

Craig Stephen DVM PhD

CV Highlights Specific to the Cohen Commission Mandate

Current Positions

Professor. Faculty of Veterinary Medicine (Dept of Ecosystem and Public Health) and Faculty of Medicine (Dept of Community Health Science) University of Calgary

Clinical Professor. School of Population and Public Health. University of BC

President and Director. Centre for Coastal Health (www.centreforcoastalhealth.ca)

Committees

- Disease Advisory Group member. Salmon Dialogue. World Wildlife Fund.
- Technical Advisory Team Member - Salmon Aquaculture Review. B.C. Environmental Assessment Office.
- Fish Health Advisor BC Aquaculture Research Committee. Science Council of British Columbia.
- Chair. Federal-Provincial Fish Health Management Committee. British Columbia.
- Board of Technical Experts. Great Lakes Fisheries Commission. Ecology of Infectious Diseases in Great Lakes Fishes: Effects of Lake Management Strategies.
- Chair – Canadian Veterinary Medical Association Environmental Advisory Committee
- Founding Scientific Director and Chair. BC Environmental and Occupational Health Research Network
- Advisory Committee. National Collaborating Centre for Infectious Diseases

Consulting

- Consulting Veterinarian – Vancouver Aquarium. 1996-2006
- Consulting fish health veterinarian BC Ministry of Agriculture and Land
- Expert witness for aquaculture disease outbreak in New Zealand and impacts of fish health management in Canada (Provincial Court) (2 cases)

Research Projects and Risk Assessments

- Veterinary public health as part of the global response to emerging diseases. Building a sustainable model in Sri Lanka with extension to South and Southeast Asia. (IDRC/GHRI)
 - Includes research on impediments to sustainable prawn aquaculture and policy for sustainable ornamental fish aquaculture
- Social learning in rural aquaculture to break the cycle of poverty, food insecurity and unsustainable practices in Sri Lanka (IDRC/CIFSRF)
- Ecology of Infectious Diseases in Great Lakes Fishes: Effects of Lake Management Strategies. (Great Lakes Fishery Commission)

- Environmental impact of water diversion and the risk of aquatic pathogen transfer in the Yukon (AECOM)
- Risk assessment on the Devil's Lake water diversion. (International Joint Commission)
- Prevalence of antimicrobial resistant enteric pathogens in Sri Lankan aquaculture products. (Public Health Agency of Canada)
- Development of training program for fish health and avoidance of antimicrobial resistance in Sri Lanka. (Public Health Agency of Canada)
- Critical assessment of provincial surveillance of fish disease in commercial aquaculture. (Government of British Columbia)
- Risk assessment for live Pacific oysters (*Crassostrea gigas*) from Guernsey into British Columbia. (Canadian Food Inspection Agency)
- Risk assessment for sablefish aquaculture. (Fisheries and Oceans Canada)
- Risk Assessment Workshop. Great Lakes Fishery Commission
- Examining the health effects of barotrauma management in rockfish. (Fisheries and Oceans Canada)
- Development of a Fish Health Code of Practice for BC. (Government of British Columbia)
- Review of risks associated with live food market for Tilapia. (Fisheries and Oceans Canada)
- Outbreak investigation of deformities in netpen salmon in Chile. (Nutreco)
- Epidemiologic investigation of Infectious Hematopoietic Necrosis in BC. (National Research Council)
- Using Mortality Diagnoses to Study Marine Anemia in B.C. Salmon Farms. (BC Science Council)
- Objective assessment of proposed protocols for the introduction and movement of fish. (Canadian Aquaculture Industry Alliance/Department of Fisheries and Oceans)
- Design and management of an investigation of the public health impacts of antibiotic use in salmon farming in B.C (Health Canada)
- Assessing the risk of re-introducing sockeye salmon to Okanagan Lake (Okanagan First Nations Alliance.)
- Development of Risk Assessment Manual for the Federal-Provincial Fish Transplant Committee (Fisheries and Oceans Canada)
- Outline a Product Background Surveillance Program for Seafood Safety and Quality. (Canadian Food Inspection Agency)
- Design of fish health surveillance programs for commercial and SEP hatcheries. (Government of British Columbia)
- Development of a serum database for farmed Atlantic salmon. (Government of British Columbia)
- Development of interim risk management strategies for control of Infectious Hematopoietic Necrosis. (BC Salmon Farmers Association)
- Environmental impacts of aquaculture therapeutants. (Salmon Health Consortium)

Fish and aquaculture related scientific papers (total papers = 63)

- Munasinghe N, Stephen C, Abeynayake P, Abeygunwardena I. 2010. Shrimp farming practices in the Putallam district of Sri Lanka: Implications for disease control, industry sustainability and rural development. *Veterinary Medicine International*. Article ID 679130, 7 pages, 2010. doi:10.4061/2010/679130
- Stephen C, DiCicco E, Munk B. 2009. British Columbia's fish health regulatory framework's contribution to sustainability goals for salmon aquaculture. *Ecohealth* 5(4):472-81
- Grahn BH, Sangster C, Breaux C, Stephen C, Sandmeyer L. 2007. Case Report: Clinical and Pathologic Manifestations of Gas Bubble Disease in Captive Fish. *J of Exotic Pet Medicine*. 16(2): 104-112.
- Stephen C, Thorburn M. 2004. Formulating a vision for fish health research. *Guelph Ichthyology Reviews*.
<http://repository.lib.uoguelph.ca/gir/viewarticle.php?id=3>
- St-Hilaire S, Ribble CS, Stephen C, Anderson E, Kurath G, Kent ML. (2002) Epidemiological investigation of infectious hematopoietic necrosis virus in salt water net-pen reared Atlantic salmon in British Columbia, Canada. *Aquaculture* 212(ed1-4): 46-67.
- Stephen C. 2001. Applying risk assessment to fish health policy and management. *ICES Journal of Marine Science*. 58(2): 374-379.
- St. Hilarie, S., Stephen, C., Kent, M., Ribble, C.S. 2001. Sentinels in a bay: A model for assessing disease transmission in fish. *ICES Journal of Marine Science*. 58(2): 363-373.
- Stephen, C., Ribble, C.S. 1997. Mortality surveys as a tool for studying marine anaemia in seapen-reared chinook salmon, *Oncorhynchus tshawytscha* (Walbaum). *Aquaculture Research*. 28: 265-269.
- Stephen, C., Ribble, C.S. 1996. The descriptive epidemiology of marine anemia in seapen-reared salmon in southern British Columbia. *Canadian Veterinary Journal*. 37:420-425
- Stephen, C., Ribble, C.S. 1995. Marine anemia in farmed chinook salmon (*Oncorhynchus tshawytscha*): Development of a working case definition. *Preventive Veterinary Medicine*. 25(3-4): 259-269.
- Stephen, C., Ribble, C.S., Kent, M.L. 1995. The effects of changing demographics on the distribution of marine anemia in farmed salmon. *Canadian Veterinary Journal*. 36: 557-562.
- Stephen, C., Ribble, C.S. 1995. An evaluation of surface moribund salmon as indicators of seapen health. *Aquaculture*, 133: 1-8.
- Stephen, C., Ribble, C.S., Kent, M.L. 1995. Observer variation in the histological diagnosis of plasmacytoid leukemia (marine anemia). *Canadian Journal of Veterinary Research*. 59: 15-19.
- Stephen, C. Kent, M.L. 1993. Hepatic megalocytosis in chinook salmon (*Oncorhynchus tshawytscha*). *Diseases of Aquatic Organisms*. 16: 35-39.
- Kent, M.L., Newbound, G.C., Dawe, S.C., Stephen, C., Eaton, W.D. Traxler, G.S., Kieser, D., Markham, R.F. 1993. Observations on the transmission and range of plasmacytoid leukemia of chinook salmon. *Fish Health Section - American Fisheries Society Newsletter*. 21: 1-3.

Fish and Aquaculture Related Technical Reports (total technical reports = 29)

- Hammel. L., Stephen, C., Bricknell, I., O. Evensen. 2009 “Salmon Aquaculture Dialogue Working Group Report on Salmon Disease” commissioned by the Salmon Aquaculture Dialogue, World Wildlife Fund. available at <http://wwf.worldwildlife.org/site/PageNavigator/SalmonSOIForm>
- Stephen C. 2004. Salmon Holding Capacity in SW New Brunswick: Commentary on the Canadian Technical Report of Fisheries and Aquatic Sciences 2489. Report to the New Brunswick Salmon Growers Association.
- Stephen C, Dawson-Coates J. 2004. Capacity of the British Columbia shellfish industry to meet European Union health requirements for exports: Preliminary situation assessment. Prepared for the BC Ministry of Agriculture, Fisheries and Food.
- Sheppard M, Stephen C. 2004. Guidelines to Managing Fish Health of Yellowtail Kingfish. The foundation for a health program for Australian finfish aquaculture. Federal Research and Development Corporation's Aquatic Animal Health Subprogramme: project No. 2003/216 (for South Australia Marine Finfish Farmers Association) entitled: Detection and management of yellowtail kingfish (*Seriola lalandi*, YTK) health issues.
- Stephen C. 1999. Disease risks associated with the re-introduction of sockeye salmon into Okanagan Lakes. Report to the Okanagan Nation Alliance.
- Stephen, C. Iwama, G. 1997. Report to the B.C. Environmental Assessment Office Salmon Aquaculture Review. Health Issues.
- Stephen C., McAdie, M. 1995. The environmental impact of aquaculture therapeutants: A risk assessment approach. Report to the Salmon Health Consortium, Ottawa.
- Stephen, C., Ribble, C.S. 1993. The epidemiology of marine anemia (plasmacytoid leukemia) in farmed salmon in British Columbia. Report to the B.C. Ministry of Agriculture, Fisheries and Food.

Theses

Stephen, C. 1995. A Field Investigation of Marine Anemia in Farmed Salmon in British Columbia. Ph.D. Thesis. University of Saskatchewan.

Fish and aquaculture related conference presentations (total conference presentations 68)

- Dawson-Coates J, Stephen C, Dale A. 2009. Policy in support of sustainable ornamental fish farming in Sri Lanka. Aquaculture Canada. Nanaimo
- Munasinghe N, Abeynayake P, Abeygunawardena I, Stephen C. 2009. Health management practices for prawn farmers in Sri Lanka. Aquaculture Canada. Nanaimo
- Stephen C. 2006. The place for community on aquaculture environmental impact research. Pacific Salmon Forum Workshop on Ecosystem Management of the Broughton Archipelago.

- Stephen C. 2005. Aquatic and Marine Ecosystem: The Role of Veterinarians. University California (Davis) School of Veterinary Medicine Curriculum Planning Process.
- Stephen C. 2005. Aquaculture, veterinarians and environmental health. International Association of Aquatic Animal Medicine Annual Conference. Seward Alaska.
- Stephen C. 2004. Health management: The foundation for international trade. Pacific Aquaculture Conference.
- Saksida, S., Jones, S., Karreman, G. A., and C. Stephen. *Kudoa thyrsites* in Atlantic salmon: an industry wide study to generate testable hypotheses (part 1). Western Fish Disease Conference. Seattle, July 2003.
- Karreman, G. A., Saksida, S., Jones, S and C. Stephen. *Kudoa thyrsites* in Atlantic salmon: an industry wide study to generate testable hypotheses (part 2). Western Fish Disease Conference. Seattle, July 2003.
- Stephen C, Sifton E, Sheppard, M. 2001. Health Management Codes of Practice: Lessons learned. Western Fish Disease Conference. June. Victoria, BC.
- Stephen C. 1999. Applying risk assessment to fish health policy and management. ICES Symposium on the Environmental Effects of Mariculture. Sept 13-17. St. Andrews NB.
- Stephen C. 1999. Epidemiological Musings on Whirling Disease (Abstract). 5th Annual Whirling Disease Symposium. Missoula.
- St. Hilarie, S., Stephen, C., Kent, M., Ribble, C.S. 1999. Sentinels in a bay: A model for assessing disease transmission in fish. ICES Symposium on the Environmental Effects of Mariculture. Sept 13-17. St. Andrews NB.
- Stephen C. 1998. Ecosystem health and its relationship to aquaculture management. Aquatech'98. Vancouver. March 8.
- Scimeca JM, McGinnis M, Stephen C, Young S. 1998. Bilateral Panophthalmitis in the Giant Pacific Octopus. International Association for Aquatic Animal Medicine. 29th Conference. San Diego.
- Stephen, C. 1997. Panel Member - Impacts of pathogens on natural populations. Pathogens and Diseases of Fish in Aquatic Ecosystems. Portland.
- Leighton B, Hui L, Stephen C, Boom JDG, Smith M, Hartwick EB. 1997. Seastar epizootic on the British Columbia coast. (Poster) B.C. Parasitologists Fall Meeting. Simon Fraser University. Nov.7.
- Stephen, C. 1993. Investigating mortality in seapens. Canadian Veterinary Medical Association. Edmonton. July 8-10.
- Stephen, C, Ribble, C. 1993. Determining the pattern of mortality in salmon netpens. Western Fish Disease Conference. Port Ludlow, Wash. June 16.
- Stephen C., Kent, M. 1993. Hepatic megalocytosis in chinook salmon. Western Wildlife Disease Workshop. Saskatoon. Feb. 22-23.
- Stephen, C., Ribble, R. 1992. Epidemiology of plasmacytoid leukemia (marine anemia): An update. Marine Anemia Workshop. Pacific Biological Station, Nanaimo. June 12.
- Stephen, C., Kent, M. 1992. Hepatic megalocytosis in chinook salmon. Western Fish Disease Conference. Parksville, B.C. June 15.

Fish and aquaculture related invited presentations (total invited presentations 64)

- Stephen C. 2006. The place for community on aquaculture environmental impact research. Pacific Salmon Forum Workshop on Ecosystem Management of the Broughton Archipelago.
- Stephen C. 2005. Aquatic and Marine Ecosystem: The Role of Veterinarians. University California (Davis) School of Veterinary Medicine Curriculum Planning Process.
- Stephen 2001. Fish health management. Salmon farming and the Northcoast; Prince Rupert Aquaculture Forum. Prince Rupert BC.
- Stephen, C. 2000. Risk Management in Aquaculture. Canadian Food Inspection Agency National Science Forum. Parksville. BC.
- Stephen, C. 1999. Moderator – Panel Discussion. Probiotic Solutions: Alternatives for Disease Control in Aquaculture Systems. Nanaimo.
- Stephen, C. 1999. Session Chair. Needs and Opportunities in Fish Health Research. Aquaculture Canada. Victoria

Some other projects, papers or products relevant to the Cohen Commission

Projects

- Managing the interface of wildlife and agriculture health in the Northwest Territories – Strengths, needs and opportunities
- The role of wildlife in First Nations community health in BC.
- Risks to Wildlife from Camelids in BC
- Developing a Model Community-Based Ecosystem Health Program
- Assessing the risk of disease in endangered Vancouver Island Marmots
- Risk management plan for introduced winter tick in Yukon moose and other wildlife

Papers, reports, presentations

- Stephen C. 2009. The challenge of integrating ecosystem health throughout a veterinary curriculum. J Veterinary Medical Education. 36(1): 145-151
- Nishi JS, Stephen C, Elkin BT. (2002). Implications of agriculture and wildlife policy on management and eradication of bovine tuberculosis and brucellosis in free ranging Wood Bison in northern Canada. In The Domestic Animal/Wildlife Interface: Issues for Disease Control, Conservation, Sustainable Food Production, and Emerging Diseases edited by E. Paul J. Gibbs and Bob H. Bokma. Annals of the New York Academy of Sciences. 969: 1-9.
- Stephen, C, Ribble, CS. (2001). Death, Disease and Deformity: Using Outbreaks of Disease in Animals as Sentinels for Emerging Environmental Health Risks. Global Change and Human Health. 2(2): 108-117
- Stephen C. 2007. Wildlife Health Management: Developing the “Colorado Charter”. Wildlife Disease Association Annual Meeting. Estes Park. Aug.

- Stephen C. 2007. Attributing cause and effect in free-ranging wildlife: Challenges and shifting approaches. Keynote lecture. Respiratory Disease in Mountain Sheep: Knowledge, Gaps and Future Research. Davis, California.
- Stephen C. 2004. The role of ecology, the environment and ecosystem health in veterinary research. RG Thomson Lecture. University of PEI.
- Stephen C. 2003. In Search of the One Health Model: Commentary on Community Health in Clayoquot Sound. Clayoquot Symposium 2003: Citizen Science and Community Health. Tofino.
- Stephen C. 1998 Bridging human health and farming through ecology. Canadian Society of Animal Scientists - Agriculture Institute of Canada Annual Meeting. Vancouver. July.
- Stephen C. 1998. The role of disease in the ecology of wildlife populations. Environmental contaminants and marine mammal health: Research applications workshop. Institute of Ocean Sciences. Victoria April 17-19.
- Harding, L., Stephen, C., Elliot, J. 1996. Effects of pulp mill contaminants on aquatic-based wildlife. 3rd D.O.E. Fraser River Action Plan Workshop. Vancouver, Feb. 20-22.

Teaching

Current

- VETM 323 Animals, Health and Society (University of Calgary)
- HHSC 640 Ecosystem Approaches to Health (UNBC, UBC, UC)

Past

- AQUA 241 (Malaspina University-College) Fish Health
- AQUA 341 (Malaspina University-College) Disease of fish and shellfish
- Marine Science 502.34 (BMS) Measuring and Assessing Coastal Health
- Professional education
 - Introduction to Risk Assessment (Great Lakes Fishery Commission)
 - Disease Surveillance (Fisheries and Oceans Canada)
 - Applied Epidemiology (Washington Fish and Game)
 - Applied Epidemiology (Canadian Aquaculture Institute)

Fish health graduate student supervision/co-supervision

- Topics
 - Health impacts on wild Pacific herring of the Exxon Valdez oil spill (PhD)
 - Health management in prawn aquaculture in Sri Lanka (MPhil)
 - Antimicrobial use and resistance in Sri Lankan prawn farms (PhD)
 - Policy for sustainable ornamental fish farming in Sri Lanka (MA)
 - Epidemiology of infectious hematopoietic necrosis in BC salmon farms (PhD)