Bayesian Ecosystem and Natural Capital Models to Understand the Effect of Offshore Renewables on the Marine System

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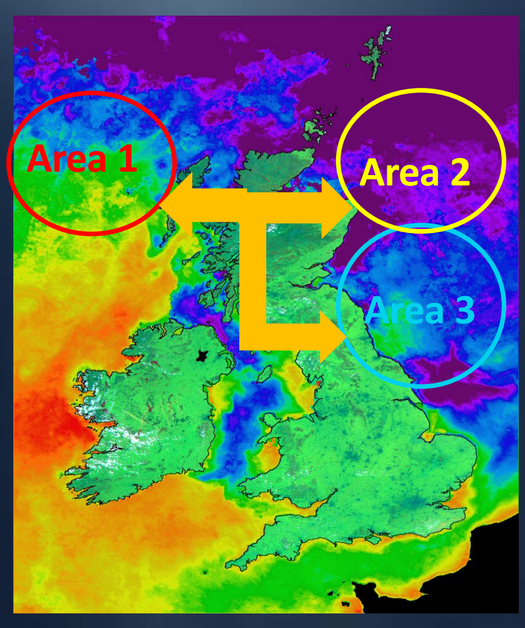
1. Introduction

- The UK is at the forefront of the development, adoption and export of offshore renewable energy (ORE) technologies.
- Climate change is a major concern, leading to predictions of a global temperature rise of 3–5 °C within 50 years.
- Understanding how usage of spatial habitat of highly mobile marine species may change with climate change and large-scale energy extraction devices is essential for sustainable management of their populations.
- Computational ecosystem models to provide indications of how the ecosystem is likely to change.
- Model parameterization to explore a range of scenarios to investigate optimal locations and design of ORE technologies.
- Natural capital models need to be developed to forecast the ecological and socio-economic benefits and trade-offs that will occur with the operation of ORE technologies and future climate change, which is vital for the sustainable management of all uses of our marine ecosystems.

2. Bayesian Networks

Bayesian networks (BNs) are models that graphically and probabilistically represent relationships among variables.

- BNs can capture nonlinear, dynamic and arbitrary combinatorial relationships.
- BNs efficiently integrate variables presented at different scales.
- Empirical data can be combined with existing knowledge.
- BNs integrate the uncertainty associated with species dynamics due to the action of multiple driving factors and can be used for environmental decision making.
- BNs can use different 'currencies': ecological, economic (natural) and social capital.



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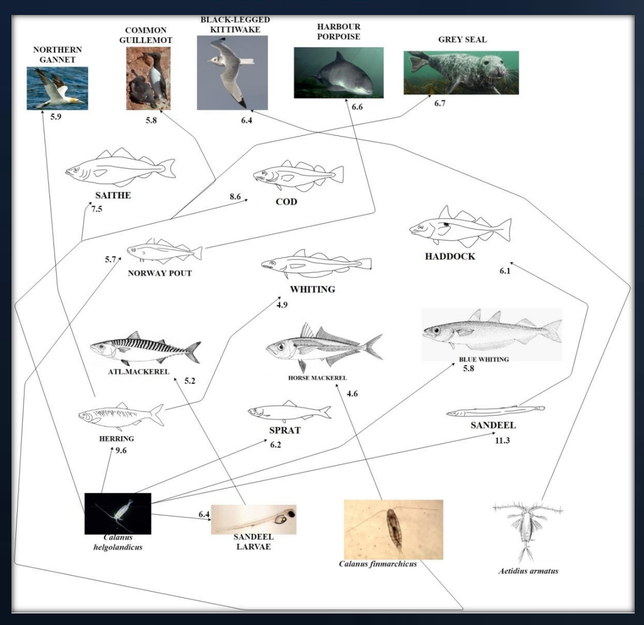

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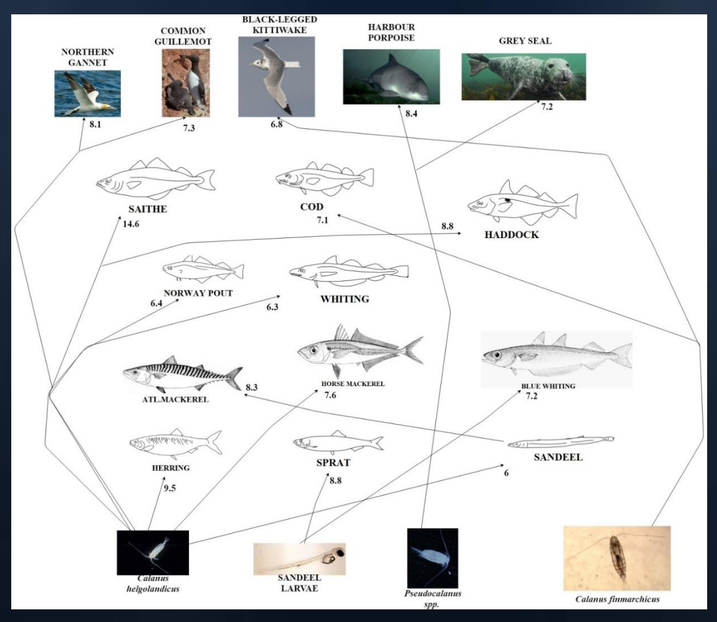

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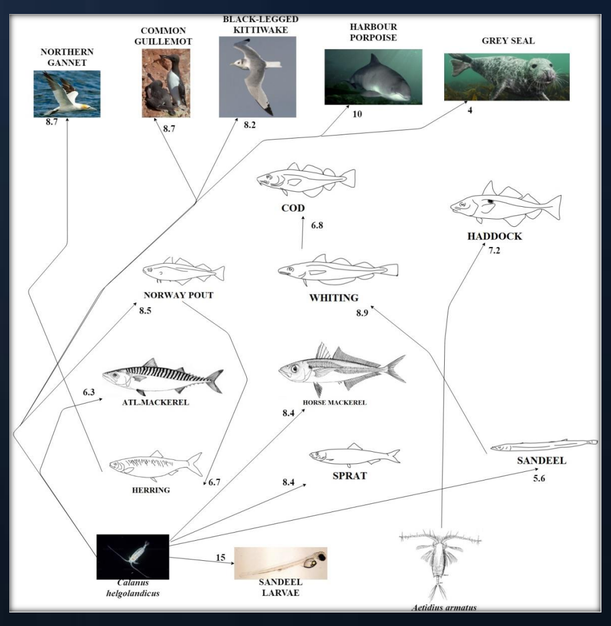
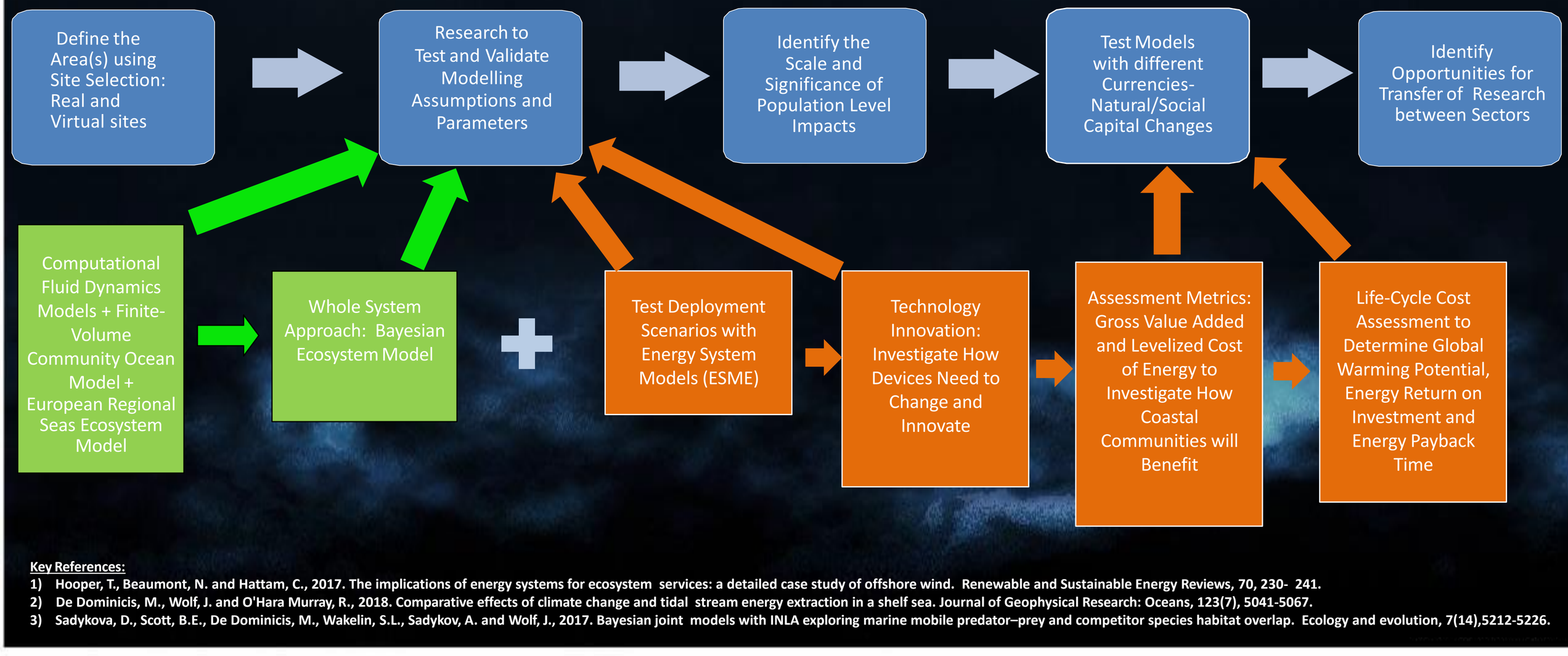


3. Bayesian Ecosystem and Natural Capital Models and ORE Supergen

- Develop and validate Bayesian ecosystem models to support the confident prediction of the environmental impact of ORE technologies.
- Opportunities to work with government establishments to design coastal management plans that facilitate sustainable use of the environment, benefiting locals and the global community.



Key References:

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