SeaChanges: a training network bridging archaeology and marine biology


understanding past marine resource use / assessing past impact / informing the present

The need for long-term perspectives to inform marine management is increasingly clear, but disciplinary silos continue to hold back integration of archaeological data and approaches to this end. SeaChanges is a new training and research network on marine historical ecology that has been established to address this challenge. SeaChanges brings together experts from seven leading institutions in archaeology, zoology, marine ecology and conservation biology, united by our recognition of this gap. Supported by 29 partner organisations across a total of 15 countries, we will pool our disparate skills and experience in an integrated training programme, forging a new generation of researchers who from the outset of their careers have the interdisciplinary understanding and skills required to operate confidently at the interface of archaeology and marine biology. Our primary aims are to:

1. Improve understanding of the time depth of human use and impact on key European marine species
2. Train a cohort of researchers who can communicate across disciplinary and sectoral boundaries
3. Increase cross-disciplinary and cross-sectoral awareness of the potential of long-term perspectives in marine ecology

The network is comprised of 24 distinct but complementary PhD projects, covering species from herring to sperm whale, timescales from decades to millennia, and all of Europe’s seas and beyond. These are supported by a series of advanced cohort-wide training workshops that will take place throughout the 3-year programme, covering topics from marine ecology and archaeological sampling to public outreach and media training. This poster presents the research to come over the next three years.

ESR 1: Using ancient DNA to discover the legacy of historic Atlantic cod exploitation

Atlantic cod (Gadus morhua) has profound historical and cultural value for communities around the North Atlantic, with a millennia-long tradition of exploitation making it difficult to quantify the extent of human impact. Laurens will analyse genome-wide data from environmental samples across NW Europe to explore links between fisheries, population trends and anthropogenic selection.

ESR 2: Noise into signal: ID challenges and the medieval fishing revolution

Gadids were important trade goods in medieval Europe, but their most abundant remains—salmon—are often omitted from fish faunal studies due to taphonomic challenges. Rachel will develop protocols for replicable IDs using quantitative image analysis of parietal scales to assess changes in size and age structures explained during the commercialisation of fisheries.

ESR 3: Tracing the early origins of Atlantic herring trade using aDNA

Herring (Clupea) has supported an important pre-European trade network for centuries, the origins of which are obscure. This trade was influenced by dynamic climate in abundance, probably due to climate fluctuations.ware will sequence & annotate data from herring teeth & bones to identify source populations and elements of historic trade routes, to assess long-term variations of annual vs. spring spawning of herring in association with climatic time series.

ESR 4: Flatfish and the origins of European Marine fishing

Sea fishing was a mainstay of Western Europe until a rapid shift in whaling occurred. The size of this shift is unclear, and due to problems identifying key species, of which Pollack is potentially existent. Richard will develop ZooMS & ancient DNA protocols for identifying species, age & size to unlock marine flatfish catches. He will explore the historical connection fishing and primary to secondary specific timeframe of sourcing data to track potential impacts.

ESR 5: Tracking the decline of salmon in the North Sea basin

Historical data implicates declining & vanishing communities of salmonids stocks around much of the North Sea. The potential ecological ramifications to explore this hypothesis further is limited by difficulties in distinguishing pre-industrial data from modern studies. Liz will use ZooMS & aDNA to quantify size & age changes core biogeography species & reconstruct productivity in the North Sea for the latter. Potential impacts will be assessed via aDNA.

ESR 6: Sedimentary fish archives and diadromous taxa

Diadromous fish are vulnerable to pollution of estuaries, and the extent to which these species can be used as a proxy for understanding past environmental change is unclear. The extent to which the decline in salmon is due to climate change is also unclear. This project aims to answer both of these questions using diadromous and non-diadromous diadromous taxa, and to understand the interactions between environmental and socio-economic factors. This project is funded by the European Union’s EU Framework Programme for Research and Innovation Horizon 2020 under Grant Agreement No. 813383.

Chronological scope of projects

ESR 15: Exploitation and collapse of the Black Sea marine fauna

Marine resources appear to have played an important role in diets across the Black Sea for millennia, as documented by palaeo-ecological and archaeological studies. This project will study the impact of exploitation and environmental change on early Black Sea coastal and marine species, in particular fishes such as anchovy and hake, to better understand the human exploitation on connectivity and effective population size in the eastern Mediterranean over 1,000–500-year periods.

ESR 14: Green sea turtle population dynamics and foraging ecology in the ancient Mediterranean

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ESR 13: Foraging ecology and catch size in Mediterranean groupers c. 2500 BC–AD 500

This project prese...