CURRICULUM VITA

LAURA MURRAY

Horn Point Laboratory
University of Maryland, Center for Environmental Science
PO Box 775
Cambridge, MD 21613
Phone: 410 221-8419
Fax: 410 221-8490
email: murray@hpl.umces.edu

Education

1969:	AA Mississippi Junior College, Perkinston, Mississippi
1971:	BS (Marine Science) University of West Florida, Pensacola, Florida
1973:	MST (Biology/Education) University of West Florida, Pensacola, Florida
1983:	Ph.D. (Wetlands Ecology) College of William and Mary, Marine Science Institute, Gloucester Point, Virginia

Professional Background

1971-1973	Graduate Assistant. Invertebrate Ecology. A Comparative Study of the Crustacean Fauna of Two Bayous in Northwest Florida. University of West Florida, Pensacola, Florida.
1972	Scientific Russian Language Instructor Aid, University of West Florida, Pensacola, Florida.
1973-1975	High School Biology and Science Teacher.Biology and Earth Science, Woodham High, Pensacola, FL
1975-1979	High School Biology and Science Teacher. Biology, Marine Science, Quantitative Physical Science, Norcum High School, Portsmouth, VA.
1977-1979	Laboratory Specialist in Salt Marsh Ecology. Long term effects oil spills on a temperate salt marsh. College of William and Mary, Marine Science Institute, Gloucester Point, VA.
1981- 1985	Research Assistant/Associate. Tropical seagrass ecosystem community metabolism. Cooperative U.S. - Mexican Scientific Research sponsored by the National Science Foundation. Universial Nacional Autonoma de Mexico, Mexico City, Mexico.
1984	Research Investigator. Outer Continental Shelf Marine Productity Study. University of Maryland Eastern Shore, Princess Anne, Maryland.

1985 Visiting Scientist. Dept. Ecology and Genetics, University of Aarhus; Denmark Freshwater Biological Laboratory, University of Copenhagen; Denmark.

1979-1981 Graduate Assistant (Ph.D. dissertation) in Estuarine Ecology. Seagrass investigations in the lower Chesapeake Bay. College of William and Mary, Marine Science Institute, Gloucester Point, VA.

1983-1992 Adjunct Research Scientist. Horn Point Environmental Laboratories, University of Maryland, Cambridge.

1982-1990 Assistant Professor of Biology. Salisbury State University, Salisbury, Maryland

1990-1993 Associate Professor of Biology (Tenured), Biology Faculty: Salisbury State University, Salisbury, Maryland

1993-2009 Research Associate Professor, Head of Environmental Science Education, University of Maryland Center for Environmental Science, Horn Point Laboratory, Cambridge, MD.

2009-present Research Professor, Head of Environmental Science Education, University of Maryland Center for Environmental Science, Horn Point Laboratory, Cambridge, MD

Areas of professional expertise

Environmental Science Education: Teaching undergraduate, graduate and educators; administering Science Education Programs; administering Summer Teacher Research Programs; mentoring teachers in research fellowships; teaching courses for educators, interpreting science for education, developing curricula for teacher and student programs.

Science Research: Marsh and seagrass ecology, plant responses to ecological variables.

Research, Scholarly and Creative Activities

***Peer-Reviewed Publications*:**

Recent

Murray, L. *Learning Geoscience by doing Geoscience.* American Geophysical Journal, Eos (featured article).Vol.96,No.13. 15 July 2015. Pp.16-20.

Murray, L., C. Gurbisz, D. Gibson, J. Woerner, T. Carruthers. 2012. *Collaborative Partnerships Help Bridge the Gap between Science and Education*. American Geophysical Journal, Eos, Volume 93, Number 49, 4 December 2012

Murray, L. and C. Gurbisz. 2012. *Learning Research through Science*. Journal of Information Technology and Application in Education. September, Vol. 1, Issue 3, pp. 105-107.

Gurbisz, C. L. Murray, D. Hinkle, B. Crump. 2011. Invisible World: Exploring Microscopic Life in the Ocean. *Green Teacher*. Issue 92, Spring 2011.

Testa, J., C. Gurbisz, L. Murray, W. Gray, J. Bosch, C. Burrell, and W. M. Kemp. 2010. *Investigating Dead Zones in Aquatic Ecosystems: Surfacing a Mystery of the Deep*. The Science Teacher. February, 2010.

Hengst, A., J. Melton and L. Murray. 2010. *Restoration of mesohaline submerged aquatic vegetation : The nursery bed effect*. Restoration Ecology. Vol. 18, no 4.

Murray, L., W. M. Kemp, D. Hinkle, D. Shafer. 2009. *Production and Field Planting of Vegetative Propagules for Restoration of Redhead Grass and Sago Pondweed in Chesapeake Bay*. Army Corps of Engineers. Tech Notes.

Ksiazek, K., K. McGlathery, L. Reynolds, A. Schwartzchild, C. Wilkerson, T. Carruthers, C. Gurbisz, J. Woerner, L. Murray. 2009. *Learning About Coastal Trends. What is the Story with Seagrasses.* Science Activities. Vol. 46, No. 2.

Murray, L and D. Gibson. 2008. *Real-Time Ocean Data in the Classroom*. The Science Teacher. October pp.44-48.

Murray, L., W.M. Kemp. 2008. *Biological factors: Aquatic grasses*, pp. 115-120, In: J. Petersen, V. Kennedy, W. Dennison and W.M. Kemp (eds.). 2008. Experimental ecosystems and scale: Tools for understanding and managing coastal ecosystems. Springer, New York.

Kemp, W.M., L. Murray. 2008. *Nutrient enrichment and aquatic grass restoration*, pp. 172-178, In: J. Petersen, V. Kennedy, W. Dennison and W.M. Kemp (eds.). 2008. Experimental ecosystems and scale: Tools for understanding and managing coastal ecosystems. Springer, New York.

Sanford, L, S. Suttles, W.M. Kemp, J. Petersen, L. Murray. 2008. *Physical factors: Materials exchange*, pp. 75-81, In: J. Petersen, V. Kennedy, W. Dennison and W.M. Kemp (eds.). 2008. Experimental ecosystems and scale: Tools for understanding and managing coastal ecosystems. Springer, New York.

Lemus, J. and L. Murray. 2007. *Leveraging COSEE: Going Above and Beyond*. Special Issue of Currents. Currents. (Spring 2007).

Murray, L. 2004. *Restoring Bay grasses: Bringing research to the field*. Maryland Aquafarmer. Issue # 2004-01-02.

Kemp, W. M., R. Batiuk, R. Bartleson, P. Bergstrom, V. Carter, G. Gallegos, W. Hunley, L. Karrh, E. Koch, J. Landwehr, K. Moore, L. Murray, M. Naylor, N. Rybicki, J. C. Stevenson, D. Wilcox. 2004. *Habitat requirements for submerged aquatic vegetation in*

Chesapeake Bay: Water quality, light regime, and physical-chemical factors. Estuaries. 27: 363-377.

Petersen, J., W. M. Kemp, W. Boynton, C-C Chen, J Cornwell, R. Gardner, D. Hinkle, E. Houde, T. Malone, W. Mowitt, L. Murray, L. Sanford, C. Stevenson, K. Sundberg. S. Suttles. 2003. *Multi-scale experiments in coastal ecology: Improving realism and advancing theory*. BioScience. 53: 1181-1197.

Past

Bender, M.E., A.E. Shearls, L. Murray, R.J. Huggett. 1980. Ecological effects of experimental oil spills in Eastern coastal plain estuaries. Environ. Internat., 3: 121-133.

Kemp, W.M. and L. Murray. 1986. Oxygen release from the roots of the submersed macrophyte, Potamogeton perfoliatus: Regulating factors and ecological implications. Aquatic Botany, 26: 271-283.

Murray, L. and R.L. Wetzel. 1987. Oxygen production and consumption associated with the major autotrophic groups in two temperate seagrass communities. Mar. Ecol. Prog. Ser.38: 231-239.

Kemp, W.M., L. Murray, J. Borum, K. Sand-Jensen. 1987. Diel growth in eelgrass Zostera marina. Mar. Ecol. Prog. Ser. 41, 79-86.

Kemp, W.M., L. Murray, W.R Boynton, C. Madden, R.L. Wetzel, F. Vera Herrera. 1988. Light relations for the seagrass, Thalassia testudinum, and its epiphytic algae in a tropical estuarine environment. Chap. 11:193-206. In: A Yanez-Arancibia and J.W. Day (eds.) Ecology of Coastal Ecosystems in the Southern Gulf of Mexico: The Terminos Lagoon Region. Inst. Cienc. del MAR Y Limnol. UNFM. Coast Ecol. Inst. LSU Editorial Universitaria, Mexico, D.F.

Kemp, W.M., L. Murray, and C.P. McRoy. 1988. Primary Production. In:R. Phillips and C.P. McRoy (ed). Seagrass Research Methods. UNESCO Publ., Paris, France.

Borum, Jens, L. Murray and W.M. Kemp. 1989. Aspects of Nitrogen Acquisition and Conservation in Eelgrass Plants. Aquatic Botany. 35: 289-300.

Murray, L., W.C. Dennison, W.M. Kemp. 1993. Nitrogen versus Phosphorus Limitation for growth of an estuarine eelgrass (Zostera marina L.) population. Aquatic Botany 44: 83-100.

Boynton, W. R., L. Murray, J. Hagy, C. Stokes, and W. M. Kemp. 1996 A comparative analysis of eutrophication patterns in a temperate coastal lagoon. Esutaries, vol. 19, No. 28,p. 408-421.

Sturgis, R. B. and L. Murray. 1997. Scaling of nutrient inputs to submersed macrophyte mesocosms: Temporal and spatial variations. Mar Ecol Prog Ser 152: 89-102.

Murray, L., R.B. Sturgis, R. Bartleson, W. Severn and W. M. Kemp. 1999. Scaling submersed plant community responses to experimental nutrient enrichment. In Seagrasses: Monitoring, Ecology, Physiology, and Management, S. A. Bortone (editor). CRC Press, New York.

Murray, L. and P. Chambers. 1999. Water quality assessment: coupling science and education. *In* E. Özhan [ed.], MEDCOAST 99 B EMECS 99 Joint Conference Proceedings, Antalya, Turkey; pp 1193-1198. Middle East Technical University, Ankara, Turkey.

Digital Media

Teach Ocean Science website (http://teachoceanscience.net/).

Water Quality and GIS. Scientist-Educator Partnership Program. June-August, 2014.
http://www.teachoceanscience.net/teaching_resources/education_modules/water_quality_and_gis/get_started/

Aquatic Food Webs. Scientist-Educator Partnership Program. June-August, 2011. (http://teachoceanscience.net/teaching_resources/education_modules/aquatic_food_webs/get_started/)

Plankton-Aquatic Drifters. Scientist-Educator Partnership Program. June-August, 2011. http://teachoceanscience.net/teaching_resources/education_modules/plankton_-_aquatic_drifters/get_started/

Murray, L, E. Day-Miller, C. Gurbisz, A. Ward, K. Jensen. 2011. An Introduction to our Dynamic Ocean: An Ocean Science Curriculum (http://www1.coseecoastaltrends.net/ocean_science).

COSEE Coastal Trends staff and Land-Sea Scientist-Educator Partners. From the Land to the Sea Module (http://www1.coseecoastaltrends.net/modules/from_land_to_the_sea/). This educational module was developed summer 2010 in a partnership with COSEE Coastal Trends and the UMCES HPL faculty (Tom Fisher) and graduate students. It focuses on 3 sub-sections: Learn about watersheds, Explore the research associated with watersheds, and Teach the classroom activities developed by the team.

COSEE Coastal Trends staff and Marine Bacteria Scientist-Educator Partners. Marine Bacteria Module (http://www1.coseecoastaltrends.net/modules/marine_bacteria/). 2009 This educational module was developed summer 2009 in a partnership with COSEE Coastal Trends and the University of Delaware faculty (D. Krichman) and graduate students. It focuses on 4 sub-sections: Learn about marina bacteria, Explore the trend, Investigate current research, and Access classroom activities.

COSEE Coastal Trends staff and Fish and Physics Scientist-Educator Partners. Fish and Physics Module (http://www1.coseecoastaltrends.net/modules/fish_and_physics/). This

educational module was developed summer 2009 in a partnership with COSEE Coastal Trends and the UMCES HPL faculty (E. North) and graduate students. It focuses on 4 sub-sections: Learn about striped bass, Explore the trend of striped bass populations, Investigate current research on the ETM and striped bass life history, and Access Classroom Activities, and an introductory video on the home page.

COSEE Coastal Trends staff and Seagrass Scientist-Educator Partners. Seagrass Module (http://www.coseecoastaltrends.net/modules/seagrass/get_started/). This educational module was developed summer 2008 in a partnership with COSEE Coastal Trends and the Long Term Ecosystem Reserve (Anheuser-Busch Coastal Research Center), Oyster VA faculty (K. McGlathery) and graduate students. It focuses on 4 sub-sections: Learn about Seagrasses, Explore the Trend, Investigate Current Research, and Access Classroom Activities, and an introductory video on seagrasses on the home page.

COSEE Coastal Trends staff and Dead Zone Scientist-Educator Partners. Dead Zone Module. (http://www.coseecoastaltrends.net/modules/dead_zone/get_started/). This educational module was developed summer 2008 in a partnership with COSEE Coastal Trends and the UMCES HPL faculty (WM Kemp) and graduate students. It focuses on 4 sub-sections: Learn about Dead Zones, Explore the Trend, Investigate Current Research, and Access Classroom Activities, and an introductory video on dead zones on the home page.

Murray, L and D. Gibson. *Taking the Pulse of our Ocean. Users Guide for Observing Systems Education*. (http://www.coseecoastaltrends.net/ocean_pulse). 2007. This curriculum is based on our experience of conducting a workshop for secondary school teachers over four year, and focuses on the science associated with coastal ocean observing systems for educators. The main objective of the program was to bring together scientists and educators to study ocean science through coastal observing systems and the information these systems can provide on physical and biological processes. Teachers adapted activities presented in the workshop to their classrooms.

Murray, L, Boicourt, B., Kelley, *A. Density: Lessons for High School Science*. January 2006. This CD-ROM describes density currents through two power point presentations and includes a classroom lesson on water density. (http://hpl.umces.edu/faculty/murray/outreachoce.html)

Murray, L., JH Melton, L May, M Parks. *Submersed Aquatic Vegetation: Applications for Education*. Jan 31, 2003. This CD-ROM includes 5 power point presentation describing SAV ecology and restoration and 3 lesson plans for the K-12 classroom. (http://hpl.umces.edu/faculty/murray/outreachsav.html).

Murray, L., DS Lloyd, J Whitelock, J.C. Stevenson. *Wetlands: Applications for Education*. Maryland Association of Outdoor Educators. Jan 31, 2003. This CD-ROM describes Stevenson's salt marsh research and includes lessons for the K-12 classroom.

Murray, L., Ma, Xiping, Melton, J. *Bringing Ocean Observation System Science to Education*. Mid-Atlantic COSEE. July, 2003-2006. (www.cosee-ma.net)

Murray, L. 2006-present. UMCES faculty website describing my programs. http://hpl.umces.edu/faculty/murray/index.html

Murray, L, C. Gurbisz, A. Jones, T. Carruthers, J. Woerner. 2007-present. COSEE Coastal Trends website describing our center's activities. http://www.coseecoastaltrends.net/

Frederick, A, J. Takacs, K. Bruce, C. Stylinski and L. Murray. 2002-present. Environmental Science Education Program website describes science education programs at the three UMCES labs and our Teacher Research Fellowship program, including lessons developed by the participants. (http://www.esep.umces.edu/)

Technical Reports

Recent

Murray, L. Research Experiences for STEM Students. August 2012-2013. Final Report submitted to the National Science Foundation.

Murray, L. Development of park focused, web based learning resources for coral communities in the changing climate of parks of the PACN network. July 2013-14. Final report submitted to PACN NPS, Hawaii National Park.

Murray, L. Learning Science through Chesapeake Bay Research: Talbot County Public Schools. Sept 2008-2013. Final report submitted to NOAA Chesapeake Bay Office. Annapolis, MD

Murray, L. T. Carruthers, D. Gibson, C. Witherspoon, W. Hall. COSEE Coastal Trends. Progress Report. National Science Foundation. Sept. 2008-2011.

Murray, L. Establishment of Mid-Atlantic Center for Ocean Science Education Excellence (COSEE). Report to National Science Foundation. 2003-2008.

Murray, L. Learning Science through Chesapeake Bay Research: Dorchester County Public Schools. Sept 2008-2010. Report submitted to Chesapeake Bay Trust.

Kemp, W. M. and L. Murray. 2008. Applying natural propagation mechanisms for effective restoration of submersed plants in mesohaline Chesapeake Bay. Report to NOAA Chesapeake Bay Office. Annapolis, MD.

Murray, L. W. M. Kemp, D. Hinkle. 2007. Production and field planting of vegetative tubers for restoration of redhead grass (*Potamogeton perfoliatus)* and sago pondweed *(Stuckenia pectinata)* in Chesapeake Bat. Final Report Army Corps of Engineers. Vicksburg, MS.

Kemp, W. M. and L. Murray. 2007. Large-Scale Restoration of Submerged Aquatic Vegetation in Mesohaline Chesapeake Bay: A Design-with-Nature Approach. Final Report to NOAA Chesapeake Bay Office. Annapolis, MD.

Kemp, W. M. and L. Murray. 2007. Quantifying Ecological Feedbacks and Thresholds for Enhanced Restoration of Submersed Aquatic Vegetation. Report submitted to NOAA Sea Grant.

Murray, L. 2006. Restoration of Mesohaline Submerged Aquatic Vegetation through Community-based Projects in Chesapeake Bay. Report to NOAA Restoration Center.

Murray, L. 2005. SAV Habitat Restoration in the Lower Nanticoke River Watershed. Report to the National Fish and Wildlife Foundation. Washington, DC

Murray, L. 2003. Scale-dependent relationships in Submersed Aquatic Vegetation Ecosystems. Multi-scale Experimental Ecosystem Research Center. Report to U. S. Environmental Protection Agency, Washington, D.C.

Murray, L. 2003. Restoration of Mesohaline SAV. Report to the Chesapeake Bay Trust. Annapolis, MD.

Past

Bender, M.E., A.E. Shearls, L. Murray, C.H. Hershner, R.J. Huggett. 1981. Ecological effect: IN: Fate and effects of experimental oil spills in an eastern coastal plain marsh system. M.E. Bender, J.G. Hudgins and R.A. Jordan (eds.). American Petroleum Institute report, VIMS No. 539440:11-1157.

Wetzel, R.L., P.A. Penhale, M.S. Kowalski, K.L. Webb, L. Murray and R.vanTine. 1981. Primary production, community metabolism and nutrient cycling. IN: Functional ecology of submerged aquatic vegetation in the lower Chesapeake Bay. R.L. Wetzel (ed.). Report to Chesapeake Bay Program.

Wetzel, R.L., L. Murray, R. vanTine, J.W. Day, Jr., C.R. Madden. 1982. Preliminary studies on community metabolism in a tropical seagrass ecosystem, Laguna de Terminos, Campeche, Mexico. College of William and Mary. IN: An ecological program for the laguna de Terminos, Campeche, Mexico, with special reference to fishery resources and the potential impact of man. John W. Day, Project Coordinator. Louisiana State University Cont. No. LSU-CEL. 82-03. Baton Rouge,LA.

Kemp. W.M. and L. Murray. 1986. Nutrient-macrophyte interactions for submersed plant communities in coastal waters. Final Report to Maryland Sea Grant College, College Park (No R/F - 4-PD). UMCEES Tech. Rep Ser. TS-56-86.

Kemp, W.M., J. Neundorfer, L. Murray, W.C Dennison. 1988. Nitrogen versus phosphorus nutrient enrichment effects on submerged aquatic vegetation. Report to State of MD. Chesapeake Bay Trust, Annapolis, MD.

Boynton, W., L. Murray and F. Jacobs. 1993. "Maryland's Coastal Bays: an assessmentof aquatic ecosystems, pollutant loadings, and management options." Report to Maryland Department of the Environment, Baltimore, Md.

Murray, L. and B. Sturgis. 1994. "Scaling of nutrient input in submersed aquatic vegetation mesocosms." Report to MEERC, U.S. Environmental Protection Agency, Washington, D. C.

Moore, K. A., J. L. Goodman, J. C. Stevenson, L. Murray and K. Sundberg. 1994. Chesapeake Bay nutrients, light and SAV: Relations between variable water quality and SAV in field and mesocosm studies. Report to Chesapeake Bay Program, Environmetnal Protection Agency, Annapolis, MD. 21401.

Jones, T. W., L. Murray and J.C. Cornwell. 1994. Relative inportance of nutrient inputs to the productivity of an eatuarine marsh, Monie Bay NERRS. Report to NOAA National Estuarine Research Reserve System.Washington, D. C.

Moore, K. A., J. L. Goodman, J. C. Stevenson, L. Murray and K. Sundberg. 1995. Chesapeake Bay nutrients, light and SAV: Relations between variable water quality and SAV in field and mesocosm studies. Final Report to Chesapeake Bay Program, Environmetnal Protection Agency, Annapolis, MD. 21401.

Murray, L. and B. Sturgis. 1995. "Scaling of nutrient input in submersed aquatic vegetation mesocosms." Report to MEERC, U.S. Environmental Protection Agency, Washington, D. C.

Murray, L. and B. Sturgis. 1996. "Trophic scaling in submersed aquatic vegetation mesocosms: Response to nutrient enrichment" Report to MEERC, U.S. Environmental Protection Agency, Washington, D. C.

Jones, T. W., L. Murray and J.C. Cornwell. 1997. Short-term and long-term sequestering of nitrogen and phosphorus in the Maryland National Estuarine Research Reserve. Report to NOAA National Estuarine Research Reserve System. Washington, D.C.

Murray, L., B. Sturgis, R. Bartleson, W. Severn. 1997. "Scaling response of SAV community to nutrient loading: Effects of Trophic Complexity. In. Scale-Dependent Relations Governing Extrapolation from Mesocosm to Nature in Coastal Ecosystems. V.S. Kennedy (ed).Report U. S. Environmental Protection Agency, Washington, D.C.

Murray, L. R. B. Sturgis, R. Bartleson. 1998. "Scaling response of SAV communities to nutrient loading: Effects of water exchange. In. Scale-Dependent Relations Governing Extrapolation from Mesocosm to Nature in Coastal Ecosystems. V.S. Kennedy (ed). Report to U. S. Environmental Protection Agency, Washington, D.C.

Murray, L. R. B. Sturgis, R. Bartleson. 1999. "Scaling response of SAV communities to nutrient loading: Coupling open water and seagrass systems. In. Scale-Dependent Relations Governing Extrapolation from Mesocosm to Nature in Coastal Ecosystems. V.S. Kennedy (ed). Report U. S. Environmental Protection Agency, Washington, D.C.

Murray, L. P. Chambers, S. Miller, D. Richardson, G. Dendrinos, C. Lea, B. Sturgis. 1999. Water qulaity assessment using artificial substrates and sediments: Coupling

science and education. Report to Maryland Coastal Bays, Department of Natural Resources, Annapolis, MD.

Murray, L. 1999. Chesapeake Bay as an ecosystem: An experience in estuarine ecology, data interpretation and classroom applications. Report submitted to Maryland Higher Education Commission, Annapolis, MD.

Kemp, W. M., Murray, L. , DF Gruber. 1999. Comparative analysis of South Florida estuarine ecosystems: Responses to variations in freshwater inputs. Report to Florida Center for Environmental Studies. Palm Beach Gardens, FL.

Murray, L. 2000. MEERC Outreach through Education: Sustainable Restoration of Mesohaline SAV. In. Scale-Dependent Relations Governing Extrapolation from Mesocosm to Nature in Coastal Ecosystems. V.S. Kennedy (ed). Report to U. S. Environmental Protection Agency, Washington, D.C.

Murray, L. 2001. MEERC Outreach through Education: Sustainable Restoration of Mesohaline SAV. In. Scale-Dependent Relations Governing Extrapolation from Mesocosm to Nature in Coastal Ecosystems. V.S. Kennedy (ed). Report to U. S. Environmental Protection Agency, Washington, D.C.

Grants and Contracts:

Awarded

Murray, L and T. Ackerman. Integration of environmental and geographic literacy: A model for Maryland Schools. NOAA Chesapeake Bay Office, BWET. 9/1/2014 - 8/31/2015. $291,410.

Ball, W.P., W. M. Kemp, L. Murray. WSC Category 3 Collaborative: Impacts of Climate Change on the Phenology of Linked Agriculture-Water Systems. NSF, Sept. 2013. $54,132.

***Murray, L.* MSP for High School Environmental Literacy. Maryland State Department of Education. May 2014- Dec 2014. Subcontract from Howard County Public Schools. $33.918.**

***Murray, L*. Research Experiences for STEM Students: A pilot program (RE STEM). National Science Foundation. August 2012-2014. $115,000.**

***Murray, L*. Science communication and demonstration of a reporting framework for National Parks in the Pacific Island Network. National Park Service. (June 2010-Dec 2014. ($174,547).**

Awarded (expired)

Murray, L. MSP for High School Environmental Literacy. Maryland State Department of Education. May 2013- Dec 2013. Subcontract from Howard County Public Schools. $25,098.

Murray, L. Learning Science through Chesapeake Bay Research: A partnership with Talbot County Public Schools. NOAA CBO. B-WET. March, 2008 – February, 2013. ($197,759)

Murray, L., T. Carruthers, D. Gibson, W. Hall, C. Weatherspoon . COSEE Coastal Trends. National Science Foundation. September, 2007-August 2011. ($1,080,000)

Murray, L. COSEE – New Collaborations: A Partnership to Assemble "An Introduction to Our Dynamic Ocean" Course. National Science Foundation. Sept 2008-Dec 2012. ($150,000).

Murray, L. Establishment of Mid-Atlantic Center for Ocean Science Education Excellence (COSEE). Sub-contract. National Science Foundation. (Aug 2003-Sept 2009) ($462,050).

Murray, L. Learning Science through Chesapeake Bay Research. Chesapeake Bay Trust. (Aug 2007-July 2010) ($90,000)

Vickers, P. (with *L. Murray* and others). Science, Technology, Engineering, and Mathematics (STEM) Education Initiative. Dorchester County Public Schools. ($100,000) Aug 2008-Aug 2009.

Kramer, J., *L. Murray*, J. Takacs, A. Frederick, C. Stylinski. Chesapeake Teacher Research Fellowship Program. National Oceanic and Atmospheric Administration B-WET Program. $454,853 (HPL portion $143,458) (April 2004-Mar 2009).

Gross, T., W. Ball, D. DiToro, W.M. Kemp. M. Piasecki, *L. Murray*, B Cuker. A prototype system for multi-disciplinary shared cyberinfrastructure: Chesapeake Bay environmental observatory (CBEO). National Science Foundation. June 2006 - June 2009 ($331,242 UMCES portion).

Kemp, w. M., and *L. Murray*. CHRP07. Modeling Hypoxia and Ecological Responses to Climate and Nutrients. NOAA. Oct 07- Sept 08. $195,323 UMCES portion.

North, E, Boicourt, WC, Chou, SY, Roman, MR. and *Murray, L*. Collaborative Research: Larval transport in a coupled-estuary-shelf system: a modeling study. National Science Foundation. Nov 04-Oct 08. ($13,658 education portion)

Kemp, W. M. & *Murray, L*. Applying natural propagation mechanisms for effective restoration of submersed plants in mesohaline Chesapeake Bay. NOAA, Chesapeake Bay Office. (2007-2008). ($93,185)

Kemp, W. M. & *Murray, L*. Large-scale SAV restoration in mesohaline Chesapeake Bay: Designing with nature. NOAA, Chesapeake Bay Office. (2006-2008). ($81,436)

Kemp, W. M. and *L. Murray*. Quantifying ecological feedbacks and transition-points for enhanced restoration of submerged aquatic vegetation. NOAA MD Sea Grant.(Feb 2007-Feb 2009), $188,529

Murray, L and W. M. Kemp. Production and field planting of vegetative tubers for restoration of redhead grass (*Potamogeton perfoliatus)* and sago pondweed *(Stuckenia pectinata)* in Chesapeake Bay. Army Corps of Engineers, Vicksburg, MS. (2005-6) ($89,483; $86,573).

Murray, L. Restoration of Mesohaline Submerged Aquatic Vegetation through Community-based Projects in Chesapeake Bay (Nanticoke River). National Fish and Wildlife Foundation. 2003-2005 ($50,000).

Murray, L. Restoration of Mesohaline Submerged Aquatic Vegetation through Community-based Projects in Chesapeake Bay (Chester River).2003-2005. NOAA. ($36,086).

Kemp, WM, *L Murray* and J Cornwell. Scales of Sediment Biogeochemistry in Seagrass Beds: Implications for Restoration and Sustainability. Maryland Sea Grant. February, 2002-4 ($134,769)

Murray, L. Co-PI. Submersed Aquatic Vegetation Studies. Subcontract from Multiscale Experimental Ecosystem Research Center (MEERC). Funded by Environmental Protection Agency. 1993 ($34,586), 1994 ($210,060), 1995 ($168,028),1996 ($158,000), 1997 ($82,000), 1998 ($60,000), 1999 ($60,000) 2000 ($60,000) 2001 (60,000), 2002

Murray, L. and J Greer. Research Fellowship Program. NOAA, Chesapeake Bay Program. 2002-2004. ($88,500).

Stylinski, C. and *L. Murray*. Learning with GIS: Integrating scientific tools into the classroom. Proposal submitted to Eisenhower Professional Development Foundation. January 30, 2002. ($92,000)

Murray, L. Science Seminar Series. NOAA, Chesapeake Bay Program. January, 2002. ($5000).

Bell, W., M Schwamm, *L. Murray*, R. Gabreys. Earth Tech. Using Technology to teach earth and environmental sciences. Carnegie Foundation. June 2002. ($645,00).

Murray, L. Summer Internships for Dorchester County Students. Waddell Foundation. Cambridge, MD. 1994- 2001 ($8,000/yr).

Murray, L. Wetland Teacher Workshop. Waterfowl Festival. Easton, MD. 2001. ($10,000)

Murray, L. Sustainable restoration of mesohaline SAV. Chesapeake Bay Trust. 2000-01. ($42,000).

Murray, L. and J. Melton. SAV habitat restoration in the lower Nanticoke River watershed. National Fish and Wildlife Foundation. ($47,320)

Murray, L. and J. Powers. SAV Restoration Project. Mid-Shore Community Foundation. Easton, MD. 2001-2002 ($10,000).

Murray, L. Career Connections in Environmental Science. University System of Maryland Headquarters. College Park. Md. (1999-2001) $10,000.

Murray, L. and Anne Willey. Remote Access to MEES Courses. VISION Funds. Horn Point Laboratory. ($5200)

Fisher, T. and *L. Murray*. Use of GIS and Remote Sensing as a tool for teaching Earth Science and Geography in Local Schools. VISION Funds ($8900).

Kemp, W. M. and *L. Murray*. Seagrass-Eutrophication Interactions: Role of Spatial Pattern. Funded by Maryland Sea Grant. (1999-2001) ($60,000).

Murray, L. and J. C. Stevenson. Chesapeake Bay nutrients, light and SAV: Relations between variable water quality and SAV in mesocosm studies. Environmental Protection Agency. May 25,1993.($33,315)

Jones, T. W., *L. Murray* and J. Cornwell. A two-year study of the short-term and long-term sequestering of nitrogen and phosphorus in the Maryland National Estuarine Research Reserve. National Oceanic and Atmospheric Administration. June 1, 1993 ($146,389)

Murray, L. Sea Grant Environmental Education Intern. Maryland Sea Grant, College Park, MD. 1995-6, ($35,000), 1997 ($10,000).

Murray, L. Wetland Teacher Workshop. Waterfowl Festival. Easton, MD. 1994. ($7,500), 1996 ($8200), 1997 ($7500)

Murray, L. Summer Internships for Dorchester County Students. Waddell Foundation. Cambridge, MD. 1994. ($8,000), 1995 ($8200), 1996 ($9,000), 1997 ($7000)

Mackiernan, G. M. Leffler, *L. Murray*. NSF Research Experiences for Undergraduates Program. National Science Foundation, Washington, D.C. ($221,400).

Murray, L., C. Baptist, D. Lloyd. Maryland summer center for gifted and talented students. Maryland State Department of Education. Annapolis, MD. 1994 ($72,000).

Murray, L. and C. Baptist. Marsh and trail restoration for Horn Point Environmental Education Center. Chesapeake Bay Trust. ($6,000).

Lupis, J., *L. Murray*, C. Baptist. Teacher Training Workshops for the HPEL Environmental Education Center. Chesapeake Bay Trust. ($20.070).

Murray, L., C. Baptist, D. Lloyd. Maryland summer center for gifted and talented students. Maryland State Department of Education. Annapolis, MD. 1994 $72,000.

Murray, L. Chesapeake Bay as an Ecosystem: An Experience in Estuarine Ecology. Chesapeake Bay Trust. 1994 $7,800.

Murray, L. Summer Internships for Dorchester County Students. Waddell Foundation. Cambridge, MD. 1994. $8,000.

Bell, W.H, *L. Murray*, et al. "A Relative Comparison of Marine Productivity Among the Outer Continental Shelf Planning Area." Federal OCS Oil and Gas Activities. Minerals Management Service. Washington, D.C. Jan 1984 -Dec 1984.

Kemp, W.M. and *L. Murray*. "Seagrass nutrient interactions" NOAA, MD. Sea Grant College, June 1984 - June 1985. ($5,000)

Kemp, W.M. and *L. Murray*. "Seagrass-nutrient interactions" NOAA, Sea Grant College. Jan 1985 - Dec 1985 ($10,500)

Kemp, W.M., W.C. Dennison, and *L. Murray*. "Resurgence of submerged aquatic vegetation in Chesapeake Bay (1985-1988): A natural experiment to test eutrophication effects." Maryland Water Resources Research Center, Univ. of MD., College Park, MD. May 1989 - April 1990. ($30,000).

Kemp, W.M., W.C., Dennison, *L. Murray*. "Eutrophication effects of growth and survival of submerged aquatic vegetation in Chesapeake Bay: An ecosystem simulation model. Maryland Water Resources Research Center, Univ. of Md. College Park, MD. Dec. 1989 - Dec. 1990. ($18,000).

Murray, L. and T.W. Jones. "A Comparison of Two Marsh Creek Systems in the Monie Bay National Estuarine Research Reserve." Maryland Department of Natural Resources, May 1991-October 1991. ($5,000)

Murray, L. "Maryland's Coastal Bays: An assessment of aquatic ecosystems, pollutant loadings, and management options." Sub-contract from Environmental Protection Agency through the Center of Environmental and Estuarine Studies, University of Maryland, Oct 1991- Dec 1992. ($43,000).

Murray, L. Submersed Aquatic Vegetation Studies. Subcontract from Multi-scale Experimental Ecosystem Research Center. Funded by Environmental Protection Agency. June, 1993.($40,000).

Murray, L. 1998. Internet Resource Center: Linkages with Math-Science Education. Maryland Space Grant, Baltimore, MD. $13,525. (1998)

Murray, L. Chesapeake Bay as an Ecosystem: An Experience in Estuarine Ecology. Eisenhower Professional Development Program, MD Higher Education Commission. 1998 ($30,300)

Murray, L. USM Program for Minority Recruitment in Life Sciences. University of Maryland System. 1998-1999 ($15, 700)

Murray, L. Correlation of Nutrient Enrichment with Submersed Aquatic Vegetation Growth: Coupling Research and Education. Maryland Department of Natural Resources. 1998 ($10,000).

Murray, L. Wetland Teacher Workshop. Waterfowl Festival. Easton, MD. 1998 ($8,200)

Murray, L. Water Quality Assessment Using Artificial Substrates and Sediments: Coupling Science and Education. Maryland Department of Natural Resources. 1999 ($10,200).

Murray, L. Environmental Education for Dorchester County. Waterfowl Festival. Easton, MD. 1999 ($8,200)

***Seminars and Presentations**:*

Recent

Murray, L and T. Ackerman. *Using the Environment to Integrate Science and Social Studies Literacy*. National Science Teachers Association conference. Boston, MA April 3-6, 2014.

Murray, L. *Research Experiences for STEM Students.* Coastal and Estuarine Research Federation conference. San Diego, CA. November 2013.

Murray, L. *Learning Science through Research: Bridging the Gap*. Coastal and Estuarine Research Federation conference. Daytona Beach, FL. November 2011.

Murray, L. *Learning Science through Research*. Oceans 11: MTS/IEEE Conference. Kona, Hawaii. September 2011.

Gurbisz, C. and L. Murray. Investigating microscopic life in the ocean: an example of Learning Science through Research. Coastal and Estuarine Research Federation Conference. Daytona Beach, FL, Nov 6-10, 2011.

Murray, L., D. Gibson, T. Carruthers, C. Gurbisz, J. Woerner. Developing online educational resources through scientist-educator partnerships. American Society of Limnology and Oceanography Conference. San Juan Puerto Rico. Feb 14-18, 2011.

Murray, L. *COSEE: Coastal Trends in Seagrasses*. National Science Teachers Association. New Orleans, LA. Mar. 2009.

Murray, L., W.M. Kemp, J Testa, J. Bosch, C. Gurbisz, T. Carruthers. *Expanding the word on Hypoxia*. Coastal and Estuarine Research Federation Conference. Portland OR. Nov 2-6, 2009.

Murray, L., T. Carruthers, D. Gibson, C. Gurbisz, J. Woerner. *Understanding Trends in Coastal Ecosystems through Science-Education Partnerships.* Marine Technology Society Conference. Biloxi, MS. October 2009.

Gurbisz, C. and L. Murray. Investigating microscopic life in the ocean: an example of Learning Science through Research. Coastal and Estuarine Research Federation Conference. Daytona Beach, FL, Nov 6-10, 2011.

Gurbisz, C. M. Leandre, D. Gibson, L. Murray, T. Carruthers, J. Woerner*Building awareness of trends in coastal science through scientist-educator partnerships*. American Society of Limnology and Oceanography Ocean Sciences Meeting. Feb 22-26, 2010. Portland, OR.

W. M Kemp, T. Carruthers, D. Gibson, W. Hall, C. Witherspoon, C. Gurbisz, L. Murray. *Understanding Trends in Coastal Ecosystems through Science-Education Partnerships*. Coastal and Estuarine Research Federation Conference. Portland OR. Nov 2-6, 2009.

McGlathery, K. J., Ksaizek, K., Reynolds, L. K., Schwarzchild, A., and Wilkerson, C., Carruthers, T., Murray, L. Learning about Coastal Trends: *Why are Seagrasses Important?* Coastal and Estuarine Research Federation Conference. Portland OR. Nov 2-6, 2009.

Ksiazek, K., Carruthers, T., K. McGlathery, L.K. Reynolds, E. Hinkle, A. Schwarzschild, C. Wilkerson, C. Gurbisz, J. Woerner, and L. Murray. The Seagrass Story. National Association of Biology Teachers, Denver, November, 2009.

L. Murray, L. Spence, A. Ward, D. Gibson. *Partnerships in Ocean Observing Systems Education: A Transfer Model*. American Society of Limnology and Oceanography. Orlando, FL. March 2008.

T. Carruthers, L. Murray, D. Gibson, W. Hall, C. Witherspoon. K Burns. *Coastal Trends Issues and the Formation of Science-Education Partnerships.* Poster. American Society of Limnology and Oceanography. Orlando, FL. March 2008.

Murray, L., E. Day-Miller, K. Jensen, P. Hamner, L. Whitley. *Ocean Literacy and an Ocean Science Course*. National Marine Educators Association. Savannah, GA. July 2008.

Murray, L. R. Johnson, A. De Charon, J. Osowski. *Climate Change and COSEE*. Panel member. National COSEE Network Conference. Catalina Island, CA. May 2008.

Spence, L and L. Murray. *"Taking the Pulse of the Coastal Ocean" from Mid-Atlantic to South East.* National Marine Educators Association. Portland ME, July 2007.

Frederick A., L. Murray , J. Takacs, C. Stylinski. *How you can integrate real-world research into your education program.* North American Association of Environmental Educators. Virginia Beach, VA. Nov. 2007

Boicourt, W., A. Kelley, L. Murray. *Density Currents: Application of Science to Education*. American Geophysical Union. Honolulu, HI. Feb. 2006.

Murray, L, A. Hengst, D. Hinkle, J. Melton, W. M. Kemp. *Restoration of Submerged Aquatic Vegetation in Mesohaline Chesapeake Bay: A Design-with-Nature Approach*. Restore Americas Estuaries Conference. New Orleans, LA. Dec 2006.

Murray, L, J. McDonnell, L. Hotaling, M. DeLuca, M. Newman, D. Gibson. *Using Observing Systems to Enhance Ocean Science Education*. Marine Technology Society. Washington D.C. Sept. 2005.

Battles, E. and L. Murray. *Artificially Induced Tuber Production and SAV Restoration on the Chesapeake Bay.* Poster presentation. Estuarine Research Federation. Norfolk Va. October, 2005.

Hengst, A and L. Murray. *Restoration of Potomogeton perfoliatus in a mesohaline tributary of Chesapeake Bay: The nursery bed effect*. Poster presentation. Estuarine Research Federation. Norfolk Va. October, 2005.

L. Murray, J. McDonnell, L. Hotaling, M. Newman, D. Gibson, and M. DeLuca. *Use of observing systems in science education: A course for teachers.* American Society of Limnology and Oceanography. Savannah, GA. 2004

Murray, L. *Teachers working with your research team: Meeting the "Broader Impacts" criteria*. American Geophysical Union. December, 2004. San Francisco, CA.

Stylinski C.D., J.A. Frederick, L. Murray and J. Takacs. 2004. *Partnering Teachers with Scientists in a Watershed-wide Fellowship Program*. Ecological Society of America Conference, August 1-5 2004, Portland, OR

Murray, L. *How is COSEE addressing the broader impact statement? NSF Town Meeting.* American Society of Limnology and Oceanography. Savannah, GA. 2004

Murray, L, M. DeLuca, J. McDonnel, L. Hotaling, M. Newman and D. Gibson. *Use of Observing Systems in Science Education: A Pilot Course for Teachers*. Poster presentation. ORION conference. Jan 2004. San Juan, Puerto Rico.

Murray, L. C. Stylinski, A Ferderick, J. Takacs. *The ESEP Teacher Research Fellowship*. Maryland Association of Outdoor Educators. January 2004.

Past

Murray, L. J. Melton, M. Parks, S. Stockham. Correlating environmental parameters with site selection for submersed aquatic vegetation restoration: Applications to education. Southeast Coastal Ocean Science Conference. Charleston, SC. January 2003.

Murray, L., DS Lloyd, J Whitelock. Wetlands: Applications for Education. Maryland Association of Outdoor Educators. Jan 31, 2003.

Murray, L., JH Melton, L May, M Parks. Submersed Aquatic Vegetation: Applications for Education. Maryland Association of Outdoor Educators. Jan 31, 2003.

Murray, L. and D. Lloyd. UMCES Environmental Science Education Program. Poster presentation. Maryland Association of Outdoor Educators. January 2002.

Murray, L. and J. Melton. Combining science education and SAV restoration in mesohaline regions of Chesapeake Bay. Seagrass Restoration Conference. Baltimore, MD. Sept 2003.

Kelley, A. and L. Murray. The effect of sediment type, irradiance, and bed persistence on growth of *Pomatogeton perfoliatus* (Redhead grass). Presentation to NOAA BEWET Conference, Baltimore, MD, July 2003.

Bunnell, J. and L. Murray. Effects of SAV bed age, density, and persistence on the survivorship and growth of transplanted *Pomatogeton perfoliatus* (Redhead grass). Presentation to NOAA B-WET Conference, Baltimore, MD, July 2003.

Schulte, K.E., L. Murray, and W.M. Kemp. 2001. The relationship of seagrass bed patchiness to primary production and bed "health". Poster. 16th Biennial Conference of the Estuarine Research Federation. Nov. 4-8 2001.

Murray, L. How can environmental research enhance science education? Maryland Association of Science Teachers Conference. Salisbury, MD. March 2001.

Chambers, P., Murray, L. G. Dendrinos, and. From environmental science to the classroom: Studies of seagrass habitats and water quality. EMECS. Japan, Nov. 2001.

Bartleson, R. L. Walstad, L. Sanford, W. M. Kemp, C. Stevenson. Effects of seagrass bed size and flow regime on local water quality: Preliminary model study and field corroboration. ASLO, Albuquerque, NM, Feb. 2001

Bartleson, R.D., W. M. Kemp, L. Walstad, L. Murray, and L. P. Sanford. Effects of seagrass bed size on local water quality: preliminary model study and field corroboration. Benthic Ecology Meeting, UNC., Wilmington, N , Mar 2000.

Bartleson, R.D., L. Murray, W.M. Kemp and R.B. Sturgis. Use of numerical ecosystem simulation to aid in the design of SAV nutrient enrichment mesocosm experiments. Estuar. Research Federation, New Orleans. Sept 1999.

Murray, L. G. Dendrinos, and P. Chambers. From environmental science to the classroom: Studies of seagrass habitats and water quality. EMECS, Turkey. Nov. 1999. FIRST PLACE POSTER.

Murray, L., DF Gruber and WM Kemp. Comparative analysis of South Florida estuarine ecosystems: Responses to variations in freshwater inputs. Poster presentation to Florida Bay Conference. Key Largo, FL. Nov 1999.

Bartleson, R.D., L. Murray, W.M. Kemp and R.B. Sturgis. Use of numerical ecosystem simulation to aid in the design of SAV nutrient enrichment mesocosm experiments. Estuarine Research Federation, New Orleans, Sept 1999.

Murray, L., R. B. Sturgis, and R. Bartleson, Scaling effects on seagrass community responses to nutrient enrichment. Subtropical and Tropical Seagrass Management Ecology. Ft. Myers, Fl. Oct. 1998.

Murray, L. Sturgis, B., W. Severn, R. Bartleson. Scaling trophic complexity and nutrient enrichment in submersed macrophyte mesocosms. Estuarine Research Federation, Rhode Island, Oct. 1997.

Horn Point Environmental Education, Poster Presentation, Maryland Association of Science Teachers, Solomon's, MD. Nov 1997

Murray, L., R. B. Sturgis, R. Bartleson. Effects of variations in nutrient loading on submersed plant communities: Experiments in mesocosms and models. ERFECSA Symposium, Middelburg, The Netherlands. 1996.

Murray, L. and R. B. Sturgis. Nutrient Loading effects on submersed plant communities: Importance of frequency, form and timing of delivery. Hillerod, Denmark. 1996.

Murray, L. and R. B. Sturgis. Temporal Scaling of nutrient inputs to experimental estuarine ecosystems containing submersed macrophytes. Presented at the Ecological Society of America conference in Snowbird Utah. 1995.

Murray, L. Seasonal timing of nutrient inputs to SAV mesocosms. Presented to the Living Resources Committee, Chesapeake Bay Program, Annapolis, MD. March 1995.

Murray, L. Nutrient dynamics of mesohaline marsh vegetation: A comparison of two systems within the Monie Bay NERS. Presented to the Chesapeake Bay NERS Conference, Jug Bay, MD. April 1995.

Murray, L. and R. B. Sturgis. Trophic dynamics in SAV Mesocosms. Presented to the Scientific Advisory Committee, MEERC, Horn Point Environmental Laboratory, Cambridge MD. I. June, 1995; II. Nov. 1995,

Murray, L. and R. B. Sturgis. Scaling of nutrient inputs in experimental mesocosms containing submersed aquatic vegetation. Presented to the Scientific Advisory

Committee, MEERC, Horn Point Environmental Laboratory, Cambridge, MD. I. April, 1994; II. Sept. 1994,

Murray, L. "A comparison of vegetation and nutrient dynamics from two marsh-creek systems within the Monie Bay NERS. Chesapeake Research Conference, Norfolk, Va. 1994.

Murray, L. and R. B. Sturgis. Nutrient loading effects on submersed plant communities: Importance of frequency, form and timing of delivery. Presented at the International Wetlands Conference, Key Largo, FL 1994. (Invited Paper).

Murray, L, W.Boynton, C. Stokes, J. Hagy, W. M. Kemp. "Eutrophication of a temperate Coastal Lagoon: A comparative analysis". Presented at Estuarine Research Federation, Hilton Head SC. 1993.

Murray, L. A Comparison of Two Marsh-Creek Systems in the Monie Bay National Estuarine Research Reserve System. Presented at Estuarine Research Federation, San Francisco, CA. 1991.

Effects of sediment N and P enrichment on growth, biomass and tissue composition of seagrass, Zostera marina. Presented at Estuarine Research Federation, Baltimore, MD.1989.

Light relations for the seagrass, Thalassia testudinum, and its epiphytic algae in a tropical lagoon. Presented at Estuarine Research Federation. New Orleans, LA. 1987.

Seagrass Growth and Photosynthesis: Diel cycles and light/nutrient interactions. Presented at the American Society of Limnology and Oceanography, New Orleans, LA. 1986.

Downward transport of oxygen through the vascular system of a submerged estuarine plant. Atlantic Estuarine Research Society. Salisbury, MD.1984.

Influence of nutrient enrichment and light reduction on the epiphytic growth on Zostera marina. Presented at the Atlantic Estuarine Research Society, Baltimore, MD. 1982.

Production partitioning in a temperate seagrass ecosystem. Presented at the American Society of Limnology and Oceanography, Chapel Hill, North Carolina. 1982.

General Audience Presentations

Dorchester County Public Schools and Chamber of Commerce. ACES program. UMCES Horn Point Laboratory. Jan, 2014

Coral Reef and /Climate Change Workshop for Guam Teachers. Radio Australia interview broadcast. June 2012.

STEM Programs at Horn Point Laboratory. Easton High School Advanced Placement students and teachers. Sept. 2012.

Seagrass Ecology. Presentation to National Aquarium Summer Camp students. August, 2012.

Seagrasses: What are they and why should we care. Henson School of Science. Salisbury University. March 2011.

Bay Grasses: Why We Should and How We Bring Them Back. Horn Point Seminar Series. March 2011.

SAV Ecology Workshop. Chesapeake Bay Educators. Chester River. September, 2011.

Bridging the Gap between Science and Education. China's State Oceanographic Administration Delegation. November 16, 2011.

SAV Ecology. Presentation to the Gifted and Talented students. Horn Point Laboratory. July 2011.

Scientist-Educator Partnership Program. University of Maryland Eastern Shore CREST program. February, 2011.

Restoration of Submerged Aquatic Vegetation in Mesohaline Chesapeake Bay: Tuber Restoration. SAV Workgroup. Gloucester Point, VA. February 2008.

CBEO and COSEE Partnership. Chesapeake Bay Environmental Observatory PI meeting. Annapolis, MD. May 2008

Restoration of Submerged Aquatic Vegetation in Mesohaline Chesapeake Bay. SAV Workgroup. Annapolis. Sept 2007.

SAV restoration in the mesohaline Bay. Six presentations to Dorchester Co. Public Schools. Learning Science through Research program for 7th graders. October 2007.

Ecology of Submersed Aquatic Vegetation. Shoreline Erosion Committee. Cambridge, MD. September, 2007

Macrophyte Ecology. Biological Oceanography. HPL. Nov 2007.

COSEE Coastal Trends. Presentation to the UMCES Board of Visitors. HPL. Nov 2007.

COSEE Coastal Trends Hypoxia Partnerships. Modeling Hypoxia and Ecological Responses to Climate and Nutrients meeting. HPL. Dec. 2007.

Ocean Observing Systems in the Classroom. COSEE-MA Conference. Cambridge, MD. July 2007.

SAV Ecology and Restoration. Two presentations to the Gifted and Talented program and one to the Hampton U MAST program. HPL. 2006.

Science and Education. Two presentations to teachers. Dorchester Co. Public Schools. 2006

Ecology and Research of Submersed Aquatic Vegetation. Hampton University. April 2005

Ecology of Chesapeake Bay. Annapolis Rotary Club. August, 2005.

Chesapeake Science. Presented to the Men's Club, Ginger Cover Retirement Home Oct 2005, Annapolis MD.

Environmental Science Education at Horn Point. Presentation to the Superintendents of the Eastern Shore, CA, Cambridge, MD. May 2004.

Nutrients in Chesapeake Bay. Presentation to Chesapeake Bay Foundation, Tilghman Island, MD. February, 2004

Environmental Education. Presentation to UMCES External Review Team. UMCES. Cambridge, MD. May, 2004.

Radio Interview on SAV Restoration in Chesapeake Bay. Michael Buckley of WRNR "Voices of the Chesapeake".

Reduction of nutrients from sewage treatment plants: Effects on Chesapeake Bay waters. Seminar presented to the Chesapeake Bay Foundation. Port Isobelle, VA. February 2003.

SAV Ecology and Restoration. Presentation to the Issac Walton League, Easton MD. February 2003.

Past

Wetlands: *What are they and why protect them*? Seminar at the Waterfowl Festival of Easton. Nov 1999.
Environmental Education at Horn Point. Shore Leadership. Oct. 1999.
SAV and water quality: Why Restoration? Gifted and Talented Program, HP EE Center, Aug 1999.
Wetlands Ecology, Florida Bay and the Everglades, MEES 648. Fall 1998.
Marsh Ecology in the Field, Fifth Grade, The County School, Easton, MD
State of the Bay: Water Quality, Chesapeake Bay Foundation Education Conference, Tilghman Island, MD. Feb 1997.
Mexico Then and Now. Horn Point TGIF: April, 1997
Careers in Marine Science. Saints Peter and Paul High School, Easton, MD.
Everglades: River of Grass. Talbot County Public Library. Oct. 1997

Wetlands and non-tidal wetland issues. Leadership Maryland. Salisbury MD. October. 1995, 1997

Horn Point Outreach Program, Worcester County Public Schools, Snow Hill, MD. Spr. 1997

Status of Chesapeake Bay SAV. Contribution to CES Annual Report. Fall 1997

Chesapeake Bay Observing System. Presentation for Teachers. HPEL. July 1995.

Environmental Education at Horn Point Laboratory. Presentation to the Kent County Board of Education. Feb. 1995.

Status of HPEL Environmental Education facility usage. Presentation to the Environmental Education Advisory Board, Horn Point Environmental Laboratory. April, 1994

The Biology major and graduate school. Salisbury State University. October. 1994

Wetlands and non-tidal wetland issues. Leadership Maryland. Salisbury, MD. October. 1994, 1996,1997

SAV decline in Chesapeake Bay. Heron Point Citizens Committee. Chestertown. MD. May, 1994.

SAV Resurgence. WBOC TV. Salisbury, MD. July. 1994.

Ecology of freshwater tidal wetlands. Maryland Native Plant Society. Easton, MD. Sept. 2001.

SAV Ecology and Restoration. Workshop presented to teachers/citizens. Horn Point Environmental Science Education Center. Cambridge, MD. April- May 2001.

Mesohaline SAV restoration. Poster presentation. Chesapeake Bay Trust Annual meeting, Kent Island, MD. April 2001.

Wetlands Ecology. Presentation to the Environthon, Dorchester County Soil Conservation Service. Horn Point, Cambridge MD. April, 2001.

Horn Point Environmental Science Education Center. Presentation to Eastern Shore Public School Superintendents. Horn Point, Cambridge, MD. May 2001.

Horn Point Environmental Science Education Center. Presentation to Shore Leadership. Horn Point, Cambridge, MD. May 2001.

Nitrogen in the Chesapeake Bay. Presentation to Chesapeake Bay Foundation Educators and staff. Annapolis, MD. June, 2001.

Sustainable restoration of mesohaline SAV. Presentation to the Choptank River Strategy Team, Easton, MD. Feb. 2001

Research and Education at HPL. Presentation at the Faculty Retreat. December 2003.

Bay Grasses. Seminar presented to the Chesapeake Bay Foundation. Port Isobelle, VA. February 2002.

Ecology of Submersed Aquatic Vegetation. Workshop for SAV restoration. Horn Point Laboratory. February 2002.

Bringing research to education. Horn Point Laboratory Seminar Series. February 2002

Panel on education. UMCES Convocation. April 2002.

Horn Point Education. Presentation to the UMCES Board of Visitors. October 2002.

Membership in Professional Societies:

American Society of Limnology and Oceanography
National Association of Science Teachers
Coastal and Estuarine Research Federation
National Marine Educators Association

Other Professional Recognition
UMCES and MEES Faculty member
National COSEE Council
National Academies Review of Edwards Aquifer Habitat Conservation Program
National Academies Review of NOAA Education
ASLO/AGU Session Organizer. 2006
NSF Review Panels: CAREERS and G K-12
Interview on "Voices of Chesapeake Bay". Michael Buckley (http://www.voicesofthechesapeakebay.org/)
Board of Directors, Maryland Space Grant

International Activities
Visiting Scientist, University of Copenhagen. June-Aug 1985.
Universidad Nacional Autonoma de Mexico, Tropical Seagrass Research, Member Mexico-USA Research Team. International Sea Grant, Campeche, Mexico (1981-1985).

Teaching and Student Training:

Science Education Activities 2014

Coral Reef and Climate Change. Workshop for Educators,Maui, Hawaii. June 9-13, 2014. (5 days, 18 participants).

Maryland Environmental Literacy Partnership Summer Institutes. Chesapeake Bay Water Quality. 2014. (Four 5-day institutes with 20 participants in each, 80 total teachers).

Maryland Environmental Literacy Partnership Fall Workshop. Sept 30-Oct1, 2013. (2-day workshop for 73 teachers).

STEM workshop for teachers. *Research Experiences for Students* program. August 2013. (5-day workshop on science research in the classroom, 9 participants).

Introduction to Biology (BIOL 210). 3 credit course. Salisbury University. January-May 2012.

Coral Reef and Climate Change. Workshop for Educators (28 participants). Guam. June 9-13, 2012.

Research Experiences in STEM. Workshop for teachers (7 participants). Horn Point Laboratory, Cambridge, MD. July 9-13, 2012.

Research Experience in STEM. DCPS Advance Placement Academy for students. Horn Point Laboratory. July 23-27.

Marsh and Wetland Ecology. Led field trip for MEES Land Margins course. Oct 2012

Teach Ocean Science Education Modules. UMES CREST Coastal Marine Sciences teacher workshop. July 2012.

Teach Ocean Science Education Modules. Salisbury University pre-service teachers. Sept 13, 2012.

Courses and Teacher Institutes

2014. Maryland Environmental Literacy Partnership Summer Institutes for teachers. Inquiry-based investigation of land use and water quality connections. 2010-2014. COSEE Coastal Trends Scientist-Educator Partnership Program.

2010-2014. The Scientist-Educator Partnership Program created partnerships among scientists, educators and students to help advance teacher understanding of science concepts, to improve scientist communication skills, and to develop classroom and field applications that build on the research experiences. Each partnership program listed below ran for six weeks during the summer and included at least four members: research scientist, graduate student, educator, and underrepresented college student.

2011. Aquatic Food Webs. Plankton-Aquatic Drifters. Barrier Island and Sea Level Rise.
2010. From land to Sea
2009. Fish and Physics. Marine Bacteria. Coral Reefs and Climate Change
2008. Dead Zones. Seagrass. Observing the Ocean

Coral Reefs and Climate Change. Workshop for educators (15 participants). Coconut Island, Hawaii. June 20-24, 2011.

Coral Reef Ecology. Workshop for educators (40 participants). Invited session at the Marine Technology Society conference. Kona, Hawaii. September 9, 2011.

Microbes. Talbot County Public Schools teachers. April 8, 2011.

Microbes Field Trip. All Eight Grade students, Talbot County Public Schools (215 students + 20 teachers). May 3-13, 2011

Seagrass Ecology and Photosynthesis. All Seventh grade students North Dorchester Middle School (111 students + 8 teachers). April 12-22, 2011.

Murray, L. *Topics in coastal trends*. 2008-2010. A five-day teacher professional development workshop that focuses on changes in our coastal systems (17 participants in each of 4 workshops). (www.coseecoastaltrends.net).

Murray, L and E. Day-Miller. *An Introduction to our Dynamic Ocean*. 2009-2010. A five day introduction to an online ocean science curriculum (18 participants) (http://www1.coseecoastaltrends.net/ocean_science)

Murray, L, D. Gibson, T. Carruthers. C. Witherspoon. *COSEE Scientist-Educator Partnership Orientation Workshop* June 16-20, 2010. Week-long program introduces COSEE Coastal Trends partners, programs, content overview of the focus themes, the how-to of module development, and detailed information on follow-up expectations of the Scientists-Educator Partnership. (www.coseecoastaltrends.net) (20 participants).

Murray, L., R. Fortner and D. Gibson. *Using Real-time Aquatic Data in the Classroom*. July 14-18, 2008. Stone Lab Gibraltar Island, OH. This week-long teacher institute was offered in partnership by COSEE Great Lakes and COSEE Coastal Trends on Ocean Observing Systems, how real-time aquatic data are collected and the science they represent. Topics included water circulation, density and stratification, climate change and water levels, nutrients, plankton and chlorophyll, and dead zones. Participants experienced hands on data collection, technology updates, classroom applications (12 participants)

Murray, L.,L Duguay, P Hamner, G. Noda. *Using Real-time Ocean Data in the Classroom*. Aug 11-15, 2008. Los Angeles, CA. This week-long teacher institute was offered in partnership by COSEE West and COSEE Coastal Trends on Ocean Observing systems, how real-time aquatic data are collected and the science they represent. Topics included water circulation, density and stratification, climate change and water levels, nutrients, plankton and chlorophyll, and dead zones. Participants experienced hands on data collection, technology updates, classroom applications. (18 participants)

Murray, L. *Learning Science through Chesapeake Bay Research Teacher Professional Development*. Dorchester County Public Schools, August 5-7, 2008. This three-day teacher professional development program is a partnership between the University of Maryland Center for Environmental Science, Horn Point Laboratory and the Dorchester County Public Schools. Teachers learned about: Land Use and Water Quality Using GIS, Photosynthesis and Respiration with Submersed Aquatic Vegetation and Fish, and Exploring the Ocean through Ocean Observing Systems. (15 participants).

Murray, L. C. Gurbisz, D. Stotts. *Photosynthesis and Respiration in Submersed Aquatic Vegetation.* Horn Point Laboratory. Sept 2006, Oct 2007, Sept 2008. One-day field experience for all Dorchester County Public School 7th grade students involves students conducting experiments which convey the importance of light to plant photosynthesis. (over 1000 participants). Please see attached for details.

Murray, L., D. Stotts, E. Markin, and A. Lazur. *Calculating the Feeding Rate and Condition Factor for Atlantic Sturgeon*. June, 2008. One-day field experience for all DCPS Science Fair participants, in which students explored the science of finfish aquaculture and restoration of the Atlantic sturgeon. (90 participants). Please see attached for details.

Murray, L. *Using Real-time Ocean Data in the Classroom*. Sept. 2008. One-day field experience for DCPS STEM students, in which participants studies density circulation

and the influence of temperature on organisms through ocean observing system data available on the Internet. (37 participants). Please see attached for details.

Murray, L. *Wetlands Ecology*. VoiCES. Chesapeake Bay Foundation. Blackwater NWR. Feb 23, 2007 and 2008. One day program for adults, which included a lesson presentation on wetland ecology and a field experience identifying marginal wetlands. (30 participants) (http://www.cbf.org/site/PageServer?pagename=state_sub_md_heart_voices)

Murray, L. J. Takacs, A. Frederick, C. Stylinski. *Chesapeake Bay and Watershed Teacher Research Fellowship Orientation Workshop.* (June 02, 03, 04, 05, 06, 07, 08). Week-long workshop to introduce Chesapeake Bay research to teachers in the Chesapeake Teacher Research Fellowship program taught each summer since 2002 (7 years) for 78 participants. (www.esep.umces.edu).

Murray, L. *Ocean Science Curriculum. Queen Anne's County Public Schools*. 9th grade teachers. Aug 19, 2007. One day professional development workshop using the Ocean Literacy Principles as a guide for teaching ocean science. (3 participants)

Murray, L., D. Gibson and A. Ward. *Taking the Pulse of our Ocean Conference*. UMCES, Horn Point Laboratory. Cambridge, MD. July 9-12, 2007. (42 participants). A 3-day conference to teach users how to use the Ocean Observing system curriculum.

Murray, L. and D. Gibson. *Taking the Pulse of our Ocean.* COSEE Mid-Atlantic. UMCES Horn Point Lab. Week-long professional development for teachers on Ocean Observing Systems taught each summer at HPL for 4 years (2003, 2004, 2005, 2006) to 90 teachers. Please see attached for details.

Murray, L. and L. Spence. *Taking the Pulse of our Coastal Ocean.* Jointly presented by COSEE Mid-Atlantic and COSEE SE. Savannah GA. (June 20-25, 2006). Week-long professional development for teachers on Ocean Observing Systems, how real-time aquatic data are collected and the science they represent. Topics included water circulation, density and stratification, climate change and water levels, nutrients, plankton and chlorophyll, and dead zones. Participants experienced hands on data collection, technology updates, classroom applications (18 participants). Please see enclosed CD-ROM for details.

Murray, L. *Chesapeake Bay Ecology for Educators* (August 2004, 2005, 2006). MEES 698. Two week graduate level (3 credits) field course for informal Bay educators offered through the Graduate Program in Marine-Environmental-Estuarine Science (MEES), UMD College Park. The course emphasizes the use of authentic data, applications and interpretation through internet connections, laboratory experiments and field work. The course includes one week of classroom lecture and one week of lecture/field work. The field time includes lectures, field trips and demonstrations of activities educators may use with students. The activities will be coordinated with content material. (36 participants).

Murray, L. *Restoration of Mesohaline Submerged Aquatic Vegetation through Community-based Projects in Chesapeake Bay.* (April 2004, 2005, October 2004) A 1-2 day workshop for citizens on SAV ecology and methods for growing and planting SAV for restoration. (65 participants).

Stevenson, JC, L. Murray, EM Koch and J Cornwell. *Wetlands Ecology and Management*. MEES 621. Selected lectures. (Oct 2004)

Recent Curriculum Development

Murray, L. *Research Experiences in STEM.* Horn Point Laboratory, Cambridge, MD. August 5-9, 2013. A five-day teacher institute for STEM teachers to learn the process of scientific research for implementation in their classrooms. Participants learn directly from research faculty, participate in field and lab activities and conduct research projects that are designed for the classroom.

Murray, L. and T. Ackerman. Maryland Environmental Literacy Partnership Summer Institutes. Chesapeake Bay Water Quality. Summer, 2012-14. 5-day institutes for Science and Social Studies teachers from nine partnering school district in Maryland. Educators participated in field investigations on Chesapeake Bay water quality and land use.

Murray, L. *Coral Reefs and Climate Change.* 2011-2014. Five day professional development workshop for teachers in Hawaii, Guam, and American Samoa, based on the COSEE educational module posted on the Teach Ocean Science website (www.teachoceanscience.net), where teachers experience coral reef ecology first hand and translate this knowledge to their students.

Murray, L. Introductory Biology (BIOL 210). Salisbury University. January-May 2012. A three credit course for Biology majors focusing on laboratory and filed research skill development.

Murray, L. *Research Experiences in STEM.* Horn Point Laboratory, Cambridge, MD. July 9-13, 2012. A five-day teacher institute for Biology and Environmental Science STEM teachers to learn the process of scientific research for implementation in their classrooms. Participants learn directly from research faculty, participate in field and lab activities and conduct research projects that are designed for the classroom.

Murray, L. *Topics in coastal trends*. 2008-2010. A five-day teacher professional development workshop that focuses on changes in our coastal systems. (15-18 teachers each year. (http://www.teachoceanscience.net/).

Murray, L and E. Day-Miller. *An Introduction to our Dynamic Ocean*. 2009-2010.A five day introduction to the use of an online ocean science curriculum. (20 teachers each year) (http://www.teachoceanscience.net/)

Murray, L. and D. Stotts. *Photosynthesis and Respiration in Submersed Aquatic Vegetation.* 2008-2011. One day field exercise for middle school students which

explores the importance of light for plant photosynthesis using submersed aquatic vegetation.

Murray, L. and C. Gurbisz. *Microscopic Life Field Trip*. 2008-2011. One day field exercise for middle school students which explores the microbial food web and techniques used to identify microbes.

Murray, L. *Wetlands and Sea Level Rise*. 2008. One day field exercise for middle school students which explores the importance of elevation in marshes.

Murray, L., D. Stotts, E. Markin, and A. Lazur. *Amimal Adaptations and Atlantic Sturgeon Restoration*. Field exercise for middle school students which teaches the importance of environmental factors for animal survival coupled with factors which effect survival in captivity.

Murray, L. *Ocean Science and Observing Systems*. 2008. A one day, hands on field exercise for teachers and high school students which focuses on utilizing data from ocean observing systems to study the "health" of coastal waters.

Murray, L. and D. Gibson. *Taking the Pulse of Our Ocean*. 2004-2006. A seven-day teacher professional development institute which focuses on the science associated with coastal ocean observing systems. The main objective of this program was to bring together scientists and educators to study ocean science through coastal observing systems and the information these systems can provide on physical and biological processes. The daily structure of the workshop included an introductory activity, science overview, classroom activities conducted by participants, field trips to extend thematic content, and an "apply to classroom" session. The five content areas included: Global Ocean Movement, Coastal Ocean and Estuarine Circulation/Weather, Dynamic Coastal Waters and the Food Web, Ecosystem Health, Under Represented Audiences--What Works?

Murray, L. *Chesapeake Bay Ecology for Educators*. 2004-2006. A three hour graduate credit course offered through the Graduate Program in Marine-Environmental-Estuarine Science (MEES), UMD College Park for science educators. The course consists of 3 days of classroom lecture and 7 days of lecture/field work. The 3 days of lecture include instruction in internet use and sites of available authentic data on estuarine systems. The field time includes lectures, field trips and demonstrations of activities educators may use with students, which are coordinated with content material.

Past courses

Courses with existing syllibi
Biology 101 (Salisbury University 1982-93)
Biological Principles & Processes (Biol 121,Salisbury University 1982-93)
Cell Biology (Biol 201, Salisbury University 1982-93)
Human Anatomy & Physiology (Biol 215-lab, Salisbury University 1982-93)

Plant Taxonomy (Biol 312, Salisbury University 1982-93)

Courses I Developed
Wetlands Ecology (Biol 401**,** Salisbury University 1989-93)
Marine Science (Biol 490-501, Salisbury University 1985)
Aquatic Pollution (Biol 490-501, Salisbury University 1986)
Ecology/Evolution (Biol 225 Salisbury University 1988)
Tropical Marine Ecology (Biol 490-501, Salisbury University 1987)
Science Enhancement Seminar (Salisbury University 1988-92)
Learning with GIS: Incorporating local science into the classroom (with C. Stylinski). Workshop for teachers (July 2002)
Murray, L. SAV Ecology and Restoration. Workshop for teachers.
Wetland Ecology for Teachers (1999,2000,2001,2002)
Submersed Aquatic Vegetation Workshop for Teachers
Chesapeake Bay Ecology for Teachers. Biol 502, MEES 498 (1989, 1991, 1994, 1998, 2001)
Ecology of the Chesapeake Bay Watershed (MEES 698, 1995)
Environmental Education for High School Teachers (CEES)
Wetland Plant Ecology, SSU. One week seminar.

Past Educational Programs/Activities
Horn Point Summer Internship Program (1993-1999)
Coordinate REU Program for Sea Grant (1993-1999)
Developed partnership with the skipjack Nathan of Dorchester for high school education programs (1998)
Developed Science/Research workshops for teachers (1996-1999)
Developed Summer Environmental Education Program for Kids (1992-9994)
Directed Science Workshops: Jellyfish Ecology; Land Use and Water Quality (2000)
Directed High School Career Day: (2000)
Featured in Maryland Public Television documentary "Splendor in the Grass" (April 2000)

Undergraduate Research Students Directed

Recent
2011. Daniel Yeager and Lenise Gogging. Hampton University. Scientist-Educator Partnership. Aquatic Food Webs and Plankton Dynamics Modules.
2010. Shadasha Green. Hampton University. COSEE Coastal Trends Scientists-Educator Partnership. From Land to Sea Module. (www.coseecoastaltrends.net)
2009. Maryse Leandre. Hampton University. COSEE Coastal Trends Scientists-Educator Partnership. Marine Bacteria. (www.coseecoastaltrends.net)
2009. Darryl Luthy. Hampton University. COSEE Coastal Trends Scientists-Educator Partnership. Fish and Physics Module. (www.coseecoastaltrends.net)
2008. Delmario Warwick. Easton High School. Restoration Ecology of SAV.
2008. Carissa Wilkerson. Hampton University. COSEE Coastal Trends Scientists-Educator Partnership. Seagrass Module (www.coseecoastaltrends.net)
2008. Chris Burrell. Hampton University. COSEE Coastal Trends Scientists-Educator Partnership. Dead Zone Module (www.coseecoastaltrends.net)

2005. Eric Battles. Hampton University. Artificially Induced Tuber Production and SAV Restoration on the Chesapeake Bay.
2007. Ariel Cook. Cambridge-South Dorchester High School. Use of vegetative propagules in SAV restoration.
2003. Sarah Turner. Artificial substrates as indicators of water quality.
2003. Sarah Henson (co-advisor). Scales of sediment biogeochemistry in seagrass beds.

Past

1991 Stokes, C. A Comparison of Macrophyte Biomass and
Species Composition in Two Marsh Creek Systems in Monie Bay, Md.
1991 A. Sullivan. A Comparison of Macrophyte Tissue
Nutrient Concentrations in Two Marsh Creek Systems in
Monie Bay , MD.
1991 K. Whipp and J. Cotton. Primary Production of a Northern Cypress Swamp.
1992. B. Sturgis. The Effect of Elevated Sulfide and Reduced Light on the Primary Productivity of Eelgrass (*Zostera marina*)
1992. K. Schisler. Nitrogen and Phosphorus Characterization of Two Marsh Systems in Monie Bay, Md.
1992, K. Whipp. A Model of the Primary Production in a Northern Cypress Swamp.
1992. L. Madgeburger. The Effect of Fertilization on Macrophyte Growth and Tissue Nutrient Concentrations in Two Marsh Systems in Monie Bay, MD.
1992. A. Seth. Sediment Nutrient Composition and CO_2 Fluxes in the Monie Bay Marsh System.
1993. W. Severn. The Effects of Nutrient Delivery Modes on the growth of the submersed angiosperm, *Potomogeton perfoliatus*.
1994. B. Strugis, Salisbury State University, Salisbury, MD. The Effects of Nutrient Delivery Modes on the growth of the submersed angiosperm, *Potomogeton perfoliatus*.
1994 C. Fellows, Univ of MD. College Park, MD Nutrient removal by SAV systmes.
1995 J. Bryner, Salisbury State Univ. Salisbury, MD. Nutrient monitoring the SAV mesocosms
1995 L. Taylor, UMD, College Park, MD . Amphipod grazing in SAV systems.
1996 J. Bryner, Salisbury State Univ. Salisbury, MD. Nutrient removal by SAV mesocosms.
1996 J. Krut, Salisbury State Univ. Salisbury, MD. Energetics of grazers in SAV systems.
1996 S. Simmons, Md. Collaborative Teacher Program, Salisbury State Univ. Salisbury, MD.
1997 Odette Thomas. Univ of Md. Eastern Shore, Princess Anne, MD. Effects of exchange rate on nutrient removal in SAV mesocosms.
1997 Micha Tinkler. Salisbury State University, Salisbury, MD. Epiphyte accumulation in SAV systems subject to varying exchange rates.
1998. Georgia Dendrinos. Use of SAV systems to characterize water quality: signatures in the sediments
1999. Georgia Dendrinos. Effects of SAV density on water quality.
2001 Zeb Schonernd. Use of artificial substrates to predict habitat suitability for SAV restoration.
2001 Clohessy, Ryan Comparisons of growth and morphology of lab propagated and wild SAV.

2002. Shannon Stockham. Effects of temperature and salinity on growth of *Potamogeton perfoliatus*.

Teacher Research Fellows

Recent

Note: The following two lists are teachers who have participated in summer teacher research program at the Horn Point Laboratory in a variety of program, but mostly in our Chesapeake Teacher Research Fellowship Program. The teachers listed under "mentored directly" are those who have worked directly with me and our SAV restoration ecology research program. The teachers listed under "co-mentored" are participants which I directed in the science education aspect of their experience, while the scientists listed directed the research end.

Mentored Directly

2014. Hemalatha Bhaskaran, Jane Whitelock. Science-Education Partnership program. Water quality and GIS.
2011. Carol Smith. Science-Educator Partnership program. Aquatic Food Webs Module.
2011. Diane Lee. Science-Educator Partnership program. Plankton Drifters Module.
2011. Greg Domgaard and Scott Sperber. Barrier Island and Sea Level Rise Module.
2010. Claire Sargo. COSEE Coastal Trends Scientists-Educator Partnership. From Land to Sea Module (www.coseecoastaltrends.net).
2010. Angela Ward. Development of Ocean Science course curriculum (COSEE Coastal Trends)
2010. Kris Jensen. Development of Ocean Science course curriculum (COSEE Coastal Trends)
2009. April Riechet. COSEE Coastal Trends Scientists-Educator Partnership. Fish and Physics Module (www.coseecoastaltrends.net)
2009. Rosetta Jordan. COSEE Coastal Trends Scientists-Educator Partnership. Dead Zone Module (www.coseecoastaltrends.net)
2008. Angela Ward. Development of Ocean Science course curriculum (COSEE Coastal Trends)
2008. Kris Jensen. Development of Ocean Science course curriculum (COSEE Coastal Trends)
2008. William Grey. COSEE Coastal Trends Scientists-Educator Partnership. Dead Zone Module (www.coseecoastaltrends.net)
2008. Kelly Ksiazek. COSEE Coastal Trends Scientists-Educator Partnership. Seagrass Module(www.coseecoastaltrends.net)
2007 Angela Ward. Use of vegetative propagules in SAV restoration
2006. Angela Kelley. SAV restoration
2006. Shavonne Newman. SAV dispersion by vegetative fragments.
2005 Angela Kelley. SAV restoration: Forcing tuber production.
2004 John Sandkuler. Reproduction strategies in Ruppia maritime
2003 Angela Kelley. Effects of sediment biogeochemistry on the growth of Potamogeton perfoliatus: A mesocom experiment.
2003 Jean Bunnell. . Effects of sediment biogeochemistry on the growth of Potamogeton perfoliatus: A field experiment.

2002 Myra Parks. Effects of substrate on growth of Potamogeton perfoliatus

Co-Mentored
2002: C. Overington with D. Merritt; J. Whitelock with C. Stevenson.
2003: D. Turney with A. Lazur
2004: B. Schulman with D. Merritt; S. Snyder with E. North
2005: T. Grant with P Glibert; K. de la Cerda with D. Stoecker; C. LeFebvre with D. Merritt
2006: M. Kimmel with P. Glibert; R. Warrilow with B. Crump; D. Yarmchuk with D. Merritt.
2007: B. Crowell with Howard Townsed; C. Shilling with P. Glibert
2008: S. Fundi with E. North; P Walker-Davis with E. Koch.

Past
Mentored Directly
1995 J. Bailey, Martin Meritta Teacher Scholar. Nitrogen and phosphorus enrichment in mesohaline marshes.
1998 Pat Chambers. Use of SAV systems to characterize water quality: The plants
1998 Stephanie Miller. Use of SAV systems to characterize water quality: Artificial substrates
1999 Pat Chambers. Georgia Dendrinos. Use of artificial substrates to assess water quality.
2000 Pat Chambers. Georgia Dendrinos. Use of artificial substrates to assess water quality.

***Graduate Students and Committees*:**

Recent
Cassie Gurbisz
Dianna Roman
Renee Gruber, committee member (2010)
Angela Hengst, Advisor (2006)
J. Melton, Advisor. (2003)
B. Sturgis, Advisor (2000)
W. Severn, Advisor (2001)
Jess Davis, Committee member (2006)
K Schulty, Co-Advisor (2003)

Past
J. Bryner, committee member (graduated 2000)
Udy, James, Review Committee for Ph. D. U. of Queensland, Australia
Meridith Bartley. Committee member
K. Splain 6/96. Mixing in SAV Mesocosms.
K. Moore 4/96. "Chesapeake Bay Nutrients, Light and SAV: Relationships between water quality and SAV growth in field and mesocosm studies."
J. Neundorfer. MEES/MS 12/90 "Effects of N versus P additions to waters overlying estuarine populations of two submersed vascular plants".

L. Alves. MEES/Ph.D.. 12/93. "The fate of stream water nitrate entering littoral area of an Amazonian floodplain lake: The role of plankton, periphyton, inundated forest soils and littoral sediments."
W. Kuhn. MEES/MS 8/92. "Interacting effects of light and sediment sulfide on eelgrass growth".

Service, Advisory capacity and committees

National
Reviews:
2014. Article Review. Title: Developing the critical thinking skills of undergraduate students through creative and scientific inquiry
For: *Journal of Education Research*

Article Review. Title: Coastal Margin Science and Education in the Era of Collaboratories. For: *Current: The Journal of Marine Education.*

Boyd Professorship Review Committee, Louisiana State University, Eugene Turner, Sept 2012
Manuscript Review. Comparing Production and Biogeochemistry of Native and Transplanted Thalassia testudium and Halodule wrightii in Big Lagoon, Florida, USA July, 2012

Proposal Review. National Ocean Sciences Bowl: Inspiring Tomorrow's Leaders. National Science Foundation. June 2012

Tenure and promotion review.
Deidre Gibson, Hampton University, Sept 2012. Letter of support
Judy O'Neil and Cindy Palinkas. Promotion review**.**

Committees
National Research Council, National Academies. Edwards Aquifer Habitat Conservation Program. Fall 2013-2014.

UMCES Accreditation Committee WG5

ASLO Aquatic Sciences Meeting Conference Planning Committee Feb-Dec 2012
National Science Foundation Panel. ITEST. June 2011.
Kanesa Duncan Seraphin, University of Hawaii at Manoa, Tenure and promotion, October 2010.
Judy Lemus, Hawai'i Institute of Marine Biology, Tenure and promotion, November 2010.
Life on an Ocean Planet." Current Publishing. Second edition. Textbook review.
National Academies Review of National NOAA Education (2008-2010)
Other
Director, COSEE Coastal Trends (2007-2010)

National COSEE Council (2004-2010)
National COSEE Council Committees: Network Planning & Marketing/Messaging (2008)
NSF Panel Review for Careers program (2006)
NSF Panel Review for G K-12 program (2005)
NSF Panel Review for REU program (2010)
The Associated Press (Fri 13 Jul, 2007). Science educators get course on ocean at Horn Point Laboratory
Proposal Reviews: Coastal Restoration and Enhancement through Science and Technology (2008); North Carolina National Estuarine Research Reserve (2007)
Paper Review: South Carolina Sea Grant Consortium/COSEE South East (2008)
Judge: Poster session. Ocean Sciences Meeting. ASLO/AGU. 2008
Media Articles:
The Associated Press (Fri 13 Jul, 2007). *Science educators get course on ocean at Horn Point Laboratory*.
The Associated Press (Sat 12 Aug, 2006). *Nature tourism matures on Maryland's Eastern Shore*

Regional
Chesapeake Bay Program Living Resources Subcommittee. SAV Task Group (2006-8).
Chesapeake Bay Program Education and Communications Subcommittee (2004-2008).
Maryland State Department of Education Tool Kit Committee (2006-2007)
Media Articles:
Bay Journal Wed 1 Oct, 2008. Scientists keep plugging away to keep seagrass cropping up in Bay, rivers: Karl Blankenship.
Voices of the Chesapeake Bay (Author Michael Buckley). Dr. Laura Murray, Scientist/Educator, Horn Point Laboratory. pp. 98-103.
(www.geareduppublications.com)

UMCES Horn Point Lab
Sustainability Committee member. 2010-2014
SESYNC Website focus group
Waterfowl Festival Booth
Potential Funding Functions: REMUS Committee, Cambridge Yacht Club, Londary

Environmental Science Education Partnership. Chair (2002-2004) and committee member (2004-2006)
HPL Environmental Education Committee (2006-2008)
HPL Sustainability Committee (2008-2010)
Restoration Ecology Institute (2006-2008)
Open House Exhibit (2003-2009)

Media Articles:
The Cambridge Daily Banner (Thu 11 Oct, 2007)
The natural world: Shedding light on science; Middle schools visit Horn Point

The Easton Star Democrat (Fri 13 Jul, 2007)
Science educators get crash course on ocean sciences

The Worcester County Times (Tue 28 Nov, 2006)
Coastal Bays Offer Outdoor Classroom

The Cambridge Daily Banner (Thu 21 Sep, 2006)
Horn Point Lab Opens Up

Past
Waterfowl Festival of Easton, Board Member, Easton, MD
The Country School, Easton. Ecology Deck Co-Coordinator.
Chair. Conservation in Action exhibit. Waterfowl Festival of Easton
Chair. Maryland Native Plant Society speakers committee.
Upper Shore Manufacturing and Business Councel, Career Connections
Space Grant Board of Directors
Open House Committee
Appilachain Laboratory Search Committee for Environmental Science Educator, faculty position
HPL Land Use Committee, Chair
HPL Environmental Education Committee, Chair
EPA Bay Program Technical Synthesis/SAV Committee
Sea Grant selection committee for summer intern program
Coorperative Education Program Meeting, Chesapeake College
Wetlands and SAV STAC Committees
Assateague Island National Park Service Advisory Committee
Plant Ecologist Search Committee, Salisbury State University
Wetlands Expert. R. Horner Students.
Wetlands Expert. Testimony to State Legislature. Blackwater Development**.**
Trappe Landing Farm. Wetland restoration project.
Forestry Plan. Mimi Wright
National COSEE Advisory Council
Alliance for Chesapeake Bay, Environmental Education advisory panel
Gifted and Talented Program at Horn Point. Science Projects
Day School. Bay Studies Advisory Panel.
Waterfowl Festival of Easton, Board Member
Adkins Arborium, Scientific Advisory Board
Queen Anne's County Ecotourism Committee
SAV Monitoring Porgram, Assateague Island National Park Service,
Scientific Advisory Pannel, Assateague Island National Park Service, Berlin, MD.
Maryland House of Delegates, HPL Visit, August 1997
Chestertown Rotary Club , HPL Visit Oct. 1997
Talbot County Garden Club. Oct. 1995.
Land-Water Connection. Pannel. Environmental Education Center, HPEL. July, 1995
Girl Scout Presentation on Marsh Ecology. July, 1995
Sea Grant Review Pannel for REU students. April, 1995.
Environmental Education Advisory Board, HPEL. 1995.
NOAA Greenbackville Facility. Advisor.
STAC. Chesapeake Bay Program. Annapolis, MD.
Nanticoke River Project with Chesapeake Bay Foundation. Advisor.

Chesapeake Bay and Center for Environmental and Estuarine Studies Joint Planning Committee. 1994
NOAA Greenbackville Facility. Advisor