Supporting Appendix:
Figs. S1-S8
Tables S1-S10

Materials and Methods

Human Remains Materials and Methods

Following a skeletal inventory, osteometric measurements were taken of all complete and refitted elements. The approximate ages of Individuals 1 and 2, along with length and weight of the latter, were then estimated using several standard techniques (1-8). Aging based on the state of deciduous crown development follows (9) and (10). These two methods account for multiple formation stages to facilitate precision in aging young individuals; however, both are based on European reference groups. A third method adjusted for aging Native Americans (11) is also used, but is primarily based on eruption times so in this case is more subjective.

Recording of the 22 dental nonmetric traits in the deciduous crowns of Individual 1 was effected using the method of Sciulli (12). With exception, this method emulates the Arizona State University Dental Anthropology System (ASUDAS) (13) and other previous approaches for the study of permanent teeth. The utility of these traits is well known (14-15). Briefly, they have minimal inter- and intra-observer recording error rates, are easily identifiable, represent all dental morphogenetic fields, are not sexually dimorphic and, of most importance, because they are evolutionarily conservative with a high genetic component in their expression (16-18), are excellent markers for biodistance analyses (19). Beyond simply making them available to interested researchers, these data are included to show that the USR site inhabitants apparently possessed a Sinodont-like dental pattern (16) present in all Northeast Asians and Native Americans; there are researchers who believe that some early immigrants had alternate origins and/or possess a morphologically simpler Sundadont pattern (16).

The success of sex estimation in infant skeletal remains differs by element and feature(s), but has most often been attempted using mandible and ilium morphology (20-24); that approach was followed here. Accuracy rates also vary by sex and among samples if derived from different populations (24). Still, Schutkowski (21) reported accuracy rates of up to 95%, though his work is based on samples of European and European-derived skeletal remains. And, many researchers are dubious that skeletal sexing of infants can be done at all. Therefore, the successful extraction of viable (nuclear or mitochondrial) aDNA is a crucial step toward final sex determination.

Excavation Methods

Archaeological excavation methods follow best practices for subarctic Alaska. A metric grid was established over the entire dune and provenience was recorded by a Leica T407 total station. Excavation proceeded by natural strata for the upper soil horizons and contoured arbitrary 10 cm levels within sediments relatively unaltered by soil processes (C-horizon). Given the wide vertical separation (~20-90 cm) between components 10 cm levels were appropriate. Finer levels were used to recover materials within features and the occupation surface. All sediments were dry-sieved through 1/8-in screens by 50 x 50 cm quadrants (except 25 cm quadrants established for the burial). Feature and control sediments were collected in bulk by quadrant for further laboratory analyses. All *in situ* items were 3-pointed and bagged separately. Bulk sediments were sieved through 1/16-in screens.

Description of Feature 2010-5 (cremation hearth) and Feature 2011-13 (burial pit)

Given the complexity of the features and burials examined here, we describe the excavation process (Fig. S6-S8 and Table S10). During excavation of the F2010-5 (termed Feature 5 in 2010) hearth we recovered the hearth in its entirety, clearly demarcated stratigraphically by oxidized sediment, large quantities of charcoal, and faunal remains (between 65-82 cm BD). At the lower contact of the oxidized sediment (hearth) (~80 cm BD), we

encountered apparently unaltered aeolian silts (C-horizon), with a similar Munsell color as the surrounding (sterile) aeolian sediments. At the time, we excavated 5 cm below the bottom of the hearth (~85 cm BD) and found no additional artifacts or human bones and halted excavation for the season. We did not observe any 'edges' indicating continuation of a feature, however, the contours were irregular due to the dimensions of the pit hearth. In the lab, we found small faunal fragments in the bulk matrices collected 0-5 cm below the bottom of the hearth.

In 2011, we excavated the residential feature and continued excavation below the F2010-5 hearth. At ~104 cm BD (~140 cm below surface (BS)), we identified a roughly circular 'stain' directly below the hearth, designating this Feature 2011-13 (Fig. S7C). The area within the C-horizon that while very similar in appearance to unaltered sediment (color, texture, grain size, presence of redoximorphic mottling), we did observe a higher water content, stronger iron oxide mottling, increased concentrations of root casts, and terrestrial snail shells (succinids) (Fig. S8). While we found no artifacts, we did recover bone fragments (fish, small mammal) localized below the pit hearth (84-106 cm BD); they were low density, with some small disassociated charcoal chunks, and the bones were found in different orientations, including vertical. Hypotheses (at that time) included hearth remains pushed into the lower C-horizon, a cache pit, a trash pit, or remnants from earlier hearth cleaning. We stopped excavation at 104-107 cm BD (~140 cmBS) and 40-50 cm below the bottom of hearth feature F2010-5, except for two quads that were taken an additional 10 cm level (to ~115 cm BD, or 150 cmBS).

In 2013, we continued excavation of this feature (F2011-13). We recovered additional scattered fauna within the feature from 114-127 cm BD. Human remains were identified, and we followed the protocols set up under the Memorandum of Agreement between National Science Foundation (lead federal agency) and the State of Alaska Office of History and Archaeology with the local Native BIA-recognized tribal entity (Healy Lake Village) as an invited signatory. Following agreement of all parties, we continued excavating the feature. We instituted additional contamination-control procedures, including gloves and facemasks and minimal contact with the remains between excavation and bagging. Delicate remains were placed in foil, archival plastic bags, and small archival boxes. We gridded the bottom of the burial pit in 25 cm units and established photo-control points (pins) via total station. All F2011-13 fill (from 114 cm BD) and the ochre layer were recovered in matrix samples for further analysis. The bottom of the ochre-stained burial pit was 124-128 cm BD (~160-170 cmBS).

The ochre layers and bone exhibit similar colors for both individual skeletal elements indicating similar treatment. Individual 1 color values range from 10R 3/2 (dusky red) to 5YR 4/3 (reddish brown) and Individual 2 color was more consistent, at 2.5YR 4/4 (yellowish red). The ochre layer was intermediate between the inside fill and the human remains, at 7.5YR 4/3 (brown) dry and 10YR 4/3 (brown) wet. The inside fill was 10YR 4/2 (dark grayish brown) and finer in texture (dominated by silts) while the unaltered C-horizon at that level was 2.5Y 4/2 (dark grayish brown) and was coarser (silty sand). This is consistent with backfill material coming partially from upper sediments, which have higher silt percentages (*3*). We excavated an additional 10 cm below the bottom of F2011-13 into sterile C-horizon loess. All sediment matrices have been screened for cultural remains, and no cultural materials were found below the pit feature.

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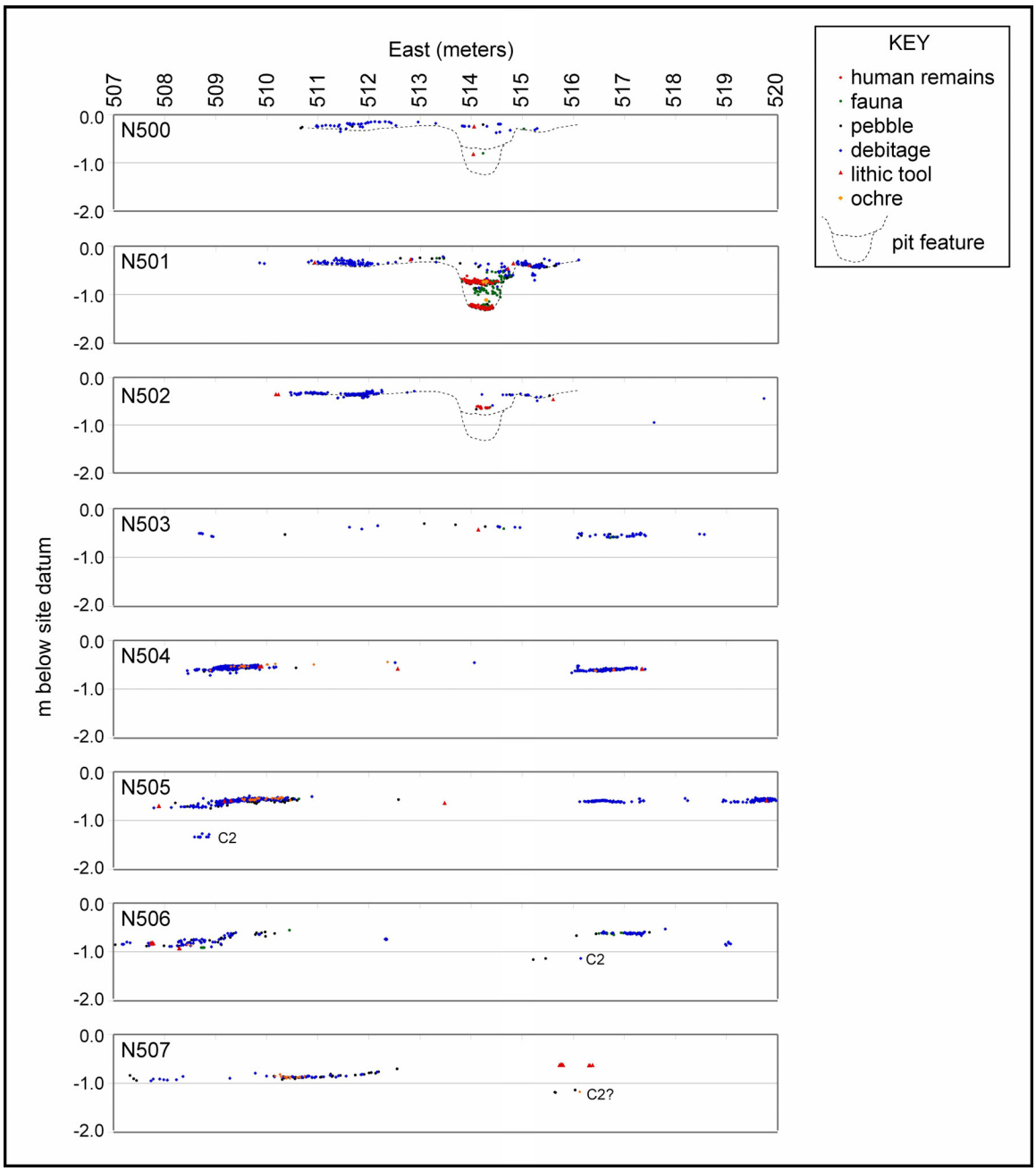

Fig. S1. Backscatter plot for East 507-520 by 1 m unit north.

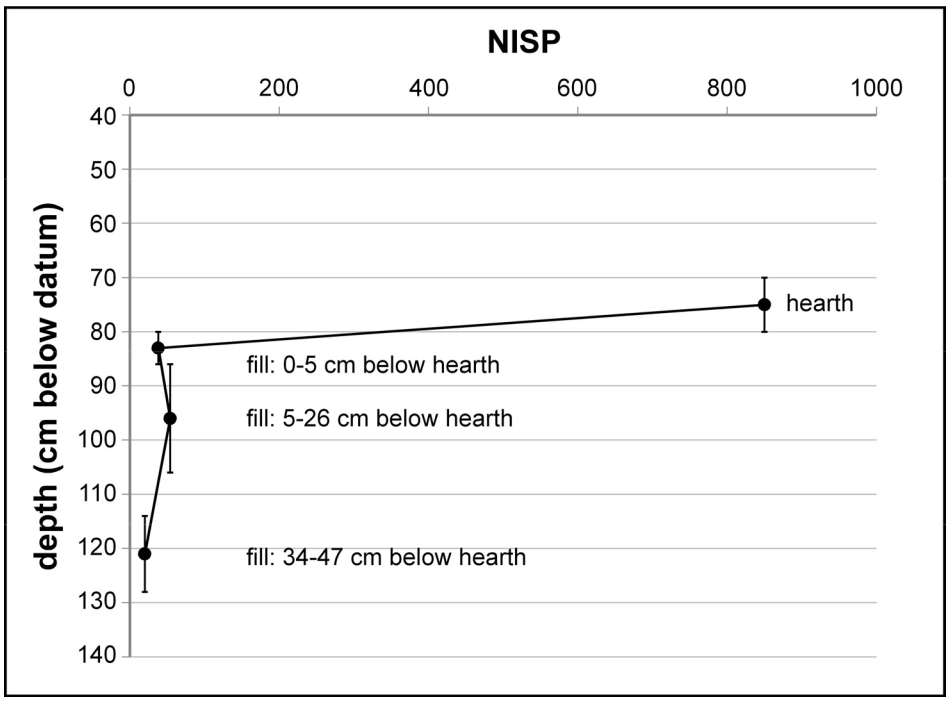

Fig. S2. Faunal NISP by depth.

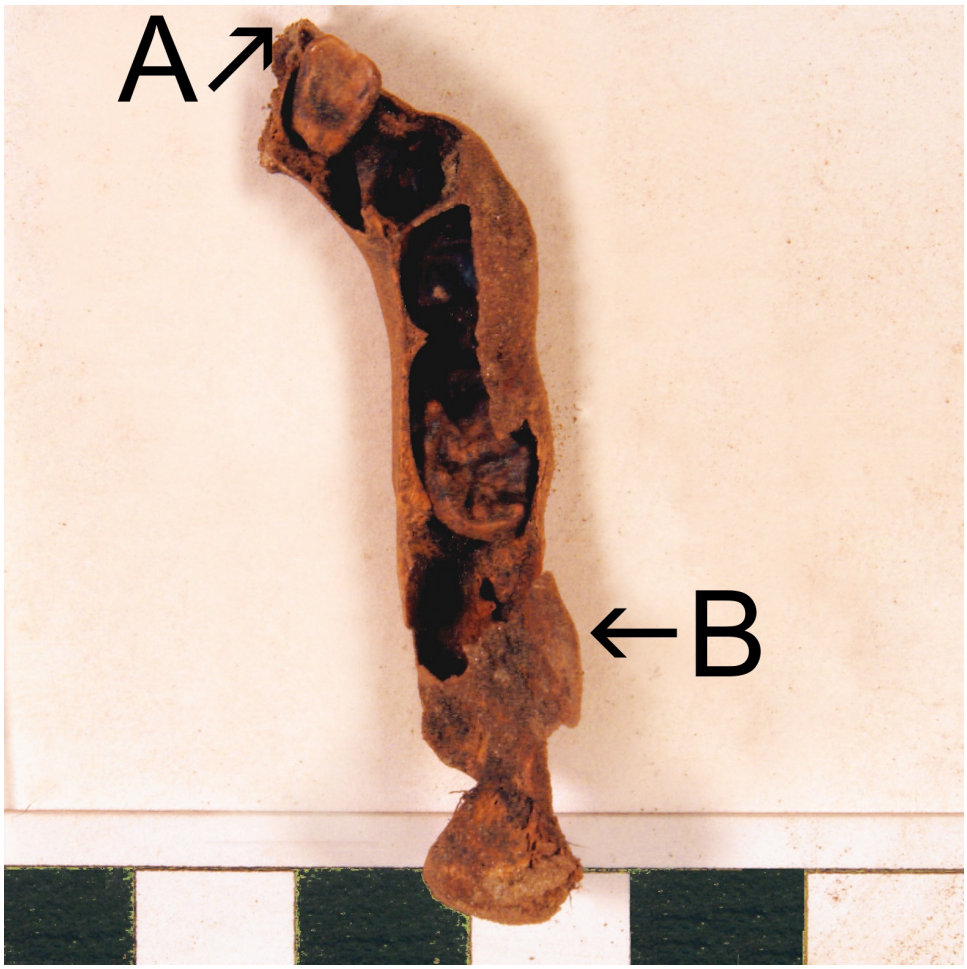

Fig. S3. Right mandible half of Individual 1, showing A) faint protrusion of a narrow mental eminence, and B) lack of gonial eversion, that is suggestive of female (*21*).

Fig. S4. Right ilium from Individual 1 exhibiting shallow oblique greater sciatic notch that is suggestive of female (*21*).

Fig. S5. Antler foreshafts, top views (on recovery, except for shortest foreshaft) and side views.

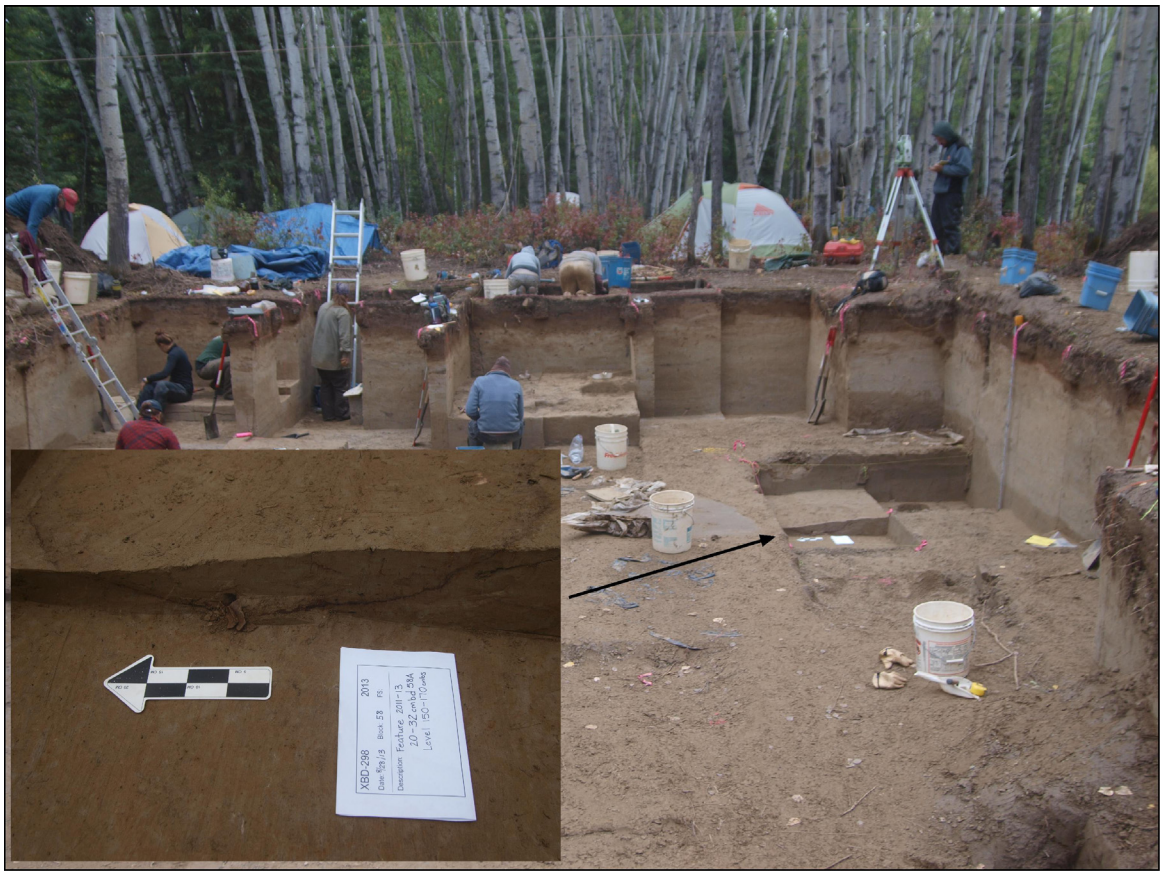

Fig. S6. Overview of USR site, view west. (**Inset**) burial pit on discovery of human remains.

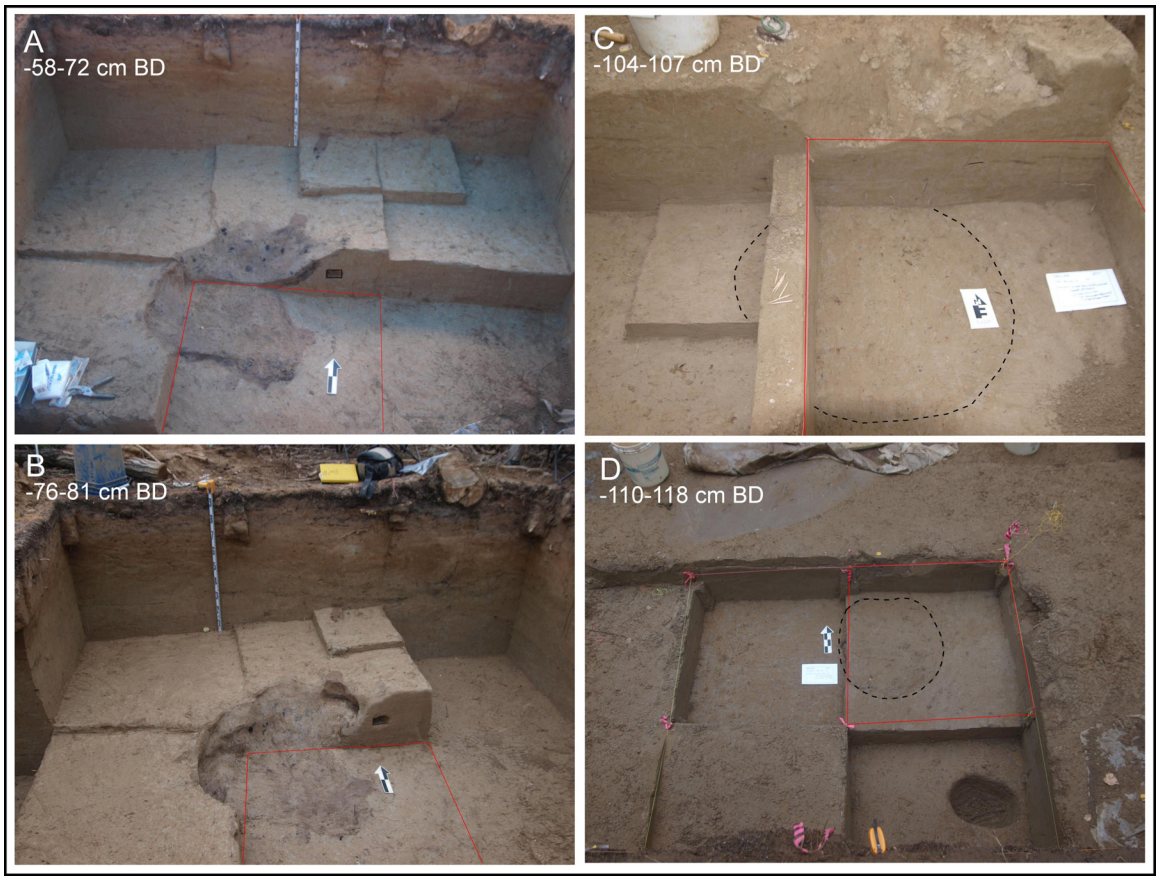

Fig. S7. Excavation of cremation hearth and burial pit. (**A**) surface of cremation hearth, (**B**) bottom of oxidized hearth, (**C**) pit feature outline, (**D**) pit feature on discovery of human remains. Red lines are excavation unit N501E514.

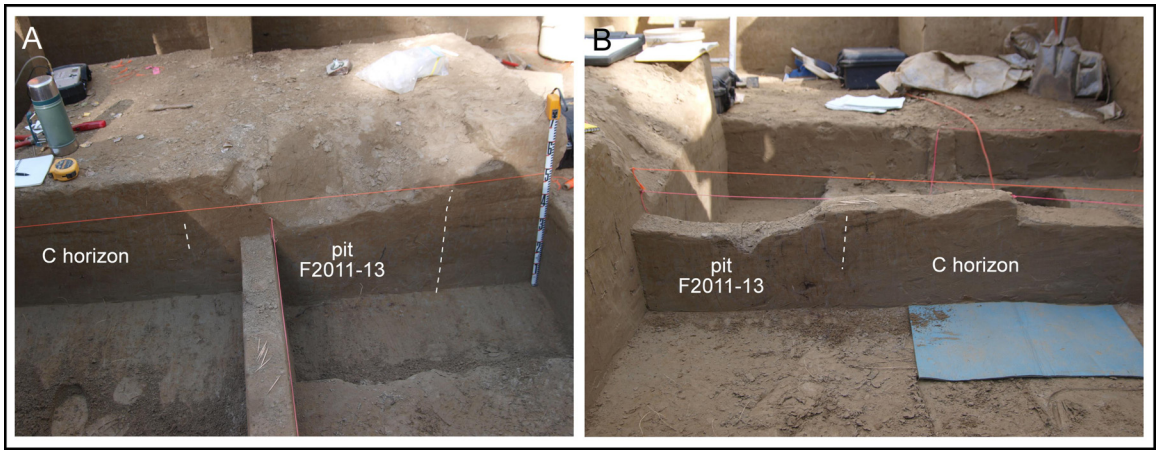

Fig. S8. Stratigraphy of burial pit, view north (**A**), and east (**B**).

Table S1. Radiocarbon results for cremation hearth and burial pit.

Lab No.	*Material*	*14C yr BP*	*$\delta^{13}C$*	*Cal BP (2 sd)*	*Cal BP (1 sd)*
Beta-280584	charcoal (*Populus/Salix* sp.)	9920±80	NA	11700-11200	11600-11230
Beta-280585	charcoal (*Populus balsamifera*)	9990±50	-24.0	11700-11260	11600-11320
Beta-280586	charcoal (*Populus balsamifera*)	10020±50	-23.4	11750-11290	11690-11360
Beta-371567	charcoal (*Betula* sp.)	9930±50	-23.9	11600-11230	11390-11250
Average		9973±27		11600-11270	11590-11290

Table S2. Faunal remains from the cremation hearth and burial pit.

	Hearth			*Burial Pit Fill*			*Total*	
Taxon (common name)	*NISP*	*%NISP*	*%burn.*	*NISP*	*%NISP*	*%burn.*	*NISP*	*%NISP*
Pisces	**326**	**39.4**		**36**	**35.0**		**362**	**38.9**
Oncorhynchus sp. (salmon)	308	37.2	96.1	29	28.2	27.6	337	36.2
Salmonidae (small salmonid)	18	2.2	100.0	7	6.8	0.0	25	2.7
Mammalia	**473**	**57.2**		**67**	**65.1**		**540**	**58.1**
Urocitellus parryii (ground squirrel)	191	23.1	95.9	51	49.5	14.6	242	26.1
Lepus americanus (snowshoe hare)	46	5.6	100.0	2	1.9	0.0	48	5.2
Marmota sp. (marmot)	4	0.5	100.0	-	-	-	4	0.4
Sorex sp. (shrew)	1	0.1	100.0	-	-	-	1	0.1
Avricolinae (vole and microtine)	231	27.9	99.6	14	13.6	28.6	245	26.3
Aves	**28**	**3.4**		**-**	**-**	**-**	**28**	**3.0**
Tetraoninae (ptarmigan/grouse)	16	1.9	100.0	-	-	-	16	1.7
Paridae (passerine)	11	1.3	100.0	-	-	-	11	1.2
Aves (possibly Picidae)	1	0.1	100.0	-	-	-	1	0.1
Total NISP	**827**	**100.0**		**103**	**100.0**		**930**	**100.0**

Table S3. Individual 2 skeletal part elevations, ordered by depth

Skeletal part	*average depth (cm below site datum)*	*Sd*	*n points*
Pelvis / sacrum	-128.3	0.006	8
Lower limb	-128.1	0.005	13
Ribs	-128.0	0.004	28
Vertebrae (lumbar)	-128.0	0.003	5
Vertebrae (cervical)	-128.0	0.006	7
Upper limb	-127.9	0.005	21
Tarsals and phalanges	-127.8	0.004	9
Carpals and phalanges	-127.5	0.002	7
Vertebrae (thoracic)	-127.4	0.013	20
Cranium (vault)	-127.2	0.006	10
Cranium (base)	-127.2	0.005	13
Mandible	-127.2	0.003	4

Table S4. Measurements (mm) of cranial elements and long bones of Individual 1 with estimated post-natal ages in weeks from greatest dimensions.

	Left	*Mid*	*Right*	*Age1*	*Age2*	*Age3*	*Age4*	*Age5*	*Age6*	*Age7*	*Min*	*Max*
Zygomatic												
Length	23.1		22.2[1]	>-4							>-4	>-4
Oblique height	20.2		21.0	>0							>0	>0
Maxilla												
Length	32.2			>0						0-12	>0	0-12
Oblique length	34.3			>0						0-12	>0	0-12
Mandible												
Oblique length			54.1	>0						>16	>0	>16
Width			19.8	>0						0-12	>0	0-12
Body length			40.7	>0							>0	>0
Pars petrosa												
Length	43.9		43.7	>0							>0	>0
Width	21.2[1]		23.8	>-10							>-10	>-10
Pars lateralis												
Length	28.0			>0							>0	>0
Width	20.8			>0							>0	>0
Pars basilaris												
Sagittal length		12.8		<0					>12		<0	>12
Width		17.7		>0							>0	>0
Maximum length		18.2		>0							>0	>0
Clavicle												
Length	43.7			<0							<0	<0
Humerus												
Length	69.1		69.2	>0	>0	0.38 ± 2.33	<6	<4			>0	<6
Midshaft diameter	6.2		6.0									
Distal extremity width	18.3			>0							>0	>0
Radius												
Length	59.6		59.0	>0	>0	2.23 ± 2.29	6	4			>0	6
Midshaft diameter	4.3		4.7									

Table S4, continued.

	Left	*Mid*	*Right*	*Age1*	*Age2*	*Age3*	*Age4*	*Age5*	*Age6*	*Age7*	*Min*	*Max*
Ulna												
Length	67.0[1]		65.6	>0	>0	1.8 ± 2.20	6	4			>0	6
Midshaft diameter	4.4		3.9									
Ilium												
Length	36.4		37.3	>0							>0	>0
Width	31.5		33.2	>0							>0	>0
Pubis												
Length	16.7		16.2	>0							>0	>0
Ischium												
Length			20.8									
Width	12.8[1]		11.8	>0	>0						>0	>0
Femur												
Length	83.8		83.6	>0	>0	1.24 ± 2.08	<6	<4			>0	<6
Midshaft diameter	7.3		7.1									
Distal extremity width	23.3											
Tibia												
Length	73.0		72.9	>0	>0	2.18 ± 2.12	>6	>4			>0	>6
Midshaft diameter	6.4		6.1									
Fibula												
Length			68.2	>0	>0						>0	>0
Midshaft diameter			3.9									

[1]Estimated measurement from damaged element.
Age1 = Mean values from tables in (*3*) based on measurements closest to actual dimensions.
Age2 = Values from (*4*) in (*8*).
Age3 = Values from (*4*) in (*8*).
Age4 = Values from (2) in (*8*).
Age5 = Values from (*1*) in (*8*).
Age6 = Values from (*7*) in (*8*).
Age7 = Values from (*6*) in (*8*).

Table S5. Measurements (mm) of cranial elements and long bones of Individual 2 with estimated gestational ages in weeks from greatest dimensions.

	Left	*Mid*	*Right*	*Age1*	*Age2*	*Age3*	*Age6*	*Age7*	*Min*	*Max*
Zygomatic										
Length			18.4	32					32	32
Oblique height	16.2		15.4	32					32	32
Pars petrosa										
Length	27.7		27.6	32					32	32
Width	14.3		14.3	>32					>32	>32
Pars lateralis										
Length	19.4		20.2	>34					>34	>34
Width	11.5		11.0	36						
Pars basilaris										
Sagittal length		11.8		36			<38		36	<38
Width		12.5		36			38		36	38
Humerus										
Length	50.0		49.8	<32	<30	31.58±2.33			<30	<32
Midshaft diameter	3.5		4.3							
Distal extremity width	11.1		11.2	>28					>28	>28
Ulna										
Length	48.6			<34	>30	32.47±2.20			>30	<34
Midshaft diameter	2.3									
Ilium										
Length	25.3		25.8	>32				<40	>32	<40
Width	22.0		21.8	32				<40	32	<40
Pubis										
Length	9.4		9.8	32					32	32
Ischium										
Length	13.5	13.4		34					34	34
Width	8.6	8.7		<34					<34	<34
Femur										
Length	56.5	56.6		>32	<30	32.25±2.08			<30	>32
Midshaft diameter	4.8	4.8		32					32	32
Distal extremity width	13.9	14.5								

Table S5, continued.

	Left	*Mid*	*Right*	*Age1*	*Age2*	*Age3*	*Age6*	*Age7*	*Min*	*Max*
Tibia										
Length	49.0	49.5		>32	<30	32.30±2.12			<30	>32
Midshaft diameter	4.2	4.4								
Fibula										
Length	45.9	47.2		>32	30				30	>32
Midshaft diameter	1.8	2.1								

Age1 = Mean values from tables in (*3*) based on measurements closest to actual dimensions.
Age2 = Values from (*4*) in (*8*).
Age3 = Values from (*4*) in (*8*).
Age6 = Values from (*7*) in (*8*).
Age7 = Values from (*6*) in (*8*).

Table S6. Estimated post-natal ages in weeks for Individual 1 based on crown development.

	Stage	*AgeA*	*Stage*	*AgeB*
Maxillary				
dm2	Coc	>6 -- <18	B	<15.1 +/- 7.3
dm1	Cr1/2	>6 -- <18	C	9.4 +/- 13.5
dc	Coc-Cr1/2	18	B-C	<17.7 +/- 10.0
di1	Cr3/4-Crc	>6 -- <18	C-D	<6.2 +/- 12.5
di2	Cr3/4	6	C-D	<14.6 +/- 12.5
Mandibular				
dm2	Coc-Cr1/2	>6 -- <18	B-C	<20.3 +/- 10.9
dm1	Cr3/4	18	C	6.8 +/- 13.0
dc	Cr1/2	18	C	19.8 +/- 9.4
di1	Crc+	6	D-E	<16.6 +/- 6.8
di2	Crc	6	D	16.6 +/- 3.6
Interpolated Average		12 weeks		<14 weeks

AgeA = from (*10*), with ages in months converted to weeks
AgeB = from (*9*), with ages in years converted to weeks

Table S7. Nonmetric crown traits in comparative Native American sample and Individual 1

			*Comparative Sample**		*Individual 1*	
Tooth	*Trait*	*n*	*Break-points*	*%*	*Status*	*Grade*
dui1	Shovel	163	2-3	77.3	Absent*	1
	Double shovel	157	1-3	20.4	Absent	0
	Interruption groove	161	1-4	0.0	Absent	0
	Tuberculum dentale	155	1-4	11.6	Present?	1?
dui2	Shovel	147	2-3	92.5	Present	2
	Double shovel	143	1-3	10.5	Absent	0
	Interruption groove	149	1-4	0.0	Absent	0
	Tuberculum dentale	139	1-4	15.1	Present*	1
duc	Shovel	162	2-3	87.7	Present?	2?
	Double shovel	158	1-3	9.5	Present?	2?
	Distal acc ridge	150	1-4	30.0	Present	1
dum1	Cusp number	188	4	49.5	Present	4
dum2	Cusp 5	206	P	26.7	Absent	A
dli1	Shovel	118	2-3	38.9	Absent	1
dli2	Shovel	147	2-3	65.3	Present	2
dlc	Shovel	150	2-3	90.7	Present	2
	Tuberculum dentale	144	1-4	5.6	Absent?	0?
	Distal acc ridge	144	1-4	11.1	Absent	0
dlm1	Delta form	219	Triangle	21.9	Absent	0
dlm2	Cusp 6	230	1-5	43.9	Present	2
	Cusp 7	230	1-5	47.4	Absent	0
	Groove pattern	203	Y	93.1	Present	Y

* Comparative sample of prehistoric Ohio Native Americans, traits, and presence/absence breakpoints from Sciulli (*12*).

Table S8. USR burial pit biface measurements.

Specimen	*Length*	*Width*	*Thickness*	*Width/thickness*	*Wt. (g)*	*Lithology (color)*
58-87	92.4	27.4	9.2	3.0	23.63	Basalt (N 3/1)
58-88	83.2	21.8	8.8	2.5	16.63	Basalt (N 3/1)
58-86	86.1	37.2	11.0	3.4	32.69	Rhyolite (7.5 YR 6/2)

Note: All linear measurements in mm. Width and thickness are maximum values.

Table S9. Antler foreshaft metric data.

Specimen	*Wt (g)*	*Length*	*Width (midpoint)*	*Thickness (midpoint)*
58-82	54.48	279	15.2	11.3
58-85	103.56	525	16.4	11.4
58-83	112.01	492	18.4	12.0
58-84	107.27	446	17.0	11.5

Note: All linear measurements in mm.

Table S10. Depth sequence for cremation hearth and burial pit (cm below site datum).

Description (depth order)	*Avg. Depth*	*Depth ranges*	*N points*
Occupation surface (charcoal)	-37 ± 7	-18-45	133
Hearth top rim perimeter (lithics)	-35 ± 6	-23-43	42
Hearth: cremated human remains	-73 ± 3	-65-81	163
Hearth: fauna	-69 ± 15	-67-82	33
Hearth: bottom	-73 ± 7	-51-80	78
Fauna in fill	-92 ± 3	-84-106	39
	-123 ± 3	-114-127	14
Individual 1	-123 ± 1	-121-129	192
Individual 2	-128 ± 1	-122-129	151
Bottom of pit (F2011-13)	-123 ± 4	-111-129	54