CALIBRATE 2024 PARTICIPANTS WORKSHOP

BLUE ECONOMY COOPERATIVE RESEARCH CENTRE

Australian Government
Department of Industry, Science and Resources
AusIndustry
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Exploiting oysters as an eDNA sampling platform

Brett Bolte[1,2,3,4]

Supervised by: **Kylie Pitt[2,3], Joseph DiBattista[3], Andrew Bissett[1], Pascal Craw[1], James Wynne[5], Carmel McDougall[3,4,6]**

[1]CSIRO Environment, Hobart, Australia, [2]Blue Economy CRC, Launceston, Australia, [3]Griffith University School of Environment and Science, Nathan, Australia, [4]Australian Rivers Institute, Nathan, Australia, [5]CSIRO Agriculture and Food, Hobart, Australia, [6]University of St. Andrews, Scottish Oceans Institute, St. Andrews, Scotland

I undertook a PhD on this topic with the Blue Economy CRC because I am interested in the use of molecular technologies, namely eDNA, as a useful method for industry partners.

Following my PhD, I plan to continue developing eDNA methodologies to facilitate advanced molecular monitoring in fin fish and oyster aquaculture industries.

eDNA to address industry needs:

- Environmental DNA is DNA left behind in the environment from an organism allowing for detection via downstream molecular methods
- Molecular methods are highly sensitive, cost-effective and less labour intensive than traditional methods
- Many farms have started the transition to molecular techniques for monitoring

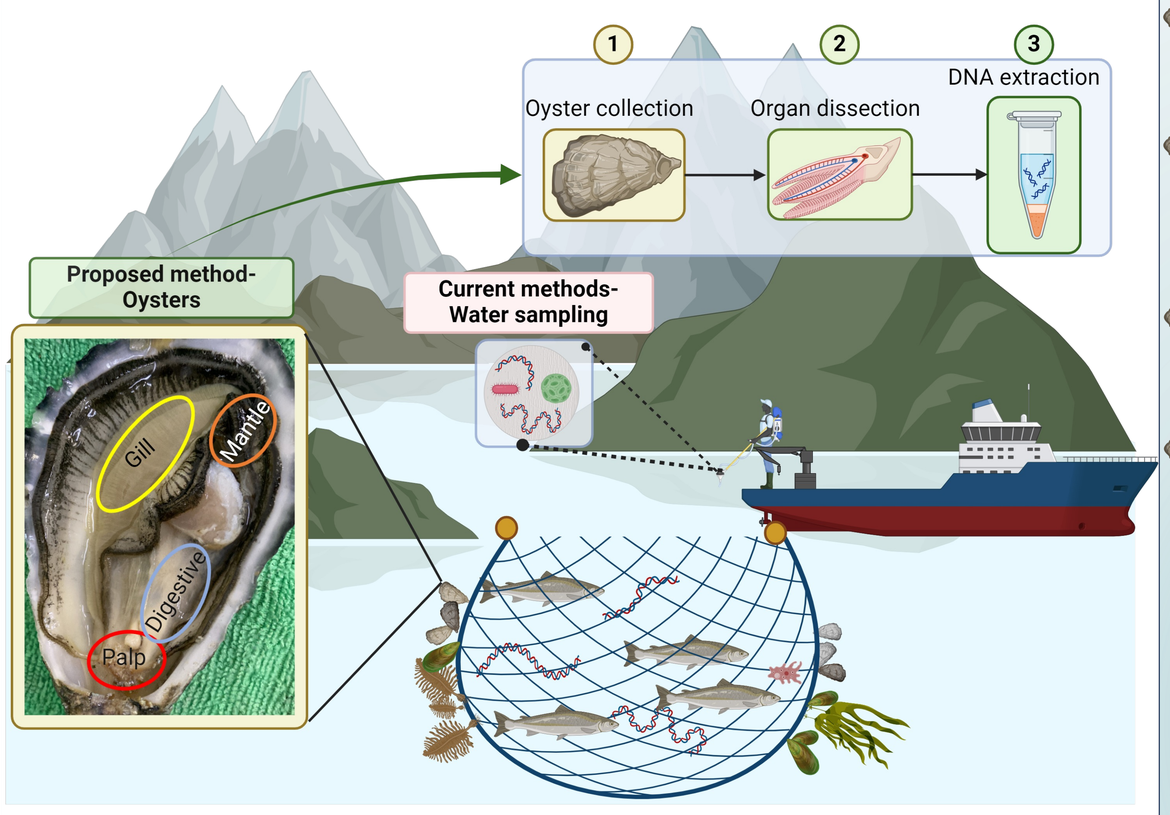
Why oysters?

- Extremely efficient filter feeders making them great candidates for natural samplers
- Accumulate DNA within their tissues from the surrounding water
- Commonly found biofouling aquaculture infrastructure

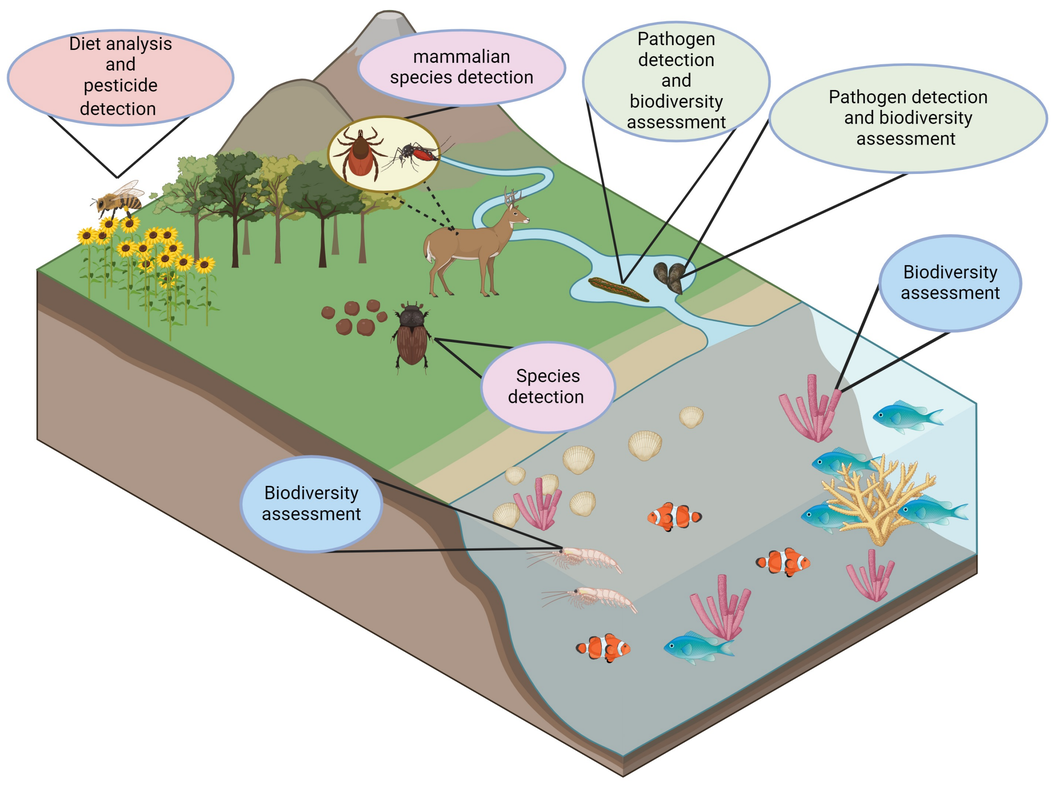
PhD outcome:

The outcome of this PhD will allow for the use of oysters to detect eDNA, namely from aquaculture pathogens. Results have indicated the ability for oysters to detect *Neoparamoeba perurans* in controlled experiment as well as DNA from other metazoan species. This validation of oysters as natural samplers signals the potential use of these organisms as natural samplers, *in situ* on aquaculture leases.

Proposed use of oysters as eDNA samplers on a fish farm



Current uses of known natural samplers



Benefits to offshore aquaculture and the Blue Economy CRC:

- New method for pathogen surveillance and monitoring
- Sampling can be fit in with regular biofouling cleaning, rather than needing to train staff on water collection and pathogen screening of stock
- Accumulation of DNA within tissues can inform of severity of pathogen prevalence.
- Timely detection and management of pathogens via natural samplers offers increased aquaculture sustainability

Bivalves vs. traditional water samples:

While bivalves offer some selectivity in their feeding behaviors, different parts of the organism may be sampled to determine the relative "real time" presence of potential pathogens. For example, the mantle is the first to come in contact with DNA from the environment. DNA then travels to the gills, where particles and DNA can stimulate a response to create two times of mucous which will later be ingested or egested. This mucous then travels through the palps or the primary sorting organ. Unwanted particles are packaged and removed as pseudofaeces. This ability to be able to gather so much information from a single organism can be invaluable to the aquaculture industry.

Traditional water samples, however, only represent a single time point. Additionally, the DNA collected is subject to the pore size of the filter used causing DNA to either be missed, or short temporal scales.

oysters TASMANIA

Griffith UNIVERSITY

CSIRO