

Email: [h.all@disroot.org](mailto:h.all@disroot.org)

## Education

- 2023-present**      **Postdoc** –Maurice Lamontagne Institute, Fisheries and Oceans Canada  
*Spatiotemporal distribution of great white sharks (*Carcharodon carcharias*) in Atlantic Canadian waters and their impact on grey seal behavior.* (Supervised by X. Bordeleau and H. Bowlby).
- 2017-2023**      **PhD - Biology**, Université du Québec à Montréal, Canada  
*The role of individual differences in the ecology of southern elephant seals (*Mirounga leonina*).* (Supervised by D. Réale, S.C. Patrick, and C. Guinet)
- 2014-2017**      **M.Sc. - Zoology**, University of British Columbia, Canada  
*Variability of harbour seal (*Phoca vitulina*) foraging behaviour during out-migrations of salmon smolts.* (Supervised by A. Trites)
- 2011-2014**      **B.Sc. - Biology**, Université du Québec à Montréal, Canada
- 2004-2009**      **B.Sc. - Software engineering**, École Polytechnique de Montréal, Canada

## Research experience

### Research collaboration:

- 2014-Present**      **SQuID-Group**  
Statistical quantification of individual differences: educational and statistical approaches informing study design, analysis, and inferences of multi-level behavioral data (list of collaborators: <https://squidgroup.org/members/>).

### Research assistant:

- May-Aug 2014**      Validation of a new method to estimate Steller sea lion (*Eumetopias jubatus*) energy expenditure. (PI: A. Trites, University of British Columbia, Canada).
- Jan-Dec 2014**      Development of simulation-based models to quantify individual trait differences (PI: D. Réale, Université du Québec à Montréal, Canada).
- May-Aug 2013**      Using biologging technology to investigate diving and foraging behavior in pre-weaned harbor seal pups (PI: G. Beauplet, Université de Laval, Québec, Canada)

**2012-2013** Development and programming individual-based models related to behavioral and community ecology. (PI: P. Peres-Neto, Université du Québec à Montréal, Canada).

**May-Aug 2012** Impact of intra and inter-specific competition in Atlantic salmon morphological development. (PI: P. Peres-Neto, Université du Québec à Montréal, Canada).

## **Research field work:**

**August 2023 and 2024** Magdalen Islands, QC, Canada. White shark data collection.

**June-July 2023 and 2024** Kouchibouguac National Park, NB, Canada, and Magdalen Islands, QC, Canada. Grey seal data collection.

**May-Jun 2023 and 2024** Bic Island, Saint Lawrence River, QC, Canada. Harbour seal pup data collection.

**2023-2024** Gulf of St Lawrence, Canada. Acoustic receiver deployment.

**Sep-Jan 2017-2018 and 2018-2019** Kerguelen Islands (Terres Australes et Antarctiques Françaises). Southern elephant seal data collection.

**Apr 2016** Puget Sound, Washington, USA. Harbour seal data collection.

**May-Oct 2015** Strait of Georgia, British Columbia, Canada. Harbour seal data collection.

**May-Jun 2013** Bic Island, Saint Lawrence River, QC, Canada. Harbour seal pup data collection.

## Teaching and supervision

**2023-2024** **Mentoring** in statistics a PhD (Pier-Olivier Cusson) and Master (Alymuhammed Irani) student from University of Sherbrooke, Sherbrooke, Canada.

**May-Jun 2021** **Teacher assistant** - Université du Québec à Montréal, Canada. Methods in Ecology (BIA3010).

## **Quebec Centre for Biodiversity Science (QCBS) - R workshop preparation:**

**Feb 2021** Mixed Effects Models.

**Nov 2020** Introduction to R.

**Jan-Mar 2020** **Teacher** - Université du Québec à Montréal, Canada. Specialization II in Ecology (BIA3511)

**Workshop organization and teaching:**

**Oct 2022** Centre d'Ecologie Fonctionnelle et Evolutive, Montpellier, France.

**Apr 2022** Norwegian University of Science and Technology, Trondheim, Norway.

**Sep 2019** Centre for Ecological Research, Tihany, Hungary.

**Dec 2016** Norwegian University of Science and Technology, Trondheim, Norway.

**Dec 2015** Max Plank Institute for Ornithology, Seewiesen, Germany.

*Study design and sampling decisions in mixed-effect model analyses* (list of other organizers and teachers: <https://squidgroup.org/members/>).

**May 2017** **Main organizer** of the Northwest Student Chapter of the Society for marine Mammalogy (University of British Columbia, Canada).

**Sep-Dec 2016** **Teacher assistant** - University of British Columbia, Canada. Ecological methodology (BIOL404).

**May-Aug 2015** **Co-supervisor** for an undergraduate student (S. Boyer-Trembley, University of British Columbia, Vancouver, Canada).

**Jan-Apr 2015** **Mentor** of a grade 10<sup>th</sup> student (N. Jung, Prince of Wales Mini School, Vancouver Canada).

## Specific skills

### Analytical skills

Programming languages:

- General programming: R, C++, C#, Matlab, Java
- Data base programming: SQL
- Web programming: XHTML, CSS, PHP, JavaScript, XML
- Writing: LaTeX, RMarkdown, Quarto

Software proficiency: Office Suite, Inkscape, Photoshop, Illustrator, Flash.

Statistical modeling: multivariate, mixed-effect models, cluster analysis, state-space models, hierarchical models, regression trees, etc.

Statistical modeling languages: Stan, R-nimble

	<p>Biologging data analysis:</p> <ul style="list-style-type: none"> <li>• Track data (Argos, GPS)</li> <li>• Depth, temperature, and salinity profiles (CTD)</li> <li>• Three-dimensional movement analysis (accelerometers, magnetometers, and gyroscopes)</li> <li>• Environmental remote sensing data</li> </ul>
<b>Field skills</b>	<p>Tagging of white sharks with satellite and acoustic tags using a harpoon method</p> <p>Capture and handling of pinnipeds (harbor seals, grey seals, and southern elephant seals)</p> <p>Data logger programming and deployment</p> <p>Tissue sample collection (blood, skin biopsies, flipper tagging)</p> <p>Scuba diving certification (CMAS)</p> <p>Car and boat licenses:</p> <ul style="list-style-type: none"> <li>• Marine Emergency Duties (MED) A3</li> <li>• Small Vessel Operators Proficiency (SVOP)</li> <li>• VHF Commercial Radio Operator (ROC)</li> </ul>
<b>Languages</b>	<p>Fluent in written and oral French and English</p>

## Grants and Awards:

<b>2021-2022</b>	Fonds de Recherche Nature et Technologies (Québec, Canada)	<b>30,000\$</b>
<b>2017-2020</b>	NSERC PhD's Program – Université du Québec à Montréal	<b>105,000\$</b>
<b>2014-2016</b>	Pacific Salmon Foundation (Co-Investigator) (British Columbia, Canada)	<b>370,000\$</b>
<b>2014-2016</b>	Fonds de Recherche Nature et Technologies (Québec, Canada)	<b>30,000\$</b>
<b>2014-2015</b>	NSERC Master's Program-Université du Québec à Montréal (declined)	<b>17,500\$</b>
<b>May-Aug 2014</b>	NSERC Undergraduate student research award (Canada)	<b>4,500\$</b>
<b>Jan-Apr 2014</b>	Research initiation scholarship (Denis Réale's lab, UQAM)	<b>3,000\$</b>
<b>May-Aug 2013</b>	NSERC Undergraduate student research award (Canada)	<b>4,500\$</b>
<b>2012-2013</b>	Research initiation scholarship (Pedro Peres-Neto's lab, UQAM)	<b>4,000\$</b>
<b>May-Aug 2012</b>	NSERC Undergraduate student research award (Canada)	<b>4,500\$</b>
<b>May-Aug 2012</b>	Research initiation scholarship (Pedro Peres-Neto's lab, UQAM)	<b>2,000\$</b>

## Contribution to research and development:

Journal papers: (<https://orcid.org/0000-0001-9357-9151>)

**Allegue H.**, Bordeleau X., Bowlby H., Winton M. V., Joyce W., Leos Barajas V., Trudel M., and Skomal G. B. (in review) *A systematic assessment of the increasing presence of white sharks in Atlantic Canadian waters*. Marine Ecology Progress Series.

Reale D., **Allegue H.**, Araya-Ajoy Y.G., Dochtermann N.A., Nakagawa S., Pick J., Schielzeth H., Westneat D., Dingemanse N.J. (in review) *Avoiding biased estimates of among-individual variance caused by non-random sampling of individuals in a changeable environment*. Methods in Ecology and Evolution.

Toscano, B. J., **Allegue H.**, Bauloye D., Drausnik M., and Orloff P. (2024) *Predation risk elicits a negative relationship between boldness and growth in *Helisoma* snails*. Behavioral Ecology. arae063. <https://doi.org/10.1093/beheco/arae063>

**Allegue H.**, Guinet G., Patrick S.C., Ribout C., Bichet C., Lepais O., Réale D. (2024) *Offspring sex ratio increases with paternal reproductive success in a colony of southern elephant seals*. Marine Mammal Science, 40(3), e13108. <https://doi.org/10.1111/mms.13108>

Pick J.L., Kasper C., **Allegue H.**, Dingemanse N.J., Dochtermann N.A., Laskowski K.L., Lima M.L, Schielzeth H., Westneat D.F., Wright J., Araya-Ajoy Y.G. (2023) *Describing posterior distributions of variance components: Problems and the use of null distributions to aid interpretation*. Methods in Ecology and Evolution. 00, 1– 18. <https://doi.org/10.1111/2041-210X.14200>

Toscano, B. J., **Allegue, H.**, Gownaris, N. J., Drausnik, M., Yung, Z., Bauloye, D., Gorman, F., and Ver Pault, M. (2023). Among-individual behavioral responses to predation risk are invariant within two species of freshwater snails. Ethology, 00, 1– 11. <https://doi.org/10.1111/eth.13363>

**Allegue, H.**, Réale D., Picard B., and Guinet C. (2023) *Track- and dive-based metrics do not predict the number of prey encountered in a marine predator*. Movement Ecology, 11, 3. <https://doi.org/10.1186/s40462-022-00361-2>

**Allegue H.**, Guinet C., Patrick S.C., Hindell M.A., McMahon C.R., and Réale D. (2022) *Sex, age, and boldness shape the seasonal foraging habitat selection in southern elephant seals*. Ecology and Evolution, 12:e8457. <https://doi.org/10.1002/ece3.8457>

Thomas, A.C., Deagle, B., Nordstrom, C., Majewski S., Nelson B. W., Acevedo-Gutiérrez A., Jeffries S., Moore J., Louden A., **Allegue H.**, Pearson S., Schmidt M., and Trites A. W. (2022) *Data on the diets of*

*Salish Sea harbour seals from DNA metabarcoding*. Scientific Data, 9, 68. <https://doi.org/10.1038/s41597-022-01152-5>

Santostefano F., **Allegue H.**, Garant D., Bergeron P., and Réale D. (2021) *Indirect genetic and environmental effects on behaviors, morphology, and life-history traits in a wild Eastern chipmunk population*. Evolution, 75:1492-1512. <https://doi.org/10.1111/evo.14232>

Schielzeth H., Dingemanse N.J., Nakagawa S., Westneat D.F., **Allegue H.**, Teplitsky C., Réale D., Dochtermann N.A., Garamszegi L.Z., and Araya-Ajoy Y.G. (2020) *Robustness of linear mixed-effects models to violations of distributional assumptions*. Methods Ecol Evol 11:1141-1152. <https://doi.org/10.1111/2041-210X.13434>

Westneat D.F., Araya-Ajoy Y.G., **Allegue H.**, Class B., Dingemanse N., Dochtermann N.A., L.Z. Garamszegi, Martin J.G. A., Nakagawa S., Réale D., and Schielzeth H. (2020) *Collision between biological process and statistical analysis revealed by mean centring*. J Anim Ecol, 89:2813– 2824. <https://doi.org/10.1111/1365-2656.13360>

**Allegue H.**, Thomas A.C, Liu Y., and Trites A. (2020) Harbour seals responded differently to pulses of out-migrating coho and Chinook smolts. Mar Ecol Prog Ser, 647:211-227. <https://doi.org/10.3354/meps13389>

**Allegue H.**, Araya-Ajoy Y.G., Dingemanse N.J., Dochtermann N.A., Garamszegi L.Z., Nakagawa S., Réale D., Schielzeth H., and Westneat D.F. (2016). *SQUID - Statistical Quantification of Individual Differences: an educational and statistical tool for understanding multi-level phenotypic data in the mixed modelling framework*. Methods Ecol Evol, 8:2 257-267. <https://doi.org/10.1111/2041-210X.12659>

### Conference presentation:

**Allegue, H.**, Bordeleau, X., Bowlby, H., Winton, M. V., Joyce, W., Leos Barajas, V., Trudel, M., Skomal, G. B. (2024) *Systematic assessment of the increasing presence of white sharks in Atlantic Canadian waters*. Ocean Tracking Network Symposium, Halifax, NS, Canada.

**Allegue, H.**, Guinet C., Patrick S.C., and Réale D. (2021) *Validating and comparing dive and track-based metrics for inferring foraging success in a marine predator*. Société Québécoise pour l'Étude Biologique du Comportement, Sherbrooke, QC, Canada.

**Allegue, H.**, Guinet C., Patrick S.C., Hindell M.A., McMahon C.R., and Réale D. (2020) *Sex, age and Rock 'N' Roll: Foraging habitat selection in southern elephant seals*. Société Québécoise pour l'Étude Biologique du Comportement and Quebec Centre for Biodiversity Science, Montréal, QC, Canada.

**Allegue, H.**, Thomas, A., Liu, Y. and Trites, A. (2019) *Quality over quantity: out-migrating coho smolts trigger a larger foraging response by harbour seals than Chinook smolts*. Société Québécoise pour l'Étude Biologique du Comportement, Montréal, QC, Canada.

**Allegue, H.**, Thomas, A., Liu, Y. and Trites, A. (2016) *Accelerometry reveals specialist predation by harbour seals in river mouths on salmon smolts*. Northwest Student Chapter of the Society for Marine Mammalogy, Vancouver, BC, Canada.

**Allegue, H.**, Araya-Ajoy, Y.G., Dingemans, N.J., Dochtermann N.A., Garamszegi, L.Z., Nakagawa, S., Réale, D., Schielzeth, H. and Westneat, D.F. (2016) *Introducing the educational and statistical tool "SQUID"*. International Behavioral Ecology Congress, Exeter, England.

**Allegue, H.**, Thomas, A., Liu, Y. and Trites, A. (2016) *Fine-scale biologging provides new insights into seal foraging behaviour*. International Behavioral Ecology Congress, Exeter, England.

**Allegue, H.**, Thomas, A., Liu, Y. and Trites, A. (2016) *"Hot spots" of harbour seal predation risk during the out-migration of salmon smolts*. Northwest Student Chapter of the Society for Marine Mammalogy, Seattle, WA, USA.

**Allegue, H.**, Thomas, A. and Trites, A. (2015) *Harbour seal foraging behaviour after release of coho smolts from Big Qualicum hatchery*. Salish Sea Marine Survival Project US-Canada Science Retreat, Richmond and Nanaimo, BC, Canada.

## Poster:

**Allegue H.**, Guinet C., Patrick S.C., Hindell M.A., McMahon C.R., and Réale D. *Sex, body size, and boldness shape the seasonal foraging habitat selection in southern elephant seals*. Biennial Conference on Marine Mammal Biology 2022, Palm Beach, FL, USA.

**Allegue, H.**, Guinet C., Patrick S.C., Hindell M.A., McMahon C.R., and Réale D. *Digging deeper into the ecology of southern elephant seals (Mirounga leonina): does personality on land predict variation in foraging behaviour at sea?* Société Québécoise pour l'Étude Biologique du Comportement and Quebec Centre for Biodiversity Science 2019, Montréal, QC, Canada.

**Allegue, H.**, Thomas, A., Liu, Y. and Trites, A. *"Hot spots" of harbour seal predation risk during the out-migration of salmon smolts*. Zoology Graduate Student Annual Symposium 2016, Vancouver, BC, Canada

**Allegue, H.**, Thomas, A., Liu, Y. and Trites, A. *"Hot spots" of harbour seal predation risk during the out-migration of salmon smolts*. Biennial Conference on Marine Mammal Biology 2015, San Francisco, CA, USA.

## R package:

**Allegue, H.**, Araya-Ajoy, Y.G., Dingemanse, N.J., Dochtermann N.A., Garamszegi, L.Z., Nakagawa, S., Réale, D., Schielzeth, H. and Westneat, D.F. (2016) *squid: Statistical Quantification of Individual Differences*. R package version 0.2.1. (<https://cran.r-project.org/package=squid>)