

CURRICULUM VITAE

For

Kenneth W. Staver

Date Prepared:

September 2022

- I. Notarization: I have read the following and certify that this curriculum vitae is a current statement of my professional record

Kenneth W. Staver

Date

II. Personal Information

Name: Kenneth Winfield Staver

Position: Associate Research Scientist
University of Maryland
College of Agriculture and Natural Resources
Wye Research and Education Center

Office Address: 124 Wye Narrows Drive
Queenstown MD 21658

Home Address: 3121 Price Station Road
Centreville, MD 21617

Date of Birth: July 11, 1956

Educational Background:

<u>Degree</u>	<u>Institution</u>	<u>Date</u>	<u>Major</u>
Ph.D.	University of Maryland	1994	Agricultural Engineering
M.S.	University of Maryland	1984	Estuarine Science
B.A.	Cornell University	1979	Biology

Professional Licenses: Fundamentals of Engineering Exam (EIT), passed 10/90

Current Position Description (1994-present): My current position is an Associate Research Scientist in the University of Maryland College of Agriculture and Natural Resources. In addition, from 2015 through 2020, I served as the acting director of the Wye Research and Education Center. The research component of my position is not affiliated with an academic department and is primarily grant-funded. I am housed at the Wye Research and Education Center which is the flagship off-campus research facility of the Maryland Agricultural Experiment Station. In my research role, I currently supervise three technicians and oversee the operation of a water and soil analytical laboratory, and data collection and processing from a class A weather station. My current USDA MFA Hatch Project (UMD-WREC-19006) is titled "Mechanistic Drivers of Nutrient Transport in Maryland Agroecosystems". My overall research objective has been the development of strategies for reducing nutrient transport rates from cropland through both surface and subsurface flow. My approach to this objective initially focused only on evaluating in-field hydrologic and nutrient transport processes and evaluation of practices designed to control soil erosion or subsurface nitrate transport. After the first decade, my research focus shifted to include larger watershed scale nutrient cycling issues associated with crop and animal production, and the associated human waste streams. Recently I have initiated several multidiscipline studies that take a systems level approach to solving local water quality problems as well as the global greenhouse gas problem. I also have an interest in the role that biofuel production and utilization could play in reducing environmental degradation associated with agricultural production. I work closely with local, state, and Federal agencies to bring research findings into policy discussions about reducing the environmental impacts of agricultural production. For the last two decades I also have been working closely with Maryland Environmental Services on plant-soil-water quality issues associated with upland placement of sediments removed from Chesapeake Bay shipping lanes. My recent research activities include: a long-term paired watershed study of nutrient loss patterns under differing management systems, development of a GIS-based soil phosphorus tracking system for increasing the efficacy of watershed scale efforts to reduce phosphorus losses, development of large scale strategies for restoring fine-grained sediments dredged from Chesapeake Bay shipping lanes to terrestrial soil, improving the USDA NRCS Conservation Effects Assessment Program winter cover crop simulation component, a project assessing changes in nitrate losses from cropland in the Choptank River during the last decade, and a scale-up field study of the use of

switchgrass in riparian buffers for biofuel production and control of subsurface nitrate losses. My involvement with the US EPA Chesapeake Bay Program has increased in the last decade years in an effort to make the Bay watershed model more mechanistically consistent with research findings.

III. Academic Activities

A. Positions Held

1979-1981

Position: Faculty Research Assistant-full time

Employer: University of Maryland, Horn Point Environmental Laboratory, Cambridge, Maryland

Description: Field research assistant on an EPA funded study of the Chesapeake Bay, with the primary emphasis on the role of submerged vegetation in the Bay ecosystem and the factors leading to its decline. Research activities included fish and invertebrate sampling, water quality monitoring and both qualitative and quantitative assessment of rooted vascular plant communities.

1981-1984

Position: Graduate Research Assistant-full time

Employer: University of Maryland, Horn Point Environmental Laboratory, Cambridge, Maryland

Description: Conduct microcosm, pond, and field studies on the effects of nitrogen and phosphorus enrichment on competitive interactions between algal and vascular plant communities in Chesapeake Bay.

1984_89

Position: Graduate Research Assistant-full time

Employer: University of Maryland, Wye Research and Education Center, Queenstown, Maryland

Description: Conducted field research on hydrologic pollutant transport from agricultural watersheds. Research activities included collection of field data necessary for determination of mass transport of nitrogen, phosphorus, and sediment as well as triazine herbicides from agricultural systems through surface and subsurface hydrologic flow paths.

1989-1993

Position: Faculty Research Assistant-full time

Employer: University of Maryland, Wye Research and Education Center, Queenstown, Maryland

Description: Continued watershed research described above, and extended research to include groundwater flow processes through riparian areas and at the estuarine discharge interface. Also initiated field studies on nitrate leaching problems and possible solutions associated with land application of sewage sludge and animal wastes.

IV. Research

A. Publications

1. Articles in Refereed Journals

- Twilley, R.R., W. Kemp, K. Staver, J. Stevenson, and W. Boynton. 1985. Nutrient enrichment of estuarine submersed vascular plant communities I. Algal growth and effects on production of plants and associated communities. *Mar. Ecol. Prog. Ser.* 23:179-191.
- Shirmohammadi, A., W. Magette, R. Brinsfield, and K. Staver. 1989. Ground water loading of pesticides in the Atlantic Coastal Plain. *Ground Water Monitoring Review*. pp 141-148.
- Brinsfield, R.B. and K. Staver. 1990. Addressing groundwater quality in the 1990 Farm Bill. *Journal of Soil and Water Conservation* 45: 285-286.
- Staver, K.W. and R. Brinsfield. 1990. Patterns of soil nitrate availability in corn production systems: Implications for reducing groundwater contamination. *Journal of Soil and Water Conservation* 45: 318-322.
- Stevenson, J., L. Staver, and K. Staver. 1993. The survival of submersed aquatic vegetation along an estuarine gradient. *Estuaries* 16:347-359.
- Staver, L., K. Staver, and J. Stevenson. 1996. Watershed discharge effects on water quality in the Choptank River estuary: Implications for watershed management. *Estuaries* 19:342-358.
- Staver, K.W. and R. Brinsfield. 1996. Groundwater nitrate seepage into the Wye River estuary from a riparian agroecosystem. *Estuaries* 19:359-370.
- Lowrance, R., L. Altier, J. Newbold, R. Schnabel, P. Groffian, J. Denver, D. Correll, J. Gilliam, J. Robinson, R. Brinsfield, K. Staver, W. Lucas, and A. Todd. 1997. Water quality functions of riparian forest buffer systems in Chesapeake Bay watersheds. *Environmental Management* 21:687-712.
- Staver, K.W. and R. Brinsfield. 1998. Using cereal grain winter cover crops to reduce groundwater nitrate contamination in the Mid-Atlantic Coastal Plain. *Journal of Soil and Water Conservation* 53: 230-240. (received best 1998-99 JSWC feature article award).
- Staver, K.W. and R. Brinsfield. 2001. Agriculture and water quality on the Maryland Eastern Shore: Where do we go from here? *Bioscience* 51: 859-868.
- Rutherford, D.W., A. Bedner, J. Garbarino, R. Needham, K. Staver, and R. Wershaw. 2003. Environmental fate of roxarsone in poultry litter. Part II. Mobility of arsenic in soils that have been amended with poultry manure. *Environmental Science and Technology* 37: 1515-1520.
- Yonkos, L.T., D. Fisher, P. Van Veld, A. Kane, B. McGee, and K. Staver. 2010. Poultry litter-induced endocrine disruption in fathead minnow, Sheepshead Minnow and mummichog laboratory exposures. *Environmental Toxicology and Chemistry* 29:2328-2340.
- Kim, S.-H., Y. Yang, D. Timlin, D. Fleisher, A. Dathe, V.R. Reddy and K. Staver. 2012. Improved temperature functions for simulation of leaf growth and biomass with the Maize model MAIZSIM. *Agronomy Journal* 104: 1523-1537.
- Yang, Y., D. Timlin, D. Fleisher, S. Lokhande, J. A. Chun, S. Kim, K. Staver and V. Reddy. 2012. Nitrogen concentration and dry matter accumulation in maize crop: assessing maize nitrogen status with allometric function and a chlorophyll meter. *Communications in Soil Science and Plant Analysis* 43:1563-1575.

Fisher, D.J., L.T. Yonkos and K.W. Staver. 2015. The Environmental Concerns of Roxarsone in Broiler Poultry Feed and Litter in Maryland, U.S.A. - A Critical Review. *Environ. Sci. Technol.* 49:1999-2012. DOI: 10.1021/es504520w.

Spadafora, E, A.W. Leslie, L.E. Culler, R.F. Smith, K.W. Staver, and W.O. Lamp. 2016. Macroinvertebrate community convergence between natural, rehabilitated, and created wetlands on the Delmarva Peninsula. *Restoration Ecology*: doi: 10.1111/rec.12352.a.

Stocker, M.D., Y.A. Pachepsky, R.L. Hill, K.G. Seliner, D. Macarasin, and K.W. Staver. 2019. Intraseasonal variation of *E. coli* and environmental covariates in two irrigation ponds in Maryland, USA. *Science of the Total Environment*. 670:732-740.

Timlin, D, J.A. Chun, J. Meisinger, K. Kang, D. Fleisher, K. Staver, C. Doherty, and A. Russ. 2019. Evaluation of the agricultural policy environmental extender (APEX) for the Chesapeake Bay watershed. *Agricultural Water Management* 221: 477-485.

Staver, L.W., J.C. Stevenson, J.C. Cornwell, N.J. Nidzieko, K.W. Staver, M.S. Owens, L. Logan, C. Kim, and S.Y. Malkin. 2020. Tidal marsh restoration at Poplar Island: II. Elevation trends, vegetation development, and carbon dynamics. *Wetlands*. Springer. <https://doi.org/10.1007/s13157-020-01295-4>

Staver, L.W., J.C. Cornwell, N.J. Nidzieko, K.W. Staver, J.C. Stevenson, M. Owens, W. Boynton, and L. Lopez-Gonzales. 2021. The fate of nitrogen in dredged material used for tidal marsh restoration. *J. Mar. Sci. Eng.* 9:849. <https://doi.org/10.3390/jmse9080849>

2. Refereed Book Contributions

Boynton, W.R., W. Kemp, A. Herman, K. Staver, et al. 1982. An analysis of energetic and economic values associated with the decline of submerged macrophytic communities in Chesapeake Bay. In: W. Mitsch, R. W. Bosserman, and J. M. Klopatek (eds.) *Energy and Ecological Modeling*. Elsevier, Amsterdam.

Staver, K.W., R. Brinsfield, and J. Stevenson. 1989. The effect of best management practices on nitrogen transport into Chesapeake Bay. In: J. B. Summers and S. S. Anderson (eds.) *Toxic Substances in Agricultural Water Supply and Drainage*. U. S. Committee on Irrigation and Drainage, Denver, CO. pp 163-180.

Staver, K.W. and R. Brinsfield. 1991. Monitoring agrochemical transport into shallow unconfined aquifers. In: *Agrochemical Residue Sampling Design and Techniques: Soil and Groundwater*. American Chemical Society Symposium Series No. 465. pp 264-278.

Fisher, T.R., T. Jordan, K. Staver, A. Gustafson, A. Koskela, R. Fox, A. Sutton, T. Kana, K. Beckert, J. Stone, G. McCarty, and M. Lang. 2010. The Choptank Basin in transition: intensifying agriculture, slow urbanization, and estuarine eutrophication. In: M.J. Kennish and H.W. Paerl (eds.) *Coastal Lagoons: Systems of Natural and Anthropogenic Change*. CRC Press. Pp 135-165.

Staver, K.W. 2020. The growing role of dissolved nutrients in soil and water conservation. In: J.A. Delgado, C.J. Gantzer, and G.F. Sassenrath (eds.) *Soil and Water Conservation: A Celebration of 75 years*. 183-196. Soil and Water Conservation Soc., Ankeny, IA.

3. Refereed Proceedings

- Staver, K.W. and R. Brinsfield. 1991. Groundwater discharge patterns in Maryland Coastal Plain agricultural systems. In: J. Mihursky and A. Chaney (eds.) *New Perspectives in the Chesapeake System*. 593-603. CRC Pub. No. 137, Chesapeake Research Consortium, Solomons, MD.
- Brinsfield, B. and K. Staver. 1991. The use of cereal grain cover crops for reducing groundwater nitrate contamination in the Chesapeake Bay region. In: W.L. Hargrove (ed.) *Cover Crops for Clean Water*. 79-82. Soil and Water Conservation Soc., Ankeny, IA.
- Staver, K.W. and R. Brinsfield. 1991. Effect of cereal grain winter cover crops on surface water pollutant transport from Coastal Plain corn production systems. In: W. L. Hargrove (ed.) *Cover Crops for Clean Water*. 50-52. Soil and Water Conservation Soc., Ankeny, IA.
- Staver, K.W, R. Brinsfield, and W.L. Magette. 1991. Relating nitrogen uptake by cereal grain winter cover crops to changes in groundwater nitrate concentration. In: W. L. Hargrove (ed.) *Cover Crops for Clean Water*. 77-79. Soil and Water Conservation Soc., Ankeny, IA.
- Staver, K.W. and R. Brinsfield. 1993. Groundwater/Estuarine interactions in a Coastal Plain riparian agroecosystem. In: R. (ed.) *Riparian Ecosystems in the Humid U.S.* 256-276. National Assoc. of Soil Conserv. Districts, Washington, DC.
- Staver, KN. and R. Brinsfield. 1995. The effect of erosion control practices on phosphorus transport from Coastal Plain agricultural watersheds. In: *Proceedings 1994 Chesapeake Bay Research Conference*. 215-222. CRC Pub. No. 149, Chesapeake Research Consortium, Edgewater, MD.
- Staver, K.W. and R. Brinsfield. 1995. Edge-of-field nutrient losses during the 1993 spring freshet. In: *Proceedings 1994 Chesapeake Bay Research Conference*. 537-543. CRC Pub. No. 149, Chesapeake Research Consortium, Edgewater, MD.
- Staver, K.W. 2001. Increasing N retention in Coastal Plain agricultural watersheds. In: *Optimizing Nitrogen management in Food and Energy Production and Environmental Management: Proceedings of the 2nd International Nitrogen Conference on Science and Policy*. The Scientific World 1: 207-215.
- Volk, T.A., L.P. Abrahamson, K.D. Cameron, P. Castellano, T. Corbin, E. Fabio, G. Johnson, Y. Kuzovkina-Eischen, M. Labrecque, R. Miller, D. Sidders, LB. Smart, K. Staver, G. R. Stanosz, and K. Van Rees. 2011. Yields of willow biomass crops across a range of sites in North America. *Aspects of Applied Biology, Biomass and Energy Crops IV*.

4. Bulletins and Reports

- Staver, K.W., W. Kemp, and W. Boynton. 1981. Interactions between macrophytes and their epiphytic communities as related to plant distribution and abundance in the Chesapeake Bay. In: Kemp, W. M., Boynton, W. R., Stevenson, J. C, Means, J. C. (ed.) *Submerged Aquatic Vegetation in Chesapeake Bay*. University of Maryland, Center for Environmental and Estuarine Studies, Ref. No. HPEL-81-28.
- Staver, K.W., W. Boynton, and W. Kemp. 1981. The epifauna communities associated with two different submerged grass beds in the euryhaline region of the Chesapeake Bay. In: Kemp, W.M., Boynton, W.R., Stevenson, J.C., Means, J. C. (eds.) *Submerged Aquatic Vegetation in Chesapeake Bay*. University of Maryland, Center for Environmental and Estuarine Studies, Ref. No. HPEL-81-28.
- Brinsfield, R. B, K. Staver, and W. Magette. 1988. Quantification of pesticide losses by leaching and runoff in tilled and untilled fields in the Chesapeake Bay region. Final Report Contract Number USDA-TPSU-UM 2077-410, USDA-CSRS-Northeast Pesticide Impact Assessment Program.

Brinsfield, R. B. and K. Staver. 1991. Strategies for reducing pesticide movement from agricultural land in the Chesapeake Bay region. Final Report Contract No. USDA-TPSU-UM-3361-523, USDA-CSRS Northeast Pesticide Impact Assessment Program.

Brinsfield, R. B. and K. Staver. 1991. The role of cover crops in reduction of cropland nonpoint source pollution. Final Report USDA-SCS Cooperative Agreement No. 25087.

Staver, K. W. and R. Brinsfield. 1993. Coupling of agricultural watersheds and coastal waters. Final Report Maryland Depart. Environ., FFY90 Section 319(h) Grant.

Staver, K. W. and R. Brinsfield. 1993. Spatial and temporal scaling of hydrologic components. Final Report to C.E.E.S EPA Multiscale Experimental Ecosystem Research Center (MEERC).

Staver, K.W. and R. Brinsfield. 1995. Assessing the impact of changes in management practices on nutrient transport from Coastal Plain agricultural systems. Final Report, CRC CA NPS#3, Chesapeake Research Consortium, Edgewater, MD. 82 p.

Lowrance, R., L. Altier, J. Newbold, R. Schnabel, P. Groffimn, J. Denver, D. Correll, J. Gilliam, J. Robinson, R. Brinsfield, K. Staver, W. Lucas, and A. Todd. 1995. Water quality functions of riparian forest buffer systems in the Chesapeake Bay watershed. EPA 903-R-95-004,C CBP/TRS 134/95. Chesapeake Bay Program, Annapolis, MD.

Staver, K. W. and R. Brinsfield. 1996. Evaluating changes in subsurface nitrogen discharge from an agricultural watershed into Chesapeake Bay after implementation of a groundwater protection strategy. Final Report Maryland Depart. Environ., FFY94 Section 319 Grant. Project 361-C-MDE94. 76 p.

Staver, K.W. and R. Brinsfield. 1998. Crop management systems for reduction of hydrologic nutrient transport. Final Report Maryland Department of Agriculture (Governor's Council on Chesapeake Bay Research). 121 p.

Staver, K.W. and R. Brinsfield. 1998. Using cereal grains to minimize nitrogen leaching losses. Maryland Grain Producers Utilization Board. Grant 98107. 36 p.

Staver, K. W. and R. Brinsfield. 2000. Evaluating changes in subsurface nitrogen discharge from an agricultural watershed into Chesapeake Bay after implementation of a groundwater protection strategy. Final Report Maryland Depart. Environ., Section 319 Grant. Project 14-98-340-EPA-029. 92 p.

Staver, K.W. 2001. The effect of agricultural best management practices on subsurface nitrogen transport in the German Branch watershed. Final Report submitted to Maryland Department of Natural Resources Coastal Zone Management Division, Project 14-198-346czm025.

Staver, K.W. 2003. Developing options for direct application of dredge material to cropland. Final Report Final Report submitted to Maryland Environmental Services. 63 p.

Staver, K.W. 2004. Efficient utilization of poultry litter in cash grain rotations. Final Report submitted to: Maryland Grain Producers Utilization Board, Delmarva Poultry Industry, Inc., and Maryland Center for Agro-Ecology, Inc. 73 p.

Staver, K.W., 2004. Linking field nutrient levels to nutrient losses in the Pocomoke watershed. Final Report submitted to Maryland Department of the Environment.

Angel, R., T. Applegate, L.G. Becker, D. Burnham, B. Humphrey, G. Malone, M.A. Ottinger, T. Sims, K. Staver, K. Powers. 2006.. Broiler production and the environment: 2006. Pub. EB 368, U. MD. College of Agriculture and Natural Resources, College Park, MD. 36 p.

Staver, CP., L. Garcia, J. Haggard, K.W. Staver, R. Munguia, M. Barrios, EM. Virginio, V.H. Caceres, G. Soto, and P. Aguilar. 2006. Sustainable production systems of perennial crops under shade: efficiency and effectiveness of nutrient use in Central American coffee. Final Report to USDA. 138 p.

Staver, K.W. 2006. Establishing baseline subsurface nitrate levels in the Corsica River watershed. Final Report submitted to Maryland Department of Natural Resources.

Staver, K.W. 2007. Making corn more Bay friendly. In: Biofuels and the Bay: Getting it right to benefit farms, forests, and the Chesapeake. Report to the Chesapeake Bay Commission. pp 16-17.

Staver, K.W. 2008. Subsurface nitrate levels in the Corsica River watershed: Cover crop implementation results. Final Report submitted to Maryland Department of Natural Resources.

Staver, K.W., G. Dively, P. Blank, and J. Nelson. 2009. Optimizing benefits from riparian buffers. Final Report submitted to National Fish and Wildlife Foundation.

Staver, K.W. 2010. Stormwater runoff characteristics from a newly constructed subdivision in the Corsica River watershed. Final Report submitted to Maryland Department of Natural Resources. 44 pp.

Staver, K.W. and R. Chaney. 2011. Developing options for upland placement of Chesapeake Bay dredge materials — II: long term leachate/plant nutrient monitoring and risk assessment. Final Report submitted to Maryland Environmental Services. 60 pp.

Fisher, D.J., L.T. Yonkos and K. Staver. 2011. The Environmental Concerns of Arsenic Additives in Poultry Litter - Literature Review. HCAE Pub 2011-05. Harry R. Hughes Center for Agro-Ecology, Inc., Queenstown, MD. 44 pp.

Hirsch, R., E. Yagow, M. Ribaud, K.G. Seliner, J.K. Bohlke, K. Staver, K. Boomer. 2013. Incorporating Lag-Times Into the Chesapeake Bay Program. US EPA STAC Publication Number 13004, Edgewater, MD. 66 pp.

Fisher, D.J., L.T. Yonkos and K.W. Staver. 2013. The Environmental Concerns of Arsenic Additives in Poultry Litter and the Maryland Ban on Arsenic Additives in Poultry Feed. Extension Fact Sheet (FS-947). University of Maryland, College of Agriculture and Natural Resources, University of Maryland Extension, College Park, MD.

Belt, K., P. Groffman, D. Newbold, C. Hession, G. Noe, J. Okay, M. Southerland, G. Speiran, K. Staver, A. Hairston-Strang, D. Weller, and D. Wise. 2014. Recommendations of the Expert Panel to Reassess Removal Rates for Riparian Forest and Grass Buffers Best Management Practices. Final panel report submitted to the EPA Chesapeake Bay Program Forestry Workgroup. US EPA Chesapeake Bay Program, Annapolis, MD. 93 pp.

Staver, K., P. Kleinman, S. Ator, A. Buda, Q. Ketterings, J.T. Sims, and J. Meisinger. 2014. A review of agricultural P-dynamics in the Chesapeake Bay Watershed Model. US EPA STAC Publication Number 14-006, Edgewater, MD. 20 pp.

Fisher, D.J., K.W. Staver and L.T. Yonkos. 2015. Effect of Different Tillage Practices (Vertical Tillage and Subsurface) on the Surface Runoff of Nutrients and Fecal Steroids from Poultry Litter

Amended Fields: And the 2012 Changes to Maryland's Nutrient Management Guidelines. Extension Fact Sheet (FS-1017). University of Maryland, College of Agriculture and Natural Resources, University of Maryland Extension, College Park, MD.

Staver, K.W. 2016. Developing Treatment Strategies for Meeting Short and Long-term Water Quality Discharge Standards for the North Cell of Hart-Miller Island. Final Report submitted to Maryland Environmental Services. 73 pp.

Mason, P., R. Spagnola, K. Boomer, D. Clearwater, D. Davis, J. Denver, J. Hatranft, M. Henicheck, E. McLaughlin, J. Miller, K. Staver, S. Strano, Q. Stubbs, J. Thompson, and T. Uybarreta. 2016. Wetlands and Wetland Restoration: Recommendations of the Wetland Expert Panel for the incorporation of non-tidal wetland best management practices and land uses in the Phase 6 Chesapeake Bay Watershed Model, Final panel report submitted to the US EPA Chesapeake Bay Program, Annapolis, MD. CBP/TRS-314-16. 266 pp

Staver, K., C. White, J. Meisinger, P. Salon, and W. Thomason. 2017. Definitions and recommended nutrient reduction efficiencies of cover crop practices for use in Phase 6.0 of the Chesapeake Bay Watershed model, Submitted by Phase 6.0 cover crops expert panel — Panel Chair.

Staver, K.W. 2017. Environmental Benefits from Establishing a Switchgrass Production Base in the Chester River Watershed. Final Project report delivered to the Harry R. Hughes Center for AgroEcology, Inc., Queenstown, MD.

Lansing, S., J. Kays, K. Staver, A. Hassanein and D. Schiavone. 2019. Sustainable Farm Energy Production and Use. Multistate Research Project NECC 1501 Annual Station Report.

5. Professional Papers Presented

a. Invited Presentations with Published Proceedings

Stevenson, J.C., K. Staver, and R. Brinsfield. 1986. Surface runoff and groundwater impacts from agricultural activities in the Chesapeake Bay region. In: J. Summers and S. Anderson (eds.) Toxic Substances in Agricultural Water Supply and Drainage: Defining the Problem. 211-220. U. S. Committee on 11Tigation and Drainage, Denver, CO.

Staver, K.W., R. Brinsfield, and C. Stevenson. 1987. Strategies for reducing nutrient and pesticide movement from agricultural land in the Chesapeake Bay region. In: J. Summers and S. Anderson (eds.) Toxic Substances in Agricultural Water Supply and Drainage: Searching for Solutions. 87101. U.S. Committee on Irrigation and Drainage, Denver, CO.

b. Presentations with Published Proceedings

Brinsfield, R.B., K. Staver, and W. Magette. 1988. The role of cover crops in reducing nitrate leaching to groundwater. In: Agricultural Impacts on Groundwater. National Water Well Association. Dublin, OH. pp 127-146.

Brinsfield, R.B. and K. Staver. 1989. Cover crops: a paragon for nitrogen management. In: Ground Water Issues and Solutions in the Potomac River Basin/Chesapeake Bay Region. National Water Well Association, Dublin, OH. pp 271-287.

Staver, K.W. 1999. Production and nutrient uptake by native warm-season grasses. In: Proceedings of the 2nd Eastern Native Grass Symposium, Baltimore, MD. USDA/ARS/NRCS. Beltsville, MD.

Staver, K.W. 2002. Nutrient Uptake Dynamics and Biofuel Potential of Switchgrass in Maryland. Proceedings of the 3rd Eastern Native Grass Symposium, Chapel Hill, NC.

Staver, K.W. 2006. Using switchgrass in a small-scale boiler to supplement farm heating needs. In M.A. Anderson et al (eds). Proceedings of the fifth Eastern Native Grass Symposium, Harrisburg, PA. October 10-13, 2006.

c. Presentations with Written Papers

Brinsfield, R.B., K. Staver, and W. Magette. 1987. Pesticide losses in surface and ground water as influenced by tillage practices. American Society of Agricultural Engineers, St. Joseph, MI. ASAE Paper No. NAR87-203.

Staver, K.W., W. Magette, and R. Brinsfield. 1987. Tillage effect on nutrient and sediment field losses. American Society of Agricultural Engineers, St. Joseph, MI. ASAE Paper No. 87-2086.

Brinsfield, R.B., K. Staver, and W. Magette. 1987. Impact of tillage practices on pesticide leaching in Coastal Plain soils. American Society of Agricultural Engineers, St. Joseph, MI. ASAE Paper No. 87-2631.

Shinnohammadi, A., W. Magette, R. Brinsfield, and K. Staver. 1987. Groundwater loading of agrochemicals in the Coastal Plain region. American Society of Agricultural Engineers, St. Joseph, MI. ASAE Paper No. 87-2632.

Staver, K.W., R. Brinsfield, and W. Magette. 1988. Nitrogen export from Atlantic Coastal Plain soils. American Society of Agricultural Engineers, St. Joseph, MI. ASAE Paper No. 88-2040.

Magette, W.L., R. Brinsfield, K. Staver, and A. Shirmohammadi. 1988. Hydrologic differences of paired watersheds: Implications for transport of soluble agrochemicals. American Society of Agricultural Engineers, St. Joseph, MI. ASAE Paper No. 88-2038.

Brinsfield, R.B., K. Staver, and W. Magette. 1988. Use of anions in screening for pesticides in groundwater. American Society of Agricultural Engineers, St. Joseph, MI. ASAE Paper No. 88-2639.

Staver, K.W., R. Brinsfield, and W. Magette. 1988. Strategies for reducing nitrogen leaching from Atlantic Coastal Plain soils. American Society of Agricultural Engineers, St. Joseph, MI. ASAE Paper No. 88-2643.

Brinsfield, R.B., K. Staver, and W. Magette. 1988. Leaching of pesticides in Coastal Plain soils as influenced by tillage system. American Society of Agricultural Engineers, St. Joseph, MI. ASAE Paper No. 88-2650.

Staver, K.W., R. Brinsfield, and W. Magette. 1988. Tillage effects on phosphorus transport from Atlantic Coastal Plain watersheds. American Society of Agricultural Engineers, St. Joseph, MI. ASAE Paper No. 88-2651.

6. Published Abstracts

Brinsfield, R.B. and K. Staver. 1989. Impact of tillage on pesticide transport from Atlantic Coastal Plain soils. Abstracts from Symposium on Pesticide Runoff and Leaching Losses - Field Studies. American Chemical Society Annual Meetings, Division of Agrochemicals, Dallas, TX. Vol. 1: 98.

- Staver, L.W., J.C. Stevenson, and K.W. Staver. 1989. Nutrient loading in Mid-Chesapeake Bay: Implications for management of macrophytes. Tenth Biennial International Estuarine Research Conference. Estuarine Research Federation, Baltimore, MD. p. 79.
- Staver, K.W. and R.B. Brinsfield. 1989. Pesticide leaching in Atlantic Coastal Plain soils: Influence of tillage system. Abstracts from Symposium on Pesticide Runoff and Leaching Losses - Field Studies. American Chemical Society Annual Meeting, Division of Agrochemicals, Dallas, TX. Vol. 1: 117.
- Brinsfield, R.B. and K.W. Staver. 1990. Nitrogen and phosphorus management on cropland. In: Reducing Pollution from Nonpoint Sources: The Chesapeake Experience. Chesapeake Bay Program, lis MD. CBP/TRS 53/90, p. 23.
- Staver, K.W. and R.B. Brinsfield. 1990. Monitoring agrochemical transport into shallow unconfined aquifers. Symposium on agrochemical residue sampling design and techniques. American Chemical Society Annual Meeting, Division of Agrochemicals, Boston, MA. No. 49.
- Staver, K.W. and R.B. Brinsfield. 1994. Phosphorus discharge patterns in Coastal Plain agricultural watersheds. H32B-10. American Geophysical Union, Washington, DC.
- Garbarino, JR., K.R. Kennedy, D.W. Rutherford, K.Staver, and R.L. Wershaw. 2001. The mobility of arsenic in soils that have been amended with chicken manure. Society of Environmental Toxicology and Chemistry (fall 2001 meeting, Baltimore, MD).
- Staver, K.W. 2005. Does the strategy match the science: What we know after 20 years of trying to reduce nutrient losses from Coastal Plain cropland. 18th Biennial Conference of the Estuarine Research Federation, Norfolk, VA.
- Staver, K.W. and J.M. McCoy. 2005. Unreasonable expectations: Lessons learned from as ten-year effort to reduce nitrogen losses from the Jar-mins Branch watershed. 18th Biennial Conference of the Estuarine Research Federation, Norfolk, VA.
- Stevenson, J.C., K.W. Staver, K.W., and L.W. Staver. 2005. A tale of two tributaries: Trends in nutrient loadings and submersed vascular plant communities in the Choptank River and upper Chesapeake Bay. 18th Biennial Conference of the Estuarine Research Federation, Norfolk, VA.
- Staver, K.W. 2008. Achieving nutrient reduction goals from Maryland cropland: What worked? What didn't? What will it take? American Chemical Society 236th National Meeting, Philadelphia, PA. Agro. 196.
- Staver, K.W. 2008. Potential of biofuel production to complement Chesapeake Bay restoration efforts: Management strategies for grasses. American Chemical Society 236th National Meeting, Philadelphia, PA Agro. 159.
- Staver, K.W. 2015. Spatial and temporal patterns of nutrient inputs to the Choptank River sub-estuary of Chesapeake Bay. 23th Biennial Conference of the Estuarine Research Federation, Portland, OR.
- Duro, L, K. W. Staver, J. Meisinger, and ML. Nor-fleet. 2016. Using the EPIC model to assess cover crop effects across a range of climate, soil, and management conditions. 2016 National Meeting of ASA/CSSA/SSSA. Phoenix, AZ.
- Staver, K.W. 2017. Winter cover crops as a firewall against climate change effects on agricultural nutrient loads. 24th Biennial Conference of the Estuarine Research Federation, Providence, RI.

Staver, K.W. 2018. Using winter annual cereal grains to mitigate climate change induced soil carbon and nitrogen losses from cropland in the Chesapeake Bay watershed. 2018 Fall meeting of the American Geophysical Society. B31 C-02.

7. Thesis and Dissertation

Staver, K.W. 1984. Responses of Epiphytic Algae to Nitrogen and Phosphorus Enrichment and Effects on Productivity of the Host Plant, Potamogeton perfoliatus L, in Estuarine Waters. M. S. thesis, University of Maryland.

Staver, K.W. 1994. Quantifying Advective Transport of Nitrate from the Root Zone into Shallow Groundwater. Ph. D. thesis, University of Maryland.

B. Selected Presentations

Staver, K. W. 1980. Interactions between macrophytes and their epiphytic community as related to plant distribution and abundance in Chesapeake Bay. Atlantic Estuarine Research Federation meeting, November 1980, Virginia Beach, NC.

Staver, K. W. 1982. Nutrient enrichment, algal growth and the response of submerged vascular plants in upper Chesapeake Bay: An experimental approach. Atlantic Estuarine Research Federation meeting, October 1982, Richmond, VA.

Brinsfield, R. B. and K. Staver. 1989. Impact of tillage on pesticide transport from Atlantic Coastal Plain soils. Symposium on Pesticide Runoff and Leaching Losses - Field Studies. Presented at the American Chemical Society Annual Meetings, Division of Agrochemicals, Dallas, TX.

Staver, K. W. and R. Brinsfield. 1989. Pesticide leaching in Atlantic Coastal Plain soils: Influence of tillage system. Symposium on Pesticide Runoff and Leaching Losses - Field Studies. Presented at the American Chemical Society Annual Meeting, Division of Agrochemicals, Dallas, TX.

Staver, K. W., R. Brinsfield, and J. Stevenson. 1989. The effect of best management practices on nitrogen transport into Chesapeake Bay. Second Pan-American Conference on Irrigation and Drainage, Ottawa.

Staver, K. W. and R. Brinsfield. 1990. Groundwater dynamics in Maryland Coastal Plain riparian agricultural systems. Special Session: Submarine Groundwater Discharge. North American Benthological Society Annual Meeting, Blacksburg, VA.

Staver, K. W. and R. Brinsfield. 1990. Groundwater discharge patterns in Maryland Coastal Plain agricultural systems. Session: Groundwater as a Source of Nutrients and Toxicants. Chesapeake Research Conference, Baltimore, MD.

Staver, K. W. and R. Brinsfield. 1990. Monitoring agrochemical transport into shallow unconfined aquifers. Special Session: Agrochemical Residue Sampling Design and Techniques: Soil and Groundwater. American

Chemical Society National Meeting, Boston, MA.

Staver, K. W. and R. Brinsfield. 1991. Effect of cereal grain winter cover crops on surface water pollutant transport from Coastal Plain corn production systems. Session: Surface Water Impacts. Soil and Water Conservation Soc. Cover Crops for Clean Water Conference, Jackson TN.

Staver, K. W. and R. Brinsfield. 1992. The use of cereal grain winter cover crops for groundwater protection in the Mid-Atlantic Coastal Plain. Session: Groundwater movement and protection. Soil and Water Conservation Society National Meeting, Baltimore, MD.

Staver, K. W. and R. Brinsfield. 1993. Groundwater/Estuarine interactions in a Coastal Plain agroecosystem. Session: Water quality -nutrients. Riparian ecosystem conference, Atlanta, Georgia.

Staver, K.W. and R. Brinsfield. 1994. Phosphorus discharge patterns in Coastal Plain agricultural watersheds. Session: Water quality in the Chesapeake Bay and its watershed. American Geophysical Union Spring Meeting, Baltimore, MD.

Staver, K.W. and R. Brinsfield. 1994. The effect of erosion control practices on phosphorus transport from Coastal Plain agricultural watersheds. Chesapeake Research Consortium Chesapeake Bay Research Conference, Norfolk VA.

Staver, K.W. and R. Brinsfield. 1994. Edge-of-field nutrient losses during the 1993 spring freshet. Chesapeake Research Consortium Chesapeake Bay Research Conference, Norfolk, VA.

Staver, K.W. 2000. Where does science support and not support phosphorus regulations? 2000 National Poultry Waste Management Symposium, Ocean City, MD.

Staver, K.W. 2001. Increasing N and C retention in Coastal Plain agricultural watersheds. N2001 The Second International Nitrogen Conference, Potomac, MD.

Staver, K.W. 2001. Relating watershed nitrate leaching rates to baseflow nitrate loads. ASA/CSSA/SSSA Annual Meeting, Charlotte, NC.

Staver, K.W. 2005. Does the strategy match the science: What we know after 20 years of trying to reduce nutrient losses from Coastal Plain cropland. 18th Biennial Conference of the Estuarine Research Federation, Norfolk, VA.

Staver, K.W. and J. McCoy. 2005. Unreasonable expectations: Lessons learned from a ten-year effort to reduce nitrogen losses from the Jarmins Branch watershed. 18th Biennial Conference of the Estuarine Research Federation, Norfolk, VA.

Staver, K.W. 2006. Reducing nonpoint source N losses in Maryland Coastal Plain watersheds using winter cover crops. NRC207-Drainage design management practices to improve water quality, Annual meeting, Ames,

Staver, K.W. 2006. Using switchgrass in a small-scale boiler to supplement farm heating needs. Fifth Eastern Native Grass Symposium, Harrisburg, PA.

Staver, K.W. 2011. Nutrient transport in Maryland Coastal Plain watersheds: What we know and what next. Quarterly meeting of US EPA Chesapeake Bay Program Scientific and Technical Advisory Committee (STAC). September 14, 2011. Annapolis, MD.

Staver, K.W. 2015. Spatial and temporal patterns of nutrient inputs to the Choptank River sub-estuary of Chesapeake Bay. 23th Biennial Conference of the Estuarine Research Federation, Portland, OR.

Duro, L., K. W. Staver, J. Meisinger, and M.L. Norfleet. 2016. Using the EPIC model to assess cover crop effects across a range of climate, soil, and management conditions. 2016 National Meeting of ASA/CSSA/SSSA. Phoenix, AZ

Staver, K.W. 2017. Efficient use of poultry litter in Delmarva crop rotations. Delaware Soil Health Partnership Soil and Water Quality Forum. March 17, 2017. Georgetown, DE.

Staver, K.W. 2017. Improving drinking water protection in agricultural systems. 2017 Region III Water Source Protection Meeting. June 14, 2017. Salisbury, MD.

Staver, K.W. 2017. Lessons Learned from 30 Years of Water Quality Monitoring in Agriculture Dominated Coastal Plain Watersheds. Chesapeake and Atlantic Coastal Bays Trust Fund Monitoring Forum. June 19, 2017. Edgewater, MD.

Staver, K.W. 2017. Reconciling findings from field studies of phosphorus loss with monitoring and modeling results. Quarterly meeting of US EPA Chesapeake Bay Program Scientific and Technical Advisory Committee (STAC). September 13, 2017. Annapolis, MD.

Staver, K.W. 2017. Winter cover crops as a firewall against climate change effects on agricultural nutrient loads. 23rd Biennial Conference of the Coastal and Estuarine Research Federation. November 6, 2017. Providence, RI.

Staver, K.W. 2017. History and trends of water quality in the Choptank. Envision the Choptank Stakeholder Forum. December 7, 2017. Wye Mills, MD.

Staver, K.W. 2017. Three Decades of Progress on Reducing Nutrient Loads from Maryland Cropland. Maryland Water Monitoring Council Annual Conference. December 8, 2017. Linthicum, MD.

Staver, K.W., Q. Zhang, and W. Ball. 2018. Improving Estimates of Sub-Scour Storm Flow Loads to Chesapeake Bay from the Susquehanna Watershed. 2018 Chesapeake Community Research and Modeling Symposium. June 12, 2018. Annapolis, MD.

Staver, K.W. 2018. Using winter annual cereal grains to mitigate climate change induced soil carbon and nitrogen losses from cropland in the Chesapeake Bay watershed. Fall meetings of the American Geophysical Union. December 12. Washington, DC.

K. Staver. 2019. Using winter cover crops to increase retention of nitrogen and carbon in Maryland agricultural watersheds. UMD AGNR Cornerstone Event: Ensure a Clean and Healthy Chesapeake Bay. October 29, 2019. College Park, MD

K. Staver. 2020. Optimizing soil and water quality. Chesapeake Bay Program STAC Workshop: Linking Soil and Watershed Health to In-field and Edge-of-field Water Management. January 23, 2020. Morgantown, WV.

K. Staver 2021. Success in cover crop programs: Highlights of Chesapeake Bay cover crop program. Northeast Cover Crops Council Fourth Annual Conference. March 4, 2021. Virtual.

K. Staver 2021. Overview of cover crop planting date issues: The race between uptake and leaching. Virginia Nutrient Management Staff Annual Meeting. March 24, 2021. Virtual.

K. Staver 2022. Cover crop report for the Chesapeake bay Program: Behind the numbers. Science Committee for the Indiana State Nutrient Reduction Strategy. April 1, 2022. Virtual.

K. Staver 2022. Cover crop nitrogen and phosphorus dynamics. USDA-NRCS Conservation Outcomes Webinar Series. August 25, 2022. Virtual.

C. Other Creative and Scholarly Activities

1. Competitive Grants

Quantification of Pesticide and Nutrient Losses from Soils on Which Conventional and No-till Corn

Production Systems are Employed: Sponsors: United States Environmental Protection Agency, United States Department of Agriculture and Maryland Agricultural Experiment Station: Funding: \$115,000/yr. Duration: Oct. 1984 - Sept. 1989. Role: Co-Investigator-Maryland Effort.

Role of Cereal Grain Cover Crops in Nitrogen Management for the Chesapeake Bay Region. Sponsors: United States Department of Agriculture and Maryland Agricultural Experiment Station. Funding: \$150,000. Duration: July 1988 - Sept 1990. Role: Co-Investigator— Maryland Effort.

The Role of Cover Crops in Reduction of Cropland Nonpoint Source Pollution. Sponsors: United States Department of Agriculture, Soil Conservation Service and Maryland Agricultural Experiment Station. Funding: \$47,460. Duration: May 1989 - Sept 1990. Role: Co-Investigator.

Strategies for Reducing Pesticide Movement from Agricultural Land in the Chesapeake Region. Sponsors: United States Environmental Protection Agency, United States Department of Agriculture, and Maryland Agricultural Experiment Station. Funding: \$40,000. Duration: Oct. 1988 - Sept. 1990. Role: Co-Investigator.

Impact of Episodic Agricultural Runoff on Rates of Nitrogen and Phosphorus Cycling in a Wye River Sub-estuary. Sponsor: University of Maryland Sea Grant Program. Funding: \$5,000. Duration: January 1989 - January 1990. Role: Co-Investigator.

Crop Management Systems for Reduction of Hydrologic Nutrient Transport. Sponsor: State of Maryland Governor's Research Council on the Chesapeake Bay, Maryland Agricultural Experiment Station. Funding: \$298,315. Duration: January 1990 - October 1992. Role: Co-Investigator.

Coupling of Agricultural Watersheds and Coastal Waters: Role of Groundwater Nutrient Inputs. Sponsor: Maryland Agricultural Experiment Station, Soil Conservation Service. Funding: \$15,000. Duration: March 1990 - March 1991. Role: Co-Investigator.

Coupling of Agricultural Watersheds and Coastal Waters: Role of Groundwater Nutrient Inputs. Sponsor: U. S. Environmental Protection Agency. Funding: \$41,500. Duration: May 1991 - March 1993. Role: Co-Investigator.

Nitrogen and Phosphorus Removal in a Shallow Wetland. Sponsor: Maryland Department of the Environment. Funding: \$43,500. Duration: October 1991 - December 1993. Role: Co-Investigator.

Assessing the Impact of Changes in Management Practices on Nutrient Transport from Coastal Plain Agricultural Systems. Sponsor: Chesapeake Research Consortium. Funding: \$60,000. Duration: January 1993 - May 1995. Role: Principal Investigator.

Development of a Multiscale Experimental Ecosystem Research Center. Sponsor: U. S. Environmental Protection Agency. Funding: \$1,000,000/year. Duration: May 1992 -May 2002. Role: One of 22 Principal Investigators. Terrestrial hydrologic studies leader.

Spatial and Temporal Scaling of Hydrologic Components. Sponsor: U.S. EPA through MEERC. Funding: \$37,500. Duration: July 1992 - October 1995. Role: Principal Investigator.

Evaluating Changes in Subsurface Nitrogen Discharge from an Agricultural Watershed into Chesapeake Bay after Implementation of a Groundwater Protection Strategy. Sponsor: Maryland Department of the Environment, Maryland Department Resources. Funding: \$137,000. Duration: October 1993 - March 1999. Role: Principal Investigator.

Nitrogen Delivery to the Choptank River through Groundwater Discharge. Sponsor: Maryland Department of the Environment. Funding: \$19,300. Duration: October 1994 - September 1995. Role: Principal Investigator.

The Use of Cereal Grain Winter Cover Crops in Soybean Production. Sponsor: Maryland Soybean Board. Funding: \$10,000. Duration: April 1993 - May 1995. Role: Principal Investigator.

The Effect of Best Management Practices on Subsurface Nitrogen Transport in the German Branch Watershed. Sponsor: Maryland Department of Natural Resources. Funding: \$89,000. Duration: October 1995 - March 31, 1999. Role: Principal Investigator.

Characterizing Baseline Nitrate Storage and Transport Patterns in a Potential Riparian Buffer Zone. Sponsor: University of Maryland, College of Agriculture and Natural Resources Competitive Grants Program. Funding: \$14,600. Duration: July 1996 - June, 1997. Role: Principal Investigator.

Developing Options for Land Application of Dredge Material. Sponsor: Maryland Environmental Services. Funding: \$204,750. Duration: April 1998 - December 31, 2002. Role: Principal Investigator.

Efficient Utilization of Poultry Litter in Cash Grain Rotations. Sponsor: Maryland Grain Producers, Delmarva Poultry Industries, Maryland Center for Agro-Ecology. Funding: \$208,000. Duration: April 1998 - September 30, 2002. Role: Principal Investigator.

Technical Assistance for Development of TMDLs for the Maryland Eastern Shore. Sponsor: Maryland Department of the Environment. Funding: \$84,634. Duration: July 1, 1998 — June 30, 2001. Role: Principal Investigator.

Linking Field Nutrient Levels to Nutrient Losses in the Pocomoke Watershed. Sponsor: Maryland Department of the Environment. Funding: \$80,000. Duration: July 1, 2000 - September 30, 2002. Role: Principal Investigator.

Evaluation and Demonstration of a Small-Scale Biofuel System. Sponsor: Maryland Energy Administration. Funding: \$51,000. Duration: July 1, 2001 - June 30, 2005. Role: Principal Investigator.

Model Calibration Support for Maryland Coastal Plain Agricultural Watersheds. Sponsor: EPA through U. Missouri-Columbia. Funding: \$47,508. Duration: January 1, 2003 - June 30, 2004. Role: Collaborator.

Assessing Contaminants in Poultry Litter and Consequences of Exposure to Wildlife. Sponsor: Maryland Center for Agro-Ecology. Funding: \$118,800. Duration: January 1, 2002 — December 31, 2003. Role: Co-Principal Investigator.

Developing Sustainable Tree Crops in Central America. Sponsor: USDA. Funding: \$393,500. Duration: January 1, 1999 — April 30, 2004. Role: Project Director.

Integrating Winter Cover Crops into Maryland Agricultural System. Sponsor: Maryland Center for AgroEcology. Funding: \$233,100. Duration: July 1, 2003 — December 31, 2006. Role: Project Director.

Optimizing Environmental Benefits from Riparian Buffers in Maryland. Sponsor: Maryland Center for Agro-Ecology. Funding: \$189,400. Duration: July 1, 2003 — April 30, 2006. Role: Project Director.

Establishing Baseline Subsurface Nitrate levels in the Corsica River Watershed. Sponsor: Maryland Department of Natural Resources. Funding: \$53,850. Duration: July 1, 2004 — June 30, 2005. Role: Principal Investigator.

Evaluation and Demonstration of a Small-Scale Biofuel System. Sponsor: Maryland Energy Administration. Funding: \$51,000. Duration: July 1, 2001 - June 30, 2005. Role: Principal Investigator.

Current Stocks and Flows of Phosphorus in Maryland. Sponsor: Keith Campbell Foundation. Funding: \$41,000. Duration: October 1, 2005 — June 30, 2006. Role: Principal Investigator.

Tracking Changes in Baseline Subsurface Nitrate levels in the Corsica River Watershed. Sponsor: Maryland Department of Natural Resources. Funding: \$152,300. Duration: October 1, 2006 –September 30, 2007. Role: Principal Investigator.

Effects of Agricultural Conservation Practices on Nitrate Losses from Croplands of the Choptank River Basin. Sponsor: USDA, CSREES. Funding: \$99,596. Duration: October, 2005 -September 30, 2007. Role: Co-Principal Investigator.

Developing Options for Land Application of Dredge Material - II. Sponsor: Maryland Environmental Services. Funding: \$144,459. Duration: September 1, 2006 - December 31, 2007. Role: Principal Investigator.

Developing an Assessment of Potential Reductions in Nitrate Leaching from Cover Crops. Sponsor: Maryland Center for Agro-Ecology. Funding: \$145,480. Duration: July 1, 2005-June 30, 2008. Role: Co-Principal Investigator.

Restoration of Former Wetlands on a Caroline County Farm: Nutrient Reduction and Biotic Habitat Development. Sponsor: Maryland Center for Agro-Ecology. Funding level: \$70,002. Duration: July 1, 2005-July 14, 2008. Role: Co-Principal Investigator.

Transport/fate/ecological effects of Steroids from Poultry Litter and Evaluations of existing/novel Management Strategies. Sponsor: US EPA NCER STAR Grant. Funding: \$694,736. Duration: October 2007 — October 2010. Role: Co-Principal Investigator.

Agricultural and Development Related Nonpoint Source Impacts in the Corsica River Watershed. Sponsor: Maryland Department of Natural Resources. Funding: \$130,300. Duration: March 1, 2008 — February 28, 2009. Role: Principal Investigator.

Environmental Benefits of Establishing a Switchgrass Production Base in the Chester River Watershed. Sponsors: National Fish and Wildlife Foundation, Abell Foundation, Keith Campbell Foundation. Funding: \$600,000. Duration: September 2008 — June 30, 2012. Role: Project Director.

Evaluating the Effects Stormwater Detention Basin Enhancement on Nonpoint Source Nutrient Loads and Stream Water Quality in the Corsica River Watershed. Sponsor: Maryland Department of Natural Resources. Funding: \$90,000. Duration: January 1, 2009 — April 30, 2011. Role: Principal Investigator.

Regional Simulation of Cover Crop Effectiveness for Reducing Nitrate Leaching, Increasing Poultry Litter N Use Efficiency. Sponsor: USDA-ARS BARC Cooperative Agreement. Funding: \$50,000. Duration: July 1, 2009 - December 14, 2011. Role: Principal Investigator.

Developing Options for Land Application of Chesapeake Bay Dredge Material - III. Sponsor: Maryland Environmental Services. Funding level: \$126,010. Duration: December 1, 2009 — December 31, 2010. Role: Principal Investigator.

Assessing Progress Toward Meeting Nutrient Reduction Goals for Maryland Coastal Plain Cropland. Sponsor: Harry R. Hughes Center for Agro-Ecology, Inc., Town Creek Foundation. Funding: \$360,000. Duration: December 1, 2009 —June 30, 2019. Role: Principal Investigator.

Transport/Fate of Antibiotics and Antibiotic Resistant Bacteria from Poultry Litter, Biosolids, and Wastewater Treatment Plant Effluents and an Evaluation of Subsurface Litter Injector to Reduce the Surface Runoff of Nutrients and Antibiotics from Agricultural Fields. Sponsor: Harry R. Hughes Maryland Center for Agro-Ecology, Inc. Funding: \$408,563. Duration: April 1, 2010 — December 31, 2012. Role: Co- Principal Investigator.

Feasibility of Implementing an Organic Dredged Material Distribution Center. Sponsor: Maryland Environmental Services. Funding level: \$126,010. Duration: January 1, 2011 — December 31, 2012. Role: Principal Investigator.

The Environmental Concerns of Arsenic Additives in Poultry Litter - Literature Review. Sponsor: Harry R. Hughes Maryland Center for Agro-Ecology, Inc. Funding: \$50,000. Duration: April 1, 2011 — December 31, 2012. Role: Co- Principal Investigator.

Feasibility of Implementing an Organic Dredged Material Distribution Center. Sponsor: Maryland Environmental Services. Funding level: \$126,010. Duration: January 1, 2011 —December 31, 2012. Role: Principal Investigator.

Computer Model Simulations with APEX to Assess the Effectiveness of Management Practices. Sponsor: USDA-ARS BARC Cooperative Agreement. Funding: \$124,232. Duration: February 10, 2014 December 1, 2015. Role: Co-Principal Investigator.

Improving Modeling of Phosphorous and Nitrogen Transport, and Leaching on Manure-Treated Soils for the Chesapeake Bay Region. Sponsor: USDA-ARS BARC Cooperative Agreement. Funding: \$149,000. Duration: September 21, 2015 —September 29, 2016. Role: Co-Principal Investigator.

Developing Treatment Strategies for Meeting Short and Long-term Water Quality Discharge Standards for the North Cell of Hart-Miller Island. Sponsor: Maryland Environmental Services. Funding level: \$252,301. Duration: January 1, 2014 — June 30, 2020. Role: Principal Investigator.

Support of USDA-NRCS CEAP modeling efforts. Sponsor: USDA NRCS CESU. Funding level: \$300,000. Duration: October 1, 2016 — September 30, 2021. Role: Principal Investigator.

Field Data Support of USDA-NRCS CEAP Modeling of optimal nitrate and dissolved P control strategies. Sponsor: USDA NRCS CESU. Funding level: \$167,000. Duration: October 1, 2021 — September 30, 2023. Role: Principal Investigator.

2. Invited Presentations

a. Expert Testimony

Chesapeake Bay Living Resources Subcommittee (1989)

U. S. House Agriculture Subcommittee - hearing on structuring of the 1990 Farm Bill (1989)

USDA-NRCS — meeting to develop winter cover crop practice standard for water quality protection (1992)

MD Department of the Environment — Hearing on modification of sewage sludge application regulations for protection of groundwater quality (1993) Tributary Strategy Technical Work Group (1993-94)

Choptank Tributary Strategy Team (1996)

Upper Shore Tributary Strategy Team (1996)

MD State Attorney General - Briefing on the impacts of poultry production on water quality (2007)

State Environmental Matters Committee — Briefing on strategy for restoration of the Choptank River (2007)

EPA Senior Advisor on Chesapeake Bay — Briefing on strategy to reduce nutrient loss from agriculture (2009)

USDA NRCS Chesapeake Bay Liaison Briefing on strategy to reduce nutrient loss from agriculture (2009)

b. Conference, Workshop, and Seminar Presentations

Nutrient Management on Cropland. 1990. Conference on Reducing Pollution from Non-point Sources: The Chesapeake Experience, Williamsburg, VA.

Reducing Water Quality Degradation associated with Agricultural Activities in the Coastal Plain. 1990. Water Quality Conference sponsored by Virginia Soil Conservation Service and Agricultural Stabilization and Conservation Service, Franklin, VA.

Results from hydrologic nutrient transport studies and implications for development of effective nutrient management plans. 1991. Meeting with M.D.A. nutrient management specialists, Tilghman, MD.

Findings from pesticide transport research in field-scale watersheds. 1991. Maryland/Chesapeake Workshop, Annapolis, MD.

Hydrologic nitrogen transport. 1993. MD Department of Agriculture Nutrient Management Continuing Education Course, Annapolis, MD.

Hydrologic cycles in Maryland agricultural systems. 1994. MD Department of Agriculture Fundamentals of Nutrient Management Course, Annapolis, MD.

Evaluating the impact of a groundwater protection strategy on subsurface nitrogen levels in an agricultural watershed. 1994. Maryland Department of the Environment State/County Groundwater Symposium, Baltimore, MD.

Nutrient transport processes in Coastal Plain agricultural systems. 1994 and 1996. University of Maryland School of Public Affairs. Guest Lecturer Course 601, College Park, MD.

Warm and cool season grass options in Riparian buffers. 1997. U. Md. Coop. Ex. Ser. Riparian Buffer Training Program. Chesapeake College, Wye Mills, MD.

Nutrient transport patterns in Coastal Plain agricultural watersheds. 1998. Delaware Inland Bays Scientific and Technical Advisory Committee, Lewes, DE.

Staver, KN. and R. Brinsfield. 1999. Water quality issues in the tropics: A roundtable discussion. USDA-CABI-ACRI Collaborative Cocoa-Coffee Research Meeting, London.

Poultry waste on the Eastern Shore: The big picture. 2000. Wye Research and Education Center Field Day, Queenstown, MD.

Options for land application of dredge material. 2002. Maryland Port Authority Dredged Material Management Issue Forum, Linthicum Heights, MD.

Strategies for reducing nitrate contamination of shallow groundwater. 2003. Maryland Department of the Environment State-County Ground Water Symposium, Baltimore, MD.

Switchgrass as an alternative crop, biofuel, and CRP alternative. 2003. Mid-Atlantic Crop Conference, Ocean City, MD.

Monitoring restoration of the agricultural component of Coastal Plain watersheds. 2003. Maryland Water Monitoring Council 9th Annual Conference, Linthicum Heights, MD.

Reducing nonpoint source N losses in Coastal Plain agricultural watersheds using winter cover crops. 2004. 12th National Nonpoint Source Monitoring Workshop, Ocean City, MD.

Terrestrial nitrogen process and implications for coastal eutrophication. 2004. University of Maryland Center for Environmental Science, Horn Point Laboratory Seminar Series, Cambridge, MD.

Edge-of-field monitoring in Coastal Plain watersheds. 2004. Maryland Water Monitoring Council Workshop on integrated hydrologic monitoring, Baltimore, MD.

Water quality implications of substituting poultry litter for inorganic fertilizer. 2004. EPA Office of Research and Development Regional Science Workshop on Animal Feeding Operations, College Park, MD.

What do we know after 20 years of nonpoint source research? 2005. Maryland Coastal Bays STAC meeting.

Water quality implications of increased barley production in Maryland. 2006. MD Association of Soil Conservation Districts Winter Meeting, Ocean City, MD.

No-till, cover crops, and nutrient losses from Coastal Plain cropland. 2006. VA Nitrogen and No-till Field Day, New Kent, VA.

The potential of switchgrass as a biofuel in Maryland. 2006. Federal Agency Committee Meeting, Washington, DC.

Potential options for innovative reuse: Agricultural Issues in Maryland. 2006. MD Port Authority Dredge Material Innovative Reuse Committee Meeting, Hanover, MD.

Switchgrass for energy and habitat: Pros and Cons. 2006. Toward a Vision Plan for Sustaining Agriculture in Talbot County Public Forum IV, Easton, MD.

Water quality protection/bioenergy opportunities. 2006. USDA CEAP Forum: Progress and Opportunities in the Choptank River Watershed Project, Centreville, MD.

Achieving multiple environmental objectives using small-scale switchgrass fired boiler. 2007. UMD Energy Research Center mini-Workshop, College Park, MD.

Agriculture, biofuels, and the environment. 2007. Smithsonian Environmental Research Center Evening Lecture Series, Edgewater, MD.

Making corn Bay friendly: How good can we do? 2007 Mid-Atlantic Crop Management School, Ocean City, MD.

Reducing nutrient losses from Maryland cropland: Where we have been. Where we are. Where we need to go. 2007. Maryland Farm Bureau Annual Conference, Ocean City, MD.

Agriculture in Maryland: How do we get there from here? 2008. Chesapeake Bay Foundation Conference on Agriculture and the Environment: Past, Present, and Future, Annapolis, MD.

Switchgrass: What's the deal? 2008. Chester River Association Queen Anne's County Farmer's Breakfast, Centreville, MD.

Why cover crops? 2008. Chester River Association Kent County Farmer's Breakfast, Chestertown,

Nitrate residence time in shallow Coastal Plain aquifers. 2008. Soil and Water Conservation Society Pocomoke Chapter Winter Meeting, Centreville, MD.

Switchgrass biofuel options and limitations. 2008. Federal Interfuel Meeting, Washington, DC.

Near-term options for using switchgrass as biofuel in Maryland. 2008. UMD Energy Research Center Biofuels Symposium, College Park, MD.

Principals for managing cover crops to protect water quality in Chesapeake Bay (with J.J. Meisinger). 2008. Chesapeake Bay Program Cover Crop Enhancement Conference, Queenstown, MD.

Biofuel Basics II. 2008 and 2009. University of Maryland College of Agriculture and Natural Resources, Guest lecturer ENST 233, College Park, MD.

Assessing the impact of changes in management practices on nutrient loads from Coastal Plain watersheds. 2009. MD Trust Fund Evaluation Workgroup Meeting, Annapolis, MD.

Land use changes and watershed impacts. 2009. Caroline County Choptank River Forum, Denton, Method for quantifying reductions in delivered nitrogen loads from the use of winter cover crops in Maryland. 2009. Bay Workgroup Meeting on meeting Chesapeake Bay 2 Year Nutrient Reduction Milestones, Baltimore, MD.

Managing nutrients on the soil surface to reduce runoff nutrient losses. January 2010. Maryland Grain Producers Utilization Board meeting. Grasonville, MD.

Switchgrass: What's the deal-II? January 2010. H.R. Hughes Center for Agro-Ecology Board of Directors meeting. Queenstown, MD.

Wye River water quality basics. January 2010. Wye River Association. Queenstown, MD.
Phosphorus transport in Maryland Coastal Plain Watersheds: What we know after 20 years. March 2010. Meeting with USDA/NRCS National program staff. Queenstown, MD.

Reducing nitrogen losses from cropland in the Chesapeake Bay watershed. October 2010. US EPA STAC Chesapeake Bay Goal Line 2025 conference: Opportunities for Enhancing Agricultural Conservation. Hunt Valley, MD.

Agriculture, biofuels and the environment. March 2010. UMD-UMCES-HPL Research seminar series. Cambridge, MD.

Tillage effects on edge-of-field nutrient losses from Maryland Coastal Plain Watersheds. March 2011. US EPA Chesapeake Bay Program Agricultural Workgroup. Annapolis, MD.

Nutrient transport in Maryland Coastal Plain watersheds: What we know and what next. September 2011. US EPA STAC quarterly meeting. Annapolis, MD.

The role of cover crops in reducing N losses from Coastal Plain Cropland. December 2012. Delaware Small Farms Conference. Dover, DE.

Assessing progress toward meeting nutrient reduction goals for Maryland Coastal Plain cropland: Changes in soil P in the Green Run watershed. May 2012. H.R. Hughes Center for Agro-Ecology Board of Directors meeting. Queenstown, MD.

Temporal dynamics of changes in delivered nutrient loads resulting from various cropland nutrient reduction practices. October 2012. US EPA STAC workshop on lag times in the watershed and their influence on Chesapeake Bay restoration. Buckeystown, MD.

Assessing progress toward meeting nutrient reduction goals for Maryland Coastal Plain cropland: Changes in soil P in the Green Run watershed and Base flow nitrate in the Choptank. January 2013. H.R. Hughes Center for Agro-Ecology Board of Directors meeting. Annapolis, MD.

Conowingo Dam: Science, process, local perspective. January 2013. H.R. Hughes Center for AgroEcology Board of Directors meeting. Annapolis, MD.

Comparing cropland and residential hydrology. April 2013. UMD AGNR Ecosystems Services Symposium. Queenstown, MD.

Findings of the STAC ad hoc workgroup on how P transport from cropland is simulated in the Bay watershed model. September 2013. US EPA STAC quarterly meeting. Annapolis, MD.

Drivers of short-term nutrient losses from cropland. November 2013. Mid-Atlantic Crop Management School. Ocean City, MD.

Temporal dynamics of changes in delivered nitrogen loads resulting from cropland practices that reduce nitrate leaching. December 2013. State of Delaware conference on monitoring the results of investments in water quality improvement: Are we Moving the Needle? Dover, DE.

Using cover crops to reduce nitrogen losses from cropland in the Choptank river watershed. February 2014. Choptank River Team meeting. Denton, MD.

Staver, K.W. 2014. The role of winter cover crops in the restoration of Chesapeake Bay. USDA-SARE National Conference on Cover Crops and Soil Health. Omaha, NE.

Staver, K.W. 2014. Final report of the STAC ad hoc workgroup on how P transport from cropland is simulated in the Bay watershed model. Quarterly meeting of US EPA Chesapeake Bay Program Scientific and Technical Advisory Committee (STAC). June 17, 2014. Annapolis, MD.

What we know after 30 years of trying to reduce nutrient losses from Coastal Plain cropland. July 2015. Delmarva Conservation Partnership science-management meeting. Wye Mills, MD.

Remote sensing and sensing in MD agriculture: Applications and issues. October 2015. Washington College mapping, satellite and sensor technologies forum. Chestertown, MD.

Renewable energy and Bay health: Switchgrass. November 2015. Eastern Shore Land Conservancy's 16th Annual Eastern Shore planning conference: Powering our renewable energy future. Easton, MD.

Soil sampling issues moving forward. December 2015. Maryland Department of Agriculture annual nutrient management update conference. Laurel, MD.

Using winter cover crops to reduce nitrogen losses from cropland. May 2016. Romanian Delegation World Bank Workshop. UMD WREC.

Staver, K.W. 2016. Nutrients at the field, watershed and regional scales. 2016 Northeast Joint Summer Session: The impact of innovation on the Environment and Health. June 20, 2016 Pittsburgh, PA.

Reconciling findings from field studies of P loss with monitoring and modeling results. September 2016. EPA CB Program STAC. Annapolis, MD.

Efficient use of poultry litter in Delmarva crop rotations. March 2017. Delaware Soil Health and Water Quality Forum. Georgetown, DE.

Staver, K.W. 2017. Efficient use of poultry litter in Delmarva crop rotations. Delaware Soil Health Partnership Soil and Water Quality Forum. March 17, 2017. Georgetown, DE.

Staver, K.W. 2017. Improving drinking water protection in agricultural systems. 2017 Region III Water Source Protection Meeting. June 14, 2017. Salisbury, MD.

Staver, K.W. 2017. Lessons Learned from 30 Years of Water Quality Monitoring in Agriculture Dominated Coastal Plain Watersheds. Chesapeake and Atlantic Coastal Bays Trust Fund Monitoring Forum. June 19, 2017. Edgewater, MD.

Staver, K.W. 2017. Reconciling findings from field studies of phosphorus loss with monitoring and modeling results. Quarterly meeting of US EPA Chesapeake Bay Program Scientific and Technical Advisory Committee (STAC). September 13, 2017. Annapolis, MD.

Staver, K.W. 2018. Chesapeake Bay Watershed Model Phase 6 cover crop nitrogen reduction computations. Maryland Department of Agriculture Cover Crop Technical Advisory Committee meeting. March 5, 2018. Annapolis, MD.

Staver, K.W. 2018. Beyond the 4Rs: Using All the Tools to Reduce Nutrient Loss and Optimize Benefits. Delaware-Maryland 4R Alliance Technology Field Day, August 15, 2018. Queenstown, MD.

3. Workgroups, Task Forces, Panels, and Committees

Chesapeake Bay Cabinet Public Drainage Task Force

Technical advisor to Maryland Department of the Environment Total Maximum Daily Load (TMDL) modeling department. (1998-2001)

Member and vice-chair — Choptank River Tributary Strategy Team (2004 Governor's Citation as Choptank Tributary Hero)

USDA-ARS Beltsville Farming Systems Project Focus Group

Technical Review Committee — Chesapeake Bay Commission Biofuels and the Bay Report

Technical Review Committee — Chesapeake Bay Program cover crop efficiency reevaluation

Project technical coordinator - Scientific summit on the impacts of growth on water quality, May 2007

Steering Committee — Chesapeake Bay Program Cover Crop Enhancement Conference, 2008

Maryland Chesapeake Bay Trust Fund Evaluation Workgroup

Science advisor — Maryland Department of Agriculture Cover Crop Technical Advisory Committee

Member — US EPA Chesapeake Bay Program Agriculture Workgroup P-5.3 Expert Review Panel on Nutrient Management

Member — US EPA Chesapeake Bay Program Agriculture Workgroup P-5.3 Expert Review Panel on Cover Crops

Member — US EPA Chesapeake Bay Program Agriculture Workgroup P5.3 Expert Review Panel on Conservation Tillage

Member — US EPA Chesapeake Bay Program Agriculture Workgroup P-5.3 Expert Review Panel on Riparian Buffers

Chair — US EPA Chesapeake Bay Program Science and Technical Advisory Committee Workgroup on improving phosphorus transport simulations in the Bay Watershed Model.

Member — Chesapeake Bay Program Science and Technical Advisory Committee Workgroup on Lag times and their influence on Chesapeake Bay Restoration.

Member — EPA Chesapeake Bay Program Integrated Trends Analysis Team

Member — US EPA Chesapeake Bay Program Agriculture Workgroup P-6.0 Expert Review Panel on Wetlands

Chair — US EPA Chesapeake Bay Program Agriculture Workgroup P-6.0 Expert Review Panel on Cover Crops

Board of Directors — Maryland Water Monitoring Council

Member — Chesapeake Bay Program Agriculture Workgroup

Member — Hart-Miller Island vegetation working group

Co-chair — UMD College of Agriculture and Natural Resources "Ensure a Clean and Healthy Chesapeake Bay" implementation management team

4. Selected Media Outreach Activities

Maryland Public Television News Night State Circle Edition Newsmaker , March 6, 1998. WQIA Phosphorus discussion

MD Seagrant Chesapeake Quarterly 4: I , March 2005. From Farm to Bay: Nitrogen's Underground Passage

NPR News, All Things Considered with Christopher Joyce, Jan. 7, 2008. Study Boosts Switchgrass as New Alternative Fuel

Maryland Public Television Outdoors Maryland, April 2010. The Runoff Dilemma

NPR News, Weekend Edition with Dan Charles, Feb. 10, 2008. Poultry Production and Chesapeake Bay

NPR News, The Salt with Dan Charles, Dec. 14, 2011. Putting Farmland on Fertilizer Diet

NPR News, Morning Edition with Dan Charles, Jan. 2, 2014. Meat Production and Phosphorus.

USDA SARE Outreach Youtube, March 2014. Environmental Impacts of Cover Crops, <https://www.youtube.com/watch?v=kkK17RnBRy8>.

NPR News, The Salt with Dan Charles, March 16, 2017. How to Make Farmers Love Cover Crops? Pay Them.

Maryland Public Television Fann and Harvest Episode 507, Dec. 26, 2017. Poultry Production and Phosphorus

From Cloud to Cab Podcast Episode 10: 35 years of water quality research at the UMD Wye Research and Education Center, Harry R. Hughes Center for Agro-Ecology, <http://soundcloud.com/from-cloud-to-cab>, Nov. 2018.