Revisiting Kelly Forks (10CW34): Current and Future Research at a Western Stemmed Tradition Occupation in the Nez Perce-Clearwater National Forest, Idaho, USA

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Abstract: The Kelly Forks Work Center Site (10CW34) is a deeply buried and stratified late Pleistocene to late Holocene aged archaeological site located on the North Fork Clearwater River in the Nez Perce-Clearwater National Forest. Previous research suggested the site contained archaeological components associated with the Western Stemmed Tradition. Here, we report preliminary results of ongoing reinvestigation of the site to assess the stratigraphy, geochronology, archaeology, and traditional Nez Perce use of the Clearwater River drainage.

Keywords (5): Western Stemmed Tradition, Nez Perce, geoarchaeology, Paleoindian, Columbia Plateau

Main Text:

The Kelly Forks Work Center Site (10CW34), hereafter Kelly Forks, is in the Bitterroot Mountains, Nez Perce-Clearwater National Forest, Idaho within the traditional homelands of the *Nimíipuu* (Nez Perce) Tribe (**Fig 1a**). Kelly Forks is preserved on an alluvial terrace within 2.2 m of stratified anthropogenic, biogenic, eolian, alluvial, and pyroclastic deposits **(Fig 1b)**. Buried cultural materials were identified by the Forest Service in the late 1960s, with intermittent testing occurring throughout the 1970s–1990s during the construction of a ranger station and work center. Excavations by the University of Idaho (UI) from 2010–2012 provided evidence for a continuous occupation spanning 13,740 to 280 cal. BP (Longstaff 2013). The earliest deposits included nineteen stemmed point basal fragments, eight Cascade points, and one potential Goshen point. These artifacts are associated with radiocarbon dates spanning the Bølling–Allerød through early Holocene (see Longstaff 2013:339, Table 35).

While early excavations at the site were crucial for establishing the importance of the Kelly Forks site in regional prehistory, some questions remain about the earliest components at the site (Reid 2017). Specifically, more information is needed about (1) the contextual association between cultural material and radiocarbon dates, (2) the stratigraphic integrity of the site's deposits, (3) site formation history, and (4) how these data, coupled with paleoethnobotanical data and ethnography, contribute to our understanding of *Nimíipuu* subsistence and land use since the Pleistocene.

Beginning in the summer of 2021 Washington State University and the University of Kansas, in consultation with the *Nimíipuu*, reopened the site seeking to address these problems. We removed backfill from previously excavated test units 53, 56, 58, 64, 68, and 69 in Block C3 to expose, document, and sample sedimentary profiles **(Fig 1c)**. To evaluate the stratigraphic integrity of the site, as well as to determine the accuracy of the earliest dates, we incorporated geoarchaeological analyses with optically stimulated luminescence (OSL) dating. We focused our primary field description and sampling on the grid north wall of contiguous excavation units 64 and 53 in Block C3 because it contained a 2.2-m-deep profile section presumably representing the entire sedimentary sequence at the site (**Fig 1d**).

We reinterpreted the Kelly Forks stratigraphy and constructed a geoarchaeological framework including both litho- and pedostratigraphy based on macro-and microscopic observations (**Fig 2a**). We identified four soil sequences, three of these as previously undocumented buried soils (S1–S4). These soils were developed on a sequence of alluvial, pyroclastic, and eolian sediments comprising nine lithostratigraphic units (LU). The oldest potential buried soil (S4) is ephemeral and occurs at the contact between LU2 and LU3 and has been post-depositionally altered due to a fluctuating water table as evidenced by the presence of redoximorphic features (Fe stains and depletions). The second buried soil (S3) represents culturally-dense surface(s) developed during a period of stability before the eruption of Mt. Mazama (Crater Lake). The third buried soil (S2) represents a period of stability following the eruption of Mt. Mazama and is developed over tephra and eolian silt. Finally, the fourth soil (S4) is a modern soil developed on an eolian mantle draping the alluvial terrace which has evidence of in-situ vegetation burn and is capped by a root mat.

Understanding the age of the lower deposits, which includes LU2 and LU3 and the potential buried paleosol (S4), is a key goal of ongoing research. Previous research yielded two radiocarbon assays of 10,680±50 ^{14}C BP (12,560–12,650 cal BP) and 11,780±40 ^{14}C BP (13,490–13,750 cal BP) at depths of 180 cm and 185–186 cm, respectively. To test these ages, we placed an OSL dating sample at 196 cmbs, which returned a depositional age for the sands at 11.36 ± 0.63 ka, potentially providing a TPQ for the age of the artifacts in LU2 (Table 1). These preliminary results contradict the earliest dates previously obtained at the site and indicate that more work is needed to understand the age of the earliest cultural assemblages at Kelly Forks.

Future research at the site will focus on excavating a new 2 x 3 m block to investigate the four buried surfaces and their relationships to buried cultural assemblages. This research will expand our geoarchaeological framework seeking to reconstruct site formation processes via soil micromorphology and increase the resolution of site geochronology through radiocarbon and OSL dating. This will include high-resolution spatial mapping for all charcoal, sediment/soil, botanical, and lithic samples recovered during excavation with the goal of reconstructing discrete occupation zones and understanding the age and relationship between stemmed, foliate, and other point forms found at the site. One key research goal will be to investigate the purported lanceolate point (Fig 2c–h) interpreted by the original researchers as a Goshen or Plainview point. Given that the assemblage is largely characterized by Western Stemmed Tradition point types, another hypothesis is that the point type is a Black Rock Concave point, which suggests a connection with the Great Basin, rather than the Great Plains. However, detailed technological analyses of these assemblages are ongoing, and these hypotheses will be tested in the future.

Another major goal of future research is to contribute to our understanding of Pleistocene to late Holocene *Nimíipuu* subsistence activity in the Clearwater River drainage. The *Nimíipuu* traditionally migrated through their territory throughout the year, harvesting a broad range of plant and animal foods on seasonal subsistence landscapes. An important part of the *Nimíipuu* seasonal round consisted of summertime hunting, fishing, and root and berry harvesting in the Bitterroot Mountains (Walker 1998). Archaeological evidence suggests that this seasonal subsistence round may extend back tens of thousands of years; however, the evidence is currently sparse (Ames 1988). Indeed, the discovery of a ~15,000-year-old Western Stemmed

Tradition campsite at Cooper's Ferry, Idaho was viewed by the *Nimíipuu* as a reaffirmation of the deep time connection between *Nimíipuu* and their ancestral lands (Wade 2019; Davis et al. 2019).

One approach to understanding past human subsistence activities is the study of microscopic plant residues from archaeological contexts. Plant foods leave behind microscopic but durable pollen, phytolith (silica casts of plant cells), and starch grains (crystalline glucose structures). These remains are commonly found on stone tools and in archaeological feature sediments and can provide important information on plant use in the past (McLeester 2018; Pearsall 2015). Of particular interest is whether archaeological sediments and tools will contain starch, pollen, and/or phytolith residues representative of upland plant foods traditionally harvested by the *Nimíipuu* (e.g., roots and berries). The application of these methods at the Kelly Forks site may reveal new information about upland subsistence activities important to the *Nimíipuu*.

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Tables

Table 1. Summary OSL data for Sample KF-OSL-1 taken at Kelly Forks. De, D, and age are shown to two decimal places, with all calculations made prior to rounding[1,2]. Age is relative to the year 2022.

Sample ID	CERSA #	Depth (cmbs)	Lithostratigraphic Unit (LU)	Equivalent dose (Gy)	D_{β} (Gy ka^{-1})	D_{γ} (Gy ka^{-1})	D_{cosmic} (Gy ka^{-1})	D (Gy ka^{-1})	Age (ka)
KF-OSL-1	857	195	2	36.34 ± 1.19	1.75 ± 0.12	1.26 ± 0.08	0.19 ± 0.02	3.20 ± 0.14	11.36 ± 0.63

[1] D_es were determined by isolating quartz mineral grains (Srivastava et al., 2019) and using a single aliquot regenerative protocol (Murray and Wintle, 2000). Final D_e was based on 28 small aliquots which passed the rejection criteria of Murray and Wintle (2003), using central age model of Galbraith et al. (1999).

[2] Infinite matrix dose rates (Ds) were calculated from reconciled values of radionuclide concentrations of ^{232}Th, ^{238}U and ^{40}K obtained from two methods: (i) inductively coupled plasma mass spectrometry (ICP-MS; Th, U) and inductively coupled plasma optical emission spectrometry (ICP-OES; K); and (ii) environmental radioactivity measurements using a MiDose Solutions µDose unit (Tudyka et al., 2018). Conversion factors of Guérin et al. (2011) were used and values were adjusted for attenuation by grain size and chemical etching using the datasets of Guérin et al. (2012) and Bell (1979), as well as by measured water content of 8 ± 5 %. The contribution from the cosmic dose (D_{cosmic}) was determined following Prescott and Hutton (1994).

Figures

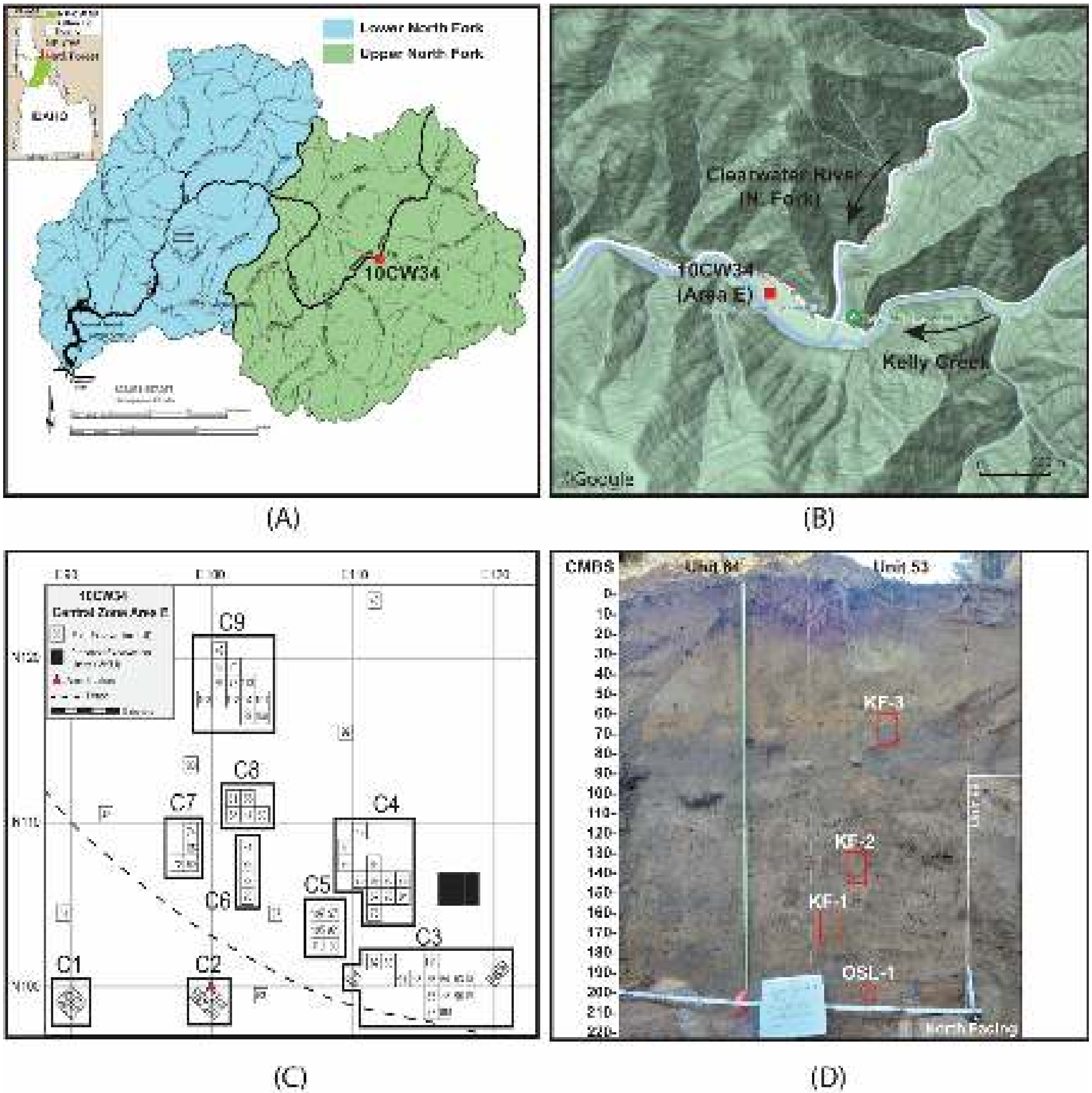

Figure 1. (A) map of study area within the Nez Perce Clearwater National Forest (modified from Longstaff 2013, p. 6), (B) location of Central Zone Area E at the confluence of the North Fork of the Clearwater River and Kelly Creek, (C) excavation area including the locations of previous test pits by the University of Idaho and future excavations by Washington State University, and (D) north profile of units 64 and 53, representing the main focus of this study. Red squares and circle represent sampling areas for soil micromorphology and optically stimulated luminescence dating, respectively.

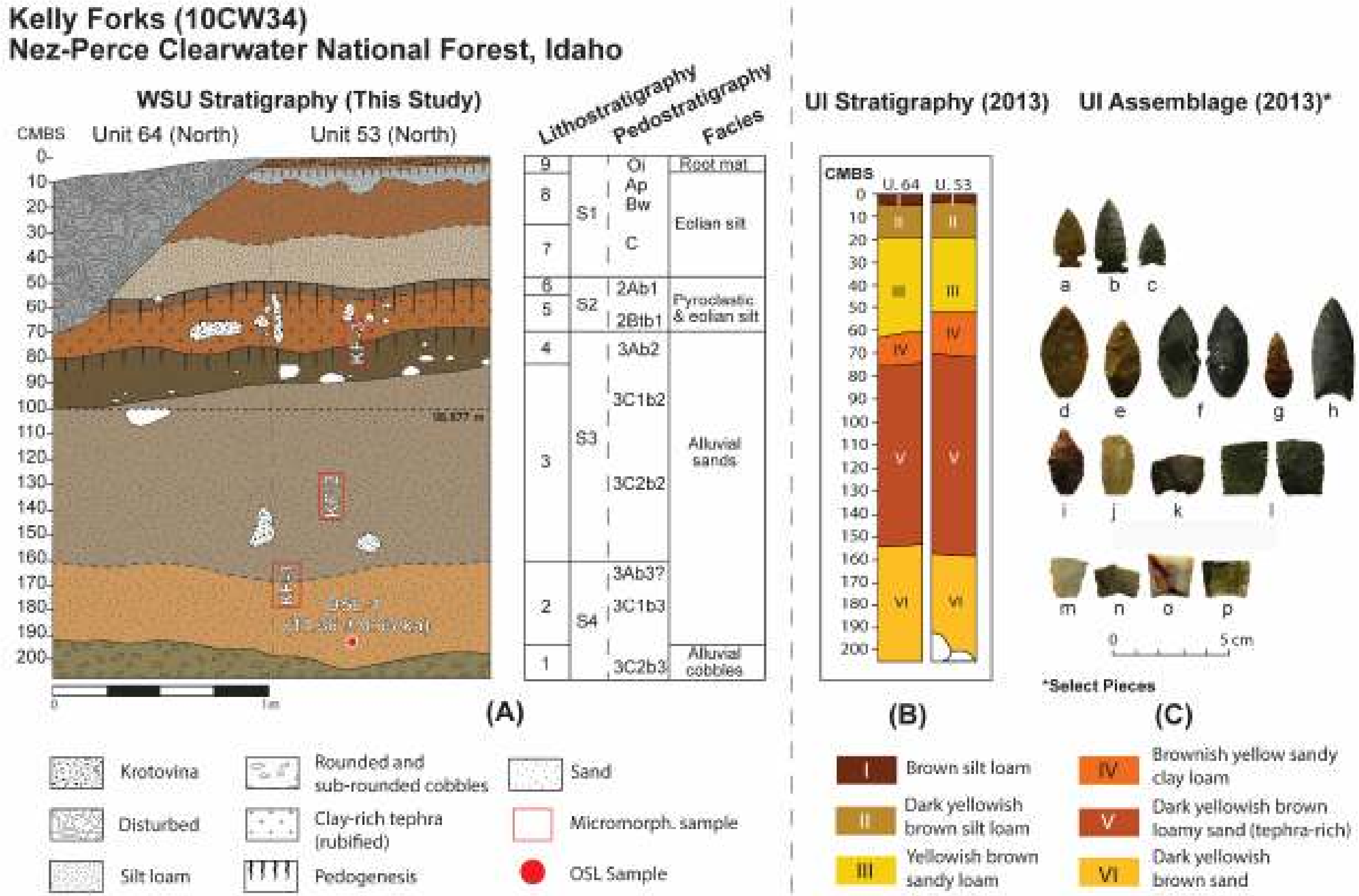

Figure 2. (A) Preliminary WSU stratigraphic framework at Kelly Forks, (B) UI stratigraphy including six strata, and (C) select projectile points collected and interpreted during the 2010 and 2012 excavations by UI (modified from Longstaff 2013): (a–c) Side-notched and corner-notched points; (d–g) Cascade points; (h) Goshen/Plainview type; (i–l) Cascade point fragments; (m–p) Western Stemmed Points (concave based).

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