleton Graduate Teaching Assistant Award	N/A	Institutional	June 2001
OAC Class Of '60 Outstanding Teaching Assistant Award	N/A	Institutional	Nominated March 2001
Canadian Network Of Toxicology Centres Graduate Student Scholarship	\$1000	National	March 2001
Fisheries & Oceans Canada (DFO) NSERC Supplement	\$5000	National	March 2001
2 nd Place, Petro-Canada Student Platform Competition, 27 th Annual Aquatic Toxicity Workshop St. John's, Newfoundland	\$300	National	October 2000
Canadian Network of Toxicology Centres Graduate Student Scholarship 2000	\$5000.00	National	May 2000
NSERC PGS B	\$38,200.00	National	May 2000-May 2002
OAC Class Of '60 Outstanding Teaching Assistant Award	N/A	Institutional	Nominated Oct 1999
Ontario Graduate Scholarship	\$11,859.00	Provincial	May 1999-May 2000
Best Student Paper Award, Laurentian Chapter of SETAC	\$ 100.00	Regional	May 1999
Arthur D. Latornell Graduate Travel Scholarship	\$ 500.00	Institutional	April 1999
Izak Walton Fly Fishing Club Scholarship in Aquatic Sciences	\$ 2,500.00	Institutional	November 1998
Second Place, Best Student Paper, 25th Annual Aquatic Toxicity	N/A	National	October 1998

Workshop, Quebec City			
Roger Parly Memorial Research Scholarship	\$ 1,000.00	Institutional	May 1998
Board of Graduate Studies: University Graduate Scholarship	\$ 2,000.00 \$ 2,000.00 \$ 2,000.00	Institutional	Sept. 1997 Jan. 1998 Sept. 1998
Ronald C. Ko Award in Parasitology	\$ 250.00	Institutional	January 1996
Dean's Scholarship, University of Guelph	\$ 1,000.00	Institutional	November 1992
Dean's List of Students, University of Guelph	N/A	Institutional	1991 - 1995
College of Biological Science Roll of Distinction, University of Guelph	N/A	Institutional	1993 - 1995
Dean's List of Students, Sir Sandford Fleming College	N/A	Institutional	1989 - 1991
President's Honour Roll, Sir Sandford Fleming College	N/A	Institutional	1991

Contributions to Research

Papers

Tetreault, G.R., Brown, C.J.M., Bennett, C.J., Oakes K.D., McMaster M.E., Servos M.R. 2013. Fish community responses to multiple municipal wastewater inputs in a watershed. *Integr. Environ. Assess. Manag.* (accepted)

Hu, A., Zhang, X., Kurdi, S., Luong, D., Liang, R., Huang, H., Peng, P., Oakes, K.D., Zhou, Y., Servos, M.R. Enhanced photocatalytic degradation of dyes by TiO₂ nanobelts with hierarchical structures. *J. Photochem. Photobio A.* (accepted).

Togunde, O.P., Lord, H., Oakes, K.D. Servos, M.R., Pawliszyn, J. 2013. Development and evaluation of a new *in vivo* solid-phase microextraction sampler. *J. Separ. Sci.* **36**:219-223.

Hu, A., Zhang, X., Luong, D., Oakes, K.D., Servos, M.R., Liang, R., Kurdi, S., Peng, P., Zhou, Y. 2012. Adsorption and photocatalytic degradation kinetics of pharmaceuticals by TiO₂ nanowires during water treatment. *Waste Biomass Valor.* **3**:443-449.

Peng, P. Hu, A., Zheng, W., Su, P., He, D., Oakes, K.D., Fu, A., Han, R., Lee, S.L., Tang, J., Zhou, Y.N. 2012. Microscopy study of snail trail phenomenon on

- photovoltaic modules. *RSC Adv.* (accepted)
- Togunde, O., Cudjoe, E., Oakes, K.D., Mirnaghi, F., Servos, M.R., Pawliszyn, J. 2012. Determination of selected pharmaceutical residues in wastewater using automated open bed solid phase microextraction system. *J. Chromatograph. A.* **1262**:34-42.
- Togunde, O., Oakes, K.D., Pawliszyn, J., Servos, M.R. 2012. Optimization of solid-phase microextraction for non-lethal *in vivo* determination of selected pharmaceuticals in fish muscle using liquid chromatography – mass spectrometry. *J. Chromatograph A.* **1261**:99-106.
- Zhang, X., Oakes, K.D., Ehsanul Hoque, M., Luong, D., Taheri-Nia, S., Lee, C., Smith, B.M., Metcalfe, C.D., de Solla, S.R., Servos, M.R. 2012. Depth-profiling of environmental pharmaceuticals in biological tissue by solid-phase microextraction. *Anal. Chem.* **84**:6956-6962.
- Guo, J.Y., Xu, C.X., Hu, A.M., Oakes, K.D., Sheng, F.Y., Shi, Z.L., Dai, J., Z. L. Jin, Z.L. 2012. Sintering dynamics and thermal stability of novel configurations of Ag clusters. *J. Phys. Chem. Solids.* **73**:1350-1357.
- Togunde, O., Oakes, K.D., Servos, M.R., Pawliszyn, J. 2012. Study of kinetic desorption rate constant in fish muscle and agarose gel model using solid phase microextraction coupled with liquid chromatography with tandem mass spectrometry. *Anal. Chim. Acta* **742**:2-9.
- Ings, J.S., Oakes, K.D., Vijayan, M.M., Servos, M.R. 2012. Temporal changes in stress and tissue-specific metabolic responses to municipal wastewater effluent exposure in rainbow trout. *Comp. Biochem. Physiol. C.* **156**:67-74.
- Togunde, O., Oakes, K.D., Servos, M.R., Pawliszyn, J. 2012. Determination of pharmaceutical residues in fish bile by solid-phase microextraction coupled with liquid chromatography-tandem mass spectrometry (LC/MS/MS). *Environ. Sci. Technol.* **46**:5302-5309.
- Shan, Z., Zhou, Z., Chen, H., Zhang, Z., Zhou, Y., Wen, A., Oakes, K.D., Servos, M.R. 2012. PCR-ready human DNA extraction from urine samples using magnetic nanoparticles. *J. Chromatogr. B.* **881-882**:63-68.
- Zhang, X., Oakes, K.D., Wang, S., Cui, S., Pawliszyn, J., Metcalfe, C.D., Servos, M.R. 2012. *In vivo* sampling of environmental organic contaminants in fish by solid-phase microextraction. *Trends Anal. Chem.* **32**:31-39.
- Wang, S., Oakes, K.D., Bragg, L., Pawliszyn, J., Dixon, D.G., Servos, M. 2011. Validation and use of *in vivo* solid phase micro-extraction (SPME) for the detection of emerging contaminants in fish. *Chemosphere* **85**:1472-1480.
- Ouyang, G., Oakes, K.D., Bragg L.M., Wang, S., Cui, S., Servos, M.R., Dixon, D.G., Pawliszyn, J. 2011. Sampling-rate calibration method for rapid and non-lethal

- monitoring of contaminants in fish muscle with solid-phase microextraction. *Environ. Sci. Technol.* **45**:7792-7798.
- Zhang, X., Oakes, K.D., Luong, D., Metcalfe, C.D., Servos, M.R. 2011. Solid-phase microextraction coupled to LC-ESI-MS/MS: Evaluation and correction for matrix-induced ionization suppression/enhancement for pharmaceutical analysis in biological and environmental samples. *Anal. Chem.* **83**:6532-6538.
- Zhang, X., Oakes, K.D., Hoque, M.E., Luong, D., Metcalfe, C.D., Pawliszyn, J., Servos, M.R. 2011. Pre-equilibrium solid-phase microextraction of free analyte in complex samples: Correction for mass transfer variation from protein binding and matrix tortuosity. *Anal. Chem.* **83**:3365-3370.
- Brown, C.J.M., Knight, B.W., McMaster, M.E., Munkittrick, K.R., Oakes, K.D., Tetreault, G.R., Servos, M.R. 2011. The effects of tertiary treated municipal wastewater on fish communities of a small river tributary in Southern Ontario, Canada. *Environ. Poll.* **159**:1923-1931.
- Hu, A., Zhou, Y.N., Zhang, X., Oakes, K.D., Servos, M.R. 2011. Hydrothermal growth of free standing TiO₂ nanowire membranes for photocatalytic degradation of pharmaceuticals. *J. Haz. Mat.* **189**:278-285.
- Zhang, X., Oakes, K.D., Luong, D., Metcalfe, C.D., Pawliszyn, J., Servos, M.R. 2011. Kinetically-Calibrated Solid-Phase Microextraction using Label-Free Standards and its Application for Pharmaceutical Analysis. *Anal. Chem.* **83**:2371-2377.
- Shan, Z., Li, C., Zhang, X., Oakes, K.D., Servos, M.R., Wu, Q., Chen, H., Wang, X.X., Huang, Q., Zhou, Y., Yang, W. 2011. Temperature-dependent selective purification of plasmid DNA using magnetic nanoparticles in an RNase-free process. *Anal Biochem.* **412**:117-119.
- Kavanagh, R.J., Frank, R.A., Oakes, K.D., Servos, M.R., Young, R.F., Fedorak, P.M., MacKinnon, M.D., Solomon, K.R., Dixon, D.G., Van Der Kraak, G.J. 2011. Fathead minnow (*Pimephales promelas*) reproduction is impaired in aged oil sands process-affected waters. *Aquat. Toxicol.* **101**:214-220.
- Zhang, X., Oakes, K.D., Luong, D.A., Wen, J. Z., Metcalfe, C.D., Pawliszyn, J., Servos, M.R. 2010. Temporal resolution of solid-phase microextraction: measurement of real-time concentrations in a dynamic sample system. *Anal. Chem.* **82**:9492-9499
- Oakes, K.D., Benskin, J.P., Martin, J.W., Ings, J.S., Heinrichs, J.Y., Dixon, D.G., Servos, M.R. 2010. Biomonitoring of perfluorochemicals and toxicity to the downstream fish community of Etobicoke Creek following deployment of Aqueous Film-Forming Foam. *Aquat. Toxicol.* **98**:120-129.
- Oakes, K.D., Coors, A., Escher, B.I., Fenner, K., Garric, J., Gust, M., Knacker, T., Küster, A., Kussatz, C., Metcalfe, C.D., Monteiro, S., Moon, T.W., Parrott, J., Péry, A.R.R., Ramil, M., Roennefahrt, I., Tarazona, J.V., Sánchez-Argüello, P., Ternes, T.A., Trudeau, V.L., Boucard, T., Van Der Kraak, G.J., Servos, M.R.

2010. Environmental Risk Assessment for the Serotonin Re-uptake Inhibitor Fluoxetine - Case Study Using the European Risk Assessment Framework. *Integr. Environ. Assess. Manag.* **6**:524-539
- Zhang, X., Oakes, K.D., Cui S., Bragg, L., Servos, M.R., Pawliszyn, J. 2010. Tissue-specific *In Vivo* Bioaccumulation of Pharmaceuticals in Rainbow Trout (*Oncorhynchus mykiss*) using Space-resolved Solid-Phase Microextraction. *Environ. Sci. Technol.* **44**:3417-3422.
- Metcalf, C.D., Chu, S., Judt, C., Li, H., Oakes, K.D., Servos, M.R., Andrews, D.M. 2010. Antidepressants and their metabolites in municipal wastewater, and downstream exposure in an urban watershed. *Environ. Toxicol. Chem.*, **29**:79-89
- Shan, Z., Wu, Q., Wang, X., Zhou, Z., Oakes, K.D., Zhang, X., Huang, Q., Yang, W. 2010. Bacteria capture, lysate clearance, and plasmid DNA extraction using pH-sensitive multifunctional magnetic nanoparticles. *Anal. Biochem.* **398**:120-122.
- Zhang, X., Cai, J., Oakes, K.D., Breton, F., Servos, M.R. Pawliszyn, J. 2009. Development of Space-Resolved Solid-Phase Microextraction for *In Situ* Sampling. *Anal. Chem.* **81**:7349-7356
- Zhou, S.N., Oakes, K.D., Servos, M.R., Pawliszyn, J. 2009. Use of simultaneous dual-probe microdialysis for the determination of pesticide residues in a jade plant (*Crassula ovata*). *Analyst* **134**:748-754.
- Zhou, S.N., Oakes, K.D., Servos, M.R., Pawliszyn, J. 2008. Application of solid-phase microextraction for *in vivo* laboratory and field sampling of pharmaceuticals in fish. *Environ. Sci. Technol.* **42**:6073-6079.
- Oakes, K.D., Tremblay, L.A., Van Der Kraak, G.J. 2005. Short-term lab exposures of immature rainbow trout (*Oncorhynchus mykiss*) to sulphite and kraft pulp mill effluents: effects on oxidative stress and circulating sex steroids. *Environ. Toxicol. Chem.* **24**:1451-1461.
- Oakes, K.D., Sibley, P.K., Martin, J.W., MacLean, D.D., Solomon, K.R., Mabury, S.A., Van Der Kraak, G.J. 2005. Short-term exposures of fish to perfluorooctane sulfonate (PFOS): acute effects on fatty acyl-CoA oxidase activity, oxidative stress, and circulating sex steroids. *Environ. Toxicol. Chem.* **24**:1172-1181
- Oakes, K.D., Hewitt, L.M., McMaster, M.E., Wood, C., Munkittrick, K.R., Van Der Kraak, G.J. 2005. An evaluation of oxidative stress and reproductive function as potential monitoring tools in fish following short-term pulp mill effluent exposure. *J. Toxicol. Environ. Health A.* **68**:267-286
- Oakes, K.D., Sibley, P.K., Solomon, K.R., Mabury, S.A., Van Der Kraak, G.J. 2004. Impact of perfluorooctanoic acid (PFOA) on fathead minnow (*Pimephales promelas*) fatty acyl-CoA oxidase activity, circulating steroids, and reproduction in outdoor microcosms. *Environ. Toxicol. Chem.* **23**:1912-1919.

- Oakes, K.D., McMaster, M.E., Van Der Kraak, G.J. 2004. Oxidative stress responses in longnose sucker (*Catostomus catostomus*) exposed to pulp and paper mill and municipal sewage effluents. *Aquat. Toxicol.* **67**:255-271.
- Hewitt, L.M., Hobby, A.C.P., Parrott, J.L., Marlatt, V., Wood, C., Oakes, K., and Van Der Kraak, G.J. 2003. Bioavailability of ligands for sex steroid receptors and the Ah receptor to fish exposed to treated effluent from a sulphite/groundwood pulp mill. *Environ. Toxicol. Chem.* **22**:2890-2897.
- Oakes, K.D., McMaster, M.E., Pryce, A., Munkittrick, K.R., Portt, C.B., Hewitt, L. M., Maclean, D.D., Van Der Kraak, G.J. 2003. Oxidative stress and bioindicators of reproductive function in pulp and paper mill effluent exposed white sucker. *Toxicol. Sci.* **74**:51-65.
- Oakes, K.D. and Van Der Kraak, G.J. 2003. Utility of the TBARS assay in detecting oxidative stress in white sucker (*Catostomus commersoni*) populations exposed to pulp mill effluent. *Aquat. Toxicol.* **63**:447-463.

Papers Currently Under Review

- Wang, S., Oakes, K.D., Bragg, L., Pawliszyn, J., Dixon, D.G., Servos, M. 2011. *In vivo* monitoring of emerging contaminants in wild fish exposed to municipal effluents using solid phase micro-extraction. *Chemosphere* (submitted).
- Togunde, O., Oakes, K.D., Cudjoe, E., Pawliszyn, J., Servos, M.R. Determination of pharmaceutical residues in wastewater samples using automated solid phase micro-extraction (SPME) with liquid chromatography and sensitive mass spectrometry (LC/MS/MS). *J. Chromatograph A*.
- Tanna, R., Tetreault, G., Bennett, C., Bragg, L., Oakes, K.D., McMaster, M.E., Servos, M.R. 2012. Occurrence and degree of intersex (testis-ova) across an urban gradient in the Grand River, Ontario, Canada. *Environmental Toxicology and Chemistry* (submitted)

Paper Currently In Preparation

- de Jourdan, B., Oakes, K., Hanson, M., Sibley, P., Servos, M., Muir, D., Solomon, K. 2011. Physiological effects of 3 non-PBDE brominated flame retardants on *Pimephales promelas* (fathead minnows) exposed in outdoor mesocosms. *Environmental Toxicology & Chemistry*
- Loomer, H.A., Oakes, K.D., Schiff, S., Taylor, W., Servos M.R. The effect of different municipal wastewater treatment plant effluents on carbon and nitrogen stable isotope values of aquatic organisms within the Grand River watershed.
- Kormos, J.L., Yang, P., Hao, C., Kleywegt, S., Oakes, K.D., Huck, P.M., Cheung, P., Socha, A., Whitehead, B., Servos, M.R. Presence and seasonal variability of carbamazepine, gemfibrozil and ibuprofen in southern Ontario drinking water

supplies.

Loomer, H.A., Oakes, K.D., Schiff, S., Servos M.R. Trends in the stable carbon and nitrogen isotope ratios of riffle dwelling aquatic organisms along a 200 km river reach of the Grand River.

Togunde, O.P., Oakes, K.D., Servos, M.R., Pawliszyn, J. Study of uptake and tissue distribution of pharmaceuticals in rainbow trout plasma, muscle, and bile using solid-phase microextraction coupled with liquid chromatography-tandem mass spectrometry.

Presentations

Hu, A., Liang, R., Zhang, X., Luong, D., Li, W., Oakes, K.D., Servos, M.R., Zhou, Y. 2013. Development of large scale high performance TiO₂ nanowire membranes for Water Treatment. Materials Research Society Spring Meeting, San Francisco, California, April 1-5, 2013.

Servos, M.R., Oakes, K.D., Bragg, L., Ings, J., Tanna, R., Fuzzen, M., Smith, B., Bahamonde, P., Van Der Kraak, G., Metcalfe, C., Martinuk, C., Munkittrick, K., Tetreault, G., McMaster, M.. 2013. Assessing the environmental risk of emerging contaminants in municipal wastewater. Connecting Water Resources, Canadian Water Network Annual Meeting, Ottawa, ON, March 18-21, 2013.

Cooper, K.J., Murphy, S., Tsuji, L., Oakes, K.D. 2013. Koi Herpesvirus and subsequent mass die-offs of *Cyprinus carpio carpio* L. in Lake Simcoe: A case study examining fish disposal and potential for land contamination. American Fisheries Society, Ontario Chapter, Annual General Meeting, Orillia, ON Feb 27-March 1, 2013.

Servos, M.R., Oakes, K.D., Bragg, L., Bowron, L., Ings, J., Tanna, R., Fuzzen, M., Smith, B., Brown, C., Robinson, C., Wang, S., Bahamonde, P., Martyniuk, C., Munkittrick, K., Tetreault, G., McMaster, M. 2012. Effects of wastewater effluents on the reproductive function of fish in the Grand River, Ontario. American Water Resources Association Summer Specialty Conference, Denver, CO, June 25-27, 2012.

Togunde, O.P., Cudjoe, E., Oakes, K.D., Servos, M.R., Pawliszyn, J. 2012. Development of SPME/LC/MS/MS method for *in vitro* and *in vivo* determination of pharmaceutical bioconcentration in fish bile, muscle. 60th American Society for Mass Spectrometry Conference on Mass Spectrometry and Allied Topics. Vancouver, BC, May 20-24, 2012.

Togunde, O.P, Cudjoe E, Oakes, K.D., Mirnaghi, F S, Servos, M R, Pawliszyn, J B Determination of pharmaceutical residues in wastewater using automated solid phase microextraction (SPME) with liquid chromatography and mass spectrometry (LC/MS/MS) Abstract- Pittcon Conference, March 11-15 , 2012 Orlando, FL, USA.

Liang, R., Hu, A., Zhang, X., Luong, D., Oakes, K., Servos, M., Zhou, Y. 2012. TiO₂ nanowire membranes for pharmaceutical degradation in wastewater. 47th Central Canadian Symposium on Water Quality Research, Burlington, ON, February 21-

22, 2012.

- Luong, D., Zhang, X., Hu, A., Peng, P., Liang, R., Kurde, S., Oakes, K., Servos, M., Zhou, N. 2012. Antimicrobial efficacy of photocatalytic TiO₂ nanowire membranes on *Escherichia coli*. 47th Central Canadian Symposium on Water Quality Research, Burlington, ON, February 21-22, 2012.
- Hu, A., Zhang, X., Pham, P. H., Luong, D., Kurde, S., Liang, R., Oakes, K., Bols, N.C., Servos, M., Zhou, N. 2012. Fast synthesis of large scale high performance TiO₂ nanowire membranes for water treatment. 47th Central Canadian Symposium on Water Quality Research, Burlington, ON, February 21-22, 2012.
- Pham, P. H., Hu, A., Oakes, K., Tang, S.X., Bols, N.C. 2012. Evaluating nanomaterial/fish virus interactions to understand the potential of nanomaterials to modulate pathogen removal in wastewater treatment. 47th Central Canadian Symposium on Water Quality Research, Burlington, ON, February 21-22, 2012.
- Hu, A., Luong, D., Zhang, X., Kurdi, S., Peng, P., Oakes, K.D., Servos, M.R., Zhou, Y. 2011. Synthesis of flexible TiO₂/Ag nanowire membranes for ultrafiltration and photocatalytic degradation of emerging pollutants during water treatment. Eco-materials and Eco-Innovation for Sustainable Society, an International Symposium on Materials Science and Innovation for Sustainable Society. Hotel Hankyu Expo Park, Osaka, Japan. Nov. 28-30, 2011
- Smith, B.M., Oakes, K.D., Engelhardt, H.E., Bragg, L., Parker, W., Heinrichs, J., Servos, M.R. 2011. Effects Directed Assessment: Evaluating Estrogenic Activity of Municipal Wastewater. Society of Environmental Toxicology and Chemistry, North America 32nd Annual Meeting, Boston, Massachusetts November 13–17, 2011.
- Togunde, O.P., Pawliszyn, J., Oakes, K.D., Servos, M.R. 2011. *In vitro* and *in vivo* determination of pharmaceutical residues in fish bile, muscle respectively using solid phase microextraction (SPME/LC/MS/MS). Society of Environmental Toxicology and Chemistry Annual Meeting, Boston, Mass. Nov. 11-13, 2011.
- Servos, M.R., Hu, A., Zhang, X., Kurdi, S., Peng, P., Luong, D., Oakes, K.D., Zhou, Y.N. Development of multifunctional TiO₂ nanowire membranes for water treatment. Society of Environmental Toxicology and Chemistry, North America 32nd Annual Meeting, Boston, Massachusetts November 13–17, 2011.
- Hu, A., Luong, D., Zhang, X., Peng, P., Oakes, K.D., Servos, M.R., Zhou, Y. 2011. Adsorption and photocatalytic degradation kinetics of pharmaceuticals by TiO₂ nanowires during water treatment. Materials Science & Technology 2011, Columbus, OH, October 16-20, 2011.
- Hu, A., Peng, P., Zhou, N., Luong, D., Zhang, X., Oakes, K.D., Servos, M.R. 2011. Adsorption and photocatalytic degradation kinetics of pharmaceuticals by TiO₂ nanowires during water treatment (short paper). Proceedings of the International Conference on Environmental Pollution and Remediation, Ottawa, ON. August 17-19, 2011.

- de Jourdan, B., Oakes, K., Hanson, M., Sibley, P., Servos, M., Muir, D., Solomon, K. 2011. Physiological effects of 3 non-PBDE brominated flame retardants on *Pimephales promelas* (fathead minnows) exposed in outdoor mesocosms. International Symposium on Advanced Studies by Young Scientists on Environmental Pollution and Ecotoxicology (YSEPE 2011) Proceedings August 4-6, 2011, Ehime, Japan
- Hu, A., Zhang, X., Luong, D., Oakes, K.D., Peng, P., Servos, M.R., Zhou, Y. 2011. Potential for mechanical filtration and photocatalytic degradation of emerging pollutants by TiO₂ nanowire membranes during water treatment. Canadian Water Network, Project Leaders Meeting, Toronto, Ontario. June 2011.
- Sethi, N., K. Oakes, B. Smith, L. Bragg, M.R. Servos. Effects-directed assessment of contaminants in municipal wastewater effluents using Rainbow Trout thyroid hormone receptors. Centre for Control of Emerging Contaminants, Waterloo, Ontario. June 2, 2011.
- Wang, S., Bragg, L., Oakes, K.D., Servos, M. 2011. *In vivo* detection of emerging contaminants in fish using solid phase micro-extraction. Centre for Control of Emerging Contaminants, Waterloo, Ontario. June 2, 2011.
- Sethi, N., K. Oakes, B. Smith, L. Bragg, M.R. Servos. Effects-directed assessment of contaminants in municipal wastewater effluents using Rainbow Trout *Oncorhynchus mykiss* thyroid hormone receptors. Pollutant Responses in Marine Organisms 16th Annual Conference (Primo 16), Long Beach, CA, May 15-18, 2011.
- Hu, A., X. Zhang, K. Oakes, D. Luong, M. Servos, Y. Zhou. 2011. Photocatalytic degradation of pharmaceuticals by TiO₂ nanowires. Canadian Water Network Program Review, Toronto, Ont. May 18, 2011.
- Tanna, R.N., K.D. Oakes, M.E. McMaster, G.R. Tetreault, C.J. Bennett, L. Bragg and M.R. Servos. Association of intersex in wild fish with wastewater effluent in the Grand River, Ontario. Water Institute Workshop, University of Waterloo, Waterloo, Ontario. March 2 2011
- Robinson, C.S., C.J.M. Brown, K.D. Oakes, K.D., M.E. McMaster, D.R. Barton, G.R. Tetreault, M.R. Servos. Impacts of municipal wastewater effluent on $\delta^{13}\text{C}$, $\delta^{15}\text{N}$, and population dynamics of Rainbow and Greenside Darters in the Speed River, Ontario. Connecting Water Resources 2011: Responding to the Opportunities, Canadian Water Network, Ottawa, Ontario. Feb. 28—March 3, 2011.
- Sethi, N., Oakes, K.D., Smith, B., Bragg, L., Bowron, L., Worrall, T., Vijayan, M., Servos, M.R. The interaction of chemicals isolated from municipal wastewater effluent with rainbow trout (*Oncorhynchus mykiss*) thyroid hormone receptors. Connecting Water Resources 2011, Canadian Water Network Annual Meeting, Ottawa, ON, February 28-March 3, 2011.
- Hu, A., Zhang, X., Oakes, K.D., Luong, D., Servos, M.R., Zhou, Y. 2011. Adsorption and photocatalytic degradation kinetics of pharmaceuticals by TiO₂ nanowires during

- water treatment. Connecting Water Resources 2011, Canadian Water Network Annual Meeting February 28-March 3, 2011.
- Tanna, R.N., Oakes, K.D., McMaster, M.E., Tetreault, G.R., Bennett, C.J., Bragg, L., Servos, M.R. 2011. Association of Intersex in Wild Fish with Wastewater Effluent in the Grand River, Ontario. Connecting Water Resources 2011, Canadian Water Network Annual Meeting February 28-March 3, 2011.
- Togunde, O.P., Oakes, K.D., Mirnaghi, F.S., Pawliszyn, J.B., Servos, M.R. 2011. Application of solid phase microextraction for analysis of pharmaceuticals in urban wastewater. Connecting Water Resources 2011, Canadian Water Network Annual Meeting February 28-March 3, 2011.
- Hu, A., Zhang, X., Luong, D., Oakes, K., Servos, M., Zhou, N. 2011. Adsorption and photocatalytic degradation of pharmaceuticals by TiO₂ nanowires. 46th Central Canadian Symposium on Water Quality Research, Burlington, ON, February 22-23, 2011.
- Ouyang, G., Oakes, K. D., Bragg, L., Wang, S., Cui, S., Servos, M. R., Pawliszyn, J. 2010. A simple and fast solid-phase microextraction technique for non-lethal monitoring of contaminants in fish muscle. Pacificchem 2010, International Chemical Congress of Pacific Basin Societies, Honolulu, HI, United States, December 15-20, 2010.
- Servos, M.R., M. McMaster, K. Oakes, L. Bragg, S. Wang, X. Zhang, G. Tetreault, J. Ings, C. Brown, C. Robinson, N. Sethi, R. Tanna, K. Munkittrick. The impact of municipal effluents on fish communities in the Grand River, Ontario. Society of Environmental Toxicology and Chemistry Annual Meeting, Portland, OR, Nov. 7-11, 2010.
- Tetreault, G., M. McMaster, K. Oakes and M.R. Servos. Fish communities to individuals: Weighing the evidence for environmental assessments for municipal wastewater. Society of Environmental Toxicology and Chemistry Annual Meeting, Portland, OR, Nov. 7-11, 2010.
- Zhang, X., Oakes, K., Metcalfe, C., Pawliszyn, J., Servos, M. 2010. *In vivo* solid phase microextraction (SPME) for monitoring pharmaceuticals in fish. 37th Annual Aquatic Toxicity Workshop, Toronto, ON, October 3-6, 2010.
- Servos, M.R., McMaster, M.R., Oakes, K.D, Bragg, L., Wang, S., Zhang, X., Ings, J., Smith, B., Sethi, N., Brown, C., Robinson, C., Loomer, H., Tanna, R., Munkittrick K.R., , Tetreault, G. 2010. Fish community responses to municipal effluents in the Grand River watershed. 37th Annual Aquatic Toxicity Workshop, Toronto, ON, October 3-6, 2010.
- Togunde, O.P., Oakes, K.D., Servos, M.R., Pawliszyn, J. 2010. Application of solid-phase microextraction (SPME/LC/MS/MS) for analysis of pharmaceuticals in fish bile for biomonitoring. 37th Annual Aquatic Toxicity Workshop, Toronto, ON, October 3-6, 2010.

- Tanna, R., Oakes, K., McMaster, M., Tetreault, G., Bennett, C., Servos, M. High levels of intersex found in two species of darter downstream of municipal wastewater effluent. 37th Annual Aquatic Toxicity Workshop, Toronto, ON, October 3-6, 2010.
- Wang, C., Oakes, K., Bragg, L., Pawliszyn, J., Dixon, D.G, Servos, M. 2010. *In vivo* detection of emerging contaminants in fish using solid phase microextraction. 37th Annual Aquatic Toxicity Workshop, Toronto, ON, October 3-6, 2010.
- Brown, C., Knight, B., McMaster, M., Munkittrick, K., Oakes, K., Tetreault, G., Servos, M., Robinson, C., Barton, D. 2010. Effects of municipal wastewater effluent on fish communities and $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ isotopic signatures in the Speed River, ON. 37th Annual Aquatic Toxicity Workshop, Toronto, ON, October 3-6, 2010.
- Loomer, H., Oakes, K., Schiff, S., Taylor, W., Servos, S. 2010. Use of stable isotopes to trace municipal wastewater effluent inputs through aquatic food webs within a highly developed river system. 37th Annual Aquatic Toxicity Workshop, Toronto, ON, October 3-6, 2010.
- Loomer, H., Oakes, K., Schiff, S., Servos, M. 2010. Shifting stable isotope signatures of aquatic organisms in response to cumulative anthropogenic disturbances in a highly developed temperate watershed. 37th Annual Aquatic Toxicity Workshop, Toronto, ON, October 3-6, 2010.
- Smith, B., Bragg, L., Oakes, K.D., Servos, M.R. 2010. A toxicity identification evaluation of municipal wastewater effluent for endocrine disrupting compounds. 37th Annual Aquatic Toxicity Workshop, Toronto, ON, October 3-6, 2010.
- Robinson, C., Brown, C, Oakes, K.D., McMaster, M., Barton, D., Tetreault, G., and Servos, M.R. 2010. Shifts in the $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ of Rainbow and Greenside Darters exposed to a municipal wastewater effluent in the Speed River, Ontario. 37th Annual Aquatic Toxicity Workshop, Toronto, ON, October 3-6, 2010.
- Hu, A., Zhou, N., Zhang, X., Oakes, K.D., Servos, M.R. 2010. Development of TiO_2 nanowire membranes for nanofiltration and photocatalytic degradation of water pollutants. Materials Science & Technology 1010 Conference & Exhibition, Houston, Texas October 17-21, 2010.
- Robinson, C., Brown, C., Oakes, K., McMaster, M., Barton, D., Tetreault, G., Servos, M. 2010. Shifts in the $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ of rainbow darters and greenside darters exposed to a municipal wastewater effluent in the Speed River, Ontario. American Fisheries Society 2010 Meeting, Pittsburgh, Pennsylvania, September 12-16, 2010.
- Hu, A., Zhang, X., Oakes, K., Zhou, N., Servos, M. 2009. Photocatalytic degradation of pharmaceuticals and mechanical filtration by TiO_2 nanowire membranes. 22nd Canadian Materials Science Conference, Waterloo, ON, June 8-11th, 2010.

- Sethi, N., Smith, B., Oakes, K., Ings, J., Bragg, L., Servos, M. 2010. Toxicity identification evaluation for endocrine disrupting compounds in municipal wastewater effluents. Centre for Control of Emerging Contaminants/Canadian Water Network Workshop on the Control of Emerging Contaminants in Water and Wastewater. Toronto, ON May 31-June 1, 2010.
- Brown, C., Knight, B., Munkittrick, K., Oakes, K., Robinson, C., Servos, M., Tetreault, G., McMaster, M. 2010. The effects of tertiary-treated municipal wastewater on Rainbow Darter and Greenside Darter on the Speed River. Ontario Chapter of the American Fisheries Society Annual Meeting, Geneva Park, Orillia, ON, March 4-6, 2010.
- Brown, C., Knight, B., Munkittrick, K., Oakes, K., Servos, M., Tetreault, G., McMaster, M. 2010. Grand River fish community changes downstream of secondary treated municipal wastewater effluent. Ontario Chapter of the American Fisheries Society Annual Meeting, Geneva Park, Orillia, ON, March 4-6, 2010.
- Zhang, X., Oakes, K.D., Metcalfe, C.D., Pawliszyn, J., Servos, M.R. 2010. Time-Resolved Solid-Phase Microextraction (TR-SPME) and Its Application for Highly Dynamic Systems. The 61st Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy (Pittcon) 2010, Orlando FL, February 28-March 5, 2010.
- Zhang, X., Oakes, K.D., Cui, S., Bragg, L.M., Servos, M.R., Pawliszyn, J. 2010. Tissue-specific *In Vivo* Bioconcentration of Pharmaceuticals in Rainbow Trout (*Oncorhynchus mykiss*) using Space-resolved Solid-Phase Microextraction. The 61st Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy (Pittcon) 2010, Orlando FL, February 28-March 5, 2010.
- Hu, A., Zhang, X., Oakes, K., Zhou, N., Servos, M. 2009. Photocatalytic degradation of pharmaceuticals and mechanical filtration by TiO₂ nanowire membranes. Materials Research Society Fall Meeting, Boston, Mass, Nov. 30-Dec 4, 2009.
- Wang, S. Oakes, K., Bragg, L., Ouyang, G., Servos, M. 2009. Validation of *in vivo* detection of pharmaceuticals in fish collected from the Grand River using solid phase microextraction. Society of Environmental Toxicology and Chemistry 30th Annual Meeting, New Orleans Hilton Riverside, New Orleans, LA, USA, November 19-23, 2009.
- De Jourdan, B., Hanson, M., Oakes, K., Muir, D., Solomon, K. 2009. The use of aquatic microcosms to assess the environmental fate of three non-PBDEs and their effects on fathead minnow (*Pimephales promelas*). Society of Environmental Toxicology and Chemistry 30th Annual Meeting, New Orleans Hilton Riverside, New Orleans, LA, USA, November 19-23, 2009.
- Brown, C., Knight, B., Munkittrick, K., Oakes, K., Servos, M., Tetreault, G., McMaster, M. 2009. The effects of secondary treated municipal wastewater effluent on fish communities in the Grand River. Society of Environmental Toxicology and Chemistry 30th Annual Meeting, New Orleans Hilton Riverside, New Orleans, LA, USA, November 19-23, 2009.

- Brown, C., Knight, B., McMaster, M., Munkittrick, K., Oakes, K., Tetreault, G., Servos, M., 2009. Changes in fish community within a small receiving environment for tertiary municipal wastewater effluent in southern Ontario. Society of Environmental Toxicology and Chemistry 30th Annual Meeting, New Orleans Hilton Riverside, New Orleans, LA, USA, November 19-23, 2009.
- Servos, M., Brown, C., Ings, J., Kormos, J., Wang, S., Zhang, X., Oakes, K. 2009. Environmental risk of emerging contaminants in surface waters exposed to municipal effluents. Centre for Control of Emerging Contaminants/Canadian Water Network Workshop on the Control of Emerging Contaminants in Water and Wastewater. Toronto, ON June 3-4, 2009.
- Zhou, S., Oakes, K., Servos, M., Pawliszyn, J. 2009. Application of Solid-Phase Microextraction for *in Vivo* Laboratory and Field Sampling of Pharmaceuticals in Fish. 60th Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy (Pittcon), Chicago, IL, USA, March 8-13, 2009
- Zhou, S., Oakes, K., Servos, M., Pawliszyn, J. 2009. Use of Simultaneous Dual-Probe Microdialysis for the Determination of Pesticide Residues in Semi-Solid Matrices. 60th Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy (Pittcon), Chicago, IL, USA, March 8-13, 2009.
- Brown, C., G. Tetreault, M. McMaster, K. Oakes, M. Servos. The effects of municipal wastewater effluent on fish communities in the Speed River. 44th Central Canadian Symposium on Water Quality Research, Burlington, Ontario, Feb. 23-24, 2009.
- de Jourdan, B., Muir, D., Hanson, M., Oakes, K., Solomon, K. 2008. Mesocosm evaluation of the toxicity and fate of three potential PBDE replacement brominated flame retardants. Society of Environmental Toxicology and Chemistry 29th Annual Meeting, Tampa Convention Center, Tampa, FL, USA, November 16-20, 2008.
- Metcalf, C.D., Li, H., Oakes, K.D., Servos, M.R., Andrews, D. 2008. Antidepressants and their metabolites in municipal wastewater and an urban watershed. Society of Environmental Toxicology and Chemistry 29th Annual Meeting, Tampa Convention Center, Tampa, FL, USA, November 16-20, 2008.
- Coors, A., Oakes, K., Escher, B., Fenner, K., Garric, J., Gust, M., Knacker, T., Kuster, A., Kussatz, C., Metcalfe, C., Monteiro, S., Moon, T., Parrott, J., Pery, A., Ramil, M., Servos, M., Tarazona, J.V., Ternes, T., Trudeau, V., Van Der Kraak, G.J. 2008. Environmental risk assessment of fluoxetine- a case study with a human pharmaceutical. Society of Environmental Toxicology and Chemistry Europe, 18th Annual Meeting, Warsaw, Poland, May 25-29, 2008.
- Oakes, K. 2008. Fish on drugs- they can't say no! Invited Talk, Ecology and Evolution Seminar Series, Trent University, Peterborough, ON, April 18, 2008.

- Oakes, K.D., Metcalfe, C.D., Lister, A., Van Der Kraak, G.J., Paterson, G., Mulla, I., Zhou, N., Servos, M.R. 2008. Assessing the biological effects of pharmaceuticals in fish: Impacts of the serotonin reuptake inhibitor fluoxetine. Best in Science Environmental Science Symposium, Ontario Ministry of the Environment, Etobicoke, ON March 7, 2008.
- Servos, M.R., Oakes, K., Ings, J., Tetreault, G., Loomer, H. 2008. Emerging contaminants in the Grand River Watershed. Southern Grand River Ecosystem: Current Conditions and Restoration Strategies Workshop. Grand River Conservation Authority, Cambridge, ON. March 4-5, 2008
- Kuster, A., Coors, A., Oakes, K., Escher, B., Fenner, K., Garric, J., Gust, M., Knacker, T., Kussatz, C., Metcalfe, C, Monteiro, S., Moon, T., Parrott, J. Pery, A., Ramil, M., Servos, M., Tarazona, J.V., Ternes, T., Trudeau, V., Van Der Kraak, G. 2008. Environmental risk assessment of fluoxetine- a case study with a human pharmaceutical. Knappe 2nd International Conference, Nimes, France, February 19-20, 2008.
- Ings, J.S., Oakes, K.D., Servos, M.R., Vijayan, M.M. 2007. Potential disruption of steroid biosynthesis in rainbow trout (*Oncorhynchus mykiss*) caged below a municipal wastewater effluent outfall. Society of Environmental Toxicology and Chemistry 28th Annual Meeting, Milwaukee, Wisconsin, USA, November 11-15, 2007.
- Servos, M. Oakes, K. 2007. Endocrine disruption in aquatic ecosystems: an overview of the problem. VIII Congreso SETAC LA, Ecotoxicología y desarrollo sustentable, Facultad de Ciencias, University de la Republica, Montevideo, Uruguay, October 8-11, 2007.
- Tetreault, G., Loomer, H., Heinrichs, J., Ings, J., Knight, B., Oakes, K., McMaster, M., Servos, S. 2007. Studies involving municipal wastewater effluents in the Grand River Watershed. Grand River Watershed Research Forum, Cambridge, ON, May 18, 2007.
- Kormos, J.L., Yang, P., Hao, C., Kleywegt, S., Oakes, K.D., Huck, P.M., Cheung, P., Socha, A., Whitehead, B., Servos, M.R. 2007. Pharmaceuticals in Ontario drinking water supplies. Pharmaceuticals and Personal Care Products in the Canadian Environment: Research and Policy Directions. Queen's Landing Inn, Niagara-on-the-Lake, Ontario, March 5-7, 2007.
- Tetreault, G, M. McMaster, K Oakes, and M. Servos. Population responses of wild fish exposed to municipal wastewater effluents in Ontario, Canada. Pharmaceuticals and Personal Care Products in the Canadian Environment: Research And Policy Directions Workshop, Niagara-on-the-Lake, On, March 5-7, 2007.
- Tetreault, G., McMaster, M., Oakes, K., Servos, M. 2007. Population responses of wild fish exposed to municipal wastewater effluents in Ontario, Canada. Proceedings of the 42nd Central Canadian Symposium on Water Quality Research. National Water Research Institute, Burlington, Ontario, February 12-13, 2007
- Kormos, J., P. Yang, C. Hao, S. Kleywegt, K. Oakes., P. Cheug, A. Socha, B.

- Whitehead, M. Servos. Presence and seasonal variability of pharmaceuticals in southern Ontario drinking water supplies. *Connecting Water Resources 2006; Water Management in Canada: Leadership at Every Level*. Canadian Water Network, Montreal Nov. 20-23, 2006.
- Oakes, K., Georgiades, E., Fernie, K., DeSolla, S., Mitchell, T., Knight, B., Ings, J., Heinrichs, J., Kormos, J., Leung, E., Barrett, G., Dixon, D.G., Holdway, D., Servos, M.R. Effects of municipal wastewater effluents and 17 α -ethinylestradiol on male hatchling snapping turtles (*Chelydra serpentina*). *Connecting Water Resources 2006*, Montreal, Quebec, Canada, November 20-24, 2006.
- Oakes, K., Georgiades, E., Fernie, K., DeSolla, S., Mitchell, T., Knight, B., Ings, J., Heinrichs, J., Kormos, J., Leung, E., Barrett, G., Dixon, D.G., Holdway, D., Servos, M.R. Effects of municipal wastewater effluents and 17 α -ethinylestradiol on male hatchling snapping turtles (*Chelydra serpentina*). *Society of Environmental Toxicology and Chemistry 27th Annual Meeting*, Montreal, Quebec, Canada, November 5-9, 2006.
- Kormos, J., Yang, P., Hao, C., Kleywegt, T., Oakes, K., Cheung, P., Socha, A., Whitehead, B., Servos, M. 2006. Occurrence and seasonal variability of selected pharmaceuticals in southern Ontario drinking water supplies. *Society of Environmental Toxicology and Chemistry 27th Annual Meeting*, Montreal, Quebec, Canada, November 5-9, 2006.
- Tetreault, G., Oakes, K., McMaster, M., Servos, M. 2006. Population responses of wild fish exposed to municipal wastewater effluents in Ontario, Canada. *Society of Environmental Toxicology and Chemistry 27th Annual Meeting*, Montreal, Quebec, Canada, November 5-9, 2006.
- Lampi, M.A., Oakes, K., Bols, N.C., Servos, M.R. 2006. Effects of six classes of pharmaceutical compounds on rainbow trout cell lines. *Society of Environmental Toxicology and Chemistry 27th Annual Meeting*, Montreal, Quebec, Canada, November 5-9, 2006.
- Oakes, K., Ings, J., Knight, B., Kormos, J., Lampi, M., Hallett, L., Mitchell, T., Heinrichs, J., Leung, E., Mabury, S., Dixon, D.G., Servos, M.R. 2006. An evaluation of the potential impacts of fire extinguishing foam on the Etobicoke Creek fish community following an aircraft fire on Air France Flight 358. *Society of Environmental Toxicology and Chemistry 27th Annual Meeting*, Montreal, Quebec, Canada, November 5-9, 2006.
- Georgiades, E., Tetreault, G., McMaster, M., Servos, M., Dixon, D.G., Oakes, K., Holdway, D.A. 2006. Optimization of acetylcholinesterase and metabolic enzyme activity in multiple aquatic species. *Society of Environmental Toxicology and Chemistry 27th Annual Meeting*, Montreal, Quebec, Canada, November 5-9, 2006.
- Oakes, K., Georgiades, E., Fernie, K., DeSolla, S., Mitchell, T., Knight, B., Ings, J., Heinrichs, J., Kormos, J., Leung, E., Barrett, G., Dixon, D.G., Holdway, D., Servos, M.R. Effects of municipal wastewater effluents and 17 α -ethinylestradiol

- on male hatchling snapping turtles (*Chelydra serpentina*). Canadian Amphibian and Reptile Conservation Network 11th Annual Meeting, Victoria, BC, October 27-29, 2006.
- Kormos, J., Servos, M., Oakes, K., Hao, C., Yang, P. 2006. Seasonal variation of pharmaceuticals and endocrine disrupting chemicals in southern Ontario drinking water supplies. SETAC Europe, the Hague, Netherlands, May 7-11, 2006.
- Kormos, J., Servos, M., Oakes, K., Hao, C., Yang, P. 2006. The presence and seasonal variation of pharmaceuticals and endocrine disrupting chemicals (EDCs) in southern Ontario drinking water supplies. 12th Annual Drinking Water Conference, Saint John, New Brunswick, April 1-4, 2006.
- Kormos, J., K. Oakes, M. Servos. Presence and seasonal variability of pharmaceuticals in southern Ontario drinking water supplies. 12th Canadian National Conference and 3rd Policy Forum on Drinking Water, Canadian Water and Wastewater Association Saint John, NB, April 1-4, 2006.
- Tetreault, G., Oakes, K., Kormos, J., Knight, B., Lampi, M., McMaster, M., Servos, M. 2006. Studies involving pharmaceuticals and municipal wastewater effluents in the Grand River Watershed. Linking Watersheds Workshop, Fredericton, New Brunswick, February 26-March 1, 2006.
- Tetreault, G., Oakes, K., Bennie, D., McMaster, D., Servos, M. 2006. Effects of municipal wastewater effluents on fish. 59th Canadian Conference for Fisheries Research, Calgary, AB, January 5-7, 2006.
- Tetreault, G., Oakes, K., McMaster, M., Servos, M. Effects of municipal wastewater effluents on resident fish populations. The 32nd Annual Aquatic Toxicity Workshop, Waterloo, ON October 1-4, 2005.
- Van Der Kraak, G., Oakes, K., Dorval, J., Hontela, A. 2004. Invited State of the Art Lecture: Oxidative stress: implications to reproductive and stress physiology. 5th International Symposium on Fish Physiology. University of Jaume, Casetellon de la Plana, Spain. September 5-9, 2004.
- McMaster, M., Hewitt, M., Tetreault, G.R., Van Der Kraak, G.J., Hobby, A., Denslow, N., Portt, C.B. and Oakes, K. 2002. Endocrine responses in wild fish exposed to municipal sewage effluents and pulp and paper mill wastes. Can we separate out the responses? Society Of Environmental Toxicology and Chemistry 23rd Annual Meeting, November 16-20, 2002, Salt Lake City, Utah, U.S.A.
- Oakes, K., Martin, J., Sibley, P., Richards, S., Solomon, K., MacLean, D., and Van Der Kraak, G. 2002. Evaluation of the potential of waterborne perfluorooctanesulfonate and perflouroctanoic acid in promoting endocrine disruption and oxidative stress in fish. Society Of Environmental Toxicology and Chemistry 23rd Annual Meeting, November 16-20, 2002, Salt Lake City, Utah, U.S.A.

- Van Der Kraak, G., Alsop, D., Lister, A., Marlatt, V., Matsumoto, J., Monkhouse, A., Oakes, K., Pryce, A., Wood, T., McMaster, M., Servos, M., Hewitt, M. 2002. Development of methods to assess reproductive endocrine function in fish. CNTC Annual Research Symposium, March 20-21, 2002, Crowne Plaza, Ottawa, ON.
- Oakes K.D., and Van Der Kraak G.J. 2002. Oxidative stress in fish exposed to industrial effluents. Conférence en Écologie Aquatique, Université de Montréal, Pavillon Marie-Victorin 90 Vincent d'Indy QC, February 11, 2002.
- Alsop D., Brown S., Hewitt M., Oakes, K., Van Der Kraak, G. 2002. Effect of pulp and paper mill effluent on retinoic acid in fish: disruption via receptor mediated events and non-receptor mediated events. Thirty-Seventh Central Canadian Symposium on Water Pollution Research, February 4 & 5, 2002, Canada Centre For Inland Waters, Burlington, ON.
- McMaster, M., Tetreault, G., Hewitt, M., Parrott, J., Sherry, J., Koli, M., Van Der Kraak, G., Oakes, K., Portt, C., and Denslow, N. 2002. Reproductive Endocrine Function in Wild Fish Exposed To Pulp and Paper Mill Effluents and Municipal Sewage Wastes in Northern Alberta, Canada. Thirty-Seventh Central Canadian Symposium on Water Pollution Research, February 4 & 5, 2002, Canada Centre For Inland Waters, Burlington, ON.
- Alsop D., Brown S., Hewitt M., Oakes, K., Van Der Kraak, G. 2001. Influence of pulp and paper mill effluent on vitamin A stores, retinoic acid receptors, and retinoic acid binding in fish. Society Of Environmental Toxicology and Chemistry 22nd Annual Meeting, November 11-15, 2001, Baltimore, Maryland, U.S.A.
- Martin, J.W., Oakes, K., Van Der Kraak, G., Solomon, K.R., Mabury, S.A., and Muir, D.C.G. 2001. Toxic effects and tissue distribution of perfluorooctanesulfonate in rainbow trout. Society Of Environmental Toxicology and Chemistry 22nd Annual Meeting, November 11-15, 2001, Baltimore, Maryland, U.S.A.
- McMaster, M., Hewitt, M., Parrott, J., Sherry, J., Koli, M., Van Der Kraak, G., Oakes, K., Portt, C., Denslow, N. Assessment of reproductive endocrine function in wild fish exposed to pulp and paper mill effluents and municipal sewage wastes in Northern Alberta, Canada. Society Of Environmental Toxicology and Chemistry 22nd Annual Meeting, November 11-15, 2001, Baltimore, Maryland, U.S.A.
- Richards, S., Sibley, P., Oakes, K., Cheong, J., Small, J., Mabury, S., Solomon, K. 2001. Fate and effects of perfluorooctanoic acid and perfluorooctane sulfonic acid. Society Of Environmental Toxicology and Chemistry 22nd Annual Meeting, November 11-15, 2001, Baltimore, Maryland, U.S.A.
- Oakes, K.D. 2001. Oxidative stress in fish exposed to industrial effluents. M.A. Ali Graduate Chair Award Public Lecture, University Of Guelph, October 10th, 2001.
- Oakes, K., Hewitt M., Wood C., Tremblay L., Alsop D., and Van Der Kraak G. Onset of oxidative stress in pulp mill effluent exposed fish. 6th Annual Laurentian SETAC Meeting. May 25-26, 2001 McMaster University, Hamilton, ON

- Oakes, K.D., Hewitt M., Luxon L., Wood C., Boutot, P., Tremblay L., Parrot J., LeBlanc E., and Van Der Kraak G.J. 2001. A possible mechanism of pulp mill effluent induced reproductive dysfunction in white sucker (*Catostomus commersoni*). CNTC Annual Research Symposium, March 20-21, 2001, Crowne Plaza, Ottawa, ON.
- McMaster, M.E. , Peters, L., Hewitt M.L., Van Der Kraak G.J., Oakes, K., Portt C., and Deslow N. 2001. A thorough evaluation of reproductive endocrine function in wild fish downstream of three mills within the Northern Rivers basin. Thirty-Sixth Central Canadian Symposium on Water Pollution Research, February 5 & 6, 2001, Canada Centre For Inland Waters, Burlington, ON.
- Oakes, K., Hewitt M., Parrott J., Wood C., Tremblay L., and Van Der Kraak G. 2001. Free radicals as a possible mechanism of pulp mill effluent induced reproductive impairment in exposed fish populations. Thirty-Sixth Central Canadian Symposium on Water Pollution Research, February 5 & 6, 2001, Canada Centre For Inland Waters, Burlington, ON.
- Alsop, D., Brown S., Oakes, K., Hewitt M., and Van Der Kraak G. 2001. The effects of environmental contaminants on retinoic acid binding and its receptors. 10th Annual Fish Physiology And Biochemistry Workshop, February 2-4, 2001. Elmhirst Resort, Keene, ON.
- Alsop, D., Brown S., Oakes, K., Hewitt M., and Van Der Kraak G. 2000. Development of a retinoic acid receptor-binding assay with rainbow trout tissue: the influence of environmental contaminants on retinoic acid binding and its receptors. Society Of Environmental Toxicology and Chemistry 21st Annual Meeting, November 12-16, 2000, Nashville, Tennessee, U.S.A.
- Hanson M.L., Oakes K., Sibley P.K., Solomon K.R., Muir D.C.G., and Mabury S.A. 2000 Possible mechanisms of action for haloacetic acid toxicity in the aquatic macrophytes *Myriophyllum spicatum*, *Myriophyllum sibiricum*, and *Lemna gibba*.. Society Of Environmental Toxicology and Chemistry 21st Annual Meeting, November 12-16, 2000, Nashville, Tennessee, U.S.A.
- McMaster M.E., Hewitt M.L., Parrott, J., Sherry J., Koli, M., Van Der Kraak, G.J., Oakes, K., Portt, C.B., and Denslow N. 2000. Detailed endocrine assessments in wild fish downstream of pulp and paper mills in northern Alberta, Canada. Society Of Environmental Toxicology and Chemistry 21st Annual Meeting, November 12-16, 2000, Nashville, Tennessee, U.S.A.
- Oakes, K.D., Hewitt M., Luxon L., Wood C., Boutot, P., Tremblay L., Parrot J., LeBlanc E., and Van Der Kraak G.J. 2000. A possible mechanism of pulp mill effluent induced reproductive dysfunction in white sucker (*Catostomus commersoni*) Society Of Environmental Toxicology and Chemistry 21st Annual Meeting, November 12-16, 2000, Nashville, Tennessee, U.S.A.

- Oakes K., Hewitt M., Parrott J., Wood C., Tremblay L., and Van Der Kraak G.J. 2000. Free radicals as a possible mechanism of pulp mill effluent induced reproductive dysfunction in white sucker (*Catostomus commersoni*). The 27th Annual Aquatic Toxicity Workshop, St. John's, Newfoundland, October 1-4, 2000.
- McMaster M.E., Peters, L. Hewitt, M.L., Van Der Kraak G.J., Oakes K., Portt, C., and Denslow N. 2000. Detailed endocrine assessment of wild fish within the northern rivers basins. The 27th Annual Aquatic Toxicity Workshop, St. John's, Newfoundland, October 1-4, 2000.
- Van Der Kraak G., McMaster M., Hewitt M., Munkittrick K., & Oakes K. 2000. Unravelling the actions of a complex of EDCs: Pulp Mill Effluent. International Fish Endocrinology Symposium, July 30-Aug 4, 2000. University Of Washington, Seattle Washington.
- McMaster M.E., Hewitt L.M., Parrott, J., Sherry, J., Koli, M., Van Der Kraak G.J., Oakes K.D., Janz D., Portt C.B., Denslow, N., and Munkittrick K.R. 2000. Detailed endocrine assessment in wild fish downstream of pulp and paper mills: application to the northern rivers ecosystem initiative endocrine program. 4th International Conference On Environmental Impacts Of The Pulp And Paper Industry June 12-15, 2000, Helsinki, Finland. The Finnish Environment Institute Publication 417, pp 232-237
- Oakes K.D., and Van Der Kraak G.J. 2000. Role of redox-active metal species in promoting free radical damage and impairment of fish reproductive competence. ASTM Tenth Symposium on Environmental Toxicology and Risk Assessment. April 10-12, 2000, Toronto, ON .
- Oakes, K.D. and Van Der Kraak, G.J. 2000. Pulp and paper mill effluent exposure elevates free radical activity in exposed fish populations. Canadian Network Of Toxicology Centres Annual Research Symposium, March 27-28, 2000, Hull, P.Q.
- Van Der Kraak G.J., Squires E.J., Wells, K., Oakes K., Lister A., Elliott K., Alsop D., McMaster M., Servos M., Hewitt M., and Munkittrick K. 2000. Developing methods to assess reproductive endocrine function in fish. Canadian Network Of Toxicology Centres Annual Research Symposium, March 27-28, 2000, Hull, P.Q.
- Oakes, K.D. Van Der Kraak G.J. 2000. Why Mr. Sucker Is Not Smiling; Oxidative Stress In Fish Exposed To Pulp Mill Effluent. 9th Annual Fish Physiology And Biochemistry Workshop, February 4-6, 2000. Elmhurst Resort, Keene, ON.
- Oakes, K.D., Van Der Kraak G.J., Portt C.B., McMaster M.E. and Munkittrick K.R. 1999. Pulp and Paper Mill Effluent Exposure Elevates Free Radical Activity in Exposed Fish Populations. 20th Annual Meeting Society of Environmental Toxicology and Chemistry, November 14-18, 1999, Philadelphia, Pennsylvania.

- McMaster M.E., Hewitt L.M., Van Der Kraak G.J., Oakes K.D., Janz D., Portt C.B. and Munkittrick K.R. 1999. Detailed Endocrine Assessment in Wild Fish Downstream of Pulp and Paper Mills: Application to the Northern Rivers Ecosystem Initiative Endocrine Program. 26th Annual Aquatic Toxicity Workshop, October 2-6, 1999, Edmonton, Alberta.
- MacLatchy D.L., Gilman C.I., Smitheram A.K., Downing D.M. and Oakes K.D. 1999. Effects of Two Phytoestrogens and 17 β -Estradiol on Reproductive Endocrine Status in Fish. 5th International Congress of Comparative Physiology and Biochemistry, August 23-28, 1999, Calgary, Alberta.
- Oakes, K.D. and Van Der Kraak G.J. 1999. Increased Hepatic Lipid Peroxidation in White Sucker (*Catostomus commersoni*) Populations Exposed to Bleached Kraft Mill Effluent (BKME). University of Guelph - Michigan State University Graduate Student Mini-Symposium on Environmental Toxicology and Chemistry, June 27-28, 1999. University of Guelph, Ontario.
- Oakes, K.D. and Van Der Kraak G.J. 1999. Do Free Radicals In Complex Industrial Effluents Impact Fish In Adjacent Receiving Waters? Fourth Annual Meeting of the Laurentian Chapter of SETAC, May 28-29, 1999. University of Guelph, Ontario.
- McMaster M.E., Jardine J.J., Munkittrick K.R., Portt C.B., Oakes, K., Van Der Kraak G.J. 1998. Examination of Reproductive Function in White Sucker Populations on the Moose River Basin Influenced by Hydroelectric Dams and Pulp and Paper Effluent. 19th SETAC Meeting, Charlotte, North Carolina, November 15-19, 1998.
- Oakes, K.D. and Van Der Kraak G.J. 1998. Effects of Bleached Mill Effluent (BKME) Exposure on a Feral White Sucker (*Catostomus commersoni*) Population. 25th Annual Aquatic Toxicity Workshop, October 18-21, 1998, Quebec City, Canada.
- Van Der Kraak G., Munkittrick D., McMaster M., Larson A., Forlin L., Sandstrom O., Jardine J. and Oakes K. 1997. The Utility of Measuring Plasma Sex Steroid Levels in Assessing the Reproductive Fitness of Fish. Third International Conference on Environmental Fate and Effects of Pulp and Paper Mill Effluents, November 9-13, 1997. Rotorua, New Zealand.

Peer-Review Contributions

Journal Articles

<i>Aquaculture</i>	1
<i>Aquatic Ecosystem Health & Management</i>	3
<i>Archives of Environmental Contamination and Toxicology</i>	1
<i>Canadian Journal of Fisheries and Aquatic Sciences</i>	1
<i>Comparative Biochemistry and Physiology</i>	2
<i>Ecotoxicology and Environmental Safety</i>	7

<i>Environment International</i>	2
<i>Environmental Science & Technology</i>	4
<i>Environmental Toxicology and Chemistry</i>	10
<i>Environmental Biology of Fishes</i>	3
<i>General and Comparative Endocrinology</i>	1
<i>Fish Physiology and Biochemistry</i>	2
<i>Marine Environmental Research</i>	1
<i>Science of the Total Environment</i>	1
<i>The Environmentalist</i>	1

Textbooks

Molles, M.C. Jr., Cahill, J.F. Jr. Ecology, Concepts & Applications, Second Canadian Edition, McGraw-Hill Ryerson, Toronto. ISBN 9780070963412

Molles, M.C. Jr., Cahill, J.F. Jr. Ecology, Concepts & Applications, Third Canadian Edition, McGraw-Hill Ryerson, Toronto. ISBN (not yet assigned)

STUDENT SUPERVISION

Graduate Thesis Committee Member

Adrienne Smith (ongoing). M.Sc. Candidate. Dept of Biology, University of Waterloo. Effects of the 2000 rule curves on upper Rainy River food web, spawning, and nursery critical habitats. Supervisor: Mike Power

Cicic Chen (ongoing) M.Sc. Candidate. Dept. of Biology, University of Waterloo. Using rainbow trout cell lines to evaluate the toxicity of heavy fuel oil. Supervisor: Niels Bols.

Heather Dixon (ongoing). Ph.D. Candidate. Dept of Biology, University of Waterloo. The Marine Feeding Habits of Atlantic Salmon (*Salmo salar L.*) in the Northwest Atlantic. Supervisor: Mike Power

Kira Jade Cooper. (ongoing). M.ES. Candidate. Dept of Environment and Resource Studies. Supervisors: Ken Oakes, Steve Murphy and Len Tsugi

Janice Yu Ting Wong. 2011. Use of fish cell lines to compare the cytotoxicity of tetrabromobisphenol A with its degradation products and with an alternative brominated flame retardant. M.Sc. Dept. of Biology, University of Waterloo. Supervisor: N. Bols, Defended June 21, 2011. (*maternity leave replacement for V. Dayeh*)

Jennifer Sophia Ings. 2011. Stress and metabolic responses to municipal wastewater effluent exposure in rainbow trout. Ph.D. Dept. of Biology, University of Waterloo, Supervisors M. Vijayan and M. Servos. Defended August 3, 2011 (*delegate for D.G. Dixon*).

Full Supervision

Undergraduate Honours Projects

Scott MacIntosh, Mark VanderBeek. 2007-2008. *Use of Treatment Wetlands to Polish Septic Tank Effluent*, Senior Honours Project (two-term SYDE 461, and SYDE 462). Dept of Systems Design Engineering, Faculty of Engineering, University of Waterloo

Co-Supervision

Undergraduate Honours Projects

Rose Bendix 2009-2010. Effects of the Dietary Exposure of 1,2 Bis (2,4,6-tribromophenoxy)-ethane and a Commercial Polybrominated Diphenyl Ether Mixture on Juvenile Snapping Turtle (*Chelydra serpentina*) Hepatic Oxidative Stress and Circulating Sex Steroids. Dept of Biology, Faculty of Science, University of Waterloo.

Lin Li. 2007-2008. Induction of vitellogenin (VTG) in fathead minnow (*Pimephales promelas*) caged below sewage treatment plants. Dept of Biology, Faculty of Science, University of Waterloo.

Jill Heinrichs, 2006-2007. Development of a fathead minnow (*Pimephales promelas*) vitellogenin enzyme-linked immunosorbent assay (ELISA) for measurement of environmental estrogenic responses. Dept of Biology, Faculty of Science, University of Waterloo.

Andrew Tin. 2006-2007. Laboratory Exposure of Hatchling Male Snapping Turtle (*Chelydra serpentina*) to Fluoxetine. Dept of Biology, Faculty of Science, University of Waterloo.

Tyson Mitchell. 2005-2006. The effects of Municipal Wastewater Effluent and 17 α -Ethinylestradiol on the development of male hatchling snapping turtles (*Chelydra serpentina*). Dept of Biology, Faculty of Science, University of Waterloo.

MISCELLANEOUS

Married to Kim (1993); sons Ethan (10), Joshua (8), Matthew (3)
Undergraduate cumulative average 85.5%; Graduate cumulative average 87.4%
Recent Class 1 Backpack electroshocking certified
Pleasure Craft Operator Card
Ontario Fishes Identification Workshop (Royal Ontario Museum)
First Aid/CPR (Current Until May 2015)

Volunteer Activities

Organized Award Winning College Royal Displays involving ~25 volunteers (2000-2002)
Let's Talk Science (Public school talks on the relevance of science, 6 years - ongoing)
Guelph & Wellington Special Olympics (3 yrs)
Frosh Buddy (mentoring program for international students) (2 yrs)
Host annual tour of Sir Sandford Fleming College students at the University Of Guelph (2 yrs)
Member of the Grand River Fisheries Management Plan Implementation Committee (5 yrs -ongoing)

Waterloo Unlimited – Participate in approx. 12 workshops enriching gifted public school students, generally two or three (half to full day) events per year over five years (ongoing).

Coach, North Perth Soccer Association U10
Waterlutions Facilitator
Career Night Mentor, University of Guelph
Faculties Serve Food

References

Glen Van Der Kraak
Assoc. Dean Research, Biological Sciences
Professor, Dept. of Int. Biology
University Of Guelph
Guelph, ON
N1G 2W1
(519) 824-4120 ext. 53424
gvanderk@uoguelph.ca

Gerald Mackie
Professor Emeritus
Dept. Of Zoology
University Of Guelph
Guelph, ON
N1G 2W1
(519) 824-4120 ext. 53505
gmackie@uoguelph.ca

D. George Dixon
Vice-President, Research

Professor, Dept. of Biology
University of Waterloo
Waterloo, ON
N1G 2W1
(519) 888-4567 ext 32531
dgdixon@uwaterloo.ca

Mark Servos
Canada Research Chair, Water Quality
Protection
Professor, Dept. of Biology
University Of Waterloo
Waterloo, ON
N2L 3G1
(519) 888-4567 ext. 36034
mservos@uwaterloo.ca