

Curriculum Vitae

Dr. Noel G. Cadigan.

Centre for Fisheries Ecosystems Research
Fisheries and Marine Institute of Memorial University of Newfoundland

Education

1999: University of Waterloo. Ph.D. in Statistics.

Thesis title: Statistical inference about fish abundance: an approach based on research survey data.

Supervisor: Dr. Jiahua Chen.

1993: Memorial University of Newfoundland. Master of Applied Statistics.

Thesis title: Structural equation models and small sample bias reduction, with application to fishery data.

Supervisor: Dr. Uditha Balasooriya.

1990: Memorial University of Newfoundland. Bachelor of Science – Joint Honors
Biology and Statistics.

Employment

current: Fisheries and Marine Institute of Memorial University of Newfoundland - Centre for
Fisheries Ecosystems Research.
Position: Research Scientist II.

1999 - 2011: Fisheries and Oceans Canada - Science Branch. Newfoundland Region
Position: Research Scientist III.

Appointments

2012-present: Memorial University of Newfoundland – Cross Appointment, Department of
Mathematics and Statistics.

2012-present: Memorial University of Newfoundland – Faculty Member, Environmental Science
Program.

2001-2012: Memorial University of Newfoundland - Adjunct professor, Department of Mathematics
and Statistics.

Areas of Research

Survey analyses. Scientific surveys are the backbone of fish stock assessment. I am investigating methods for improved inference about population and sub-domain means and totals from multi-species bottom trawl research surveys. This research has included nonparametric model calibration to utilize auxiliary covariate information, confidence interval methods, and survey models to deal with missing data (i.e. missed strata).

Inference about fish stock size using cohort models. This is an important category of models used in fish stock assessments. My focus is on model formulation and improved inference based on state-space time-series methods with random effects. This has included risk analyses about stock size projections. I am researching methods to better accommodate within-survey variability in population abundance indices used to estimate cohort model parameters. I am also investigating biased-catch and catch-free (i.e. survey-based) assessment models and projections for fishery management options.

MSY reference points in a variable environment. My main objective is to provide researchers with algorithms to evaluate Maximum Sustainable Yield (MSY) reference points (e.g. B_{msy} , F_{msy}) from cohort models using data typically available, and accounting for the types of variations in population processes that are observed for many stocks. This includes variations, trends, and shifts in maturities, weights, natural mortalities, and stock-recruitment relationships.

Mixed-models. Models for observational field studies are often complex with many unknown parameters. Some of these parameters are better accommodated as random effects in a mixed-effects model framework. I am researching various approaches for estimating mixed-effects models, with several fisheries applications. This involves developing forecast models for aspects of stock productivity which is linked to the MSY research summarized above.

Statistical analysis of fish tag-return data. My focus is on inference about fishery exploitation, growth and migration rates.

Publications/Presentations (since 2005)

Recognized Scientific Journals

1. Cadigan, N. G. 2006. Local influence diagnostics for quasi-likelihood and lognormal estimates of a biological reference point from some fish stock and recruitment models. *Biometrics*. 62: 713-720.
2. Cadigan, N. G. and Brattey, J. 2006. Reporting and shedding rate estimates from tag-recovery experiments on Atlantic cod (*Gadus morhua*) in coastal Newfoundland. *Can. J. Fish. Aquat. Sci.* 63: 1944-1958.
3. Cadigan, N. 2009. Sensitivity of common estimators of management parameters derived from stock-recruit relationships. *Fish. Res.* 96: 195–205.

4. Cowen, L., Walsh, S. J., Schwarz, C. J., Cadigan, N., and Morgan, J. 2009. Estimating exploitation rates of migrating yellowtail flounders using multi-state mark-recapture methods incorporating tag-loss and variable reporting rates, *Can. J. Fish. Aquat. Sci.* 66: 1245–1255.
5. Cadigan, N. G. and Dowden, J. J. 2010. Statistical inference about relative efficiency from paired-tow survey calibration data. *Fish. Bull.* 108: 15–29.
6. Cadigan, N.G., and Chen, J. 2010. Kernel regression estimators for nonparametric model calibration in survey sampling. *J. Stat. Theor. Appl.* 4: 1-25.
7. Cadigan, N.G. and Tobin, J. 2010. Estimating the negative binomial dispersion parameter with highly stratified surveys. *J. Statist. Plan. Infer.* 140: 2138-2147.
8. Bousquet, N., Cadigan, N., Duchesne, T., and Rivest, L.-P. 2010. Detecting and correcting underreported catches in fish stock assessment: trial of a new method. *Can. J. Fish. Aquat. Sci.* 67: 1247-1261.
9. Cadigan, N.G. 2011. Confidence intervals for trawlable abundance from stratified-random bottom trawl surveys. *Can. J. Fish. Aquat. Sci.* 68: 781-794.
10. Cadigan, N.G. and O. Bataineh. 2011. Inference about the ratio of means from paired count data with over-dispersion. *Environ. Ecol. Stat.* 19: 269-293.
11. Cadigan, N.G. 2013. Fitting a nonparametric stock-recruitment model in R that is useful for deriving MSY reference points and accounting for model uncertainty. *ICES J. Mar. Sci.* 70: 56–67.
12. Cadigan, N.G, J. Morgan, and J. Bratley. 2013. Improved Estimation and Forecasts of Stock Maturities using Generalized Linear Mixed Effects Models with Auto-correlated Random Effects. *Fisheries Management and Ecology.* 21(5), 343-356.

Special publications (NAFO SCR documents and DFO research documents are internally peer-reviewed)

1. Lilly, G. R., Bratley, J., Cadigan, N. G., Healey, B. P., Murphy, E. F. 2005. An assessment of the cod (*Gadus morhua*) stock in NAFO Divisions 2J3KL in March 2005. DFO Canadian Science Advisory Secretariat Research Document 2005/018.
2. Bratley, J., N. G. Cadigan, B. P. Healey, G. R. Lilly, E. F. Murphy, P.A. Shelton, J.-C. Mahé. 2005. An assessment of the cod (*Gadus morhua*) stock in NAFO Subdiv. 3Ps in October 2005. DFO Canadian Science Advisory Secretariat Research Document 2005/070.
3. Cadigan, N. G. 2005. Confidence intervals for trawlable abundance from random stratified bottom-trawl surveys. in Annex 7 of the Report of the Workshop on Survey Design and Data Analysis (WKSAD). ICES CM 2005/B:07.
4. Cadigan, N.G., S.J. Walsh, and W. Brodie. 2006. Relative efficiency of the Wilfred Templeman and Alfred Needler research vessels using a Campelen 1800 shrimp trawl in NAFO Subdivision 3Ps and Divisions 3LN. DFO Canadian Science Advisory Secretariat Research Document 2006/085.

5. Bratney, J., N. G. Cadigan, B. P. Healey, E. F. Murphy, J.-C. Mahé. 2007. An assessment of the cod (*Gadus morhua*) stock in NAFO Subdiv. 3Ps in October 2006. DFO Canadian Science Advisory Secretariat Research Document 2007/053.
6. Cadigan, N., and Bratney, J. 2008. Reporting rates from cod tagging studies in NAFO Divisions 2J3KL and Subdivision 3Ps. DFO Canadian Science Advisory Secretariat Research Document 2008/031.
7. Bratney, J., N. G. Cadigan, B. P. Healey, E. F. Murphy, M. J. Morgan, D. Maddock Parsons, D. Power, Dwyer, K., and J.-C. Mahé. 2008. Assessment of the cod (*Gadus morhua*) stock in NAFO Subdivision 3Ps (November 2007). DFO Canadian Science Advisory Secretariat Research Document 2008/029.
8. Bratney, J., Cadigan, N. G., Dwyer, K., Healey, B. P., Morgan, M. J., Murphy, E. F., Parsons, D., and D. Power. 2008. Assessments of the cod (*Gadus morhua*) stock in NAFO Divisions 2J3KL (April 2007 and April 2008). DFO Canadian Science Advisory Secretariat Research Document 2008/086.
9. Fernández, C., Cadigan, N. G., Nielsen, A., Miller, T., and Poos, J. J. 2008. Uncertainty in stock assessment models. Section 4 of the Report of the Working Group on Methods of Fish Stock Assessments (WGMG). ICES CM 2008/RMC:03.
10. Bratney, J., Cadigan, N. G., Dwyer, K., Healey, B. P., Morgan, M. J., Murphy, E. F., Parsons, D., and D. Power. 2009. Assessment of the cod (*Gadus morhua*) stock in NAFO Divisions 2J+3KL in 2009. DFO Canadian Science Advisory Secretariat Research Document 2009/061.
11. Cadigan, N. G. 2009. Further Extensions to the SURBA model (SURBA+). Section 9.1 of the Report of the Working Group on Methods of Fish Stock Assessment (WGMG). ICES CM 2009/RMC:12.
12. Cadigan, N. G. 2010. Trends in Northwest Atlantic Fisheries Organization (NAFO) Subdivision 3Ps Cod (*Gadus morhua*) stock size based on a separable total mortality model and the Fisheries and Oceans Canada Research Vessel survey index. DFO Canadian Science Advisory Secretariat Research Document 2010/015.
13. Healey, B.P., Murphy, E.F., Bratney, J., Cadigan, N.G., Morgan, M.J., Maddock Parsons, D., Power, D., Dwyer, K., and Mahé, J.-C. 2011. Assessing the status of the cod (*Gadus morhua*) stock in NAFO Subdivision 3Ps in 2009 – results from a Zonal Assessment Process (February/March 2009) and a Regional Assessment Process (September/October 2009). DFO Can. Sci. Advis. Sec. Res. Doc. 2010/102. viii + 91 p.
14. Cadigan, N. G. and Power, D. 2010. Vessel calibration results for redfish (*Sebastes* sp.) from comparative fishing between the Teleost research vessel and the Cape Beaver fishing vessel. DFO Can. Sci. Advis. Sec. Res. Doc. 2010/062. iv + 17 p.
15. Bratney, J., Cadigan, N.G., Dwyer, K., Healey, B.P., Morgan, M.J., Murphy, E.F., Maddock Parsons, D., and Power, D. 2011. Assessment of the cod (*Gadus morhua*) stock in NAFO Divisions 2J+3KL in 2010. DFO Can. Sci. Advis. Sec. Res. Doc. 2010/103. viii + 108 p.
16. Healey B.P., Murphy, E.F., Bratney, J., Cadigan, N.G., Morgan, M.J., Maddock Parsons, D., Power, D., Rideout, R., Colbourne, E., and Mahé, J.-C. 2011. Assessing the status of the cod (*Gadus morhua*) stock in NAFO Subdivision 3Ps in 2010. DFO Can. Sci. Advis. Sec. Res. Doc. 2011/076. vi + 86 p.

17. Tallman, R., Cadigan, N, Cass, A., Duplisea, D., Healey, B., Trzcinski, K. and Wade, E. 2012. Techniques for the Provision of Advice in Information-Poor Situations. DFO Can. Sci. Advis. Sec. Res. Doc. 2011/106. vi + 42 p.
18. Cadigan, N. G. 2011. Preliminary investigations into standardizing the 4T snow crab (*Chionoecetes opilio*) bottom-trawl survey index. DFO Can. Sci. Advis. Sec. Res. Doc. 2012/016. iv + 48 p.
19. Cadigan, N. G. 2011. Impact of stock-recruit and natural mortality process errors on MSY reference points. DFO Can. Sci. Advis. Sec. Res. Doc. 2012/075. iii + 20 p.
20. Cadigan, N. 2013. Update of SURBA+ for 2J3KL cod. DFO Can. Sci. Advis. Sec. Res. Doc. 2013/054. v + 19 p.
21. Cadigan, N. 2013. Predicting 2J3KL cod stock weight-at-age using a modified Gompertz growth model. DFO Can. Sci. Advis. Sec. Res. Doc. 2013/053. v + 27 p.
22. Benoît, H.P., and Cadigan, N. 2014. Model-based estimation of commercial-sized snow crab (*Chionoecetes opilio*) abundance in the southern Gulf of St. Lawrence, 1980-2013, using data from two bottom trawl surveys. DFO Can. Sci. Advis. Sec. Res. Doc. 2014/082. v + 24 p.
23. Benoît, H.P., Cadigan, N. 2015. Update on trends in the biomass, distribution, size composition and model-based estimates of commercial abundance of snow crab (*Chionoecetes opilio*) using data from the September multi-species bottom trawl survey of the southern Gulf of St. Lawrence, 1980-2014. DFO Can. Sci. Advis. Sec. Res. Doc. 2015/XXX. v + XX p.

Conference and Seminar Presentations (since 2005)

Contributed

- 2005:** Cadigan, N. G. Improved Nonparametric Smoothing using Kernel Regression, and Marine Ecosystem Research Surveys. Presented at the Workshop on Spatial/Temporal Modelling for Marine Ecological Systems, August 17-19, Dalhousie University, Halifax.
- 2007:** Dowden, J., and Cadigan N. Improved Estimation and Forecasts of Stock Maturities using Generalized Linear Mixed Effects Models. Poster Presentation at the Annual meeting of the Statistical Society of Canada, Memorial University, St. John's, NL.
- 2009:** Cadigan, N. G. Incorporating survey variance in sequential population analysis. Presented at the ICES Annual Science Conference, Berlin, Germany.
- 2010:** Cadigan, N. G. Accounting for survey variance can improve fish stock assessment. Presented at the International Statistical Ecology Conference 2010, Canterbury, England.
- 2010:** Cadigan, N. G and Tobin, J. Estimating the Negative Binomial Dispersion Parameter with Highly Stratified Surveys. Presented at the International Statistical Ecology Conference 2010, Canterbury, England.
- 2011:** Cadigan, N. G. Measurement error bias in fish stock spawner-recruitment models. Presented at the Annual meeting of the Statistical Society of Canada, Wolfville, Nova Scotia.

- 2012:** Cadigan, N. G. A nonparametric approach to fitting a stock-recruitment relationship, and implications for fisheries management reference points. Presented at 40th Annual Meeting of the Statistical Society of Canada, University of Guelph, Guelph, Ontario.
- 2012:** Cadigan, N. G. Measurement error bias when fitting fish stock-recruit models and estimating maximum sustainable yield management reference points. Presented at the International Symposium in Statistics (ISS) on Longitudinal Data Analysis Subject to Outliers, Measurement Errors, and/or Missing Values, Memorial University, St. John's, NL.
- 2012:** Cadigan, N. G. Improved Estimation and Forecasts of Stock Maturities using Generalized Linear Mixed Effects Models. MUN Statistics Seminar Series, November 5.
- 2013:** Cadigan, N. G. A survey model for snow crab (*Chionoecetes opilio*) abundance in the southern Gulf of St. Lawrence: Integrating two surveys and comparative fishing data. CFER Seminar Series, March 27.
- 2013:** Cadigan, N. G. Harvest advice for northern cod when catch information is (very) incomplete. ICES/NAFO symposium on Gadoid fisheries. St Andrews, NB.
- 2014:** Cadigan, N. G. Modelling the uncertain stock dynamics and noisy catch and survey data for northern cod, with emphasis on short-term projections for catch advice. Johan Hjort Symposium on Recruitment Dynamics and Stock Variability. Bergen Norway.
- 2014:** Cadigan, N. G. An integrated state-space stock assessment model for northern cod and short-term prospects for the fishery. CFER Seminar Series, November 20.
- 2015:** Cadigan, N. G. An integrated state-space stock assessment model for northern cod and short-term prospects for the fishery. MUN Statistics Seminar Series, February 2.
- 2015:** Cadigan, N. G. An integrated state-space stock assessment model for northern cod and short-term prospects for the fishery. MUN Computer Science Seminar, March 12.

Invited

- 2005:** Cadigan, N.G. Improved kernel regression methods for inference about the population mean from sample surveys, with application to fishery surveys. Statistics Seminar. March 2, Memorial University of Newfoundland.
- 2006:** Cadigan, N.G, and Lemay, J. Accounting for misreported catches as censored observations in surplus production models. Preliminary simulations. Presented to the Working Group on Methods of Fish Stock Assessments, Galway, Ireland. Section 3.1.3.3 in Report of the Working Group on Methods on Fish Stock Assessments. CM 2006/RMC:07.
- 2006:** Cadigan, N.G. Local Influence diagnostics for the retrospective problem in the Gulf of Maine - Georges Bank Herring VPA of 2005. TRAC Working Paper 2006/xx. Presented to the Benchmark Review of Stock Assessment Models for the Gulf of Maine and Georges Bank Herring. May 2-5, Woods Hole, Massachusetts.
- 2006:** Cadigan, N.G. Estimating Fish Stock Size Using Sequential Population Analysis. Statistics Seminar. September 21, Université Laval.

- 2007:** Cadigan, N.G. Local influence diagnostics for the retrospective problem. Presented at the Annual meeting of the Statistical Society of Canada, St. John's.
- 2007:** Cadigan, N.G. Local influence diagnostics for the retrospective problem in VPA. Presented to the Working Group on Methods of Fish Stock Assessments, Woods Hole, USA. Section 2.14 in Report of the Working Group on Methods on Fish Stock Assessments. ICES CM 2007/RMC:04.
- 2007:** J. Dowden, N. Cadigan, J. Morgan and J. Brattey. Improved estimation and forecasts of stock maturities using generalized linear mixed effects models. Presented to the Working Group on Methods of Fish Stock Assessments, Woods Hole, USA. Section 2.5 in Report of the Working Group on Methods on Fish Stock Assessments. ICES CM 2007/RMC:04.
- 2007:** Cadigan, N.G. M from Tagging Analyses in inshore 3KL, and survey Z's in offshore 2J3KL. Presented at the DFO Zonal Review Meeting: Review of the framework to assess the natural mortality rate (M) to use in the upcoming assessment of the two cod stocks from the Gulf of St. Lawrence, Mont-Joli, Quebec.
- 2008:** Cadigan, N. On the foundations for inference in fish stock assessment by sequential population analysis. Presented to the Working Group on Methods of Fish Stock Assessments, Woods Hole, USA. Section 2.12 in Report of the Working Group on Methods on Fish Stock Assessments. ICES CM 2008/RMC:03.
- 2009:** Cadigan, N. Updates on Noel's version of SURBA. Presented to the Working Group on Methods of Fish Stock Assessments, Nantes, France. Section 2.6 in Report of the Working Group on Methods on Fish Stock Assessments. ICES CM 2009/RMC:12.
- 2011:** Cadigan, N. Review of state space assessment model. Presented at the DFO Science Advisory Process on Assessment Framework for SW Nova Scotia / Bay of Fundy Herring. Dartmouth, NS. January 24-28.
- 2011:** Cadigan, N. Measurement error bias in spawner-recruitment models and MSY benchmarks. NIWA science seminar, Wellington, New Zealand. April 7.
- 2011:** Cadigan, N. G. Accounting for survey variance can improve fish stock assessment. Presented at the Annual meeting of the Statistical Society of Canada, Wolfville, Nova Scotia.
- 2011:** Cadigan, N. G. Preliminary investigations into standardizing the 4T snow crab bottom-trawl survey index. Presented at the DFO Framework assessment review for southern Gulf snow crab. Moncton, NB.
- 2011:** Cadigan, N. G. Maximum sustainable yield when productivity varies. Presented at the DFO National workshop: Maximum Sustainable Yield (MSY) Reference Points and the Precautionary Approach when Productivity Varies, Montreal, Quebec.
- 2011:** Cadigan, N. G. Accounting for correlated errors in stock assessment models. Presented via WebEx to the Working Group on Methods of Fish Stock Assessments, Vigo, Spain. Section 5.1 in Report of the Working Group on Methods on Fish Stock Assessments. ICES CM 2011/SSGSUE:08.
- 2011:** Cadigan, N. G. Measurement error bias in fish stock spawner-recruitment models. Presented via WebEx to the Working Group on Methods of Fish Stock Assessments, Vigo, Spain.

Working Document 8 in Report of the Working Group on Methods on Fish Stock Assessments. ICES CM 2011/SSGSUE:08.

- 2012:** Cadigan, N. G. Fitting a nonparametric stock-recruitment model in R that is useful for deriving MSY reference points and accounting for model uncertainty. Presented to the Study Group on Recruitment Forecasting (SGRF), Barcelona, Spain.
- 2012:** Cadigan, N. G. Forecasting Barent Sea cod recruitment using simple stock-recruit models with auto-correlated errors. Presented to the Study Group on Recruitment Forecasting (SGRF), Barcelona, Spain. Appendix A in Report of the Study Group on Recruitment Forecasting (SGRF). ICES CM 2012/ACOM:24.
- 2012:** Cadigan, N. G. Statistics and Fish Stock Assessment. MUN Course Lecture - Statistics 1510, September 14.
- 2012:** Cadigan, N. G. Statistical problems to address for some NL fish stocks when deriving Maximum Sustainable Yield reference points. Statistics Colloquium, November 20.
- 2013:** Cadigan, N. G. Statistics and Fish Stock Assessment. MUN Course Lecture - Statistics 1510, January 18.
- 2013:** Cadigan, N. G. Improved Estimation and Forecasts of Fish Stock Maturities using Generalized Linear Mixed Effects Models. Presented at 41th Annual Meeting of the Statistical Society of Canada, University of Alberta, Edmonton, Alberta.
- 2015:** Cadigan, N. G. A spatial depletion model for Newfoundland and Labrador snow crab (*Chionoecetes opilio*), 2000-2012. Presented at the 2015 DFO Newfoundland and Labrador Regional Peer Review Meeting: Assessment of Snow Crab. St. John's, NL. February 26.

Professional Membership

- 2001:** Elected to the Board of the Statistical Society of Canada as a representative for the Atlantic Region.
- 2001:** Elected as Secretary of the Biostatistics Section of the Statistical Society of Canada (2001-2003).
- 2004:** Appointed as a member of the Election Committee, Statistical Society of Canada.
- 2004:** Elected as Secretary of the Biostatistics Section of the Statistical Society of Canada (2004-2007).
- 2013:** Elected to the Board of the Statistical Society of Canada as a representative for the Atlantic Region.

Chair of Meetings (since 2005)

- 2006:** Newfoundland and Labrador Regional Advisory Process for Snow Crab, Northern Shrimp, Iceland Scallop, and Lobster.

- 2007:** Newfoundland and Labrador Regional Advisory Process for Snow Crab. DFO Canadian Science Advisory Secretariat Proceedings Series 2007/004.
- 2007:** Assessment Framework for Northern Shrimp (*Pandalus borealis*) off Labrador and the northeastern coast of Newfoundland. DFO Canadian Science Advisory Secretariat Proceedings Series 2007/034.
- 2008:** Meeting of the Newfoundland and Labrador Regional Advisory Process (RAP) on Snow Crab; March 3-5, 2008. DFO Can. Sci. Advis. Sec. Proceed. Ser. 2008/016.
- 2008:** Meeting of the Newfoundland and Labrador/Central and Arctic Zonal Advisory Process (ZAP) on Northern Shrimp DFO Can. Sci. Advis. Sec. Proceed. Ser. 2008/015..
- 2008:** Meeting of the Newfoundland and Labrador Regional Advisory Process for 2J3KL Cod, 2008; March 26-29, 2008. DFO Can. Sci. Advis. Sec. Proceed. Ser. 2008/005.
- 2009:** Meeting of the First Workshop of the Stock Assessment Methods Committee; January 7-8, 2009. DFO Can. Sci. Advis. Sec. Proceed. Ser. 2009/022.
- 2009:** Meeting of the Zonal Advisory Process for Atlantic Cod for 2009; February 24 - March 6, 2009. DFO Can. Sci. Advis. Sec. Proceed. Ser. 2009/050.
- 2010:** ICES. Technical review for Arctic/North-Western fish stock assessments. May 6-20. Annex 11 in ICES. 2010. Report of the Arctic Fisheries Working Group (AFWG), 22 - 28 April 2010, Lisbon, Portugal / Bergen, Norway). ICES CM 2010/ACOM:05. Annex 3 in ICES. 2010. Report of the North-Western Working Group (NWWG), 27 April - 4 May 2010, ICES Headquarters, Copenhagen. ICES CM 2010/ACOM:07
- 2011:** Technical Expertise in Stock Assessment (TESA): Maximum Sustainable Yield (MSY) Reference Points and the Precautionary Approach when Productivity Varies. National DFO workshop. DFO Can. Sci. Advis. Sec. Proceed. Ser. 2012/055.
- 2014:** ICES. Benchmark Workshop on northern Haddock stocks. February 24-28, Copenhagen Denmark. ICES. 2014. Report of the ICES Benchmark Meeting on Northern Haddock Stocks (WKHAD), 27-29 January 2014, Aberdeen, Scotland, 24-28 February 2014, Copenhagen, Denmark. ICES CM 2014\ACOM:41. 150 pp.

Chair of Working Groups/Programs

- 2009-2011:** DFO Technical Expertise in Stock Assessment (TESA) program. This is a national program to help rebuild capacity in fish stock assessment and develop technical approaches.

Conference Sessions

- 2000:** Co-Convenor of a Theme Session on "Application of Mark-Recapture Experiments in Stock Assessments", at the 2001 ICES Annual Science Conference, Oslo, Norway.
- 2003:** Organised a session "Estimating Fish Stock Mixtures", at the Annual meeting of the Statistical Society of Canada. Halifax, Canada.

- 2003:** Member of the Steering committee for a Symposium "Large Scale Fishery Independent Surveys: Looking to the Future by Learning from the Past", at the American Fisheries Society annual meeting, Quebec City.
- 2007:** Organised a session "Diagnostics for the retrospective problem in sequential population analysis of exploited fish stocks", at the Annual meeting of the Statistical Society of Canada. St. John's, Canada.
- 2013:** Organised a session "Fitting Complex Models using ADMB", at the Annual meeting of the Statistical Society of Canada. Edmonton, Canada.

Invited Expert Reviews (since 2005)

- 2006:** External expert for the ICES Baltic Fisheries Assessment Working Group review meeting. Copenhagen, Denmark. May 22-24.
- 2006:** External expert for the Canada-US Transboundary Resources Assessment Committee: Gulf of Maine and Georges Bank Herring Benchmark Review. NEFSC, Woods Hole, Mass., USA. May 2-5.
- 2006:** External reviewer for the DFO Regional Advisory Process for the assessment of cod in the southern Gulf of St. Lawrence and the assessment of witch flounder in the Gulf of St. Lawrence.
- 2007:** Member of the review group for the ICES management strategy evaluation for North Sea Saithe.
- 2008:** External expert for the Joint Canada-US Review Panel for Pacific hake. Seattle, USA, February 11-14.
- 2008:** ICES review group for the revised assessment on Celtic Sea cod.
- 2008:** Member of the ICES Arctic fisheries/Northwestern Review Group.
- 2008:** Center for Independent Experts (CIE) reviewer for SEDAR 17 REVIEW WORKSHOP: South Atlantic Spanish Mackerel and South Atlantic Vermilion Snapper. Savannah, Georgia. October 20-24.
- 2009:** External expert for WKBENCH2 (Roundfish). ICES Benchmark Workshop on Roundfish. Copenhagen, Denmark, 16–23 January.
- 2009:** CIE external independent resource assessment panel member for SEDAR 18 Stock Assessment Workshop: Atlantic Red Drum. North Charleston, South Carolina. June 1-5.
- 2010:** CIE Independent peer review of the stock assessment of North Pacific swordfish. 2010.
- 2010:** CIE external expert for SEDAR Procedural Workshop on Uncertainty. Charlotte, North Carolina, February 22-26.
- 2010:** CIE external expert for SEDAR 24 Review on South Atlantic Red Snapper Assessment. Savannah, Georgia. October 12-14.

- 2010:** Gulf-Maritimes framework meeting on assessment models, projections and reference points for cod. Moncton, December 6-8.
- 2010:** Informal review of proposed assessment models for the American plaice Maritimes designated unit for the American plaice recovery potential assessment. Moncton, December 9.
- 2010:** ICES Workshop on Reviews of Recent Advances in Stock Assessment models Worldwide: “Around the World in AD Models” (WKADSAM), Nantes, France. September 27 - October 1.
- 2011:** External expert for the DFO Science Advisory Process on Assessment Framework for SW Nova Scotia / Bay of Fundy Herring. Dartmouth, NS. January 24-28.
- 2011:** External expert at a workshop to assess the comparability of orange roughy survey results (1992-94 and 2010) in the 'Mid-East Coast' of New Zealand. Wellington, NZ. April 4-8.
- 2011:** CIE external expert for the 52st Stock Assessment Workshop/Stock Assessment Review Committee (SAW/SARC): Winter flounder (Southern New England Stock), Winter flounder (Georges Bank Stock), Winter flounder (Gulf of Maine Stock). Woods Hole, Massachusetts, 6-10 June, 2011.
- 2011:** External expert at the DFO Framework assessment review for southern Gulf snow crab. Moncton, NB. November 21-25.
- 2012:** External expert at the Science Advisory Process on Assessment of the status of the southern Gulf of St. Lawrence snow crab stock. Moncton, NB. February 7-8.
- 2012:** External expert at the Recovery Potential Assessment Atlantic Salmon (*Salmo salar*), Southern Newfoundland Designatable Unit (DU). St. John’s, NL. February 14-16.
- 2012:** CIE external expert for the NWFSC Southern California Shelf Rockfish Hook and Line Survey. Seattle, Washington. April 4-5.
- 2012:** CIE independent review: SEDAR 29 Highly Migratory Species Atlantic and Gulf of Mexico Blacktip Shark Review. Desktop Review.
- 2012:** CIE independent review: 55th Stock Assessment Workshop/Stock Assessment Review Committee (SAW/SARC): Benchmark stock assessments for Georges Bank cod and Gulf of Maine cod. Woods Hole, Massachusetts. December 3-7, 2012
- 2013:** External expert at the Science Advisory Process on Assessment of the status of the southern Gulf of St. Lawrence snow crab stock. Moncton, NB. January 30-31.
- 2013:** External expert at the Transboundary Resources Assessment Committee Benchmark Assessment of Eastern Georges Bank Cod. St. Andrews, NB. April 9-11, 2013.
- 2013:** CIE independent review: Stock Assessment Review (STAR) Panel for Darkblotched rockfish and Petrale Sole. Seattle, Washington. May 13-17.
- 2013:** Invited expert: ICES Inter-Benchmark Protocol for herring in Subdivision 30. February 28 – March 28.
- 2013:** Assessment committee for PhD student. Technical University of Denmark. July.
- 2014:** CIE independent review: Bering Sea Snow Crab Stock Assessment Review. Seattle, Washington. January 21-24.

2014: CIE independent review: SEDAR 38 South Atlantic and Gulf of Mexico King Mackerel Assessment Review. Miami, Florida. August 12-14.

2014: CIE independent review: Stock Assessment Update for the Main Hawaiian Islands Deep7 Bottomfish Complex Through 2013 With Projected Annual Catch Limits Through 2016. Honolulu, Hawaii. December 9-12.

2014: Natural Sciences and Engineering Research Council of Canada (NSERC) Discovery Grant proposal: Mathematics and Statistics Evaluation Group (1508) confidential review.

Editor for Journals

2010-2012: Associate editor of the Canadian Journal of Statistics.