The following submission to the Joint Committee on Housing, Planning & Local Government on the 'Prohibition of Micro-Plastics Bill 2016' is provided by Dr Audrey Morley (not in attendance) and Dr Kevin Lynch (presenting the material). Both academics are scientists of the physical environment based in the Discipline of Geography at NUI Galway. Their field is not 'micro-plastics', but they have employed their expertise in coastal and marine processes to supervise graduate student research projects in the area of micro-plastics. The students have graduated from the Discipline's MSc Programme in Marine and Coastal Environments over the last three years. The submission presents an overview of their research, highlighting ***the presence of micro-plastics in shellfish, nephrops and marine sediments*** in the sites studied on Ireland's west coast.

1) Limited evidence of micro-plastics in Ireland's environment

Prior to 2014 there was no published work on micro-plastics in Irish coastal environments. From this point on Dr Amy Lusher and the Marine and Freshwater Research Centre, Galway-Mayo Institute of Technology published a series of papers on micro-plastics in marine waters and in marine fish and birds. Internationally the literature is more extensive and certainly pointed to micro-plastics being a potential risk in Ireland's marine and coastal environments. This formed the rationale for developing graduate projects that would seek to quantify the level of micro-plastic contamination in selected areas. A summary of each study follows.

2) Peer-reviewed Publication

Martin, *et al.* (2016) gathered box core samples during two R.V. Celtic Explorer cruises. Micro-plastics were identified and counted according to protocols developed by Lusher, *et al.* (2014). 97% of recovered microplastics were found to reside shallower than 2.5 cm sediment depth. All recovered microplastics were classified as secondary micro-plastics; fibres being the principal form of micro-plastic pollution (85%), followed by broken fragments (15%). The range of polymer types recovered suggests a variety of sources. Micro-plastics in this benthic zone could potentially be consumed by fauna either through filter feeding or by animals that feed on similar sized particles of organic material mistakenly consuming the micro-plastics.

3) Overview of unpublished work

Loughlin and Morley (2018) confirmed the robustness of the methodology by comparing new cores from Galway Bay, Ireland to Martin *et al.* (2017) results from similar locations.

Sonny and Morley (2016) gathered *Nephrops norvegicus* (also known as Dublin Bay prawns) samples from Galway Bay fishing grounds to investigate micro-plastics occurrence. Micro-plastic

contamination was found in the intestinal tract of the Nephrops. Although this part of the animal is not usually eaten, transfer of chemical contaminants from the intestinal tract into the muscle tissue could be a risk factor.

Casserly and Lynch (2015) investigated the possibility that microplastics could be a risk factor in *Mytilus edulis* (also known as the common mussel) around Galway Bay. Samples of both wild stocks and off the shelf mussels were examined, with micro-plastics confirmed present in all samples. As the whole of a mussel is consumed this may be a cause for concern and suggests the need for further research. Wild samples taken from closer to the wastewater treatment outflow on Mutton Island showed higher levels of contamination, than those from Rusheen Bay.

4) Summary and recommendations regarding the proposed 'Prohibition of Micro-Plastics Bill 2016'

Based on the evidence presented here, micro-plastics are present in Ireland's coastal and marine environments. Based on international research this is likely to pose a risk to human health and habitat quality. More research is required to quantify the level of contamination, the sources of the micro-plastics, and the degree of risk for Ireland. In the meantime, however, the evidence strongly suggests that reducing the quantity of micro-plastics entering Ireland's coastal and marine waters should be prioritised. In our opinion, the 'Prohibition of Micro-Plastics Bill 2016'will act as a good starting point in achieving this goal.

Peer-reviewed Publication

Jake Martin, Amy Lusher, Richard C. Thompson & Audrey Morley (2016) Deposition and accumulation of microplastics and pollutants in marine sediments from the Irish continental shelf, *Scientific Reports*, volume 7, Article number: 10772(2017), doi:10.1038/s41598-017-11079-2

Unpublished MSc Theses

Casserly, J. (2015) Evidence of micro-plastics in the Irish marine environment, *Unpublished MSc Thesis*, NUI Galway [Supervisors & Advisors: Lynch, K. & Lusher, A.]

Loughlin C. (2017) Micro-plastic pollution in marine sediments surrounding Iceland, *Unpublished MSc Thesis*, NUI Galway [Supervisor: Morley, A]

Sonny, F. Z. (2016) Micro-plastics and heavy metals in Nephrops norvegicus and their potential impact to the commercial market, *Unpublished MSc Thesis*, NUI Galway [Supervisors & Advisors: Morley, A & Lusher, A.]

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