

The Geologic Source of an Obsidian Wealth Blade from the Whale Cove Site (35-LNC-60), Central Oregon Coast: Results of X-Ray Fluorescence Trace Element Analysis

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Introduction

The Whale Cove Site (35-LNC-60) is located along the central Oregon coast near Depoe Bay. The site is situated on a small knoll overlooking Whale Cove, a small salt water cove cut into the coastal sandstone. Excavated by Oregon State University archaeologists in 1985, the Whale Cove Site is primarily composed of midden deposits – the vast majority of materials removed from the 63.5 m³ excavation consisted of marine shell and the remains of marine mammals. Only one obsidian artifact consisting of several broken fragments of a large obsidian biface was found (Figure 1). The results of the archaeological investigations at Whale Cove are reported in detail by Bennett (1988) and Bennett and Lyman (1991).

The obsidian biface, although incomplete, is almost certainly a portion of a large wealth or ceremonial blade, a unique category of artifact occasionally encountered at sites along the Northwest California coast and southwest Oregon (Kroeber 1905; Gould 1966; Hughes 1978, 1990). Once assembled, the biface fragments measured 9.0 cm in length, 5.2 cm in width, and 1.2 cm in thickness. The weight of the combined pieces totaled 47.8 gm.

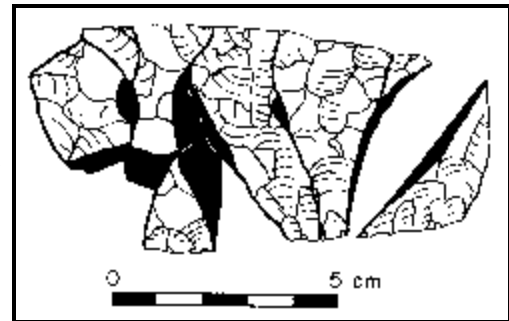


Figure 1. Obsidian wealth blade fragment (adapted from Bennett and Lyman 1991:249).

A small fragment of the biface was initially geochemically characterized in 1987 using instrumental neutron activation analysis (Skinner 1987) as part of an investigation of local use of obsidian from the nearby Siuslaw River (i.e., Inman Creek chemical obsidian source groups). At that time, the source of the biface was not identified although it was noted that it shared the same geologic source as a similar smaller biface fragment recovered from another central Oregon coastal site, the Umpqua/Eden Site (35-DO-83; Lyman 1991). In 1996, we reanalyzed the Whale Cove and Umpqua/Eden artifacts using nondestructive X-ray fluorescence trace element methods.

Results of X-Ray Fluorescence Analysis

Nondestructive trace element analysis of the obsidian biface was completed using a Spectrace 5000 energy dispersive X-ray fluorescence spectrometer. The system is equipped with a Si(Li) detector with a resolution of 155 eV FWHM for 5.9 keV X-rays (at 1000 counts per second) in an area 30mm². The

X-ray tube employed is a Bremsstrahlung type with a rhodium target and 5 mil Be window. The tube is driven by a 50 kV 1 mA high voltage power supply, providing a voltage range of 4 to 50 kV. Specific analytical conditions used for the analysis of all elements reported here are described in Skinner (1997). The results of the analysis are presented in Table 1.

The trace element values used to characterize the sample were compared directly to published values reported for obsidian sources located in Oregon and northern California (Skinner 1997) and with unpublished trace element data collected by Northwest Research Obsidian Studies Laboratory through analysis of geologic source samples.

Table 1. Results of trace element analysis of the obsidian blade.

Trace Element	PPM *	Uncertainty (±)
Rubidium (Rb)	119	4
Strontium (Sr)	14	5
Yttrium (Y)	49	3
Zirconium (Zr)	321	7
Niobium (Nb)	19	3

* Parts per million

The Source of the Biface

The geologic source of the characterized blade was identified as the Silver Lake/Sycan Marsh geochemical source (Figure 2). Obsidian from this source group is found at many scattered outcrops ranging in distribution from the town of Silver Lake in the Fort Rock Basin to south of Silver Lake in the northeast margin of the Klamath Basin. Obsidian nodules from the source are also spread over a large area south of Silver Lake in the Sycan River and Sycan Marsh regions (Hughes and Mikkelsen 1985:313–314; Hughes 1986:313–314).

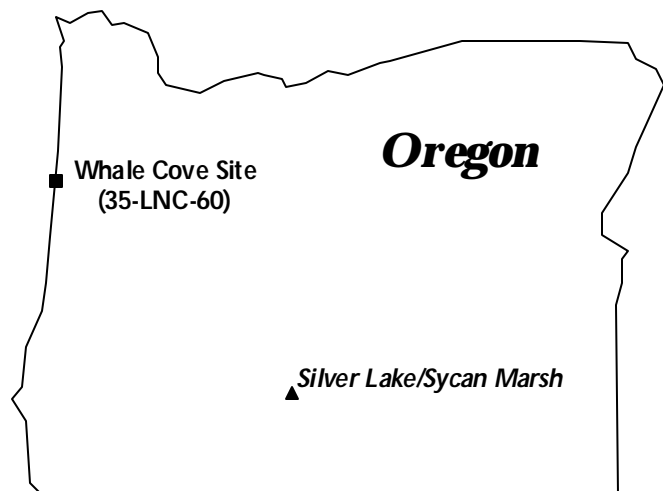


Figure 2. Location of the Whale Cove Site and the Silver Lake/Sycan Marsh obsidian source area

Other wealth blades from northwest California (Hughes 1978; Hughes and Bettinger 1984), southwest Oregon (Hughes 1990; Hall 1995; Northwest Research Obsidian Studies Laboratory, unpublished research results), and the Willamette Valley (Hughes 1990) have been previously characterized. They were all found to originate either from sources in northeastern California or the Klamath Basin and northwestern Great Basin of central Oregon. The identification of the source of the Whale Cover biface as the Silver Lake/Sycan Marsh source is consistent with the source use and artifact production patterns presented by previous trace element investigations.

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