

CURRICULUM VITAE

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I. Education

1972 - B.A., Humboldt State University, Arcata, California, Zoology

1973 - M.A., Humboldt State University, Arcata, California, Biology

1978 - Ph.D., Stanford University, Stanford, California, Biology

II. Professional Background

Department of Oceanography, Humboldt State University

1971-73 - Research Assistant, Lawrence Livermore Laboratories Radionuclide Study of Humboldt Bay, California

Department of Biological Sciences, Hopkins Marine Station, Stanford University

1973-75 - Graduate Research Assistant, National Science Foundation

1976-78 - Graduate Research Assistant, Dept. of Biological Sciences

Marine Science Institute & Department of Biological Sciences, University of California, Santa Barbara

1978-80 - National Needs in Science Postdoctoral Fellow, National Science Foundation

1981 - Instructor, Department of Biological Sciences

Chesapeake Bay Institute, The Johns Hopkins University

1981 - 1987 - Associate Research Scientist

1987 - 1991 - Research Scientist

1989 - 1990 - NASA Summer Faculty Fellow, Goddard Space Flight Center

University of Maryland Center for Environmental Science (UMCES)

1991 - 94 - Research Assoc. Professor, Horn Point Laboratory (HPL)

1991 - 2007 - Maryland Sea Grant College

1991 - present - Graduate Faculty Marine-Environmental-Estuarine-Sciences (MEES) Program, Univ. of Maryland, College Park

1994 - present - Research Professor, HPL

2008 - 2010 - Program Director, National Science Foundation, Biological Oceanography Program, Arlington, Virginia.

III. Research Interests

Phytoplankton physiology and ecology, aircraft and satellite remote sensing, estuarine biology, biological oceanography, land-margin ecosystem research.

IV. Publications

1. Harding, L. W., Jr. 1973. Primary production in Humboldt Bay. Master's thesis. Humboldt State University. Arcata, California, USA. 55. p.
2. Harding, L.W. 1976. Polychlorinated biphenyl inhibition of marine phytoplankton photosynthesis in the northern Adriatic Sea. *Bull. Environ. Contam. Toxicol.*, 16: 559-566.
3. Harding, L.W., Jr. 1978. Marine phytoplankton and polychlorinated biphenyls (PCBs): uptake mechanisms and effects on photosynthesis and cell division. Ph.D. Dissertation, Stanford University, Stanford, California, USA. 158 p.
4. Harding, L.W., Jr., James L. Cox and John E. Pequegnat. 1978. Spring-summer phytoplankton production in Humboldt Bay, California. *Calif. Fish Game* 64: 53-59.
5. Harding, L.W., Jr. and J.H. Phillips. 1978. Polychlorinated biphenyls: Transfer from microparticulates to marine phytoplankton and the effects on photosynthesis. *Science* 202:1189-92.
6. Harding, L.W., Jr. and J.H. Phillips. 1978. Polychlorinated biphenyl (PCB) effects on marine phytoplankton photosynthesis and cell division. *Marine Biology* 49: 93-101.
7. Harding, L.W., Jr. and J.H. Phillips. 1978. Polychlorinated biphenyl (PCB) uptake by marine phytoplankton. *Marine Biology* 49: 103-111.
8. Harding, L.W., Jr. and J.H. Butler. 1979. The standing stock of production of eelgrass, *Zostera marina*, in Humboldt Bay, California. *Calif. Fish Game* 65: 151-158.
9. Harding, L.W., Jr., B.W. Meeson, B.B Prézelin and B.M. Sweeney. 1981. Diel periodicity of photosynthesis in marine phytoplankton. *Marine Biology* 61: 95-105.
10. Harding, L.W., Jr., B.B Prézelin, B.M. Sweeney and J.L. Cox. 1981. Diel oscillations in the photosynthesis-irradiance relationship of a planktonic marine diatom. *J. Phycol.*, 17: 389-394.
11. Harding, L.W. Jr., B.B Prézelin, B.M. Sweeney and J.L. Cox. 1982. Diel oscillations of the photosynthesis-irradiance (PI) relationship in natural assemblages of phytoplankton. *Marine Biology* 67: 167-178.
12. Harding, L.W., Jr., B.B Prézelin, B.M. Sweeney and J.L Cox. 1982. Primary production as influenced by diel periodicity of phytoplankton photosynthesis. *Marine Biology* 67: 179-186.
13. Harding, L.W., Jr., B.W. Meeson and M.A. Tyler. 1983. Photoadaptation and diel periodicity of photosynthesis in the dinoflagellate *Prorocentrum mariae-lebouriae*. *Mar. Ecol. Prog. Ser.*, 13: 73-85.

14. Harding, L.W., Jr. and J.F. Heinbokel. 1984. Periodicities of photosynthesis and cell division: Behavior of phase-lagged replicate cultures of *Ditylum brightwellii* in a diurnally varying photic regime. *Mar. Ecol. Prog. Ser.*, 15: 225-232.
15. Harding, L.W., Jr., B.W. Meeson and T.R. Fisher. 1985. Photosynthesis patterns in Chesapeake Bay phytoplankton: short- and long-term responses of PI curve parameters to light. *Mar. Ecol. Prog. Ser.*, 26: 99-111.
16. Harding, L.W., Jr., B.W. Meeson and T.R. Fisher, Jr. 1985. Patterns of photosynthetic carbon metabolism in light-limited phytoplankton. *Marine Biology* 89: 121-133.
17. Harding, L.W., Jr., B.W. Meeson and T.R. Fisher, Jr. 1986. Phytoplankton production in two east coast estuaries: photosynthesis-light functions and patterns of carbon assimilation in Chesapeake and Delaware Bays. *Estuar. Coast. Shelf Sci.*, 23: 773-806.
18. Harding, L.W., Jr., T.R. Fisher, Jr. and M.A. Tyler. 1987. Adaptive responses of photosynthesis in phytoplankton: Specificity to time-scale of change in light. *Biol. Oceanogr.*, 4: 403-437.
19. Fisher, T.R., L.W. Harding, Jr., D.W. Stanley and L.G. Ward. 1988. Phytoplankton, nutrients, and turbidity in the Chesapeake, Delaware, and Hudson estuaries. *Estuar. Coast. Shelf Sci.*, 27: 61-93.
20. Harding, L.W., et al. 1988. The time-course of photoadaptation to low-light in *Prorocentrum mariae-lebouriae*. *J. Phycol.*, 24: 274-281.
21. Coats, D.W. and L.W. Harding, Jr. 1988. Effect of light history on the ultrastructure and physiology of *Prorocentrum mariae-lebouriae* (Dinophyceae). *J. Phycol.*, 24: 67-77.
22. Harding, L.W., Jr. and D.W. Coats. 1988. Photosynthetic physiology of *Prorocentrum mariae-lebouriae* (Dinophyceae) during is subpycnocline transport in Chesapeake Bay. *J. Phycol.*, 24: 77-89.
23. Harding, L.W., Jr., M.E. Mallonee and K.W. Henderson. 1989. Spectral distribution and species-specific photosynthetic performance of natural populations of *Prorocentrum mariae-lebouriae* (Dinophyceae) in the Chesapeake Bay. *Mar. Ecol. Prog. Ser.*, 52: 261-272.
24. Fisher, T.R., E.R. Peele, J.W. Ammerman and L.W. Harding, Jr. 1992. Nutrient limitation of phytoplankton in Chesapeake Bay. *Mar. Ecol. Prog. Ser.*, 82: 51-63.
25. Harding, L.W., Jr., E.C. Itsweire and W.E. Esaias. 1992. Determination of phytoplankton chlorophyll concentrations in the Chesapeake Bay with aircraft remote sensing. *Rem. Sens. Environ.*, 40: 79-100.
26. Harding, L.W., Jr., E.C. Itsweire and W.E. Esaias. 1992. Algorithm development for recovering chlorophyll concentrations in the Chesapeake Bay using aircraft remote sensing, 1989-91. In: *Proceedings, First Thematic Conference on Remote Sensing for Marine and Coastal Environments*, p. 1133-1150, New Orleans, Louisiana, 15-17 June 2002.

27. D'Elia, C.F., L.W. Harding, Jr., M. Leffler and G.B. Mackiernan. 1992. Role and control of nutrients in Chesapeake Bay. *Water Sci. Technol.*, 26: 2635-2644.
28. Harding, L.W., M. Leffler and G.E. Mackiernan. 1992. Dissolved oxygen in the Chesapeake Bay: a scientific consensus. Maryland Sea Grant, College Park, Maryland, 18 p.
29. Harding, L.W., Jr. 1994. Long-term trends in the distribution of phytoplankton in Chesapeake Bay: roles of light, nutrients and streamflow. *Mar. Ecol. Prog. Ser.*, 104: 267-291.
30. Harding, L.W., Jr., E.C. Itsweire and W.E. Esaias. 1994. Estimates of phytoplankton biomass in the Chesapeake Bay from aircraft remote sensing of chlorophyll concentrations, 1989-92. *Rem. Sens. Environ.*, 49: 41-56.
31. Glibert, P.M., D.J. Conley, T.R. Fisher, L.W. Harding, Jr. and T.C. Malone. 1995. The spring bloom of 1990 in Chesapeake Bay. *Mar. Ecol. Prog. Ser.*, 122: 27-43.
32. Harding, L.W., Jr., E.C. Itsweire and W.E. Esaias. 1995. Algorithm development for recovering chlorophyll concentrations in the Chesapeake Bay using aircraft remote sensing, 1989-91. *Photogramm. Eng. Rem. Sens.*, 61: 177-185.
33. Malone, T.C., D.J. Conley, T.R. Fisher, P.M. Glibert and L.W. Harding, Jr. 1996. Scales of nutrient limited phytoplankton productivity in Chesapeake Bay. *Estuaries* 19: 371-385.
34. Harding, L.W., Jr. and E. Perry. 1996. Long-term increase of phytoplankton biomass in Chesapeake Bay. *Mar. Ecol. Prog. Ser.*, 157: 39-52.
35. Weiss, G.M., L.W. Harding, Jr., E.C. Itsweire and J.C. Campbell. 1996. Assessing lateral variations of surface chlorophyll concentrations in the Chesapeake Bay using aircraft remote sensing. *Mar. Ecol. Prog. Ser.*, 149: 183-199.
36. Boynton, W.R., W. Boicourt, S. Brandt, J. Hagy, L. Harding, E. Houde, D.V. Holliday, M. Jech, W.M. Kemp, C. Lascara, S.D. Leach, A.P. Madden, M. Roman, L. Sanford and E.M. Smith. 1996. Interactions between physics and biology in the estuarine turbidity maximum (ETM) of Chesapeake Bay, USA. International Council for the Exploration of the Sea, CM 1997/S:11.
37. Harding, L.W., Jr. 1998. Review of "Marine Ecological Processes" by Ivan Valiela, *Quarterly Reviews of Biology* 72: 216.
38. Scardi, M. and L.W. Harding, Jr. 1998. Phytoplankton primary production estimates using neural network analysis: a case study for Chesapeake Bay. International Workshop on Applications of Artificial Neural Networks to *Ecological Modelling*, Toulouse, France, 14-17 December 1998.
39. Hood, R.R., H.V. Wang, J.E. Purcell, E.D. Houde and L.W. Harding, Jr. 1999. Modeling particles and pelagic organisms in Chesapeake Bay: convergent features control plankton distributions. *J. Geophys. Res.*, 104: 1223-1243.
40. Smodlaka, N., T.C. Malone, A. Malej and L.W. Harding, Jr. 1999. Introduction, in Malone, T.C., A. Malej, L.W. Harding, Jr., and N. Smodlaka, (Eds.), *Ecosystems at the Land-Sea Margin: Drainage Basin to Coastal Sea*, Chapter 1, Amer. Geo-

- phys. Union, Estuarine and Coastal Sciences Series, No. 55, p 1-6.
41. Harding, L.W., D. Degobbi and R. Precali. 1999. Production and fate of phytoplankton: annual cycles and interannual variability, in Malone, T.C., A. Malej, L.W. Harding, Jr., and N. Smolaka (Eds.), *Ecosystems at the Land-Sea Margin: Drainage Basin to Coastal Sea*, Chapter 4, Amer. Geophys. Union, Estuarine and Coastal Sciences Series, No. 55, p. 131-172.
 42. Malej, A., L.W. Harding, Jr., N. Smolaka and T.C. Malone. 1999. Summary and Conclusions, in Malone, T.C., A. Malej, L.W. Harding, Jr. and N. Smolaka (Eds.), *Ecosystems at the Land-Sea Margin: Drainage Basin to Coastal Sea*, Chapter 12, Amer. Geophys. Union, Estuarine and Coastal Sciences Series, No. 55, p. 367-377.
 43. Leonard, C.L., C.R. McClain, E. Hofmann, R. Murtugudde and L.W. Harding, Jr. 1999. An iron-based ecosystem model of the equatorial Pacific. *J. Geophys. Res.*, 104: 1325-1341.
 44. Scardi, M. and L.W. Harding, Jr. 1999. Developing an empirical model of phytoplankton primary production: a neural network case study. *Ecol. Modell.*, 120: 220-233.
 45. Harding, L.W., W.D. Miller, R.N. Swift and C.W. Wright. 2001. Aircraft remote sensing, In: Steele, J., S. Thorpe, and K. Turekian, (Eds.), *Encyclopedia of Ocean Sciences*, Academic Press, London, UK, p. 113-122.
 46. Harding, L.W., M.E. Mallonee and E.S. Perry. 2002. Toward a predictive understanding of primary productivity in a temperate, partially stratified estuary. *Estuar. Coastal Shelf Sci.*, 55: 437-463.
 47. Adolf, J.E., D.K. Stoecker and L.W. Harding, Jr. 2003. Autotrophic growth and photoacclimation in a mixotrophic protist *Karlodinium micrum* (Dinophyceae) and a common prey *Stoeatula major* (Cryptophyceae). *J. Phycol.*, 39: 1109-1115.
 48. Lazin, G., L.W. Harding and S. McLean. 2003. Ocean color radiometry from aircraft. I. Low altitude measurements from light aircraft. In: Mueller, J.L., G.S. Fargion and C.R. McClain (Eds.), *Ocean Optics Protocols for Satellite Ocean Color Sensor Validation, Revision 4, Volume VI: Special Topics Protocols and Appendices*. Chap. 4, p. 79, NASA/TM-2003-211621/rev4-Vol.VI, 2003.
 49. Magnuson, A., L.W. Harding, Jr., M.E. Mallonee and J.E. Adolf. 2004. Bio-optical model for Chesapeake Bay and the Middle Atlantic Bight. *Estuar. Coast. Shelf Sci.*, 61, 403-424.
 50. Harding, L.W., Jr., J.G. Kramer and J. Phinney. 2004. Estuarine and watershed monitoring using remote sensing technology: A workshop report. Maryland Sea Grant College, University of System of Maryland, 59 p.
 51. Acker, J.G., L.W. Harding, G. Leptoukh, T. Zhu and S. Shen. 2005. Remotely-sensed chl *a* at the Chesapeake Bay mouth is correlated with annual freshwater flow to Chesapeake Bay. *Geophys. Res. Lett.*, 32: L05601, doi:10.1029/2004GL021852, 2005.

52. Harding, L.W. Jr. 2005. Review of "Biological Oceanography" by Charles B. Miller. Oxford and Malden (Massachusetts): Blackwell Science. *Quarterly Review of Biology* 80: 494.
53. Harding, L.W., A. Magnuson and M.E. Mallonee. 2005. SeaWiFS retrievals of chlorophyll in Chesapeake Bay and the mid-Atlantic bight. *Estuar. Coast. Shelf Sci.*, 62: 75-94.
54. Kemp, W.M, W.R. Boynton, J.E. Adolf, D.F. Boesch, W.C. Boicourt, G. Brush, J.C. Cornwell, T.R. Fisher, P.M. Glibert, L.W. Harding, Jr., E.D. Houde, D.G. Kimmel, W.D. Miller, R.I.E. Newell, M.R. Roman, E.M. Smith and J.C. Stevenson. 2005. Eutrophication of Chesapeake Bay: historical trends and ecological interactions. *Mar. Ecol. Progr. Ser.*, 303: 1-29.
55. Miller, W.D., L.W. Harding, Jr. and J.E. Adolf. 2005. The influence of Hurricane Isabel on Chesapeake Bay phytoplankton dynamics. In: Sellner, K.G. (ed.), Hurricane Isabel in Perspective: Proceedings of a Conference. Chesapeake Research Consortium, Edgewater, Maryland, p. 155-160.
56. Roman, M.R., J.E. Adolf, J. Bichy, W.C. Boicourt, L.W. Harding, Jr., E.D. Houde, S. Jung, D.G. Kimmel, W.D. Miller and X. Zhang. 2005. Stimulation of plankton and fish abundance in Chesapeake Bay by Hurricane Isabel. *EOS, Transactions, American Geophysical Union* 86: 261, 265.
57. Yeager, C.L.J., L.W. Harding, Jr. and M.E. Mallonee. 2005. Phytoplankton production, biomass and community structure following a summer nutrient pulse in Chesapeake Bay. *Aquat. Ecol.*, 39: 135-149.
58. Adolf, J.E., C.L. Yeager, W.D. Miller, M.E. Mallonee and L.W. Harding, Jr. 2006. Environmental forcing of phytoplankton floral composition, biomass, and primary productivity in Chesapeake Bay, USA. *Estuar. Coast. Shelf Sci.*, 67: 108-122.
59. Adolf, J.E., D.K. Stoecker and L.W. Harding, Jr. 2006. The balance of autotrophy and heterotrophy during mixotrophic growth of *Karlodinium micrum* (Dinophyceae). *J. Plankton Res.*, 28: 737-751.
60. Miller, W.D., D.G. Kimmel and L.W. Harding, Jr. 2006. Predicting spring discharge of the Susquehanna River from a winter synoptic climatology for the Eastern United States. *Water Resources Res.*, 42: W05414, doi:10.1029/2005WR004270, 2006.
61. Miller, W.D., L.W. Harding, Jr. and J.E. Adolf. 2006. Hurricane Isabel generated an unusual fall bloom in Chesapeake Bay. *Geophys. Res. Lett.*, 33: L06612, doi:10.1029/2005GL025658, 2006.
62. Paerl, H.W., L.M. Valdes, B.L. Peierls, J.E. Adolf and L.W. Harding, Jr. 2006. Anthropogenic and climatic influences on the eutrophication of large estuarine ecosystems. *Limnol. Oceanogr.*, 51: 448-462.
63. Tzortziou, M., J.R. Herman, C.L. Gallegos, P.J. Neale, A. Subramaniam, L.W. Harding, Jr. and Z. Ahmad. 2006. Bio-optics of Chesapeake Bay from measurements and radiative transfer calculations. *Estuar. Coast. Shelf Sci.*, 68: 348-362.

64. Adolf, J.E., A.R. Place, D.K. Stoecker and L.W. Harding, Jr. 2007. Modulation of polyunsaturated fatty acids in mixotrophic *Karlodinium micrum* (Dinophyceae), and prey *Storeatula major* (Cryptophyceae). *J. Phycol.*, 43: 1259-1270.
65. Miller, W.D. and L.W. Harding, Jr. 2007. Climate forcing of the spring bloom in Chesapeake Bay. *Mar. Ecol. Prog. Ser.*, 331: 11-22.
66. Tzortziou, M., A. Subramaniam, J.R. Herman, C.L. Gallegos, P.J. Neale and L.W. Harding, Jr. 2007. Remote sensing reflectance and inherent optical properties in the mid Chesapeake Bay. *Estuar. Coast. Shelf Sci.*, 72: 16-32.
67. Werdell, P.J., B. A. Franz, S.W. Bailey, L.W. Harding, Jr. and G.C. Feldman. 2007. Approach for the long-term spatial and temporal evaluation of ocean color satellite data products in a coastal environment. *SPIE Proc.* 668: DOI: 10.1117/12.732489.
68. Harding, L.W., Jr. and W.D. Miller. 2009. Airborne remote sensing of chlorophyll in Chesapeake Bay, USA. In: *Remote Sensing and Geospatial Technologies for Coastal Ecosystem Assessment and Management*, Lecture Notes in Geoinformation and Cartography, Part II, p. 115-138, DOI: 10.1007/978-3-540-88183-4_6.
69. Kimmel, D.G., W.D. Miller, L.W. Harding, Jr., E.D. Houde and M.R. Roman. 2009. Estuarine ecosystem response captured using a synoptic climatology. *Estuaries and Coasts* 32: 403-409.
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71. Li, M., L. Zhong and L.W. Harding, Jr. 2009. Sensitivity of plankton biomass and productivity to variations in physical forcing and biological parameters in Chesapeake Bay. *J. Mar. Res.*, 67: 667-700.
72. Tzortziou, M., C.L. Gallegos, P.J. Neale, A. Subramaniam, J.R. Herman and L.W. Harding, Jr. 2009. Bio-optical characteristics and remote sensing in the mid Chesapeake Bay through integration of observations and radiative transfer closure. In: *Remote Sensing and Geospatial Technologies for Coastal Ecosystem Assessment and Management*, Lecture Notes in Geoinformation and Cartography, Part II, p. 139-168, DOI: 10.1007/978-3-540-88183-4_7.
73. Wang, M., S. Son and L.W. Harding, Jr. 2009. Retrieval of diffuse attenuation coefficient in the Chesapeake Bay and turbid ocean regions for satellite ocean color applications. *J. Geophys. Res.*, 114: C10011, doi:10.1029/2009JC005286, 2009.
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75. Pan, X., A. Mannino, M.E. Russ, S.B. Hooker and L.W. Harding, Jr. 2010. Remote sensing of phytoplankton pigment distribution in the United States northeast coast. *Remote Sens. Environ.*, 114: 2403-2416.
76. Annis, E.R., E. D. Houde, and L.W. Harding, Jr. 2010. Variation of a bioenergetics

- model linking primary production and Atlantic menhaden *Brevoortia tyrannus* growth in Chesapeake Bay. *Mar. Ecol. Prog. Ser.* (submitted).
77. Miller, W.D., L.W. Harding, Jr., M.E. Mallonee, J.E. Adolf and D.G. Kimmel. 2010. Climate forcing of primary productivity in Chesapeake Bay. *Estuar. Coast. Shelf Sci.* (in revision).
 78. Harding, L.W., Jr., R.A. Batiuk, T.R. Fisher, C.L. Gallegos, T.C. Malone, W.D. Miller, M.R. Mulholland, H. Paerl, E.S. Perry and P. Tango. 2011. Multiple lines of evidence for numerical chlorophyll (*chl-a*) criteria in Chesapeake Bay. *Ecol. Applications* (in prep.).
 79. Harding, L.W., Jr., J.E. Adolf, W.D. Miller and M.E. Mallonee. 2011. Environmental forcing of phytoplankton floral composition in Chesapeake Bay. *Estuar. Coast. Shelf Sci.* (in prep.).
 80. Harding, L.W., Jr., M.E. Mallonee and E.S. Perry. 2011. Long-term trend analysis of chlorophyll in Chesapeake Bay using shipboard and aircraft observations. *Mar. Ecol. Prog. Ser.* (in prep.).

V. Presentations (since 1994)

1. Harding, L.W., Jr., S.M. Gennari and G.M. Weiss. 1994. Aircraft remote sensing of chlorophyll in the Chesapeake Bay, 1989-93: Seasonal and interannual variability. 1994. Ocean Sciences, American Geophysical Union (AGU) / American Society of Limnology and Oceanography (ASLO), San Diego, California, 21-25 February 1994.
2. Gennari, S.M., L.W. Harding, Jr. and G.M. Weiss. 1994. Development of a geographic information system to quantify winter-spring phytoplankton blooms in the Chesapeake Bay. Ocean Sciences, AGU/ASLO, San Diego, California, 21-25 February 1994.
3. Weiss, G.M., L.W. Harding, Jr. and S.M. Gennari. 1994. Assessing lateral variations of surface chlorophyll in the Chesapeake Bay using aircraft remote sensing. Ocean Sciences, AGU/ASLO, San Diego, California, 21-25 February 1994.
4. Harding, L.W., Jr., G.M. Weiss and S.M. Gennari. 1994. Analysis of spatial and temporal scales of variability in phytoplankton abundance in the Chesapeake Bay using airborne remote sensing. Proc. 1st Internat. Airborne Remote Sensing Conference and Exhibition, Strasbourg, France, 11-15 September 1994.
5. Weiss, G.M., J.W. Campbell and L.W. Harding, Jr. 1995. The effect of inter-pixel variance on satellite remote sensing. The Oceanography Society (TOS), Newport, Rhode Island, 18-21 April 1995.
6. Boynton, W.R., W. Boicourt, E. Houde, W.M. Kemp, M. Roman, L. Harding, S. Brandt and S. Jech. 1995. Design and preliminary results from a new LMER Program in Chesapeake Bay: Trophic Interactions in Estuarine Systems (TIES). Estuarine Research Federation (ERF), Corpus Christi, Texas, 12-16 November 1995.
7. Cornwell, J.C., W.C. Boicourt and L.W. Harding, Jr. 1995. Understanding eutrophication

- cation in the Chesapeake Bay: Indications of environmental change and changes in key ecosystem processes. ERF, Corpus Christi, Texas, 12-16 November 1995.
8. Harding, L.W., Jr., E.S. Perry and E.C. Itsweire. 1996. Detection of a long-term increase of phytoplankton biomass in Chesapeake Bay using shipboard and aircraft observations. Estuarine and Coastal Science Association (ECSA) / ERF, Middelburg, Netherlands, 15-20 September 1996.
 9. Leffler, M., G. Mackiernan and L.W. Harding, Jr. 1996. The influence of scientific consensus on public policy: A Chesapeake Bay case study. ECSA/ERF, Middelburg, Netherlands, 15-20 September 1996.
 10. Kemp, W.M., E. Smith, J. Hagy, C. Lascara, B. Boicourt, S. Brandt, L. Harding, E. Houde, M. Roman and W. Boynton. 1996. Trophic interactions in Chesapeake Bay: relations to organic carbon balance. ECSA/ERF, Middelburg, Netherlands, 15-20 September 1996.
 11. Harding, L.W., Jr. 1997. Detection of a long-term increase of phytoplankton biomass in Chesapeake Bay using shipboard and aircraft observations. AGU, Baltimore, Maryland, May 1997.
 12. Boynton, W.R., W. Boicourt, S. Brandt, J. Hagy, L. Harding, E. Houde, D.V. Holliday, M. Jech, W.M. Kemp, C. Lascara, S.D. Leach, A.P. Madden, M. Roman, L. Sanford and E.M. Smith. 1997. Interactions between physics and biology in the estuarine turbidity maximum (ETM) of Chesapeake Bay, USA. International Council for the Exploration of the Sea (ICES), Baltimore, Maryland.
 13. Smith, E.M., L.W. Harding, Jr., M.E. Mallonee and W.M. Kemp. 1997. Phytoplankton productivity and community metabolism in Chesapeake Bay, 1995-96. ERF, Providence, Rhode Island, October, 1997.
 14. Harding, L.W., Jr. 1998. EPA Chesapeake Bay Program, Scientific and Technical Advisory Committee (STAC), Solomons, Maryland, July, 1998.
 15. Harding, L.W., Jr., R.R. Hood and M. Scardi. 1999. Enhanced phytoplankton biomass and productivity associated with persistent mesoscale eddies in the lower Chesapeake Bay. ASLO, Santa Fe, New Mexico, January, 1999.
 16. Harding, L.W., Jr. 1999. EPA/NASA Coastal Intensive Sites Network (CISNet) Annual Meeting, Gulf Breeze, Florida, February, 1999.
 17. Magnuson, A. and L.W. Harding, Jr. 1999. NASA SeaWiFS Case 2 Algorithms Working Group, NASA Goddard Space Flight Center, April, July 1999.
 18. Magnuson, A. and L.W. Harding, Jr. 1999. NASA SeaWiFS Science Team Meeting, Monterey, California, May, 1999.
 19. Harding, L.W., Jr., E.C. Itsweire, W.E. Esaias and M. Scardi. 1999. An aircraft observing system in Chesapeake Bay: Remote sensing of chlorophyll 1989-1999. ERF, New Orleans, Louisiana, September, 1999 (invited talk, chaired session).
 20. Magnuson, A., L.W. Harding, Jr. and J. O'Reilly. 2000. NASA SIMBIOIS Science Team Meeting, Annapolis, Maryland, March, 2000.

21. Magnuson, A. and L.W. Harding, Jr. 2000. NASA SeaWiFS Science Team Meeting, Durham, New Hampshire, May, 2000.
22. Harding, L.W., Jr. 2000. ASLO, Copenhagen, Denmark, June, 2000 (invited talk, session co-chair).
23. Harding, L., A. Magnuson, M. Mallonee, K. Cone, C. Jordan, J. Adolf and D. Miller. 2000. National Academy of Sciences Eutrophication Symposium, Washington, D.C.
24. Adolf, J.E., A.R. Place, D.K. Stoecker and L.W. Harding, Jr. 2001. ASLO, Albuquerque, February, 2001.
25. Harding, L.W., Jr. 2001. EPA EMAP Symposium, Pensacola Beach, Florida, April, 2001.
26. Adolf, J.E., A.R. Place, D.K. Stoecker and L.W. Harding, Jr. 2001. Effects of inorganic nutrient and prey additions on nighttime metabolism of photosynthate in the mixotrophic dinoflagellate *Gyrodinium galatheanum*. 9th East Coast Protozoology Conference, Smithfield, Rhode Island, June, 2001
27. Magnuson, A. and L.W. Harding, Jr. 2001. NASA Ocean Color Science Team, San Diego, California, May, 2001.
28. Harding, L.W., Jr. 2002. CBP STAC Remote Sensing Workshop, Annapolis, Maryland, January, 2002 (co-convened workshop).
29. Harding, L.W., Jr. 2002. Laboratory Seminar at HPL, February, 2002.
30. Adolf, J.E., A.R. Place, D.K. Stoecker and L.W. Harding, Jr. 2002. Autotrophic and heterotrophic C metabolism during mixotrophic growth of the dinoflagellate *Gyrodinium galatheanum*: ¹⁴C tracer studies. Symposium, Phytoplankton Productivity: an Appreciation of 50 Years of the Study of Oceans and Lakes, Bangor, Wales, United Kingdom, March, 2002.
31. Harding, L.W., Jr. 2002. Recovery of primary productivity from remote sensing and models based on current work in Chesapeake Bay. Symposium, Phytoplankton Productivity: an Appreciation of 50 Years of the Study of Oceans and Lakes, Bangor, Wales, United Kingdom, March, 2002.
32. Harding, L.W., Jr. and M. Scardi. 2002. Artificial neural network (ANN) models for estimating primary productivity in Chesapeake Bay. International Conference on Informatics, Rome, Italy, August, 2002.
33. Adolf, J.E., A.R. Place, D.K. Stoecker and L.W. Harding, Jr. 2002. Octadecapentaenoic acid (18:5n-3) abundance in the dinoflagellate *Karlodinium micrum*: effects of light, inorganic nutrient starvation, and mixotrophy. Xth International Conference on Harmful Algae, St. Petersburg Beach, Florida, October, 2002.
34. Magnuson, A. and L.W. Harding, Jr. 2002. Ocean Optics, Santa Fe, New Mexico, November, 2002.
35. Adolf, J.E., C.L. Jordan, W.D. Miller, A. Magnuson, M.E. Mallonee and L.W. Harding, Jr. 2003. Phytoplankton floral composition from pigment reconstructions. At-

- Atlantic Coast Estuaries Indicators Consortium (ACE INC) Annual Meeting, Charleston, South Carolina, May, 2003.
36. Miller, W.D. and L.W. Harding Jr. 2003. Climate and phytoplankton dynamics. ACE INC Annual Meeting, Charleston, South Carolina, May, 2003.
 37. Miller, W.D. and L.W. Harding, Jr. 2003. Influence of synoptic-scale climate variability on Chesapeake Bay phytoplankton biomass. ERF, Seattle, Washington, September, 2003.
 38. Harding, L.W., Jr. 2003. NOAA Coastal Services Center, Charleston, South Carolina, October, 2003.
 39. Harding, L.W., Jr. 2003. Tidal Monitoring Analysis Workgroup (TMAW), Chesapeake Bay Program, Laurel, Maryland, October, 2003.
 40. Harding, L.W., J.E. Adolf, W.D. Miller and M.E. Mallonee. 2003. EPA ALL EaGLes meeting, University of California, Bodega Marine Laboratory, 3-6 December 2003, Bodega Bay, California.
 41. Adolf, J.E., M.E. Mallonee, W.D., Miller, M. Hoover, J. Benjamin and L.W. Harding, Jr. 2003. Phytoplankton indicators in two differentially impacted sub-estuaries of Chesapeake Bay. EPA ALL EaGLes Meeting, University of California, Bodega Marine Laboratory, Bodega Bay, California, 3-6 December 2003.
 42. Kimmel, D.G., W.D. Miller, M.R. Roman and L.W. Harding Jr. 2003. Synoptic scale climatic forcing of plankton dynamics in Chesapeake Bay. EPA ALL EaGLes Meeting, University of California, Bodega Marine Laboratory, Bodega Bay, California, 3-6 December 2003.
 43. Jung, S., D.G. Kimmel, J. Adolf, E.D. Houde, M.R. Roman and L.W. Harding, Jr. 2003. Biomass size spectra: linking spectra across trophic levels as indicators of estuarine state. EPA STAR, EaGLes, University of California, Bodega Marine Laboratory, Bodega Bay, California, 3-6 December 2003.
 44. Adolf, J.E., C.J. Jordan, M.E. Mallonee, W.D. Miller and L.W. Harding, Jr. 2004. Phytoplankton floral composition and primary productivity in Chesapeake Bay. Ocean Research Conference, ASLO/TOS, Honolulu, Hawaii, February, 2004.
 45. Harding, L.W., Jr., J.E. Adolf, W.D. Miller and M.E. Mallonee. 2004. Predictions of phytoplankton biomass and primary productivity using data from *in-situ* and remote sensing observations in Chesapeake Bay, USA. Ocean Research Conference, ASLO/TOS, Honolulu, Hawaii, February, 2004.
 46. Kimmel, D.G., X. Zhang, M.R. Roman, W.C. Boicourt and others. 2004. Spatial and temporal variability of mesozooplankton biomass size spectra in Chesapeake Bay as measured by an optical plankton counter. Ocean Research Conference, ASLO/TOS, Honolulu, Hawaii, February, 2004.
 47. Houde, E.D., W.C. Boicourt, L.W. Harding and M.R. Roman. 2004. Trophic Indicators of Ecosystem Health. ACE INC, Chesapeake Bay, ACE INC All Hands Meeting, Morehead City, North Carolina, April, 2004.
 48. Jung, S, D.G. Kimmel, J. Adolf, E.D. Houde, M.R. Roman and L.W. Harding, Jr.

2004. Biomass size spectra as integrative trophic indicators in Chesapeake Bay. EPA STAR EaGLEs meeting, Duluth, Minnesota, September, 2004.
49. Adolf, J.E. and L.W. Harding, Jr. 2004. Interpreting phytoplankton indicators against a backdrop of high spatial and temporal variability in Chesapeake Bay. EPA STAR EaGLEs meeting, Duluth, Minnesota, September, 2004.
 50. Adolf, J.E., M.E. Mallonee, W.D. Miller, M. Hoover and L.W. Harding, Jr. 2004. Integrating phytoplankton indicators: relationships between phytoplankton floral composition and size structure in Chesapeake Bay. EPA STAR EaGLEs meeting, Duluth, Minnesota, September, 2004.
 51. Miller, W.D., L.W. Harding, Jr. and J.E. Adolf. 2004. The influence of Hurricane Isabel on Chesapeake Bay phytoplankton dynamics. Conference, Hurricane Isabel in Perspective, Linthicum Heights, Maryland, November, 2004.
 52. Harding, L.W., Jr. 2005. Recent progress in aircraft and satellite remote sensing of Chesapeake Bay. Seminar, UMCES Integration and Application Network, Annapolis, Maryland, October, 2005.
 53. Harding, L.W., Jr. 2005. Recent progress in using aircraft and satellite remote sensing to study phytoplankton dynamics in Chesapeake Bay and the mid-Atlantic bight. Horn Point Laboratory Seminar, Cambridge, Maryland, April, 2005.
 54. Harding, L.W., Jr. 2005. Supporting leading-edge science to advance our understanding of estuarine and coastal processes. Maryland Sea Grant Performance Appraisal Team, session chair, Annapolis, Maryland, September, 2005.
 55. Adolf, J.E. and L.W. Harding, Jr. 2005. Variability of phytoplankton floral composition and size structure in Chesapeake Bay. ERF, Norfolk, Virginia, October, 2005.
 56. Harding, L.W., Jr., J.E. Adolf and W.D. Miller. 2005. Variability and trends of chl-a in Chesapeake Bay. ERF, Norfolk, Virginia, October, 2005.
 57. Miller, W.D., D.G. Kimmel and L.W. Harding, Jr. 2005. Predicting spring discharge of the Susquehanna River from a synoptic climatology for the eastern United States. ERF, Norfolk, Virginia, October, 2005.
 58. Kimmel, D.G., W.D. Miller, R.J. Wood, L.W. Harding, Jr. and M.R. Roman. 2005. Regional scale climate forcing of Chesapeake Bay trophic dynamics. ERF, Norfolk, Virginia, October, 2005.
 59. Harding, L.W., Jr. 2006. Chesapeake Bay Remote Sensing Program. Chesapeake Bay Remote Sensing Symposium, Smithsonian Environmental Research Center, Edgewater, Maryland. January, 2006.
 60. Annis, E.R., E.D. Houde, L.W. Harding, Jr., S Jung, A. Hashinaga, W.D. Miller and M.E. Mallonee. 2006. Bottom-up controls and recruitment variability of Atlantic menhaden and bay anchovy in Chesapeake Bay. AERS, Baltimore, Maryland, October, 2006.
 61. Harding, L.W., Jr. 2006. Laboratory Seminar, Smithsonian Environmental Research Center, Edgewater, Maryland, December, 2006.

62. Harding, L.W., Jr., M. Li and H. Paerl. 2008. Climatic perturbations of phytoplankton dynamics in mid-Atlantic estuaries. AGU, San Francisco, California (invited), December, 2008.

VI. Professional Societies

American Association for the Advancement of Science
American Geophysical Union
American Society of Limnology and Oceanography
Phycological Society of America
Society of the Sigma Xi
The Oceanography Society
Coastal and Estuarine Research Federation

VII. Reviewer

Continental Shelf Research
Estuaries
Estuarine, Coastal and Shelf Science
Geophysical Research Letters
Journal of Phycology
Journal of Geophysical Research
Limnology and Oceanography
Marine Biology
Marine Ecology - Progress Series
Marine Biology Vienna
Science
U.S. Environmental Protection Agency
National Science Foundation
Hudson River Foundation
NASA
NOAA Sea Grant
NOAA Coastal Ocean Program

VIII. Teaching and Training

1972 - 1973 - Teaching Asst., Dept. of Oceanography, Humboldt State University: Biological Oceanography; Dynamics of Primary Production.

1976 - 1978 - Teaching Asst. & Lecturer, Hopkins Marine Station, Stanford University: Marine Biology; Biology of Plankton; Undergraduate Research in Marine Biology.

1979 - 1981 - Lecturer, Dept. of Biological Sciences, University of California, Santa Barbara: Photosynthesis and Primary Productivity in the Oceans; Physiology of Algae; Aquatic Biology Seminar; Instructor, Photosynthesis and Primary Productivity in the Oceans.

1993 - MEES 699, Phytoplankton Ecology Seminar, Spring Semester.

1994 - MEES 699, Readings in Bio-Optics and Phytoplankton Physiology, Spring Semester.

1997 - MEES 699, Phytoplankton Photosynthesis and Primary Production (with Kana), Fall Semester.

2004 – MEES 699, Physical-Biological Interactions (with Li and Roman), Fall Semester

IX. Graduate Students Supervised as Major Advisor

1. Degrees Completed

Leonard, Carrie; Ph.D.; Oceanography; 1998; HPL / UMCES, MEES Program; “An Ecosystem Model of Iron Limitation in the Central Equatorial Pacific Ocean.”

Schieber, Brian; M.S.; Oceanography; 1998; MEES Program; “Ross Sea Variability and the Performance of Case I Ocean Color Algorithms.”

Adolf, Jason; Ph.D.; Oceanography; 2002; HPL / UMCES, MEES Program; “Photosynthesis and Carbon Metabolism in a Mixotrophic Dinoflagellate, *Karlodinium micrum*.”

Jordan, Christy; Ph.D.; Oceanography, 2003; HPL / UMCES, MEES Program, “Mesoscale Patterns of Phytoplankton Size Structure, Primary Productivity and Implications for Trophic Transfer in Chesapeake Bay Planktonic Communities.”

Miller, W. David; Ph.D.; Oceanography; 2006; HPL / UMCES, MEES Program, “Climate Forcing of Phytoplankton Dynamics in Chesapeake Bay.”

2. Current Students – None

3. Graduate Student Committee Memberships

Berg, Mine; Ph.D.; Biological Oceanography, HPL / UMCES; MEES Program, University of Maryland, College Park, December 1999.

Del Vecchio, Rossana; Ph.D.; Environmental Chemistry, University of Maryland, College Park, Dept. of Chemistry and Biochemistry, MEES Program, May 2002.

Smalley, Gabriella; Ph.D.; Biological Oceanography, HPL / UMCES, MEES Program May 2002.

Mannino, Antonio; Ph.D.; Environmental Chemistry, CBL / UMCES; MEES Program, University of Maryland, College Park, May 2004.

Connelly, Bill; Ph.D.; Fisheries, CBL / UMCES; MEES Program, University of Maryland, College Park (current).

Moore, Eli; Ph.D.; Environmental Chemistry, CBL / UMCES; MEES Program, University of Maryland, College Park (current).

C. Research Internships Supervised

Weiss, Greg; Graduate, Arizona State University, Tempe, Arizona, Summer 1993, NASA Summer Fellowship Program in Remote Sensing of the Oceans.

Gennari, Scott; Junior, Senior, College of the Atlantic, Bar Harbor, Maine, Summer 1992, Winter 1993, NASA Summer Fellowship Program in Remote Sensing of the Oceans.

Graf, Nathan; Junior, Harvard University, Cambridge, Massachusetts, summer 1995, NASA Summer Fellowship Program in Remote Sensing of the Oceans.

Franck, Valerie; Graduate, University of California, Santa Barbara, California, Summer-Fall 1996, NASA Summer Fellowship Program in Remote Sensing of the Oceans.

Polyakov, Olga; Senior, University of Maryland, College Park, Fall-Spring 1997, NASA Summer Fellowship Program in Remote Sensing of the Oceans, and independent study.

Hoover, Miranda; Junior, Wittenberg University, Springfield, Ohio, Maryland Sea Grant Research Experience for Undergraduates program, Summer 2003 (advised by post-doc, Jason Adolf).

X. Outreach and Service

- Member, NASA SeaWiFS Science Team for seven years. My group was involved in the primary productivity workgroup that operated under the auspices of SeaWiFS and the EOS MODIS project, and of the *ad hoc* workgroup on chlorophyll recoveries in coastal waters from SeaWiFS and MODIS that implemented changes to data processing to improve accuracy of satellite retrievals. We provided bio-optical and pigment data from Case II waters to support revisions of operational ocean-color algorithms to improve recoveries at high chlorophyll concentrations.
- Member, NASA SIMBIOS Science Team for three years. My group was involved in SIMBIOS bio-optical measurements in Case II waters. We were among the main providers of estuarine/coastal data for calibration and validation of ocean color sensors.
- Member, UMCES Faculty Senate for three years, and as secretary for the Senate for two years.
- Member, MEES Program Committee as Chair of the Oceanography Area of Specialization (AOS) in MEES. The Program Committee is the main policy-setting organ of the MEES Graduate Program.
- Chair, Admissions Committee for Oceanography AOS of the MEES Program for six years.
- Chair, Oceanography AOS of the MEES Program for eight years.
- Coordinator, NASA / Maryland Sea Grant College Summer Fellowships in Remote Sensing for nine years.
- Member, NSF REU Selection Committee at Maryland Sea Grant for 17 years.
- Chair, member HPL / UMCES Graduate Education Committee – chaired the committee for five years, and served as member for another four years.
- Member, UMCES Graduate Faculty Council.
- Participant, Chesapeake Futures, Innovative Technologies Committee.
- Participant, Coastal Observing System workshop sponsored by several federal agencies in Solomons, Maryland, May, 1999.

- Member, Steering Committee Adriatic Observing System workshop - one of four US members of this committee; participated in a multinational workshop in Rovinj, Croatia, in October, 1999.
- Participant and Session Chair, Scientific and Technical Advisory Committee (STAC), EPA Chesapeake Bay Program, Workshop on Trophic Change - I led the discussion at the STAC workshop in Solomons, Maryland that considered the role of meteorological forcing in eliciting recent patterns observed in water quality data on the Bay, and reported on the conclusions of the workgroup to the Implementation Committee of the Chesapeake Bay Program in Annapolis, Maryland.
- Member, Steering Committee, National Research Council Committee on Commercialization of Space-Based Remote Sensing in Earth Sciences – Appointed in Fall, 1999, three-year term.
- Participant, NASA Regional Application Center Meeting, October, 1999, Chesapeake College, Easton, Maryland.
- Organizer and participant, STAC Workshop on Remote Sensing, Annapolis, Maryland, January, 2002, focusing on facilitating increased use of remotely sensed and in-situ observations for management of Bay resources and for assessing changes in water quality and land-use/land-cover.
- HPL representative, MEES Graduate Colloquium Committee, Chesapeake Biological Laboratory (CBL), September, 2002.
- Member, Facilities Committee, HPL / UMCES, July, 2002 – June, 2003.
- Member, Library Committee, HPL / UMCES, July, 2002 – June, 2003.
- Member, EPA/CPB chlorophyll/nutrient criteria subcommittee, July, 2001 – present.
- Coordinator, Maryland Sea Grant Program Seminar Series, September, 2002 – 2006.
- Member, Chlorophyll Criteria Team, EPA Chesapeake Bay Program, April, 2005-present.
- Invited Participant, Alliance for Coastal Technologies (ACT) Workshop on Coastal Remote Sensing, Moss Landing, California, January, 2006.
- Coordinator, *ad hoc* advisory group with NASA and NOAA to test and implement Chesapeake Bay algorithms for retrieval of chlorophyll from SeaWiFS and Aqua-MODIS satellite ocean color instruments, Annapolis, Maryland, January, 2006 – present.
- Invited Participant, Chapman Conference on long-term phytoplankton data, Rovinj, Croatia, 8-12 October 2007.
- Program Director, National Science Foundation, Biological Oceanography Program, Arlington, Virginia, 15 September 2008 – 14 September 2010.