Analytical Approaches to Interpreting the Little John Site (KdVo6), a Multi-Component Late Pleistocene Occupation in Yukon's Southeast Beringia

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Introduction

Little John (KdVo-6) is a multi-component archaeological site with evidence of human occupation from the recent past to the late Pleistocene, c. 14 Kya. Located 12 km north of Beaver Creek and 2 km east of the international border, the Little John site sits atop a knoll above *Cheejil Niik* (Grayling Creek), the easternmost extension of the Tanana River drainage that contains a number of late Pleistocene sites assigned to the East Beringian Tradition and the Chindadn, Nenana, and Denali Complexes.

Figure 1. Little John from the Southwest

Excavation – Vector for Community Engagement

Figure 2. Local *Dineh* Youth Field Participants, D. Peters and Eldred Johnny

Excavations since 2003 have occurred in conjunction with field schools of Yukon College (Easton) and University of Alaska Anchorage (Yesner) and participating collaboration of local *Dineh* communities of the White River First Nation, Yukon, and Village Councils of Northway, Tetlin and Tanacross, Alaska including a unique *Art and Archaeology* week with the Northern Cultural Expressions Society for Native youth at risk.

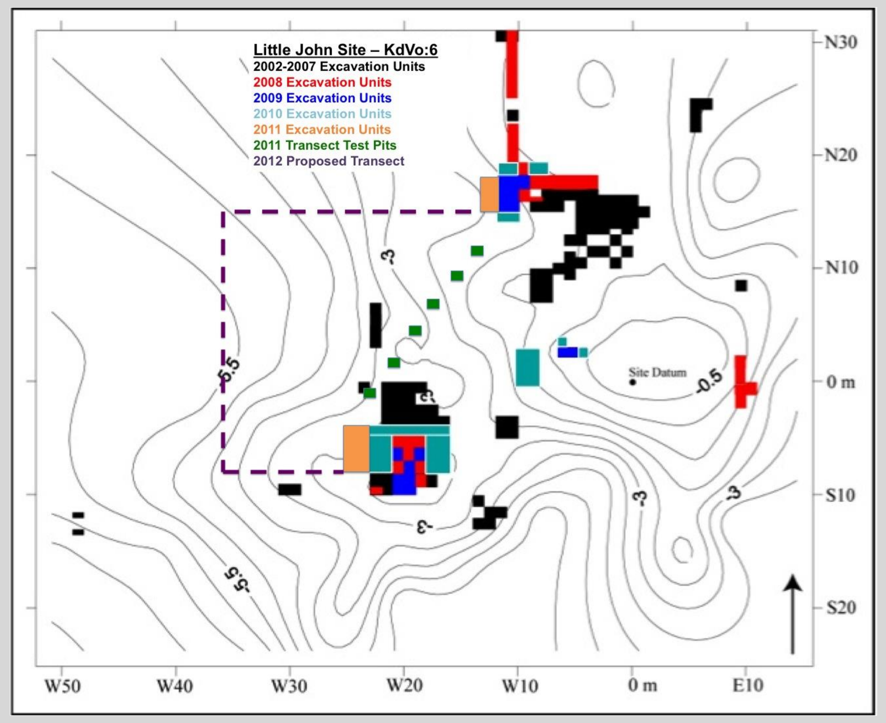
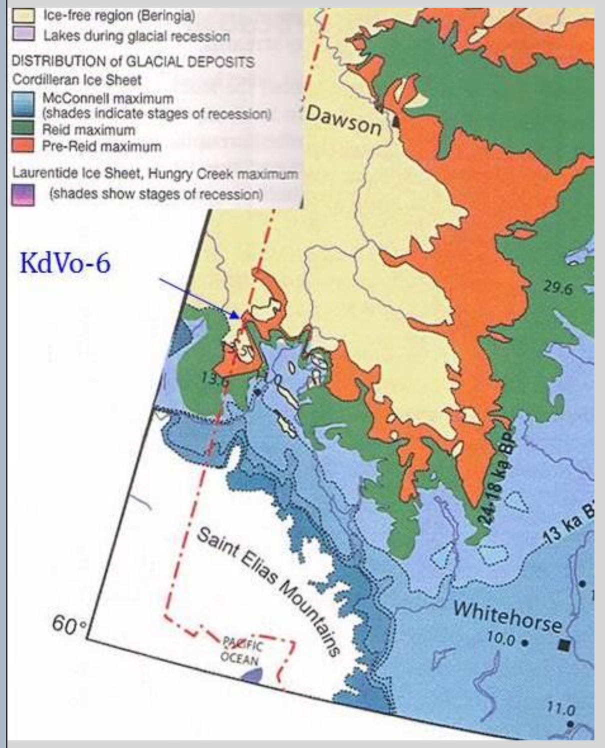


Figure 3. Site Topography and Excavation Units

Regional Paleoecology



The site lies on the western extent of the thin piedmont Mirror Creek glacial advance, variously dated to MIS 6, c. 140 Kya or MIS 4, c. 70 Kya years, corresponding to the interior Yukon's Reid glacial event. The late Wisconsin McCauley glacial advance ended at McCauley ridge, some 50 kilometers to the southeast, rapidly receding c. 16 Kya; by 13 Kya the region was ice-free to at least the White River, some 150 km SE.

Figure 4. Late Quaternary Glaciations of Yukon Territory

Ivory (mammuthus) fragments from the hillside above the site, date to 38 Kya; additional Pleistocene fauna of bison, equus (dated at c. 23 Kya), mammuthus, rangifer, and possibly saiga - has been recovered about 2 km from the site, showing the area supported a range of fauna during the mid to late Wisconsin.

Figure 5. *Yikahh M'ann'* Pollen Record (RC years)
- 13.5-11 Kya – Herb Tundra Steppe
- 11 – 8 Kya – Birch Rise
- 8 – 7.5 Kya – Spruce Rise
- 7.5 – 5.5 Kya – Spruce Zone
- 5.5 Kya – Alder Rise

Palynological data from *Yikahh M'ann'*, a lake 2 km away, suggest a late glacial environment of grasses, sage, willow, and sedges – equivalent to Dale Guthrie's "mammoth steppe", with the local Birch Rise beginning c. 13 Kya, and the Spruce Rise beginning c. 9 Kya.

Site Stratigraphy

Figure 6. West Lobe Shallow Stratigraphy

Above the chemically altered and ice-fractured basal regolith are found loess sediments varying in thickness from a few centimeters to over 4.5 meters. Two soil horizons designated B1 and B2, represent boreal brunisols generally separated by several centimeters of tephra, believed to be from the White River volcanic eruption, c. 1.2-1.9 Kya. A thin (5 cm) A horizon composed of decaying organics caps the sequence.

Figure 7. East Lobe Deep Loess Deposits intersected by Paleosols

The varying depth of the loess deposits results from two distinct depositional environments, an eroding cliff side plateau to the southwest and a deep swale to the northeast separated by a higher knoll feature. The East lobe deposits are intersected by numerous paleosol strata containing faunal remains and cultural artifacts and features. Discontinuous permafrost and evidence of past cryoturbation present unique challenges to excavation and stratigraphic interpretation.

Figure 8. Measuring Electrical Resistivity and pXRF of KdV6 Sediments

Cubley and Samolczyk (YC) have recently collected Electrical Resistivty and pXRF data from the site in order to explore the recognition of unique sedimentological signatures that may facilitate the linking of strata across the site. At the same time Grooms (UNM) is examining the stratigraphy and chronology at the Little John site, Yukon Territory, in order to interpret technological differences between the Chindadn (non-microblade) and Denali (microblade) complexes. Soil micromorphology, combined with OSL and AMS radiocarbon dating methods, are being used to assess chronological relationships between excavation lobes and to past climate perturbations.

AMS Radiocarbon Dates

The deep loess deposits of the East Lobe have preserved bone and other organics in direct association with lithics.

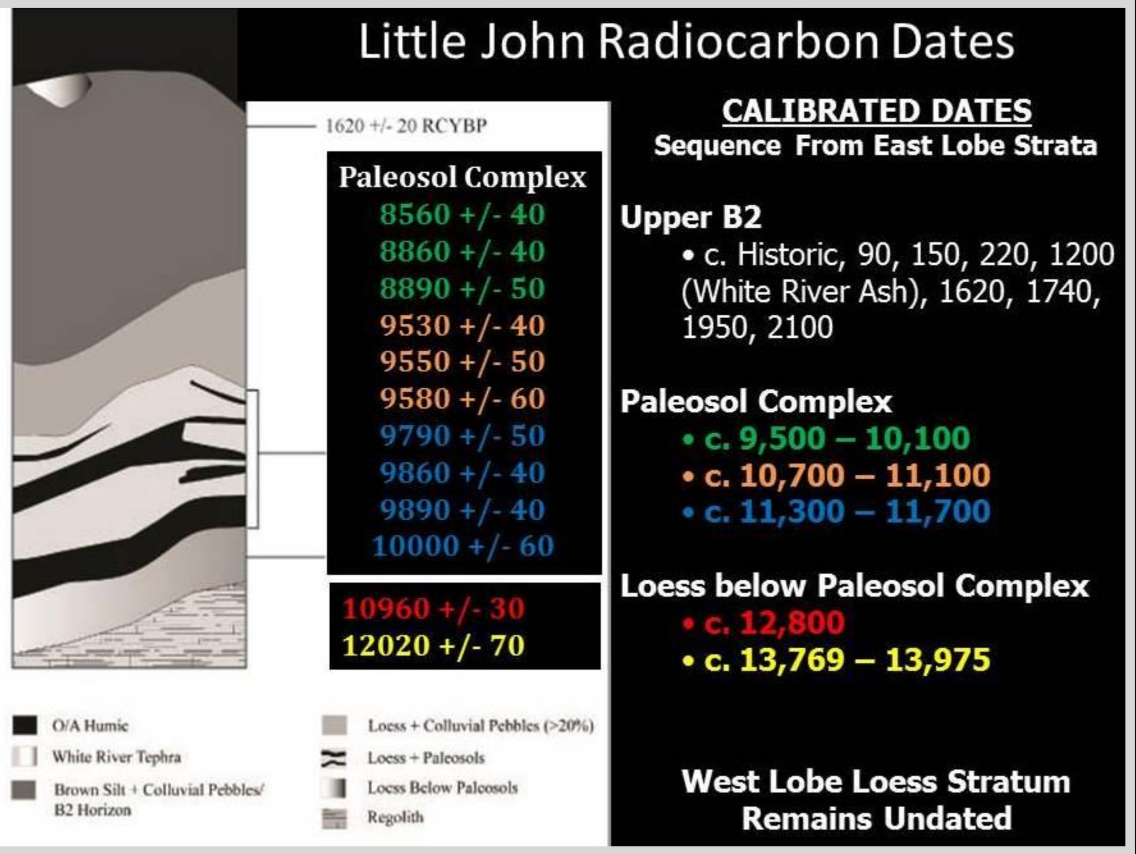


Figure 9. Radiocarbon Dates from KdVo-6

Calibrated AMS dates on bone, charcoal, and wood samples suggest five major times of early occupation of the site from 9.5 Kya to as early as 13.9 Kya (Fig. 9). Formed tools include Foliate Bipoints, Tear-Drop Chindadn Points, and medial sections of Collaterally Flaked Lanceolate Points. The lower West Lobe loess stratum, which holds Chindadn technology remains undated due to a lack of organic preservation.

Figure 10. Dated Wapiti and Bison Bone Below the East Lobe Paleosol Complex

Within the Loess below Paleosol stratum we have identified at least two further paleosol strata of mercurial integrity tentatively labeled P5 and P6. In addition these strata hold a patchwork of decaying wood features; one wood sample dated to Cal BP 12880 – 12810, a date very close to a wapiti inominate and bison long bone fragments from the same level (see Fig. 10 and 12).

Figure 11. Left: Collaterally Flaked Lanceolate Point in situ with calibrated date; Right: Example of Wood Remains identified as Betula spp. With similar date to Wapiti remains in Fig. 10.

Four samples of wood were identified to genus level by Hawes. All were deciduous hardwoods, with vessel elements and perforation plates visible. Vessels are few in number, with scalariform perforation plates and alternate intervessel pits; homocellular uniseriate ray structures were observed. These features indicate a plant of the Betulaceae family, which include the genera Alnus (alder) and Betula (birch). Both have similar cellular structure; however the Alnus genus generally has aggregate rays, not present in the wood samples examined.

Figure 12. Bison bone in association with Retouched Flake

With Contributions from

Michael Grooms, University of New Mexico, Jordan Handley / Rudy Reimer, Simon Fraser University,
David Yesner, University Alaska Anchorage, Jeff Rasic / Natalia Slobodin, University of Alaska Fairbanks,
Laurianne Bourgeon, University of Montreal, Kathleen Hawes, Pacific Northwest Archaeological Services,
Vance Hutchinson / Joel Cubley / Mary Samolczyk, Yukon College

Early Cultural Faunal Remains

Over 2,000 Pleistocene fauna fragments have been recovered from the early East Lobe strata, representing a broad spectrum subsistence strategy, but with a sustained focus on Bison until the early Holocene. The identifiable bison remains are exclusively of axial and appendicular elements, while caribou and moose remains include cranial elements as well.

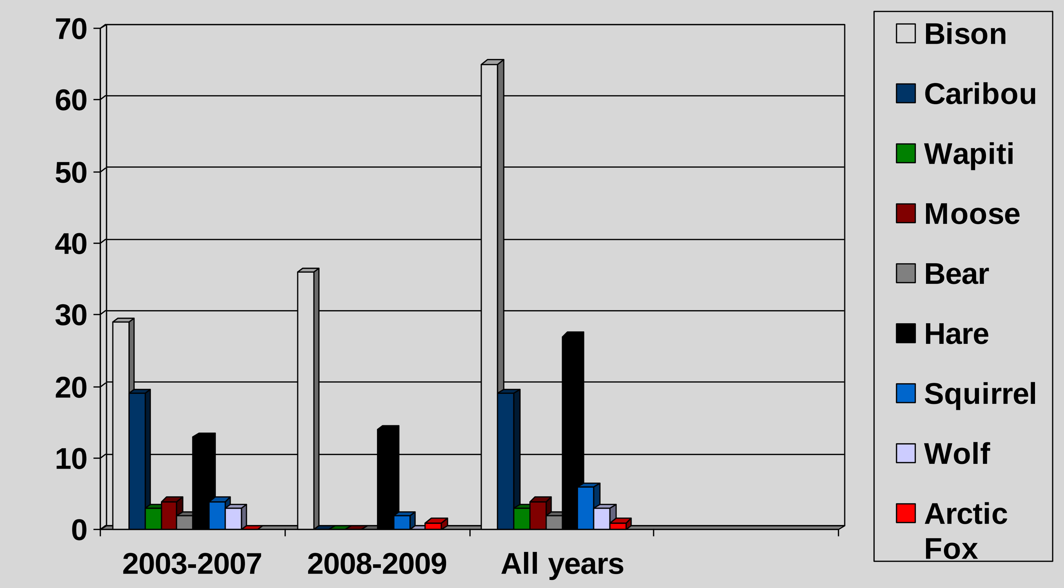


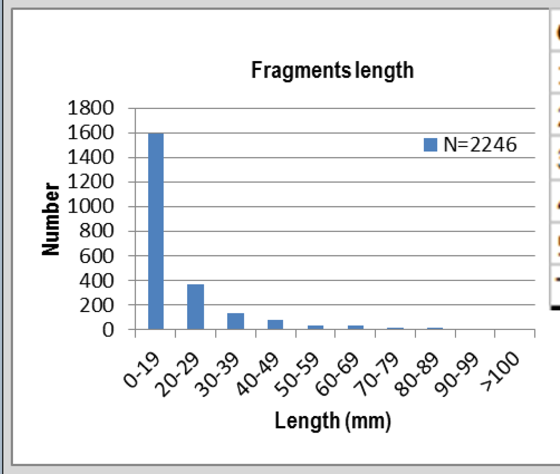
Figure 13. Distribution of Mammalian Fauna by Identified Species

Six bones bear a combination of fresh fractures, polished edges and sharp points that suggest they have been modified for use as tools, including a possible Beamer, Awl, and two chisel-like forms, perhaps for working hide or wood.

Figure 14. Split Bison bone with polished rounded edge typical of use wear on bone beamer – Calibrated AMS date of c. 11.2 = 11.4 Kya

Figure 15. Edge-modified split Bison bones from within the Paleosol Complex. Possible Awl on Left; Chisel- forms on Right. All bear polish on distal surfaces indicative of Use-Wear.

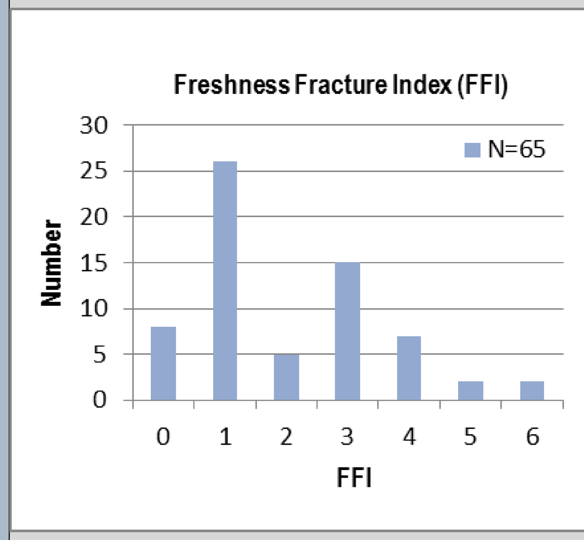
Faunal Taphonomy



Completeness	NR	NR%
1 = 0 to 1/4	2071	96,9
2 = 1/4 to 1/2	39	1,8
3 = 1/2 to 3/4	13	0,6
4 = 3/4 to 1	7	0,3
5 = no damage	7	0,3
Total	2137	100,0

Figure 16. Faunal Length and Element Completeness of KdVo6 Fauna

Bourgeon has sorted most fauna through 2013 by Size (0-20 mm, then by 10 mm classes) and Quartile Extent of element; 96% is fragmented to less than ¼ of the entire element and 87% of the material is smaller than 30 mm. The level of fragmentation could be explained by cultural processes.



Shaft circ.	NR	NR%
<1/2	67	98,5
>1/2	0	0,0
complete	1	1,5
Total	68	100,0

Figure 17. Freshness Fracture Index and Shaft Circumference of KdVo6 Fauna

On 68 long bone fragments >30mm in length, 67 show a shaft circumference of less than half, and 60% of them have been attributed to fresh fractures (FFI from 0 to 2) which suggests breakage for marrow extraction; the relatively high amount of small fragments of cancellous bone could also be interpreted as grease exploitation by humans.

Natural factors	Number	Percent
Weathering	263	95
Abrasion / Polish	198	69
Root Etching	77	27
Gnawing	18	6

Figure 18. Identified Natural Processes Effecting KdVo6 Fauna – n=285

Several natural processes have also affected the fauna. On 285 fragments more than 30 mm in length: 95% are affected by weathering, 69% by abrasion and polish, 27% by root etching and 6% show gnawing by carnivores or humans. These climatic, edaphic and geological processes may explain the fact that only 11 fragments examined displayed unequivocally clear cut-marks from butchering (short, deep V-shaped incisions); one of these include the bison vertebra identified by Yesner and dated to CAL BP 13,850 (Fig. 10). Taphonomic analysis is continuing through comparison with fauna from Broken Mammoth and Bluefish Caves.

Lithic Analysis

A variety of lithic materials are present and fashioned into a wide range of formed tools, utilized flakes, and debitage representing the entire prehistoric and historic cultural sequence of interior Yukon / Alaska. Over forty bifaces recovered in stratigraphic context will allow for a more precise characterization of the cultural sequence on the Yukon / Alaska borderlands.

Figure 19. Selection of Biface Forms from Little John

pXRF analysis by Raisic and Slobodin showed 85% of 105 obsidian specimens came from Wiki Peak, a source 75 km south and visible from KdVo-6 and which also dominates the Nenana component at the Walker Road site; the complete absence of Batza Tena obsidian at KdVo6 is distinct from all other early Tanana valley sites, (e.g. Healy Lake, Gerstle River, and the Shaw Creek site complex).

Sample Source/Stratum	Wiki Peak	Group M Hoodoo Mt.	Group AF Unknown	Edziza	Group P	Unassigned	Totals
West Lobe A/B1 Horizon	8			1			9 (8.6%)
West Lobe B2 Horizon	59	2			2	2	65 (62%)
West Lobe Loess	11		2				13 (12.4%)
East Lobe Paleosol	1						1 (0.96%)
Unassigned	10					7	17 (16%)
Totals (n = 105)	89 (84.7%)	2 (1.9%)	2 (1.9%)	1 (0.9%)	2 (1.9%)	9 (8.6%)	105 (100%)

Figure 20. Obsidian Sourcing Results on 105 Samples

Jordan Handley (SFU, Rudy Reimer-Yumks Supervisor) has undertaken an additional pXRF analysis to characterize non-vitreous igneous artifacts from the site.

The sample included 263 artifacts exhibiting basaltic attributes from a 2x2m unit and 1x2m unit from the East and West lobes, along with an additional formal tool sub-assemblage.

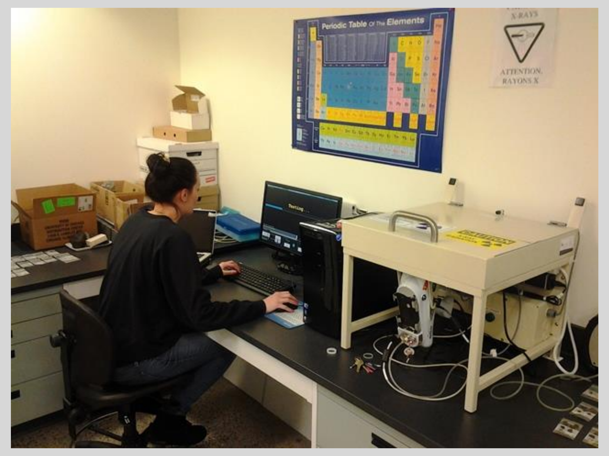


Figure 21. Jordan Handley at the Simon Fraser University XRF Laboratory

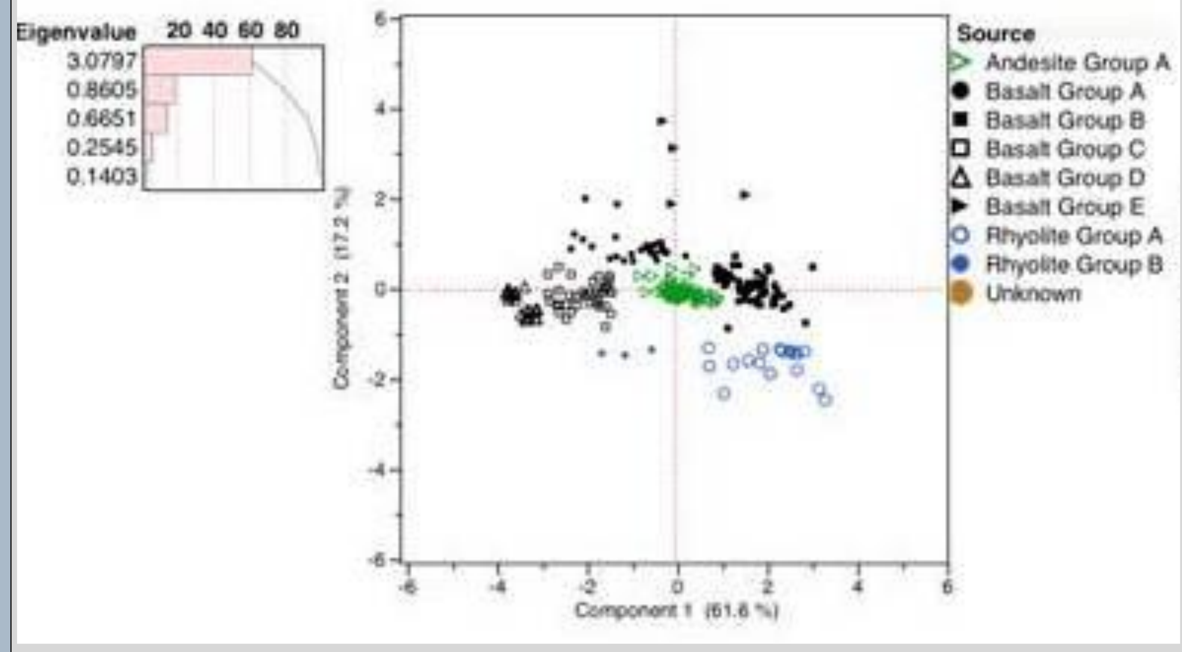


Figure 22. Basaltic Lithic Groups Identified by pXRF Analysis

Eight distinct lithic groups are suggested by this analysis. The most visually consistent and geochemically distinct group was Andesite Group A (AG-A), a black fine-grained andesite exhibiting visible quartz phenocrysts. A number of formal tools associated with the early Chindadn complex are composed of this material. An increase in AG-A artifacts between the Late Pleistocene Paleosol/Loess strata (n=19) to the Late Holocene B2 horizon (n=78), suggests that AG-A had acquired significance early on and the fluorescence of this material may be indicative of its local accessibility.

Figure 23. Two Early Chindadn Points made on Andesite Group A

While little is known about the distribution of basaltics in southeastern Beringia, the results suggest that geochemical analysis can contribute to questions of both intra- and inter-site acquisition, movement, and use of non-vitreous igneous artifacts. Handley will explore this further in her Masters research program at SFU.

Concluding Remarks

While clearly effected by complex periglacial processes the Little John site holds promise to refine our understanding of early human history of southeastern Beringia by applying a variety of standard and new analytical approaches to the data driven by the ArcomNorth motto –

"Permafrost is No Excuse"

We are happy to hear from colleagues and students wanting to participate in our work.

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