Exponent®
Engineering & Scientific Consulting

Beatrice Hernout, Ph.D.

Senior Scientist | Ecological and Biological Sciences
Natick
+1-508-903-4686 | bhernout@exponent.com

Professional Profile

Dr. Hernout specializes in wildlife toxicology, with a focus on understanding how chemical stressors impact wildlife populations. She has experience assessing the exposure and bioaccumulation of chemicals in wildlife, evaluating potential adverse effects and predicting risks.

Dr. Hernout's research draws upon her expertise using techniques from molecular toxicology (e.g., Western blotting, EROD assays, and GST assays), spatial analysis, analytical chemistry (i.e., ICP-MS and GC-MS), ecological monitoring, and computational biology.

Her doctoral studies focused on developing and applying a spatially explicit modeling framework to assess the risks of soil-associated metals to bats in England and Wales. She also extended the model to assess exposure to several passerine bird species, and validated model results against a targeted monitoring dataset of metal concentrations in bat tissues. Further, Dr. Hernout developed an in vitro gastric model to assess the bioaccessibility of metals ingested by insectivorous bats.

Dr. Hernout’s post-doctoral research focused on the effects of organic chemicals on marine organisms. She investigated the effects of crude oil, dispersant, and their mixture, on enzymes involved in endocrine function and detoxification processes in the loggerhead sea turtle (Caretta caretta). Her research also investigated metabolic disruptions (e.g., Tricarboxylic acid (TCA) cycle activity) induced by hypoxia in zebrafish (Danio rerio) using a genome-scale metabolic model. She also studied the association between organic compounds (e.g., PCBs and PAHs) and biochemical biomarkers of pollution in fish from the Gulf of Mexico.

Academic Credentials & Professional Honors

Ph.D., Environmental Science, University of York, UK, 2014

M.S., Ecology and Ethology, Universite Jean Monnet, France, 2008

B.S., Environment Management, Universite de Provence, France, 2006

Post-doctoral Scholarship from Texas A&M in Galveston, Department of Marine Biology (2017 - 2019).

Marie Curie Fellowship, Seventh Framework Programme. CREAM (Mechanistic Effect Models for Ecological Risk Assessment of Chemicals) Project Fellow (2010 – 2014).

Awardee from the Exchange Programme CREPUQ with the Université du Québec à Rimouski, Québec, Canada (2005 – 2006).

Academic Appointments

Assistant Professor, Environmental Sciences, Institute for a Sustainable Environment and Department of Biology, Clarkson University, 2019 – 2022.

Professional Affiliations

Society of Environmental Toxicology and Chemistry (SETAC) Member

Society of Environmental Toxicology and Chemistry (SETAC) Wildlife Toxicology Interest Group Steering Committee Member

Languages

French (France)

Publications

Keute, J., Rizzo, J., Giunta, F., & Hernout, B. V., 2024. Evaluating washing techniques to eliminate external contamination of trace elements in bat fur and bird feathers. Ecotoxicology and Environmental Safety, 283, 116819. https://doi.org/10.1016/j.ecoenv.2024.116819.

Giunta, F., Hernout, B. V., Langen, T. A., & Twiss, M. R., 2024. A systematic review of trace elements in the tissues of bats (Chiroptera). Environmental Pollution, 124349. https://doi.org/10.1016/j.envpol.2024.124349.

Giunta, F.; Hernout, B.; Langen, T.; Twiss, M., 2024. Supplementary information from: A systematic review of trace elements in the tissues of bats (Chiroptera) [Dataset]. Dryad. https://doi.org/10.5061/dryad.sxksn03bb

Hala, D., Faulkner, P., He, K., Kamalanathan, M., Brink, M., Simons, K., Apaydin, M., Hernout, B., Petersen, L.H., Ivanov, I. and Qian, X., 2021. An integrated in vivo and in silico analysis of the metabolism disrupting effects of CPI-613 on embryo-larval zebrafish (Danio rerio). Comparative Biochemistry and Physiology Part C: Toxicology & Pharmacology, p.109084.

Copat C, Ferrante M, Hernout BV, Giunta F, Grasso A, Messina A, Grasso R, Spena MT, 2020. Trace elements bioaccumulation in Stone Curlew (Burhinus oedicnemus, Linnaeus, 1758): a case study from Sicily (Italy). International Journal of Molecular Sciences, 21(13), 4597. doi:10.3390/ijms21134597.

Hernout BV, Leleux J, Lynch J, Ramaswamy K, Faulkner P, Matich P, Hala D, 2020. The integration of fatty acid biomarkers of trophic ecology with pollutant body-burdens of PAHs and PCBs in four species of fish from Sabine Lake, Texas. Environmental Advances. 1, 100001. doi.org/10.1016/j.envadv.2020.100001.

Hala D, Cullen J, Hernout BV, Ivanov I, 2018. In silico predicted transcriptional-regulatory control of steroidogenesis in spawning female fathead minnows (Pimephales promelas). Journal of Theoretical Biology, 14; 455-179-190. doi: 10.1016/j.jtbi.2018.07.020.

Hernout BV, Gibson LJ, Walmsley AJ, Arnold KE, 2018. Interspecific variation in the spatially-explicit risks of trace metals to songbirds. The Science of the Total Environment, 642: 679–689. doi.org/10.1016/j.scitotenv.2018.05.390.

Ferrante M, Spena MT, Hernout BV, Grasso A, Messina A, Grasso R, Agnelli P, Brundo MV, Copat C, 2018. Trace elements bioaccumulation in liver and fur of Myotis myotis from two caves of the eastern side of Sicily (Italy): a comparison between a control and a polluted area. Environmental Pollution, 7; 240:273-285. doi: 10.1016/j.envpol.2018.04.133.

Hernout BV, Arnold KE, McClean CJ, Walls M, Baxter M, Boxall ABA, 2016. A national level assessment of metal contamination in bats. Environmental Pollution, 214: 847–858. doi:10.1016/j.envpol.2016.04.079.

Kistler WM, Hock S, Hernout BV, Brake E, Williams N, Downing C, Dunham NR, Kumar N, Turaga U, Parlos JA, Kendall RJ, 2016. Plains lubber grasshopper (Brachystola magna) as a potential intermediate host for Oxyspirura petrowi in northern bobwhites (Colinus virginianus). Parasitology Open, 2(7): 1-8.

Hernout BV, McClean CJ, Arnold KE, Walls M, Baxter M, Boxall ABA, 2016. Fur: a non-invasive approach to monitor metal exposure in bats. Chemosphere, 147: 376-381.doi:0.1016/j.chemosphere.2015.12.104.

Hernout BV, Pietravalle S, Arnold KE, McClean CJ, Aegerter J, Boxall ABA, 2015. Interspecies variation in the risks of metals to bats. Environmental Pollution. Volume 206: 209-216. doi:10.1016/j.envpol.2015.06.016.

Hernout BV, Bowman SR, Weaver R, Jayasinghe CJ, Boxall ABA, 2015. Implications of in vitro bioaccessibility differences for the assessment of risks of metals to bats. Environmental Toxicology and Chemistry, 34(4): 898–906. doi:10.1002/etc.2871.

Hernout BV, Somerwill K, Arnold KE, McClean CJ, Boxall ABA, 2013. A spatially-based modeling framework for assessing the risks of soil-associated metals to bats. Environmental Pollution, 173: 110-116. doi:10.1016/j.envpol.2012.08.017.

Hernout BV, Arnold KE, McClean CJ, Grimm V, Boxall ABA, 2011. Predicting the threats of chemicals to wildlife: What are the challenges? Integrated Environmental Assessment and Management, 7(3): 499-506. doi:10.1002/ieam.198.

Presentations
Selected Oral Presentations

Hernout BV, Keute J*, Giunta F*, 2024. Trace elements contamination in bats: an overview. SETAC North Atlantic Chapter, 30th Annual Meeting, Woods Hole, MA, USA.

Rattner B, Bean T, Hernout BV, Olker J, 2023. Critique of lower-level toxicological response measurements with linkage to apical effects for wildlife ecological risk assessments" with Barnett Rattner, Thomas Bean and Jennifer Olker. SETAC meeting 44th annual meeting, Louisville, KY, USA.

Keute J*, Hernout BV, 2022. The Efficiency of Washing Techniques to Eliminate External Contamination of Trace Metals in Bat Fur and Bird Feathers. RAPS (Research and Project Showcase) Conference, Clarkson University.

Spotlight speaker: Wildlife Toxicology Interest Group SETAC, Online General Meeting. Spring 2022.

Hernout BV, Hernandez E, Hala D, 2018. PAHs and PCBs levels and associated biomarker activity in fish from Galveston Bay (TX) following Hurricane Harvey. Harvey Research Symposium, Port Aransas.

Hernout BV, Bowman SR, Weaver R, Jayasinghe CJ, Boxall ABA, 2013. Assessing metal bioaccessibility from invertebrates to bats using an In Vitro Gastric Model, CREAM Open Conference, Leipzig, Germany.

Hernout BV, Somerwill K, Arnold KE, McClean CJ, Boxall ABA, 2013. Predicting exposure of bats to soil-associated metals: Model evaluation. SETAC Europe 23rd Annual meeting, Glasgow, UK.

Hernout BV, Somerwill K, McClean CJ, Arnold KE, Boxall ABA, 2011. Predicting exposure of Pipistrellus sp. to soil associated metals, SETAC North America 32nd Annual meeting, Boston, USA.

Hernout BV, Somerwill K, McClean CJ, Arnold KE, Boxall ABA, 2011. Predicting exposure of Pipistrellus

sp. to soil-associated metals, SETAC 2nd Young Environmental Scientists Meeting, Aachen, Germany.

Selected Poster Presentations

Keute J*, Hernout BV, 2022. The Efficiency of Washing Techniques to Eliminate External Contamination of Trace Metals in Bat Fur and Bird Feathers, SETAC NA 43rd Annual meeting, Pittsburg, PA, USA.

Jemal H*, Hernout BV, 2022. The toxicological effects of two halogenated methoxyphenols found in the Great Lakes on Daphnia magna. RAPS (Research and Project Showcase) Conference, Clarkson University, Potsdam, NY, USA.

Giunta F*, Hernout BV, 2021. Trace metal contamination in bats: an overview from literature data. RAPS (Research and Project Showcase) Conference, Clarkson University, Potsdam, NY, USA.

Keute J*, Hernout BV, 2021. A Review of Methylmercury (MeHg) and Total Mercury (THg) Levels in Bird Feathers. RAPS (Research and Project Showcase) Conference, Clarkson University, Potsdam, NY, USA.

Keute J*, Hernout BV, 2021. Testing an Efficient Method to Remove External Contamination in Feathers Prior to Trace Metal Analysis. RAPS (Research and Project Showcase) Conference, Clarkson University, Potsdam, NY, USA.

Hernandez E, Hernout BV, Hala D, 2018. Physiological effects and pollutant levels in fish from Galveston Bay following Hurricane Harvey. OCEANUS (NSF Program) symposia, Undergraduate Research Poster Session at Texas A&M University, College Station, TX, USA.

Hernout BV, Arnold KE, McClean CJ, Walls M, Baxter M, Boxall ABA, 2013. Trace metal elements in the common pipistrelle bat (Pipistrellus pipistrellus), SETAC Europe 23rd annual meeting, Glasgow, UK.

Hernout BV, Somerwill K, McClean CJ, Arnold KE, Boxall ABA, 2011. Predicting exposure of Pipistrellus sp. to soil-associated metals, SETAC 21st Europe Annual Meeting, Milan, Italy.

**Students supervised by BVH*

Project Experience

Performed literature review on the effects of light pollution in sea turtles and helped to develop a business proposal plan for prospective client.

Trained in using the Pesticide in Water Calculator Version 3 (PWC3) developed by the EPA to assess the risk of a pesticide to human health or the environment.

Provided support in integrating experimental toxicity data into the Physiologically-Based Pharmacokinetic (PBPK) model for evaluation of internal dosimetry following Spinosad exposure in rats and humans.

Performed the validation of span/runs of civil and electric as-built drawings as part of a large QA effort for an electric company in the context of limiting risks of wildfires.

Performed technical QA on sampling methodology involved to determine the abundance of aquatic organisms (Ephemeroptera, Plecoptera, Tricoptera EPT) in freshwater as part of a Natural Resource Damage Assessment project.

Performed technical QA on lead soil concentrations compared to lead cleanup levels for and commercial properties determined by the EPA for a former zinc smelting facility site.

Assessed recent literature on fire ecology, the recovery of vegetative species, protection of seed banks, and owl species after wildfires in the Pacific Northwest.

Provided expert support by compiling and summarizing information regarding the history, past and present demographics, economical activities, and potential sources of pollution for several towns located in the vicinity of East St Louis (IL).

Prepared narratives for expert report by assessing the history of Baltimore Harbor, Patapsco River, and Sparrows Point (MD) in terms of industrial activity, potential sources of pollution, contaminants of concern, potential risks to human health and the environment, and past or on-going remediations.

Reviewed documents available from EPA for several Superfund sites in Illinois (e.g., Sauget) and Maryland (e.g., Sparrows Point), including remedial investigation reports and records of decision, to summarize information regarding contaminants of concern, potential risks to human and the environment, and cleanup activities.

Prepared narratives for expert report by researching information about soil concentrations of contaminants of concern, prepared data summary and figures comparing PCBs data with Ecological Soil Screening Level (ECOSSLs) values.

Provided technical QA on environmental risk assessment developed for PCBs for several wildlife species documentation for expert report, and technical QA on Toxicological Reference Value (TRV) developed for bats based on uptake of PCBs from sediments via insect ingestion.

Indexed large series of documents for various projects.

Reviewed toxicity data of PFOA for mammals to perform a QA of the database on PFAS toxicity in mammals.

Performed technical QA on myrosinase activity data from an enzymatic assay.

Reviewed and summarized ecotoxicological data on lecithins as part of the Toxic Substances Control Act (TSCA) support for the Food and Chemical Regulation team.

Performed a literature review on PCB 209 toxicity to human health or the environment.

Performed a literature review on the state of research regarding PCB exposure, alternative stressors, species of concern, conservations status, spatial distribution, population trends, and health of mammals in Pennsylvania and California.

Conducted state of science review on metals and metalloids accumulation in bat tissues, and mercury concentrations in bird feathers.

Evaluated methods used to remove potential external contamination of metals in bird feathers and bat fur prior to trace metal analysis.

Evaluated the LC50 and EC50 (immobilization) for two halogenated methoxyphenols found in the Great Lakes.

Performed data curation of a stoichiometric metabolism model of zebrafish (Danio rerio).

Performed exposure trials of CPI-613 (mitochondrial metabolism inhibitor) on embryo-larval zebrafish (Danio rerio) to study the metabolic pathways potentially altered after CPI-613 exposure.

Assessed risk of dioxin-like PCBs in fish from the Gulf of Mexico using the toxic equivalent (TEQ) approach.

Analyzed polychlorinated biphenyl (PCBs) and PAH concentrations in hepatic tissues of bull shark (Carcharhinus leucas), alligator gar (Atractosteus spatula), red drum (Sciaenops ocellatus), and gafftopsail catfish (Bagre marinus) from the Gulf of Mexico using GC-MS and analyzed their associated enzymatic activities using GST and EROD assays.

Performed a state of the science literature review on molecular effects in reptiles after exposure to Polycyclic Aromatic Hydrocarbons (PAHs) and other organic chemicals.

Evaluated enzymatic effects of crude oil, dispersant and the mixture of dispersant and crude oil in hepatic tissues of the loggerhead sea turtle (Caretta caretta) using Western blotting techniques.

Developed an In vitro gastric model to assess the bioaccessibility of metals to insectivorous bats. Refined estimations of the amount of metals readily accessible in the blood stream though the digestive tract of bats using the bioaccessible fraction.

Analyzed metal (Cadmium, Copper, Lead, and Zinc) concentrations in bat tissues using ICP-MS techniques. This dataset was used to perform a model estimation by comparing risk predictions against a monitoring dataset.

Developed a spatially explicit modeling framework to predict risk of soil-associated metals to bats in England and Wales using a food chain model and a risk characterization approach. The model was next used to assess risk of soil-associated metals to several bat species and passerine birds present in England and Wales.

Conducted state of science review on bioaccumulation factors (BAFs) of metals from soil into invertebrates.

Conducted state of science review related to diet of bat species present in the UK.

Additional Education & Training

Preditox. 2024. School of Ecotoxicology and Predictive modelling. Online workshop organized by the laboratory of biometry and evolutionary biology, Universite Claude Bernard, Lyon 1, France.

Coastlines & People (CoPe). 2018. NSF Scoping Session Workshop, San Diego CA, USA. Research needs related to advancing understanding of the impacts of coastal environmental variability and natural hazards on populated coastal regions.

Course: “Career Development.” 2012. CREAM Network. Aachen, Germany.

Course: “Complementary Skills:” oral presentations, writing of grant proposals, scientific writing, and poster presentations. 2011. CREAM Network. Rennes, France.

Course: “Statistics with R and Spatial analyses with ARCgis.” 2011. CREAM Network. Holte, Denmark.

Course at regulatory authority Chemicals Regulation Division (CRD). 2010. CREAM Network. York, UK.

Ecotoxicology and Risk Assessment. 2010. CREAM Network. University of York, UK.

Ecological Modeling. 2010. CREAM Network, Bad Schandau, Germany.

Peer Reviews

Nature Scientific Reports; Nature Sustainability; Chemosphere; Environmental Pollution; Environmental Toxicology and Chemistry; Global Ecology and Conservation; Environmental Science and Pollution Research; Ecological Indicators; Environment and Natural Resources Research; Biological Trace Element Research.