

Patrick Joyce

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Employment

- Sep 2020 – present **Postdoctoral Research Associate**, The Chinese University of Hong Kong
Ecological impacts of climate change
- Oct 2019 – Sep 2020 **Postdoctoral researcher**, Danish Shellfish Centre, DTU Aqua
Coastal shellfish production and invasive species impacts
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Academic Qualifications

- Jan 2016 – Aug 2019 **PhD Biophysical Ecology**, Queen's University, Belfast
Supervised by Dr Louise Kregting and Professor Jaimie Dick
Thesis title: Biotic and abiotic factors influencing the invasion success and ecological impacts of the Pacific oyster, *Crassostrea gigas*
- Sept 2014 – Nov 2015 **MRes Marine Biology**, University of Plymouth
Thesis title: Biogenic reef destruction and changes to localised flow: Impacts on recruitment success?
- Sept 2010 – July 2013 **BSc (Hons) Marine Biology (2:1)**, University of Portsmouth
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Research Interests

Broadly, I am interested in how the physical environment affects biological processes and biotic interactions. I use both field and laboratory experimental approaches to quantify these interactions, especially concerning coastal species, with a particular focus towards bivalves and invasive species. By combining a range of field and laboratory experiments, my research aims to quantify interactions among species and allow predictions of invasive species ecological impacts as well as developing the understanding of biological responses to environmental variations.

Another interest of mine is how habitat complexity affects supply side ecology, which is important for population persistence and recovery. Following this, I have developed survey programs to quantify both commercially important and ecologically damaging shellfish populations in temperate and tropical systems. Further, I have been involved with work assessing unassisted recovery and reef formation of the native European oyster, *Ostrea edulis*.

Peer Reviewed Publications

(Google scholar: n = 11 publications, 97 citations, h-index = 5, i-10 index = 4)

Published:

- Xie, Y., Huang, E.Y.Y., Nong, W., Law, S.T.S., Yu, Y., Cheung, K., Li, Y., Wong, C.F., Yip, H.Y., Joyce, P.W.S., Chan, K.M., Chu, K.H., Russell, B.D., Falkenberg, L.J. & Hui, J.H. (2022) Population genomics, transcriptional response to heat shock, and gut microbiota of the Hong Kong oyster *Magallana hongkongensis*. *Journal of Marine Science and Engineering*, 10: 237.
- Coughlan, N.E., Cunningham, E.M., Cuthbert, R.N., Joyce, P.W.S.... Sylvester, F. (2021) Biometric conversion factors as a unifying platform for comparative assessment of invasive freshwater bivalves. *Journal of Applied Ecology*, 58: 1945-1956.
- Joyce, P.W.S., Smyth, D.M., Dick, J.T.A. & Kregting, L.T. (2021) Coexistence of the native mussel, *Mytilus edulis*, and the invasive Pacific oyster, *Crassostrea (Magallana) gigas*, does not affect their growth or mortality, but reduces condition of both species. *Hydrobiologia*, 848: 1859-1871.
- Kregting, L., Hayden-Hughes, M., Millar, R.V., Joyce, P.W.S. & Smyth, D.M. (2020) A first record of intertidal *Ostrea edulis* 3D structural matrices in Strangford Lough, Northern Ireland – an emergent reef? *Journal of Sea Research*, 163, 101927.

7. **Joyce, P.W.S.**, Dick, J.T.A. & Kregting, L.T. (2020) Lack of biotic resistance to an invasive bivalve irrespective of season or hydrodynamic disturbance. *Journal of Experimental Marine Biology and Ecology*, 528: 151382.
6. Smyth, D.M., Horne, N., Ronayne, E. Millar, R., **Joyce, P.W.S.**, Hayden-Hughes, M. & Kregting, L.T. (2020) Wild gregarious settlements of *Ostrea edulis* in a semi-enclosed Sea Lough: a case study for unassisted restoration. *Restoration Ecology*, 28: 645-654.
5. Dickey, J.W.E., Cuthbert, R.N., South, J., Britton, J.R., Caffrey, J., Chang, X., Crane, K., Coughlan, N.E., Fadaei, E., Farnsworth, K.D., Ismar, S.M.H., **Joyce, P.W.S.**, Julius, M., Lavery, C., Lucy, F.E., MacIsaac, H.J., McCard, M., McGlade, C.L.O., Reid, N., Ricciardi, A., Wasserman, R.J., Weyl, O.L.F., Dick, J.T.A. (2020) On the RIP: Using the Relative Impact Potential metric to assess the ecological impacts of invasive alien species. *Neobiota*, 55: 27-60.
4. Cuthbert, R.N., Dickey, J.W.E., Coughlan, N.E., **Joyce, P.W.S.** & Dick, J.T.A. (2019) Functional Response Ratio: advancing metrics for the prediction of invader ecosystem impacts. *Biological Invasions*, 21: 2543-2547.
3. **Joyce, P.W.S.**, Cuthbert, R.N., Kregting, L., Crane, K., Vong, G.Y.W., Cunningham, M.E., Dick, J.T.A. & Coughlan, N.E. (2019) Stay clean: direct steam exposure to manage biofouling risks. *Marine Pollution Bulletin*, 142: 465-469.
2. **Joyce, P.W.S.**, Dick, J.T.A. & Kregting, L.T. (2019) Relative impacts of the Pacific oyster, *Crassostrea gigas*, over the native blue mussel, *Mytilus edulis*, are mediated by flow velocity and food concentration. *Neobiota*, 45:19-37.
1. **Joyce, P.W.S.**, Dickey, J.W.E., Cuthbert, R.N., Dick, J.T.A. & Kregting, L.T. (2019) Using functional responses and prey switching to quantify invasion success of the invasive Pacific oyster, *Crassostrea gigas*. *Marine Environmental Research*, 145: 66-72.

Conference presentations

- **Joyce, P.W.S.** & Falkenberg, L.J., **Biodiversity, Ecology and Conservation of Marine Ecosystems 2022**, The impacts of conventional plastics and biodegradable alternatives on physiological function and trophic interactions of an important bivalve, *Perna viridis* (Oral presentation)
- Tsang, H.H.*, **Joyce, P.W.S.** & Falkenberg, L.J., **Biodiversity, Ecology and Conservation of Marine Ecosystems 2022**, Modified physiology and behaviour of a predatory dogwhelk under future warming.
- Cheng, Y.S.*, **Joyce, P.W.S.** & Falkenberg, L.J., **International Symposium on Marine Science and Engineering 2021 (virtual)**, Behavioural and physiological responses of tropical marine gastropods to marine heatwaves
- **Joyce, P.W.S.**, Cheng, Y.S. & Falkenberg, L.J., **ASLO Aquatic Sciences Meeting 2021 (virtual)**, Marine heatwave magnitude influences survival and behavioural responses, but not oxygen consumption, of tropical marine gastropods (Oral presentation)
- **Joyce, P.W.S.**, Dick, J.T.A. & Kregting, L., **Neobiota 2018**, The influence of waves and currents on growth rates of native and invasive bivalves (Poster)
- **Joyce, P.W.S.**, Dick, J.T.A. & Kregting, L., **International Meeting on Marine Research 2018**, Waves and currents affect growth rates of native and invasive bivalves (Oral presentation)
- **Joyce, P.W.S.**, Kregting, L. & Dick, J.T.A., **ASLO Ocean Sciences Meeting 2017**, The influence of oscillatory flow velocity on clearance rates of native and non-native bivalves (Oral presentation)

*student presenter

Awards & Grants

- 2022 **Chinese University of Hong Kong Research Fellowship Scheme** to support postdoctoral fellow HK\$445,980 (~£43,000)
- 2022 **Chinese University of Hong Kong Direct Grant for Research**. How ocean acidification and warming will shape the role of herbivory in structuring ecosystems. HK\$45,000 (Co-Investigator)

2022	Environment and Conservation Fund, Hong Kong. Invasive species of Hong Kong: Understanding the current distribution, spread, and ecological impacts. HK\$492,400 (~£47,000; Co-Investigator)
2018	QUB Emily Sarah Montgomery Travel scholarship, £300
2017	QUB Ray Armstrong Travel scholarship, £700
2017	British Ecological Society Travel scholarship, £500

Research skills

Field based

- Live-aboard experience on research vessel (five days) conducting benthic stock assessment
- Intertidal shore sampling including species identification, quantification, and biodiversity assessments
- Design and execution of field manipulation experiments
- Subtidal work using SCUBA: transect surveys of tropical coral reef and temperate coastal communities, sediment core sampling, deployment of various equipment such as Acoustic Doppler Current Profilers
- Boating operations (launch, recovery, helm under supervision) for a range of activities including fieldwork at remote sites

Laboratory based

- Design and execution of experiments including consumer-resource dynamics, investigation of physiological responses to abiotic change
- Water sampling and analysis (i.e. chlorophyll, total particulate matter, particulate organic matter, seawater nutrients)
- Ecological sample processing (e.g. condition indexing)
- Organism dissection
- Long term husbandry of bivalve stock under laboratory conditions
- Maintenance of microalgal stock for feeding bivalves

Data analysis

- Data analysis in R (data manipulation and analyses including linear models, functional response analysis, mixed effects models, beta regression, survival analysis, data plotting) and PRIMER/PERMANOVA
 - Experience setting up and analysing data from Acoustic Doppler Current Profilers and pressure sensors (for wave and current data measurements)
 - Streams software (R. Nokes, University of Canterbury, NZ) for particle tracking velocimetry
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Professional qualifications

- DMA Danish commercial SCUBA qualification
 - Fire safety training
 - Danish first aid certificate
 - HSE SCUBA (with full face mask; UK commercial SCUBA qualification)
 - RYA Powerboat level 2
 - RYA Short range VHF radio
 - First Aid at Work (UK)
 - Oxygen Administration
 - First Aid at Sea
 - PADI Rescue diver
 - Full, clean UK driving licence
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Teaching & Supervision

The Chinese University of Hong Kong

2022	Guest lecture for Conservation Biology (Invasive species, 4 th year module)
2021	Techniques in Marine Research postgraduate module. Demonstrating the use of software packages for statistical analysis of ecological data.

2021 Co-supervised two summer undergraduate research projects (Summer Undergraduate Research Program)
2020 – present Facilitating implementation of 4 PhD theses, 5 BSc undergraduate student projects

Queen's University Belfast

2016-2018 Demonstrator for Coastal and Oceanic Biology field course. (QUB)
2017 Nuffield Foundation research student supervisor. (QUB)

Professional Activities

Reviewer: Biology Letters, Marine Environmental Research, Biological Invasions, Marine & Freshwater Behaviour & Physiology, Journal of Marine Science & Engineering

Memberships: British Ecological Society, Association for the Sciences of Limnology and Oceanography

References

Dr Laura Falkenberg

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