

A dark horizon

Many of us know Homer's iconic image at right (and may have thoughts on it). The quintessential historical New England fisherman with fat halibuts the fruits of a hard day's work, yet looking to the distance between his dory and the main ship, an ominous fog bank on the horizon, and the challenge of returning to safety and home.

We are in grim and uncertain times. Many of us – and our colleagues – are already feeling the impacts of the novel corona virus pandemic. I also remain troubled by the storm yet to hit, by what is between us and some semblance of normalcy. I fear our world is forever altered.

Yet I also have hope. Human communities come together in times of crisis in ways difficult to predict – and, as our historian colleagues know very well, have weathered extreme crises in the past, only to start anew. Moreover, despite these dark times, we are looking out for one another more than ever, and recognizing a common threat to address collectively, across neighborhoods, cities, and nations. We are not alone in the boat.

In the meantime between us and quiet harbor, dear colleagues and friends, I wish you good health and safety. Life marches on, and if the number of studies we highlight in this edition is an indication, research does too. Take care of yourselves and each other.



The Fog Warning. Winslow Homer. 1885. Museum of Fine Art, Boston (USA)

Emily S. Klein, OPN Editor

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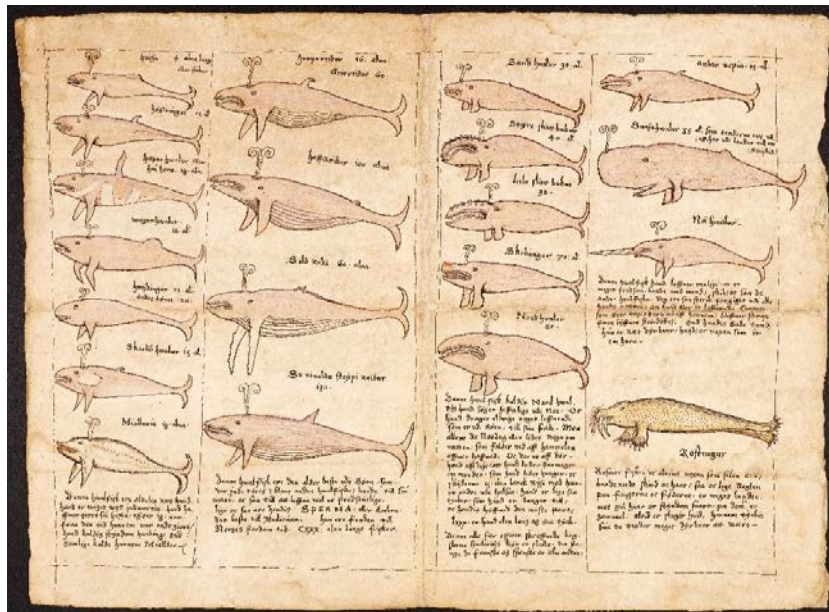
OCEANS PAST SPOTLIGHT*

Assessing the Distribution and Variability of Marine Mammals through Archaeology, Ancient DNA, and History in the North Atlantic.

Dr. Vicki Szabo (Western Carolina University) & Dr. Brenna Frasier (St. Mary's University)

As symbols of the northern world, marine mammals are archetypal megafauna emblematic of climate change, and critical for many societies. Seals and walrus have been extensively studied in premodern northern contexts, but **what was the importance of whales prior to the industrial era of whaling?** Many recent studies have considered whether cetaceans were hunted or scavenged in ancient and medieval Europe, but moving beyond these important questions, our project focuses on cetacean use with respect to **economic, cultural, and environmental baselines**, and a more holistic and integrative understanding of whale use in pre-modern societies.

To these aims, we take an expansive look at whale use from the late Iron Age through the early era of commercial whaling, ca. 400 BCE – 1800 CE. Our project, funded by the National Science Foundation (USA), has **used historical, literary, legal, archaeological, and molecular approaches to reassess pre-modern cetacean populations and the economic, social, and cultural significance of whales in the pre-modern North Atlantic world.** Our transdisciplinary



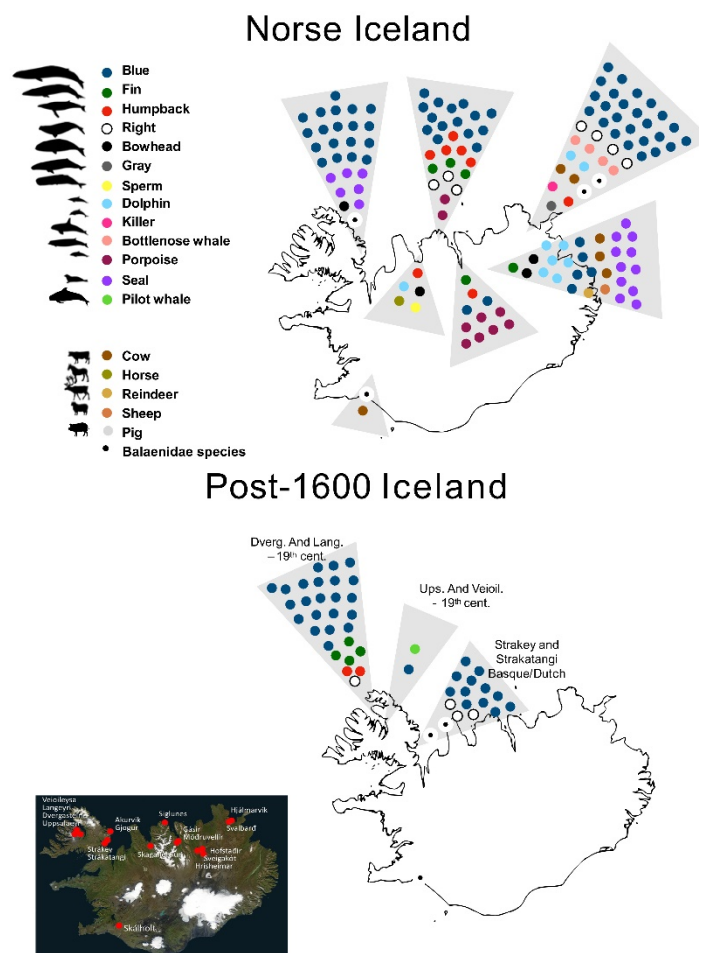
Jón Laerði, or Jon the Learned (1574-1658), illustration of whale species from his *Natural History of Iceland*, GKS 1639 kvart, Royal Library, Copenhagen; photo courtesy of Icelandic Museum of Natural History.

Our project has illuminated how whales were used and valued by people. Given that cetacean populations in the pre-modern era were larger than today, and with larger animals in possibly larger pods, strandings may have been more frequent, making cetaceans a more readily anticipated if not reliable resource for people across the North Atlantic. References in historical texts denote whale products were divided among Icelandic communities in precise shares from the 13th century onwards, **ensuring communal access regardless of whale species stranded**. Unlike literary accounts that problematize whales as famine resources, this suggests they were regularly utilized - an important yet largely invisible part of the medieval Icelandic economy.

Molecular analysis of archaeological whale bone provides additional insight. This work has identified 14 cetacean species, largely coincident with modern species assemblages but distributed unevenly across archaeological contexts. Whales of all species, but particularly toothed whales, are found in most Iron Age through Norse assemblages in Orkney and Shetland, while whale use in medieval and early modern Iceland featured many more baleen whales, especially blue (*Balaenoptera musculus*), humpback (*Megaptera novaeangliae*) and North Atlantic right whales (*Eubalaena glacialis*). Blue whale specimens dominate the Icelandic assemblages. While not indicative of pre-modern hunting, this species preponderance **may indicate a favored whale for consumption or raw materials for fuel or material utilities**. The molecular evidence also shows a more extensive habitat range than today for the now-diminished North Atlantic right whale and the now-extirpated North Atlantic population of gray whales (*Eschrichtius robustus*), with specimens found both in Iceland and Scotland.

Collectively, this project **has leveraged collaboration across disciplines to elucidate past whale populations and whale use**, and how previous abundance and ecology interconnected with whales were valued by premodern North Atlantic people.

approach has created new data sets, including translations of medieval Icelandic texts, which indicate common and regular use of whales for subsistence and commercial products. Likewise, **Dr. Brenna Frasier** (Saint Mary's University, Canada), and **Dr. Mike Buckley** (Manchester University UK), have sampled whale bone waste and objects from 42 archaeological sites, provided by colleagues from the **North Atlantic Biocultural Organisation (NABO)**. In conjunction with more well-known medieval historical sources, these data helps us consider how cetaceans routinely featured within medieval economies and ecosystems, particularly during the dynamic climatic eras from the age of Norse settlement (ca. 870 CE) through the end of the Little Ice Age (ca. 1800 CE).



Distribution of cetacean species in Icelandic archaeological contexts, ca. 870-1500 CE: Dr. Brenna Frasier, St. Mary's University.

RESEARCH NEWS

Iron triangles and subsidies explain the historical trajectory of Swedish fisheries. Many natural resources have degraded and collapsed despite being managed under rigorous institutional frameworks set up to ensure rational exploitation. Path dependency of dysfunctional institutions has been suggested as an explanation for such undesired outcomes. In this work, Hentati-Sundberg and colleagues explored the role of path dependency in a 100-year empirical analysis of Swedish fisheries, employing on policy documents, econometric data outlining government spending on management and subsidies, and historical catch and fleet data. Four pieces of evidence suggested the existence of a path dependent dynamic in the Swedish fishery:

- (1) despite increasing insights into the vulnerability of fish stocks to overexploitation, national policy continuously promoted incompatible goals of social and economic growth but without any reference to the sustainability of the biological resources;
- (2) the same policy instruments were used over long periods;
- (3) actor constellations within the fisheries policy subsystem were stable over time; and
- (4) neither political regime nor macroeconomic variables and fisheries performance (industry production, oil price, landing values) could explain observed temporal variation in subsidies.

The researchers concluded that key policy actors in the Swedish bureaucracy formed an “iron triangle” and thereby prevented necessary policy changes. These national reinforcing feedbacks have been weakened since joining the EU, and indicators for path dependency show broader stake-holder involvement, a shift in spending, and policy goals that explicitly address ecological sustainability. ~ Jonas Hentati-Sundberg (Swedish University of Agricultural Sciences).

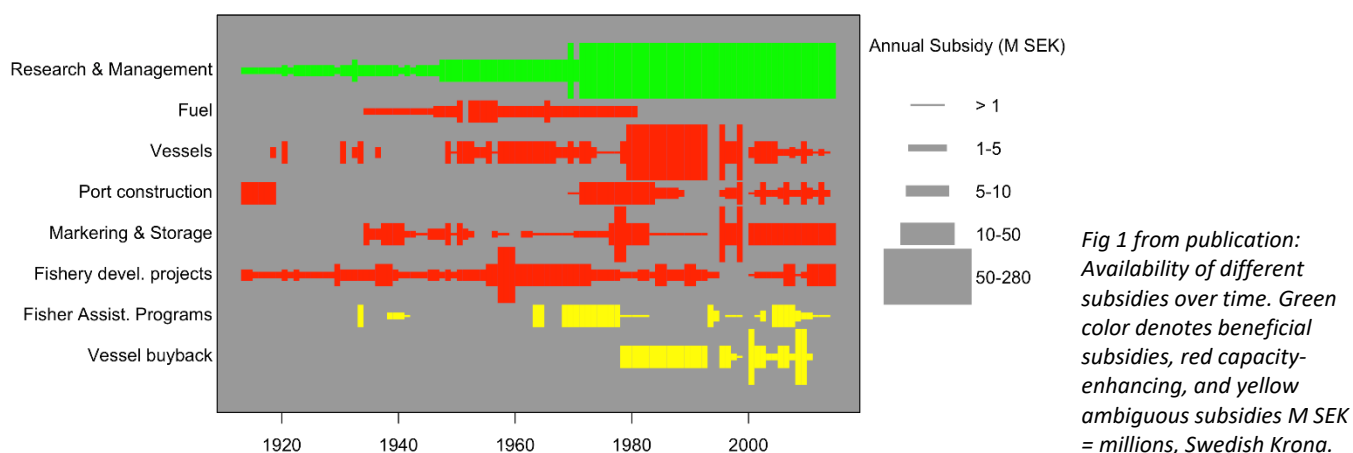


Fig 1 from publication: Availability of different subsidies over time. Green color denotes beneficial subsidies, red capacity-enhancing, and yellow ambiguous subsidies M SEK = millions, Swedish Krona.

Publication: Hentati-Sundberg J. et al. (2019). Iron triangles and subsidies: understanding the long-term role of the government on Swedish commercial fisheries. *Ecology & Society* 24:4. [doi.org/ 10.5751/ES-11259-240418](https://doi.org/10.5751/ES-11259-240418).

New research leverages diverse data to reconstruct a coastal social-ecological system. Oyster reef ecosystems once formed significant components of many temperate and subtropical inshore coastal systems but have since declined globally. The early timing of many of these declines makes determining current restoration targets difficult. In Australia, however, more recent transitions from Indigenous (Aboriginal) to Westernized use and management allows exploration of relevant social-ecological changes (Fig. 1). In this work, we integrated archaeological, anthropological, fisheries, government and media data to reconstruct transformations in the Sydney rock oyster (*Saccostrea glomerata*) commercial industry of central and southeast Queensland, and by extension its reef ecosystems, as well as the changing societal and cultural values related to the presence and use of the oyster over the last two centuries.

Before the 1870s, Aboriginal peoples featured as sole traders to Europeans, supplying oysters and becoming a substantial component of the industry's labour pool - Australia's commercial oyster industry effectively arose from Aboriginal-European trade. During this initial phase, wild oysters were relatively abundant, with subtidal oyster reef structures in regions where oysters are today absent or scarce. These reefs declined by the late 19th century, despite production of oysters increasing due to continued large-scale oyster recruitment and the expansion of oyster cultivation in intertidal areas. Production peaked in 1891, with successive peaks observed in regions further north. During the 1890s, flood events coupled with land-use changes introduced large quantities of silt into the system, which likely facilitated an increase in oyster pests and diseases, ultimately decreasing system carrying capacity. Today oyster production here is less than one-tenth of historical peak production, and many cultural heritage components have also been lost. Indigenous management is now very minor due to the massive decimation of Aboriginal peoples and their respective practices. Yet, we found Indigenous communities still hold strong cultural attachment to midden remains and continue oyster production, with considerable community support. Collectively, this study highlights the value of conducting thorough analysis of early media accounts to reconstruct historical resource decline and management, and demonstrates the application of historical information and context for contemporary management, protection, and restoration of much-altered coastal social-ecological systems. ~ Ruth Thurstan, Univ. of Exeter (UK). Publication: Thurstan RH et al. (2020) "Charting two centuries of transformation in a coastal social-ecological system: A mixed methods approach". Global Environmental Change, doi.org/10.1016/j.gloenvcha.2020.102058.

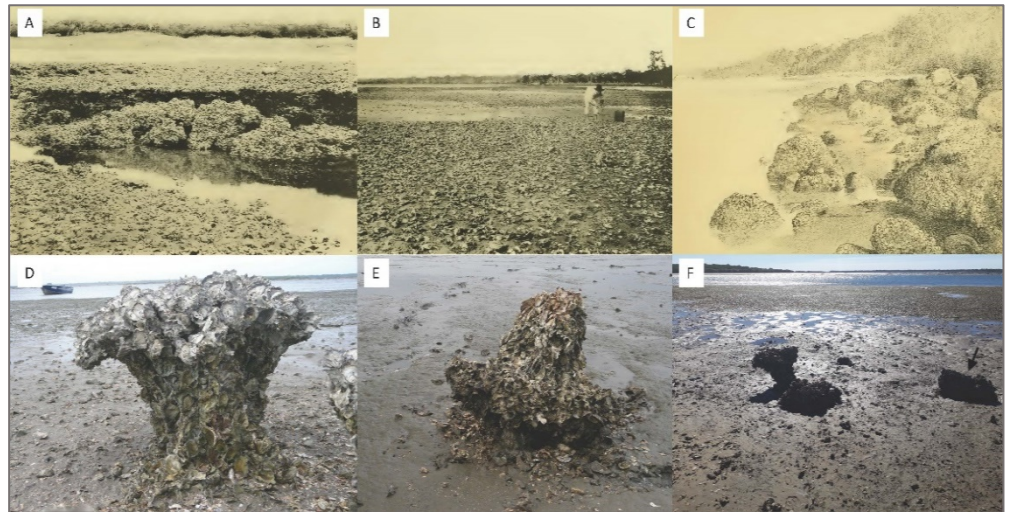


Figure 1. A) An oyster (*S. glomerata*) reef, northern Central Coast region (ca. 1890). B) A typical cultivated oyster bank, Moreton Bay region (ca. 1890). C) Rock oysters, Moreton Bay region (ca. 1890). D) Degraded oyster clump, Bribie Passage, Moreton Bay region (2011). The same clump is shown after breakage due to a lack of oyster recruitment and subsequent undermining in E) 2012 and F) 2019 (clump highlighted by black arrow). Sources: A-C) Saville-Kent 1891, D-F) Ben Diggles.

What was the impact of commercial whaling on whale genetics? One critical consequence of commercial whaling was a bottleneck in whale populations, with rapid and recent declines relative to the life spans and generation times of these species. Béland and her colleagues aimed to understand the related consequences commercial whaling had on whale genetic characteristics. They focused on whale two populations with high degrees of recovery, eastern North Pacific gray (*Eschrichtius robustus*) and humpback whales (*Megaptera novaeangliae*). The researchers analyzed mitochondrial and nuclear DNA from pre- and post-whaling samples, and compared the performance of different methods to test for historic bottlenecks and infer past demography. Results showed substantially higher levels of genetic diversity in gray whales for both time periods, and the authors argued this is due to recent connectivity between Atlantic and Pacific gray whale populations. Yet, other than mitochondrial diversity in humpback whales, they also found levels of diversity were not lower in contemporary samples relative to those before whaling, which they believe indicates a minimal impact of commercial whaling on the metrics of genetic diversity themselves. However, they concluded whaling influenced patterns of diversity: all coalescent-based methods they used showed clear evidence of a bottleneck for both populations, whereas all but one method not based on the coalescent failed to detect a bottleneck. Publication: Béland SL et al. (2019). "Using pre- and postexploitation samples to assess the impact of commercial whaling on the genetic characteristics of eastern North Pacific gray and humpback whales and to compare methods used to infer historic demography." Marine Mammal Science. DOI: 10.1111/mms.12652.

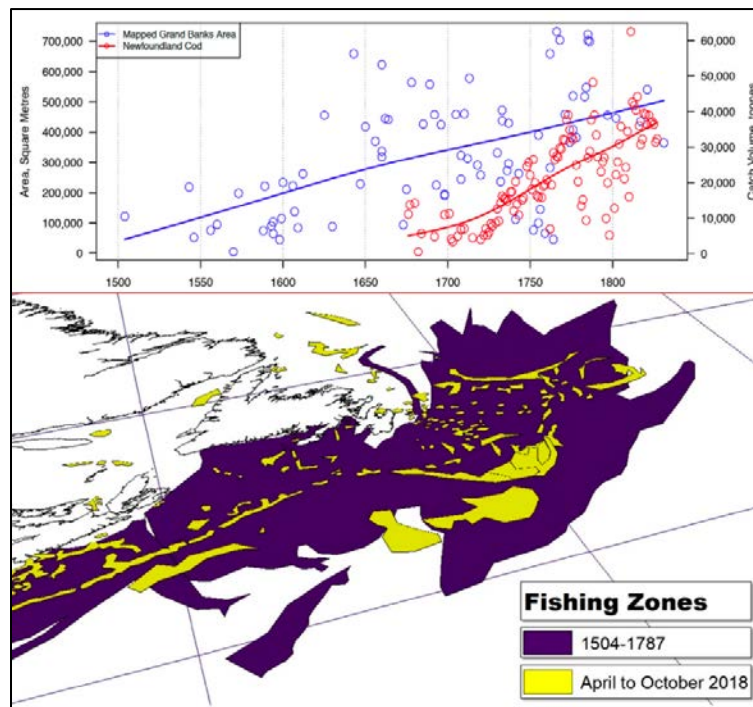


Fig 1. Top: Graph depicts fishery symbolism size of 83 successive Grand Banks charts published between 1504 and 1831 in square metres correlated with English cod catch in metric tons, 1675–1831. Blue and red lines are exponential trend lines for fishery area and catch volume, respectively (Francis Ludlow & Al Matthews). Bottom: Fishing Zones: 1504-1787 and April to October 2018 (Charles Travis, Kevin Lougheed, Francis Ludlow, Robert Legg).

Inventing the Grand Banks: A deep chart. The Trinity Centre for the Environmental Humanities' **NorFish: Environmental History of the North Atlantic 1400-1700** European Research Council project, led by **Dr. Poul Holm** (Trinity College, Ireland), combines geographic information systems (GIS) applications and methods in oceanic and maritime history to map the early modern cartographical, cultural, and commercial 'invention' of the Newfoundland Grand Banks fishery. The *NorFish* team employed both quantitative and qualitative applications of GIS to explore and visualize the various historical cycles, cod-catch records, and geographical scales of the Fish Revolution that contributed to the early modern invention of the Grand Banks Fishery. The team reviewed American, British, Canadian, and French nautical cartographical archives, and identified 203 Grand Banks fishery charts published between the 1500s and the 1800s, by fishery symbolism typology. 83 chart samples were correlated in GIS with English and French Cod catch records to create graphs and time-space models to study the contexts, dynamics, and relations between Grand Banks fishery symbolism and catch records between the 1500s and 1800s.

The GIS study illustrated a variable but clear progression in the size and extent of fishery chart symbolism and increased Grand Banks Cod catches during three historical cycles of the Fish Revolution between 1504 and 1786 (Fig. 1, top). Yet, two centuries later in July 1992, the Canadian Government, fearing the extinction of the cod fishery, put a moratorium on five centuries of harvesting the Grand Banks, resulting in the single largest mass layoff in Canadian history. The *NorFish* GIS team compared Grand Bank fishing zones charted between 1504 and 1787 with those in 2018 (Fig.1, bottom), sourced from nautical cartography archives and Global Fishing Watch, globalfishingwatch.org) and found differences could be attributed to many factors: the collapse of the fishery and moratorium on cod, in addition to technological innovations in oceanic cartography and advances in the understanding of marine science.

From a qualitative perspective, charting of the northwest Atlantic / Grand Banks appears between 1504 and 1556 as a series of portolan navigational line tracings. Between 1600 and 1700, the modern extent of the Grand Banks' fisheries begin to emerge and, in terms of the English Oceanic Plantation, can be contextualized by William Shakespeare's *The Tempest* (1611) and charts drafted by the Thames School of Cartography. Starting in the 1700s, a third phase of Grand Banks charting begins to reflect modern scientific observations, as area is increasingly understood in the context of ocean currents. A timeline map narrative showing the various GIS methods and study results can be accessed at <https://oceanspast.org/videos/norfish/index.html>. ~ Charles Travis, Trinity College (Ireland). Publication: Travis C et al. (2020). *Inventing the Grand Banks: A Deep Chart- Humanities GIS, Cartesian, and Literary Perceptions of the North-West Atlantic Fishery ca 1500-1800*. Geo. doi.org/10.1002/geo2.85.

From sea monsters to 'charismatic megafauna: a new study explores our changing perceptions. Through time, it seems people have always cared for – or at least noted – marine megafauna. Historically, people saw them as fantastic mythological creatures and dangerous monsters, and as a valuable resource. Despite fear and curiosity, human exploitation of large marine species has led to the collapse of populations and local extinctions. Some species were seen as competitors of fishers for marine resources and actively culled – a perception that lasts to this day. Yet, Mazzoldi et al. note, beginning in the 1970s, a change in the perception and use of megafauna. They point to the growth of marine tourism, and its focus on observing wildlife, as shifting people towards non-extractive values – in

some cases supporting species conservation. For this work, the authors reviewed and compared people's perception and use of three megafaunal groups, cetaceans, elasmobranchs and groupers, focusing on Europe. They aimed to understand the main drivers and timing of changes in perceptions, if they differed across taxonomic groups and species, and implications for management and conservation. Results indicate shifts in people's ideas about marine megafauna were driven by an increase in curiosity towards wildlife, one stimulated by documentaries (from the early 1970s onwards) and promoted by increasing access to scuba diving. The authors note these trends as consistent across all the three groups of megafauna, and additional important drivers included the development of environmental campaigns to raise public awareness about marine wildlife, in particular for cetaceans and facilitated greatly by the internet, and a growing understanding and appreciation of the key ecological role of megafauna. They concluded that, at present, cetaceans, elasmobranchs, and groupers are of increasing value for ecotourism, that this economic value may exceed the harvested value, and that the shift from extractive to non-extractive use has potential to promote both species conservation and local economic growth. However, the authors also highlight downsides to these shifts in perception. First, changes may not benefit other stakeholders, such as fishers or whalers, indicated a potential need for compensation. Second, it is increasingly clear that even non-extractive use may have a negative impact on marine megafauna, and the continued need for regulations. *Publication: Mazzoldi C et al. (2019). "From sea monsters to charismatic megafauna: Changes in perception and use of large marine animals". PLOS ONE. 14(12): e0226810. <https://doi.org/10.1371/journal.pone.0226810>*



Fig 1A from the text: 16th century representation of two whales attacking a ship, from Gesner C. *Icones Animalium Quadrupedum Viviparorum et Oviparorum*. 1553.



Figure 1: Professor Eeva Leinonen (right), Vice Chancellor of Murdoch University, doing the honours and raising the second International Indian Ocean Expedition flag aboard RV Investigator in the Port of Fremantle prior to departure on the 110°E voyage. Captain Adrian Koolhof and Dr. Lynnath Beckley (Chief Scientist) observe the proceedings. Photo: Micheline Jenner AM.

COLLABORATIONS

Following the wake of HMAS Diamantina. The Research Vessel *Investigator* departed Fremantle in May 2019 for a month-long oceanographic voyage to the 110°E meridian in the south-east Indian Ocean (Figure 1). This voyage followed in the wake of the **HMAS *Diamantina*** (Figure 2), which in the 1960s, regularly took Australian scientists to study the physical, chemical and biological oceanography of the same region as part of the first International Indian Ocean Expedition. During the 2019 voyage, which is Australia's major contribution to the second **International Indian Ocean Expedition (IIOE-2)**, a multi-national team of scientists repeated many of the measurements made nearly six decades ago to ascertain significant changes in the south-east Indian Ocean pelagic ecosystem.

The HMAS *Diamantina* is the last remaining example of the British River Class frigates in the world. Built in Australia and launched in 1944, the ship saw service in the latter part of World War 2 around Papua New Guinea, Solomon Islands, Bougainville and Nauru before being paid off into the Reserve in August 1946. The vessel was recommissioned in June 1959 as an Oceanographic Research Ship, carrying scientists from the CSIRO and assisting the Australian Army survey team along the coast of north-western Australia.



Figure 2: The frigate HMAS *Diamantina* was the primary vessel used by Australian scientists during the first International Indian Ocean Expedition. Photo courtesy of the Queensland Maritime Museum.

Although there is a new HMAS *Diamantina 2* (a Huon Class minehunter) in the Australian fleet, the legacy of the original vessel lives on as a popular exhibit at Brisbane's Queensland Maritime Museum, and is immortalised in hydrography as one of the Indian Ocean's deepest areas, the **Diamantina Deep** (~8,000 m depth). The RV *Investigator* voyage also maintained the historical connection with the Australian Navy via research on underwater sound for the Australian Defence Force. A series of short "Logs from One Ten East" cover much of the science conducted on board the RV *Investigator* during the 2019 voyage and is available at <https://iioe-2.incois.gov.in/> under "Expedition Updates". The RV *Investigator* voyage along 110°E was supported by a CSIRO Marine National Facility grant for sea time. ~ Lynnath Beckley (Murdoch University, Australia)

RECENT PUBLICATIONS

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Travis C, Ludlow F, Matthews A, Loughheed K, Rankin K, Allaire B, Legg R, Hayes P, Nicholls J, Towns L, and Holm P (2020). **Inventing the Grand Banks: A Deep Chart - Humanities GIS, cartesian, & literary perceptions of the North-West Atlantic fishery ca 1500-1800**. *Geo: Geography and Environment* 7(1). <https://doi.org/10.1002/geo2.85>.

ANNOUNCEMENTS: PhD OPPORTUNITY

The **Water and Environmental Research Center at University of Alaska Fairbanks** has a funded graduate student position to research mercury in historic/archaeological bone of pinnipeds and fish. Our research team seeks one PhD student who is interested in interdisciplinary, convergence research, and this student can be housed in a department of their choice. The project includes marine science, marine mammal science, fisheries, archaeology, iso- and biogeochemistry, and biology, and the ideal students would have, for example a mix of archaeology and chemistry, physiology, or marine sciences background, but someone with a strong background in one discipline and a desire to become more interdisciplinary is also very welcome to contact us. If you are interested in applying to be a part of the research project, please contact **Nicole Misarti** (nmisarti@alaska.edu) to learn more about the project and discuss possible departmental affiliations as soon as possible. The project abstract can be found at: https://www.nsf.gov/awardsearch/showAward?AWD_ID=1935816&HistoricalAwards=false.

ANNOUNCEMENTS: CONFERENCES

Oceans Past Conference postponed. Given the ongoing international COVID-19 pandemic, the conveners have **postponed the physical OP VIII conference until May 2021** and are exploring possibilities with our Belgian host institution, VLIZ, to reschedule for the same venue and meet again in Ostende. They will inform the OPI community as soon as rescheduling is confirmed.

In the meantime, the conveners and OPI Board have decided to host a smaller, **online, virtual 'conference'** during the week originally planned for OP VIII (**May 11-15, 2020**) consisting of a combination of live and pre-recorded talks and posters. We do hope you will join us. For more information on the schedule and free registration for the virtual meeting, please visit the website is www.oceanspast.org, or contact the organizers at info@oceanspast.org.

The Ecosystem Studies of Subarctic and Arctic Seas's (ESSAS) annual science meeting in Sapporo Japan **has been cancelled** due to concerns about the novel corona virus pandemic. More at essas.arc.hokudai.ac.jp/what_s_new/.

American Fisheries Society 150th Annual Meeting, “**Learning From The Past, Meeting Challenges Of The Present, Advancing To A Sustainable Future**”, is still planned for Columbus, Ohio (USA) 30 Aug – 3 Sept 2020. The submission deadline for presentations and posters has been extended to **20 April 2020**. <https://afsannualmeeting.fisheries.org/>.



CONTACT

Oceans Past News is a quarterly newsletter that aspires to both unite and inform the worldwide community interested in historical perspectives of marine social-ecological systems by providing insight into the wide-ranging and excellent work being done and the resources available. If you would like to propose work for OPN in the future, please contact **Emily Klein** (emily.klein04@gmail.com).

*The next Oceans Past News will be out mid-July 2020. We **warmly welcome submissions** through mid-June.*

RESOURCES

The Oceans Past News Archive is available online: <https://oceanspast.org/newsletter.php>

More on the Oceans Past Initiative: <http://oceanspast.org>

OPI on Facebook: <https://www.facebook.com/groups/122288493384/>

OPI on Twitter: [@oceans_past](https://twitter.com/oceans_past)