

EDMUND A. HALFYARD

BSc. (Envs), MSc. (Biol), PhD (Biol)

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CAREER OBJECTIVE

To provide significant contributions to the current body of knowledge about fish, fish ecology and fisheries management techniques. To provide the best possible advice to managers tasked with the conservation of fish populations, their habitats and the regulation of fisheries, particularly those of conservational or recreational importance in Canada.

FORMAL EDUCATION/ FISHERIES RESEARCH TRAINING

Dalhousie University, Halifax, NS **Class of 2014**
PhD (Fish Biology/Ecology)

Thesis – The Estuarine and Coastal Survival of Atlantic Salmon: Estimation, Correlates and Ecological Significance. Defense date: June 23 2014.

Acadia University, Wolfville, NS **Class of 2008**
MSc (Fisheries Biology / Limnology), GPA 3.93 out of 4.0

Thesis – Initial Results of an Atlantic Salmon River Acid Mitigation Program

Acadia University, Wolfville, NS **Class of 2003**
BSc.(Environmental Science), Entrance Scholarships

FISHERIES SCIENCE EXPERIENCE

University of Windsor, Windsor, Ont. **June 2014 – Present**
Post-doctorate Research Fellow, Great Lake Institute for Environmental Research

- This project involves the testing, optimization and demonstration of a novel acoustic telemetry transmitter designed to detection predation events. Both controlled laboratory and mesocosm experiments are being conducted and novel three-dimensional analytical techniques are being developed to merge with predation tags.

Fisheries and Oceans Canada, Dartmouth, NS **January 2014 – Present**
Biologist, Population Ecology Division

- Developed an analytic method to parse migration movements of fish using acoustic telemetry data to assess the role of predation by striped bass on endangered Inner Bay of Fundy Atlantic Salmon. Produced a primary publication.

Fisheries and Oceans Canada, Dartmouth, NS **January 2013 – April 2013**
Biologist, Population Ecology Division

- Analyzed data for a recovery potential assessment for Atlantic salmon of the eastern Cape Breton designatable unit. Produced a research document.
- Developed an analytical approach to estimating seasonal (i.e. summer vs. winter) survival for an endangered striped bass population using acoustic telemetry and Cormack-Jolly-Seber Models. Produced a Manuscript.

Fisheries and Oceans Canada, Dartmouth, NS
Biologist, Population Ecology Division

January 2012 – April 2012

- Analyzed acoustic telemetry on endangered Inner Bay of Fundy Atlantic Salmon
- Provided data management and quality control of an acoustic telemetry metadata and database for multiple tagging projects in the Shubenacadie River Watershed
- Analyzed acoustic telemetry data on Striped Bass from a unique lacustrine /anadromous population

Fisheries and Oceans Canada, Dartmouth, NS
Fisheries Technician, Population Ecology Division

January 2010 – May 2010

- Conducted field research at the Morgan's Falls field monitoring station
- Planning for installation of a rotary screw trap (smolt wheel) on the St. Mary's River

Acadia University, Wolfville, NS
Term Instructor, Biology Department

September 2009 – January 2010

- Sole instructor for Ichthyology 5223, a graduate-level class
- Responsible for all aspects of lesson planning, exams and marking

Salmon Smolt Estimation Project, Sheet Harbour, NS
Lead Researcher

April 2007 – Present

- Funded by the Nova Scotia Salmon Association
- Installed and operated a rotary screw trap
- Designed, performed and analyzed a stratified mark/recapture for estimation of smolt emigration
- Implementation of a Live Gene Bank program – partnership with DFO Dartmouth

Fisheries Consultant, Halifax, NS
Researcher

June 2007 – Present

- Performed biological assessments, risk analyses and literature reviews
- Provided science advice to resource managers (e.g. Federal DFO, Gulf Region)
- Contracted by the federal government, provincial governments, private industry and environmental not-for-profit groups

Nova Scotia Department of Fisheries and Aquaculture, Inland Fisheries Division
Pictou, NS

Sept. 2007 – Sept. 2008

Fisheries Biologist

- Conducted research on brook trout (*Salvelinus fontinalis*) and brown trout (*Salmo trutta*) including population estimating, fecundity assessments and population modelling
- Conducted Atlantic salmon broodstock collection for use in the Atlantic salmon enhancement program
- Worked on Mercury/Arsenic contamination project – data collection, analysis and report preparation
- Assessed early colonization of illegally introduced smallmouth bass in Lake Ainslie, NS

Acid Mitigation Project, West River, Sheet Harbour, NS
Lead Researcher

April 2005 – Sept. 2008

- Designed project monitoring regime
- Conducted fish community research -mark/recapture, electrofishing, netting and angling
- Monitored changes in the aquatic invertebrate communities
- Examined periphyton and entire aufwuchs community
- Monitored and analyzed water chemistry
- Monitored hydrology – flow rates and flow regime
- Surveyed aquatic macrophytes

Acadia Center for Estuarine Research, Wolfville NS
Biological Researcher – Field Assistant

May 2003 – June 2007

- Muzroll Lake liming project, Doaktown, NB
 - Installation and maintenance of water chemistry data loggers, insect sampling traps, periphyton traps, core sampling, zooplankton sampling, water chemistry analysis
- Cornwallis River Greencover Riparian Restoration Project, Annapolis Valley, NS
 - Data logger installation and maintenance
- Windsor mudflats project, Windsor, NS
 - Data logger installation and maintenance

Acadia University, Wolfville NS
Supervisor

March 2006 – May 2007

- Immediate supervision of an undergraduate honours student in field and laboratory settings
- Responsible for developing an undergraduate honours project, advertising position, interview process
- Project design and implementation

Acadia University, Wolfville NS
Teaching Assistant

Sept 2005-April 2007

- Aquatic ecology - practical sessions & instruction
- Ichthyology - practical sessions
- Environmental Sciences Field School - practical sessions and instruction

Acadia University, Wolfville NS
Supervisor

Sept. 2006 – March 2007

- Responsible for hiring, training, and supervising two undergraduate technicians working on an aquatic invertebrate monitoring program

VOLUNTEER FISHERIES EXPERIENCE

Aquatic Invasive Fish Working Group, Halifax, NS

Jan. 2011 – Present

- Co-founder and member of provincial 6-chair group, comprised of representatives from all major provincial fisheries organizations
- Provide external advice to Nova Scotia Dept. of Inland Fisheries on the issue of non-native and invasive aquatic species

Inland Fisheries Advisory Council, Halifax, NS

Jan 2006 - Present

- Member of provincial 8-chair council, comprised of representatives from all major provincial fisheries organizations
- Provide external advice to Nova Scotia Dept. of Inland Fisheries regarding all aspect of the freshwater fisheries in Nova Scotia

Sportfish Habitat Fund Board

Jan 2006 – Present

- Member of minister of fisheries appointed 6-chair board
- Review proposals and grant funds to not-for-profit organizations for habitat and/or access to fisheries projects

Nova Scotia Dept. of Inland Fisheries

July 2004 - Aug 2006

- Aided with deployment and operation of gill nets, fyke nets and angling
- Data collection program at smallmouth bass tournaments
- Equipment repair and maintenance (specifically fyke nets)

PROFESSIONAL PRESENTATIONS

American Fisheries Society, AGM, Quebec, PQ	2014
Ocean Tracking Network Canada Symposium, Ottawa, Ont.	2014
Guest Lecturer, Applied Field Methods in Fish Ecology (Dalhousie U.)	2014
Nova Scotia Salmon Association AGM, Halifax, NS	2014
Acadia University, Biology Lecture Series, Wolfville, NS	2013
Guest Lecturer, Aquatic Ecology (Acadia U.)	2013
Guest Lecturer, Applied Field Methods in Fish Ecology (Dalhousie U.)	2013
Nova Scotia Salmon Association AGM, Halifax, NS	2013
Ocean Tracking Network Canada Symposium, Halifax, NS	2012
St. Mary's River Association, AGM, Sherbrooke, NS	2012
King County Wildlife Association, Kentville, NS	2012
American Fisheries Society, AGM, Seattle, WA, USA	2011
Acadia University, Biology Lecture Series, Wolfville, NS	2011
Bluenose Coastal Action Foundation AGM, Lunenburg, NS	2011
St. Mary's River Association, AGM, Sherbrooke, NS	2011
Nova Scotia Salmon Association AGM, Halifax, NS	2011
Nova Scotia Salmon Association AGM, Halifax, NS	2010
Lett Biology Conference (Dalhousie U.), Halifax, NS	2009
Atlantic Society of Fish and Wildlife Biologists, Fall AGM, Kouchibouguac, NB	2009
Atlantic Society of Fish and Wildlife Biologists, Spring Seminar, Sackville, NS	2009
Risk Assessment for Smallmouth Bass Gulf Region, DFO Gulf	2008
Nova Scotia Salmon Association AGM, Halifax, NS	2007
Nova Scotia Salmon Association AGM, Halifax, NS	2007
Canadian Lands Reclamation Association AGM, Halifax, NS	2007
Nova Scotia Salmon Association AGM, Halifax, NS	2006
Nova Scotia Federation of Anglers and Hunters AGM, Bridgewater, NS	2006
Acid Rain Mitigation Workshop, BIO, Dartmouth, NS	2006
Acadia Center for Global Climate Change and Ecosystem Research AGM, Wolfville, NS	2006
Nova Scotia Salmon Association AGM, Halifax, NS	2005
Acadia Center for Global Climate Change and Ecosystem Research AGM, Wolfville, NS	2005

ADDITIONAL QUALIFICATIONS / ACHIEVEMENTS

Trained to use Slocum sea gliders	2008-present
Familiar with modern research software (R, MARK, GIS)	Current
Electrofishing certification – Malaspina University, Nanaimo, BC	Current
Nova Scotia Salmon Association's bursary recipient	2006-2013
French immersion certificate	1999
Lieutenant Governor of Nova Scotia award for leadership recipient	1999
Jostens medal for leadership excellence award recipient	1999
Lester B. Pearson international school of peacekeeping - course graduate	1998

PRIMARY PUBLICATIONS

Halfyard, E.A. *In Prep.* Shift happens: A review of the impact of ecosystem regime shift on Atlantic salmon. Target Submission (Nov 2014): Reviews in Fish Biology and Fisheries.

Halfyard, E.A., I. Jonsen, P. Smith, D. Bates, M. Dever, M.W. Stokesbury, and R.M. Branton. *In Prep.* Acoustic Telemetry Receivers and Detection Efficiency: Variability, Covariates and the Implications of Data Interpretation. Target Submission (Dec 2014): Public Library of Science (PLoS 1).

Halfyard, E.A., Gibson, A.J.F., Ruzzante, D.E. and Whoriskey, F.G. *In Prep.* Potential impact of predators on the estuarine survival of anadromous salmonids in Nova Scotia's Southern Upland. Target Submission (Dec 2014): North American Journal of Fisheries Management.

Gibson, A.J.F., Halfyard, E.A., Bradford, R.G., Stokesbury, M. and A. Redden. *In Review.* Effects of predation on telemetry-based survival estimates: insights from a study on endangered Atlantic salmon smolts. Canadian Journal of Fisheries and Aquatic Sciences.

Halfyard, E.A., Gibson, A.J.F., Stokesbury, M.J.W., Ruzzante, D.E. and Whoriskey, F.G. 2013. Correlates of estuarine survival of Atlantic salmon post-smolts from the Southern Upland, Nova Scotia, Canada. Canadian Journal of Fisheries and Aquatic Sciences. 2013. doi: 10.1139/cjfas-2012-0287

Halfyard, E.A., Ruzzante, D.E., Stokesbury, M.J.W., Gibson, A.J.F. and Whoriskey, F.G. 2012. Estuarine Migratory Behaviour and Survival of Atlantic Salmon Smolts from the Southern Upland, Nova Scotia, Canada. J. Fish Biol. **81**: 1626–1645. doi:10.1111/j.1095-8649.2012.03419.x

O'Dor, R., M. Stokesbury, P.G. Amiro and E. Halfyard. 2008. The Ocean Tracking Network – Cutting Edge Technology on a Global Scale. J. Ocean Tech. **3**(2): 23-26.

SELECTED GREY LITERATURE

Redden, A.M, Broome, J., Keyser, F., Stokesbury, M.J.W., Bradford, R., Gibson, A.J.F., Halfyard, E.A., 2014. Use of animal tracking technology to assess potential risks of tidal turbine interactions with fish. Proceedings of the 2nd International Conference on Environmental Interactions of Marine Renewable Energy Technologies (EIMR2014), 28 April – 02 May 2014, Stornoway, Isle of Lewis, Outer Hebrides, Scotland.

Redden, A.M, Stokesbury, M.J.W., Broome, J., Keyser, F., Gibson, A.J.F., Halfyard, E.A., McLean, M., Bradford, R., Dadswell, M., Sanderson, B. and R. Karsten. 2014. Acoustic tracking of fish movements in the Minas Passage and FORCE demonstration area: pre-turbine baseline studies (2011-2013). Report to the Offshore Energy Research Association of Nova Scotia and the Fundy Ocean Research Centre for Energy. Acadia Centre for Estuarine Research Technical Report 118.

Bradford, R.G., Halfyard, E.A., Hayman, T., and LeBlanc, P (2014). 2013 Overview of Bay of Fundy Striped Bass Biology and General Status. DFO Can. Sci. Advis. Sec. Res. Doc. 2012/nnn. vi + xx p.

Halfyard, E.A., and Bradford, R.G. 2014. Survival estimates for Shubenacadie River Striped Bass (*Morone saxatilis*) derived from detections of implanted acoustic transmitters. DFO Can. Sci. Advis. Sec. Res. Doc. 201X/nnn. vi + xx p.

Gibson, A. Jamie F., Horsman, Tracy L., Ford, Jennifer S. and Halfyard, Edmund A. 2013. Recovery Potential Assessment for Eastern Cape Breton Atlantic salmon (*Salmo salar*): Habitat requirements and availability, threats to populations, and feasibility of habitat restoration. Can. Sci. Advis. Sec. 2013/nnn.

Halfyard, E.A. 2010. A review of options for the containment, control and eradication of illegally introduced smallmouth bass (*Micropterus dolomieu*). Can. Tech. Rep. Fish. Aquat. Sci. 2865: vi + 71 p.

Halfyard, E.A., J.L. MacMillan and R. Madden. 2008. Trout Population Parameters of Select Lakes within the Southern Tangier – Grand Lake Wilderness Area. Technical Report. Inland Fisheries Division, Nova Scotia Department of Fisheries and Aquaculture. Pictou, Nova Scotia. 40 pp. <http://www.gov.ns.ca/fish/sportfishing/reports/>

Halfyard, E.A., J.L. MacMillan and R. Madden. 2008. Fecundity and Sexual Maturity in Select Nova Scotia Trout Populations. Technical Report. Inland Fisheries Division, Nova Scotia Department of Fisheries and Aquaculture. Pictou, Nova Scotia. 22 pp. <http://www.gov.ns.ca/fish/sportfishing/reports/>

Leblanc, J.E. and E.A. Halfyard. 2008. Preliminary Report on Mercury and Arsenic Contamination of Fish Tissues and the Influence of Historic Gold Mines in Nova Scotia. Technical Report. Inland Fisheries Division, Nova Scotia Department of Fisheries and Aquaculture. Pictou, Nova Scotia. 44 pp.

Halfyard, E.A. and J.P. Hastey. 2008. Assessment of the 2008 West River, Sheet Harbour Atlantic salmon smolt migration. Report submitted to the Nova Scotia Salmon Association. P.O. Box 396, Chester, Nova Scotia, B0J 1J0.

Halfyard, E.A., 2007. The West River, Sheet Harbour Acid Mitigation Project. In Brylinsky, M. and L. Hinks (Eds), Proceedings from the Acid Rain Mitigation Workshop, Bedford Institute of Oceanography, Nova Scotia, Canada, May 26-27, 2007. p: 83-89.

PROFESSIONAL REFERENCE CONTACTS

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