Michael L. Kline

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(i) PROFESSIONAL PREPARATION:

Institution and Location	Major	Degree & Year
Indiana University of Pennsylvania	Biology (Chemistry minor)	B.S., 1980
University of Colorado, Boulder	River Ecology	M.A., 1986

(ii) APPOINTMENTS:

2019-present	**Principle/Owner,** Fluvial Matters, LLC, Scientific and Technical Consultation. Middlesex, VT
2009-2019	**State Rivers Program Manager,** Rivers Section, Watershed Management Division, Vermont Department of Environmental Conservation, Montpelier, VT.
1999-2009	**State River Ecologist/Geomorphologist,** River Management Section, Water Quality Division, Vermont Department of Environmental Conservation, Waterbury, VT.
1988-1999	**State Rivers Program Coordinator,** Basin Planning Section, Water Quality Division Vermont Department of Environmental Conservation, Waterbury, VT.
1987-1988	**Fisheries Technician**, Colorado Division of Wildlife, Central Region, Denver, CO.
1984-1986	**Research Assistant and Graduate Teaching Assistant,** EPO Biology Department, University of Colorado, Boulder, CO.
1982-1984	**Aquatic Biologist / Environmental Planner,** URS Corporation, Engineering and Consulting Firm, Denver, CO.

(iii) SELECTED PUBLICATIONS

Christin, Z., Kline, M. 2017. Why we continue to develop floodplains: Examining the disincentives for conservation in federal policy. White Paper. Earth Economics. Tacoma, WA.

Kline, M. 2017. Giving Our Rivers Room to Move: A New Strategy and Contribution to Protecting Vermont's Communities and Ensuring Clean Water. Vermont Journal of Environmental Law (Vol.17. Issue 4), Vermont Law School.

Kline, M., R. Barr, S. Beik, T. Walker, R. Pfeiffer, T. Stevens, J. Fuller and M. McIntosh. 2016. White Paper on Riverine Erosion Hazards. Association of State Floodplain Managers (ASFPM).

Schiff, R., E. Fitzgerald, J. MacBroom, M. Kline, and S. Jaquith, 2014. Vermont Standard River Management Principles and Practices (Vermont SRMPP): Guidance for Managing Vermont's Rivers Based on Channel and Floodplain Function. Prepared by Milone & MacBroom, Inc. and Fitzgerald Environmental Associates, LLC for and in collaboration with Vermont Rivers Program, Montpelier, Vermont

Mathon, B, Rizzo, D, Kline, M, Alexander, G, Fiske, S, Langdon, R, and Stevens, L. 2013. Assessing Linkages in Stream Habitat, Geomorphic Condition, and Biological Integrity Using a Generalized Regression Neural Network. Journal of the American Water Resources Association (JAWRA) 49(2):415-430. DOI: 10.1111/jawr.12030

Fitzgerald, E.P., Bowden, W.B., Parker, S.P., and Kline, M.L., 2012. Urban impacts on streams are scale-dependent with non-linear influences on their physical and biotic recovery in Vermont, U.S.A Journal of the American Water Resources Association(JAWRA) 1-19. DOI:10.1111/j.1752-1688.2012.00639.x

Kline, Michael and Barry Cahoon, 2010. Protecting River Corridors in Vermont. Journal of the American Water Resources Association (JAWRA) 1-10. DOI:10.1111/j.1752-1688.2010.00417.x

Kline, M., "Vermont ANR Guide to River Corridor Planning," Vermont DEC, Waterbury, Vermont, 2010.

Besaw, L., D. Rizzo, M. Kline, K. Underwood, J. Doris, L. Morrissey, and K. Pelletier. 2009. Stream classification using hierarchical artificial neural networks: A fluvial hazard management tool. J. Hydrology, doi:10.1016/j.jhydrol.2009.04.007

Kline, M., C. Alexander, S. Jaquith, S. Pomeroy, and G. Springston, "Vermont ANR Stream Geomorphic Assessment Protocol Handbooks," (peer reviewed), Vermont ANR, Waterbury, Vermont, 2009.

Schiff, R., M. Kline, and J. Clark. "The Reach Habitat Assessment Protocol." Prepared by Milone and MacBroom, Inc. for the Vermont ANR, Waterbury, VT, 2008.

Caroline, H., J. Erickson, T. Noordewier, A. Sheldon, M. Kline. 2006. Collaborative environmental planning in river management: An application of multi-criteria decision analysis in the White River Watershed in Vermont. Journal of Environmental Management 84 (2007) 534–546.

(iv) SYNERGISTIC ACTIVITIES

Michael Kline has over 30 years of leadership experience working with state and federal resource managers to develop new science-based river policies and programs in response to changing social demand for river resource conservation. His leadership in synergistic activities includes:

- **2011-2019**. Led Vermont DEC and ANR's flood resiliency initiatives based on synergy between state, regional, and federal agencies and their academic and non-profit partners. This work technically supports improved design of public infrastructure, emergency instream practices, and land use planning and regulation to help Vermont communities protect their flood attenuation assets and utilize sustainable hazard mitigation and flood recovery practices.
- **2005 to present**. Assist graduate-level research and undergraduate studies at the University of Vermont and the participate as an Affiliate of the Gund Institute for the Environment (centered at UVM).
- **1999-present**. Co-lead in the integration of State river management, flow protection, and floodplain management operations around the science of landscape-scale, fluvial processes, whereby technical staff work to align outcomes and collaborate on strategies to achieve and maintain river and floodplain connectivity.
- **2005-2019**. Collaborated with the Vermont Department of Fish and Wildlife and the Vermont Agency of Transportation to create an inter-agency bridge and culvert program to install flood-resilient and fish-friendly stream crossings.
- **2009-2012.** Collaborated with scientists and resource managers nationally to assist EPA in the establishment of a Healthy Watersheds Initiative, including the development and publication of assessment and protection methodologies.
- **2004-2010**. Developed a river corridor and floodplain protection program, including a first-in-the-nation state program to purchase river channel management rights within conservation easements in partnership with USDA Natural Resources Conservation Service, the Vermont Agency of Agriculture, and statewide land conservation organizations.
- **2003-2010**. In partnership with Regional Planning Agencies, Vermont Emergency Management, and FEMA Hazard Mitigation programs, Mr. Kline has developed protocols and GIS applications for the production of geomorphic-based, fluvial erosion area (river corridor) maps in support of state and local hazard mitigation planning and land use regulation. The 2010 Vermont Legislature recognized the importance of this work as public policy in the passage of Act 110. Other States are in various stages of adopting Vermont's Fluvial Erosion Hazard Program.
- **2003-2009**. Successfully led inter-agency teams to incorporate fluvial geomorphic science into state and federal basin planning, watershed restoration projects, agricultural programs, and stormwater initiatives aimed at cleaning up phosphorus and sediment discharges in the Lake Champlain Basin.
- **2002-2010**. Led in the development of the Vermont Stream Geomorphic Assessment Protocols and authored a river corridor planning process to apply geomorphic and habitat data. This citizen-led planning is now ongoing in every Vermont watershed. The Stream Assessment Program has been recognized as a national model by the U.S. Environmental Protection Agency, the Army Corps of Engineers, and the FEMA. As a part of this work, Mr. Kline initiated a collaborative project with state and federal aquatic biologists, consulting river engineers, and UVM researchers in the development of physical habitat assessment protocols and a Web-based data management system to support Clean Water Act, fisheries management, and river corridor programs.
- **1996-2003.** Served as the lead designer and a construction supervisor of the first large-scale river restoration projects in Vermont using bio-engineering ,"natural channel design" techniques, and fluvial geomorphic principals; worked with the U.S. Fish and Wildlife Service and U.S. Forest Service to develop a statewide training program for private and public sector scientists and engineers on geomorphic assessment and river restoration design.
- **1993-1999.** Developed Vermont's Class A and Outstanding Resources Waters Programs, representing DEC in contested case designation proceedings before the Water Resource Board. His leadership in this work culminated in a multi-stakeholder revision of the Vermont Water Quality Standards to include aquatic life and aquatic habitat criteria.
- **1991-1998.** Led the start-up, program development, and technical and funding support of citizen-based watershed associations and conservation districts in all 17 major watersheds in Vermont.
- **1988-1992.** Established a multi-agency/stakeholder process to develop a State Riparian Buffer Policies and a Vermont Comprehensive River Planning Program to guide the federal relicensing and state certification of hydropower facilities operated by large utility companies on the Clyde, Deerfield, Winooski, and Passumpsic rivers in Vermont.

Mr. Kline is frequently invited to speak at universities, regional workshops, and national conferences in recognition of his work in defining fluvial erosion as a predominant hazard type in mountainous states, the public benefits of managing rivers and floodplains toward dynamic equilibrium conditions, and the importance of river corridor protection and restoration as river management tools. He has collaborated on numerous graduate and undergraduate research projects. His work and policy papers are regularly posted on the DEC Web page: http://dec.vermont.gov/watershed/rivers.