



SeaChanges: a training network bridging archaeology and marine biology

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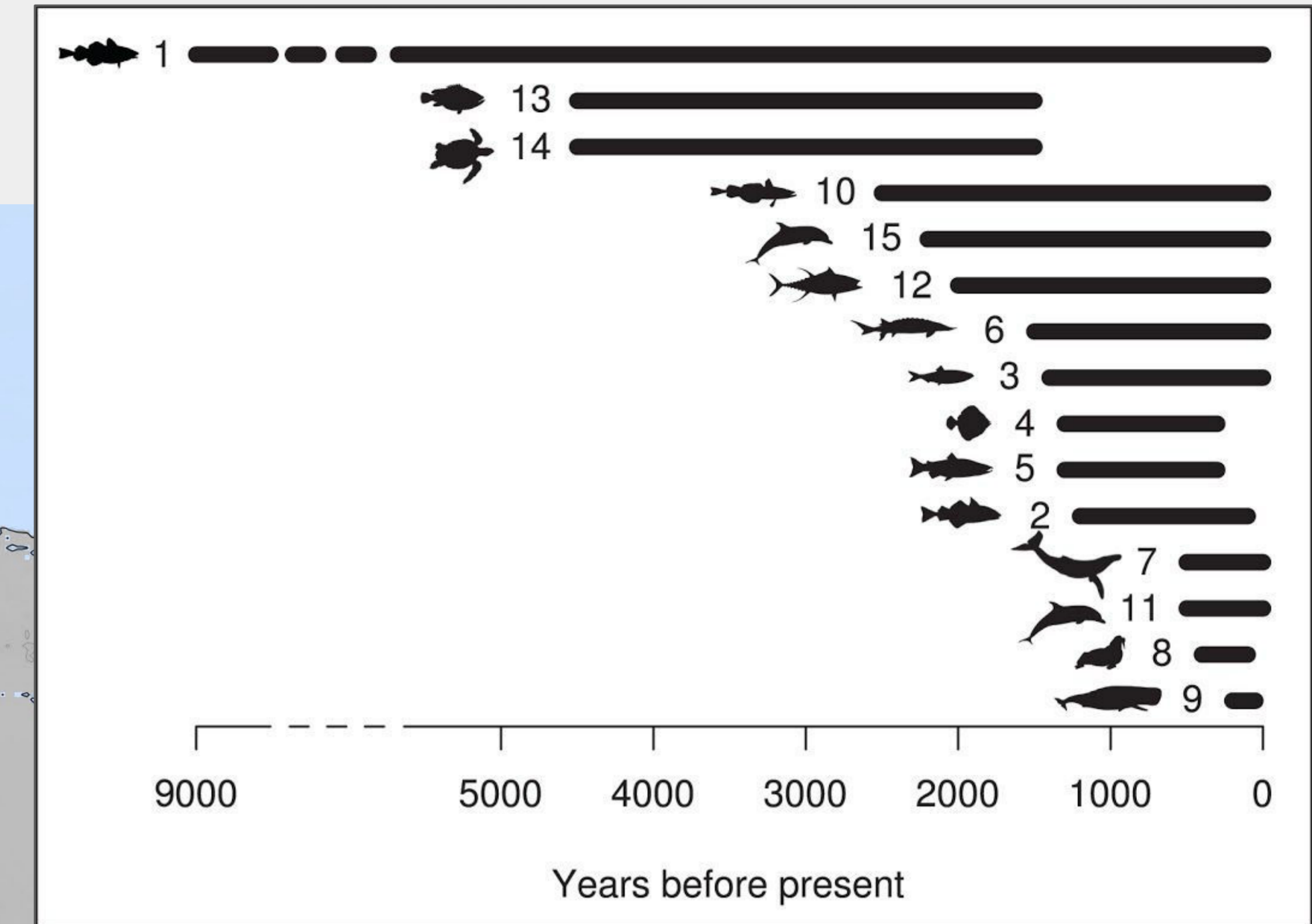
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SeaChanges



Chronological scope of projects



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 of 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 composed of 15 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 previews the research to come over the next three years.

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



Lourdes Garcia (Oslo)

Atlantic cod (*Gadus morhua*) is of profound value for communities around the North Atlantic, with a millennia-long history of exploitation making it difficult to quantify the extent of human impact. Lourdes will analyse genome-wide data from archaeological samples across N&W Europe to explore links between fisheries, population trends & anthropogenic selection.



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



Rachel Blevis (Cambridge)

Gadids were important trade goods in medieval Europe, but their most abundant remains—vertebrae—are often omitted from fish-length studies due to ID challenges. Rachel will develop protocols for replicable IDs using quantitative image analysis of vertebrae, to assess changes in taxa and sizes exploited during the commercialisation of fisheries.



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

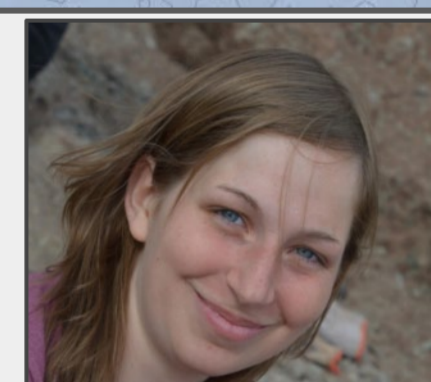


Lane Atmore (Oslo)

Herring (*Clupea*) has supported an important pan-European trade network for centuries, the origins of which are obscure. This trade was influenced by dramatic cycles in abundance, probably due to climatic fluctuations. Lane will use genomic & isotope data from herring dated AD 700 onwards to identify source populations and extents of historic trade routes, to assess long-term variations of autumn vs. spring spawning of herring in association with climatic time series.



ESR 4: Flatfish and the origins of European Marine fishing

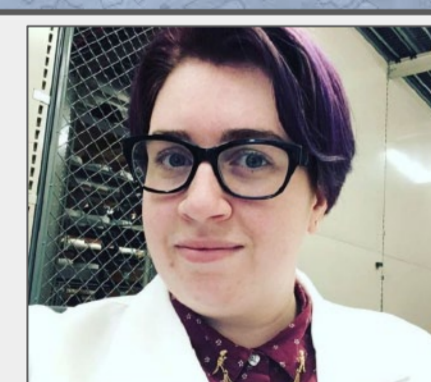


Katrien Dierickx (York)

Sea fishing was rare in much of western Europe until a rapid rise in the 10-11th century. The role of flatfish in this process is unclear due to problems identifying key species, of which flounder is potentially estuarine. Katrien will develop ZooMS & GMM ID protocols for flatfish vertebrae and use stable isotopes (C,N,S) to distinguish marine/estuarine catches. She will explore the transition to marine fishing and produce taxon/habitat-specific time-series of size/age data to track potential impacts.



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

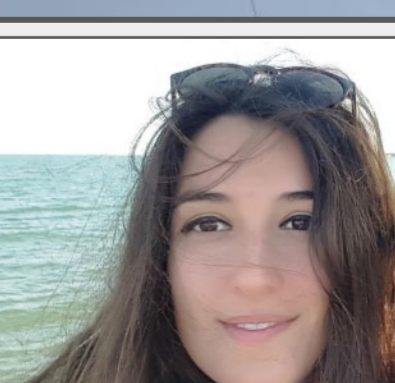


Liz M. Quinlan (York)

Historical data implicates damming & mill construction in the collapse of salmon stocks around much of the North Sea. The potential of archaeological remains to explore this hypothesis further is limited by difficulties in distinguishing salmon (*Salmo salar*) from trout (*S. trutta*), and the possibility of imports. Liz will review finds from around the North Sea, using ZooMS & GMM to refine IDs and developing a mobile app for the latter. Potential imports will be assessed via aDNA.



ESR 6: Sedimentary fish archives and diadromous taxa

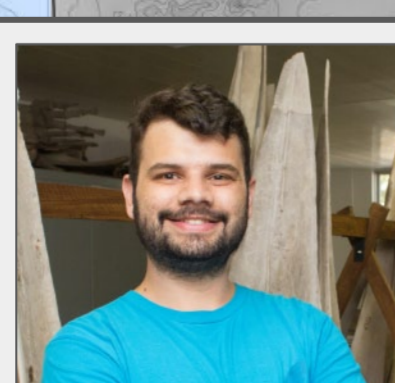


Giulia Zampirolo (Copenhagen)

Diadromous fish are vulnerable to pollution & freshwater habitat modification as well as to fishing pressure. The presence of various taxa in Europe's rivers is known to have contracted, but the time depth of this decline is unclear. ESR6 will use sedimentary aDNA to build time-series of diadromous fish presence from Cores in the North Sea and Danube basins.



ESR 7: Impacts of industrial whaling: scale, ecological & evolutionary legacies



Fabrizio Furni (Groningen)

Large baleen whales were driven to near-extinction by 16-20th C industrial whaling. Pre-whaling abundances are unclear, as are impacts on population structure, connectivity & adaptive variation. Fabrizio will conduct genomic & isotopic analysis of historical samples from whaling stations in comparison with modern data.



ESR 8: Exploitation of Atlantic walrus by European whalers, c. AD 1600-1900

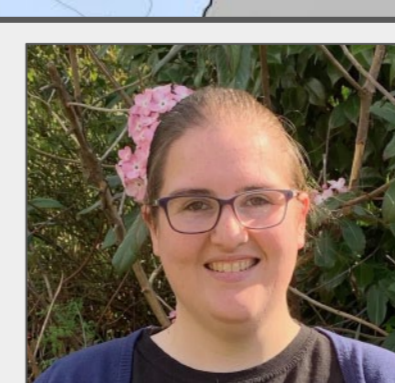


Emily Ruiz Puerta (Groningen)

Walrus were opportunistically hunted by 17-20th C European whalers around Greenland. Emily will assess the impact of this hunting on walrus genetic diversity, using (a) bones from Palaeo- & Neo-Inuit archaeological sites and (b) historical whaling logbooks in comparison with modern stock estimates.



ESR 9: Scrimshaw: unlocking the cultural and biological archive of sea mammal art

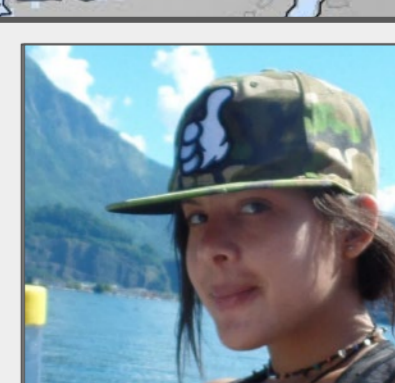


Laura Corto (Cambridge)

Scrimshaw—carving of sperm whale teeth—flourished among mid-19th C whalers, including a London-based South Sea fishery. Laura will apply genomic, stable isotope, and growth-layer analyses to this unique archive to re-evaluate the time depth of the extremely low heterogeneity seen in modern sperm whales.



ESR 10: Hindcasting to forecast: archaeobiology of the European hake fisheries



Maria Lucia Rivera (IIM-CSIC, Vigo)

Understanding hake (*Merluccius merluccius*) population structure & resilience requires more time depth than fisheries data can provide. To explore the long-term impact on Iberian hake Fisheries, ESR10 will pair morphometric and genetic analyses of archaeological bones with historical catch data and modern hake samples.



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

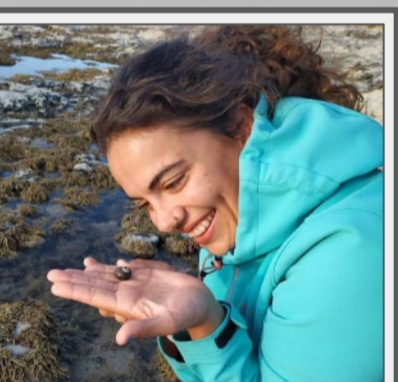


Magie Aiken (Copenhagen)

Marine resources appear to have played an important role in diets around the Black Sea for millennia, as documented by archaeological finds. How did exploitation and environmental change affect Black Sea cetaceans & key fish species, shaping the current ecosystem. ESR15 will review zooarchaeological and modern ecological data before applying genomic, proteomic, & isotopic analyses to track changes in genetics, demography, and trophic interactions of cetaceans, turbot, & anchovies.



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

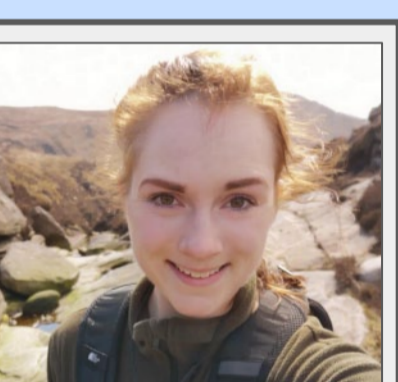


Willemien de Kock (Groningen)

Sea turtles are endangered marine flagship species, whose effective conservation relies on knowledge of ecology and past population dynamics. Willemien will combine genetic & stable isotope analyses of ancient *Chelonia mydas* remains to assess the effects of human exploitation on connectivity and effective population size in the eastern Mediterranean c. 2500 BC–AD 500.



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

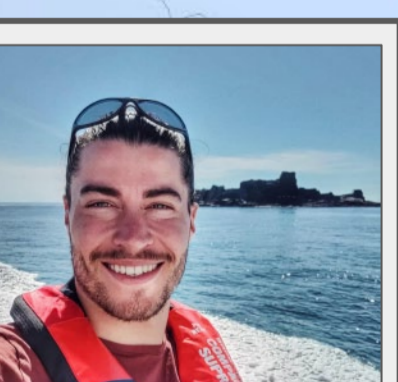


Rachel Winter (Groningen)

Mediterranean groupers (*Epinephelus*), a keystone taxon for rocky shorelines, are under pressure from overfishing and habitat loss. Groupers were fished throughout the Holocene, with evidence peaking in periods of urbanisation & expanding trade. Rachel will use ZooMS, metrics, & stable isotopes to reveal the long-term ecological history of eastern Mediterranean groupers.



ESR 12: Environmental drivers and genetic diversity of Atlantic & Mediterranean bluefin tuna

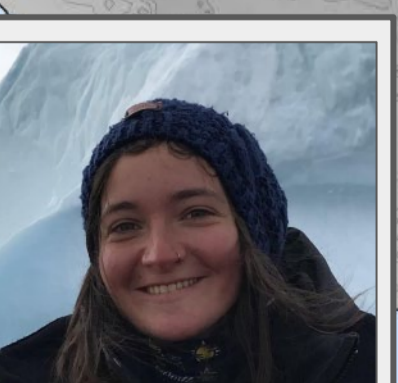


Adam Jon Andrews (Bologna)

Bluefin tuna (*Thunnus thynnus*) is one of the most significant and most threatened of commercially exploited fish species. Adam will explore correlations between environmental and ecological drivers and past/present diversity of populations, applying genomic and stable isotope analyses to modern and ancient tuna, the latter pre-screened using ZooMS.



ESR 11: Current and historical threats to dolphins in the Atlantic and the Mediterranean



Marie Petitguyot (IIM-CSIC, Vigo)

Common dolphin (*Delphinus delphis*), the most abundant cetacean in European Atlantic waters, has declined markedly in the Mediterranean, likely due to overfishing of prey. Marie will apply dietary analyses to modern & ancient dolphins, alongside bycatch mortality data & archaeological/historical fisheries data, to assess small cetacean population trajectories in the Atlantic & Mediterranean and their drivers.

