

Surveillance, Monitoring and Biological Control of insect vectors in NI and epidemiology of diseases they harbor

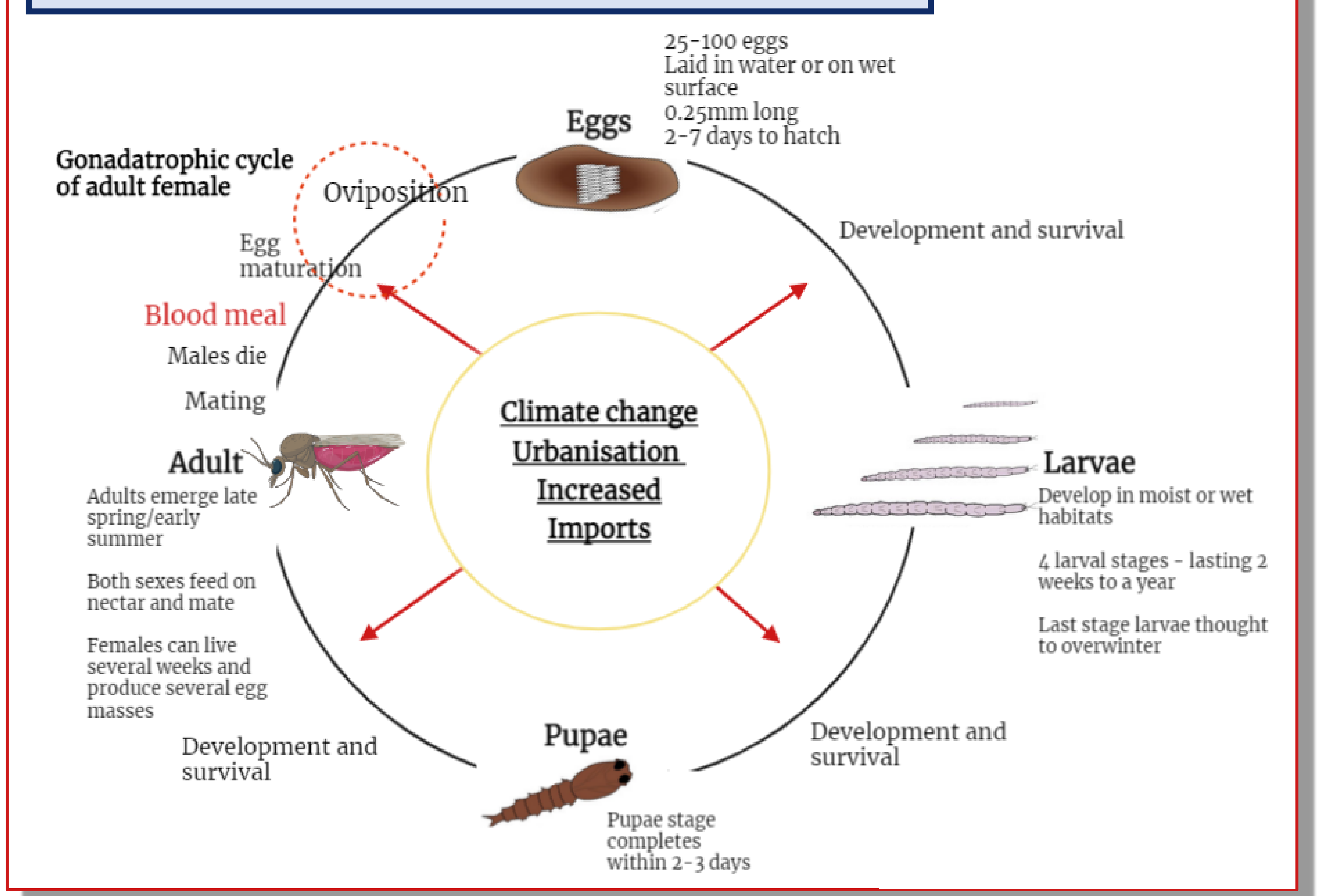
Victoria Cairnduff¹, Professor Jaimie Dick¹, Dr Sarah Heylar¹, Dr Archie K. Murchie², Dr Michael McMenemy², Dr Stephen Jess²
¹Queen's University Belfast School of Biological Sciences, ²Agri-Food and Biosciences Institute

Background

- Annually, diseases spread through insect vectors cause more than 1 billion infections, 1 million deaths, and globally they contribute **17%** of all loss of life, illness and disability¹
- Bluetongue affects ruminants and can cost **£100 Million** per annum in **central Europe**²
- Agricultural industries in NI are vital, with a total Gross output of £2.23 billion in 2020³
- Climate change, anthropogenic change and increased imports increase the risk to agricultural industries
- Biological control of vectors throughout their lifecycle can be an effective disease intervention



Biting midge Lifecycle

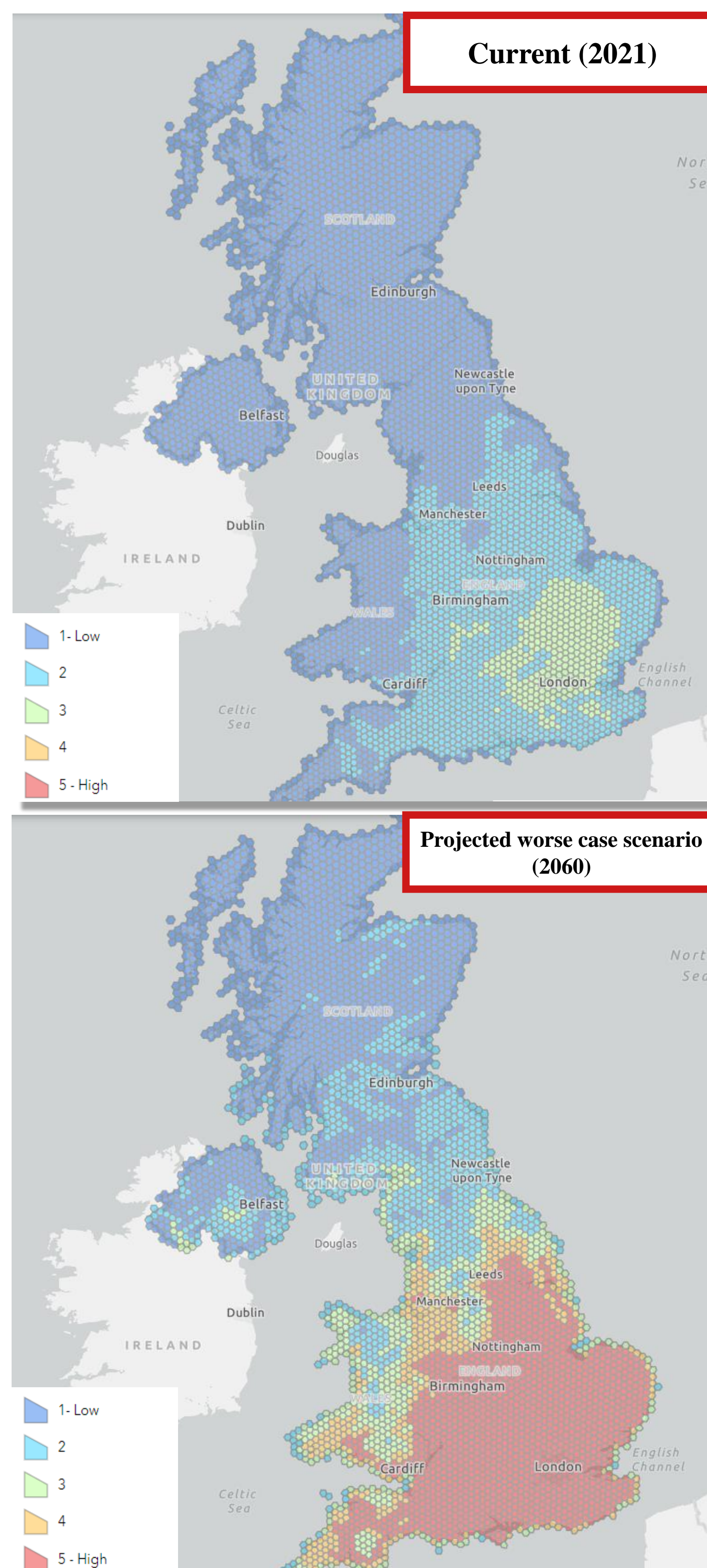


Aims

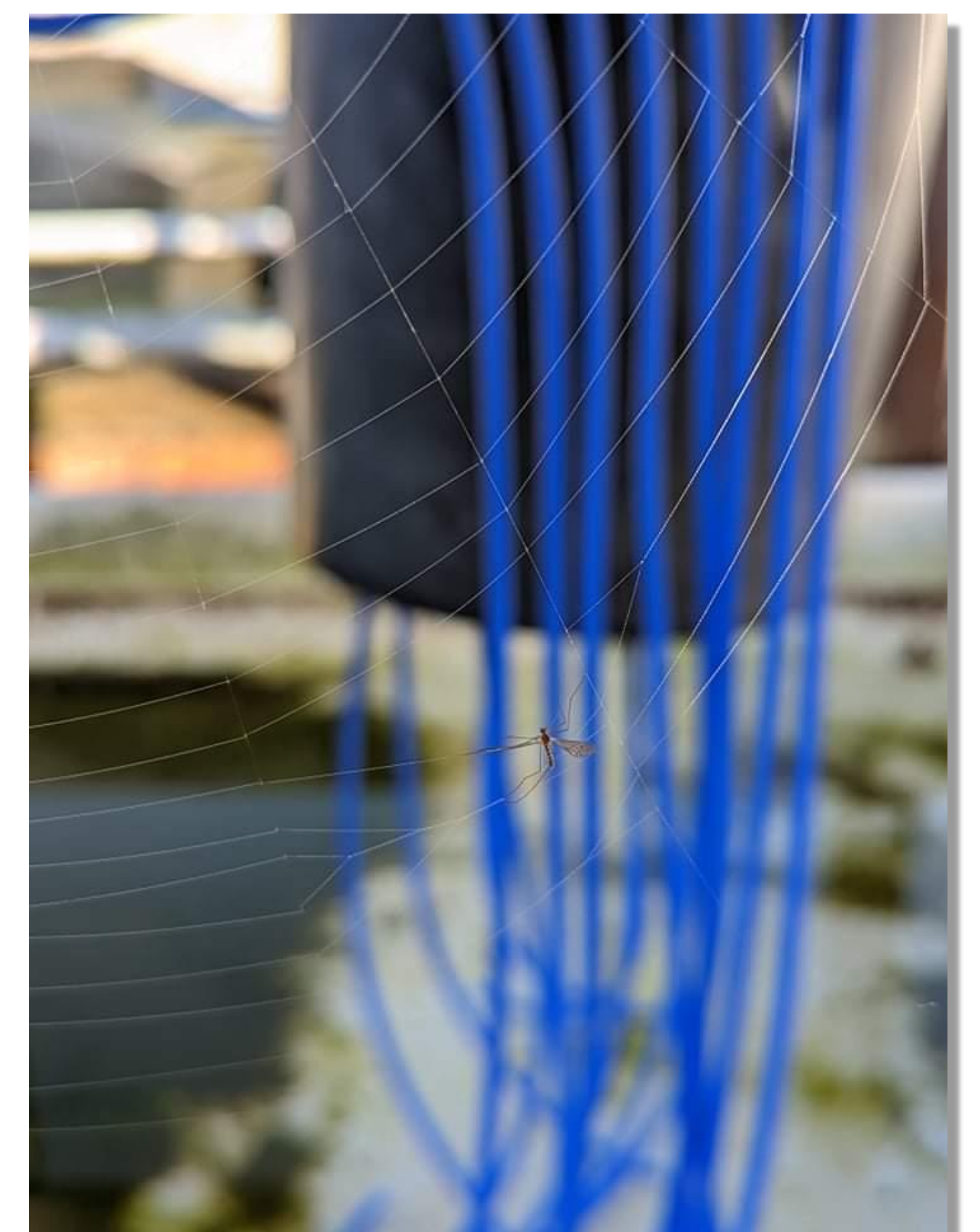
- Surveillance and monitoring of insect vectors of viral diseases in NI
- Investigate the epidemiology of disease spread by insect vectors and the increase with anthropogenic and climatic change
- Investigate and develop native species of predator (and combinations) as effective biological control agents for interventions that will maintain lower vector populations.
- Provide policymakers with appropriate information to prepare strategies to build resilience towards diseases in a more urbanised warmer world.



Climate change predictions on humidity and overheating



Surveillance: Mosquito caught in an orb weavers web (15/11/21)



Methodology

- Investigation into the populations of vectors (mosquito/biting midge) in NI through surveillance of spider webs and light/CO2 traps, monitoring their capacity to harbour economically important diseases like Bluetongue and West Nile fever through PCR.
- Novel bio-control of insect vectors utilising native predators will also be developed using our Relative Control Potential metric and best predator 'combos' will be determined.



Conclusion

- Vector species will spread with climate and anthropogenic change posing increasing risk
- Agriculture is vital to the NI economy and is threatened through vector-borne disease

Possible consequences of climate change

- Climate change can increase threat of disease outbreak through:
 - Introduction of alien species⁴
 - Decreasing overwintering times⁵
 - Altering phenology, including that of natural predators⁶
 - Increasing reproduction rate and volume of eggs produced⁷
 - Increasing body size- allows for further dispersal⁸
 - Decreasing incubation periods of disease⁴



Victoria Cairnduff, BSc Marine Biology
 vcairnduff01@qub.ac.uk

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