billion dollar US stream restoration enterprise. This was a decidedly pragmatic program. Its major contributions include developing tools, including adapting results from the other two NCED programs, to providing a better watershed context for stream restoration, which is often done on a purely local, piecemeal basis. This program also produced important advances in understanding localization of denitrification 'hot spots' in streams, and how these might be predicted and used to optimize the performance of restored stream corridors in removing nutrients from stream water. It also produced major improvements in prediction of stream-channel geometry and floodplain characteristics, with the aim of promoting better channel-floodplain integration in restoration design, and provided a template for gathering information on public preferences for restoration, and incorporating these into design as well.

NCED reached its sunset in 2012, but its successor, NCED2, continues to the present day, headquartered at SAFL. While it no longer directly funds research on large scales, NCED2 continues the major community-oriented aspects of the NCED STC program, including our extensive Native American science network, the annual Summer Institute for Earth-Surface Dynamics (SIESD), and our collaborative network for coordinated, co-mentored postdoctoral research. A link to NCED Annual Reports 2003 to 2011 which give information on NCED accomplishments is http://www.nced.umn.edu/about/official-documents.

Landscape evolution and reorganization by rainfall and runoff: A series of controlled laboratory experiments were conducted at the eXperimental Landscape Evolution (XLE) facility of the St. Anthony Falls Laboratory to study the effect of changing precipitation patterns on landscape evolution at the short- and long-time scales. Results from these experiments showed a distinct signature of the precipitation increase on the probabilistic and geometrical structure of landscape features [Singh et al. 2015]. The results further revealed rapid topographic reorganization under precipitation increase with the fluvial regime expanding into the previously debris dominated regime, accelerated erosion happening at hillslope scales, and rivers shifting from an erosion-limited to a transport-limited regime [Singh et al. 2015; Tejedor et al. 2017]. Efforts are underway to reproduce the results obtained from these physical experiments using numerical modeling [Abed-Elmdoust et al. 2017].

INNOVATIONS IN INSTRUMENTATION AND EXPERIMENTAL FACILITIES

Measurement Systems: Since its inception, SAFL has developed novel instruments, measurement techniques, and experimental facilities to study a wide array of research and engineering topics. In the early years, these pioneering devices included probes to measure air content and velocities of bubbly flows, surface waves using acoustics, and bedload and suspended sediment transport. Since that time, and in parallel with the birth and rapid advances in personal computing, a wide array of measurement and control tools has been added to SAFL's instrumentation inventory. The following is a partial list of items related to environmental research.

- Sediment transport measurements systems to measure temporally and spatially varying bed load transport at field scale and to measure suspended fine sediment flux from landscape evolution facilities.
- A system for producing high-resolution, large area digital images, primarily to aid in the analysis of experimental sedimentary stratigraphy.
- High speed measurement and control carriages used for general automated measurement and data acquisition including an innovative surface measurement system capable of millimeter resolved topographic and bathymetric measurements (Figure 13) unlimited in

spatial extent with a data acquisition rate of up to 200,000 surface elevation points per second.

- Networked field based real time measurement and control systems making a wide range of environmental measurements.

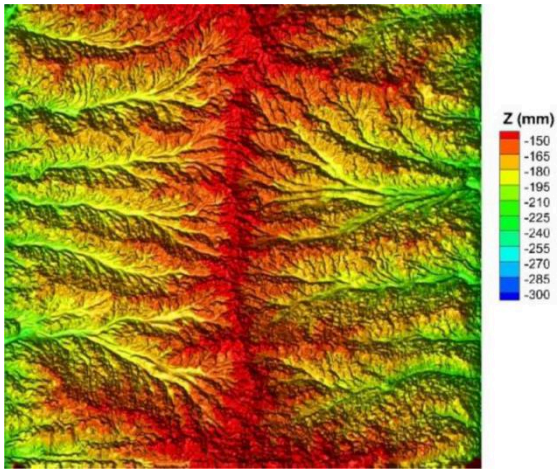

Figure 13. High resolution topographic scan of experimental landscape.

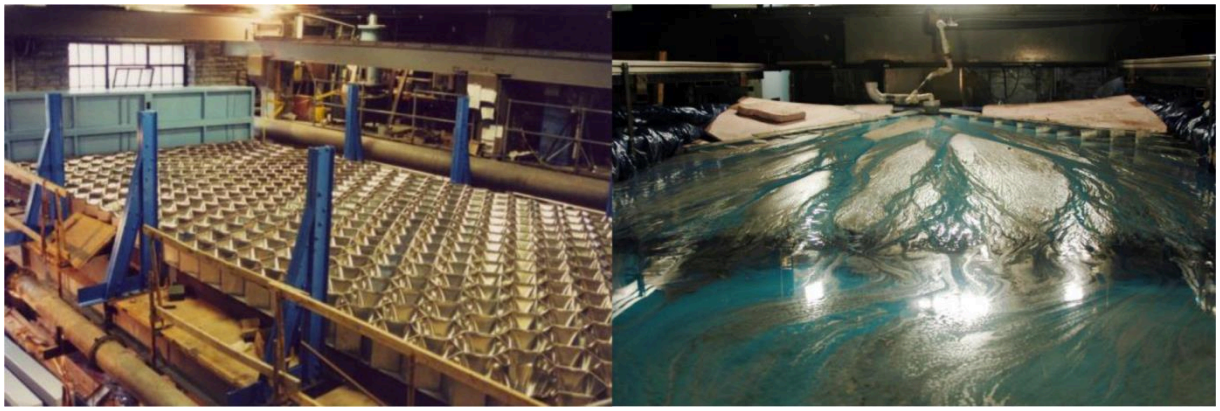

Figure 14. XES basin during construction and typical experiment.

Facilities: SAFL has also gained an international reputation for the design and automated control of novel research facilities which incorporate user friendly control interfaces such as the following examples.

- eXperimental EarthScape basin (XES), more affectionately known as Jurassic Tank (Figure 14). Used to study river delta and basin morphodynamics on geologic time scales, this basin is unique in that it incorporates the effects of tectonics on surface processes by simulating deformation of tectonic plates through the use of 432 independently controlled cells. Featured in Science (Stokstad 2000), it is the first system ever built capable of controlled physical experiments on the formation of large-scale stratigraphic patterns, which develop through the interplay of tectonic deformation and sedimentation. The basin hosts SAFL's most advanced data carriage that measures sub-aerial topography and subsurface bathymetry during experiments and assists in slicing and imaging stratigraphic sections in the experimental deposits.

- Delta Basins I and II. Similar to the XES, these basins physically model geologic processes and primarily study delta geomorphology that results from tectonic uplift or subsidence and changing sea level, variable inputs of water and sediment, and the presence of waves and tides. A SAFL high speed measurement carriage is integrated into these experimental facilities.
- eXperimental Landscape Evolution (XLE) facility (Figure 13). This facility simulates mountain landscapes that result from uniform or differential tectonic uplift in the presence of rainfall induced erosion. The uplift and rainfall rates are user settable and 1 million points of 0.5 mm resolved topography can be acquired in 5 seconds. Water and sediment fluxes from the basin are monitored using a unique SAFL designed measurement system.

ACKNOWLEDGMENTS

SAFL faculty, research staff, visiting researchers, and a large number of former and current graduate students and have contributed to environmental research at SAFL. The authors acknowledge their contributions. Barbara Heitkamp provided SAFL documents and figures.

REFERENCES

Abed-Elmdoust, A., Singh, A., and Yang, Z. L. (2017). "Emergent spectral properties of river network topology: An optimal channel network approach." *Nat. Sci. Rep*., 7(1), 11486.

Abdul–Aziz, O. I., Wilson, B. N., and Gulliver, J. S. (2007). "An extended stochastic harmonic analysis (ESHA) algorithm: Application for dissolved oxygen." *Water Resources Research*, 43, W08417, doi:10.1029/2006WR005530.

Ahmed, F., Nestingen, R., Nieber, J. L., Gulliver, J. S., and Hozalski, R. M. (2014). "A modified Philip-Dunne infiltrometer for measuring the field-saturated hydraulic conductivity of surface soil." *Vadose Zone Journal,* 13(10).

Akiyama, J. and Stefan, H. G. (1984). "Plunging flow into a reservoir: Theory." *J. Hydraulic Engineering,* ASCE 110(HY4), 484–499, Apr.

Akiyama, J. and Stefan, H. G. (1988). "Turbidity current simulation in a diverging channel." *Water Resources Research,* 24(4), 579–587.

Anderson, A. G. and Davenport, J. T. (1968). "The use of submerged groins for the regulation of alluvial streams." Symp. on Current Problems in River Training and Sediment Movement, Budapest, IAHR, 8 pp.

Blaisdell, F. W. (1948). "Development and hydraulic design of the St. Anthony Falls stilling basin." *Trans*., ASCE, (113), 483–561.

Borazjani, I. and Sotiropoulos, F. (2008). "Numerical investigation of the hydrodynamics of carangiform swimming in the transitional and inertial flow regimes." *Journal of Experimental Biology*. 211, 1541–1558.

Bowers, C. E. and Pabst, A. (1968). "Review and analysis rainfall and runoff data for select watersheds in Minnesota." SAFL Project Report No. 97*,* 69 pp.

Bowers, C. E., Muller, L. A., and Pabst, A. F. (1971). "Hydraulic model studies – Priest Rapids Project, Vol. 2, permanent fish passage studies." SAFL Proj. Report No. 117, 113 pp.

Cardle, J. and Song, C. S. S. (1988). "Mathematical modeling of unsteady flow in storm sewers." *International J. Engineering Fluid Mechanics,* 1(4), 1988.

Champlin, J. G. and Stefan, H. G. (1996). “Field study of the ice cover of a lake: Implications for winter lake quality modeling.” Proj. Report No. 387, SAFL, Univ. of Minn., Nov., 212 pp.
Chengala, A., Hondzo, M., Troolin, M., and Lefebvre, P. A. (2010). “Kinetic responses of *Dunaliella* in moving fluids.” *Biotechnology and Bioengineering*, 107(1): 65–75.
Chengala, A., Hondzo, M., and Sheng, J. (2013). “Microalga propels along vorticity direction in a shear flow.” *Physical Review E*, 87(5), 052704.
Czuba, J. A., Hansen, A. T., Foufoula-Georgiou, E., and Finlay, J. C. (accepted with revisions). “Watershed-scale nitrate removal through an interconnected complex of wetlands within a river network.” *Water Resources Research*.
Demetracopoulos, A. and Stefan, H. G. (1983). “Transverse mixing in wide and shallow river: Case study.” *J. Environmental Engineering,* ASCE 109(3): 685–699.
DeMoyer, C. C., Schierholz, E., Gulliver, J. S., and Wilhelms, S. C. (2003). “Impact of bubble and free surface oxygen transfer on diffused aeration systems.” *Water Research,* 37, 1890–1904.
Dhamotharan, S, Stefan, H. G., and Schiebe, F. R. (1978). “Prediction of post-construction turbidity of Lake Chicot, Arkansas.” *IAHR Sympos. on Envir. Effects of Hydr. Eng. Work,* TVA, 14 pp.
Dhamotharan, S., Gulliver, J. S., and Stefan, H. G. (1981). “Unsteady one-dimensional settling of suspended sediment.” *Water Resources Research,* 17(4), Aug.
Dhamotharan, S., Wood, A., Stefan, H., and Parker, G. (1981). “Mechanics of bedload transport in gravel streams.” Proc. XIX Congress IAHR, New Delhi, India, pp. 309–319, Paper No. 11.
Eaton, J. G., McCormick, J. H., Goodno, B. E., O’Brien, D. G., Hokanson, K. E. F, Stefan, H. G., and Hondzo, M. (1995). “A field information based system for estimating fish temperature requirements.” *Fisheries,* 20(4), 10–18, April.
Ebrahimian, A., Gulliver, J. S., and Wilson, B. N. (2016a). "Effective impervious area for runoff in urban watersheds." *Hydrological Processes*, 30(20), 3717–3729, http://dx.doi.org/10.1002/hyp.10839
Ebrahimian, A., Wilson, B. N., and Gulliver J. S. (2016b). "Improved methods to estimate the effective impervious area in urban catchments using rainfall-runoff data." *Journal of Hydrology*, 536, 109–118, http://dx.doi.org/10.1016/j.jhydrol.2016.02.023.
Ebtehaj, A. M., Zupanski, M., Lerman, G., and Foufoula-Georgiou, E. (2014). "Variational data assimilation via sparse regularization." *Tellus A*, 2014, 66, 21789.
Ebtehaj, A. M., Bras, R. L., and Foufoula-Georgiou, E. (2015). "Shrunken locally linear embedding for passive microwave retrieval of precipitation." *IEEE Trans. on Geosci. and Remote Sens.,* 53(7), doi:10.1109/TGRS.2014.2382436.
Ebtehaj, A. M., Foufoula-Georgiou, E., Lerman, G., and Bras, R. L. (2015). "Compressive Earth observatory: An insight from AIRS/AMSU retrievals." *Geophys. Res. Lett.,* 42, 362–369, doi:10.1002/2014GL062711.
Ebtehaj, A. M., Bras, R. L., and Foufoula-Georgiou, E. (2016). "Evaluation of ShARP passive rainfall retrievals over snow-covered land surfaces and coastal zones.” *J. Hydrometeor,* 17, 1013–1029, doi: http://dx.doi.org/10.1175/JHM-D-15-0164.1.
Ebtehaj, A. M. and Kummerow, C. D. (2017). "Microwave retrievals of terrestrial precipitation over snow covered surfaces: A lesson from the GPM Satellite.” *Geophys. Res. Lett.,* doi: 10.1002/2017GL073451.
Ellis, C. and Stefan, H. G. (1990). “Hydraulic design of a winter lake aeration system.” *J. Environmental Engineering*, ASCE 115(2), 376–393, Mar.

Ellis, C. and Stefan, H. G. (1991). “Field testing of an ice-preserving winter lake aerator system.” *Water Resources Bulletin*, AWRA 27(6), 903–914, Dec.
Ellis, C., Stefan, H. G., and Gu, R. (1991). “Water temperature dynamics and heat fluxes under the ice cover of a lake.” *Limnology and Oceanography,* 36(2), 324–335.
Erickson, A. J. (2005). “Enhanced sand filtration for storm water phosphorus removal.” M.S. Thesis, University of Minnesota.
Erickson, A J., Weiss, P. T., and Gulliver, J. S. (2013). *Optimizing Stormwater Treatment Practices: A Handbook of Assessment and Maintenance*. Springer Science + Business Media, LLC, ISBN 9781461446231.
Erickson, A. J., Gulliver, J. S., Weiss, P. T., and Arnold, W. A. (2014). “Enhanced filter media for removal of dissolved contaminants from stormwater.” SAFL Project Report No. 572, University of Minnesota, Minneapolis, MN, September 2014, http://hdl.handle.net/11299/166940.
Erickson A. J., Gulliver, J. S., Arnold, W. A., Brekke, C., and Bredal, M. (2016). "Abiotic capture of stormwater nitrates with granular activated carbon." *Environmental Engineering Science*, 33(5), 354–363, http://dx.doi.org/10.1089/ees.2015.0469.
Fang, X., Ellis, C. R., and Stefan, H. G. (1996). “Simulation and observation of ice formation (freeze-over) in a lake.” *Cold Regions Science and Technology,* 24, 129–145.
Fang, X. and Stefan, H. G. (1996). “Dynamics of heat exchange between sediment and water in a lake.” *Water Resources Research,* 36(6), 1719–1727, June.
Fang, X. and Stefan, H. G. (2000). “Dependence of dilution of a plunging submerged discharge over a sloping bottom on inflow and bottom friction.” *J. Hydraulic Research,* IAHR, 38(1), 15–26, Jan.
Fang, Xing and Stefan, H. G. (2012). “Impacts of climate change on water quality and fish habitat in aquatic systems.” Chap. 16 in *Handbook of Climate Change Mitigation,* Springer, New York, 532–569, ISBN 978-1-4419-7990-2.
Fang, Xing, Jiang, L., Jacobson, P. C., Stefan, H. G., Alam, S. R., and Pereira, D. L. (2012). “Identifying cisco refuge lakes in Minnesota under future climate scenarios.” *Trans. Amer. Fisheries Soc.*, 141, 1608–1621, April.
Fang, Xing and Stefan, H. G. (2009). “Simulations of climate effects on water temperature, dissolved oxygen, ice and snow covers of lakes in the contiguous US under past and future climate scenarios.” *Special issue of Limnology and Oceanography,* 54(6, part 2), 2359–2370.
Ford, D. E. and Stefan, H. G. (1980). “Thermal prediction using an integral energy model.” *J. Hydraulics Div.,* ASCE, 106(HY1), 39–55.
Foufoula-Georgiou, E. (1989). “A probabilistic storm transposition approach for estimating exceedance probabilities of extreme precipitation depths.” *Water Resources Research*, 25(5), 799–816.
Foufoula-Georgiou, E. and Kumar, P. (ed.) (1994). *Wavelets in Geophysics.* Academic Press, San Diego, CA, 250 pp.
Foufoula-Georgiou, E., Takbiri, Z., Czuba, J. A., and Schwenk, J. (2015) “The change of nature and the nature of change in agricultural landscapes: Hydrologic regime shifts modulate ecological transitions.” *Water Resour. Res.,* 51(8), 6649–6671, doi:10.1002/2015WR017637.
Garcia, M. and Parker, G. (1993). “Experiments on the entrainment of sediment into suspension by a dense bottom current.” *J. Geophys. Res*., 98(C3), 4793–4807, doi:10.1029/92JC02404.
García-Serrana, M., Gulliver, J. S., and Nieber, J. L. (2017a). “Non-uniform overland flow-infiltration model for roadside swales.” *Journal of Hydrology*, 552, 586–599,

https://doi.org/10.1016/j.jhydrol.2017.07.014.
García-Serrana, M., Gulliver, J. S., and Nieber, J. L. (2017b). "Infiltration capacity of roadside filter strips with non-uniform overland flow." *Journal of Hydrology*, 545, 451–462, http://dx.doi.org/10.1016/j.jhydrol.2016.12.031.
Ge, L. and Sotiropoulos, F. (2007). "A numerical method for solving the 3D unsteady incompressible Navier–Stokes equations in curvilinear domains with complex immersed boundaries." *Journal of computational physics*, 225(2), 1782–1809.
Geldert, D.A., Gulliver, J. S., and Wilhelms, S.C. (1998). "Modeling dissolved gas supersaturation below spillway plunge pools." *J. Hydraulic Engineering,* 124(5), 513–521.
Gilmanov, A., Stolarski, H., and Sotiropoulos, F. (2017a). "Flow-structure interaction simulations of the aortic heart valve at physiologic conditions: The role of tissue constitutive model." *Journal of Biomechanical Engineering*, paper accepted to be published in JBME.
Gilmanov, A., Zielinski, D., Voller, V., and Sorensen, P. (2017b). "Computational agent-based model of fish swimming through Mississippi River locks and dams can be used as a tool to gain way to selectively block invasive carp passage." *International Conference on Engineering & Ecohydrology for Fish Passage,* June 19–21, Corvallis, Oregon (USA).
Gu, R. and Stefan, H. G. (1990). "Year-round temperature simulation of cold climate lakes." *Cold Regions Science and Technology,* 18(2), 1470160, July.
Guo, Q. and Song, C. S. S. (1990). "Surging in urban storm drainage systems*." J. Hydraulic Engineering*, ASCE, 116(12), Dec.
Guala, M., Singh, A., BadHeartBull, N., and Foufoula-Georgiou, E. (2014). "Spectral description of migrating bed forms and sediment transport." *J. Geophysical Research: Earth Surface,* 119 (2), 123–137.
Guentzel, K. S., Hondzo, M., Badgley, B. D., Finlay, J. C., Sadowsky, M. J., and Kozarek, J. L. (2014). "Measurement and modeling of denitrification in sand-bed streams under various land uses." *J. Environ. Qual.*, 43(3), 1013–1023, doi:10.2134/jeq2013.06.0249.
Gulliver, J. S. (1977). "Water temperature dynamics in experimental streams." M.S. Thesis, University of Minnesota, Minneapolis, MN.
Gulliver, J. S. and Stefan, H. G. (1982). "Lake phytoplankton model destratification." *J. Environmental Engineering Div*., ASCE, 108(EE5), 864–882.
Gulliver, J. S and Stefan, H. G. (1984a). "Stream productivity analysis with DORM: I. Development of computational model." *Water Research*, 18(12), 1569–1576.
Gulliver, J. S and Stefan, H. G. (1984b). "Stream productivity analysis with DORM: II. Parameter estimation and sensitivity." *Water Research*, 18(12), 1577–1588.
Gulliver, J. S. and Stefan, H. G. (1986). "Wind function for a sheltered stream." *Journal of Environmental Engineering*, 112(2), April.
Gulliver, J. S. and Halverson, M. (1989). "Air-water gas transfer in open channels." *Water Resources Research*, 25(8), 1783–1793.
Gulliver, John S., Thene, J. R., and Rindels, A. J. (1990). "Indexing gas transfer measurements in self-aerated flows." *Journal of Environmental Engineering*, 116(3), 503–523.
Gulliver, J. S. and Rindels, A. J. (1993). "Measurement of air-water oxygen transfer at hydraulic structures." *Journal of Hydraulic Engineering*, 119(3), 327–349.
Gulliver, J. S., Hibbs, D. E., and McDonald, J. P. (1997). "Measurement of an effective saturation concentration for gas transfer with a plunging water jet." *Journal of Hydraulic Engineering*, 123(2), 86–97.

Gulliver, J. S., Wilhelms, S. C., and Parkhill, K. L. (1998). “Predictive capabilities in oxygen transfer at hydraulic structures.” *J. Hydraulic Engineering*, ASCE, 124(7), 664–671.
Gulliver, J. S., Erickson, A. J., and Weiss, P. T. (eds.) (2010). "Stormwater treatment: Assessment and maintenance." University of Minnesota, St. Anthony Falls Laboratory, Minneapolis, MN, http://stormwaterbook.safl.umn.edu.
Hansen, T. J., Hondzo, M., Mashek, M. T., Mashek, D. G., and Lefebvre, P. A. (2013). “Algal swimming velocities signal fatty acid accumulation.” *Biotechnology and Bioengineering*, 110(1), 143–152.
Hansen A. T., Hondzo, M., Sheng, J., and Sadowsky, M. J. (2014). “Microscale measurements reveal contrasting effects of photosynthesis and epiphytes on frictional drag on the surfaces of filamentous algae.” *Freshwater Biology,* 59(2), 1365–2427.
Hansen, A. T., Dolph, C. D., and Finlay, J. C. (2016). “Do wetlands enhance downstream denitrification in agricultural landscapes?” *Ecosphere,* 7(10), e01516.10.1002/ecs2.1516.
Hansen, A. T., Czuba, J. A., Schwenk, J. A., Longjas, A., Danesh-Yazdi, M., Hornbach, D. J., and Foufoula-Georgiou, E. (2016). “Coupling freshwater mussel ecology and river dynamics using a simplified dynamic interaction model.” *Freshwater Science*, 35(1), 200–215.
Hansen, A. T., Dolph, C. L., Foufoula-Georgiou, E., and Finlay, J. C. (in press). “The interactive effect of wetlands, crop lands and stream network on riverine nitrate.” *Nature Geosciences*.
Harber, C. D. and Gulliver, J. S. (1992). “Surface films in laboratory flumes.” *Journal of Hydraulic Research*, 30(6), 801–816.
Henneman, H. E. and Stefan, H. G. (1999). “Albedo models for snow and ice on a freshwater lake.” *Cold Regions Science and Technology,* 29, 31–48.
Herb, W. R., Janke, B., O. Mohseni, and Stefan, H. G. (2008). “Thermal pollution of streams by runoff from paved surfaces.” *Hydrological Processes*, 22(7), 987–999.
Herb, W. R., Janke, B., Mohseni, O., and Stefan, H. G. (2009a). “Runoff temperature model for paved surfaces.” *J. Hydrologic Engineering*, 14(10), 1146–1155.
Herb, W. R., Janke, B., Mohseni, O., and Stefan, H. G. (2009b). “Simulation of temperature mitigation by a stormwater detention pond.” *Journal of the American Water Resources Association*, 45(5), 1164–1178.
Herb, W. R., Johnson, L. B., Jacobson, P. C., and Stefan, H. G. (2014). “Projecting cold-water fish habitat in lakes of the glacial lakes region under changing land use and climate regimes.” *Can. J. Fisheries and Aquatic Sciences*, 71(9), 1334–1348.
Herb, W. R., Janke, B., and Stefan, H. G. (2017). “Study of de-icing salt accumulation and transport through a watershed.” Minnesota Department of Transportation, Report No. MN/RC 2017-XX.
Hibbs, D. E. and Gulliver, J. S. (1997). “Prediction of an effective saturation concentration at spillway plunge pools.” *Journal of Hydraulic Engineering*, 123(11), 940–949.
Hibbs, D. and Gulliver, J. S. (1999). “Processes controlling aqueous concentrations for riverine spills.” *J. of Hazardous Materials*, B64, 57–73.
Hibbs, D., Gulliver, J. S., Voller, V., and Chen, Y-F (1999). “An aqueous concentration model for riverine spills.” *Journal of Hazardous Materials,* A64, 37–53.
Higashino, M. and Stefan, H. G. (2011).”DO demand at the sediment-water interface of a stream: near-bed turbulence and pore water flow effects.” *J. Envir. Eng.,* ASCE, 137(7).
Hill, C., Musa, M., Chamorro, L. P., Ellis, C., and Guala, M. (2014). “Local scour around a model hydrokinetic turbine in an erodible channel.” *J. Hydraulic Engineering,* ASCE, 140 (8), 04014037.

Hill, C., Musa, M., and Guala, M. (2016). "Interaction between instream axial flow hydrokinetic turbines and uni-directional flow bedforms." *Renewable Energy,* 86, 409–421.
Hill, C., Kozarek, J., Sotiropoulos, F., Guala, M. (2016). "Hydrodynamics and sediment transport in a meandering channel with a model axial flow hydrokinetic turbine." *Water Resources Research,* 52(2), 860–879.
Hondzo, M. and Stefan, H. G. (1993). "Lake water temperature simulation model." *J. Hydraulic Engineering,* 119(11), 1251–1273.
Hondzo, M. and Stefan, H. G. (1996). "Heat transport." *Environmental Hydraulics,* V. Singh & W. Hager, eds., 189–218, Kluwer Academic Publishers, The Netherlands.
Hondzo, M and Stefan, H. G. (1996). "Dependence of water quality and fish habitat on lake morphometry and meteorology." *J. Water Resourc. Planning and Management,* 122(5), 364–373.
Hondzo, M. and Lyn, D. (1999). "Quantified small-scale turbulence inhibits the growth of a green alga." *Freshwater Biology*, 41(1), 51–61.
Howard, A., Mohseni, O., Gulliver, J., and Stefan, H. G. (2011). "SAFL baffle retrofit for suspended sediment removal in storm sewer sumps." *Water Research,* 45(18), 5895–5905, Nov.
Hussain, C. F. (2005). "Pollutant removal from dry detention ponds with underdrains." M.S. Thesis, University of Minnesota.
Jacobson, P. C., Stefan, H. G., and Pereira, D. L. (2010). "Coldwater fish oxythermal habitat in Minnesota lakes*." Can. J. Fisheries and Aquatic Sciences*, 67(12), 2003–2013, Sep.
Jacobson, P. C., Fang, Xing, Stefan, H. G., and Pereira, D. L. (2011). "Protecting cisco (coregonus artedi lesueur) oxythermal habitat from climate change." *Advances in Limnology, Biology and Management of Fishes,* 64, 323–332.
Janke, B. D., Herb, W. R., Mohseni, O., and Stefan, H. G. (2013). "Case study of simulation of heat export by rainfall-runoff from a small urban watershed using MINUHET." *J. Hydrological Engineering,* 18(8), 995–1006, Aug.
Johnson, T. R., Ellis, C. R., and Stefan, H. G. (1989). "Negatively buoyant flow in a diverging channel. Part 4: Entrainment and dilution." *J. Hydraulic Engineering,* ASCE, 114(4), Apr.
Johnson, D. W., Semmens, M. J., and Gulliver, J. S. (1998). "Unconfined membranes, transfer performance and module design." *J. Membrane Science,* 40, 13–25.
Khosronejad, A., Kang, S., Borazjani, I., and Sotiropoulos, F. (2011). "Curvilinear immersed boundary method for simulating coupled flow and bed morphodynamic interactions due to sediment transport phenomena." *Advances in water resources*, 34(7), 829–843.
Khosronejad, A., Kozarek, Jessica L., and Sotiropoulos, F. (2014). "Simulation-based approach for stream restoration structure design: Model development and validation." *Journal of Hydraulic Engineering,*140(7), 1–16.
Khosronejad, A., Kozarek, J. L., Palmsten, M. L., and Sotiropoulos, F. (2015). "Numerical simulation of large dunes in meandering streams and rivers with in-stream structures." *Adv. Water. Resour.,* 81, 45–61.
Khosronejad A., Le, T., Bartelt, N., Woldeamlak, S., Peterson, B., DeWall, P., Yang, X., and Sotiropoulos, F. (2016). "High-fidelity numerical modeling of Upper Mississippi River under extreme flood condition." *Adv. in Water Resour.,* 98, 97–113.
Kostic, S. and Parker, G. (2003). "Progradational sand-mud deltas in lakes and reservoirs. Part 2. Experiment and numerical simulation." *Journal of Hydraulic Research,* 41(2), 141–152.

Markfort, C. D., Perez, A. L. S., Thill, J. W., Jaster, D. A., Porte-Agel, F., and Stefan, H. G. (2010). "Wind sheltering of a lake by a tree canopy or bluff topography." *Water Resources Research* 46, W03530, doi:10.1029/2009WR007759.

Markfort, C.D., Porte-Agel, F., and Stefan, H. G. (2013). "Canopy-wake dynamics and wind sheltering effects on Earth-surface fluxes." *Environmental Fluid Mechanics,* Springer, doi 10, 1007/s10652-013-9313-4, 35 pp., Sep.

Marr, J. D., Shanmugam, G., and Parker, G. (2001). "Experiments on subaqueous sandy gravity flows: The role of clay and water content in flow dynamics and depositional structures." *Bulletin of the Geological Society of America*, 113(11), 1377–1386.

Marr, J. D., Hill, C., Johnson, S., Grant, G., Campbell, K., and Mohseni, O. (2007). "Physical model study of Marmot Dam removal: Cofferdam Notch location and resulting fluvial responses." SAFL Project Report 508.

Marsh, M. H. (1987). *The St. Anthony Falls Hydraulic Laboratory: The First Fifty Years.* St. Anthony Falls Hydraulic Laboratory.

McIntire, K. D., Howard, A., Mohseni, O., and Gulliver, J. S. (2012). "Assessment and recommendations for operation of standard sumps as best management practices for stormwater treatment." Final Report 2012-1, vol. 2 Research Services and Library, Office of Transportation System Management, Minnesota Department of Transportation, http://www.lrrb.org/pdf/201108.pdf.

Missaghi, S., Hondzo, M., Sun, C., and Guala, M. (2016). "Influence of fluid motion on growth and vertical distribution of cyanobacterium microcystis aeruginosa." *Aquatic Ecology*, 50(4), 639–652.

Mohrig, D., Elverhøi, A., and Parker, G. (1999). "Experiments on the relative mobility of muddy subaqueous and subaerial debris flows, and their capacity to remobilize antecedent deposits." *Marine Geology,* 154 (1), 117–129.

Mohseni, O. and Stefan, H. G. (1998). "A Monthly Streamflow Model." *Water Resources Research,* AGU 34(5), 1287–1298, May.

Mohseni, O., Erickson, T. R., and Stefan, H. G. (1999). "Sensitivity of stream temperatures in the U.S. to air temperatures projected under a global warming scenario." *Water Resources Research,* 35(12), 3723–3733, Dec.

Morgan, J. G., Paus, K. A., Hozalski, R. M., and Gulliver, J. S. (2011). "Sorption and release of dissolved pollutants via bioretention media." SAFL Project Report No. 559, http://purl.umn.edu/116560.

Morris, M. and Hondzo, M. (2013). "Glossosoma nigrior (trichoptera: Glossosomatidae) respiration in moving fluid." *Journal of Experimental Biology*, 216(16), 3015–3022.

Morris, M., Haji, M. M., Day, S., Hondzo, M., and Sotiropoulos, F. (2015). "Prediction of *Glossosoma* biomass spatial distribution in Valley Creek by field measurements and three-dimensional turbulent open-channel flow model." *Water Resources Research*, 51(3), 1457–1471.

Musa, M., Heisel, M., and Guala, M. (2017). "A theoretical model for MHK turbine scour depth." Subm. to *Physical Review F.*

Nakamura,Y. and Stefan, H. G. (1994). "Effect of flow velocity on sediment oxygen demand." *J. Environmental Engineering,* ASCE, 120(5), Sep/Oct.

Nestingen, R. (2007). "The comparison of infiltration devices and modification of the Philip-Dunne permeameter for the assessment of rain gardens." M.S. Thesis, University of Minnesota.

Novotny, E. V., Sander, A., Mohseni, O., and Stefan, H. G. (2009). "Chloride ion transport and mass balance in a metropolitan area using road salt." *Water Resources Research,* 45, W 12410, doi: 10.1029/2009WR008141.

Novotny, E. V. and Stefan, H. G. (2012). "Road salt impact on lake stratification and water quality." *J. Hydraulic Engineering,* ASCE, 138(12), 169–180.

Nowinski, J. D., Cardenas, M. B., Lightbody, A. F., Swanson, T. E., and Sawyer, A. H. (2012). "Hydraulic and thermal response of groundwater-surface water exchange to flooding in an experimental aquifer." *Journal of Hydrology*, 472–473(2012), 184–192.

O'Connor, B., Hondzo, M., Dobraca, D., LaPara, T., Finlay, J., and Brezonik, P. L. (2006). "Quantity-activity relationship of denitrifying bacteria and environmental scaling in streams of forested watershed." *Journal of Geophysical Research-Biogeosciences,* 111(G04014), 1–13.

O'Connor, B. L. and Hondzo, M. (2007). "Enhancement and inhibition of denitrification by fluid-flow and dissolved oxygen flux to stream sediments." *Environmental Science and Technology*, 42(1), 119–125.

O'Connor, B., Hondzo, M., and Harvey, J. W. (2010). "Predictive modeling of transient storage and nutrient uptake: Implications for stream restoration," *Journal of Hydraulic Engineering*, 136(12), 1018–1032.

Orlins, J. J. and Gulliver, J. S. (2000). "Dissolved gas supersaturation downstream of a spillway, II: Computational model." *Journal of Hydraulic Research*, 38(2), 151–159.

Parker, G. (1976). "On the cause and characteristic scales of meandering and braiding rivers." *J. Fluid Mechanics,* 76(3), 457–480

Parker, G. and Anderson, A. G. (1977). "Basic principles of river hydraulics." *J. Hydraulics Div.,* ASCE, 103(9), 1077–1087.

Parkhill, K. L. and Gulliver, J. S. (1999). "Modeling the effect of light on whole-stream respiration." *Ecological Modeling,* 117, 333–342.

Paus, K. H., Morgan, J., Gulliver, J. S., Leiknes, T., and Hozalski, R. M. (2014a). "Assessment of the hydraulic and toxic removal capacities of bioretention cells after 2 to 8 years of service." *Water, Soil and Air Pollution*, 225(1803), dx.doi.org/10.1007/s11270-013-1803-y.

Paus, K. H., Morgan, J., Gulliver, J. S., and Hozalski, R. M. (2014b). "Effects of bioretention media compost fraction on toxic metals Removal, hydraulic conductivity, and phosphorus release." *Journal of Environmental Engineering*, 140(10), 04014033, http://dx.doi.org/10.1061/(ASCE)EE.1943-7870.0000846.

Paus, K. H., Morgan, J., Gulliver, J. S., Leiknes, T., and Hozalski, R. M. (2014c). "Effects of temperature and NaCl on toxic metal retention in bioretention media." *Journal of Environmental Engineering*, 140(10), 04014034, http://dx.doi.org/10.1061/(ASCE)EE.1943-7870.0000847.

Pilgrim, J. M., Fang, X., and Stefan, H. G. (1998). "Stream temperature correlations with air temperatures in Minnesota." *J. Amer. Water Resources Assoc.,* 34(5), 1109–1121, Oct.

Qian, Q., Voller, V. R., and Stefan, H. G. (2009). "Modeling of vertical dispersion of a solute in a stream or lake bed enhanced by wave-induced interstitial flow." *J. Amer.Water Resourc. Ass.,* 45(2), 343–354, Apr.

Riley, M. J. and Stefan, H. G. (1988). "MINLAKE: A dynamic lake water quality simulation model." *Ecological Modeling,* 43, 155–182.

Riley, M. J. (1988). "User's manual for the dynamic lake water quality simulation program MINLAKE." SAFL External Memorandum No. 213, Dec.