

PREDICTING HABITAT USE BY THE ARGENTINE HAKE *MERLUCCIUS HUBBSI* IN A WARMER WORLD: INFERENCES FROM THE MIDDLE HOLOCENE

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Abstract: Fish skeletal remains recovered from two archaeological sites dated in the Middle Holocene of Tierra del Fuego (Argentina) were analysed to describe habitat use patterns by hake in the past and predict changes in a warmer world. Mitochondrial DNA was successfully extracted and amplified from 42 out of 45 first vertebra from ancient hake and phylogenetic analysis assigned all haplotypes to Argentine hake (*Merluccius hubbsi*). According to osteometry, the Argentine hake recovered from the archaeological site were likely adults ranging 37.2 to 58.1 cm in standard length. C and N stable isotope analysis showed that currently Argentine hake use foraging grounds deeper than those of Patagonian blenny and pink cusk-eel. Argentine hake, however, had a much broader isotopic niche during the Middle Holocene, when a large part of the population foraged much shallower than contemporary pink cusk-eel. The overall evidence suggests the presence of large numbers of Argentine hake onshore Tierra del Fuego during the Middle Holocene, which allowed exploitation by hunter-gatherer-fisher groups devoid of fishing technology. Interestingly, average SST off Tierra del Fuego during the Middle Holocene was higher than currently (11°C vs 7°C) and matched SST in the current southernmost onshore spawning aggregations, at latitude 47°S. This indicates that increasing SST resulting from global warming will likely result into an increased abundance of adult Argentine hake onshore Tierra del Fuego, as during the Middle Holocene. Furthermore, stable isotope ratios from mollusc shells confirmed a much higher marine primary productivity during the Middle Holocene off Tierra del Fuego.

Key words: Hake, Osteometry, Stable isotopes, Tierra del Fuego, Zooarchaeology

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