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Fishing ancient Lake Baikal, Siberia: inferences from the reconstruction of harvested perch (*Perca fluviatilis*) size

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Abstract

Fishing was the foundation for many of the world's foraging peoples and was undertaken using a variety of technologies. Reconstructing fishing technologies can be difficult because these tools were often made of perishable materials. Here we explore fishing technologies employed at the Ityrkhei site on Lake Baikal, Siberia. Specifically, we employ regression analyses to reconstruct the sizes of perch (*Perca fluviatilis*) captured through time at the site. Our analyses demonstrate that almost no juvenile perch were taken, suggesting some selectivity in harvest. We suggest this selectivity is most consistent with the use of relatively large gauge nets or traps. Such mass harvesting technologies may have been important elements of the subsistence economies of Lake Baikal's foraging peoples throughout much of the Holocene.

Keywords: Fishing; Siberia; Lake Baikal; Size reconstruction; Mass harvesting; *Perca fluviatilis*; Gear selectivity

1. Introduction

Fishing was an economic mainstay of many of the world's foraging peoples, both in marine and freshwater settings (Erlandson, 2001; Plew, 1996; Leach, 2006). A wide array of technologies were employed in fishing by these groups, from simple hooks and lines utilized by individuals on shore, to large nets deployed by sizeable groups of fishermen in sturdy boats. These technologies varied in terms of cost, their effectiveness at providing quantities of food, and the social arrangements needed to use and maintain them. Some could be used nearly anywhere fish were present, while others only were effective at specific locations. Obtaining fish was only one step in a process—equally important was the labor and technologies involved in processing, storage, and distribution. Efficient use of large quantities of fish, especially when procured over short durations, can require substantial pools of labor, organization of that labor, and storage facilities. Reconstructing fishing practices thus speaks directly to multiple aspects of subsistence systems, including harvesting, processing, storage, labor organization, and settlement patterns, and as such is ultimately informative about social complexity.

Most fishing technologies used by ancient foraging groups were of perishable materials. As a result, it is often necessary to infer these technologies through the study of their non-perishable components or through examination of the remains of harvested fish. Our study is focused on Holocene fishing practices at Lake Baikal in Eastern Siberia, Russia (Fig. 1). Here direct evidence of fishing technologies consists only of tools designed for taking individual fish, namely composite fishhooks with stone shanks, single-piece bone hooks, stone fish 'lures', and bone and antler harpoons (Okladnikov, 1936, 1948, 1950, 1955; Medvedev, 1967, 1969, 1971; Studzitskaia, 1976; Svinin, 1971, 1976; Georgievskaia, 1989). Notched stones have been found and interpreted as net sinkers, but this interpretation is difficult to test without additional data. No clear evidence of mass harvesting technologies such as nets or traps has been discovered and detailed analyses of fish faunal assemblages from the lakeshore are almost non-existent. Nonetheless, stable isotope analyses of human

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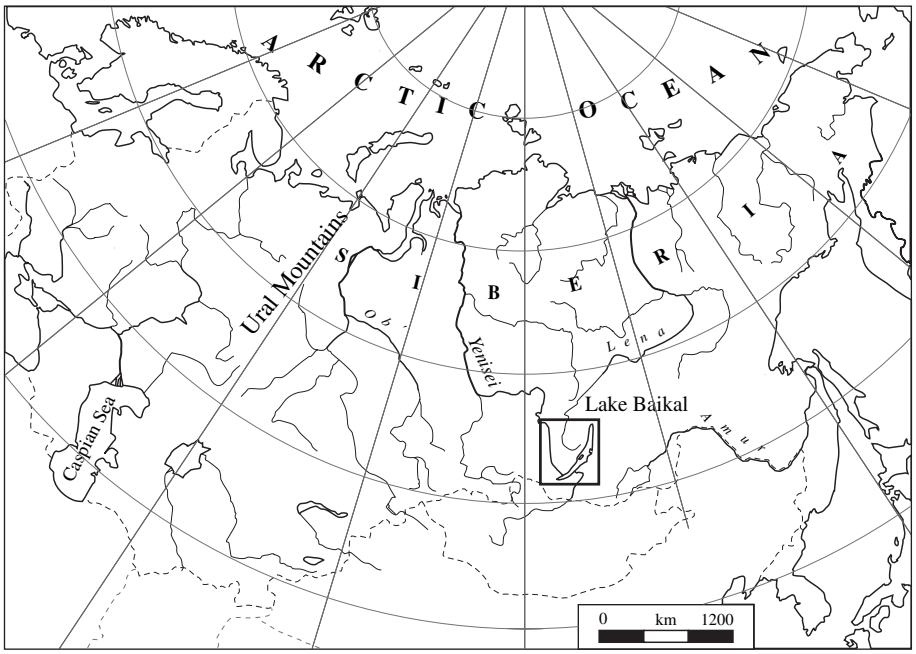

Fig. 1. Map of Siberia with Lake Baikal indicated.

skeletal remains from the Baikal area indicate fish were important components of the diet during much of the Holocene (Katzenberg and Weber, 1999; Weber et al., 2002). Basic questions remaining unanswered include (but are not limited to) how such fish were procured and how fish and fishing functioned within the subsistence and settlement patterns of Lake Baikal's foraging cultures.

As a starting point, we reconstruct fishing practices at the Ityrkhei site, on Lake Baikal's northwest coast (Fig. 2). This study is the first comprehensive analysis of faunal remains recovered from any Lake Baikal archaeological site. We focus on the harvest of European perch (*Perca fluviatilis* L.), the dominant fish in the site assemblage, and a widely used species in Eurasia. We specifically examine perch size as a way of assessing the fishing technology employed at the site. While fish size is relatively commonly examined in archaeological studies (Butler, 1996, 2001; Casteel, 1974; Desse and Desse-Berset, 1996; Leach and Davidson, 2000, 2001; Leach et al., 1997; Luff and Bailey, 2000; Owen and Merrick, 1994a; Van Neer and Depraetere, 2005), it often has not been used to infer harvest technology (but see Greenspan, 1998; Owen and Merrick, 1994b; Zohar et al., 1997). Using a modern sample of perch from Lake Baikal, we develop regression formulas for estimating the size of archaeological perch. The size range of these fish, and behavioral and morphological characteristics of other fishes taken at the site, allow us to make inferences regarding fish harvest technologies. We begin by discussing general characteristics of Lake Baikal, and then describe Ityrkhei and its fauna. Following this, we outline our methods and discuss selectivity of fishing gear. Inferences are made about technologies used for harvesting fish at the site, and we conclude with suggestions for additional studies.

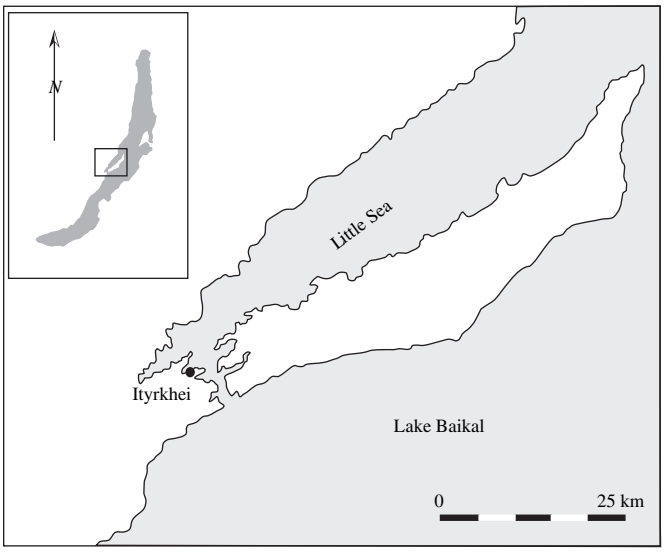

Fig. 2. Map of Lake Baikal, Russia, with Ityrkhei indicated.

2. Fishing Lake Baikal

Lake Baikal is in Eastern Siberia a few hundred kilometers from the border between Russia and Mongolia, and stretches from 52° to 56° north latitude. This freshwater lake is generally flanked by mountain ranges and hills. The climate varies by micro-region, but overall is markedly continental, with relatively warm summers and very long and cold winters. The lake surface is ice covered by midwinter, usually with the exception of the very headwaters of the Angara River, the lake's only outlet. Many vegetation zones intersect the lake, but the southern boreal forest is dominant in most areas. However, steppe vegetation can be found along the lake, most