

## Dr. Craig Orr

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### EDUCATION

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<b>Ph.D., Behavioural Ecology</b> Simon Fraser University	<b>1986</b>
<b>M.Sc., Wildlife Ecology</b> Acadia University	<b>1977</b>
<b>B.Sc., Biology; Chemistry &amp; Conservation minor</b> Central Michigan University	<b>1975</b>

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### EMPLOYMENT HISTORY

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Executive Director, Watershed Watch Salmon Society	<b>1998 - 2011</b>
Associate Director, Centre for Coastal Studies, SFU	<b>2001 - 2004</b>
Selective Fishing Advisor, BC Aboriginal Fisheries Secretariat	<b>1998 - 2001</b>
Conservation Advisor, Fraser River Aboriginal Fisheries Secretariat	<b>1998</b>
President/Executive Director, Steelhead Society of BC	<b>1991 - 1997</b>
Ecologist, Eastern Arctic, McLaren Marex Inc., Halifax, NS	<b>1977 - 1980</b>
Naturalist, US Forest Service endangered species program	<b>1974, 1975</b>

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### CAREER SYNOPSIS

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#### **Wild Salmon**

Professional ecologist 40-plus years, past 20 in salmon conservation involved in advancing science, outreach, harvest reform, habitat protection/restoration:

**Harvest:** Long focus of providing conservation- and science-based harvest advice, promoting selective fishing policy/projects, Wild Salmon Policy, and meaningful fisheries certification. Current member: Fisheries and Oceans South Coast Integrated Harvest Planning Committee, Chair of Pacific Marine Conservation Caucus, Fraser Salmon Table, Monitoring and Compliance Panel (founding chair). Formerly: BC Aboriginal Fisheries Commission Selective Fishing Advisor, Fraser River Aboriginal Fisheries Secretariat Conservation Advisor, Steelhead Society Executive Director. Video project manager: *Restoring Respect: Aboriginal Selective Fishing in BC*.

**Habitat Protection/Restoration:** Long/broad focus on habitat protection and restoration, including: Riparian Technical Committee, BC Forest Practices Code (1994); various groundwater protection and research projects; in-river hydro development; various academic committees (sockeye, sea lice, salmon habitat).

Strong focus on hydro and in-stream flow issues, including past tenures on Coquitlam River Water-Use Planning & Fish Technical committees; BC Hydro Fisheries Advisory Team; First Nations Water Use Planning Committee; Ash River Water-Use Planning Consultative Committee; Helios Institute green hydro working group. Produced *Preliminary Review of Fish Conservation Gains within BC Hydro's Water Use Planning Program* (2005). Currently assist Kwikwetlem on sockeye restoration as member of Kwikwetlem River Salmon Restoration Program. Strong focus on water act modernization, reducing impacts of river diversion projects.

Long involvement in habitat restoration. Provided proposal reviews to: BC Hydro's Bridge Coastal Fish & Wildlife Restoration Program (founding chair and board member, 2000-2004); Habitat Conservation Trust Fund (9 years board member & Vice-Chair); Grizzly Bear Trust Fund (board); Vancouver Foundation (environment committee); BC Hydro; Pacific Salmon Endowment Fund; Pacific Salmon Commission; Fraser Salmon and Watersheds Program. Currently advise Kwikwetlem First Nation on habitat mitigation related to Gateway transportation projects.

**Aquaculture Impacts:** Active for more than a decade on identifying and addressing impacts from open net-cage salmon farms. Founding member and science director, Coastal Alliance for Aquaculture Reform; involved in improving access to and quality of data, promoting science and outreach, monitoring and reducing farm impacts. Helped SFU organize 7 workshops on aquaculture; authored numerous reports and peer-reviewed papers. Currently represent NGO interests on Broughton area lice monitoring program; participant in Cohen Inquiry on Fraser sockeye declines.

### **Sturgeon**

Director, Communications Director, Science Committee Chair, Sturgeon Society (2003-2008). Authored numerous reports and successful sturgeon conservation/research proposals. Helped Kwikwetlem First Nation fund/launch telemetry study of Fraser River sturgeon associated with bridge replacement project.

### **Wildlife**

Laboratory instructor, wildlife ecology, mammalogy, natural history (Simon Fraser University, Acadia University, 1975-85). M.Sc. research on snowshoe hares, NS.

### **General Conservation**

Project Manager, Canada's first oil spill contingency plan, Gulf of St. Lawrence (1979). Presenter at numerous workshops on environmental aspects of offshore oil

and gas. Federal-provincial Treaty Negotiation Advisory Committee (1990-97). Steering Committee/editor/facilitator for 20-plus *Speaking for the Salmon* workshops, SFU (1998-present). Former member/representative: Friends of Environment Foundation (Tri-Cities board), District 43 Social Development Council (Environment Committee), Forest Land Use Liaison Committee, Sto:lo Fisheries Public Monitoring Panel, BC Fish Habitat Protection Council, Wild Salmon Coalition, Minister's Pacific Salmon Treaty advisory panel.

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## AWARDS

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NSERC Doctoral Scholarship, President's Stipend SFU; Canada 125 Medal; Haig-Brown Conservation Trophy; Cal Woods Conservation Award.

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## WRITING / TECHNICAL SKILLS

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Edited numerous technical papers on salmon, aquaculture (Hatcheries and the Protection of Wild Salmon, Summit of Scientists on Sea Lice, Aquaculture and the Protection of Wild Salmon). Proficient in researching, preparing and delivering Power Point and oral presentations on above subjects. More than 40 years experience in preparing funding proposals. Author of some 200 popular articles on the environment, outdoors and nature in 20-plus magazines and newspapers (9 writing/editing awards), numerous scientific papers, technical reports (aerial surveys, environmental impact assessments, biological literature reviews, oil spill contingency plans, pipeline crossings, breeding bird surveys, marine issues), two academic dissertations. Reviewer for various journals.

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## SELECTED REPORTS / PUBLICATIONS

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### **Aquaculture Papers:**

Price M.H.H., S.L. Proboaszcz, R.D. Routledge, A.S. Gottesfeld, C. Orr and J.D. Reynolds. 2011. Sea Louse Infection of Juvenile Sockeye Salmon in Relation to Marine Salmon Farms on Canada's West Coast. PLoS ONE 6(2): e16851. doi:10.1371/journal.pone.0016851.

Krkosek, M., A. Bateman, S. Proboaszcz, and C. Orr. 2010. Dynamics of outbreak and control of salmon lice on two salmon farms in the Broughton Archipelago, British Columbia. *Aquaculture Environment Interactions* 1: 137–146.

Orr, C. 2007. Estimated sea louse egg production from Marine Harvest Canada farmed Atlantic salmon in the Broughton Archipelago, British Columbia, 2003-2004. *North American Journal of Fisheries Management* 27:187-197.

De Bruyn, A. M. H., Trudel, M., Eyding, N., Harding, J., McNally, H., Mountain, R., Orr, C., Urban, D., Verenitch, S., and Mazumder, A. 2006. Ecosystemic effects of

salmon farming increase mercury contamination in wild fish. *Environmental Science and Technology*. 40(11): 3489-3493.

### **Aquaculture Reports/Briefs:**

Watershed Watch Salmon Society and Coastal Alliance for Aquaculture Reform. 2008. *Sea Lice and Salmon: a Science Primer*, CAAR.

Routledge, R., Gallagher, P., and Orr, C. 2007. *Aquaculture and the protection of wild salmon*. January 25-27, 2007. Convener's Report. Burnaby, BC, Continuing Studies in Science, Simon Fraser University.

Watershed Watch Salmon Society. 2006. *Farmed-Wild Fish Interactions in the Broughton Archipelago: A Synopsis of Key Biological and Ecological Evidence*. Coquitlam, BC, Watershed Watch Salmon Society prepared for the BC Pacific Salmon Forum.

Orr, C. 2006. *Brief to Special Committee on Sustainable Aquaculture: Sea Lice and the Cycle of Resource Management Pathology*. Coquitlam, BC, Watershed Watch Salmon Society.

Orr, C. 2004. *Farmed, wild, but rarely indifferent*. *Foundation Focus* Winter 2004.

Watershed Watch Salmon Society. 2004. *Sea Lice and Salmon: Elevating the dialogue on the farmed-wild salmon story*. Coquitlam, Watershed Watch Salmon Society.

Gallagher, P., Orr, C. D., Berry, M. and Broomhall, P. (eds.) 2002. *Speaking for the salmon: Proceedings of the summit of scientists on sea lice*. July 22, 2002. Burnaby, BC, Continuing Studies in Science, Simon Fraser University.

Orr, C.D. 2002. *Environmental and Economic Costs of Sea Lice: Brief to the Standing Committee on Fisheries and Oceans*. Coquitlam, BC, Watershed Watch Salmon Society.

Watershed Watch Salmon Society 2001. *Salmon Farms, Sea Lice and Wild Salmon: A Watershed Watch report on risk, responsibility and the public interest*. Coquitlam, BC, Watershed Watch Salmon Society.

Gallagher, P. and Orr, C.D. (eds.) 2000. *Speaking for the salmon: Aquaculture and the protection of wild salmon*. March 2-3, 2000. Burnaby, BC, Continuing Studies in Science, Simon Fraser University.

### **Conservation Papers:**

Abbott, J.C., Dunbrack, R.L. & Orr, C.D. 1985. The interaction of size and experience in dominance relationships of juvenile steelhead trout (*Salmo gairdneri*). *Behaviour*, 92, 241-253.

Orr, C.D. 1985. Status-specific foraging trade-offs of black-capped chickadees.

Ph.D. Dissertation, Simon Fraser University.

Orr, C.D. and Verbeek, N.A.M. 1984. Female demands: some fitness implications in chickadee flocks. *Can. J. Zool.* 62: 2550-2552.

Orr, C.D. and Parsons, J.L. 1983. Ivory gulls (*Pagophila eburnea*) and ice edges in Davis Strait and the Labrador Sea. *Canadian Field Naturalist.* 96(3): 323-328.

Orr, C.D., Ward, R.M.P., Williams, N.A. and Brown, R.G.B. 1982. Migration patterns of red phalaropes (*Phalaropus fulicarius*) and northern phalaropes (*Lobipes lobatus*) in southwest Davis Strait and in the Northern Labrador Sea. *Wilson Bulletin.* 94(3): 303-312.

Orr, C.D. and Ward, R.M.P. 1982. The autumn migration of thick-billed murre (*Uria lomvia*) near southern Baffin Island and northern Labrador, Canada. *Arctic.* 35(4): 531-536.

Orr, C.D. and Dodds, D.G. 1979. Snowshoe hare (*Lepus americanus*) habitat preferences in Nova Scotia, Canada spruce fir forests. *Wildlife Society Bulletin.* 10(2): 147-150.

Orr, C.D., Gillis, D.J., and Valdron, L.G. 1980. Snow buntings, Lapland longspurs, and other passerines in Davis Strait and Labrador Sea, Canada 1977-1979. *Canadian Field Naturalist.* 94(2). 185-187.

Orr, C.D. 1977. Determination of habitat preferences and population trends of snowshoe hares in Nova Scotia spruce-fir forests. M.Sc. Dissertation, Acadia University.

Orr, C.D. 1975. 1974 breeding success of Kirtland's Warbler. *Jack-Pine Warbler* 53: 59-66.

### **Conservation / Science Reports:**

Nowlan, L. and Orr, C. 2010. Brief on BC Water Act Reform. Coquitlam, BC, Watershed Watch Salmon Society Submission to Province of BC on Water Act Modernization.

Watershed Watch Salmon Society, Secwepemc Fisheries Commission, Okanagan Nation Alliance Fisheries Department, Northern Shuswap Tribal Council, Nicola Tribal Association 2009. Fish Out of Water: Tools to Protect British Columbia's Groundwater and Wild Salmon.

Watershed Watch Salmon Society. 2009. Groundwater & Healthy Salmon Streams - it's all connected. Coquitlam, BC, Watershed Watch Salmon Society.

Hill, A. and Orr, C. 2009. Reconciling the conservation of wild salmon and the production of enhanced salmon under Canada's Wild Pacific Salmon Policy: A discussion. Speaking for the Salmon, SFU Harbour Centre, Vancouver, BC, February 23-24, 2009, Continuing Studies in Science, Simon Fraser University.

Hall, T., Gallagher, P., Orr, C., and Wood, L. (eds.) 2008. A Think Tank on

Transferable Shares in the Salmon Fishery: A Special Seminar of the Speaking for the Salmon Series - Conveners' Report. Speaking for the Salmon, SFU Harbour Centre, Vancouver, BC, Continuing Studies in Science, Simon Fraser University.

Proboszcz, S. and Orr, C. 2007. Speaking for the Salmon: Groundwater and Salmon. Burnaby, BC, Continuing Studies in Science, Simon Fraser University.

Watershed Watch Salmon Society. 2007. Water and salmon issues and options for conservation and governance improvements in the lower Fraser River. Vancouver, BC, Prepared for the Fraser Salmon and Watershed Program, Pacific Salmon Foundation and Fraser Basin Council.

Orr, C.D., Gallagher P., and Penikett, J. (eds.) 2002. Hatcheries and the protection of wild salmon. June 2002. Burnaby, BC, Continuing Studies in Science, Simon Fraser University.