Exploiting fish migration and seasonal agglomeration in connection to long-term storage at Norje Sunnansund – Strontium isotope analyses on fish teeth through LA-MCICP-MS

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Abstract

Hunter-fisher-gatherers subsistence strategies are often related to optimal foraging theory. This often implies a close connection to mobility patterns where it is assumed that once a particular part of the landscape is beginning to run low on resources people use mobility, i.e. moving from the area, as a risk-reducing strategy. However, among societies that are largely depending on aquatic resources for sustenance, mobility is often less important. For these groups of people certain favourable spots in the landscape increase in importance, e.g. where fish is available all year round and where it is possible to exploit massively increasing numbers of fish during limited periods (i.e. during fish migrations or spawning activities). The ability to utilize increasing fish abundance during periods of agglomeration is often considered a mobility reducing factor and if it is also connected to large scale and long-term storage the prerequisites for sedentary foraging societies have been met. On the south Scandinavian Early Holocene site Norje Sunnansund, evidence of fish fermentation as the means of creating this type of storage has been presented. The vast majority of the fish in the fermentation pit belong to freshwater fish (roach in particular) and less than a per mille of the identified fish bones belong to migrating anadromous species. Because salmonids, in particular, are normally connected to hot spots and delayed-return foraging societies among known ethnographic sources it is important to understand where the massive amounts of freshwater fish that were fermented at Norje Sunnansund came from. It has previously been suggested that the large amounts of roach that were caught and fermented, to provide the long-term storage, was caught during spawning agglomerations. However, up until recently no means of proving this nor any means of detecting the origins of the fish found in the fermentation pit have been sought. Here I will present the result of recent laser ablation multi-collector inductively coupled plasma mass spectrometry (LA-MCICP-MS) runs on fish teeth from Norje Sunnansund. The evidence presented will highlight the mobility of the fish and show how the humans at Norje Sunnansund used their agglomeration during spawning to catch fish from remote areas agglomerating in the shallow lake close to the settlement site. The ability to trace migration in non-diadromous fish species and connect it to human exploitation is promising and suggest that it will be possible to trace similar type of fish exploitation elsewhere. These results will thus enable us to detect past foraging societies ability to benefit from natural occurring fish agglomerations to catch a large amount of fish during e.g. spawning activities. This ability is on Norje Sunnanasund connected to the ability to create large scale storage. However, since storage is typically difficult to detect in

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archaeological remains the typical strontium mobility signal seen among the roach found in the fermentation pit could be used elsewhere as a model to detect similar utilization of fish spawning. If this is also connected to mass catching devices or substantial amounts of fish bones it might be an indication of resource management in an active strive for affluence.

Keywords: Fish fermentation, spawning, Sr analysis, affluence