

Scott Howard Ensign, Ph.D.**Curriculum Vitae (04 June 2018)**

Assistant Director and Research Scientist
Stroud Water Research Center
970 Spencer Road
Avondale, PA 19311

Professional Experience

2018-present Assistant Director, Research Scientist Stroud Water Research Center
2013-present Adjunct Assistant Professor, Marine, Earth, and Atmospheric Science Department, NC State University
2013-2018 Founder/CEO, Planktos Instruments, LLC, Morehead City, NC
2004-2017 Founder/Managing Partner, Aquatic Analysis and Consulting, LLC, Wilmington, NC
2010-2011 Research Ecologist, National Research Program, U.S. Geological Survey, Reston, VA
2004-2005 Research Technician III, University of North Carolina at Chapel Hill, Institute of Marine Science, Morehead City, NC
1997-2002 Research Technician II, Center for Marine Science, University of North Carolina at Wilmington, Wilmington, NC

Education

2005-2010 Doctor of Philosophy - Ecology, University of North Carolina at Chapel Hill.
Advisers: Michael Piehler and Martin Doyle
2002-2004 Master of Science - Ecology, University of North Carolina at Chapel Hill. Adviser: Martin Doyle
1992-1996 Bachelor of Arts - Environmental Science, Cum laude, University of North Carolina at Wilmington

Teaching

2012, 2016 Guest Lecturer, Curriculum in the Ecology and Environment, Capstone Class, University of North Carolina at Chapel Hill, Institute of Marine Sciences
2010 Guest Lecturer, Environmental Biology, Craven Community College, New Bern NC
2002, 2006, 2010 Guest Lecturer, Human Impacts on Estuarine Ecosystems, University of North Carolina at Chapel Hill
2002-2003 Lecturer/Teaching Assistant, Introduction to Physical Geography, University of North Carolina at Chapel Hill

Graduate Student Committees

2017-present Adam Gold, PhD, Curriculum in Ecology, UNC Chapel Hill
2015-2018 John Gardner, PhD, Nicholas School for the Environment, Duke University
2014-2015 Lauren Handsel, MS, Department of Marine, Earth, and Atmospheric Sciences Department, NC State University
2013-2014 Caitlin White, MS, Department of Marine Sciences, UNC Chapel Hill

Fellowships and Awards

2016 NC IDEA Seed Grant for Planktos Instruments, LLC

2011-2012 Mendenhall Post-Doctoral Research Fellow, US Geological Survey, Reston VA
 2010 Dissertation Completion Fellow, University of North Carolina at Chapel Hill
 2010 Future Faculty Fellow, University of North Carolina at Chapel Hill
 2007-2010 STAR Graduate Fellow, US Environmental Protection Agency
 2007 Best Biogeoscience Paper, Ecological Society of America (Ensign and Doyle 2006: "Nutrient spiraling in streams and river networks")

Media Coverage

2016 "Morehead City Startup's River Drifting Device Makes Water Quality Easy to Measure", ExitEvent
 2016 "HydroSphere Drifter Brings Lagrangian Sampling to Freshwater", Environmental Monitor Magazine
 2009 "Species on the Brink: Latest Challenges for River Herring Research", Coastwatch Magazine

Professional Service

2003-present Reviewer for *Biogeoscience*, *Journal of Applied Geography*, *Freshwater Science*, *Environmental Science and Technology*, *Journal of Geophysical Research*, *Journal of Environmental Quality*, *Ecological Applications*, *Hydrobiologia*, *Ecology*, *Journal of Environmental Management*, *Wetlands*, *Ecosphere*, *Wetlands Ecology and Management*, *Estuaries and Coasts*, *EGU Biogeosciences*, *Nature Geoscience*, *Fundamental and Applied Limnology*, *Journal of Geophysical Research-Biogeosciences*, *Global Biogeochemical Cycles*, *Freshwater Biology*, *Estuarine Coast and Shelf Science*, *Catena*, *Journal of the American Water Resources Association*
 2005-present Grant Reviewer for National Science Foundation, Sea Grant
 2017 **Member**, Albemarle Pamlico National Estuary Partnership, Water Resources and Assessment Team
 2013 **Member**, Albemarle Pamlico National Estuary Partnership, Science and Technical Advisory Committee
 2013 **Participant**, North Carolina Coastal Plain Rivers Ecological Flows Working Group
 2012 **Convener**, AGU Chapman Conference "Hydrogeomorphic Feedbacks and Sea Level Rise in Tidal Freshwater River Ecosystems", Reston VA
 2010 **Session Organizer**, "Hydrology, geomorphology, and ecology of tidal freshwater zones, or What Happens in rivers when water flows upstream?" American Society of Limnology and Oceanography/North American Benthological Society Meeting, Santa Fe NM
 2006 **Session Organizer**, "Ecology and biogeochemistry of tidal freshwater ecosystems", Southeastern Estuarine Research Society Meeting, Savannah GA

Public Funding

2016-2017 North Carolina Sea Grant, Going with the Flow: New Approaches for Determining Drivers of Toxic Cyanobacteria Blooms in the Cape Fear River, NC
 2012-2017 US Department of Defense/Research Triangle Institute. Defense Coastal/Estuarine Research Program
 2011-2012 Mendenhall Research Program, National Research Program, US Geological Survey.

- Sediment and nutrient trapping in tidal freshwater rivers: Implications of sea level rise on coastal morphology and biogeochemistry
- 2008-2009 North Carolina Sea Grant Fisheries Resource Grant. Zooplankton assessment project (ZAP): Reassessing prey availability for river herring in the Chowan River Basin
- 2007-2010 US Environmental Protection Agency, STAR Graduate Fellowship. Ecology and Biogeochemistry of Tidal Freshwater Rivers
- 2005 North Carolina Water Resources Research Institute. Effects of tidal flow on riparian zone hydraulics and nitrogen dynamics: implication for nutrient management in coastal creeks

Peer Reviewed Publications

*indicates student author or co-author

- Krauss KW, GB Noe, JA Duberstein, WH Conner, CL Stagg, N Cormier, MC Jones, CE Bernhardt, BG Lockaby, AS From, TW Doyle, RH Day, **SH Ensign**, KN Pierfelice, CR Hupp, AT Chow, JL Whitbeck. 2018. The role of the upper tidal estuary in wetland blue carbon storage and flux. *Global Biogeochemical Cycles*, 10.1029/2018GB005897.
- Ensign SH**, G Noe. 2018. Tidal extension and sea level rise: Recommendations for a research agenda to guide ecosystem management. *Frontiers in Ecology and the Environment* 16(1):37-43.
- Croswell, J, I Anderson, JW Stanhope, B Van Dam*, MJ Brush, **SH Ensign**, MF Piehler, B McKee, M Bost, and HW Paerl. 2017. Carbon budget of a shallow, lagoonal estuary: Transformations and source-sink dynamics along the river-estuary-ocean continuum. *Limnology and Oceanography* 62(S1):S29-S45.
- Ensign SH**, J Gardner*, MW Doyle. New strategies for measuring rates of environmental processes in rivers, lakes, and estuaries. *Freshwater Science* 36(3):453-465.
- Ensign SH**, C Currin. Geomorphic implications of particle movement by water surface tension in a salt marsh. *Wetlands* 37(2):245-256.
- Ensign SH**, C Currin, M Piehler, C Tobias. 2016. A method for using shoreline morphology to predict suspended sediment concentration in tidal creeks. *Geomorphology* 276:280-288.
- Julian, JP, CJP Podolak, KM Meitzen, MW Doyle, RB Manners, ET Hester, **SH Ensign**, NA Wilgruber. 2016. Shaping the physical template: Biological, hydrological, and geomorphic connections in stream channels, in: *Stream Ecosystems in a Changing Environment* (Jones, JB, and Stanley, EH, eds). Elsevier, pp. 85-134.
- Leech DM, **SH Ensign**, M Piehler. 2016. Spatio-temporal patterns in the export of dissolved organic carbon and chromophoric dissolved organic matter from a coastal, blackwater river. *Aquatic Sciences* 78(4):823-836.
- Ensign SH**, GB Noe, CR Hupp, KJ Skalak. 2015. Head-of-tide bottleneck of particulate material transport from watersheds to estuaries. *Geophysical Research Letters* 42(24): 10,671-10,679.
- Ensign SH**, CR Hupp, GB Noe, KW Krauss, CL Stagg. 2014. Sediment accretion in tidal freshwater forests and oligohaline marshes of the Waccamaw and Savannah Rivers, U.S.A., *Estuaries and Coasts*, 37:1107-1119.
- Ensign SH**, DM Leech, MF Piehler. 2014. Effects of nutrients and zooplankton on an estuary's phytoplankton: Inferences from a synthesis of 30 years of data. *Ecosphere* 5(7), article 89.
- Von Korff BH*, MF Piehler, **SH Ensign**. 2014. Comparison of denitrification between rivers channels and their adjoining tidal freshwater wetlands. *Wetlands* 34(6):1047-1060.
- Ensign SH**, GB Noe, CR Hupp. 2013. Linking channel hydrology with riparian wetland accretion in tidal rivers. *Journal of Geophysical Research-Earth Surface* 119(1):28-44.

- Ensign**, SH, MW Doyle, MF Piehler. 2013. The effect of tide on the hydrology and morphology of a freshwater river. *Earth Surface Processes and Landforms* 38(6):655-660.
- Ensign** SH, K Siporin*, MF Piehler, MW Doyle, L Leonard. 2012. Hydrologic and biogeochemical controls of denitrification in tidal freshwater wetlands. *Estuaries and Coasts* 36(3):519-532.
- Ensign** SH, G Noe, CR Hupp, S Fagherazzi. 2012. A meeting of the waters: Interdisciplinary challenges and opportunities in tidal rivers. *Eos* 93(45):455-456.
- Ensign** SH, MW Doyle, MF, Piehler. 2012. Tidal geomorphology affects phytoplankton at the transition from forested streams to tidal rivers. *Freshwater Biology* 57(10):2141-2155.
- Doyle MW, SH **Ensign**. 2009. Views of a River: Alternative reference frames in river system science. *BioScience* 59(6):499-510.
- Mallin, MA, VL Johnson, SH **Ensign**. 2009. Comparative impacts of stormwater runoff on water quality of an urban, a suburban, and a rural stream. *Environmental Monitoring and Assessment* 159(1-4):475-491.
- Ensign** SH, MF Piehler, MW Doyle. 2008. Riparian zone denitrification affects nitrogen flux through a tidal freshwater river. *Biogeochemistry* 91(2-3):133-150.
- Ensign** SH, HW Paerl. 2006. Development of an unattended estuarine nutrient monitoring program using ferries as data-collection platforms. *Limnology and Oceanography: Methods* 4(10): 399-405.
- Ensign** SH, MW Doyle. 2006. Nutrient spiraling in streams and river networks. *Journal of Geophysical Research – Biogeosciences* 111(G4):G04009.
- Mallin MA, J Johnson, SH **Ensign**, T. MacPherson. 2006. Factors contributing to hypoxia in rivers, lakes, and streams. *Limnology and Oceanography* 51(1):690-701.
- Ensign** SH, S McMillan, M Piehler, S Thompson. 2006. Nitrogen and phosphorus attenuation within the stream network of a coastal, agricultural watershed. *Journal of Environmental Quality* 35(4):1237-1247.
- Ensign** SH, MW Doyle. 2005. In-channel transient storage and associated nutrient retention: evidence from experimental manipulations. *Limnology and Oceanography*, 50(6):1740-1751.
- Ensign** SH, JN Halls, MA Mallin. 2004. Application of digital bathymetry data in an analysis of flushing times of two large estuaries. *Computers and Geosciences* 30(5):501-511.
- Cahoon, LB, SH **Ensign**. 2004. Response to commentary by Hardy, Reich, and Tucker. *Nutrient Cycling in Agroecosystems* 70:323-324.
- Cahoon LB, SH **Ensign**. 2004. Excessive soil phosphorus levels in eastern North Carolina: temporal and spatial distributions and relationships to agriculture and other land uses. *Nutrient Cycling in Agroecosystems* 69:111-125.
- Mallin MA, MR McIver, SH **Ensign**, LB Cahoon. 2004. Photosynthetic and heterotrophic impacts of nutrient loading to blackwater streams. *Ecological Applications* 14(3):823-838.
- Mallin MA, MH Posey, MR McIver, DC Parsons, SH **Ensign**, TD Alphin. 2002. Impacts and recovery from multiple hurricanes in a Piedmont-Coastal Plain river system. *BioScience* 52(11):999-1010.
- Mallin MA, SH **Ensign**, TL Wheeler, DB Mayes. 2002. Pollutant removal efficacy of three wet detention ponds. *Journal of Environmental Quality* 31:654-660.
- Ensign** SH, MA Mallin. 2001. Stream water quality following timber harvest in a Coastal Plain swamp forest. *Water Research* 35:3381-3390.
- Mallin MA, LB Cahoon, DC Parsons, SH **Ensign**. 2001. Effect of nitrogen and phosphorus loading on plankton in coastal plain blackwater streams. *Journal of Freshwater Ecology* 16:455-466.
- Mallin MA, SH **Ensign**, MR McIver, GC Shank, PK Fowler. 2001. Demographic, landscape, and meteorological factors controlling the microbial pollution of coastal waters. *Hydrobiologia* 460:185-193.

Mallin MA, MH Posey, GC Shank, MR McIver, SH **Ensign**, TD Alphin. 1999. Hurricane effects on water quality and benthos in the Cape Fear watershed: Natural and anthropogenic impacts. *Ecological Applications* 9:350-362.

Invited Departmental Seminars

- 2017 Stroud Water Research Center, Avondale, PA
2017 National Oceanic and Atmospheric Administration, National Centers for Coastal Ocean Science, Beaufort, NC
2016 University of North Carolina at Chapel Hill, Department of Marine Sciences, Chapel Hill, NC
2016 University of North Carolina at Wilmington, Department of Geography and Geology, Wilmington, NC
2015 University of Texas at Austin, Marine Sciences Institute, Port Aransas, TX
2015 Virginia Institute of Marine Science, Gloucester Point, VA
2015 East Carolina University, Department of Biology, Greenville, NC
2014 University of North Carolina at Chapel Hill, Department of Marine Sciences/Institute for Ecology and the Environment, Chapel Hill, NC
2013 Virginia Commonwealth University, Department of Biology, Richmond, VA
2013 North Carolina State University, Department of Marine, Earth, and Atmospheric Science, Raleigh, NC
2013 University of Maryland Center for Environmental Science, Horn Point Laboratory, Cambridge, MD

2012 National Research Program, US Geological Survey, Reston VA
2012 University of North Carolina at Wilmington, Department of Geography and Geology, Wilmington NC
2012 North Carolina State University, Department of Marine, Earth, and Atmospheric Sciences, Raleigh NC
2011 University of Delaware, Department of Geology, Newark DE
2011 Cary Institute of Ecosystem Studies, Millbrook NY
2011 National Research Program, US Geological Survey, Reston VA
2011 Australian Rivers Institute, Griffith University, Brisbane, Australia
2010 University of North Carolina at Chapel Hill, Institute of Marine Sciences, Morehead City NC
2010 University of North Carolina at Wilmington, Department of Geography and Geology, Wilmington NC

Presentations and Exhibitions to Professional Organizations and Meetings

- Noe GB, SH **Ensign**, CR Hupp, KW Krauss, AR Korol, J Gillespie, N Bourg. 2018. Changes in sediment availability along upper estuaries create a sediment shadow: consequences for tidal freshwater wetland dynamics. Society for Wetland Science, Denver, CO.
Ensign SH. 2017. Planktos Instruments. National Environmental Monitoring Conference, Washington, DC.
Ensign SH. 2017. Planktos Instruments. Benthic Ecology Annual Meeting, Myrtle Beach, SC.
Ensign SH. 2017. Planktos Instruments. Society for Freshwater Science Annual Meeting, Raleigh, NC.

- Hall NS, A Schnetzer, SH **Ensign**, D Wiltsie, H Paerl. 2017. "Unraveling dual influences of increasing nutrients and changing flow regimes on bloom potentials along the middle Cape Fear River. North Carolina Water Resources Research Institute Annual Conference, Raleigh, NC.
- Ensign** SH. 2017. EnviroTech Summit, NC State University, Raleigh, NC.
- Noe GB, et al. 2017. "Nutrient and sediment inputs and release, soil structure, and biogeochemistry in floodplains: a comparison of natural and restored/created wetlands. Society of Wetland Scientists Annual Meeting, San Juan, Puerto Rico.
- Ensign** SH, GB Noe, CR Hupp. 2016 "Freshwater wetland landscapes and salinity intrusion", Association for the Sciences of Limnology and Oceanography Summer Meeting, Santa Fe, NM.
- Ensign** SH, C Currin. 2015 "Surface tension moves salt marsh sediment- you don't need Einstein's equations to build a marsh", Coastal and Estuarine Research Federation Biennial Conference, Portland, OR.
- Ensign** SH, J Gardner, M Doyle, R Neve. 2015 "Lagrangian river drifters reveal dissolved oxygen sinks in a large river", International Society for River Science, La Crosse, WI.
- Gardner J, **Ensign** SH, M Doyle, R Neve. 2015 "Eulerian versus Lagrangian perspectives on light in a large river", Society for Freshwater Sciences, Milwaukee, WI.
- Ensign** SH, C Currin. 2014. "Floating material is an alternative sediment source for salt marshes: Novel measurement methods and comparison with suspended sediment". South Atlantic Estuarine Research Society Meeting, Carolina Beach, NC.
- Ensign** SH. 2014. "Planktos Instruments: Future Technologies for Water Competition". Water and Health Conference 2014, UNC Chapel Hill Friday Center, Chapel Hill, NC.
- Ensign** SH. 2013. "Implications of discharge frequency and magnitude on water, carbon, and nitrogen flux through tidal freshwater rivers". Albemarle-Pamlico National Estuary Program Scientific and Technical Advisory Committee, Greenville, NC.
- Ensign** SH, G Noe, C Hupp. 2012. "Wetland sediment accretion and river channel hydrology along a salinity and tidal gradient from the non-tidal through oligohaline zone of two tidal rivers. AGU Chapman Conference: Hydrogeomorphic Feedbacks and Sea Level Rise in Tidal Freshwater River Ecosystems, Reston, VA.
- Ensign** SH, D Leech, M Piehler. 2012. "Habitat quality for river herring in the tidal freshwater Chowan River". Albemarle-Pamlico National Estuary Program Scientific and Technical Advisory Committee, Greenville, NC.
- Noe G, SH **Ensign**, C Hupp. 2011. "Tidal freshwater riverine wetlands: a unique system in the river-ocean continuum. International Estuarine Biogeochemistry Symposium, Atlantic Beach, NC.
- Siporin K, SH **Ensign**, M Piehler, M Doyle, L Leonard. 2011. "Landscape-scale controls of denitrification in tidal freshwater wetlands". International Estuarine Biogeochemistry Symposium, Atlantic Beach, NC.
- Leech DM, SH **Ensign**, MF Piehler. 2010. "A missing link: Zooplankton community dynamics in the absence of river herring in a coastal, blackwater river, North Carolina, USA". American Society of Limnology and Oceanography/North American Benthological Society Joint Meeting, Santa Fe, NM.
- Ensign** SH, MF Piehler, MW Doyle. 2010. "The influence of channel geomorphology on riparian shading and primary production in tidal freshwater rivers of the southeastern United States". American Society of Limnology and Oceanography/North American Benthological Society Joint Meeting, Santa Fe, NM.
- Ensign** SH, MF Piehler, MW Doyle. 2010. "Into the light: How geomorphology affects irradiance and primary production in tidal rivers". Benthic Ecology Meeting, Wilmington, NC.

- Mallin MA, VL Johnson, SH **Ensign**. 2010. "Landscape impacts on water quality in three oligohaline tidal creeks". Benthic Ecology Meeting, Wilmington, NC.
- Ensign** SH, M Doyle, M Piehler. 2009. "The evolution of tidal freshwater river geomorphology: Observations of short-term processes and speculation about long-term feedbacks". Coastal and Estuarine Research Federation Meeting, Portland, OR.
- Mallin M, M McIver, SH **Ensign**. 2009. "Comparative hypoxia drivers and impacts in adjacent riverine and lagoonal estuaries in North Carolina". Coastal and Estuarine Research Federation Meeting, Portland, OR.
- Ensign** SH. 2009. "Tidal freshwater rivers: The hydrologic nexus linking nutrient and fishery management". EPA STAR Graduate Fellowship Conference, Washington, DC.
- Piehler M, A Smyth, S **Ensign**. 2009. "Habitat specific rates of denitrification within the estuarine continuum". Society of Wetland Scientists Annual Meeting, Madison, WI.
- Ensign** SH, M Piehler, DM Leech. 2009. "Caught in the crossfire: Phytoplankton response to nutrient management and anadromous fish restoration". Ecological Society of America Annual Meeting, Albuquerque, NM.
- Doyle MW, SH **Ensign**. 2009. "Alternative reference frames in river system science". North American Benthological Society Annual Meeting, Grand Rapids, MI.
- Mallin MA, MR McIver, SH **Ensign**, J Lin. 2009. "Water column hypoxia in adjacent riverine and lagoonal estuaries in North Carolina". Meeting of the Southeastern Estuarine Research Society, Conway, SC
- Ensign** SH, MF Piehler, MW Doyle. 2008. "The ebb and flood of tidal freshwater rivers affect watershed denitrification: A missing link in river basin nitrogen budgets". Ecological Society of America Annual Meeting, Milwaukee, WI.
- Ensign** SH, MF Piehler, MW Doyle. 2007. "Nitrogen cycling in the riparian zone of a tidal freshwater river". North American Benthological Society Annual Meeting, Columbia, SC.
- Ensign** SH, MF Piehler, MW Doyle. 2007. "Celestial controls on nitrogen cycling in a tidal freshwater river". Southeastern Estuarine Research Society Meeting, Atlantic Beach, NC.
- Blum J, SH **Ensign**, S Slingsby, L Cahoon. 2007. "El Nino – Southern Oscillation effects on river discharge in the southeast United States: Coupling with the coastal ocean". Southeastern Estuarine Research Society Meeting, Atlantic Beach, NC.
- Ensign** SH, MF Piehler. 2006. "Transformations of carbon within the tidal freshwater zone of estuaries". Southeastern Estuarine Research Society Meeting, Savannah, GA.
- Piehler MF, SH **Ensign**, S Thompson. 2006. "Phytoplankton-nutrient relationships in the tidal freshwater zone of the Newport River, North Carolina". Southeastern Estuarine Research Society Meeting, Savannah, GA.
- Smyth A, D Velinsky, S **Ensign**, M Piehler, M Vile. 2006. "Two marshes, one problem: the effects of sea level rise on tidal freshwater marshes". Southeastern Estuarine Research Society Meeting, Savannah, GA.
- Ensign** SH, MW Doyle. 2006. "Nutrient spiraling through stream networks: a quantitative synthesis of 25 years of nutrient biogeochemical research". North American Benthological Society Annual Meeting, Anchorage, AK.
- Ensign** SH, MF Piehler, KG Fisher, MW Doyle. 2006. "Linking forested wetlands to estuaries: Nutrient dynamics and aquatic-terrestrial linkages in tidal freshwater streams of the Croatan National Forest drainage system". International Conference on Hydrology and Management of Forested Wetlands, New Bern, NC.

- Ensign** SH, MF Piehler, MW Doyle. 2006. "Effect of tidal hydrology on denitrification in a coastal freshwater stream". North Carolina Water Resources Research Institute Annual Conference, Raleigh, NC.
- Ensign** SH, HW Paerl. 2006. "Development of an unattended water quality monitoring system (FerryMon) for the Neuse River Estuary". North Carolina Water Resources Research Institute Annual Conference, Raleigh, NC.
- Ensign** SH, MW Doyle. 2004. "Quantifying controls on transient storage and nutrient retention using channel manipulations". American Society of Limnology and Oceanography, Savannah, GA.
- Mallin MA, VL Johnson, TA MacPherson, SH **Ensign**. 2004. "Biochemical oxygen demand variability in rural and urban southeastern streams". American Society of Limnology and Oceanography, Savannah, GA.
- Mallin MA, MR McIver, SH **Ensign**, JM Burkholder, PA Rublee. 2002. "Eutrophication and the distribution of Pfiesteria in urbanized tidal creeks." Tenth International Conference on Harmful Algae, St. Petersburg, Fla.
- Ensign** SH, JN Halls, MA Mallin. 2002. "Flushing times of the Cape Fear River and New River estuaries, North Carolina". Duke University Marine Lab Graduate Student Mini-Symposium, Beaufort, NC.
- Ensign** SH, MA Mallin. 2002. "Nitrogen dynamics of the Cape Fear and New River estuaries". Meeting of the Southeastern Estuarine Research Society, Savannah, SC.
- Cahoon LB, SH **Ensign**. 2001. "Assessing risks to water quality: variation in soil phosphorus levels in eastern North Carolina with time and land use". Annual Meeting of the North Carolina Academy of Science, Raleigh, NC.
- Ensign** SH, JN Halls, MA Mallin. 2001. "Flushing time of the Cape Fear River Estuary". Meeting of the Southeastern Estuarine Research Society, Charleston, SC.
- Mallin MA, LB Cahoon, MR McIver, DC Parsons, SH **Ensign**. 2001. "Impacts of industrial swine and poultry production on nutrient loading to Coastal Plain rivers. North American Benthological Society Meeting, LaCrosse, WI.
- Mallin MA, LB Cahoon, MR McIver, SH **Ensign**. 2001. "Seeking science-based ambient nutrient standards for blackwater systems". Annual North Carolina Water Resources Research Conference, Raleigh, NC.
- Mallin MA, MR McIver, SH **Ensign**, LB Cahoon. 2001. "Co-occurrence of phytoplankton N-limitation and heterotrophic P-limitation in blackwater streams". Annual Meeting of the American Society for Limnology and Oceanography, Albuquerque, NM.
- Mallin MA, MR McIver, DC Parsons, SH **Ensign**, GC Shank, VL Johnson, HA CoVan. 2001. "Preliminary impacts of sewage diversion on the New River Estuary". Meeting of the Southeastern Estuarine Research Society, Charleston, SC.
- Cahoon LB, MA Mallin, SH **Ensign**. 2000. "Environmental effects of geographic concentrations of confined animal feeding operations in the Black and Northeast Cape Fear River basins". Annual Meeting of the American Fisheries Society, St. Louis, MS.
- Mallin MA, LB Cahoon, SH **Ensign**, VL Johnson. 2000. "Domesticated animals as major sources of nutrient loading to the North Carolina Coastal Plain". Meeting of the Southeastern Estuarine Research Society, Tampa, FL.
- Mallin MA, LB Cahoon, SH **Ensign**, MR McIver. 2000. "Algal, bacterial, and BOD responses to nutrient gradients in coastal plain watersheds". UNC Water Resources Research Institute Seminar Series, Raleigh, NC.
- Mallin, MA, SH **Ensign**, MR McIver, GC Shank. 2000. "Land use, runoff, and microbial pollution of river and estuaries". Annual North Carolina Water Resources Research Conference, Raleigh, N.C.

- Mallin MA, MR McIver, SH **Ensign**, DC Parsons. 2000. "Ecological damage and fish kills resulting from hurricanes in the Cape Fear River and Estuary". Annual Meeting of the North Carolina Chapter of the American Fisheries Society, New Hill, NC.
- Mallin MA, MR McIver, SH **Ensign**, DC Parsons, MH Posey, TD Alphin. 2000. "Acute impacts of swine and poultry wastes on stream fish habitat". Annual Meeting of the American Fisheries Society, St. Louis, MS.
- Parsons DC, MA Mallin, SH **Ensign**, MR McIver, J Cook, VL Johnson. 2000. "Effects of physical parameters on fecal coliform abundance in five tidal creeks in New Hanover County, North Carolina". SEERS/AERS/Benthic Ecology Meeting, Wilmington, NC.
- Ensign** SH, MA Mallin. 1999. "Effects of Timber Harvesting on Water Quality of the Goshen Swamp". UNC Water Resource Research Institute Annual Conference, Raleigh, NC.
- Mallin MA, MR McIver, SH **Ensign**, GC Shank. 1999. "Anthropogenic and meteorological factors influencing microbial pollution of coastal streams and estuaries". Meeting of the Southeastern Estuarine Research Society, Jacksonville, FL.
- Mallin MA, MR McIver, GC Shank, SH **Ensign**, DC Parsons. 1999. "Comparative effects of Hurricanes Fran and Bonnie on the Cape Fear Watershed". Annual North Carolina Water Resources Research Conference, Raleigh, NC.
- Wheeler TW, MA Mallin, DC Parsons, SH **Ensign**. 1999. "Pollutant removal efficacy of three coastal plain wet detention ponds". Annual North Carolina Water Resources Research Conference, Raleigh, NC.
- Mallin MA, LB Cahoon, DC Parsons, SH **Ensign**. 1998. "Nutrient limitation of photosynthetic and heterotrophic plankton in blackwater rivers". Annual Meeting of the American Society for Limnology and Oceanography, St. Louis, MS.
- Mallin MA, SH **Ensign**, MR McIver, DC Parsons, CA Preziosi, GC Shank, TL Wheeler. 1998. "Environmental impacts of Hurricane Bonnie in the Cape Fear Watershed". Meeting of the Southeastern Estuarine Research Society, Georgetown, SC.
- Mallin MA, MR McIver, GC Shank, DC Parsons, SH **Ensign**. 1998. "Geography and biological responses of North Carolina estuaries". Meeting of the Southeastern Estuarine Research Society Meeting, Athens, GA. (Invited).
- McIver MR, SH **Ensign**, MA Mallin, DP Parsons, TL Wheeler, AR Skeen. 1998. "Nutrient and algal dynamics in the New River estuary, North Carolina". Annual Meeting of the Southeastern Estuarine Research Society, Georgetown, SC.
- Parsons DC, MA Mallin, TL Wheeler, SH **Ensign**, MR McIver. 1998. "Spatial and temporal water quality patterns in five tidal creeks in southeastern North Carolina". Annual Meeting of the Southeastern Estuarine Research Society, Athens, GA.
- Mallin MA, LB Cahoon, DC Parsons, SH **Ensign**. 1997. "Effect of swine waste on blackwater systems: Field and experimental data". North Carolina Water Resources Research Institute Seminar Series, Raleigh, NC.
- Shank GC, MA Mallin, MH Posey, MR McIver, SH **Ensign**, TD Alphin. 1997. "The effects of Hurricane Fran on water quality and benthos in the Cape Fear River, North Carolina". Biannual Meeting of the Estuarine Research Federation, Providence, RI.
- Mallin MA, GC Shank, MR McIver, SH **Ensign**. 1996. "Hurricane effects on water quality of the Cape Fear Estuary". Annual Meeting of the Southeastern Estuarine Research Society, Atlantic Beach, NC.

Technical Reports and Reviewed Theses

- Defense Coastal/Estuarine Research Program 2 (DCERP2)** Final Report. 2017. RTI International, Research Triangle Park, NC
- Defense Coastal/Estuarine Research Program 2 (DCERP2)** Annual Report. 2016. RTI International, Research Triangle Park, NC
- Defense Coastal/Estuarine Research Program 2 (DCERP2)** Annual Report. 2015. RTI International, Research Triangle Park, NC
- Defense Coastal/Estuarine Research Program 2 (DCERP2)** Annual Report. 2014. RTI International, Research Triangle Park, NC
- Leech, D., S.H. **Ensign**, M Piehler, H. Byrum, B. Byrum. 2011. Zooplankton assessment project (ZAP): Reassessing prey availability for river herring in the Chowan River Basin- Year 2. NC Sea Grant FRG 08-EP-06 Final Report.
- Ensign** SH. 2010. The biogeochemistry and ecology of tidal freshwater rivers. Ph.D. dissertation, University of North Carolina at Chapel Hill
- Mallin MA, SH **Ensign**, MR McIver. 2006. A water quality assessment of the upper Town Creek watershed, North Carolina. A report prepared for the North Carolina Coastal Land Trust by Aquatic Analysis and Consulting, Wilmington, NC.
- AquaCo**. 2006. Evaluation of sediment curtain efficacy and water quality during dredging at Oceana Marina, Carolina Beach, North Carolina. Aquatic Analysis and Consulting, Wilmington, NC.
- Ensign** SH. 2004. Nutrient dynamics in coastal North Carolina: spatial/temporal variation and processes influencing nitrogen and phosphorus uptake. M.S. thesis, University of North Carolina at Chapel Hill.
- Mallin MA, LB Cahoon, MR McIver, SH **Ensign**. 2002. Seeking science-based nutrient standards for coastal blackwater stream systems. Report No. 341. Water Resources Research Institute of the University of North Carolina, Raleigh, N.C
- Mallin MA, MH Posey, TE Lankford, MR McIver, SH **Ensign**, TD Alphin, MS Williams, ML Moser, JF Merritt. 2001. Environmental Assessment of the Lower Cape Fear River System, 2000-2001. CMS Report No. 01-01. Center for Marine Science, University of North Carolina at Wilmington, NC.
- Mallin MA, MH Posey, MR McIver, SH **Ensign**, TD Alphin, MS Williams, ML Moser, JF Merritt. 2000. Environmental Assessment of the Lower Cape Fear River System, 1999-2000. CMS Report No. 00-01. Center for Marine Science, University of North Carolina at Wilmington, N.C.
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