MATT HODGE, PE

Water Resources Engineer



EDUCATION

MIT (2008), M.Eng.
Civil and Environmental Engineering

MIT (2007), M.S.
TPP Engineering Systems Division

U. of South Carolina (2004), B.S.
Civil and Environmental Engineering

REGISTRATIONS/MEMBERSHIPS

- Professional Engineer, MA
- American Society of Civil Engineers, Chair of the Environmental Water Resources Institute (EWRI) for the Boston Society of Civil Engineers Section (BSCES), 2015-2016

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QUALIFICATIONS

Matt Hodge is a Professional Engineer (PE) with experience in many aspects of environmental modeling. Matt specializes in numerical modeling of surface water resources and groundwater. Matt has more than 18 years of experience providing modeling of wetlands, estuaries, lakes, rivers, streams, and coastal zones. Matt has expertise in hydrodynamic modeling, hydrology and hydraulics, sediment transport, contaminant fate and transport, water quality, and mixing zone models. Matt works with a range of numerical models such as ADCIRC, BASINS, CGWAVE, CMS-FLOW, CORMIX, EFDC, GNOME, HEC-HMS, HEC-RAS, HEC-5, HEC-5Q, HSPF, HydroCAD, ICPR, MODFLOW, PHABSIM, PTM, QUAL2K, RIVER2D, RMA2, RMA4, STWAVE, SWMM, and WASP.

PROJECT EXPERIENCE

Water Quality

NPDES Permit Model Review: HydroAnalysis, Inc.* **Kershaw County, SC**
A local municipality requested a technical review of a nearby town's most recent draft wastewater treatment plant (WWTP) National Pollutant Discharge Elimination System (NPDES) permit in order to provide appropriate comments during public comment period. Reviewed QUAL2E model and supporting documentation. Provided memo to client explaining potential basis for comment and challenge of draft permit.

TMDL Model Review: DK Water Resource Consulting* **Davidson, NC**
Provided technical review of EFDC model for Total Maximum Daily Load (TMDL) study of High Rock Lake. Review was specifically focused on the incorporation of dam spillways into EFDC water quality model.

Waste Load Allocation Study: HydroAnalysis, Inc.* **Sumter County, SC**
In support of study to evaluate assimilative capacity of receiving water, modeled 12 miles of river in QUAL2K. Used model to evaluate dissolved oxygen (DO), biochemical oxygen demand (BOD), and ammonia under low flow conditions. Provided modeling expertise through project scoping, field program, regulatory review and final allocation decision.

Waste Load Allocation Study: Multiple Municipalities* **Catawba County, NC**
In support of study to evaluate assimilative capacity of receiving water, modeled multiple streams within watershed. Evaluated DO, BOD, and ammonia under a range of flow and operating conditions. Evaluated optimal performance options for multiple wastewater treatment plants within watershed incorporating historical evaluations and biological studies to provide recommendations on appropriate permit limits.

Water Quality Modeling Study: Geosyntec Consultants* **Fox River, IL**
As a part of the modeling team provided guidance and expert review of watershed modeling using HSPF. Contributed to QUAL2K6 model calibration for nutrients, phytoplankton, bottom algae and dissolved oxygen. Leveraged technical expertise and collaborative approach to achieve project goals.

* denotes Hodge.WaterResources, LLC project

Expert Review Long Term Control Plan: HydroAnalysis, Inc.* **New York, NY**

Reviewed draft long-term control plan (LTCP) for urban estuary in New York City. Evaluated LTCP data review for appropriateness of findings. Conducted a preliminary assessment of the selected alternative ability to meet performance gaps identified in the LTCP. Compared selected alternative to approved alternatives for other relevant LTCPs in New York City. Evaluated modeling that formed the basis of the LTCP findings. Provided feedback to client on how LTCP would impact contaminants of concern in estuary.

Dilution Modeling Study: Environmental Consulting & Technology, Inc.* **Manteo, North Carolina**

In support of updating NPDES permit limits for the town of Manteo WWTP, evaluated dilution available through multi-port diffuser discharge to Shallowbag Bay (part of the Albermarle-Pamlico Sound). Reviewed available hydrodynamic and meteorological data to understand complexity of wind dominated estuary. Developed appropriate CORMIX model and provided results for establishment of mixing zone.

Mixing Zone Modeling: Dalton Olmsted & Fuglevand, Inc.* **Alaska**

In support of Alaska Pollutant Discharge Elimination System (APDES) permit applications, developed quantitative assessment of hydrodynamic conditions at point of discharge based on recorded currents speeds, water depths, and water quality measurements. Completed reasonable potential analysis (RPA) based on effluent water quality, and modeled dilution using CORMIX model at various tidal stages to completely assess required dimensions of mixing zones. APDES permit applications completed successfully at various locations throughout Alaska.

Discharge Model and Salinity Analysis: Environmental Consulting & Technology, Inc.* **Virginia**

In support of Virginia Pollutant Discharge Elimination System (VPDES) permit application, evaluated mixing zone of proposed cooling water discharge of 2 million gallons per day (mgd) to a tidally-influenced river using CORMIX. Investigated the influence of CORMIX model assumptions on resulting predictions and provided support to client during review of applicable regulations.

Studied the influence of the proposed 10 mgd cooling water intake on the upstream extent of brackish water. Developed algorithm to identify and extract isohaline contours from results of the Chesapeake Bay Operational Forecast System (CBOFS) model and authored technical memorandum summarizing assumptions, analysis, and findings that demonstrated the minimal impact likely to occur from the withdrawal.

Oil Spill Trajectory Study: Industrial Client **Confidential Location**

Developed two-dimensional model of tidal estuary in order to predict current field in vicinity of oil spill. Applied National Oceanic and Atmospheric Administration (NOAA) GNOME model to predict spill trajectory and compared predicted oil transport to field observations collected immediately after spill to evaluate model performance. Made preliminary assessments of water column and sediment concentrations based on transport of spilled oil in support of natural resource damage assessment.

Thermal Discharge Study: Epsilon Associates* **Schuylkill River, PA**

Provided senior review of mixing zone study for a thermal discharge to the Schuylkill River. The project included CORMIX modeling consistent with the Delaware River Basin Commission (DRBC) water quality standards and approaches. Study determined existing mixing zone and made recommendations on alternative outfall designs to reduce the mixing zone. Subsequent phase of project included three-dimensional hydrodynamic and thermal model of the lower eight miles of the Schuylkill River. Completed modeling, using EFDC, and provided technical support as a part of the permitting process.

Thermal Discharge Study: Oil Refining Company **Lake Erie, OH**

Serving as lead modeler, developed three-dimensional hydrodynamic model in order to delineate extent of thermal plume in Lake Erie using the EFDC model. The EFDC model was coupled to the NOAA Great Lakes Coastal Forecasting System (GLCFS). Evaluated extent of thermal impact of cooling water discharge. Assessed lateral extent and vertical temperature profile in order to determine likelihood of available fish passage around thermal plume. Provided technical expertise from project development, through field program, modeling, and NPDES permit application.

Thermal Discharge Study: Oil Refining Company **Lake Michigan, IN**

Serving as lead modeler for 316(a) study, developed coupled three-dimensional hydrodynamic and water quality model in order to delineate extent of thermal plume in Lake Michigan using EFDC. Evaluated normal operation and maximum permitted operational

effluent in response to range of ambient conditions in order to delineate thermal plume extents. Worked with biological survey team to plan field study that identified and characterized representative fish populations.

Water Quality Assessment– Flushing Model: Private Developer **Englehard, NC**

Developed two-dimensional hydrodynamic model, using RMA2/RMA4, to predict flushing times for a proposed boating marina in tidal estuary. Used available salinity data to make assessment of fresh water flows. Analyzed alternative designs in order to improve flushing, maintain water quality and enable proposed marina to be permitted. Provided preliminary design of mechanical system to maintain DO in boat basin.

Hydrodynamic Data Collection QAPP: Industrial Client **Passaic River, NJ**

Developed Quality Assurance Project Plan (QAPP) for data collection to support development of tidally influenced sediment erosion model using acoustic Doppler current profiler (ADCP). Oversaw data collection and conducted quality assurance checks of final dataset.

Hydrology and Hydraulics

Dam Removal Study: EHS Support, LLC* **White Township, NJ**

Developed a HEC-RAS model of the Cedar Grove Dam on the Pequest River in White Township, New Jersey. As a part of the design process to remove the run of the river dam, followed the standard FEMA procedure for by developing a duplicate effective model and then demonstrating no increase in flood elevations given the planned dam removal. Provided comprehensive technical memorandum that was submitted to state regulators as a part of the permitting of the dam removal.

Hydrologic and Hydraulic Study: SSV Engineering, Inc.* **Framingham, MA**

Updated and calibrated existing Storm Water Management Model (SWMM) of storm water infrastructure in the Sucker Brook watershed. Used calibrated model to evaluate system-wide benefits resulting from various green infrastructure alternatives within the watershed. Worked with project team and municipal staff to understand environmental benefits, budget limitations, and feasibility of various alternatives. Presented findings to municipal staff providing forward looking development plan for watershed.

Hydrologic and Hydraulic Study: OptiRTC, Inc.* **Prince George's County, MD**

Developed HydroCAD models for a number of stormwater ponds to evaluate peak flood elevations, storage volumes, and discharge flows. Obtained model inputs from as-built plans, publicly available topography and land use data, as well as the Maryland Stormwater Design Manual.

Hydraulic Analysis of Bridge Construction: Private Property Owner* **Delaware River, NY**

Assessed the risk of additional flooding due to temporary channel fill added to support ongoing bridge construction. Reviewed applicable Flood Insurance Study (FIS), local topography, and construction plan details to understand how flooding might increase during a range of high-flow events.

Expert Review of Site Hydrology and Hydraulics: Private Property Owner* **Scituate, MA**

On behalf of a private property owner, reviewed site hydrology to understand increased frequency of flooding as a result of development in abutting property. Reviewed developer property site plans and related hydrology and hydraulics modeling. Identified errors made by developer's engineers. Presented on behalf of private property owner at Town of Scituate Planning Board meeting. Successfully argued on behalf of private property owner that developer needed to change site grading to protect private property from future flooding.

Expert Review of Site Hydrology and Hydraulics: Private Property Owner* **Hingham, MA**

On behalf of a private property owner, reviewed site hydrology to understand risks of flooding as a result of proposed road construction in a right of way that crossed the property. Evaluated constructions plans against federal flood protection requirements and town by-laws and ordinances. Provided advice to private property owner in advance of a Massachusetts Department of Environmental Protection (DEP) appeal meeting.

Energy Facility Stormwater Model: ESS Group, Inc.* **Massachusetts**

Working with a project team tasked with evaluating permitting requirements for an energy-from-waste facility, reviewed and updated the facility HydroCAD model to understand the capacity of existing retention basins to meet water usage needs of facility as well as the likelihood of off-site discharge from the facility in the event of a large precipitation event. Evaluated most recent hydrologic design storms for facility and provided preliminary design guidance on the need for additional retention ponds.

Energy Facility Base Flood Elevation Delineation: ESS Group, Inc.* **Rhode Island**

In support of facility expansion permitting, conducted hydrologic and hydraulic study of a set of streams that flood during large precipitation events. Developed a HEC-RAS model of the area surrounding the facility and used model to make a determination of the 100-year base flood elevation (BFE) for the streams. Incorporated site-specific survey with statewide datasets and culverted road crossings to establish flood plain around the facility.

Technical Support for PHABSIM Fish Habitat Model: DK Water Resource Consulting* **Chattahoochee River, GA**

Supported a team of multiple consulting firms in developing and updating a PHABSIM model of the Chattahoochee River. Provided on-call technical expertise including trouble shooting and helping to develop a conceptual understanding.

Dam Restoration and Removal Study: Town of Franklin **Franklin, MA**

Conducted hydraulic and hydrologic analysis of dam system to determine maximum ponding elevations during a range of storm events in order to inform decisions about potential dam removal stream restoration.

Preliminary Stormwater Storage Design: Town of Winchester **Winchester, MA**

Modeled existing stormwater system in order to make recommendations for improvements to the system that would lead to reduced flooding of Aberjona River during storm events. Completed conceptual design of upgrades and underground storage. Met with municipality staff to discuss modeling and preliminary designs.

Wetland Flood Study: U.S. Army Corps of Engineers **Somerville, NJ**

Updated existing HEC-RAS model of portion of Raritan River in order to assess likely peak flooding elevations and predicted inundation of revitalized wetland area. Mapped localized inundation based on model results and assessed potential improvement of wetland water budget based on changes to wetland restoration design.

Sediment Transport

Dredging Disposal and Submarine Mound Stability Analysis: INSPIRE Environmental* **New York Bight**

Conducted MDFATE modeling of planned dredged material disposal at the Historic Area Remediation Site (HARS) offshore of New Jersey. Worked with INSPIRE and the New York District of the United States Army Corps of Engineers to establish slope stability and footprint of proposed berm construction from dredged material. Model results were incorporated into final report to the District for future HARS disposal planning.

Sediment Transport Study: ESS Group, Inc.* **Raritan Bay & NJ Coastline, NJ**

In order to assess impacts of proposed cable laying operation, developed hydrodynamic model using ADCIRC and sediment transport model using PTM to predict transport of sediment suspended during proposed cable laying operations. Evaluated available sediment coring data to determine representative grain size and variability of grain size. Provided demonstrations of suspended concentrations in three dimensions within the water column. Study provided determination of the duration and extent of impacts attributable to cable laying operations.

Sediment Transport Study: ESS Group, Inc.* **Hudson River, NY/NJ**

In order to assess impacts of proposed cable laying operation, developed hydrodynamic model using ADCIRC and sediment transport model using PTM to predict transport of sediment suspended during proposed cable laying operations. Evaluated available sediment coring data to determine representative grain size and variability of grain size. Provided demonstrations of suspended concentrations in three dimensions within the water column. Study provided determination of the duration and extent of impacts attributable to cable laying operations.

Sediment Transport Study: ESS Group, Inc.* **Delaware River, DE/NJ**

In order to assess impacts of proposed cable laying operation, developed hydrodynamic model using ADCIRC and sediment transport model using PTM to predict transport of sediment suspended during proposed cable laying operations. Evaluated available sediment coring data to determine representative grain size and variability of grain size. Aided client in planning additional sediment data collection to support more accurate modeling of sediment dispersion.

Sediment Transport Study: TRC Companies, Inc.* **Lake Champlain, NY/VT**

In order to assess impact of proposed cable laying operation, developed a hydrodynamic model (RMA2) and sediment transport model (PTM) to predict transport of sediment suspended during proposed cable laying operations. Evaluated available sediment coring data to determine representative grain size and variability of grain size. Used model to provide predictions of suspended sediment concentrations and deposition depths throughout model domain.

Sediment Transport Study: ESS Group, Inc.* **Raritan Bay and New York Bight, NY/NJ**

In order to assess impact of proposed cable laying operation, developed a hydrodynamic model (ADCIRC) and sediment transport model (PTM) to predict transport of sediment suspended during proposed cable laying operations. Evaluated available sediment coring data to determine representative grain size and variability of grain size. Used model to provide predictions of suspended sediment concentrations and deposition depths throughout model domain.

Sediment Transport Study: AECOM* **New York Bight, NY**

In support of permitting for a proposed natural gas pipeline conducted a study of sediment transport and deposition along coastal shelf. Developed a hydrodynamic model and sediment transport model to predict transport of sediment suspended during proposed excavation and backfilling activities. Evaluated available sediment coring data to determine representative grain size and variability of grain size. Used model to provide predictions of suspended sediment concentrations and deposition depths throughout model domain.

In Channel Construction Erosion Study: Private Developer **Kelso, WA**

Developed HEC-RAS model of Cowlitz River and confluence with Columbia River to evaluate shear stresses during peak flows in support of a proposed pier design. Evaluated potential for erosion and deposition patterns to change due to in-channel construction and potential for long-term geomorphic changes to river bed.

Groundwater

PFAS Fate and Transport Evaluation: Silent Spring Institute* **Ayer, Massachusetts**

As a part of a national study regarding the health impacts of exposure to PFAS, completed a preliminary assessment of PFAS sources, hydrogeology, and fate and transport for public water supply wells in Ayer, Massachusetts. Reviewed previous studies from the US Army Corps of Engineers, consultants, and other sources. Conducted new analysis of previously collected water quality samples to draw new conclusions as to the likely sources of PFAS at drinking water wells. Developed MODFLOW model of aquifer and evaluated fate and transport of PFAS to the Grove Pond wellfield using MODFLOW-USG

Review of Coal Combustion Residue (CCR) Alternative Source Demonstrations: RTI International* **United States**

Conducted a detailed review of methodology and conclusions of alternative source demonstration (ASD) reports submitted to the US EPA on behalf of coal-fired power plants throughout the United States. As a part of a team of experts, reviewed more than 100 individual CCR units and made recommendations to US EPA regarding validity of ASDs with respect to compliance with CCR Rule.

Review of CCR Groundwater Monitoring: HydroAnalysis, Inc.* **United States**

Conducted a preliminary review of the procedures and data for required groundwater monitoring at CCR facilities throughout the United States. As a part of a team of experts, reviewed more than 500 individual CCR units for adherence to required procedures and made preliminary assessment of groundwater quality monitoring data. Reviews submitted to United States Environmental Protection Agency for use in evaluating compliance with CCR Rule.

Groundwater Mounding Study: Old New England Properties* **Arlington, MA**

In response to conservation commission request, conducted a mounding analysis of proposed stormwater infiltration structure. Analysis conducted consistent with Massachusetts Stormwater Handbook using Hantush method.

Expert Review of Hydrogeologic Study: Old New England Properties* **Arlington, MA**

Conducted expert review of a hydrogeologic study that was completed on behalf of the Town of Arlington. Provided developer an independent review of the study findings and assessed how those findings might impact the permitting and design of the planned development. Presented findings at Conservation Commission hearing and provided continued support to developer through the completion of permitting.

Flooding Assessment: Revere Little League* **Revere, MA**

Evaluated potential causes of chronic flooding at McMaken Field in Revere. Investigated regional geology, hydrogeology, and hydrology to understand why the field has seen chronic flooding in the last five years. Researched recent city construction including sewer lining to understand potential for construction to have impacted the field. Based on assessment of available information, provided likely cause of flooding and suggestions on how chronic flooding can be addressed.

Groundwater Contouring: MassDOT **Multiple Sites, MA**

In support of planned site closures, provided groundwater contouring based on available groundwater sampling data using SURFER. Evaluated seasonal changes in groundwater based on sampling surveys. Provided mapping of groundwater contours in context of larger regional aquifer.

3-D Groundwater Model: City of Calgary **Calgary, Alberta**

As a part of a performance evaluation for an existing pump and treat system, developed a three-dimensional groundwater model of site using MODFLOW. Incorporated hydrogeology, interaction with adjoining Bow River, regional groundwater patterns, active and inactive wells, as well as in-place slurry wall. Provided steady-state predictions of radius of influence from wells and flow paths (MODPATH) around impervious boundaries. Provided assessment of existing performance and made recommendations about modifications to pump-and-treat system in order to improve performance.

Dewatering Design: Private Developer **Southeastern, PA**

Provided predicted dewatering requirements based on groundwater characteristics including aquifer thickness and conductivity as a part of plans to excavate trench for installation of natural gas pipeline. Modeled radius of influence and maximum drawdown in WELFLO. Also provided preliminary guidance on pump sizing and installation layout in order to achieve needed drawdown for excavation.

Historical Superfund Site Analysis: HydroAnalysis, Inc.* **Confidential Location**

Conducted review of 30 years of hydrogeological investigations at former Superfund site in order to assess likely sources of groundwater contamination. Review included assessment of historical aerial photography, assessment of geologic stratigraphy, regional groundwater flow patterns, and mounding of groundwater on the site. Compiled findings and provided report of site history to client.

Coastal Modeling

Coastal Restoration and Hydrodynamic Modeling Study: EA Engineering, Science, and Technology, Inc. PBC* **Wareham, MA**

As a part of the planned restoration of a formed cranberry bog, developed a HEC-RAS 2D model of Jack's Marsh in Wareham, Massachusetts. Provided technical guidance to help develop data collection plan for surface water and groundwater measurements as well as guidance for the survey team. Developed and calibrated the model, and applied model to a set of design alternatives to support decision making related to which design alternatives will provide the most sustainable restoration of the marsh complex within Jack's Marsh.

Expert Review of Coastal Modeling Study: ESS Group, Inc.* **Wellfleet, MA**

In support of engineering design and permitted, reviewed coastal modeling study of Herring River restoration. Evaluated how the study addresses the Mill Creek tributary. Provided expert review of modeling to determine applicability of model results to design and permitting questions. Reviewed study documentation and provided insights into how the model handles precipitation, groundwater recharge, and proposed pumping. Provided findings of expert review to client for use in design and permitting of pump intake and pump design.

Ocean Particle Tracking Study: ESS Group, Inc. **Atlantic Ocean**

In support of permitting of an offshore wind farm, developed a particle tracking model of the mid-Atlantic coastal zone of the United States to evaluate the trajectory of floating bird carcasses that might result from a bird strike at the wind farm. Used model results from the Rutgers University Doppio model to understand circulation patterns in the mid-Atlantic. Conducted long-term particle tracking model that simulated more than 100,000 particles over a calendar year to understand which parts of the United States shoreline are most likely to see a beached bird carcass. Results of modeling informed planning for field surveys along a large stretch of the mid-Atlantic coastline.

Estuary Hydrodynamic Modeling Study: US Fish and Wildlife Service **Reeds Beach Marsh, NJ**

In support of coastal resiliency efforts, developed a two-dimensional hydrodynamic model of the Reed's Beach estuary using the Coastal Modeling System (CMS) Flow model. Conducted comprehensive review of the calibration dataset. Effectively implemented wetting and drying model, and calibrated model to water levels and aerial observations. Used calibrated model to assess various design alternatives. Used calibrated model to assess various design alternatives for a breakwater structure. Used the Sea Level Affecting Marshes Model (SLAMM) model to evaluate how the selected design alterative would influence the long-term evolution of the marsh. Provided findings of modeling in comprehensive report and a series of presentation to the project team and the US Fish and Wildlife Service.

Estuary Hydrodynamic and Wave Modeling Study: US Fish and Wildlife Service **Supawna Meadows Marsh, NJ**

In support of coastal resiliency efforts, developed a two-dimensional hydrodynamic model of the Supawna Meadows estuary using the CMS Flow model and developed a wave model of the Delaware River Bay using CMS Wave. The wave model results and the flow model results were integrated to make predictions of cross-shore and long-shore currents during a range of storm events. Conducted comprehensive review of the calibration dataset. Effectively implemented wetting and drying model, and calibrated model to water levels and aerial observations. Used calibrated model to assess various design alternatives for a breakwater structure. Used the Sea Level Affecting Marshes Model (SLAMM) model to evaluate how the selected design alterative would influence the long-term evolution of the marsh. Provided findings of modeling in comprehensive report and a series of presentation to the project team and the US Fish and Wildlife Service.

Coastal Hydrodynamic and Outfall Relocation Study: HydroAnalysis Inc.* **Confidential Location**

In support of an outfall relocation study, developed three-dimensional hydrodynamic harbor model using EFDC. Built set of tools in Python for post-processing model output to make results easily understandable. Conducted analysis to establish tidal datums for project area. Provided technical review of preliminary diffuser design, CORMIX modeling, and draft mixing zone application.

Littoral Zone Study: AECOM* **Lake Tahoe, CA**

As a part of a multi-year assessment of shoreline development, designed and executed modeling and analysis of wind-wave generation (STWAVE), wave transformation (CGWAVE), and long-shore current velocities (RMA2) in Lake Tahoe. Used the results from hydrodynamic modeling to evaluate changes in littoral drift processes caused by expansion of U.S. Coast Guard pier. Evaluated potential for erosion and deposition below water line as well as potential for erosion of shoreline. The types of shoreline development that were evaluated included installation of pilings, installation of floating dock, and dredging of lake bed. Provided comprehensive report on study findings in support of permitting.

Storm Surge Analysis: Rhode Island DOT **Kingston, RI**

Modeled tidal estuary's response to storm surge using RMA2. Developed complete model domain and conduct analysis of storm surge and breach of protective dunes in order to characterize scour at in-land bridge embankments during various storm surge events.

Hydrodynamic Modeling: U.S. Army Corps of Engineers **New Orleans, LA**

Assisted in development and analysis of model to determine maximum velocities during normal operation conditions for proposed gate structures in the Inner Harbor Navigation Channel. Conducted tidal constituent analysis for evaluation of model boundary conditions performance relative to alternative models.

Web Development

MassBays EcoHealth Tracking Tool: Comprehensive Environmental, Inc.* **Massachusetts**

As the lead developer on the Ecohealth Tracking Tool (ETT) team worked with MassBays to understand website needs and long-term goals for the website. Developed a client-side only solution that provides an intuitive interface for reviewing water quality measurements and habitat quantity and quality across multiple indicators. Worked extensively in HTML, Javascript ES6, and Vue.js.

Green Infrastructure Asset Management System: EcoLucid* **Lancaster, PA**

Conducted a series of interviews with Stormwater Bureau and GIS staff at the City of Lancaster to identify requirements for a green infrastructure asset management system to support mandated annual reporting to US EPA. Developed scoring rubric for evaluating technology alternatives and developed three proofs of concept to present to city. Worked extensively with ArcGIS Online, ArcGIS Survey 123, ArcGIS Collector, and ArcGIS Workforce.

User Interface and Client-Side Model Implementation Development: University of Massachusetts*

As a part of the Ecosheds web development team (ecosheds.org), developed a user interface for a statistical model of stream temperatures throughout the northeastern region of the United States. Work includes development with JavaScript, HTML, Node.js, D3, Angular, and Bootstrap.

The Water Resources Report*

Conceptualized and developed the Water Resources Report (WRR) at www.WatResReport.com. The WRR tracks activity on Twitter by state regulatory agencies. Development of the WRR involved the use of JavaScript, HTML, Node.js, D3, Angular, and Postgres. Functionality of the WRR is based on executing and managing a series of Application Program Interface (API) calls and appropriate database storage of results. Current plans are to expand tracked organizations to include non-governmental organizations and potentially science/engineering firms that are active on different water bodies. There are also plans to increase filtering of tweets to provide time sensitive and content sensitive results.

EXPERT WITNESS TESTIMONY AND DEPOSITIONS

In the Matter of Friends of Lackawanna and Sierra Club v. Commonwealth of Pennsylvania, Department of Environmental Protection and Keystone Sanitary Landfill, Inc. Commonwealth of Pennsylvania, Environmental Hearing Board, EHB Docket No. 2021-066-L. Expert Opinion Date: January 6, 2023.

In the Matter of Sierra Club v. Genon Power Midwest LP United States District Court for the Western District of Pennsylvania. Civil Action No. 2-19-cv-01284-WSS. Expert Opinion Date: December 11, 2020.

In the Matter of Sierra Club, Inc. and Conservation Law Foundation, Inc. v. Granite Shore Power LLC, et al. United States District Court of New Hampshire. Case No. 19-cv-216-JL. Expert Opinion Date: August 11, 2020.

In the Matter of Lee Bloom and LCB Senior Living, LLC. Commonwealth of Massachusetts, Department of Environmental Protection, Office of Appeals and Dispute Resolution. OADR Docket No. WET-2018-007, DEP FILE NO. 214-0635, Medfield Massachusetts. Written Testimony Date: December 13, 2018.

Docket No. 8847. Petition of Vermont Green Line Devco, LLC, pursuant to 30 V.S.A. §§ 231 and 248, for a certificate of public good to own, operate and construct an underwater and underground 400 MW high voltage direct current ("HVDC") electric transmission line, converter station and associated facilities to be located in Lake Champlain and the Towns of Ferrisburgh, Wlatham and New Haven, Vermont, and for de minimus regulation. State of Vermont Public Service Board. Written Discovery Affidavit. Affidavit Date: May 5, 2017

PUBLICATIONS AND PRESENTATIONS

The Water Resources Report: Mapping Social Media for Water Resources, North American Lakes Management Society (NALMS) 35th Annual International Conference on Soils, Sediments, Water, and Energy. Hodge, M.; Smith, K., October 2018.

Oil Spills in Surface Water; New Approach Using NOAA pyGNOME, Association for Environmental Health and Sciences Foundation (AEHS) 39th International Symposium. Hodge, M.; Smith, K., November 2019.

Thermal Mixing Zone Studies, BP Internal Workshop for Facility Environmental Managers. Hodge, M.; Gerath, M., May 2013.

Design of Critical Cases for the Application of Calibrated Thermal Models: A Key Part of the Modeling Process, Gerath, M.; Heinen, E.; Hodge, M., Annual Meeting of the American Fisheries Society: Innovations in Thermal Research and Ecological Effect from Thermal Discharges. August, 2012.

Quantifying Potential Profit from Material Recycling: A Case Study in Brick Manufacturing, Hodge, M.; Ochsendorf, J.; Fernandez, J., Journal of Cleaner Production, Volume 18, Issue 12, p. 1190-1199. August, 2010.

The Use of Chemically Enhanced Primary Treatment (CEPT) in Honduran Imhoff Tanks, Mikelonis, A.M.; Hodge, M.M; Adams, E.E., Herrera, A., Proceedings of the Water Environment Federation, WEFTEC 2009: Session 61 through Session 70, p. 3879-3891. January, 2009.

Honduran Imhoff Tanks: Potentials and Pitfalls, Mikelonis, A.M.; Hodge, M.M; Adams, E.E., Herrera, A., Dynamic Modeling of Urban Water Systems, Monograph 18, p. 363-377. February, 2009.

Honduran Imhoff Tanks: Potentials and Pitfalls, Mikelonis, A.M.; Hodge, M.M; Adams, E.E., Herrera, A., Dynamic Modeling of Urban Water Systems, Monograph 18, p. 363-377. February, 2009.

PREVIOUS EMPLOYMENT

Woods Hole Group	2014 – 2016	Falmouth, MA
AECOM	2010 – 2012	Chelmsford, MA
ENSR/AECOM	2008 – 2010	Westford, MA
WK Dickson & Co., Inc.	2003 – 2004	Columbia, SC