

## RESEARCH INTERESTS

### CURRICULUM VITAE - THOMAS JOSHUA WILLIAMS

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## RESEARCH INTERESTS

Benthic ecology, Climate change, Data science, Polar blue carbon, Trait-function relationships

## PROFESSIONAL APPOINTMENTS

### Postdoctoral Research Fellow. Marine Ecology

#### Research

##### **SEA-Quester [Grant # EU 101136480]**

**[2025-Present]**

Environmental & Marine Biology | Åbo Akademi University (ÅAU)

*Appointed PDRA / PI: Anna Törnroos-Remes*

- Investigating biodiversity-ecosystem function relationships in Arctic soft-sediment and littoral communities, focusing on how species abundance structure and functional traits drive carbon cycling across environmental gradients in emerging Arctic-Baltic ecosystems.
- Developing novel analytical frameworks that integrate intraspecific trait variation with community-scale functional capacity assessments to better predict blue carbon production, export and sequestration.

##### **Benthic-Offshore Wind Interactions Evaluation (BOWIE) [Grant # NE/X008991/1]**

**[2024-2025]**

School of Ocean & Earth Science | University of Southampton

*Appointed PDRA / PI: Prof Martin Solan*

- Experimentally investigated the effects of offshore wind (sound, vibration, electromagnetism) on benthic biodiversity and ecosystem functioning using globally unique experimental infrastructure.
- Conducted geospatial analyses on the interaction between multiple ocean-uses (inc. shipping, fishing, MPAs, telecom cables, offshore wind) and benthic ecosystem functioning across the UK Exclusive Economic Zone.
- Presented findings of project at the Annual Impact Meeting, attendees included representatives of academia, industry, policy & regulation, consultancy, and NGOs.

##### **Implications of intraspecific trait variability across different environmental conditions for projections of marine ecosystem future [Grant # NE/T001577/1]**

**[2024]**

School of Ocean & Earth Science | University of Southampton

*Appointed PDRA / PI: Prof. Jasmin A. Godbold*

- Produced a trait-based model for predicting ecosystem functioning that incorporates intra-specific variation in functional effect and response traits.

#### Teaching

##### **Global Challenges in Biology (Y3 UG/ PGT module)**

**[2024]**

School of Ocean & Earth Science | University of Southampton

*Guest lecturer / Course Coordinators: Prof. Jasmin A. Godbold, Dr. Kelvin Peh*

- Lectured on “Organism responses to high pCO<sub>2</sub> & low pH” and “Considering multiple stressors” to third-year undergraduate and taught postgraduate students.

## PROFESSIONAL APPOINTMENTS

### PhD. Arctic Marine Ecology Research Training

#### **Laser-ablated inductively coupled plasma-triple-quadrupole-mass spectrometry (LA-ICP-QQQ-MS) [2022]**

School of Ocean & Earth Science Plasma Mass Spectrometer Laboratory | University of Southampton

*Postgraduate researcher | Supervisors: Prof. Gavin Foster, Dr. Chris Standish, Prof. J. Andy Milton*

- Conducted high-resolution elemental analysis on multiple runs of deep-water coral samples.
- Developed a script in R Markdown to automate blank and standard correction of trace element signals, resulting in increased efficiency and accuracy.
- Created a second script in R Markdown to automate trace element signal rasterization and ratio analysis, streamlining data analysis and enabling rapid generation of results.

#### **3D reconstruction of deep-water coral skeletal architecture**

**[2021]**

X-ray Histology facility | University Hospital Southampton

*Postgraduate researcher | Supervisors: Dr. Orestis Katsamenis, Dr. Philip Basford*

- Prepared coral specimens and selected regions of interest for high-resolution micro-focus computer tomography ( $\mu$ -CT), utilizing expert knowledge of sample preparation techniques to ensure optimal results.
- Developed proficiency in Linux OS and SSH to efficiently manage, process, and image large data files produced from  $\mu$ -CT scans using high-performance supercomputer clusters (IRIDIS).
- Analysed  $\mu$ -CT scans to produce detailed reconstructions of coral skeletal microarchitecture for two ecologically important coral species, providing valuable insights into their growth and morphology.

#### **Induction and training on experimentally induced invertebrate larval reproduction**

**[Cancelled due to  
COVID 19]**

White Sea Biological Station "Kartesh" (WSBS) | Zoological Institute of Russian Academy of Sciences

*Visiting postgraduate researcher | Supervisor: Dr. Liudmila Fliachinskaya (WSBS)*

### Co-Curricular Research Experience

#### **Building and Enabling UK-Greenland Research Capacity to Address Effects of Anthropogenic Stressors on Benthic Ecosystems**

**[2023]**

University of Southampton | Greenland Institute of Natural Resources

*Postgraduate researcher | PI: Prof. Martin Solan (University of Southampton)*

- Assisted with the project proposal and timeline of activities to submit to the NERC Arctic Office.
- Travelled to Nuuk, Greenland to investigate effects of marine contamination on benthic biodiversity in fjordic systems.
- Lead author on paper.

#### **Workshop on Functional Roles of Benthic Ecosystem Engineers**

**[2023]**

Université Bretagne Loire

*Postgraduate researcher | Workshop lead: Dr. Martin Marzloff (Ifremer-DYNECO-LEBCO)*

- Produced a skeleton draft of a position paper on how major benthic ecosystem engineers contribute to multiple dimensions of seafloor habitats.
- Commenced data collection for an additional paper aimed at evaluating how habitat forming species shape biodiversity-ecosystem functioning relationships.

#### **EuroMarine Foresight Workshop on Functional Traits in Marine Benthic Ecology**

**[2022]**

EuroMarine Full Member Organisations

*Postgraduate researcher | Workshop lead: Dr. Trystan Sanders (University of Southampton)*

- Conducted a comprehensive literature review with scientific colleagues on trait-function relationships in marine benthic ecology.
- Collaborated on a scientific paper aimed at evaluating the status of the functional trait approach in benthic ecosystem functioning.

## PROFESSIONAL APPOINTMENTS

### Scientific Partnership on the Consequences of Climate Change in Arctic Coastal Ecosystems [2021-2022]

University of Southampton | Zoological Institute of Russian Academy of Sciences

*Postgraduate researcher | PIs: Professor Martin Solan, Dr. Alexey Sukhotin*

- Championed the co-ordination a series of scientific workshops on White Sea Benthic Datasets.
- Led discussions with APECS to co-develop a scientific conference aimed at Early Career Researchers.

### Communication of Climate Change impacts in the Arctic

[2021-2022]

Association of Polar Early Career Scientists (APECS)

*Project member | Project leads: Alexis Geels, Geetha P.N.*

- Co-produced video shorts and social media posts about Arctic climate change and the local, regional and global threats that it would induce.
- Advocated for a presentation during the Arctic Science Summit Week 2022.

### Science & Diplomacy

[2021-2022]

Association of Polar Early Career Scientists (APECS)

*Project member | Project leads: Nicholas Parlato, Chloe Scott*

- Led discussions on facilitating better integration of APECS and country-specific collaborative groups, including UK Polar Network.
- Advocated for presenting a talk or poster on the importance of scientific diplomacy in developing the next generation of ECRs at the UArctic Congress 2022 .

### Amundsen research expedition – ROV Coral Seep Habitats / ArcticNet

[2021]

CCGS Amundsen | University of Southampton & Université Laval

*Visiting postgraduate researcher and project lead | Principal Scientist: Dr. Maxime Geoffroy (MUN)*

- Coordinated and lead two separate projects that involved running mesocosm incubations on intact samples of the seafloor and the collection of deep-water corals during the ROV dives.
- Presented the preliminary findings of the mesocosm incubations to the scientific team and crew.

### Biodiversity and ecosystem functioning in the Arctic benthos: FCDO UK-Russia Science Workshop [2020]

St. Petersburg | Zoological Institute of Russian Academy of Sciences & UK Science and Innovation Network

*Visiting postgraduate researcher | Co-ordinators: Tatiana Iakovleva, Prof. Nikita Chernetsov*

- Presented a talk on assessing the impacts of climate change on benthic biodiversity.
- Established a proposal with scientific colleagues to carry out experimental work at the White Sea Biological Station for a PhD data chapter.
- Collaborated on a scientific paper that explores the responses of White Sea benthic biodiversity to model climate change scenarios.

### Changing Arctic Ocean Seafloor (ChAOS) research expedition – [JR18006](#)

[2019]

RRS James Clark Ross | University of Southampton

*Scientific officer | Principal Scientific Officer: David Barnes (British Antarctic Survey)*

- Selected to join the multidisciplinary team of like-minded polar scientists investigating physical, chemical and biological components across a gradient of sea-ice.
- Collaborated in the sampling of and husbandry of macroinvertebrate benthic communities for future climate change experiments.

## Internships

### Geospatial mapping of impacts from offshore wind turbines on benthic community and heritage assets [2023]

School of Engineering | University of Southampton

*Postgraduate researcher | Project manager: Dr. Hugo Putuhena*

- Advised on the effects of offshore wind on the benthos to the project consortium.
- Computationally explored the effects of marine infrastructure on benthic biodiversity and ecosystem functioning within the UK EEZ.

**Building and enabling UK-Russian research capacity to address climate change effects on Arctic marine ecosystems - [link](#)** [2020-2021]

Public Policy Southampton | University of Southampton | Zoological Institute of Russian Academy of Sciences

*Policy researcher | Project manager: Gareth Giles (Public Policy Southampton)*

- Chaired multiple breakout discussion sessions (online) during the 3-day scientific workshop series in March 2020.
- Co-authored a policy brief titled “A changing Arctic: Merging scientific perspectives” aimed at British and Russian policymakers and stakeholders in scientific diplomacy and Arctic relations .
- Contributed to the completion of the end-of-project report submitted to the Foreign and Commonwealth Development Office.
- Produced an extensive scientific literature-and-policy analysis to investigate scientific diplomacy in the Arctic between Russia and the United Kingdom.

**MSci. Marine Biology (Integrated)**  
**Research Training**

**Laboratory based mesocosm experimentation**

[2018-2019]

Biodiversity and Ecosystem Futures Facility | University of Southampton

*Undergraduate student | Supervisor: Dr. Jasmin Godbold*

- Conducted a medium-term (20 week) experiment exposing two functionally contrasting Arctic invertebrate species to two levels of ocean warming and acidification.
- Carried out the continuous monitoring of environmental variables, maintenance of CO<sub>2</sub> gas mixing system and animal husbandry.
- Quantified responses in burrowing behaviour, bioturbation, carbonate chemistry and contribution to nutrient cycling.

**Flume-based laboratory experimentation**

[2019]

National Oceanography Centre Southampton

*Assistant researcher | Project manager: Professor Martin Solan (University of Southampton)*

- Accomplished 12 multi-phase flume experiments on benthic mesocosms over a period of 4 weeks.
- Contributed to the data collection on experimentally simulated consecutive storms on coastal sediment integrity and biogeochemical cycling for nationally collaborate project BLUEcoast.

**Co-Curricular Research Experience**

**Tropical reef conservation**

[2016]

Marine Conservation Cambodia | ReachOut Volunteers

*Volunteer*

- Constructed artificial coral reef pods to aid in restoration of previously dynamite-damaged reefs around Koh Rong Island.
- Qualified as an Advanced PADI Open Water Diver

**PUBLICATIONS AND MANUSCRIPTS UNDER PREPARATION**

Putuhena, H., **Williams, T.J.**, Sturt, F., White, D., Solan, M., Godbold, J. A., Gourvenec S. (2025). Integrated geospatial datasets to inform marine spatial planning and impact assessment in waters surrounding the United Kingdom. *Scientific Data* **12**, 1845. <https://doi.org/10.1038/s41597-025-05950-5>

**Williams, T.J.**, Garcia, C.R., Godbold, J.A., Archambault, P. Solan, M. (2025). Co-extinctions and co-compensatory species responses to climate change moderate ecosystem futures. *Global Change Biology*, **31**(10), e70539. <https://doi.org/10.1111/gcb.70539>

**Williams, T.J.**, Standish, C., Archambault, P., Godbold, J.A., Solan, M., Katsamanis, O.L., Basford, P.J., Foster, G. (2024). Geochemical proxies for deep-sea temperature and nutrient content in cold-water bamboo corals. *Chemical Geology*, **654**, 122053. <https://doi.org/10.1016/j.chemgeo.2024.122053>

## EDITORIAL, REVIEWING, AND PROFESSIONAL SERVICE

**Williams, T.J.**, Reed, A.J., Peck, L., Godbold, J.A., Solan, M. (2024) Ocean warming and acidification adjust inter- and intra-specific variability in the functional trait expression of polar invertebrates. *Scientific Reports*, **14**, 14985. <https://doi.org/10.1038/s41598-024-65808-5>

**Williams, T.J.**, Katsamenis, O.L., Basford, P.J., Solan, M., Foster, G., Godbold, J.A., Archambault, P. (2024). Three-dimensional reconstruction of high latitude bamboo coral via X-ray microfocus Computed Tomography. *Scientific Data*, **11**, 602. <https://doi.org/10.1038/s41597-024-03396-9>

**Williams, T.J.**, Blockley, D., Cundy, A., Godbold, J.A., Howman, R.M., Solan, M. (2024). Dilute concentrations of maritime fuel can modify sediment reworking activity of high-latitude marine invertebrates. *Ecology and Evolution*, **14**(7), e11702. <https://doi.org/10.1002/ece3.11702>

**Williams, T.J.**, Reed, A.J., Godbold, J.A., Peck, L.S., Hauton, C., Solan, M. (in review). Intra-specific variability in physiological responses to changing conditions moderate the acclimation capacity of high-latitude benthic invertebrates. *PLOS ONE*

**Williams, T.J.**, Putuhena, H., Gouvenic, S., Godbold, J.A., Strut, F., White, D., Solan, M. (in prep). Acceleration in, and composition of, anthropogenic ocean use reveal habitat dependent transitions in benthic ecosystem integrity

**Williams, T.J.**, Burgess, J., Clayton, K., Mazik, K., White, P., Ziegenfus, T., Hauton, C., Solan, M., Godbold, J.A. (in prep). Noise from offshore wind farms modifies the metabolic activity and functional trait expression of benthic invertebrates

**Williams, T. J.**, Burgess, J., Jones, A., Mazik, K., White, P., Godbold, J. A., Hauton, C., Solan, M. (in prep). Inter-specific behavioural and physiological changes in benthic invertebrates to offshore wind substrate-borne vibration

**Williams, T. J.**, Burgess, J., Mazik, K., White, P., Solan, M., Godbold, J. A. (in prep). The performance of benthic communities under offshore wind-related stressors diverges under a near-future climate

**Williams, T.J.**, Blais, G., Solan, M., Archambault, P. (in prep). Deep-water benthic invertebrate activity and biogeochemical functioning in the Eastern Canadian Arctic

Solan, M., **Williams, T.J.**, Godbold, J. A., Törnroos-Remes, A., Villnäs, A., Gogina, M., Marzloff, M., Boye, A., Grall, J. (in prep). Habitat forming species across multiple marine habitats shape benthic community capacity to mediate ecosystem functioning

Sanders, T., Solan, M., Garcia, C.R., **Williams T.J.**, Armitage, P., Godbold, J. A., Bremner, J., Cooper, K., Gogina., M., Marzloff, M., Mouillot, D., Törnroos-Remes, A., Villnäs, A. (in prep). What traits matter for seafloor ecosystem functioning?

Aristov, D.A., Garcia, C.R., Naumov, A.D., Savchenki, O.N., Sukhotin, A. A., **Williams, T.J.**, Zanodov, A.Y., Solan, M. (in prep). Scale dependency of biodiversity-ecosystem function relations modify the ecological consequences of species loss

Solan, M., Garcia, C.R., **Williams, T.J.**, Sukhotin, A.A., Shunatova, N., Naumov, A.D. (in prep). Scientific cooperation catalyses ecological insight in a changing Arctic: a review and perspectives from a bilateral UK-Russia marine science collaboration

## EDITORIAL, REVIEWING, AND PROFESSIONAL SERVICE

### Peer Review

Earth and Planetary Science Letters (Elsevier) | 2025

Journal of Experimental Marine Biology and Ecology (Elsevier) | 2024

## SCHOLARSHIPS AND RESEARCH FUNDING

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*Full Sponsor (Interdisciplinary Southampton Partnership for Investigators Researching the Environment) PhD studentship* | grant number NE/S007210/1 [2019-2027] | National Environmental Research Council (UK) & Université Laval (Canada)

*NXCT Free Beamtime Access Scheme Award* | grant number EP/T02593X/1 [2020-2025] | Engineering and Physical Science Research Council (UK)

United Kingdom – Greenland Arctic Research Bursaries Scheme 2023-24 | UK Arctic Office

United Kingdom – Greenland Arctic Research Bursaries Scheme 2024-25 | UK Arctic Office

## TECHNICAL EXPERIENCE

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### Computational and analytical

- Proficient user of **R Markdown, Git and HTML5**
- Collection, analysis and presentation of qualitative data using **R** (*tidyverse, raster, wordcloud, ggforce* packages), **VOsviewer, NVivo, AntConc, Excel** and **PowerPoint**
- Organisation, analysis and presentation of **Bayesian** and **mixed-effects** statistics using **R** (*gam, nlme, mgve, stats, vegan* packages)
- Practiced user of scientific and graphical software including **ImageJ, CO2calc, Panoply, Affinity Designer, Dragonfly**

### Laboratory skills

- Experimental design and execution across **individual-to-community scales** for benthic marine systems
- Multi-factorial **long-term climate manipulation** (temperature, salinity, pCO<sub>2</sub>, O<sub>2</sub>) with **high replication** in controlled **mesocosm systems**
- **Vibration and electromagnetic field** (EMF) experimental manipulation capability for offshore renewable energy impact assessment
- **Acoustic disturbance** experiments on benthic invertebrates
- Trained in fluorescent sediment profile imagining (**f-SPI**), closed-chamber **respirometry**, total alkalinity titration analysis
- Experience with Scanning Electron Microscopy, Digital Microscopy and Laser Ablation Inductively Coupled Plasma QQQ Mass Spectrometry (**LA-ICP-QQQ-MS**)

### Miscellaneous

- Supervised multiple undergraduates (BSc. And MSci) undertaking labwork in the *Biodiversity and Ecosystem Futures Facility*
- Administrative experience includes the organisation and chairing of focus groups and workshops
- Advanced Open Water PADI scuba diver to 30m depth, with over 30 hours logged in temperate and tropical waters
- ENG 1 certified seafarer

## EDUCATION

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### **PhD. Marine Ecology**

**[2019-2023]**

University of Southampton | Southampton, United Kingdom

Université Laval | Quebec City, Quebec, Canada

Thesis: Ecological consequences of climatic forcing in the Arctic marine benthos

### **MSci. Marine Biology (Integrated)**

**[2015-2019]**

University of Southampton | Southampton, United Kingdom

University of Bergen | Bergen, Norway (ERASMUS)

MSc. Thesis: Impacts of climate change on benthic organism behaviour and ecosystem functioning

3<sup>rd</sup> Year Dissertation: Impact and cause of rising coastal water temperatures on the aquaculture of *Salmo salar* (Atlantic Salmon) in Norway

## ACADEMIC CONFERENCE & WORKSHOP PRESENTATIONS

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**Williams, T.J.** (2024). Cumulative expansion of "Ocean-Use" predicts seafloor functioning across the UKEEZ – Presentation at the EcoWind Annual Impact Meeting [Southampton, UK]

**Williams, T.J.** (2024). Cumulative expansion of offshore wind infrastructure across the UKEEZ: A retrospective view from the seafloor – Presentation at the Aura Conference 2024 [Hull, UK]

**Williams, T.J.** (2022). Disparities in behavioural trait expression between and within species confound benthic ecosystem functioning under a near-future climate scenario – Presentation at the "6<sup>th</sup> Nereis Park Conference - Bioturbation in past and present: from terrestrial to marine ecosystems" [Logonna-Daoulas, France]

**Williams, T.J.** (2021). Deep-water benthic invertebrate activity in the Eastern Canadian Arctic – Presentation of preliminary findings from the 2021 Amundsen expedition at the "Wessex Congress 2021" conference [online]

**Williams, T.J.** (2021). Bibliometric knowledge networks: where is the science at the moment? What collaborations are there at present? – Presentation of findings from scientific literature-and-policy analysis at the "FCDO UK-RU Scientific Workshop: Development of collaborative research ideas"; 17-19th March 2021 [online]

**Williams, T.J.**, Reed, A.J., Peck, L., Godbold, J.A., Solan, M. (2020). Species responses to climate change modify benthic biogeochemical cycling – Presentation at the "Arctic Change 2020" conference; 7-10th December 2020 [online - [link](#)]

**Williams, T.J.**, Reed, A.J., Godbold, J.A. (2020). Impacts of climate change on polar benthic species behaviour and ecosystem functioning – Presentation at the "A Changing Arctic 2020" conference [Tromsø, Norway]\*

**Williams, T.J.** (2020). Assessing the impact of climate change on Arctic benthic biodiversity. Presentation at the "Biodiversity and ecosystem functioning in the Arctic benthos: FCDO UK-Russia Science Workshop" [St. Petersburg, Russia]

\*Postponed indefinitely due to COVID-19

## LIST OF INVITED TALKS

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- Geochemical proxies for deep-sea temperature and nutrient content in cold-water bamboo corals | G3 Seminar Series – UoS | 20 Feb, 2024
- High-resolution computed tomography reconstructions of deep-water bamboo coral: Applicability in understand calcification strategies | µVIS- Correlative Imaging Forum - UoS | 26 May, 2022
- Collaborations Matter: UK-Russia Collaboration Series | UK Polar Network – APECS Russia | 28 October, 2021

## ORGANISATION AFFILIATIONS

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**Interagency Arctic Research Policy Committee Collaborations**

[2022-]

*International/Early Career member [Academic]*

**Learned Society of Wales**

[2022-]

*Early Career Research Network*

**Association of Polar Early Career Scientists**

[2021-]

*Project group alumni | 2021-2022 President: Marta Moreno Ibáñez*

**The Marine Biological Association | Plymouth, United Kingdom**

[2019-]

*Professional membership*

**UK Polar Network**

[2019-]

*Active member | 2024-2025 Co-Presidents: Lucy Stephenson, Louise Mercer*

## EXTRA-CURRICULAR ACTIVITIES AND OTHER ACHIEVEMENTS

**British Ecological Society**

[2019-]

*Annual membership*

## EXTRA-CURRICULAR ACTIVITIES AND OTHER ACHIEVEMENTS

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World Aquatics Masters Championships Doha 2024 - Competition Athlete (GBR)

[2024]

Vice-President of the Southampton University Swimming Club

[2018-2019]

British Universities & Colleges Sport - Swimming Team Championships Finalist, Shield Division

[2018]