

**CURRICULUM VITAE (June 2016)****Carys L. Mitchelmore**

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**I. Education:**

- 1997 Ph.D. Biochemistry / Genetic Toxicology. University of Birmingham, U.K and Plymouth Marine Laboratory, U.K.  
 Thesis Title: Genetic Toxicity in Aquatic Organisms.  
 (Advisors: Drs. J.K. Chipman and D. R. Livingstone).
- 1993 M.Sc. Applied Toxicology (Distinction and awarded GlaxoWellcome Fellowship).  
 University of Portsmouth, U.K and GlaxoWellcome, Ware, U.K.  
 Thesis title (research): The Detection and Measurement of Interleukin-2 levels in mouse serum by an ELISA. (Advisor: Dr. P. Sibley).  
 Thesis title (library): The Use of QSARs In The Prediction Of Environmental Toxicity.  
 (Advisor: Dr. R. Greenwood).
- 1992 B.Sc. (Honors; First Class). Biology (major areas, Marine Biology and Applied Ecology).  
 University of Portsmouth, U.K.  
 Thesis title: The effect of light, temperature, salinity and nitrogen levels on the growth of apical fragments of *Sargassum muticum* to predict invasive potential of the non-native seaweed in U.K. waters. (Advisor: Dr. R. Fletcher).

**II. Professional Background:**

- 07/2008 – present Associate professor, Chesapeake Biological Laboratory, University of Maryland Center for Environmental Science.
- 04/2002 – 06/2008 Assistant professor, Chesapeake Biological Laboratory, University of Maryland Center for Environmental Science.
- 10/1999-04/2001 Postdoctoral Research Associate, Dept. Zoology, Oregon State University.  
 (Advisor: Dr. V. Weis)
- 07/1998-09/1999 Postdoctoral Research Associate, Research School of Biosciences, University of Kent, Canterbury, U.K.
- 04/1997-09/1998 Higher Scientific Officer, Molecular Toxicology Program, Plymouth Marine Laboratory, U.K.
- 09/1993-04/1997 Postgraduate Researcher / Teaching Assistant, Dept. Biochemistry, University of Birmingham, U.K.
- 09/1992-09/1993 Postgraduate Researcher, Dept. Immunotoxicology, GlaxoWellcome, U.K.

**III. Research:****A. Areas of professional expertise**

Environmental health and Environmental toxicology. Aquatic toxicology/physiology/ biochemistry,

with an emphasis on determining the exposure, uptake, metabolism, ultimate fate and effects of pollutants (heavy metals, organics including oil and its constituent PAHs and also oil spill chemical dispersants) and other abiotic and biotic stressors in resident organisms. Focus on the uptake, routes of exposure (dissolved, colloidal, particulate), mechanisms (bioaccumulation, retention and depuration, trophic transfer), partitioning, routes of metabolism and target sites of contaminants and investigating the risk bioaccumulation poses regarding consumption by higher trophic level organisms (including humans). Particular area of expertise on investigating environmental stressor-driven perturbations to normal biological processes, with respect to oxidative stress, endocrine disruption, DNA damage and gene induction. Toxicity testing (laboratory and field based approaches), application and development of various biomarkers at multiple levels. Shipboard and laboratory based assessment of ballast water treatment options and determining the presence and toxicity of halogenated disinfection by-products. Investigating mechanisms involved in the breakdown of cnidarian (including coral)-algal symbioses, including novel pathways and developing biomarkers that precede the bleaching event.

## B. Peer-Reviewed Publications (all years since Ph.D.):

### 1. Papers in Refereed Journals:

- Gonsior, M., Mitchelmore, C., Heyes, A., Harir, M., Richardson, S.D., Petty, W.T., Wright, D.A. and P. Schmitt\_Kopplin. Bromination of marine dissolved organic matter following full scale electrochemical ballast water disinfection. *ES&T*, 49, 15, 9048-9055.
- Pie, H.V., Schott, E.J. and Mitchelmore, C.L. 2015. Investigating molecular and physiological effects in juvenile blue crab, *Callinectes sapidus*, exposed to sediments contaminated by oil from the Deep-Water Horizon Incident. *STOTEN*, 532, 528-539.
- Pie, H. V. and Mitchelmore, C.L. 2015. Acute toxicity of current and alternative oil spill chemical dispersants to early life-stage blue crabs (*Callinectes sapidus*). *Chemosphere*, 128, 14-20.
- Studivan, M.S., Hatch, W.I. and Mitchelmore, C.L. 2015. Responses of the soft coral *Xenia elongata* following acute exposure to a chemical dispersant. *SpringerPlus*, 4, published Feb 13 2015.
- Pie, H. V., Heyes, A. and Mitchelmore, C.L. 2015. Investigating the use of oil platform marine fouling invertebrates as monitors of oil exposure in the Northern Gulf of Mexico. *STOTEN*, 508, 553-565.
- Harvey, R.H., Taylor, K.A., Fink, H.V. and Mitchelmore, C.L. 2014. Polycyclic aromatic and aliphatic hydrocarbons in Chukchi Sea biota and sediments and their toxicological response in the Arctic cod, *Boreogadus saida*. *J. Deep Sea Research Part II-Topical Studies in Oceanography*, 102, 32-55.
- Schwarz, J.A., Mitchelmore, C.L., Jones, R., O'Dea, A and Seymour, S. 2013. Exposure to copper induces oxidative stress responses and DNA damage in the coral *Montastraea franksi*. *Comp. Biochem. Physiol. Part C; Toxicology and Pharmacology*, 157, 3, 272-279.
- Bearr, J.S., Mitchelmore, C.L., Roberts, S.C. and Stapleton, H.M. 2012. Species specific differences in the *in vitro* metabolism of the flame retardant mixture, Firemaster BZ-54. *Aquat. Toxicol.*, 124, 41-47.
- Yost, D.M., Jones, R., Rowe, C.L. and Mitchelmore, C.L. 2012. Quantification of total and particulate dimethylsulfoniopropionate (DMSP) in five Bermudian coral species across a depth gradient. *Coral Reefs*, 31, 2, 561-570.
- Scholz, N.L., Fleishman, E., Brown, L., Werner, I., Johnson, M.L., Brooks, M.L., Mitchelmore, C.L. and Schlenk, D. 2012. A perspective on modern pesticides, pelagic fish declines, and

- unknown ecological resilience in highly managed ecosystems. *Bioscience*, 62, 428-434.
- Yost, D. M. and Mitchelmore, C.L. 2012. Substrate Kinetics of DMSP-lyases in various cultured *Symbiodinium* strains. *Bulletin of Marine Science*, 88, 2, 267-282.
- Brooks, M.L., Fleishman, E., Brown, L.R., Lehman, P.H., Werner, I., Scholz, N., Mitchelmore, C.L., Lovvorn, J.R., Johnson, M.L., Schlenk, D., van Drunick, S., Drever, J.I., Stoms, D.M., Parker, A.E., Dugdale, R. 2012. Life Histories, Salinity Zones, and Sublethal Contributions of Contaminants to Pelagic Fish Declines Illustrated with a Case Study of San Francisco Estuary, California, USA. *Estuaries and Coasts*, 35, 603-621.
- Harvey, H.R., Taylor, K.A., Fink, H.V. & C.L. Mitchelmore. 2012. OCS Study BOEM, 2012-012, 42-66.
- Schwarz, J., Jones, R., Venn, A. and Mitchelmore, C.L. 2011. Transcriptome-level responses to corals to copper. *Integrative and Comparative Biology*, 51, E250.
- Yost, D., Mitchelmore, C.L., 2010. Determination of total and particulate dimethylsulfoniopropionate (DMSP) concentrations in four scleractinian coral species: A comparison of methods. *JEMBE*, 395, 1-2, 72-79.
- Wright, D.A., Gensemer, R.W., Mitchelmore, C.L., Stubblefield, W.A., van Genderen, E., Dawson, R., Orano-Dawson, C.E., Berr, J.S., Mueller, R.A. and Cooper, W.J. 2010. Shipboard trials of an ozone-based ballast water treatment system. *Mar. Pollut. Bull.*, 60, 9, 1571-1583.
- Berr, J.S., Stapleton, H.M. and Mitchelmore, C.L. 2010. Accumulation and DNA damage in fathead minnows (*Pimephales promelas*) exposed to 2 brominated flame-retardant mixtures, Firemaster 550 and Firemaster BZ-54. *Environmental Toxicology and Chemistry*, 29, 3, 722-729.
- Yost, D., Jones, R. and Mitchelmore, C.L. 2010. Alterations in dimethylsulfoniopropionate (DMSP) levels in the coral *Montastraea franksi* in response to copper exposure. *Aquat. Toxicol.*, 98, 4, 367-373.
- Noyes, P.D., Kelly, S.M., Mitchelmore, C.L. Berr, J.S., Stapleton, H.M. and Mitchelmore, C.L. 2010. Accumulation and DNA damage in fathead minnows (*Pimephales promelas*) exposed to 2 brominated flame-retardant mixtures, Firemaster 550 and Firemaster BZ-54. *Environmental Toxicology and Chemistry*, 29, 3, 722-729.
- Noyes, P.D., Kelly, S.M., Mitchelmore, C.L. and Stapleton, H.M. 2010. Characterizing the *in vitro* biotransformation of the flame retardant BDE 99 by common carp. *Aquat. Toxicol.*, 97, 2, 142-150.
- Rowe, C.L., Mitchelmore, C.L. and Baker, J.E. 2009. Lack of biological effects of water accommodated fractions of chemically- and physically-dispersed oil on molecular, physiological, and behavioral traits of juvenile snapping turtles following embryonic exposure. *STOTEN*, 407, 20, 5344-5355.
- Schipper, C.A., Lahr, J., van den Brink, P.J. et al. 2009. A retrospective analysis to explore the applicability of fish biomarkers and sediment bioassays along contaminated salinity transects. *ICES Journal of Marine Science*, 66, 10, 2089-2105.
- Yost, D. and Mitchelmore, C.L. 2009. Dimethylsulfoniopropionate (DMSP) lyase activity in the symbiotic algae *Symbiodinium microadriaticum*. *Mar. Ecol. Prog. Ser.*, 386, 61-70.
- Schipper, C.A., Lahr, J., van den Brink, P.J. et al. 2009. A retrospective analysis to explore the applicability of fish biomarkers and sediment bioassays along contaminated salinity transects. *Assessment of effects of chemical contaminants in dredged material on marine ecosystems and human health*, 6, 9-34.

- Mitchelmore, C.L., Verde, E.A. and Weis, V.M. 2007. Uptake and partitioning of copper and cadmium in the coral *Pocillopora damicornis*. *Aquatic Toxicology*, 85, 1, 48-56.
- Sullivan, C., Mitchelmore, C.L., Hale, R. and Van Veld, P. 2007. Induction of CYP1A and DNA damage in the fathead minnow (*Pimephales promelas*) following exposure to biosolids. *Science of the Total Environment*, 384, 1-3, 221-228.
- 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, 10, 1091-1101.
- Benedict, R.T., Stapleton, H.M., Letcher, R.J. and Mitchelmore, C.L. 2007. Debromination of Polybrominated Diphenyl Ether-99 (BDE-99) in Carp (*Cyprinus carpio*) Microflora and Microsomes. *Chemosphere*, 69, 6, 987-993.
- Kuzmick, D.M., Mitchelmore, C.L., Hopkins, W.A. and Rowe, C.L. 2007. Effects of coal combustion residue on survival, antioxidant potential and genotoxicity resulting from full-lifecycle exposure of grass shrimp (*Palaemonetes pugio* Holthius). *Science of the Total Environment*, 373, 1, 420-430.
- Mitchelmore, C.L. and Rice, C. P. 2006. Correlations of Nonylphenol-ethoxylates and Nonylphenol with Biomarkers of Reproductive Function in Carp (*Cyprinus carpio*) from the Cuyahoga River. *Science of the Total Environment*, 371, 1-3, 391-401.
- Stapleton, H.M., Brazil, B., Holbrook, R.D., Mitchelmore, C.L., Benedict, R., Konstantinov, A. and Potter, D. 2006. *In Vivo* and *In Vitro* Debromination of Decabromodiphenyl Ether (BDE 209) by Juvenile Rainbow Trout and Common Carp. *Environ. Sci. Technol.*, 40, 1-5, 4653-4658.
- Owen, R., Mitchelmore, C., Jones, R., and J. Readman. 2005. A common sense approach for confronting coral reef decline associated with human activities. *Mar. Pollut. Bull.*, 51, 5-7, 481-485.
- Mitchelmore, C.L. and Hyatt, S. 2004. Assessing DNA damage in cnidarians using the Comet Assay. *Mar. Environ. Res.*, 58, 2-5, 707-711.
- Mitchelmore, C.L., Verde, E.A., Ringwood, A.H. and Weis, V.M. 2003. Differential accumulation of heavy metals in the sea anemone *Anthopleura elegantissima* as a function of symbiotic state. *Aquat. Toxicol.*, 64, 3, 317-2.
- Mitchelmore, C.L., Ringwood A.H. and Weis V.M. 2003. Differential accumulation of cadmium and changes in glutathione levels as a function of symbiotic state in the sea anemone *Anthopleura elegantissima*. *JEMBE*, 284, 1-2, 71-85.
- Mitchelmore, C.L., Schwarz, J.A. and Weis, V.M. 2002. Development of symbiosis-specific genes as biomarkers for the early detection of cnidarian-algal symbiosis breakdown. *Mar. Environ. Res.*, 54, 3-5, 345-349.
- Doyotte A., Mitchelmore, C.L., Ronisz, D., McEvoy, J., Livingstone, D.R. and Peters, L.D. 2001. Hepatic 7-ethoxyresorufin *O*-dethylase activity in eel (*Anguilla anguilla*) from the Thames Estuary and comparisons with other United Kingdom estuaries. *Mar. Pollut. Bull.*, 42, 12, 1313-1322.
- Peters L.D., Doyotte, A., Mitchelmore C.L., McEvoy J. and Livingstone, D.R. 2001. Seasonal variation and estradiol-dependent elevation of Thames Estuary eel *Anguilla anguilla* plasma vitellogenin levels and comparisons with other United Kingdom estuaries. *Science of the Total Environment*, 279, 1-3, 137-150.
- Livingstone D.R., Mitchelmore C.L., Peters L.D., O'Hara S.C.M., Shaw J., Chesman B., Doyotte A., McEvoy J., Ronisz D., Larsson D.G.J. and Forlin L. 2000. Development of Hepatic CYP1A and Blood Vitellogenin in Eel (*Anguilla anguilla*) for Use as Biomarkers in

- the Thames Estuary, UK. *Mar. Environ. Res.*, 50, 1-5, 367-371.
- Livingstone D.R., Mitchelmore C.L., O'Hara S.C.M., Lemaire P., Sturve J. and Forlin L. 2000. Increased Potential for NAD(P)H-dependent Reactive Oxygen Species Production of Hepatic Subcellular Fractions of Fish Species with *In Vivo* Exposure to Contaminants. *Mar. Environ. Res.*, 50, 1-5, 57-60.
- Livingstone, D.R., Chipman, J.K., Lowe, D.M., Minier, C., Mitchelmore, C.L., Moore, M.N., Peters, L.D. and Pipe, R.K. 2000. Development of biomarkers to detect the effects of organic pollution on aquatic invertebrates: recent molecular, genotoxic, cellular and immunological studies on the common mussel (*Mytilus edulis* L.) and other mytilids. *International J. of Environment and Pollution*, 13, 1-6, 56-91.
- Mitchelmore C.L. and Chipman J.K. 1998. DNA strand breakage in aquatic organisms and the potential value of the comet assay in environmental monitoring. *Mutation Res.- Fundamental and Molecular Mechanisms of Mutagenesis*, 399, 2, 135-147.
- Mitchelmore C.L. and Chipman J.K. 1998. Detection of DNA strand breaks in Brown Trout (*Salmo trutta*) hepatocytes and blood cells using the single cell gel electrophoresis (comet) assay. *Aquat. Toxicol.*, 41, 1-2, 161-182.
- Mitchelmore C.L., Birmelin C., Livingstone D.R. and Chipman J.K. 1998. Evidence for cytochrome P450 catalysis and free radical involvement in the production of DNA strand breaks by benzo[a]pyrene and nitroaromatics in mussel (*Mytilus edulis* L.) digestive gland cells. *Aquat. Toxicol.*, 41, 3, 193-212.
- Mitchelmore C.L., Birmelin C., Livingstone D.R. and Chipman J.K. 1998. Detection of DNA strand breaks in isolated mussel (*Mytilus edulis* L.) digestive gland cells using the comet assay. *Ecotox. Environ. Safety*, 41, 1, 51-58.
- Mitchelmore C.L., Livingstone D.R. and Chipman J.K. 1998. Conversion of 1-nitropyrene by Brown trout (*Salmo trutta*) and turbot (*Scophthalmus maximus*) to DNA adducts detected by <sup>32</sup>P-postlabelling. *Biomarkers*, 3, 1, 21-33.
- Birmelin C., Mitchelmore C.L. Goldfarb P.S. and Livingstone D.R. 1998. Characterisation of biotransformation enzyme activities and DNA integrity in isolated cells of digestive gland of the common mussel, *Mytilus edulis* L. *Comp. Biochem. Physiol. A-Molecular and Integrative Physiology*, 120, 1, 51-56.
- Hodges, N.J., Mitchelmore, C.L. and J.K. Chipman. 1997. DNA strand breakage in human lymphocytes and trout erythrocytes by MX. *Mutagenesis*, 12, 2, 107-108.
- Mitchelmore, C.L., Birmelin C. and D.R. Livingstone. 1997. Polycyclic and nitro-aromatic compounds produce DNA strand breakage in brown trout (*Salmo trutta*) and mussel (*Mytilus edulis* L.) cells. *Mutagenesis*, 12,2, 101.
- Mitchelmore C.L., Chipman J.K., Garcia-Martinez P., Lemaire P., Peters L.D. and Livingstone D.R. 1996. Normal status of Hepatic 7-ethoxyresorufin *O*-Deethylase (EROD) activity, antioxidant enzymes and DNA oxidation in Turbot (*Scophthalmus maximus*) and other flatfish species following exposure to nitroaromatic compounds. *Mar. Environ. Res.*, 42, 1-4, 329-333.
- Solé M., Porte C., Biosca X., Mitchelmore C.L., Chipman J.K., Livingstone D.R. and Albaiges J. 1996. Effects of the Aegean Sea oil-spill on biotransformation enzymes, oxidative stress and DNA-adducts in digestive gland of the mussel (*Mytilus edulis* L.). *Comp. Biochem. Physiol. C-Pharmacology, Toxicology and Endocrinology*, 113, 2, 257-265.
- Mitchelmore, C.L., Chipman, J.K., Nunn, J.W., Livingstone, D.R., Matthews, A., Fossato, V. & C. Nasci. 1995. Status of xenobiotic metabolizing enzymes and DNA adduct in *Zosterisessor*

*ophiocephalus* and *Mytilus galloprovincialis* in relation to chemical exposure in Venice Lagoon, Italy. *Mutagenesis*, 10,1 74.

## 2. Papers in review (current)

- Forth, H.P., Morris, J.M., Lay, C.R., Lipton, J., Mitchelmore, C.L. and Suttles S.E. 2015. Characterization of Oil and Water Accommodated Fractions Used to Conduct Aquatic Toxicity Testing in Support of the Deepwater Horizon Natural Resource Damage Assessment: Part 1: WAF Chemistry. ES&T. In Review.
- Mitchelmore, C.L., Bishop, C. and T.K. Collier. 2015. Toxicological estimation of mortality of oceanic sea turtles oiled during the Deepwater Horizon Oil Spill. *Endangered Species Research*. In Review.

## 3. Peer-reviewed Book chapters and other publications

- NRC. 2015. Spills of Diluted Bitumen fro Pipelines. A Comparative Study of Environmental Fate, Effects, and Response. 2015. National Academies Press, Washington DC. (Member of the committee).
- Mitchelmore, C.L., Rowe, C.L. and A. R. Place. 2006. Tools for Assessing Contaminant Exposure and Effects in Reptiles. In: *Toxicology of reptiles*, Eds: Gardner, S and E. Oberdorster, CRC Press, Taylor and Francis Group LLC, FL, pp. 63-122.
- NRC. 2005. Oil Spill Dispersants; Efficacy and Effects. National Academies Press, Washington DC. (Member of the committee; particularly responsible for Ch. 5; Toxicological effects of dispersants and dispersed oil).

## 4. Scientific or technical reports (last 5 years only):

- Mitchelmore, C.L. 2016. Written expert report for civil action No: 2:13-21588 Sierra Club v. Fola Coal Company. February 5<sup>th</sup>, 2016. Prepared for the Sierra Club and Appalachian Center for the Economy and the Environment. 15 pp.
- Mitchelmore, C.L., Bishop, C. and T.K. Collier. 2015. Estimated mortality of oceanic sea turtles oiled during the BP Deepwater Horizon Oil Spill. Expert Toxicology Panel Technical Report. 23 pp. In: DWH Trustees; *Deepwater Horizon Oil Spill Programmatic Damage Assessment and Restoration Plan and Programmatic Environmental Impact Statement*. Draft. October. <http://www.gulfspillrestoration.noaa.gov/restoration-planning/gulf-plan/>
- Mitchelmore, C.L. and C.L. Rowe. 2015. Examining the Effects of Ingested Deepwater Horizon Oil on Juvenile Red-Eared Sliders (*Trachemys scripta elegans*) and Common Snapping Turtles (*Chelydra serpentina*) as Surrogate Species for Sea Turtles. Technical Report Prepared for NOAA Assessment and Restoration Division, Seattle, WA. August, 2015. 104pp.
- Forth, H.P., Morris, J.M., Lay, C.R., Lipton, J., Suttles, S.E. and C.L. Mitchelmore. 2015. Characterization of oil and Water Accommodated Fractions Used to Conduct Aquatic Toxicity Testing in support of the Deepwater Horizon Natural Resource Damage Assessment. Technical Report Prepared for NOAA Assessment and Restoration Division, Seattle, WA. August, 2015. 49pp.
- Mitchelmore, C.L. 2013. Opinion Report on the West Virginia DEP's Emergency Rule For Changes to the Water Quality Standard For Aluminum (January, 2013). March 18<sup>th</sup>, 2013. Prepared for the Appalachian Center for the Economy and the Environment.
- Schott, E.S., Mitchelmore, C.L., Heyes, A.H. and Chung, S. December, 2013. Impacts of

- dispersant, oil and chemically-dispersed oil on larval blue crab. Final report submitted to The Coastal Response Research Center (CRRC), UNH (NOAA). Download at [www.crrc.unh.edu](http://www.crrc.unh.edu).
- Mitchelmore, C.L. 2012. Written report, testimony and expert witness in aquatic toxicology for Ohio Valley Environmental Coalition v. U.S. Army Corps of Engineers, Civil No. 3:11-cv-0149 (S.D. W.Va.) in Charleston, West Virginia, May 8th 2012.
- Mitchelmore, C.L. 2011. Written report for civil action no. 2:10-1199. Sierra club v. Fola Coal Company, LLC. Report prepared April 25th, 2011 by Dr. Carys L. Mitchelmore for Sierra Club and Appalachian Center for the Economy and the Environment.
- Mitchelmore, C.L. 2010. Written report, testimony and expert witness in aquatic toxicology before the West Virginia Environmental Quality Board in Sierra Club v. Clark, Appeal NO. 10-34-EQB, held in Charleston, West Virginia, December 13-17th 2010.
- Mitchelmore, C.L. March 1<sup>st</sup> 2010. Report on the U.S. Environmental protection Agency's Chronic Whole Effluent Toxicity Testing At Selected Sites in the Coalfields of Kentucky and West Virginia. Prepared for the Sierra Club and Appalachian Center for the Economy and the Environment.
- Mitchelmore, C.L. and Baker, J.E. July 10<sup>th</sup>, 2010. Acute and Chronic effects of oil, dispersant and dispersed oil to sensitive symbiotic cnidarian species, including corals. Final report submitted to The Coastal Response Research Center (CRRC), UNH (NOAA). Download at [www.crrc.unh.edu](http://www.crrc.unh.edu).

### C. Contracts and Grants

#### 1. Awarded proposals (2011-2015):

Effects of toxic algal blooms on health and disease of the blue crab *Callinectes sapidus*: defining thresholds for exposure. Maryland Sea Grant. \$72, 903. 1 Year (2/2011-1/2012). (co-Principal Investigator w/other). (8% time). (IMET2011-003SG; submitted 07/19/2010).

Evaluation of photoenhanced toxicity in surface water organisms in the Gulf of Mexico following exposure to oil released from the Deepwater horizon blowout. Cossich and partners. \$50,822. 6 months (March 2011-September 2011). (Principal Investigator). (8% time). (CBL2011-065MDL; submitted 03/25/2011).

Examining the differences in oil particle sizes prepared using different source oils, preparation methods and chemical dispersant. Stratus Consulting, \$115,600, 5 months (1<sup>st</sup> March – 30<sup>th</sup> July 2012). (Principle Investigator). (16% time). (CBL2012-011STR; submitted 02/24/2012).

Understanding chronic impacts of chemical dispersant and chemically-dispersed oil on behavior, molting success, and hormone status and of blue crab larvae: inputs for recruitment and population models. UNH, CRRC, NOAA, \$146, 549. 12 months (12/15/2012-12/14/2013). (co-Principal Investigator w/others). (8% time). (IMET2012-037CRR; submitted 06/18/2012).

Expansion of LISST oil particle size analyses using filtration techniques and finer resolution particle size analysis using coulter counter techniques. Stratus Consulting, \$60,466, 4 months (06/01/2012 –09/30/2012). (Principle Investigator). (0% time). (CBL2012-072aSTRA; submitted 07/03/2012).

Collection and housing of two hatchling turtle species (the snapping turtle and red eared slider) for future oil exposure studies. Stratus Consulting. \$9,030. 1 month (08/15/2012 – 09/15/2012). (Principal Investigator w/Rowe). (4% time). (CBL2013-001bSTR; submitted 08/14/2012).

Work Plan for Proposed Microbial Bio-Endpoint Study to Investigate Rapid Performance Assessment of a Ballast Water Treatment System (BWTS) and Potential for Latent UV Effects. Hyde Marine Inc./Calgon. \$23,978. 1 month (10/01/2012 – 10/30/2012). (Principle Investigator). (4% time). (CBL2013-023HYDE).

Collection and housing of two hatchling turtle species (the snapping turtle and red eared slider) for future oil exposure studies. Stratus Consulting. \$49,464. 6 months (10/01/2012 – 04/30/2013). (Principal Investigator w/Rowe). (4% time). (CBL2013-001cSTR; submitted 10/02/2012).

Examining the acute toxicity of field-collected oiled sediments from the Gulf of Mexico to juvenile blue crabs (*Callinectes sapidus*). Stratus Consulting. \$50,122. 7 months (07/01/2012 – 02/28/2013). (Principal Investigator w. others). (8% time). (CBL2013-005cSTR; submitted 11/29/2012).

Collection, housing and tank building for two hatchling turtle species (the snapping turtle and red eared slider) for future oil exposure studies. Stratus Consulting, \$29,854, 4 months (03/10/2013 – 06/30/2013). (Principal Investigator w/Rowe). (0% time). (CBL2013-050STRA; submitted 03/12/2013).

Collection and housing of two hatchling turtle species (the snapping turtle and red eared slider) for future oil exposure studies. Stratus Consulting. \$4,500. 1 month (07/15/2013 – 08/14/2013). (Principal Investigator w/Rowe). (4% time). (CBL2013-050bSTR; submitted 07/23/2013).

Quantifying the amount and size of oil particles in toxicity exposure solutions using filtration techniques, LISST and Coulter counter analyses. Stratus Consulting, \$115,999, 2 months (04/08/2013 – 09/07/2014). (Principle Investigator). (8% time).

Examining The Effects of Deepwater Horizon oil on Juvenile Sea Turtles using Surrogate Species (Red-eared Sliders and the Common Snapping Turtles): TIER 1 oil ingestion study and ACTH challenge. Stratus Consulting, \$196,415, 7 months (08/01/2013-01/31/2014). (Principle Investigator). (16% time) (CBL2014-002STRA, submitted 01/2014).

Evaluation of Options for Controlling Rope Grass Hydroid Colonies in Power Plant Intake Pipes. Constellation Energy Group, Calvert Cliffs Nuclear Energy Plant. (2 years total for Phases 1-3). Phase 1 funded, \$67,490. (02/01/2014-12/31/2014). (co-PI w/others, 4% time). (CBL2014-031CEG).

Expansion of project: Examining The Effects of Deepwater Horizon oil on Juvenile Sea Turtles using Surrogate Species (Red-eared Sliders and the Common Snapping Turtles): TIER 1 oil ingestion study and ACTH challenge. Stratus Consulting, \$18,844, 3 months (07/01/2014-09/30/2014). (Principle Investigator). (0% time) (CBL2014-021aSTR, submitted 07/25/2014).



Expansion of project: Quantifying the amount and size of oil particles in toxicity exposure solutions using filtration techniques, fluorometry and Coulter counter analyses. Stratus Consulting, \$10,999, 2 months (05/01/2014 –06/30/2014). (Principle Investigator). (8% time).

Expansion of project: Quantifying the amount and size of oil particles in toxicity exposure solutions using filtration techniques, fluorometry and Coulter counter analyses. Stratus Consulting, \$53,952, 2 months (07/01/2014 –09/22/2014). (Principle Investigator). (8% time). (CBL2014-085STRA; submitted 07/23/2014).

Continuation of data analysis, report and publication preparation for two Stratus Projects. Stratus Consulting, \$67,132, 4 months (02/2015-05/2015). (Principle Investigator). (16% time). (CBL2015-057STRA).

Does *C. ariakensis* bioaccumulate more microbial pathogens than *C. virginica* increasing the pathogenic risk for human consumption? NOAA, Chesapeake Bay Office. \$89,950. 1 year (08/2005-08/2006). (Principal Investigator).

Chronic toxicity testing to determine the environmental risks of proposed ballast water treatment biocides. National Sea Grant College - Aquatic Invasive Species. \$302,002. 2 years (06/2005-05/2007). (Principal Investigator w/Wright, Yonkos and Fisher).

Acute and chronic effects of oil, dispersant and dispersed oil to sensitive symbiotic Cnidarian species, including coral. NOAA/Univ. of New Hampshire/ CRRC. \$199,247. 2 years (1/05-1/07). (Principal Investigator w/Baker).

Dispersant effects in the soft coral *Xenia* sp. NOAA/CRRC. \$17,950. Addendum to coral oil project. (Principal Investigator w/Baker).

Studies Using Aquatic Turtles (the Diamondback Terrapin and Snapping Turtle) to Assess Long-term Effects of Oiling of Nests During Early Embryonic Development. NOAA/Univ. of New Hampshire/ CRRC. \$205,421. 2 years (1/05-1/07). (Co-Principal Investigator w/Rowe, 20% time; proposal initiation and responsible for biomarker analyses).

Studies Using Aquatic Turtles to Assess Long-term Effects of Oiling of Nests During Early Embryonic Development. NOAA/CRRC. \$13,201. Addendum to reptile oil project. (Co-Principal Investigator w/Rowe, 20% time; responsible for biomarker analyses).

An analysis of reproductive ramifications of PCBs in Hudson River Snapping Turtles. Hudson River Foundation. \$185,185. 2 years (3/04-3/06). (Co-Principal Investigator, 15% time; responsible for biomarker analyses).

Increasing controlled environmental chamber capabilities to enhance research using seawater systems facilities. NSF. \$89,120. 1 Year (10/2005-10/2006). (co-Principal Investigator w/others).

Oxidative stress and DMSP production in hard corals exposed to pesticides and heavy metals. BIOS Grants in aid program, Bermuda. \$2,104. (1 month; 10/2007). (Principal Investigator).

## 2. Proposals submitted in 2015 (\*: still pending as of 06/2015)

Gonsior, M., Heyes, A.H., Mitchelmore, C.L. and Richardson, S.D. Collaborative Research: Fundamental Understanding of the Environmental Fate of Disinfection By-Products Arising from Desalination Plants. NSF, CHE – Environmental Chemical Science, 3 years (08/01/16-07/31/19), \$483,666 (co-PI) (CBL2016-033). Submitted 11/02/15.

## D. Invited Seminars and Contributed Presentations (2010-2015):

## D1. Invited Seminars and presentations:

Pesticides and the Chesapeake Bay Watershed Project. Ninth Annual Meeting, October 2015. Baltimore, MD.

NRDA Turtle Injury Meeting, St Petersburg, FL, March 16-18 2015.

NRDA Turtle Injury Meeting, St Petersburg, FL, June 11-14 2014.

Impacts of oil to invertebrates, Invited Oral Presentation, AAS meeting, Boston MA, February 15-17<sup>th</sup>, 2013.

Toxicity of oil and chemical dispersants on corals and other cnidarian species. Invited Oral presentation at the Deepwater Horizon toxicity Topic session, Society of Toxicology (SOT), San Francisco, CA, March 11-15<sup>th</sup>, 2012.

Toxicity of oil and dispersants. Invited Oral Presentation, NOAA/Stratus Consulting, Boulder, CO. September 26-28<sup>th</sup>, 2011.

Impacts of oil and chemical dispersants on corals. Invited Oral presentation at the Gulf Oil Spill Focused Topic Meeting, SETAC, Pensacola Beach, Florida, May 26<sup>th</sup>, 2011.

Impacts of Corexit 9500 and Chemically-dispersed oil on symbiotic anemones and corals. PRIMO 16, Long Beach, CA, May 15<sup>th</sup> 2011.

Oil Spill Chemical dispersants; the Good, the Bad or the Ugly. Invited Oral Presentation at the Society of Toxicology (SOT) meeting. Washington, D.C., March 2011.

Oil Spill Chemical dispersants; the Good, the Bad or the Ugly. Invited Oral Presentation for the Department of Natural Resources (DNR). Annapolis, MD, February 2010.

Oil Spill Chemical dispersants; the Good, the Bad or the Ugly. Invited Oral Presentation at the American College of Veterinary Pathologists (AVCP) meeting. Baltimore, MD, October 2010.

Contaminants in the home. SMCM, St Mary's City, MD. Invited Seminar, March 2010.

## D2. Oral and poster presentations (2015/2016 only):

Mitchelmore, C.L., Rowe, C.L. et al. 2016. Effects of Deepwater Horizon Oil on Red-Eared Sliders (*Trachemys scripta elegans*) and Common Snapping Turtles (*Chelydra serpentina*) as Surrogate Species for Sea Turtles. 2016 Gulf of Mexico Oil Spill and Ecosystem Science Conference. February 1<sup>st</sup>-4<sup>th</sup>, 2016. Tampa, FL. Oral Presentation.

Forth, H.P. Morris, J.M. and C.L. Mitchelmore. 2015. Characterization of oil and water accommodated fractions used to conduct toxicity testing for the Deepwater Horizon Natural Resource Damage Assessment. SETAC, Salt Lake City, 1-5<sup>th</sup> November, 2015. Oral Platform Presentation.

Lay, C.R., Forth, H.P., Morris, J.M., Lipton, J. and C.L. Mitchelmore. 2015. Characterization of the dissolved fraction of PAH in mixtures of water and oil used during toxicity testing as

part of the Deepwater Horizon NRDA. SETAC, Salt Lake City, 1-5<sup>th</sup> November, 2015.  
Poster Presentation.

D3. Symposia organized/chaired for Professional meetings/workshops (last 5 years)

Co-chair, Gulf Oil Spill Session, AAS, Boston, MA, February 15-17<sup>th</sup>, 2013.

Co-chair, Gulf Oil Spill Focused Topic Meeting. SETAC, Pensacola Beach, Florida, May 26-28 2011.

D4. Invited Contributions / workshop or workgroup participation and media involvement

National Academies Committee. "Effects of Diluted Bitumen on the Environment: A Comparative Study". November 2014-December 2015.

NOAA NRDA Turtle toxicity working group (for Deepwater Horizon). 2012 – 2015.

NOAA NRDA Marine Mammal working group/workshop, Invited Participant, Charleston, SC, July 13<sup>th</sup>-15<sup>th</sup>, 2011.

Working group on contaminants and pelagic organism declines. National Center for Ecological Analysis and Synthesis and the Interagency Ecological Program. Santa Barbara, CA. January 2008 - 2010.

Dispersant workgroup meeting invited participant. NOAA CRRC, UNH. Baton Rouge, May 2010.

Various written (including New Scientist, Scientific American, New York Times etc) and TV/radio (including CNN, NPR, GMA and Dan Rather reports) media reports. These are listed on the [www.umces.edu](http://www.umces.edu) website (see UMCES in the media tab; 2010).

Science Communication workshop, Environmental Health News, Washington DC. April 2008.

#### F. Active Memberships in Professional Societies

Society of Environmental Toxicology and Chemistry (SETAC)

Society of Toxicology (SOT).

#### IV. Teaching and Training

2002- Member, USM Inter-Institutional Graduate Faculty (MEES program)

2002- Member, UMBC Toxicology Graduate Program (TOX program)

A. University System of Maryland Course's Taught (see Table 1 for details):

- Solely responsible for MEES 698I/498I (guest speakers included); Chesapeake Bay Health (every Fall, 3 credit).
- Solely responsible for MEES 743 (TOX 625); Aquatic toxicology class (even Spring, 3 credit).
- Jointly responsible (50%) for MEES 698W; Molecular Techniques in Environmental Science class (odd Winter, 2 credit).
- Jointly responsible (50%) for MEES 608; Ecotoxicology Seminar (Fall; 1 credit).
- Guest lecturer for Introduction to MEES 643: Environmental Toxicology (Fall 3 credit).

Please see Table 1 listed below for specifics on course details. Student feedback on all classes available from the Directors office as requested.

## B. Graduate Students Supervised as Major Advisor

### 1. Degrees Completed

Benedict, R.T. Ph.D. Toxicology Program, UMBC. Metabolic Debromination and Genotoxicity of Polybrominated Diphenyl Ethers in Common Carp (*Cyprinus carpio*). July 2008.

Yost, D.M. Ph.D. MEES, CBL. Dimethylsulfonyopropionate (DMSP) and DMSP-lyase in cnidarian algal symbioses. May 2010.

Bearr, J.S. Ph.D. Toxicology Program, UMBC. Fate and effects of new formulation flame retardants, Firemaster 550 and BZ-54. August 2010.

Pie, H. V. Ph.D. Toxicology Program. UMBC. Impact of oil and dispersant on invertebrate species, May 2014.

Table 1: University of Maryland Course's Taught (2002-2015):

Course No.	Title	Institution	Semester	Enrollment	Credit Hrs.	Co-Instructors	Lecture Hrs
MEES 743; TOX 625	Aquatic Toxicology	CBL	2010 (Spring)	9	3		45
MEES 608P	Oil Pollution Seminar	CBL	2010 (Fall)	14	1		15
MEES 698I/498I	Chesapeake Bay Health	CBL	2010 (Fall)	7	3	Some guest lecturers	45
MEES 608P	Oil Pollution Seminar	CBL	2011 (Spring)	15	2		30
MEES 498E/698E**	Physiological Ecology of animals	CBL	2011 (Spring)	10	3	Gave 3 lectures	30
MEES 743; TOX 625	Aquatic Toxicology	CBL	2012 (Spring)	9	3		27
MEES 608P	Oil Pollution Seminar	CBL	2013 (Spring)	4	2		8
MEES 498E/698E**	Physiological Ecology of animals	CBL	2011 (Spring)	8	3	Gave 3 lectures	24
MEES 698I/498I	Chesapeake Bay Health	CBL	2013 (Fall)	6	3	Some guest lecturers	18
MEES 608W	Environmental Forensics	CBL	2013 (Fall)	6	2	Gave 3 lectures	12
MEES 743; TOX 625	Aquatic Toxicology	CBL	2014 (Spring)	10	3		30
MEES 698I/498I	Chesapeake Bay Health	CBL	2014 (Fall)	13	3	Some guest lecturers	39
MEES 743; TOX 625	Aquatic Toxicology	CBL	2016 (Spring)	8	3		24

\*\*; guest lecturer for class

### 2. Graduate Student Committee Memberships (2002-2015) (\*; completed)

Mary Larkin	Ph.D. TOX	UMCES (IMET)
Jenna Luek	Ph.D. MEES	CBL
Ed Kruse	Ph.D. MEES	UMCP

Alison Straka*	M.Sc. MEES	CBL
Meredith Bohannon*	Ph.D. MEES	UMCP
Karen Eisenrich*	Ph.D. MEES	CBL
Dana Armstrong*	Ph.D. MEES	UMCP
Shannon Kelly*	M.Sc. TOX	UMBC
Danika Kuzmick*	M.Sc. MEES	CBL
Susan Klosterhaus*	Ph. D. MEES	CBL
Amy Merten*	Ph. D. MEES	CBL
Karen Eisenrich*	Ph.D. MEES	CBL
Moira McKernan*	Ph.D. MEES	UMCP
Connie Sullivan*	M.Sc.	VIMS

### 3. Research Internships Supervised

Table 2: a. Undergraduate (for Reported calendar years, i.e. 2007-2013)

NAME	DATE @ CBL	AFFILIATION	PROJECT TITLE
Jennifer Middleton	May-Aug 2010	MDSG-REU	Biomarkers in Arctic whelks
Zachary Watkins	May-Aug 2013	MDSG-REU	PAH in rig organisms
Sydney Novak	May-Aug 2014	MDSG-REU	DNA damage (oil responses)

## V. Outreach and Service (2002-2015)

### A. Editorships:

June 2009 – 2012: Aquatic Toxicology, co-editor

### C. Federal/State/Local Government (2010-2015):

1. Federal Congressional testimonies (available for download on [www.umces.edu](http://www.umces.edu) website);

May 11<sup>th</sup>, 2010. Senate Committee on Environment and Public Works. Hearing on “EPA’s Role in Protecting Ocean Health”.

May 19<sup>th</sup>, 2010. House Committee on Transportation and Infrastructure. Hearing on “Deepwater Horizon: Oil Spill Prevention and Response Measures, and Natural Resource Impacts”.

May 21<sup>st</sup>, 2010. House Committee on Energy and Commerce. Bipartisan Briefing on Oceans Under Siege: Environmental Impacts Of The BP Oil Spill.

June 10<sup>th</sup>, 2010. House Subcommittee on Insular Affairs, Oceans and Wildlife. Oversight Hearing on “Our Natural Resources at Risk: The Short and Long Term Impacts of the Deepwater Horizon Oil Spill”.

June 17<sup>th</sup>, 2010. Senate Committee on Small Business and Entrepreneurship. Hearing on “Harnessing Small Business Innovation: Navigating the Evaluation Process for Gulf Coast Oil Cleanup Proposals”.

2. State (Maryland) Congressional testimonies (2010-2015);

March 3<sup>rd</sup>, 2010. Testimony in Senate and House Regarding Pesticide use reporting Bill.  
 February 23<sup>rd</sup>, 2011. Testimony in House and Senate Regarding pesticide use reporting Bill.  
 March 5<sup>th</sup>, 2013. Testimony in Senate Regarding Pesticide Use reporting Bill.  
 February 27<sup>th</sup>, 2013. Testimony in House Regarding Pesticide Use reporting Bill.  
 February, 2014. Testimony in House Regarding Pesticide Use reporting Bill.  
 March, 2014. Testimony in Senate Regarding Pesticide Use reporting Bill.  
 February, 2015. Testimony in House Regarding Neonicotinide Pesticide Labeling Bill.  
 March, 2015. Testimony in Senate Regarding Neonicotinide Pesticide Labeling Bill.

### 3. Expert witness testimonies (National; past 5 years);

May 9<sup>th</sup>-10<sup>th</sup>, 2016. Expert witness in Fola “Leatherwood” trial in Huntington, West Virginia.  
 March 17<sup>th</sup>, 2016. Expert witness at the deposition for the Fola “Leatherwood” case.  
 May 8<sup>th</sup>-11<sup>th</sup>, 2012. Attendance and expert witness in trial in Huntington, West Virginia regarding the ‘Reylas case’.  
 April 19<sup>th</sup>, 2012. Expert witness at the deposition for the “Reylas case”, Annapolis, MD.  
 July 13-15<sup>th</sup>, 2011. Expert witness at Mountain top mining trial case. Charleston, West Virginia.

### D. International

Reviewer of research proposals submitted to NERC (UK). 2004-2008.

### E. University System of Maryland

Toxicology Program student selection committee member (for PhD and MSc students). 2012-present.  
 Lecture for undergraduates from Lafayette College, CBL. 2007  
 Lecture and lab based class for summer middle school children (w/ Jackie Takacs). 2006-2008.  
 Lecture and lab based class for summer high-school teacher program (w/ Jackie Takacs). 2004-2008.

### F. UMCES and Laboratory (2010-2015):

Chair of CBL’s GEC education committee (2015-present).  
 UMCES GFC fellowship committee (2015-present).  
 Member of the UMCES graduate faculty council (2015-present).  
 CBL’s GEC graduate education committee (2004-2013).  
 On numerous occasions helped out in the CBL Visitors center (including docent and public outreach talks, tours; 2002-current).  
 Chair of safety committee. (2008 – 2015).  
 CBL’s GEC graduate education committee (2004-2013).  
 Involved in various teacher outreach programs (lecture and laboratory based classes; 2004-current).  
 On various promotion and new faculty search committees (2006 to present);  
 REU selection committee. (March 2009-2011, 2012, 2013).

### G. Other Professional Service (2010-2015)

South Carolina Sea Grant proposal review panel (August 2013 and 2015).  
 National Academies Committee. “Effects of Diluted Bitumen on the Environment: A

Comparative Study". November 2014-December 2015.

Chesapeake Bay program: Toxics Contaminants Subgroup committee member (2014-present).

Board member for the Maryland Pesticide Education Network (December 2014-present).

Maryland Pesticide Network committee member (2013-present).