Fishing Over the Millennia

Harry K. Robson¹ · Kenneth Ritchie²

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The oldest continuously functioning working group of the International Council of Archaeozoology (ICAZ), the Fish Remains Working Group (FRWG), traces its ancestry back to 1980 when an informal meeting, organised by Knud Rosenlund, Inge Bødker Enghoff, and Jane Richter, took place in Copenhagen, Denmark. The second meeting was held in Sophia Antipolis, France, in 1983, and the group has continued to meet biennially since in locations across the globe. Unfortunately, last year's rendezvous in Vienna, Austria, has been postponed until this year due to the ongoing COVID-19 global pandemic and the accompanying restrictions on travel. The group has endeavoured to make the results of these meetings accessible in a scientific journal or other format almost since its inception. To date, 12 previous proceedings have been published whilst this topical collection in *Archaeological and Anthropological Sciences* represents the latest contribution of that proud tradition. The 20th meeting of the FRWG took place in the campus of Portland State University, OR, USA, from the 26th to the 30th of August 2019, organised by Virginia Butler with the help of a five member planning committee. Three days of communications featured 43 oral and 11 poster presentations from 62 scholars representing 18 countries (Fig. 1). The full range of career stages were evident from undergraduate students to emeritus professors, with academic and other researchers from the fields of archaeology, anthropology, history, zoology, and other disciplines contributing their unique insights. In addition to the formal sessions, lively discussions occurred during breaks, at group lunches, and at social events throughout

the course of the week. Whilst never shy about challenging each other on topics of mutual interest, the group is collegial and respectful, providing an outstanding forum for expanding our knowledge of the exploitation of fish in the past.

Portland, OR, located at the confluence of the Willamette and Columbia rivers and in close proximity to the Northwest Coast of North America, a region famous for its fish and other aquatic resources from prehistory to the present day, was an ideal location for a gathering of fish specialists discussing the role of these animals within human societies. In addition to enjoying the bounty of the local waters at several meals, one day of the conference was devoted to an excursion to the Columbia River Gorge to experience local fish culture first-hand. After the main conference concluded, a second, optional, field trip explored the Oregon coast.

After two intensive days of presentations and discussions, we were ready to depart Portland and witness the natural beauty of the Pacific Northwest whilst experiencing the local fishing culture. On Wednesday morning, we boarded buses and headed east along the majestic Columbia River far up into the gorge where it cuts through the Cascade Mountain Range. Lyle Falls on the Klickitat River was the first stop. Here, we visited a fisheries research station and observed members of the Yakama Nation fishing for salmon at one of their traditional fisheries. Heading back west, stops included Northwestern Park to see the recovery of the area after Condit Dam on the White Salmon River was breached in 2011, and the Bonneville Fish Hatchery where several species of salmon and trout are raised to bolster stocks in the Columbia River drainage and sturgeon are also cultivated. It was an engaging, educational, and elevating tour of an enchanting region. At the conclusion of the formal part of the conference, a two-day excursion to the Oregon coast was enjoyed by many of the participants.

In addition to the raw natural beauty of the rugged coastline of the Pacific Ocean, participants visited the Chachalu Museum and Cultural Center on the reservation of the Confederated Tribes of the Grand Ronde, the site of Ahnkuti where the remains of a 2200-year-old intertidal fish weir is present (Fig. 2), the Oregon Coast Aquarium,

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✉ Harry K. Robson
hkrobson@hotmail.co.uk

Kenneth Ritchie
kcritchie@hotmail.com

¹ BioArCh, Department of Archaeology, University of York,
York YO10 5DD, UK

² Moesgaard Museum, 8270 Højbjerg, Denmark

Fig. 1 The participants of the 20th FRWG meeting in Portland, OR, USA (photograph courtesy of Virginia Butler)

Fig. 2 The site of Ahnkuti, including the remains of a 2200-year-old fish weir (photograph by Harry K. Robson)

and the Hatfield Marine Science Center. Furthermore, Boiler Bay, the tide pools at Sea Rock, Yaquina Head, and Beverly Beach were explored; all of which provided unparalleled insights into human–environment interactions throughout the region. As with the rest of the week, these days enabled further stimulating discussions of topics relating to the zooarchaeology and history of fishing.

This topical collection, *Fishing Over the Millennia: Zooarchaeological Perspectives*, features 13 articles that present a sample of the research shared at the conference, grouped into four sections that broadly align with several of the sessions. The four sections include *Classical and*

medieval Eurasia, The Americas, Methodological Developments, and Stone Age Eurasia.

The first section includes four articles focussing on *Classical and medieval Eurasia*. Maccarinelli (2021) discusses the analysis of fish remains from 11 sites in England dating to between the eleventh and fifteenth century AD. The presence of freshwater taxa, particularly northern pike (*Esox lucius*), European perch (*Perca fluviatilis*), and carps and minnows (Cyprinidae), including large individuals, are interpreted as indicators of high status, and are in agreement with historical sources from the period. The thorough biometric analysis applied lends further weight for the management of fish, perhaps within fishponds, whilst the use of the log ratio technique greatly increased the sample size and is recommended for future research. Focussing on the mediaeval and postmediaeval town of Aalst in Belgium, Wouters et al. (2021) present the analysis of fish remains from seven sites dating from the twelfth to the end of the eighteenth century AD to explore diachronic change. Whilst great inter- and intra-site variations were observed across the town, which the authors state were “difficult to interpret” (7), they suggest that averaging the data along a diachronic line may be a future line of enquiry as has been applied elsewhere (e.g. Harland et al. 2016; Orton et al. 2014, 2016, 2017). Bartosiewicz and Gál (2021) present a case study focussing on the fourteenth to fifteenth century AD deposits from the site of Esztergom, Hungary. Whilst primarily focussing on the fish remains, the remains of birds and mammals are also presented, and together are compared with contemporaneous assemblages by use of a thorough literature review, including cookbooks. To the authors’ surprise, large individuals were infrequent, whilst luxury food items were absent,

which may indicate that the analysed material “represents the diet of the kitchen’s personnel, rather than feasting by the archbishop and his entourage” (11). Moving south, Iwaszczuk et al. (2021) present another case study focussing on the fish and cuttlefish remains from the Late Islamic, late seventeenth to nineteenth century AD, settlement of Kharā’ib al-Dasht, Kuwait. More than 12,000 fish remains were analysed in which 28 families, dominated by sea catfishes (Ariidae), were identified. The study argues that fish were likely caught in the stone fish traps surrounding the island, whilst offshore fishing through the use of fishhooks and boats was also evident. Although a diachronic comparison was not possible due to the scarcity of fish remains from the older occupation phase, fish appear to have been grilled for both consumption, and perhaps even for preservation, during the younger occupation phase at the site.

The second section consists of four articles focussing on *The Americas*. Miszaniec (2021) explores the long-term effects of warming and cooling climatic events on Pacific salmon (*Oncorhynchus* spp.) and saffron cod (*Eleginus gracilis*) populations using vertebra width and length reconstructions. By analysing more than 3500 fish remains from two sites situated in northwest Alaska, USA, spanning four temporal periods, 400–40 BC, AD 1280–1440, AD 1420–1645, and the 1800s–early 1900s AD, the study demonstrates that climatic fluctuations do indeed influence the current and past distributions of Pacific salmon, whilst saffron cod were largely unaffected. The utilisation of vertebra width measurements, often overlooked in ichthyoarchaeological research, is certainly encouraged in the future in both the Bering Sea and beyond. In the contribution by Reitz (2021), data obtained from the analysis of fish remains recovered from 22 sites located in the central Georgia Bight, USA, were collated. In doing so, the author aimed to assess the sustainability of coastal fisheries between the period from around 2760 BCE to 1500 CE. Whilst fish lengths prior to 1500 CE were less than those of the mid-twentieth century AD, localised fishing traditions were influenced by both cultural (technology) and environmental (tides, climate, sea level, and the behavioural ecologies of fish) phenomena. deFrance (2021) provides an insight into the coastal-inland transport of the Chilean jack mackerel or jurel (*Trachurus murphyi*) starting from the Andean Middle Horizon, AD 600–1000, through the analysis of more than 3000 of their remains from seven sites in far southern Peru. The study demonstrates that fish were largely shipped whole, whilst their recovery from a range of sites, including those inhabited by non-elite residents, indicates that they were likely consumed on an everyday basis. Since the Chilean jack mackerel was, in some cases, common at several inland sites, a culinary influence may have persisted during the period from AD 500 to 1500. Rebolledo et al. (2021) undertake a comparative analysis of the ichthyoarchaeological data

obtained from ten sites dating from the Terminal Pleistocene to the Early Holocene (13,000–8000 cal BP), and situated along the Atacama Desert coast of southern Peru and northern Chile. The authors highlight the advantages, and disadvantages, in their attempts to standardise the data, which included NISP, MNI, fish density, richness, and ubiquity. Through the compilation of data from both published and grey literature, the study contributes significantly to our understanding of prehistoric fishing throughout the region, and proposes a series of new methodological questions and solutions for future research, for instance dissemination to a wider audience, including the public.

The next section of this topical collection, *Methodological Developments*, includes four articles. Jelu et al. (2021) provide a series of regression equations to accurately estimate both the body length and weight of northern pike, a species that is well represented in the archaeological record of both Eurasia and North America. To test the validity of the formula, a large assemblage of northern pike vertebrae that were recently recovered from a Swift-erbant culture (ca. 5000–4000/3400 cal BC) site in The Netherlands was studied, demonstrating that they are indeed robust. The regression equations presented in the study will, no doubt, be extremely useful for the wider ichthyoarchaeological community for many years to come. By comparing the trace element compositions of tāmure (*Chrysophrys auratus*) otoliths from four assemblages, including two archaeological and two modern catches, in the Hauraki Gulf of New Zealand, Campbell et al. (2021) aimed to explore whether pre-European Māori coastal activities impacted the life histories of the species. Using laser ablation-inductively coupled plasma-mass spectrometry (hereafter LA-ICP-MS), the results demonstrated both temporal and spatial variations in the chemistry of the post-larval phases of otolith growth, suggesting that the nursery zones were indeed affected. Despite these differences, the authors state that they are likely attributable to geography, whilst the future application of LA-ICP-MS may prove to be a useful tool for evaluating the impacts of indigenous peoples on their local fisheries. Building upon a previous study (i.e. Frontini et al. 2021), Morales Muñoz et al. (2021) undertook an experimental programme of uni-axial compression forces on modern salmonid (Salmonidae) vertebrae in order to identify the diagnostic features generated. In doing so, the authors show that diagnostic features exist, whilst their frequency is influenced by both the size of the vertebrae and quantity of fat within it. For validation, a salmonid assemblage from the Late Upper Palaeolithic to Mesolithic site of Santa Catalina in Spain was assessed. It was found that ca. 2% of the sample were subjected to compression, whilst prehistoric populations of salmonid throughout the region had been affected by overexploitation as inferred by a decrease in the mean size

of the specimens prior to the onset of the Neolithic. It is suggested that the recorded features “could be applied to identify compression traits” (15) in a range of teleost species whose remains are recovered from archaeological and paleontological sites. Finally, Moss et al. (2022) discuss the utility of ancient DNA (hereafter aDNA) analysis of rockfish (Sebastidae) remains from two sites, 49-PET-556 and 49-PET-067, located on Coffman Cove, Prince of Wales Island, Alaska. In total, 100 rockfish vertebrae were sampled. Of these, DNA was recovered from 74 vertebrae, which demonstrated that misidentifications were made during the initial ichthyoarchaeological analysis. Drawing upon the life histories and habitat preferences of the eight rockfish species identified through aDNA analysis, the authors discuss fishing practices, including the technologies employed by the Tlingit ancestors. Moreover, owing to the high preponderance of Irish lords (*Hemilepidotus*) in the misidentifications (22/23), illustrations of a greenstriped rockfish (*Sebastes elongatus*) and red Irish lord (*Hemilepidotus hemilepidotus*) are provided (and welcomed) to emphasise the overlapping morphologies of rockfishes and sculpins.

The one article in the *Stone Age Eurasia* section by Yu and Cui (2021) presents the analysis of more than 11,000 fish remains from the site of Guye in southern China dating to the Neolithic period, ca. 5900–5400 cal BP. A total of 18 fish taxa, predominated by yellow head catfish (*Pelteobagrus* sp.), were identified, whilst the analysis demonstrated a lack of temporal change throughout the course of site occupation. Overall, the study contributes greatly to our understanding of fishing throughout the region, which is largely devoid of ichthyoarchaeological research, and presents a novel, clear, and concise identification guide for many of the identified taxa.

The 13 articles in this topical collection offer additional perspectives and present new insights into the study of archaeological fish remains. The diverse chronological, regional, and methodological approaches should appeal to a wide audience. Such contributions, in turn, should enhance our understanding of the role of fish and fishing among past human populations, a topic of perennial interest as it has clearly played an important part in the development of many human cultures.

Finally, it is with great sadness that we report one of the three original guest editors, Professor Arlene Fradkin of Florida Atlantic University, passed away during the preparation of this topical collection. Arlene was a powerful force in the field of zooarchaeology, known for her warm personality, meticulous scholarship, and generosity in helping others with their research. This issue is dedicated to her with gratitude for her friendship and outstanding contributions to the FRWG and archaeology in general, she will be sorely missed.

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