

## **David A. Wright PhD DSc CMarSci FIMarEST**

P.O. Box 38349  
Baltimore, MD 21231.

Phone: (U.S. EST) 443 250 8746 (Mobile)  
E-mail: david.wright105@comcast.net

### **Degrees**

Honors BSc., University of Newcastle-upon-Tyne UK  
Ph.D., University of Newcastle-upon-Tyne UK  
D Sc (Doctor of Science), University of Newcastle-upon-Tyne UK  
Chartered Marine Scientist, Institute of Marine Engineering Science and Technology.  
Fellow of the Institute of Marine Engineering Science and Technology.

### **Currently held positions.**

Emeritus Professor of Environmental Toxicology, University of Maryland System Center for  
Environmental Science,

1995 - Present. President, Environmental Research Services, Baltimore MD

### **Areas of Professional Expertise and Significant Achievements.**

- Areas of research interest: Environmental Toxicology; Physiological effects of trace metals and petroleum hydrocarbons; toxicity bioassays; environmental risk assessments; effects of UV light on aquatic organisms; physical/chemical anti-fouling strategies; control of non-indigenous aquatic species; natural product biocides; water treatment technologies.
- Former Editor, Marine Pollution Bulletin (Pergamon Press)
- Member of United Nations, IMO Correspondence Group Committee on Ballast Water Technology Standards.
- Major advisor to 15 graduate students, 1981-2006.
- Author of >120 peer-reviewed journal articles and books on Environmental Toxicology and water treatment technologies in natural water, municipal water and ballast water.

## D.A. Wright. c.v., 2011

- Author of over 260 technical/contract reports as Principal Investigator of > 75 grants and contracts from Federal and State agencies and private companies (>\$10 Million) involving managerial and fiscal responsibility in all cases.
- Over 35 years of contract and grant negotiation and management, including the private sector (managed consulting company, ERS, for seventeen years).
- Director, 1999-2008, Baltimore Harbor Ballast Water Treatment Program.
- Director, 1991-98, State of Maryland Ambient Toxicity Program.
- Leader of international team of scientists studying oil pollution in European waters 1995-1997.
- Author of three patents on water treatment technology.
- Awarded Second Doctoral degree in Environmental Toxicology, (DSc), 2001.
- Fellow of the Institute of Marine Engineering Science and Technology, 2005.
- Taught graduate and undergraduate courses in Ecotoxicology, Ecological Physiology and Environmental Science at the University of Maryland, based on my Text-book *Environmental Toxicology*, Cambridge University Press, 2002. 630pp
- >150 public seminars/scientific presentations in more than 15 different countries
- Winner Denny Medal, 2007 (Institute for Marine Engineering Science & Technology), best peer-reviewed publication, *Journal of Marine Science & Environment*.
- Winner Denny Medal, 2008 (Institute for Marine Engineering Science & Technology), best peer-reviewed publication, *Journal of Marine Design & Operations*.
- Senior Scientist and team leader. Shipboard testing of ballast water treatment systems aboard commercial vessels, according to International Maritime Organization and U.S. Coast Guard Standards. 2000-present.

## D.A. Wright. c.v., 2011

- Chief Scientist aboard R/V *Brooks McCall* and R/V *Ocean Veritas* monitoring the Deepwater Horizon oil spill. Gulf of Mexico 2010.
- Member, Advisory Board, Maritime Environmental Resource Center (Ballast Water Treatment Testing), Solomons, MD, U.S.A..
- Co-Chairman of the Ballast Water Experts Group, Institute for Marine Engineering Science and Technology, London, U.K.
- Delegate. U.N. International Maritime Organization. Marine Environmental Committee. 2002-Present.

### Selected Papers in Refereed Journals.

Hall, L.W., Jr., S.J. Bushong, M.C. Ziegenfuss, W.E. Johnson, R.L. Herman and D.A. Wright. 1988. Chronic toxicity of tributyltin to Chesapeake Bay biota. *Water, Air and Soil Pollut.* 39:365-376.

Pinkney, A.E., D.A. Wright, M.A. Jepson and D.W. Towle. 1989. Effects of tributyltin compounds on ionic regulation and gill ATPase activity in estuarine fish. *Comp. Biochem. Physiol.* 19:425-431.

Pinkney, A.E., D.A. Wright and G.M. Hughes. 1989. A morphometric study of the effects of tributyltin compounds on the gills of the mummichog, *Fundulus heteroclitus*. *J. Fish. Biol.* 34:665-677.

Pinkney, A.E., L.L. Matteson and D.A. Wright. 1990. Effects of tributyltin on survival growth, morphometry and RNA:DNA ratio of larval striped bass, *Morone saxatilis*. *Arch. Environ. Contam. Toxicol.* 19:235-241.

Wright, D.A. and C.D. Zamuda. 1991. Copper contamination in the Patuxent River, Maryland. *Hydrobiologia* 215:31-41.

Donskoy, D.M., Ludyanskiy, M. and D.A. Wright. 1996. Effects of sound and ultrasound on Zebra Mussels. *J. Acoust. Soc. Am.* Volume 99: 2577-2603.

Wright, D.A., E.M. Hamilton, J. Magee and V.S. Kennedy. 1996. Effect of salinity and temperature on survival and development of zebra mussel (*Dreissena polymorpha*) and quagga mussel (*D. bugensis*) embryos, larvae and juveniles. *Estuaries* 19:619-628.

**D.A. Wright. c.v., 2011**

Wright, D.A., E.M. Setzler-Hamilton and J. Magee. 1996. Laboratory culture of *Dreissena polymorpha* and *Dreissena bugensis* from fertilization to F1 generation juveniles using estuarine algae. *J. Great Lakes Res.* 22:46-54.

Wright, D.A., J.A. Magee, E.M. Setzler-Hamilton, L. Chalker-Scott and G.L. Morgan. (1997). Use of high energy monochromatic UV light to kill dreissenid larvae. In: F. D'Itri [ed.] *Zebra Mussels and Aquatic Nuisance Species*. Ann Arbor Press. [Contribution No. 2770-CBL].

Magee, J.A., D.A. Wright and E.M. Setzler-Hamilton. (1997). Use of Penaten® to control zebra mussel attachment. In: F. D'Itri [ed.] *Zebra Mussels and Aquatic Nuisance Species*. Ann Arbor Press. [Contribution No. 2771-CBL].

Wright, D.A. and J.A. Magee. 1997. The toxicity of endod extract to the early life stages of *Dreissena bugensis*. *Biofouling* 11:255-263.

Wright, D.A. and R.P. Mason. 2000. Biological and chemical influences on trace metal toxicology and bioaccumulation in the marine and estuarine environment. *Int. J. Environ. Pollut.* 13, 226-248.

Wright, D.A. and P.M. Welbourn. (2002). *Environmental Toxicology*. Cambridge University Press. 630pp.

Wright, D.A, R. Dawson, T.P. Mackey, H.G. Cutler and S.J. Cutler 2003. Full-Scale Shipboard Trials of Ballast Water Treatment Systems in Baltimore Harbor. Proceedings of 2<sup>nd</sup> Globallast International Ballast Water R&D Symposium at the International Maritime Organization. London, England. July 21-23, 2003. United Nations, IMO Globallast Monograph Series, No. 15, pp. 243-257, London, England.

Cutler, S.J., H.G. Cutler, J. Glinski, D.A. Wright, R. Dawson and D. Lauren (2003). Seakleen®, a potential product for controlling aquatic pests in ships' ballast water. Proceedings of the 2<sup>nd</sup> International Ballast Water R&D Symposium at the International Maritime Organization. London, England. July 21-23, 2003. United Nations, IMO Globallast Monograph Series, Number 15, pp. 164-174. London, England.

Wright, D.A., R. Dawson, C.E.F. Orano-Dawson and S.Moesel (2005). Shipboard trials of ballast water management options Part 1: Efficacy of ultraviolet irradiation. system. *Journal of Marine Science and Environment*. Proceedings of the Institute of Marine Engineering Science and Technology. Part C. No.C3. 3-13.

**D.A. Wright. c.v., 2011**

Wright, D.A., R. Dawson, C.E.F. Orano-Dawson and S.Moesel (2005). Shipboard trials of ballast water management options Part 2: Efficacy of ballast water exchange. *Journal of Marine Science and Environment. Proceedings of the Institute of Marine Engineering Science and Technology. Part C. No.C3.* 15-20.

Wright, D.A., R. Dawson, C.E.F. Orano-Dawson, G.R. Morgan and J. Coogan. (2006) The development of ultraviolet irradiation as a method for the treatment of ballast water in ships. *Proc. Inst. Mar. Eng. Sci. Technol. J. Mar. Sci. Environ. (C4)* 3-12.

Wright, D.A. and P.M. Welbourn. (2006). *Environmental Toxicology. Mandarin Chinese Edition. Cambridge University Press.* 589pp.

Wright, D.A., R. Dawson, C.E.F. Orano-Dawson and S.M. Moesel (2007). A test of the efficacy of a Ballast Water Treatment System aboard the Vessel *CoralPrincess*. *Mar. Technol.* 44, 57-67.

Wright, D.A., R. Dawson, C.E.F. Orano-Dawson (2007). Shipboard Trials of Menadione as a Ballast Water Treatment. *Mar. Technol.* 44, 68-76.

Wright, D.A., R. Dawson, S.J. Cutler, H.G. Cutler, C.E. Orano-Dawson and E. Graneli (2007). Naphthoquinones as broad spectrum biocides for treatment of ship's ballast water: toxicity to phytoplankton and bacteria. *Water Research* 41, 1294-1302.

Wright, D.A., Dawson, R., Cutler, S.J., Cutler, H.G. and Orano-Dawson, C.E. (2007). Screening of natural product biocides for control of non-indigenous species. *Environmental Technology* 28, 309-319.

Wright, D.A., Mitchelmore, C.L., Dawson, R. and Cutler, H.G. (2007). The influence of water quality on the toxicity and degradation of juglone (5-hydroxy 1,4-naphthoquinone). *Environmental Technology* 28, 1091-1101.

Wright, D.A. (2007) Problems associated with performance compliance testing for ballast water treatment. *Proc. Inst. Mar. Eng. Sci. Technol. J. Mar. Design Ops. (B12)* 25-38.

Wright, D.A. (2007). Logistics of shipboard and dockside testing of ballast water treatment systems in the United States. In: "Biological invaders in inland waters: Profiles, distribution and threats". Pp. 657-668. Edited by Francesca Gherardi. Springer Publ. Co. New York.

**D.A. Wright. c.v., 2011**

Wright, D.A, Dawson, R., Caceres, V., Orano-Dawson, C.E., Kananen, G., Cutler, S.J and Cutler, H.G. (2009). Shipboard testing of the efficacy of SeaKleen® as a ballast water treatment to eliminate non-indigenous species aboard a working tanker in Pacific waters. *Environ. Technol.* 33, 893-910.

Wright, D.A., R.W. Gensemer, C.L. Mitchelmore, W.A. Stubblefield, E. van Genderen , R. Dawson, C.E. Orano-Dawson, J.S. Bearn, R.A. Mueller and William J. Cooper (2010). Shipboard Trials of an Ozone-Based Ballast Water Treatment System. *Mar. Pollut. Bull.* 60, 1571-1583.

King, D.M., P.T Hagan, M. Riggio and DA Wright (2012). Preview of Global Ballast Water Treatment Markets. *J. Mar Eng. Technol.* 11, 3-15.

Wright, D.A. (2012). Logistics of Compliance Assessment and Enforcement of the 2004 Ballast Water Convention. *J. Mar Eng. Technol.* 11, 17-23.

**Invited Seminars, Lectures and Symposia (last 12 years only).**

February 2000. A potent cost-effective natural product biocide for ballast water treatment. Senior author with R. Dawson and M. Wildgust. 10<sup>th</sup> Annual Aquatic Nuisance and Zebra Mussel Conference. Toronto, Canada. Feb. 13-17, 2000.

February 2000. Excimer UV light as a potential treatment for ballast water. 10<sup>th</sup> Annual Aquatic Nuisance and Zebra Mussel Conference. Toronto, Canada. Feb. 13-17, 2000.

May 2000. International ballast water control. 3<sup>rd</sup> International SETAC Congress, Brighton, England. May 23-28, 2000.

May 2000. Potent cost-effective biocide for ballast-water treatment. 3<sup>rd</sup> International SETAC Congress, Brighton, England. May 23-28, 2000.

November 2000. Chemical options for ballast water treatment in the Great Lakes. Address to annual meeting of International Joint Commission on the Great Lakes. Quebec City. Nov. 1-2, 2000.

November 2000. Ballast Water Treatment Project: Field studies on the effect of primary filtration and ultraviolet light irradiation on phytoplankton from Lake Superior harbors. Presentation to Northeast Midwest Institute, Washington, D.C. Nov. 16, 2000.

**D.A. Wright. c.v., 2011**

- March 2001. A natural product biocide for ballast water treatment. Presentation at Special Globallast Conference organized by the United Nations International Maritime Organization. London. Mar. 27, 2001.
- March 2001. The Great Lakes Ballast Technology Demonstration Project: Biological effectiveness test program (including MV Regal Princess trials). Presentation at Special Globallast Conference organized by the United Nations International Maritime Organization. London. Mar. 27, 2001. (Co-author with A. Cacelosi, I. Knight, M. Balcer, R. Dawson, C. Blatchley, D. Reid, N. Mays and J. Taverna).
- June 2001. Ballast water treatment technologies. Shipboard Trials. Invited address to Joint NSF/EPA Environmental Technologies verification program. Alexandria, VA.
- September 2001. Environmental engineering solutions for ballast water treatment, including strengths and limitations of filtration, heat, UV and ozone. Invited presentation at special conference on non-indigenous aquatic species held by the Great Lakes Water Quality Board of the International Joint Commission, Montreal. Sept. 14, 2001.
- September 2001. Chemical treatment of ballast water. Invited presentation at special conference on non-indigenous aquatic species held by the Great Lakes Water Quality Board of the International Joint Commission, Montreal. Sept. 14, 2001.
- October 2001. A natural product biocide for ballast water treatment. Presentation at 11<sup>th</sup> International Conference on Aquatic Invasive Species. Alexandria, VA, Oct. 1-4, 2001.
- October 2001. Shipboard trials of ballast water treatment technologies in Baltimore Harbor. Presentation at 11<sup>th</sup> International Conference on Aquatic Invasive Species. Alexandria, VA. Oct. 1-4, 2001.
- November 2001. Chemical alternatives to ballast water treatment. First International Conference on Ballast Water Management. Singapore. Nov. 1, 2001.
- November 2001. International control of non-indigenous species. Invited address to National Academy of Sciences Conference, Meeting the Needs of Marine Transportation through Research and Technology. Nov. 15, 2001.
- November 2001. Shipboard trials of technologies for controlling non-indigenous species in ballast water. Invited address to the National Academy of Sciences conference, Meeting the Needs of Marine Transportation through Research and Technology. NAS, Washington, DC. Nov. 15, 2001.

**D.A. Wright. c.v., 2011**

November 2001. Shipboard trials of technologies for controlling non-indigenous species in ballast water. National Academy of Sciences conference, 'Meeting the needs of Marine Transportation through Research and Technology. November 15<sup>th</sup>.

November 2001. International Control of non-indigenous species. National Academy of Sciences Conference, 'Meeting the needs of Marine Transportation through Research and Technology. November 15<sup>th</sup>.

December 2001. Overview of U.S. research on ballast water treatment technologies. Invited presentation. University of Newcastle-upon-Tyne. Dept. of Marine Technology. Dec. 7, 2001.

June 2002. Experimental studies comparing biological effectiveness of commercially available ballast treatment systems. Presentation at EPA-NSF Workshop on Ballast Water Treatment Technology. Alexandria, VA. Jun. 12, 2002.

August 2002. Natural product allelochemicals for controlling pests in ships' ballast water. Third World Congress for Allelopathy: Challenge for the new millennium. Tskuba, Japan. Aug. 26, 2002.

August 2002. Ballast water treatment technologies: Shipboard trials. Presentation to Ballast Discharge Monitoring Device Workshop. U.S.G.S. Marrowstone Laboratory. Port Hadlock, WA. Aug. 12-16, 2002.

November 2002. Ballast water treatment technologies: Shipboard trials. Presentation at Annual Conference of Society of Environmental Journalists. Baltimore, MD. Nov. 2002.

December 2002. A filtration and UV-based ballast water treatment technology: Including a review of initial testing and lessons learned aboard three cruise ships and two floating platforms. Paper presented at ENSUS 2002. Marine Science and Technology for Environmental Sustainability. University of Newcastle-upon-Tyne, School of Marine Science and Technology. Dec. 16-18, 2002.

December 2002. Shipboard testing of ballast water treatment technology in Baltimore Harbor. Paper presented at ENSUS 2002. Marine Science and Technology for Environmental Sustainability. University of Newcastle-upon-Tyne, School of Marine Science and Technology. Dec. 16-18, 2002.

December 2002. A full-scale ballast water treatment: Technologies tested aboard the *Cape May*, Baltimore Harbor, 2001. Invited Presentation at the Southeast Asian Fisheries



**D.A. Wright. c.v., 2011**

Development Cooperation: Aquaculture Research Division, Tigbauan, Iloilo Philippines.  
Dec. 12, 2002.

May 2003. Full-Scale Shipboard Trials of Ballast Water Treatment Systems in Baltimore Harbor.  
Presented at the 9<sup>th</sup> International Conference on Marine Engineering Systems. Helsinki,  
Finland. May 19-21, 2003.

May 2003. Aquatic Nuisance Species: A Global Health Problem. Presented at the Annual  
Conference of American Society of Sanitarians; Safety/Human Health Issues. May 27,  
2003.

June 2003. Full-Scale Shipboard Trials of Ballast Water Treatment Systems in Baltimore Harbor.  
Presented at International Association for Great Lakes Research 46<sup>th</sup> Annual Conference  
on Great Lakes Research. June 22-26, 2003. Chicago, Illinois.

July 2003. Full-Scale Shipboard Trials of Ballast Water Treatment Systems in Baltimore Harbor.  
Presented at the 2<sup>nd</sup> International Ballast Water R&D Symposium at the International  
Maritime Organization. London, England. July 21-23, 2003.

July 2003. Seakleen® A potential product for Controlling Aquatic Pests in Ships' Ballast Water.  
Presented at the 2<sup>nd</sup> International Ballast Water R&D Symposium at the International  
Maritime Organization. London, England. July 21-23, 2003.

August 2003. Ongoing development of two ballast water treatment technologies based on full-  
scale testing in Baltimore Harbor. T.P. Mackey, D.A. Wright and R. Dawson. Presented at  
the annual Marine Environmental Engineering Technology Symposium. In pursuit of  
Cleaner Seas. Arlington, VA.

January 2004. Use of Seakleen® as a treatment for aquatic nuisance organisms in ballast water.  
Presentation to Washington State Department of Fisheries and Wildlife. Seattle, WA,  
January 8<sup>th</sup>.

March 2004. Development of a natural biocide for the control of non-indigenous species.  
Queens University, Kingston Ontario.

May 2004. The Baltimore Harbor Ballast Water Treatment Program. Presentation to Second  
International Conference and Exhibition on Ballast Water Management. May 19-21,  
2004. Singapore Institute of Technology.

**D.A. Wright. c.v., 2011**

- April 2005. Problems with Ballast Water Exchange as a Means of Controlling Movement of Harmful Algal Species throughout the World.. Presentation at 3<sup>rd</sup> International Geohab symposium, Baltimore, MD.
- May 2005. Practical Aspects of Compliance Testing for Ballast Water Treatment. Presentation to International Maritime Organization, London, England.
- May 2005. Full-scale testing of technologies to eliminate non-indigenous species from ships' ballast water. Problems with biological end-points. Invited Presentation to International Biological Invasions. Florence, Italy. May 5-7<sup>th</sup>
- October 2005. Practical Aspects of Ballast Water Treatment Systems Testing. Lloyds List Ballast Water Management Conference and Roundtables. Keynote address. London, England. October 20<sup>th</sup>-21<sup>st</sup>.
- March 2006. Practical Aspects of Ballast Water Treatment Efficacy and Compliance Testing. Presentation at the IMarEST World Maritime Technology Conference. London, March 6-10.
- September 2007. D.A. Wright and T.P. Mackey. Ballast Water Treatment Technologies. Bundesamt fuer Seeschiffahrt und Hydrographie (BSH), Hamburg, Germany. September 26<sup>th</sup>, 2007.
- September 2007. D.A. Wright. Shipboard Ballast Water Treatment Testing in the United States. Invited presentation to Department of Marine Science and Technology, University of Newcastle-upon-Tyne, U.K. September 28<sup>th</sup>, 2007.
- December 2008. D.A. Wright. Trials and Tribulations. Lloyds List Ballast Water Management Conference and Roundtables. Keynote address. London, England. December 10-11<sup>th</sup>.
- January 2009. T. P. Mackey, M. Granitto, M. J. W. Veldhuis, F. Fuhr, D. A. Wright and G. Greensmith. The Development and Type Approval Testing of a Ballast Water Treatment Technology. Presentation at the IMarEST World Maritime Technology Conference, Mumbai, India. 21<sup>st</sup>-24<sup>th</sup> January.
- July 2011. D.A. Wright. Harmful Aquatic Organisms in Ballast Water. Logistics of Compliance Assessment and Enforcement of Ballast Water Convention. Address to International Maritime Organization. Marine Environmental Protection Committee 62. IMarEST INFO paper. *MEPC 62/INF.31*.

## **D.A. Wright. c.v., 2011**

October 2011. D.A. Wright and J. Mackey. BWM Technologies. Remaining scientific and technological challenges. IMarEST Shipbuilders Forum/ Globallast R & D Forum. Istanbul, Turkey. 25-28<sup>th</sup> October.

### **Presentations at professional meetings (Last 12 years only)**

February 2000. A potent cost-effective natural product biocide for ballast water treatment. 10th Annual Aquatic Nuisance and Zebra Mussel Conference. Toronto, Canada. February 13-17, 2000.

February 2000. Excimer UV light as a potential treatment for ballast water. 10th Annual Aquatic Nuisance and Zebra Mussel Conference. Toronto, Canada. February 13-17, 2000.

May 2000. International Ballast Water Control. 3rd International SETAC Congress, Brighton, England. May 23-28, 2000.

May 2000. Potent cost-effective biocide for ballast-water treatment. 3<sup>rd</sup> International SETAC Congress, Brighton, England. May 23-28, 2000.

September 2004. The Baltimore Harbor Ballast Water Treatment Technology Program. 13<sup>th</sup> Annual Non-indigenous Aquatic Nuisance Species Conference. Sligo, Ireland, September 20<sup>th</sup>-24<sup>th</sup>.

January 2006. Shipboard and Dockside Trials of Ballast Water Treatment Technologies. D.A. Wright and T.P. Mackey. Presented at the annual Marine Environmental Engineering Technology Symposium. Arlington, VA.

September 2007. D.A. Wright. Shipboard testing of SeaKleen® as a ballast water treatment to eliminate non-indigenous species aboard a working tanker in Pacific waters. 15<sup>th</sup> International Conference on aquatic invasive species. Nijmegen, Holland. September 25<sup>th</sup>, 2007.

November 2007. J. Berr, D.A. Wright and C.M. Mitchelmore. Preliminary evaluation of ballast water ozonation to remediate risk posed by invasive species. 29<sup>th</sup> Annual Meeting of the Society for Environmental Toxicology and Chemistry. Milwaukee, Wisconsin, November 11-15<sup>th</sup> 2007.

April 2009. D.A. Wright and T.P. Mackey. Shipboard Trials of a Ballast Water Treatment system for U.S. and IMO approval – a case study. 16th International Conference on Aquatic Invasive Species. Montreal, Canada. April 19<sup>th</sup>-23<sup>rd</sup>, 2009.

## **D.A. Wright. c.v., 2011**

November 2010. D.V. Aurand, G.M. Coelho and D.A. Wright. Monitoring the sub-surface dispersant injection during the MC 252 incident with shipboard toxicity testing, in-situ fluorometry and DO measurements. 31<sup>st</sup> Annual SETAC Meeting, Portland OR, November 7-11<sup>th</sup>, 2010.

February 2012. IMarEST Ballast Water Conference. The Challenge of Achieving Compliance. Is It Physically Possible? Keynote Address. February 23<sup>rd</sup> 2012.

February 2012. Institute for Marine Engineering Science and Technology. Annual Stanley Gray Lecture. "Self and Science. High Stakes Conflict in Murky Seas." February 23<sup>rd</sup>, 2012.

### Awards

1990 Visiting Scientist Fellowship. National Science and Engineering Research Council, Canada.

1997 National Science Foundation. Korea/Japan Program Fellowship.

2005 Fellowship of the Institute of Marine Engineering Science and Technology.

2007 Denny Medal, Institute for Marine Engineering Science and Technology. Best peer-reviewed paper published in J. Marine Science Environment.

2008 Denny Medal, Institute for Marine Engineering Science and Technology. Best peer-reviewed paper published in J. Marine Design and Operations.