Obsidian Studies of Two Possible Wealth Blade Fragments from the Umpqua/Eden Site (35-DO-83), Central Oregon Coast: Results of X-Ray Fluorescence and Obsidian Hydration Analysis

Craig E. Skinner, Northwest Research Obsidian Studies Laboratory
Ann C. Bennett-Rogers, Oregon State University
Jennifer J. Thatcher, Northwest Research Obsidian Studies Laboratory

Introduction

In a previous article in *Current Archaeological Happenings in Oregon* (Skinner and Bennett-Rogers 1997), we described and identified the geologic source of an obsidian wealth blade fragment recovered from the Whale Cove Site (35-LNC-60), central coast of Oregon. In the investigation reported here, we describe two additional probable wealth blade fragments found at the Umpqua/Eden Site (35-DO-83) and report the results of X-ray fluorescence analysis trace element studies of the two artifacts. We also document the results of obsidian hydration measurements for both artifacts.

The Bifaces and the Umpqua/Eden Site

The Umpqua/Eden Site (35-DO-83) is situated on the southeast bank of the Umpqua River estuary about 3.2 mi (5 km) upstream from the mouth of the river (Figure 2). Although archaeological research at the Umpqua/Eden Site has been discussed by a number of different researchers (most completely by Lyman 1991 – also see Stenhouse 1974; Ross and Snyder 1979, 1986; and Lyman 1985), analysis of archaeological materials from the site is still unfinished and has been only partially reported.

In 1987, one of the authors initiated an exploratory neutron activation analysis (NAA) study of obsidian from 35-DO-83 and carried out a preliminary inventory of all lithic materials prior to analysis (Skinner 1987). Out of 1,051 lithic items recovered from the site, fully 335 (31.9%) were obsidian, an anomalously high percentage of obsidian that is significantly larger than for any other Oregon coastal site. Obsidian debitage (N=307), much of it with cortex (45.0%) and evidence of bipolar reduction of small obsidian pebbles, accounted for 37.4 percent of the total lithic debitage. Other excavated sites along the Oregon Coast typically yielded obsidian in much smaller frequencies, most often no more than a few percent of the total recovered lithic artifacts. Although we suspect that a local source of obsidian pebbles may exist, none has yet been found in the vicinity of the site (also see Lyman 1991:119–121). The nearest source of pebble obsidian (and the only known coastal source of obsidian in Oregon) is found near the mouth of the Siuslaw River approximately 18 mi (30 km) north of the Umpqua/Eden Site.

The larger of the two biface fragments (sample 3-161) is a portion of a medial section of what was apparently a much larger well-formed artifact (Figure 1). The biface was recovered from level 6 of unit 100N/92E. The intact bifacially flaked edge of this item is 32.3 mm long; the sample is 9.6 mm thick, a maximum of 28.3 mm wide (bifacial edge to broken interior edge) and weighs 10.1 grams. The fragment is a translucent variegated black and mahogany glass with a vitreous surface luster and no visible banding.

The smaller biface fragment (sample 6-1) consists of a 2.0 gram portion with a remaining intact bifacially-flaked edge 6 mm long. The size of the piece is 8.7 mm at its thickest point and measures 1.62 cm from the bifacial edge to the broken interior edge. This item was found at an unknown depth in unit 98N/98E. Prior to the removal of a portion of the artifact for destructive neutron activation analysis in

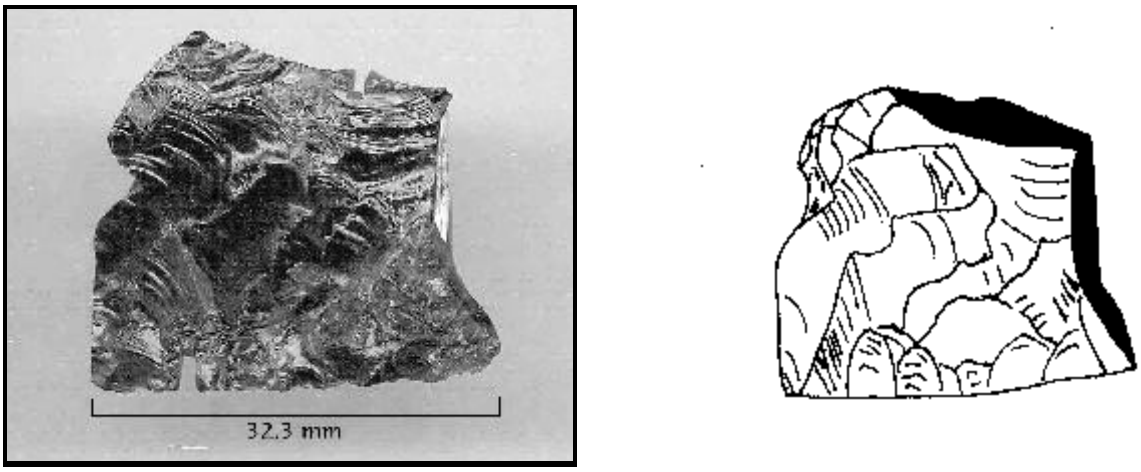

Figure 1. Possible obsidian wealth blade fragment (sample 3-161). Sections removed for hydration measurement are visible on the bifacial edge and the interior break of the scanned image on the left.

1987, the biface weighed 3.2 grams and measured 26 mm at its maximum dimension. The obsidian is a nearly opaque uniform black and exhibits a vitreous luster and a slightly matte surface texture. The small fragment of the biface that remained after NAA preparation proved just large enough for subsequent X-ray fluorescence analysis.

The smaller of the two artifacts (6-1) was identified during the 1987 initial inventory of lithic materials (Skinner 1987). The larger of the two fragments (3-161) was recognized as a possible wealth blade fragment during a later X-ray fluorescence trace element analysis investigation of obsidian artifacts from the site (currently underway).

The fine bifacial pressure flaking along the edges of the bifaces, the relatively thick intact portions, and the nonlocal origins of the glass lead us to suspect that both of these fragments are portions of what were once much larger obsidian blades, very likely large wealth or ceremonial blades. This unique category of artifact is occasionally encountered at sites along the Northwest California coast and in southwest Oregon (Kroeber 1905; Rust 1905; Drucker 1937; Goldschmidt and Driver 1943; Gould 1966; Hughes 1979, 1990; Hughes and Bettinger 1984; Hall 1995; Skinner and Bennett-Rogers 1997).

Results of Trace Element Analysis

Nondestructive trace element analysis of the samples was completed at Northwest Research Obsidian Studies Laboratory 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 FHWM for 5.9 keV X-rays (at 1000 counts per second) in an area 30 mm^2. Signals from the spectrometer are amplified and filtered by a time variant pulse processor and sent to a 100 MHZ Wilkinson type analog-to-digital converter. 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 the elements reported in Table 1 and Figure 3 are available at the Northwest Research Obsidian Studies Laboratory World Wide Web site at *www.obsidianlab.com.*

Table 1. Summary of results of trace element analysis of biface fragments from the Umpqua/Eden Site (35-DO-83). Trace element abundances are reported in parts per million.

	Trace Element Composition (ppm)	
Trace Element	**Artifact 6-1**	**Artifact 3-161**
Rubidium (Rb)	114 ± 4	91 ± 3
Strontium (Sr)	9 ± 5	31 ± 7
Yttrium (Y)	49 ± 2	54 ± 3
Zirconium (Zr)	349 ± 7	101 ± 7
Niobium (Nb)	20 ± 2	16 ± 1
Geologic Source	Silver Lake/Sycan Marsh	Glass Buttes 1

The trace element values used to characterize the bifaces fragments were compared directly to published values reported for obsidian sources located in Oregon and northern California and with unpublished trace element data collected by Northwest Research Obsidian Studies Laboratory through analysis of geologic source samples (Skinner 1999).

The trace element composition of the smaller biface (6-1) indicated that it originated from the Silver Lake/Sycan Marsh obsidian source. This source was extensively used in southwest and southcentral Oregon during the prehistoric period and is found in natural deposits over a large area of Fremont National Forest and the southern margin of the Fort Rock Lake Basin (Hughes and Mikkelsen 1985; Hughes 1986; Skinner 1999; also see Thatcher, this issue). The larger black and mahogany-colored biface fragment (3-161) correlated very well with the Glass Buttes 1 source, the most commonly encountered variety of at least nine geochemically-distinguishable obsidian sources found at the Glass Buttes Source Complex situated in eastcentral Oregon (Ambroz 1997).

Both the Silver Lake/Sycan Marsh and Glass Buttes 1 sources have been previously identified as the origins of obsidian wealth blades (Hughes 1978, 1990; Skinner and Bennett-Rogers 1997). For additional details about these sources, see the International Association for Obsidian Studies Obsidian Source Catalog at *www.peak.org/obsidian/obsidian.html*.

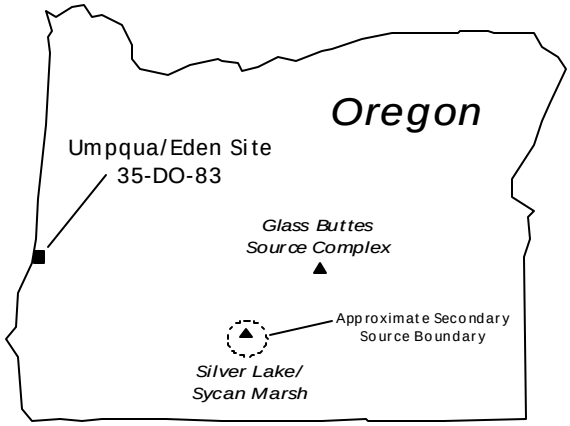

Figure 2. Location of the Umpqua/Eden Site and the geologic sources of the two characterized obsidian biface fragments.

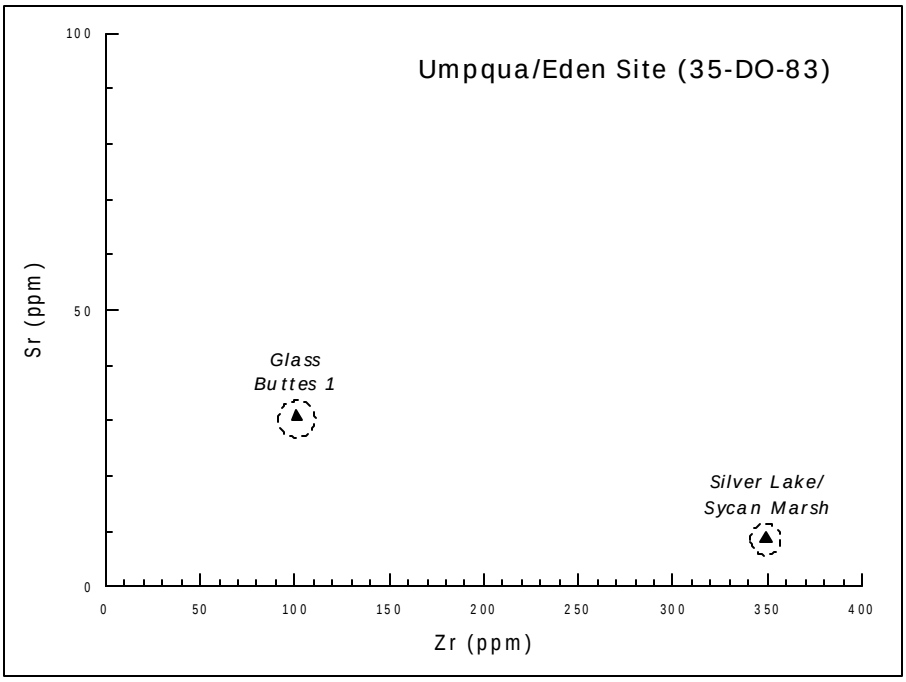

Figure 3. Scatterplot of zirconium (Zr) plotted versus strontium (Sr) for analyzed artifacts from 35-DO-83.

Results of Obsidian Hydration Analysis

The two artifacts were also prepared for obsidian hydration measurements using standard hydration analysis methods (see *www.obsidianlab.com* for details). Artifact 6-1 (Silver Lake/Sycan Marsh source) yielded a single hydration rim measurement of 2.8 microns. Two rims of 2.6 and 3.1 microns, one associated with the original surface of the biface and a second from the break, were found on artifact 3-161 (Glass Buttes source).

Due to the small number of hydration rim measurements and the vagaries of obsidian hydration rates, we do not attempt to associate calendar ages with tool surfaces. It is apparent from the thickness of the rims, however, that both items were manufactured prior to the late prehistoric period. Given a hydration rim reading uncertainty of at least 0.2 ：m, the age of manufacture for both bifacial tools is approximately the same.

Table 2. Results of obsidian hydration analysis.

	Hydration Rim Measurements (microns)	
Geologic Source	**Artifact 6-1**	**Artifact 3-161**
Glass Buttes 1	–	2.6, 3.1 *
Silver Lake/Sycan Marsh	2.8	–

* Double rim; smaller rim recorded on break.

Summary and Conclusions

The identification of the Silver Lake/Sycan Marsh and Glass Buttes 1 sources as the origins of the two potential wealth blade fragments further extends our knowledge of the geologic origins of this unusual category of artifact Additionally, the recurring pattern of nonlocal procurement of toolstone for this type of artifact from a relatively restricted set of sources in northern California and southern and central Oregon is confirmed. The correlation of the two biface fragments with different geologic sources also confirms that they are remnants of two individual artifacts. Obsidian hydration rim measurements establish the general contemporaneity of manufacture for both items, sometime prior to the late prehistoric period. Although no calendar ages are proposed for the bifaces described here, it is apparent that the manufacture of obsidian wealth and ceremonial blades, ***if*** the two fragments are indeed representatives of this category of artifact, extend well into antiquity prior to the ethnographic period in which their use is so well-documented.

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