Using Mini-Barcodes to Investigate the Species Composition of the Late Holocene (3,500 to 200 years BP) Fishery at EeRb-144, British Columbia, Canada

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Introduction

EeRb-144 is a seasonal prehistoric (~7000 to 200 cal. years BP) campsite located in the Interior Plateau region of southcentral British Columbia, Canada (Fig. 1).[1] Excavations of the site have recovered numerous Late Holocene (3500 to 200 cal. years BP) materials associated with fishing, including fish remains and fishing spear points.

The majority of fish remains recovered from EeRb-144 are fragmented. This fragmentation has generally precluded the identification of these remains through morphological analysis to the species level. Consequently, little is known about the species composition of EeRb-144's Late Holocene fishery.

To shed light on the species composition of the Late Holocene fishery at EeRb-144, we used ancient DNA (aDNA) analysis to identify a sample of Late Holocene fish remains from the site.

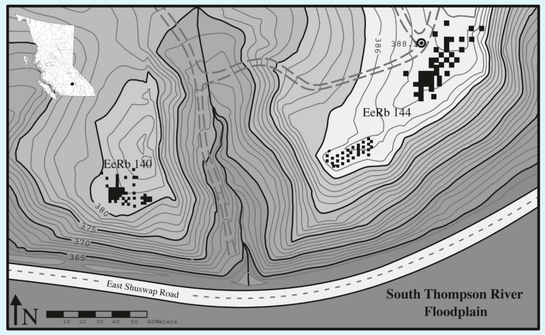


Figure 1. **Map of EeRb-144 and its environs. The location of EeRb-144 within British Columbia, Canada, is indicated in the inset map.**

Ancient DNA Analysis

64 Late Holocene fish remains from EeRb-144 were selected for aDNA analysis. The remains were taken from a variety of contexts in order to increase the likelihood that they represent multiple individuals.

A modified silica-spin column method was used to extract DNA.[2]

A 166 bp COI mini-barcode was amplified with universal primers and sequenced. The sequences were compared to reference sequences and a taxonomic identification was assigned to the remains using a threshold approach.

COI-based identifications were confirmed or refined through the analysis of a CytB mini-barcode. CytB mini-barcodes were amplified with family- or genus-specific primers.

Pre-PCR lab work was conducted in a dedicated aDNA laboratory and used strict contamination controls.[3]

Results

COI mini-barcodes were amplified from 33 of the 64 analyzed fish remains. CytB mini-barcodes were amplified from 31 of these 33 remains.

All of the remains that yielded DNA could be identified to the species level.

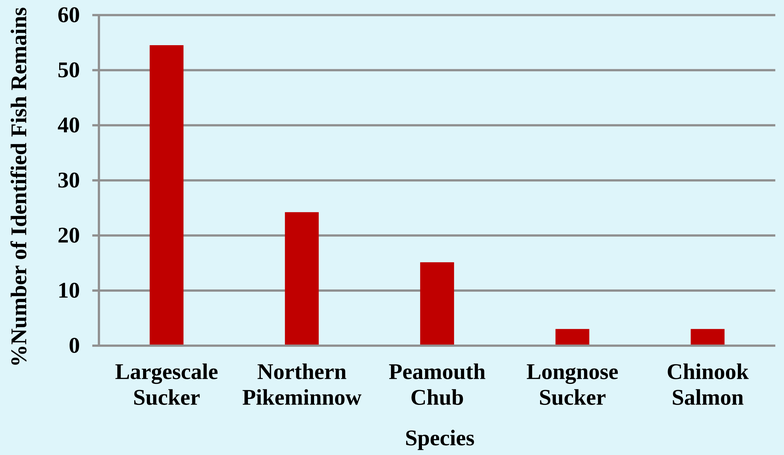
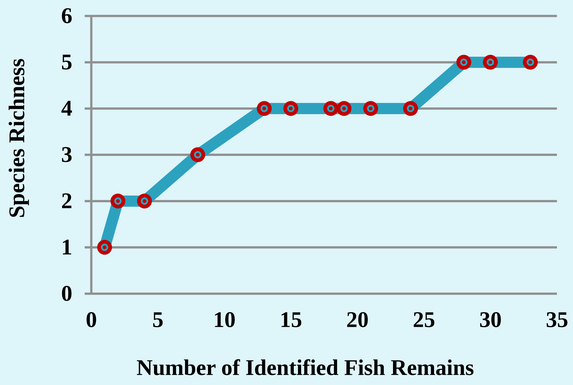


Figure 2. **Relative abundance of the fish species identified in the sample of Late Holocene fish remains from EeRb-144.**

Five locally abundant fish species were identified in the sample of Late Holocene fish remains (Fig. 2).[4,5] This indicates EeRb-144's Late Holocene fishery harvested a variety of common local species. However, the fishery appears to have been largely focused on harvesting largescale sucker (*Catostomus macrocheilus*) as most of the identified remains are from this species (Fig. 2). All of the identified species except Chinook salmon (*Oncorhynchus tshawytscha*) are resident species indicating the fishery was focused on resident fish.[5]

Figure 3. **Species accumulation curve for the sample of identified Late Holocene fish remains from EeRb-144.**



A species accumulation curve[6] indicates the sample's richness largely stabilized after 13 fish remains had been identified (Fig. 3). Another species was only identified after the number of identified remains had been nearly doubled (Fig. 3). This suggests the sample's taxonomic composition approximates the composition of the entire assemblage of Late Holocene fish remains from EeRb-144.[6]

Seasonality of Fishery

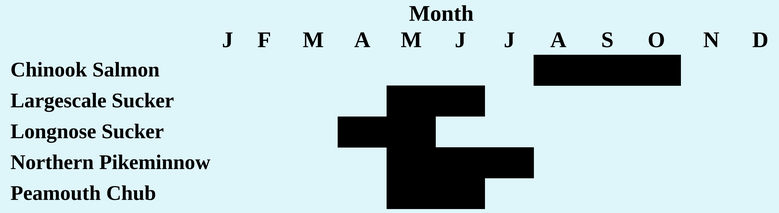


Figure 4. **Spawning seasons of the fish species identified at EeRb-144.[5,7,8,9]**

Historically, Plateau peoples caught suckers (*Catostomus* spp.) during their spring spawning runs.[11] If EeRb-144's inhabitants had similar subsistence scheduling, its Late Holocene fishery's focus on largescale sucker, which spawns in May and June (Fig. 4), would suggest this fishery occurred during the spring to early summer. The other three resident species harvested by the fishery can also be readily caught at this time as they also congregate to spawn during this period (Fig. 4).

Since Chinook salmon runs in the nearby Thompson River system from August to October (Fig. 4), its presence at EeRb-144 suggests the fishery continued into at least the mid-summer.

A spring to mid-summer time frame for EeRb-144's Late Holocene fishery concords well with other seasonal indicators from the site that suggest it was occupied during the spring and summer.[1]

Implications

Studies of Late Holocene subsistence patterns in the Interior Plateau have tended to emphasize the importance of anadromous salmon (*Oncorhynchus* spp.) and minimize the importance of resident fish. However, our results indicate that during the spring and early summer when salmon were not running, resident fish—especially largescale suckers—were an important food source for Late Holocene Plateau peoples. Moreover, this study demonstrates that the analysis of mini-barcodes from archaeological fish remains can provide a more nuanced understanding of ancient fisheries by enabling the identification of otherwise unidentifiable fish remains.

Acknowledgments

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