

ANNUAL REPORT: June 1, 2015 – May 31, 2016
(i.e., Summer 2015, AY 2015-2016)
DEPARTMENT OF ENVIRONMENTAL AND FOREST BIOLOGY
SUNY-ESF

NAME: Gordon Paterson

I. INSTRUCTIONAL ACTIVITIES

1. Regular Course Offerings

	<u>Course No.</u>	<u>Title</u>	<u>Credit Hrs.</u>	<u>No. Students</u>	<u>No. of Lab. Sections</u>
SUMMER:	EFB202	Ecol. Monitoring & Assess.	3	36	4
	EFB420	Professional Internship	4	1	
FALL:	EFB298	Research Internship	1	1	
	EFB400	Toxic Health Hazards	3	27	
	EFB420	Professional Internship	4	2	
	EFB600	Toxic Health Hazards	4	6	
	EFB797	Adaptive Peaks	1	19	
	EFB899	MS Thesis Research	1	1	
	ENS470	Env. Risk Assessment	3	7	
SPRING:	EFB298	Research Internship	1	1	
	EFB496	Study Abroad	12	1	
	EFB523	Tropical Ecology	3	14	
	EFB/ERE/FCH797	Hydrology & Biogeochem.	1	20	
	EFB797	Adaptive Peaks	1	9	
	EFB899	MS Thesis Research	4	1	

NOTE: PLEASE INDICATE WHICH COURSE(S) HAD A SERVICE-LEARNING COMPONENT AND BRIEFLY EXPLAIN THE NATURE OF THIS COMPONENT. For examples of service-learning in courses, see: <http://www.esf.edu/students/service/courses.htm>. Service-learning is a form of structured experiential education in which students engage with the community to be active learners, to enrich their sense of civic responsibility, and to explore practical application for course content. Faculty oversight, reflective thinking, and reciprocity are key components of service-learning.

2. Non-Scheduled Course Offerings (e.g., 496, 899, 999)

<u>Course No.</u>	<u>Title</u>	<u>Credit Hrs.</u>	<u>No. Students</u>
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3. Continuing Education and Extension (short courses, workshops, etc.)

4. Guest Lecture Activities

<u>Course No.</u>	<u>Title</u>	<u>No. of Lectures</u>
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EFB496	Senior Synthesis AFS (mock-employment interviews)	1
EST696	Environmental Health Policy March 22, 2016	1

II. STUDENT ADVISING

- A. Number of undergraduates for whom you are the student's official advisor 23 and unofficial advisor _____
- B. Graduate Students: (list name, degree sought, starting date, month & year; if a degree was completed, please give date and full citation for the thesis or dissertation).

MAJOR PROFESSOR

Nicole Saavedra MS Started January 2016
Caitlin Slife MS Started September 2015

CO-MAJOR PROFESSOR

MEMBER, STEERING COMMITTEE (other than those listed above)

Kelly Huffman, MPS, Fish & Wildlife Biology & Management (J. Farrell & C Whipps Co-MP)
Jessica Saville, PhD, Ecology (D. Leopold MP)
Wenjun Cai, PhD, Plant Science & Biotechnology (L. Newman MP.)

CHAIRMAN OR READER ON THESIS EXAMS, ETC.

Andrew Miano, MS, Fish & Wildlife Biology & Management (Defended 11/2015; J. Farrell MP)
Zachary Smith, MS, Fish & Wildlife Biology & Management (Defended 08/2015; N. Ringler MP)
Funmi Afelumo, MS, Plant Science & Biotechnology (Defended 07/2015; L. Newman MP)
Andrew Brainard, PhD, Fish & Wildlife Biology & Management (K. Schulz MP)
Erin Swallow, PhD, Environmental & Natural Resources Policy, Chair (P. Hirsch MP)
David Haase, MS, Environmental Studies, Chair, (S. Moran MP)

III. RESEARCH COMPLETED OR UNDERWAY

- A. Departmental Research (unsupported, boot-legged; title - % time spent)
- i) Estimating individual efficiencies for Great Lakes lake trout, unsupported 5 %.
 - ii) Contrasting PCB bioaccumulation patterns in Lake Huron lake trout, unsupported 5 %
 - iii) Latitudinal trends in lake trout lipid, PCBs and energy density, unsupported 5%.
 - iv) Relationships between life history strategy and persistent organic pollutant bioaccumulation in freshwater mysid shrimp, unsupported 5%.
- B. 1. Grant-supported Research (source, subject, amount - total award and current year, award period starting and ending dates; list graduate research assistants supported by each grant)
2. Research Proposals pending (include information as in B.1., above).
 - i) 2016: Developing early warning signals of ecosystem change in the Great Lakes. (In review: Great Lakes Fishery Commission \$135,000 Co-PI with Drs. M. Guzzo, K. McCann and MD Rennie)
 3. Research Proposals submitted, but rejected (include information as in B.1, above)

- i) 2016: The role of oxygen depletion on methylmercury formation in Irondequoit Bay, NY. Great Lakes Research Consortium \$14,972 Co-PI Dr. R. Razavi Hobart & William Smith Colleges
- ii) 2016: Biocomplexity, feeding ecology and contaminant ecology of Great Lakes Deepwater Sculpin. Great Lakes Fish and Wildlife Restoration Act. \$160,000 Co-PI Dr. D. Roy. U. Connecticut.
- iii) 2016: Physiological responses of Lake Ontario lake trout during the Ponto-Caspian invasion. Great Lakes Fishery Commission \$57,593 PI G. Paterson
- iv) 2016: Quantifying methylmercury production in aquatic dead zones. SUNY ESF Seed Fund. \$5,760 PI G. Paterson.

IV. PUBLICATIONS (Full bibliographic citation, i.e., do not use "with Jones," or "Jones, et al."; please list only publications published, in press, or actually submitted during this reporting period --- do not list manuscripts in preparation).

A. Refereed Publications

- i) **Paterson G.**, Ryder M., Drouillard KG., and Haffner GD. 2016. Contrasting PCB bioaccumulation patterns among Lake Huron lake trout reflect basin specific ecology. *Environmental Toxicology and Chemistry* 1: 65-73
- ii) McLeod AM., **Paterson G.**, Drouillard KG. And Haffner GD. 2015. PCB food web dynamics quantify nutrient and energy flow in aquatic ecosystems. *Environmental Science & Technology*. 49: 12832-12839.
- iii) McPhedran, K., Grgicak-Mannion A., **Paterson G.**, Briggs T., Ciborowski J., Haffner G.D., and Drouillard, K.G. Field validation of multi-chemical hazard metrics for predicting benthic invertebrate toxicity in the Detroit River, Ontario, Canada. Submitted to *Integrated Environmental Assessment and Monitoring*. In press.
- iv) Colborne, S.F. Rush, S.A. **Paterson G.**, Johnson TB., Lantry B.F. and Fisk AT. Estimates of lake trout (*Salvelinus namaycush*) diet in Lake Ontario using two and three isotope mixing models. Submitted to *Journal of Great Lakes Research*, in press.
- v) Pitt J.A*. Drouillard K.G. and **Paterson G.** Polychlorinated biphenyl bioaccumulation patterns among Lake Erie lower trophic level consumers reflect species ecologies. Submitted to *Bulletin of Environmental Contamination and Toxicology* (*Undergraduate student paper)

B. Non-refereed Publications

- i) Editorial Note: **Paterson G.** 2015. Total mercury in six Antarctic notothenioid fishes. *Bulletin of Environmental Contamination and Toxicology*. 95:566.

C. Papers Presented at Science Meetings (give title, date, occasion, and location)

- i) **Paterson G.** and McGoldrick DJ. Physiological responses of Lake Ontario lake trout during the Ponto-Caspian invasion. Great Lakes Fishery Commission, Board of Technical Experts Meeting, Ann Arbor Michigan, March 2, 2016.
- ii) **Paterson G.**, Ecological tracers indicate basin specific ecologies for the Lake Huron food web. 59th Annual Conference of the International Association for Great Lakes Research, University of Guelph, Guelph, Ontario, CANADA. June 6-10 2016.

D. Public Service Presentations (lectures, seminars, etc. to and for the public; give group or occasion, date(s), and attendance).

i) Comparing Lake Trout Ecological Responses During Dreissenid Mussel Invasion in Lakes Ontario & Huron. Great Lakes Institute for Environmental Research. Windsor, Ontario, October 2, 2015 (30).

ii) Lake Huron: A Great Lake in a great state of change. Cornell Biological Field Station, Bridgeport NY. July 29, 2015 (25).

iii) Pollutant ecotoxicology and toxicokinetics across ecological landscapes. Michigan Technological University, Houghton, MI, April 28, 2016 (40).

V. PUBLIC SERVICE

A. Funded Service (include consulting activities)

1. Government Agencies (Federal, State, Local):

2. Industrial and Commercial Groups, etc.

B. Unfunded Service to Governmental Agencies, Public Interest Groups, etc.

VI. PROFESSIONAL DEVELOPMENT

A. Professional Honors and Awards (for teaching, research, outreach, etc.)

B. 1. Activities in Professional Organizations (offices held, service as chairman, member, participant or consultant)

2. Professional Society Membership

International Association for Great Lakes Research
American Society of Limnology and Oceanography
Society of Environmental Toxicology and Chemistry

3. Other Professional Activities

a. Editorial activity

Journal (s)

Bulletin of Environmental
Contamination & Toxicology.

Responsibility

Senior Editor: Editorial review, processing,
and final decision for 15 manuscripts.

Other (books, symposia, etc.)

b. Reviewer

Journal(s)

ICES Journal of Marine Science

No. of manuscripts

1

Science of the Total Environment	2
Archives of Environmental Contamination &. Toxicology	1
Journal of Great Lakes Research	1
Environmental Science & Technology	1

<u>Agency</u>	<u>No. of proposals</u>
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Other

c. Participation (workshops, symposia, etc.)

<u>Name of workshop, etc.</u>	<u>Date</u>	<u>Place</u>
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i) Thiainase food web effects in Lake Ontario. Tunison Fish Hatchery, Cortland NY. June 3, 2015

ii) Editorial Board Meeting, Bulletin of Environmental Toxicology and Contamination. August 26-28th 2015. UNAM Coral Reef Research Field Station, Puerto Morelos, Mexico.

C. Further Education/Re-training Undertaken, Leaves, Workshops, etc.

D. Foreign Travel (Where, When, Purpose)

i) Commonwealth of Dominica, March 10 – 21, 2016, co-teach Tropical Ecology (EFB523) field course with Dr. Donald Stewart.

ii) Windsor, Ontario CANADA, October 1-3rd 2016. Travel for invited seminar.

iii) Puerto Morelos Mexico; Editorial Board Meeting, Bulletin of Environmental Contamination and Toxicology, August 26-28th 2016.

VII. ADMINISTRATIVE AND SERVICE RESPONSIBILITIES (include committee participation)

A. Department-level

- i) Graduate Program Advisory Committee
- ii) Cranberry Lake Biological Station Advisory Committee
- iii) Grober Graduate Research Fellowship (Candidate review and selection)
- iv) Robert Burgess Graduate Scholarship in Ecology (Candidate review and selection)
- v) Accepted Student Reception (February 15th, 2016)
- vi) Cranberry Lake Biological Station Information Session (February 8th, 2016)

B. College-level

i) Faculty position search, EFB representative, Environmental Chemist, Department of Chemistry (Committee).

ii) Spotlight on Student Research Conference April 2016.

C. University-wide, including Research Foundation

VIII. SUMMARY OF SIGNIFICANT ACTIVITIES AND ACCOMPLISHMENTS DURING THIS REPORTING PERIOD, ESPECIALLY THOSE MOST NOTEWORTHY AND RELATIVE TO THE COLLEGE'S AND DEPARTMENT'S MISSION.

During the fall of 2015 I again taught Toxic Health Hazards and received strong positive feedback from multiple students regarding the course content. I have made a concerted effort to keep this course material up to date with relevant topics and environmental issues and feel that it has now matured into a relatively smooth running course but will continue to actively update the course content, readings materials and evaluation. I also offered the Environmental Risk Assessment course requirement for the Environmental Health program during the fall 2015 semester. This year there was sufficient enrollment to proceed with the course and it received also generally positive feedback. I anticipate continuing to grow this course and its content as I offer in the coming semester. I again co-taught the Adaptive Peaks graduate seminar course with Dr. Shannon Farrell during the fall 2015 and spring 2016 semesters. Dr. Farrell and I have reworked to course syllabus to include graduate student seminar participation during the interim weeks between guest speakers. The graduate students have seemed to value the opportunity to gain public speaking experience in a more informal setting and in preparation for thesis committee meetings and capstone seminars. I am again co-teaching Tropical Ecology with Dr. Donald Stewart during the spring 2016 semester and this year the field component was able to proceed during the Spring Break period as scheduled. I also am currently contributing to the Hydrology and Biogeochemistry seminar course offered through EFB/ERE and FCH and am coordinating with Dr. Greg Boyer. I was also able to supervise a range of undergraduate students through research internships and independent research projects. One of these students completed an evaluation of a dataset on pollutants in the lower trophic levels of the Lake Erie foodweb which was of exemplary quality and insight and was suitable to amend into a short publication note and has been submitted for peer review. These projects were very enjoyable and valuable for helping teach students the lab and data analysis skills associated with pollutant extraction and analysis in biological samples and also for evaluating the status of laboratory facilities for this research.

Laboratory maintenance continues to be a challenging issue with respect to completing trace chemical analysis in Illick Hall lab space and the continued cleaning and regular maintenance required in order to maintain a suitable facility for trace chemical research. This is in addition to difficult working conditions with respect to laboratory temperatures, volatile solvents and completing bench chemistry work in the lab during the summer and fall months. I now have two MS students working on thesis projects focused on the Finger Lakes and Lake Ontario. However, recruiting graduate students to EFB for a toxicology based research program proves challenging in competition with other institutions and have lost potential students to other larger academic programs. I am currently PI or Co-PI on approximately \$365,000 in research funding proposals this year and am awaiting response on these applications.

I continue to serve on the Cranberry Lake Biological Station (CLBS) Advisory Committee and also began to serve on the Graduate Program Advisory Council (GPAC) in the fall 2015 semester. For CLBS, the committee came to a consensus to offer an additional session in the summer 2016 semester in order to remedy the student backlog for EFB202. My primary participation in GPAC has included the initiation of an evaluation of the EFB graduate program with respect to graduate student success through the program. The first priority has been discussion of the appropriate metrics with which to evaluate student and program success. Participation on this committee also included application review and candidate selection for the Grober Research Fellowship. I also continue to interact with numerous undergraduate students interested in environmental toxicology and issues related to water contamination, industrial pollutants and their potential effects on human and environmental health.

For my own professional development, I was invited to present a research funding proposal to the Great Lakes Fishery Commission's Board of Technical Experts and learned greatly from the experience. This past year proved to be highly challenging towards time management and being able to consistently fit in quality grant proposal writing time and need to reduce the number of teaching commitments in order to focus on my research program and graduate student training. I now contribute in a reduced capacity as an associate editor for the Bulletin of Environmental Contamination and Toxicology, in this revised role, I have been responsible for the editorial processing of approximately half of the number of bulletin publication style manuscripts (15) that I had handled in previous years. I have also acted as a professional reference for multiple undergraduate and graduate students applying for REU internships and full time professional positions, respectively.

IX. A. FUTURE PLANS, AMBITIONS, AND POTENTIAL CONTRIBUTIONS FOR YOUR OWN PROFESSIONAL DEVELOPMENT AND THE ENHANCEMENT OF THE PROGRAM IN ENVIRONMENTAL AND FOREST BIOLOGY (brief summary)

My primary focus continues to be to find more time to compose high quality research proposals that have greater chance of being funded. I have found much of the administrative and day to day tasks at ESF to be highly inefficient which continues to result in substantial amount of lost time that is better directed toward high quality grant writing. Navigating such inefficiency will also help provide the ability to maintain a key balance between teaching, service and research responsibilities in addition to maintaining a work-life balance. I found Environmental Risk Assessment to be a bit of a work in progress and the need also to make the course more amenable to a wider range of the ESF student population. I felt that on completion of the course this past year that there was room for improvement and more efficiency within the syllabus which I will strive to achieve for the upcoming offering in fall 2016. For research, I anticipate furthering a newly developed collaboration with researchers at the Finger Lakes Institute and also Syracuse University regarding mercury cycling and speciation in hypoxic and anoxic water bodies across the Great Lakes basin. I also anticipate developing more research proposals in an effort to investigate research questions surrounding the use of persistent organic pollutants as indicators of species bioenergetics in aquatic ecosystems. I will also continue to support the MS students currently completing thesis research projects in my laboratory.

B. PROJECTED ACTIVITIES FOR NEXT YEAR

1. Summer 2016

a. Course(s) to be offered

EFB202 (Ecological Monitoring and Biodiversity Assessment) Contribute to aquatics program teaching.

EFB496 – Aquatic Ecology Field Course

b. Proposed research activity

i) Collection of *Mysis diluviana* from Keuka, Skaneateles, Cayuga Lakes and Lake Ontario to contrast life history strategies and PCB bioaccumulation patterns in this keystone aquatic invertebrate. (C. Slife MS Thesis)

ii) Collection of Lake Ontario preyfish species in collaboration with Dr. Brian Lantry of USGS biological station in Oswego to assess feasibility of persistent organic pollutants as ecological tracers in these species. (N. Saavedra MS Thesis.)

iii) Complete research manuscript investigating lake trout energy densities across a broad landscape scale.

iv) Continued lab maintenance for sample processing and pollutant extraction and analyses.

v) Continue composition of NSF preliminary proposal investigating the significance of overwintering temperature cycles on fish proximate composition and pollutant bioamplification for January 2017 Biology Core programs solicitation.

c. University, professional society, and public service

Senior editor – Bulletin of Environmental Contamination and Toxicology

2. Fall Semester 2016

a. Course(s) to be offered

EFB400/600 (Toxic Health Hazards)

EFB797 (Adaptive Peaks; Co-taught with Dr. Shannon Farrell)

ENS470 (Environmental Risk Assessment)

b. Proposed research activity

i) MS research conducted by Caitlin Slife and Nicole Saavedra

ii) Develop mercury speciation project with Syracuse University collaborators

iii) Personal research/data analysis determining top predator ecological efficiencies

iv) Continue composition of NSF preliminary proposal investigating the significance of overwintering temperature cycles on fish proximate composition and pollutant bioamplification for January 2017 Biology Core programs solicitation.

c. University, Professional society, and public service

Senior editor – Bulletin of Environmental Contamination and Toxicology

Cranberry Lake Biological Station Advisory Committee

Various departmental, College and public outreach service requirements as they arise throughout the academic year.

3. Spring Semester 2017

a. Course(s) to be offered

EFB796 Hydrology and Biogeochemistry Seminar Series

EFB797 (Adaptive Peaks; Co-taught with Dr. Shannon Farrell)

b. Proposed research activity

i) MS research conducted by Caitlin Slife and Nicole Saavedra

ii) Personal research/data analysis determining top predator ecological efficiencies

iii) Submit NSF preliminary proposal investigating the significance of overwintering temperature cycles on fish proximate composition and pollutant bioamplification for January 2017 Biology Core programs solicitation.

c. University, professional society, and public service

Senior editor – Bulletin of Environmental Contamination and Toxicology

Cranberry Lake Biological Station Advisory Committee

Graduate Program Advisory Council

Various departmental, College and public outreach service requirements as they arise throughout the academic year.