

Curriculum Vitae
Catherine (Carrie) A. Holt

Pacific Biological Station
Fisheries and Oceans Canada
3190 Hammond Bay Road
Nanaimo, British Columbia
V9T 6N7, Canada

RESEARCH POSITIONS:

Research Scientist, Salmon and Freshwater Ecosystems Division, Fisheries and Oceans Canada (2008 – present)

Adjunct Faculty, School of Resource and Environmental Management, Simon Fraser University, Vancouver, British Columbia (2009-present)

Research Fellow, School of Aquatic and Fisheries Sciences, University of Washington (2007)

EDUCATION:

Ph.D. (2001- 2006), Fisheries science, School of Resource and Environmental Management, Simon Fraser University, Vancouver, British Columbia

Thesis: Characterizing and accounting for uncertainties in Pacific salmon fisheries

Senior Advisor: Randall Peterman

Supervisory committee: Sean Cox, Bill de la Mare, Murray Rutherford

Course work: fisheries science, advanced stock assessment, simulation modelling, risk assessment and decision analysis, management strategy evaluation, environmental economics, and environmental policy

Dean of Graduate Studies Convocation Medal for outstanding academic achievement

M.Sc. (1999-2001), Biology, York University, Toronto, Ontario

Thesis: Zooplankton as biological endpoints for critical load models of acidification

Advisors: Norman D. Yan, Don J. McQueen

Course work: multivariate statistics, ecological restoration, ecology

Nomination for Governor General's Gold Medal Award

B.Sc. Honours (1994-1998), Biology, Queen's University, Kingston, Ontario

Thesis: Historic climate, vegetation and fire regime changes in northern British Columbia

Advisors: Julian Szeicz, Brian Cumming

High School Diploma (1994), Neuchatel Junior College, Switzerland

FUNDED GRANTS AND SCHOLARSHIPS

- **International Governance Strategy Science Program Grant (Funding agency: Fisheries and Oceans Canada)** for a project forecasting Pacific hake distribution from satellite-derived oceanographic data. 2009-2010. Principal Investigator: C. Holt (valued at \$76,000).
- **Ecosystem Research Initiative Grant (Funding agency: Fisheries and Oceans Canada)** for a project evaluating Bayesian decision-support tools for ecosystem-based management. 2009-2010. Co-Principal Investigators: J. Curtis, C. Holt, and I. Perry (valued at \$14,000).
- **Natural Sciences and Engineering Research Council of Canada (NSERC) Post-Doctoral Fellowship.** March 2007, valued at \$80,000. Declined
- **National Academies Postdoctoral Research Award.** January 2007, valued at \$45,000 (US). Declined.
- **Senior Women Academic Administrators of Canada Scholarship** awarded to 3 Canadian graduate students for demonstrating academic excellence and outstanding leadership. March 2006, valued at \$1,000.
- **Graduate Fellowship.** Simon Fraser University. Sept. 2005-Dec. 2005, valued at \$6,000.
- **President's Ph.D. Research Stipend.** Simon Fraser University. Jan. 2005 - April 2005, valued at \$6,000.
- **NSERC Postgraduate Scholarship B.** Sept. 2002 - Aug. 2004, valued at \$38,400.
- **Centre for Systems Science (CSS)/Faculty of Applied Sciences (FAS) Graduate Student Award.** Simon Fraser University, 2003, valued at \$7000.
- **C.D. Nelson Memorial Graduate Scholarship.** Awarded for outstanding academic achievement at the graduate level. Simon Fraser University, Sept. 2001, valued at \$17,000.
- **NSERC Postgraduate Scholarship A.** Sept. 1999-Sept. 2001, valued at \$34,400.
- **Canadian Water Resources Association Scholarship.** Summer 2000, valued at \$1500.
- **York University Entrance Scholarship.** Sept. 1999, valued at \$2000.
- **York University NSERC Recruitment Scholarship.** 1999-2000, valued at \$2000.
- **Research Costs Funds Award.** York University, Spring 2000, valued at \$200.
- **Graduate Development Fund Award.** York University, Spring 2000, valued at \$1000.
- **Annie Bentley Lillie Book Prize for Excellence in Calculus.** Awarded to the top three students (621 students total). Queen's University, 1995.

SCIENTIFIC PAPERS

Refereed publications:

1. **Holt, C.A.** 2010. Will depleted populations of Pacific salmon recover under persistent reductions in survival and catastrophic mortality events? *ICES Journal of Marine Science* 67:000-000 (advance access available online).
2. **Holt, C.A.** and Mantua, N. 2009. Defining spring transition: regional indices for the California Current. *Marine Ecology Progress Series* 393: 285-299.
3. **Holt, C.A.** and Punt, A.E. 2009. Incorporating climate information into rebuilding plans for overfished groundfish species of the U.S. west coast. *Fisheries Research* 100: 57-67.
4. **Holt, C.A.**, and de la Mare, W. K. 2009. Feedback control systems in Pacific salmon fisheries. *In: The Future of Fisheries Science n North America (Eds. R.J. Beamish and B.J. Rothschild)* p 525-536.
5. **Holt, C.A.** and Peterman, R. M. 2008. Uncertainties in population dynamics and outcomes of regulations in sockeye salmon fisheries: implications for management. *Canadian Journal of Fisheries and Aquatic Sciences* 65:1459-1474.
6. **Holt, C.A.**, Rutherford, M.B., and Peterman, R.M. 2008. International cooperation among nation-states of the North Pacific Ocean on the problem of competition among salmon for a common pool of prey resources. *Marine Policy* 32: 607-617.
7. **Holt, C.A.** and Peterman, R. M. 2006. Missing the target: uncertainties in achieving management goals in fisheries on Fraser River, British Columbia, sockeye salmon (*Oncorhynchus nerka*). *Canadian Journal of Fisheries and Aquatic Sciences* 63: 2722-2733.
8. **Holt, C.A.** and Peterman, R. M. 2004. Long-term trends in age-specific recruitment of sockeye salmon (*Oncorhynchus nerka*) in a changing environment. *Canadian Journal of Fisheries and Aquatic Sciences* 61: 2455-2470.
9. Starzomski, B.M., Cardinale, B.J., Dunne, J.A., Hillery, M.J., **Holt, C.A.**, Krawchuk, M.A., Lage, M., McMahon, S., and Melnychuk, M.C. 2004. Contemporary visions of progress in ecology and thoughts for the future. *Ecology and Society* 9(1): 14. [online] URL: <http://www.ecologyandsociety.org/vol9/iss1/art14>.
10. **Holt, C.A.**, Yan, N.D., and Somers, K. 2003. pH 6 as the threshold to use in critical load modeling for zooplankton community change with acidification in lakes of south-central Ontario: accounting for morphometry and geography. *Canadian Journal of Fisheries and Aquatic Sciences* 60: 151-158.
11. **Holt, C.A.** and Yan, N.D. 2003. Recovery of zooplankton communities from acidification in Killarney Park, Ontario, 1971-2000: pH 6 as a recovery goal. *Ambio* 32: 302-307.

12. Pisaric, M.F.J., **Holt, C.**, Szeicz, J.M., Karst, T. and Smol, J.P. 2003. Holocene treeline dynamics in mountains of northeastern British Columbia, Canada, inferred from fossil pollen and stomata. *Holocene* 13: 161-173.
13. **Holt, C.A.** and Yan, N.D. 2001. Recovery pathways of zooplankton communities in acidified lakes of Killarney Park, Ontario. In: Porter, J. and J.G. Nelson. (eds). *Ecological Integrity and Protected Areas. Proceedings of the Parks Research Forum of Ontario (PRFO) Annual Meeting. May 9-10th, Black Creek Pioneer Village, North York, Ontario. Heritage Resources Centre, University of Waterloo, Ontario, p.219-224.*

Extended abstracts (refereed)

1. **Holt, C.A.** and Peterman, R.M. 2005. Temporal trends in age-specific recruitment of sockeye salmon (*Oncorhynchus nerka*): implications for forecasting. Conference Proceedings for the 2004 World Fisheries Congress, Vancouver, British Columbia (May 2-6, 2004) p.587-589.

Non-refereed papers

1. Peacock, S.J. and **Holt, C.A.** 2010. A review of metrics of distribution with application to Conservation Units under Canada's Wild Salmon Policy. Canadian Technical Report of Fisheries and Aquatic Sciences 2888 vii + 36p.
2. **Holt, C.A.**, Cass, A., Holtby, B., Riddell, B. 2009. Indicators of Status and Benchmarks for Conservation Units in Canada's Wild Salmon Policy. Canadian Science Advisory Secretariat 2009/058.
3. **Holt, C.A.**, 2009. Evaluation of Benchmarks for Conservation Units in Canada's Wild Salmon Policy: Technical Documentation. Canadian Science Advisory Secretariat 2009/059.
4. **Holt, C.A.** 2008. Evaluating status of conservation units: Implementing Strategy 1 of the Wild Salmon Policy. Discussion Paper for the Wild Salmon Policy Advisory Meeting. March 26-27, 2008. Richmond, B.C. Fisheries and Oceans Canada
5. Cleary, J., **Holt, C.A.**, and Cox, S.P. 2006. Dynamics and Movement of Sablefish in B.C. Mainland Inlets. Report for the Canadian Sablefish Association. pp42.
6. Bundy, A., Giannico, G., **Holt, C.**, and Salomon, A. 2005. An analysis of how natural sciences are addressing fisheries within the context of conservation. In: Chuenpagdee, R. and Bundy, A. (eds.) *Innovation and outlook in fisheries: an assessment of research presented at the 4th World Fisheries Congress. Fisheries Centre Research Reports, University of British Columbia* 13(2): 18-34.
7. **Holt, C.A.**, Peterman, R.M., Woodey, J.C., and Lapointe, M.R. 2005. Simulation of the Juvenile Growth Model for Cyclical Stocks of Fraser River, British Columbia, Sockeye Salmon (*Oncorhynchus nerka*). Contract Report to the Pacific Salmon Commission, Southern Boundary Restoration and Enhancement Fund Committee, Vancouver, British Columbia.

8. **Holt, C.A.**, Benson, A.J., and de la Mare, W.K. 2004. An initial evaluation of CCAMLR management procedures for the *Dissosticus eleginoides* fisheries. Report submitted to the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), Working Group on Stock Assessment. CCAMLR-WG-FSA-SAM-04.
9. **Holt, C.A.** and Benson, A.J. 2004. Improving estimates of mortality rates for data limited inshore rockfish *Sebastes ruberrimus* and *S. maliger*. Report submitted to L. Yamanka, Pacific Biological Station, Nanaimo, British Columbia, Fisheries and Oceans Canada. March 31, 2004.

SCIENTIFIC PRESENTATIONS (2002 - 2009)

Invited

1. **Holt, C.A.** 2009. Assessing status of populations for Canada's Wild Salmon Policy: developing indicators and evaluating benchmarks. University of British Columbia, Fisheries Centre Quantitative Seminar Series. Nov. 26, 2009.
2. **Holt, C.A.** 2009. Assessing population status for Canada's Wild Salmon Policy: A methodology incorporating uncertainties. American Fisheries Society-Washington-British Columbia Chapter Annual Meeting. Shelton, Washington, April 22, 2009.
3. **Holt, C.A.** 2009. Indicators of status and benchmarks for Conservation Units in Canada's Wild Salmon Policy. State of the Salmon Conference. Vancouver, B.C. February 4, 2009
4. **Holt, C.A.** 2007. Uncertainties in the population dynamics and management of Pacific salmon. School of Aquatic and Fisheries Science, University of Washington, Young Investigators Seminar Series. September, 2007.
5. **Holt, C.A.**, and Peterman, R.M. 2006. Simulation of the Juvenile Growth Model (JGM) for cyclical stocks of Fraser River sockeye salmon. Presented at the "Workshop to assess population dynamics of cyclic Fraser River sockeye and implications for management" hosted by Fisheries and Oceans Canada. Vancouver, British Columbia, Feb. 7-8, 2006.
6. **Holt, C.A.** 2005. Uncertainties in implementation: Lessons for groundfish from Pacific salmon fisheries. Presented at the Simon Fraser University-Fisheries and Oceans Canada Groundfish Workshop. Vancouver, British Columbia, Oct. 27-28, 2005.

Contributed

1. **Holt, C.A.** Will depleted populations recover under Canada's Wild Salmon Policy? An evaluation of benchmarks for assessing biological status. ICES/PICES UNCOVER Symposium on Rebuilding Depleted Fish Stocks. Nov. 3-6, 2009.

2. Armstrong, E., **Holt, C.A.**, Punt, A.E., Methot, R., Haltuch, M., and Mantua, N. Satellite-derived sea surface temperature frontal analysis for fisheries management. Ocean Sciences Meeting. Feb. 2008. Orlando, Florida.
3. **Holt, C.A.**, Punt, A.E., and Mantua, N. Incorporating climate information into rebuilding analyses for overfished groundfish stock. Presented at the North Pacific Marine Science Organization Annual Meeting. Victoria, British Columbia, Oct 29-Nov.1, 2007 (poster).
4. **Holt, C.A.** and de la Mare, W.K. Feedback control systems in Pacific salmon fisheries. Presented at the American Institute for Fisheries Research Biologists Symposium on the Future of Fishery Science in North America. Seattle, Washington, Feb. 13-15, 2007 (oral).
5. **Holt, C.A.** Uncertainties in population dynamics and implementation of sockeye salmon fisheries: implications for management. Presented at the 3rd Annual Fisheries and Marine Ecosystems (F.A.M.E.) Graduate Student Conference. Crescent Beach, British Columbia, April 29, 2006 (oral).
6. **Holt, C.A.**, and Peterman, R.M., Missing the target: Implementation error in sockeye salmon fisheries in British Columbia and Alaska. Presented at the American Fisheries Society Annual Meeting. Anchorage, Alaska, Sept. 11-15, 2005 (oral).
7. **Holt, C. A.**, and McKinnell, S. Annual variability in condition factor of sockeye salmon (*Oncorhynchus nerka*) from 1915-1972 in British Columbia, Canada. Presented at the 13th Annual Meeting of the North Pacific Marine Science Organization (PICES). Honolulu, Hawaii, Oct. 17-21, 2004 (oral).
8. **Holt, C.A.** and Benson, A.J. Simulations of a management procedure for Patagonian toothfish. Presented at the Graduate Student Conference on Fisheries and Marine Ecosystems (F.A.M.E.). Crescent Beach, British Columbia, April 30-May 2, 2004 (oral).
9. **Holt, C.A.** and Peterman, R. Forecasting age-specific Pacific salmon recruitment in a changing environment. Presented at the session on the Ecological Dimension of Reconciling Fisheries with Conservation at the World Fisheries Congress, Vancouver, British Columbia, May 4, 2004 (poster).
10. **Holt, C.A.** and Peterman, R. Forecasting age-specific Pacific salmon recruitment in a changing environment. Presented at the Canadian Conference for Fisheries Research, Ottawa, Ontario, January 2003 (oral).
11. **Holt, C.A.** and Peterman, R. Forecasting age-specific Pacific salmon recruitment in a changing environment. Presented at the Salmon Ocean Ecology Meeting, Newport, Oregon, February 2003 (oral).
12. **Holt, C.A.** Dynamics and implications of temporal variability in body size of Pacific salmon. Presented at the Department of Fisheries and Oceans- Simon

Fraser University Collaborative Meeting, Nanaimo, British Columbia, September 2002 (oral).

RESEARCH ACTIVITIES

- Reviewer for scientific journals: Proceedings of the Royal Society B (Biological Sciences), Natural Resource Modeling, Fisheries Oceanography, Canadian Journal of Fisheries and Aquatic Sciences, and Fisheries Research
- Member of review panel for proposals of "Comparative Analysis of Marine Ecosystem Organization" (CAMEO), a U.S. program jointly funded by NOAA and NSF responsible for allocating \$2,000,000 (USD). Sept. 29-Oct. 3, 2008.
- Advisor for NASA's DEVELOP program- an interdisciplinary team of students investigating application of remote sensing for detecting eddies in the Gulf of Alaska to inform assessment of groundfish

TEACHING EXPERIENCE

Sessional Instructor responsible for offering a one-semester graduate level course, "Risk Assessment and Decision Analysis in Natural Resource Management" (REM 625)

- School for Resource and Environmental Management, Simon Fraser University (January-April 2006)

Co-instructor for a Workshop on Decision Analysis, Risk Assessment, and Risk Management at the World Fisheries Congress 2004

- Assisted in formulating and executing computer labs (May 7-8, 2004)

Guest speaker in graduate course "Physical Processes in the Environment: An Earth Systems Approach to Environmental Management", School of Resource and Environmental Management, Simon Fraser University

- Seminar topic: "Teleconnections between physical and biological oceanographic processes" (March 2006, March 2005, and March 2004)

University Teaching Assistantships

- Introductory Biology, Simon Fraser University, instructor: Mala Fernando (2003)
- Ecology, York University, instructor: Dr. Dawn Bazley (2000)
- Limnology, York University, instructor: Dr. Don McQueen (1999)

COMPUTER SKILLS:

- Programming languages: AD Model Builder, Splus, R
- Experience manipulating relational data bases in ACCESS

SCIENTIFIC OUTREACH

- Co-organizer of Symposium for Women Entering Ecology and Evolution Today (S.W.E.E.T.). University of British Columbia, May 2008.
- Founder and co-chair of the F.A.M.E. Network, a network of graduate students from across North America studying Fisheries and Marine Ecosystems (May 2004 to May 2006).

- Coordinator of first annual **F.A.M.E.** Conference for graduate students studying **F**isheries and **M**arine **E**cosystems (April 30 – May 2, 2004)
- Member of Aqualink, an international network of young researchers, linking biophysical and human dimensions of fisheries (2003 to 2006).
- Coordinator of Weekly Fisheries Research Meetings, School of Resource and Environmental Management, Simon Fraser University (Sept. 2001-June 2004)
- Co-organizer of Speakers Series- School of Resource and Environmental Management, Simon Fraser University (Sept. 2002-April 2003)

PUBLIC OUTREACH

- Founder and coordinator of Oceans Alive, a community forum on the sustainable use of ocean resources (March 2003)
- Co-chair of Student Union, School of Resource and Environmental Management, Simon Fraser University (Sept. 2002-Sept. 2003), and representative for Ph.D. students (Sept. 2003 – 2005)
- Coordinator of a cooperative program between students and environmental consulting companies, Queen's University, **STRIVE** (**S**tudents **T**aking a **R**esponsible **I**nitiative for a **V**iable **E**nvironment) (1998)
- Program assistant for public education (volunteer), Cataraqui Region Conservation Authority, Kingston, Ontario (Fall 1997)
- Event manager's assistant (volunteer) Evergreen Foundation, Toronto, Ontario (Spring 1994)