SUMMIT Environmental Consultants Ltd.

BRIAN GUY, PH.D., P.GEO., P.H.

Senior Geoscientist, President

EDUCATION

- 1990 Ph.D. (Distinction), Water Resources Engineering, University of Guelph, Ontario
  Thesis: Sediment Transport Capacity of Shallow Overland Flow.
- 1987 M.Sc. (Distinction), Water Resources Engineering, University of Guelph, Ontario
  Thesis: Investigation of Sediment Transport at the Capacity Rate in Interrill Flow
- 1979 B.Sc., Physical Geography, University of British Columbia.

PROFESSIONAL AFFILIATIONS

- Professional Geoscientist, Association of Professional Engineers and Geoscientists of British Columbia
- Professional Hydrologist, American Institute of Hydrology
- Adjunct Professor, University of Northern British Columbia, Prince George, B.C.
- Canadian Water Resources Association (Director, B.C. Branch, former President)
- Vernon Science and Discovery Society (operates Okanagan Science Centre) (President)
- Canadian Society for Hydrologic Sciences (member)
- Canadian Environmental Auditing Association (member)
- Former member of Science Council of B.C. Advisory Board for endowed research chair at Okanagan University College (Freshwater Science Program)

PROFESSIONAL DEVELOPMENT

- Introduction to Environmental Auditing in Forestry (Malaspina University College Forestry Extension Program)
- River Restoration (ASCE course taught by Mr. Dave Rosgen)
- Riparian Management under the Forest Practices Code (B.C. Forestry Continuing Studies Network)
- Introduction to Engineering Inspection for the Forest Practices Code (BCIT)
- Terrain Mapping (UBC Continuing Education course taught by Dr. J. Ryder)
- Presenting Evidence: Being an Expert Witness in Environmental Cases (Justice Institute of B.C.)

PROFESSIONAL EXPERIENCE

Hydrology, Hydraulics, and Water Quality

- Currently developing a hydrologic model for the Okanagan River watershed as part of the development of a decision-support model to improve water management decisions for fish in Okanagan Lake and River.
- Used principal components analysis to develop improved models for forecasting seasonal inflows to Kalamalka and Okanagan Lakes.
- Estimated the natural hydrographs of Okanagan River and Okanagan Lake from 1922 to 1998, assuming that the lake outlet was uncontrolled during that time.
- Developed hydrologic and water quality models for Guichon Creek for estimating impacts of mine water releases.
- Undertook a hydrologic analysis of Coquitlam River tributaries downstream of Coquitlam Lake, as part of technical

studies in support of a Water Use Plan for the Coquitlam generating facility operated by B.C. Hydro and Power Authority.

- Supervised several hydrologic analyses in support of independent power producers in B.C., including analyses of hydrologic regime, design peak flow analyses, low flow analyses, and Probable Maximum Flood analyses. Studies have been conducted throughout B.C.
- Have conducted many watershed assessments - studies of watershed and hydrologic sensitivity, leading to land use recommendations throughout B.C., for government, industrial, and First Nations clients.
- Conducted peak flow and culvert sizing studies for several major B.C. forest companies and Forest Districts throughout B.C.
- Examined hydrologic impacts of forest harvesting for Cariboo Region, B.C. Ministry of Forests.
- Provided hydrologic and water management analysis and advice to the Seven Peaks Chiefs Executive Committee.
- Developed guidelines for the protection of fish and fish habitat at small hydro installations.
- Developed a draft Guidebook for determining instream flow needs for fish in B.C.
- Evaluated channel stability, hydrologic and sediment regimes, and estimated development impacts of proposed hydroelectric power projects on Ashlu Creek, Mamquam River and Elaho River.
- Evaluated the hydraulic effects of the Kemano Completion Project on the lower Kemano River during the annual eulachon migration period (March - April).
- Provided ongoing advice on hydrologic, hydraulic, sediment transport, and fluvial geomorphology issues during planning and construction activities associated with the Kemano Completion Project.
- Developed a procedure to estimate low flows at specified return periods for tributaries to the Upper Columbia river, upstream of Mica Dam.
- Supervised a quantitative evaluation of the hydrologic and fisheries impacts of the Walter Hardman generating facility.
- Developed and applied an original water quality model for Arrow Lakes.
- Reviewed weather and hydrologic conditions associated with the summer 1991 rainstorms in south-coastal B.C., and analysed the hydrologic and sediment transport regimes of the Bridge River.
- Undertook a hydrologic analysis of the Cheakamus River and its tributaries downstream of Daisy Lake, in support of an assessment of fisheries flow requirements and the development of a fisheries flow release strategy.
- Conducted a preliminary evaluation of valley wall and stream channel stability; reported on existing climatic and hydrologic regimes, and forecasted effect of climate change on climate and hydrology in the Quesnel River watershed.
- Reviewed hydrologic design studies for culverts and bridge crossings along a resource road in north-coastal B.C.
- Coordinated technical and field studies required to calibrate the HEC-2 backwater model for 90 km of the Nechako River.
- Determined surface and groundwater hydrology and designed parameters associated with development of salmonid habitat near Courtenay, B.C.
- Evaluated site hydrology at a proposed golf course in the Fraser Valley and developed guidelines for construction and operation to minimize erosion and stream impacts.
- Provided a technical review of bulk water export licence application.
- Conducted a hydrological and engineering evaluation of alternative

dyke alignments through the Coquitlam Indian Reserve.

- Assessed impacts of golf course and urban development on groundwater and wetland hydrology in Whistler, B.C.
- Developed a method for design peak flow estimation on very small streams near the Westwood plateau, Coquitlam, B.C., using precipitation data.
- Developed, calibrated, and verified a 2-dimensional numerical dispersion model to assess the effects of proposed diversion of Red Deer River into Buffalo Lake, Alberta.
- Adapted and applied the HSPF hydrological model to a watershed on Vancouver Island.
- Conducted regional hydrological assessments, prepared water management plans, peak flow analyses for design of water management facilities, assessment of mining impacts on hydrological regime, and low flow analyses for several operating and proposed coal mines in the eastern Kootenays of B.C.
- Performed data collection, hydrological regime assessment, developed mine area and plant water balance, peak and low flow analyses, and prepared a comprehensive water management plan for a precious metal mine on Vancouver Island.
- Designed data collection networks, conducted water supply/demand studies, evaluated groundwater resources, and performed hydrological modelling for land-use planning studies in British Columbia.
- Conducted hydrological and snowpack field surveys for the proposed Foothills pipeline.
- Completed design peak flow studies, flood frequency analyses, and regional hydrologic studies for several streams on Vancouver Island.
- Developed deterministic watershed model for monthly runoff forecasting in the Nicola River watershed in central B.C.

Environmental Geoscience

- Have supervised many watershed restoration projects in B.C., including assessments of the impacts of forestry and other types of land use on riparian and instream resources, including the watersheds of the Bonaparte River, the Mid and Upper Shuswap River, Mission Creek, the Bella Coola River and the Chilcotin River.
- Analyzed river bed scour in sockeye spawning sections of Okanagan River and developed a relationship between river discharge and the number (and proportion) of sockeye redds at risk of scour.
- Have supervised the development of prescriptions for stream channel, fish habitat, and riparian restoration in many B.C. watersheds, including Upper Kootenay, Beaverfoot, Bighorn, Bonaparte, Tranquille, Lemieux, Bridge, Birk, Twinflower, and Wallace.
- Supervised an assessment of gravel sources and retention areas on the Shuswap, Bridge, and Seton Rivers, and Cayoosh Creek.
- Supervised the design and installation of instream structures in Birk Creek and Vernon Creek, and a rearing habitat enhancement channel on the Barriere River floodplain.
- Completed detailed terrain stability, soil erosion, and sediment delivery assessments for proposed roads and cutblocks in the Shuswap and Okanagan areas.
- Supervised detailed fish habitat restoration prescriptions for a major Vancouver Island River.
- Supervised terrain and terrain stability mapping of several watersheds in the Okanagan-Shuswap region.

- Conducted avalanche and debris torrent assessments for a B.C. forest company in the Kootenays.
- Conducted several terrain stability and debris flow hazard assessments, and "flat-over-steep" stability assessments in the Kootenays.
- Assessed impacts of B.C. Hydro transmission line right-of-way on water yield and river bank erosion near Enderby, B.C.
- Determined changes in channel stability and other geomorphic characteristics, in Clayoquot Sound area of B.C., in support of possible Fisheries Act charges.
- Conducted terrain stability assessments in the Clearwater Forest District.
- Determined an optimal method for removal of accumulated sediment and debris from the Nechako River Canyon in anticipation of releasing flow from Kenney Dam for the first time since the mid-1950's.
- Assessed flood and debris torrent hazard for a steep mountain creek in Coquitlam.
- Lead a research study to compare differences in sediment movement through recently logged cutblocks, as affected by the amount of waste biomass left behind following logging.
- Advised on logging road deactivation in the Harrison River watershed.
- Modelled the erosion of the Revelstoke Dam plunge pool and downstream sediment transport during peak flow events.
- Provided technical advice to a study of the use of vegetation for bank stabilization and erosion control along the Nechako River.
- Provided drainage and erosion control recommendations associated with road construction in Burnaby, B.C.
- Developed a "user's manual" for Environment Canada's published sediment concentration and sediment load database for Ontario streams.
- Developed recommendations for surface erosion control, channel stabilization, and water treatment requirements to reduce sediment loadings to the Coquitlam River from gravel mining areas.

Environmental Assessment and Management

- Managed the development of a comprehensive water management plan for five Okanagan watersheds: Peachland, Trepanier, Lambly, McDougall, and Powers Creeks.
- Managed a large multi-disciplinary environmental impact assessment and developed mitigation and monitoring recommendations for a proposed project at Highland Valley Copper. Coordinated preparation of an Application for a Project Approval Certificate to the B.C. Environmental Assessment Office.
- Conducted ISO 14001 certification audits at wood remanufacturing facilities in Kelowna and Williams Lake, B.C.
- Conducted audit for compliance with relevant environmental legislation at a wood remanufacturing facility in Penticton, B.C.
- Conducted site assessment and made recommendations for ISO-compliant Environmental Management System at a wood remanufacturing facility in Prince George, B.C.
- Reviewed an Environmental Management System on behalf of a major B.C. forest company.
- Reviewed environmental aspects associated with a major expansion at a wood remanufacturing facility in Williams Lake, B.C.
- Developed a risk assessment approach for determining the probability of impacts from blowing dust at Revelstoke

associated with drawdown of Arrow Lakes.

- Managed a site contamination study at 68 First Nation reserves on Vancouver Island. Study included identification of contaminant sources, evaluation of pathways and cimpacts, and ranking of environmental health risks.
- Assessed surface flow and groundwater regimes and environmental sensitivity of a wetland area in North Vancouver, B.C.
- Conducted Phase 1 site assessments at several industrial properties near Vancouver.
- Conducted audits for compliance with Coastal Fish/Forestry Guidelines for two large B.C. forest companies, at several coastal logging operations.
- Performed a study of surface water/groundwater interaction at a contaminated wood preservation facility in central B.C.
- Managed scientific and engineering studies associated with a leachate-generating woodwaste storage pile adjacent to the Fraser River.
- Reviewed performance of leachate treatment system at Richmond landfill.
- Have conducted and supervised many Stage 1 and 2 contaminated site investigations in the north Okanagan, Shuswap, and Kootenays.
- Have managed remediation at several contaminated industrial properties in the B.C. Interior.
- Supervised the design, installation and operation of a soil vapour extraction system for remediation of naptha contaminants.

Legal Investigations

- Provided expert hydrologic advice in a B.C. Supreme Court case involving potential impacts associated with large-scale commercial logging in the Chilcotin region of B.C.
- Conducted technical studies and presented evidence on behalf of a major forest company during a criminal prosecution.
- Provided hydrologic and fluvial geomorphologic services in relation to alleged Fisheries Act violations near Revelstoke, B.C.
- Provided hydrologic, hydraulic and sediment transport advice in support of possible Fisheries Act charges associated with fish habitat alteration on northern Vancouver Island.
- Investigated site hydrology at property owned by Malaspina College in connection with Fisheries Act charges.
- Conducted several hydrologic investigations in relation to alleged violations of the Forest Practices Code Act on behalf of forest licencees in B.C.

Teaching and Research

- Taught Fluvial Geomorphology (Geography 405/605) in Fall 1999 at the University of Northern British Columbia.
- Supervised M.Sc. research of a graduate student at the University of Northern B.C.
- Collaborating with the University of B.C., the B.C. Ministry of Forests, and Tolko Industries Ltd. in snow hydrology research.
- Teaching Assistant for undergraduate water resources engineering courses at the University of Guelph.

EMPLOYMENT HISTORY

1994 - present:	**Summit Environmental Consultants Ltd.** President Senior Geoscientist
1990 - 1994:	**Triton Environmental Consultants Ltd.** Senior Environmental Scientist
1989 - 1990:	**Independent Consulting Hydrologist**
1984 - 1989:	**School of Engineering, University of Guelph** Laboratory Manager and Teaching Assistant
1982 - 1984:	**Norecol Environmental Consultants Ltd.** Hydrologist
1981 - 1982:	**B.C. Ministry of Environment, Planning Branch, Victoria, B.C.** Research Hydrologist
1980 – 1981	**B.C. Ministry of Environment, Water Management Branch, Victoria, B.C.** Hydrological Technician

PUBLICATIONS

Journal Articles

Commandeur, P., B.T Guy, and H. Hamilton. 1996. The effects of woody debris on sediment fluxes in small coastal stream channels. Information Report BC-X-367. Canadian Forest Service. Pacific Forestry Centre, Victoria.

Guy, B.T. Comparison of deterministic deseasonalization techniques and stochastic streamflow models. (In preparation).

Guy, B.T. Sediment transport capacity of overland flow: model development and calibration. Trans. Am. Soc. Ag. Eng. (In preparation).

Guy, B.T. Sediment transport capacity of overland flow: model verification. Trans. Am. Soc. Ag. Eng. (In preparation).

Guy, B.T., W.T. Dickinson, and R.P. Rudra. 1992. Evaluation of fluvial sediment transport equations for overland flow. Trans. Am. Soc. Ag. Eng. 35 (2) p. 545-555.

Guy, B.T., R.P. Rudra, and W.T. Dickinson. 1992. Process-oriented research on soil erosion and overland flow. Ch. 10 of Parsons, T. and A. Abrahams (eds.), Overland Flow. London. University College London Press.

Desmond, A.F. and B.T. Guy. 1991. Crossing theory for non-Gaussian stochastic processes and application to hydrology. Water Resources Research 27 (10) p. 2791-2797.

Guy, B.T., W.T. Dickinson, R.P. Rudra, and G.J. Wall. 1990. Hydraulics of sediment-laden sheetflow, and the influence of simulated

rainfall. Earth Surface Processes and Landforms. 15 (2) p. 101-118.

Guy, B.T. and W.T. Dickinson. 1990. Inception of sediment transport in shallow overland flow. In: Soil Erosion: Experiments and Models, R. B. Bryan, ed. Catena Suppl. 15., p. 91-109. Cremlingen: Springer-Verlag.

Watson, T.A., B.S. Ford, and B.T. Guy. 1991. Impacts of small hydro development on fish and fish habitat. Can. Tech. Rep. Fish. Aquat. Sci.

Guy, B.T., W.T. Dickinson, and R.P. Rudra. 1987. The roles of rainfall and runoff in the sediment transport capacity of interrill flow. Trans. Am. Soc. Ag. Eng. 30 (5) p. 1378-1386.

Other Publications & Presentations

Guy, B.T., K. Rothe, and L. Hartley. 2003. Trepanier Landscape Unit Water Management Study. Invited Presentation given to the Bow River Basin Council. December 10, 2003. Calgary, Alberta.

Guy, B.T. 2003. Perspectives from the Environment Industry. Invited presentation given to MSRM Workshop: "Who Needs It? Who Cares?: A review of the B.C. Hydrometric Program." Feb. 18, 2003. Burnaby, B.C.

Guy, B.T., L. Uunila, L. Kalmakoff, D. Moore, R. Winkler, and N. Fennell. 2002. Effects of large openings on the hydrologic regime in high elevation interior plateau environments in British Columbia, Canada. Poster presented at the International Union of Forest Research Organizations conference: Mountain Forests – Conservation and Management. Silver Star Mountain, B.C. July 31-August 2, 2002.

Kupchanko, R. and B.T. Guy. 2001. Fish Passage Restoration Using Two Types of Arch Culverts in Neighbouring Watersheds in the Cariboo. Presented at the 2001 Interior Forest Site Rehabilitation Workshop, Kamloops, B.C. April 10-11, 2001.

Guy, B.T. 2000. Water and Sustainable Forest Management. Lecture presented October 5, 2000 at the Fall Lecture Series of the Arrow Innovative Forest Practices Agreement, Castlegar, B.C.

Guy, B.T. 2000. Water and Sustainable Forest Management. Guest lecture presented November 29, 2000, Faculty of Science Seminar Series, Okanagan University College, Kelowna, B.C.

Guy, B.T. and B. Eaton. 2000. Improving the Okanagan Lake Inflow Forecasting System. Technical Bureau Supplement - Water News (newsletter of the Canadian Water Resources Association). Vol. 19. No. 1. March 2000.

Uunila, L., B. Guy, M. Nolan, W.O. Rublee, J. Fraser, D. Eustache. 2000. Barriere River off-channel habitat development: Phase 1. Presented at the 2000 Interior Forest Site Rehabilitation Workshop, Kamloops, B.C., April 12-13, 2000.

Uunila, L., B. Guy, J. Fraser, M. Ross, W.O. Rublee and G. Smith. 1999. Birk Creek channel restoration: Phase 1. Presented at the 1999 Interior Forest Site Rehabilitation Workshop, Kamloops, B.C., April 7-8, 1999.

Hamilton, H. and B. Guy. 1999. Regional Hydrology Studies in the Columbia Mountains. In: Impacts and Solutions for Aquatic Ecosystems: Proc. 4th Annual Roads, Rails & Environment Workshop. Columbia Mountains Institute of Applied Ecology. Revelstoke.

Guy, B.T. and S. Babakaiff. 1996. Protecting riparian management areas. In: "Operating under the B.C. Forest Practices Code" Proceedings of a conference Dec. 3 and 4, 1996. Insight Information, Inc., Vancouver, B.C.

Guy, B.T., H. Hamilton, and D. Hutchinson. 1996. Evaluation of level 1 watershed assessment procedures. Presented to CWRA conference: "Watercourses: getting on

stream with current thinking". October 1996. Vancouver, B.C.

Guy, B.T. and J. Barnard (eds.) 1995. Mountain Hydrology: Peaks and Valleys in Research and Applications - Proceedings. Canadian Water Resources Association. Cambridge, Ontario.

Guy, B.T. 1994. Watershed Restoration Program - stream channel/riparian zone assessments. Presented to conference of Canadian Water Resources Association (B.C. Branch). Vancouver , B.C.

Guy, B.T. 1994. Impacts of forestry practices on water quality. Presented to conference of the B.C. Water and Waste Association. Vernon, B.C.

Guy, B.T. 1994. Implications of Bill 26 for municipalities and local governments. Seminar presented with Singleton, Urquhart and MacDonald. April 1994. Vancouver.

Guy, B.T., T.A. Watson, and R. Frehner. 1993. Site remediation at a wood preservation facility in central B.C. p.163-188 of Proceedings of Industrial and Agricultural Impacts on the Hydrologic Environment - 2nd USA/CIS Joint Conference on Environmental Hydrology and Hydrogeology. Eckstein, Y. and A. Zaporozec, eds. Alexandria, V.A. Water Environment Federation.

Guy, B.T., H. Hamilton, and P. Commandeur. 1993. Intensive biomass harvesting effects on sediment production and routing to stream channels. Presented at the 16th annual B.C. Soil Science Workshop. February, 1993, Vancouver, B.C.

Guy, B.T. 1991. Sediment transport capacity of shallow overland flow. Poster presentation presented at the 44th annual conference of the Canadian Water Resources Association. June 1991, Saskatoon, Saskatchewan.

Guy, B.T., T.A. Watson, and A.E. Brotherston. 1991. Investigation of dust storms in British Columbia resulting from water regulation under the Columbia River Treaty. Poster presentation presented at the 44th annual conference of the Canadian Water Resources Association. June 1991, Saskatoon, Saskatchewan.

Guy, B.T. 1990. Sediment Transport Capacity of Shallow Overland Flow. Ph.D. Thesis, University of Guelph, Guelph, Ontario, Canada.

Guy, B.T., W.T. Dickinson, and R.P. Rudra. 1990. Comparison of fluvial sediment transport equations as applied to shallow overland flow. Paper #90-2014. American Society of Agricultural Engineers. June 1990, Columbus, Ohio.

Guy, B.T. and W.T. Dickinson. 1989. Sediment transport capacity of overland flow under rainfall. Paper #89-2048, American Society of Agricultural Engineers. June 1989, Quebec City.

Guy, B.T. and W.T. Dickinson. 1989. Transport inception in shallow overland flow. International Conference on Laboratory and Field Methods in Soil Erosion Research and Modelling of Hillslope Development. April 1989, University of Toronto.

Desmond, A.F. and B.T. Guy. 1989. Crossing theory for non-Gaussian stochastic processes and application to hydrology. Statistical Society of Canada. June 1989, Ottawa, Ontario.

Guy, B.T., W.T. Dickinson, G.J. Wall, and R.P. Rudra. 1987. The influences of rainfall and flow hydraulics on the size distributions of sediment transported in interrill flow. Paper #87-302, Canadian Society of Agricultural Engineering. May 1987, Montreal, Quebec.

Guy, B.T., W.T. Dickinson, R.P. Rudra, and G.J. Wall. 1987. Spatial variation of rainfall and shallow flow characteristics under simulated rainfall. Paper #87-2027, American Society of Agricultural Engineers. June 1987, Baltimore, Maryland.

Guy, B.T., W.T. Dickinson, G.J. Wall, and R.P. Rudra. 1987. Characterization of interrill transported sediment. Paper #87-2028, American Society of Agricultural Engineers. June 1987, Baltimore, Maryland.

Guy, B.T., W.T. Dickinson, and R.P. Rudra. 1986. The roles of rainfall and runoff in the sediment transport capacity of interrill flow. Paper #86-2537, American Society of Agricultural Engineers. December 1986, Chicago, Illinois.