

## Patrick Joyce

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### Employment

- Sep 2020 – present     **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  
Supervised by Dr Antony Knights  
**Thesis title: Biogenic reef destruction and changes to localised flow: Impacts on recruitment success?**
- Sept 2010 – July 2013     **BSc (Hons) Marine Biology**, University of Portsmouth
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### Research Interests

Broadly, I am interested in how the physical environment affects biological processes, biotic interactions and attempting to quantify these interactions, especially concerning bivalves, biogenic reefs and invasive species. Most recently, I have applied my skills to quantifying both commercially important and ecologically damaging shellfish populations as well as developing and assessing the ecological impacts of potential removal tools for shallow invasive oyster populations. Throughout my PhD, I developed an interest in consumer-resource interactions (mostly predator-prey and bivalve-plankton) and how the physical environment, namely hydrodynamic variation, mediates these. By combining a range of laboratory and field experiments, my research aims to quantify such interactions and allow predictions of invasive species impacts as well as developing the understanding of bivalve physiological responses to environmental variations. Another interest of mine is how biogenic reef morphology and complexity affect supply side ecology, which are important for biogenic reef formation, persistence and recovery. This interest led me to collaborate with work assessing unassisted recovery of reef formation of the native European oyster, *Ostrea edulis*.

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### Peer Reviewed Publications

#### Published:

8. 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.

#### **In review:**

- Coughlan, N.E., Cunningham, E.M., Cuthbert, R.N., **Joyce, P.W.S.**, et al. Weighing in: biomass conversion factors for invasive freshwater bivalves. *Journal of Applied Ecology*.
- **Joyce, P.W.S.**, Smyth, D.M., Dick, J.T.A. & Kregting, L.T. Coexistence of the native mussel, *Mytilus edulis*, and the invasive Pacific oyster, *Crassostrea gigas*, does not affect their growth or mortality but reduces condition of both species. *Hydrobiologia*.

#### **In preparation:**

- Freitas, P.S., Agüera, A., **Joyce, P.W.S.**, Petersen, J.K., Saurel, C., Nielsen, P. Contrasting evolution in Pacific oyster, *Crassostrea gigas*, populations in Denmark.

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#### **Conference presentations**

- **Neobiota 2018**, The influence of waves and currents on growth rates of native and invasive bivalves (Poster)
- **International Meeting on Marine Research 2018**, Waves and currents affect growth rates of native and invasive bivalves (Oral presentation)
- **ASLO Ocean Sciences Meeting 2017**, The influence of oscillatory flow velocity on clearance rates of native and non-native bivalves (Oral presentation)

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#### **Awards & Grants**

2018	QUB Emily Sarah Montgomery Travel scholarship, £300
2017	QUB Ray Armstrong Travel scholarship, £700
2017	British Ecological Society Travel scholarship, £500

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#### **Teaching & Supervision**

2016-2018	Level 2 Coastal and Oceanic Biology. Demonstrator: rocky shore identification, plankton sampling methods, experimental design and basic data analysis in R.
2017	Nuffield Foundation research student supervisor.

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#### **Research skills**

##### **Field based**

- 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 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 and tending to kelp farming sites
- Ground truth sampling for drone surveys of shallow (<1m depth) oyster beds

##### **Laboratory based**

- Design and execution of consumer-resource dynamics experiments

- Water sampling and analysis (i.e. chlorophyll, total particulate matter, organic particulate matter, seawater nutrients)
- Ecological sample processing (e.g. condition indexing)
- Dissections of bivalves for histological and molecular detection of parasites
- Long term husbandry of bivalve stock under laboratory conditions
- Maintenance of microalgal stock for feeding bivalves

#### **Data analysis**

- Programming languages: R (data manipulation and analyses including linear models, functional response analysis, mixed effects models, beta regression, data plotting)
- 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
- Diving related first aid certificate (Denmark)
- HSE SCUBA (with full face mask; UK commercial SCUBA qualification)
- RYA Powerboat level 2
- RYA Short range VHF radio
- Oxygen Administration
- First Aid at Sea
- PADI Rescue diver
- Full, clean UK driving licence

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#### **Public outreach**

2016-2018      Queen's University Marine Laboratory open days.

2018              Schools-University Partnerships Initiative (SUPI): introducing children to science and engineering

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