After the flood: Investigations of impacts to archaeological resources from the 2013 flood in southern Alberta

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The Wearmouth Buffalo Jump: A stratified protohistoric site on lower Jumpingpound Creek, Alberta

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ABSTRACT

As a result of the program initiated by Alberta Culture and Tourism in response to the widespread flooding of 2013, a series of previously unidentified archaeological sites were recorded northwest of Calgary on a tributary of the Bow River, Jumpingpound Creek, near the confluence of the two waterways. This site complex is organized around the newly recorded Wearmouth Buffalo Jump, a deeply stratified bison kill at the foot of a small cliff. The kill deposits from this site represent a series of events spanning the period immediately preceding, during, and directly following the first interaction between First Nations and Europeans along the foothills of southern Alberta. For well over a century the lands encompassing the jump have been under the continuous stewardship of the family that originally homesteaded the property, and the importance of the Jumpingpound Creek valley to Indigenous populations has been documented in early historic sources and may even be referenced in a major Blackfoot legend concerning the "origins of marriage." The area represents a rare instance in which aspects of archaeology, history, and Indigenous tradition may intersect at a geographic location that has remained largely intact since the period of first contact, yet this area remains highly susceptible to flood related erosion.

KEYWORDS

Alberta, archaeology, bison, bone bed, buffalo jump, Jumpingpound Creek, Protohistoric, Old Women's Phase

1. Introduction and background

Archaeological investigations in the vicinity of lower Jumpingpound Creek have been somewhat limited due in large part to the association of much of the constituent land area with large ranching operations affiliated with early homesteading families. With the exception of some early academic research in the 1950s and 1970s, most of the studies that have been undertaken were conducted in support of residential development near the mouth of the creek near the Cochrane townsite, or in relation to the Jumpingpound Gas Plant and its associated facilities (see Leyden et al. 2016 and Leyden and Landals 2017a for summary). The earliest record of human occupation along the course of the creek is associated with the area of Sibbald Flats near its confluence with Sibbald Creek, where a series of campsite occupations have been documented that date from as early as 10,000 years before present (BP) and extend up to the recent Late Precontact Period (Gryba 1983). More recently, a newly recorded campsite location (EhPp-78), identified along lower Jumpingpound Creek during the 2015 flood investigation programs, has returned a date of approximately 5,500 years BP establishing a human presence in the immediate area from at least the Middle Precontact Period (Leyden and Landals 2017a).

Historical records indicate the presence of several Indigenous groups in the vicinity of lower Jumpingpound Creek. Chief amongst these were the Blackfoot, who are

believed to have been well established in the region by as early as the beginning of the eighteenth century, and who were represented primarily by the Piikani along the mountain foothills (Dempsey 1979; Binnema 2001). By the beginning of the nineteenth century, the Stoney Nakoda were present near Morley immediately northwest of the Jumpingpound basin, as were affiliated bands of the Cree (Anderson 1970; Rundle 1977; Dempsey 1979; Wishart 2007). Additional groups in the area included the Atsina and Tsuu T'ina in the nearby plains and more western groups, such as the Kutenai and Salish, along the adjacent mountain front (Dempsey 1979; Binnema 2001; Wishart 2007). Early explorers in the region also noted periodic conflicts between the Blackfoot and another people referred to as the Snake, largely prior to the beginning of the nineteenth century (Ewers 1958). The Snake are frequently identified with the Eastern Shoshone and are often described to have had a widespread, though heavily variable, foothold throughout southwestern Alberta during various periods of the eighteenth century (Binnema 2001; Wishart 2007).

European exploration of the region encompassing Jumpingpound Creek began in the latter half of the eighteenth century (Foothills Historical Society 1976; Binnema 2001). Settlement occurred almost coeval with the extirpation of the bison and the last recorded occurrences of communal bison hunting along the mountain foothills (Verbicky-Todd 1984). The family of the current landowners settled the area in 1885 (Foothills Historical Society 1976). At that time, there was ample evidence of former communal hunting activities along the length of the creek valley. As described in the 1888 travel log of Mrs. Algernon St. Maur, an early visitor to the area:

> *June 6th – On the other side of the Bow River is a Caňon known as "the jumping pound," over the edge of which the hunters used to drive the buffalo, and in this caňon their bones still lie in places two and three feet deep* [St. Maur 1890:41].

As was typical of the time across the Great Plains, an *in situ* "bone-mining" industry developed between 1879 and 1890 (Foothills Historical Society 1976). Local ranchers collected bison bone found exposed along the creek margins, which was stockpiled at "pile-of-bones" hill and then moved to the town of Mitford along the Canadian Pacific Railway to be transported to British Columbia for use in sugar refinement (Manry 2010). Although many intact kills were disturbed during this period, landowners along lower Jumpingpound Creek have observed periodic flood exposure of bone deposits up to the present day (Leyden et al. 2016). Between the late 1950s and the early 1970s, the Glenbow Foundation and the University of Calgary undertook field studies along lower Jumpingpound Creek and identified and partially investigated at least three substantial kills and two related camp sites (Forbis 1958; Reeves and Graspointner 1970a and 1970b).

In June 2013, Jumpingpound Creek was subject to extensive flooding associated with an event that had widespread effects throughout southern Alberta, but particularly along the drainage basins of the Bow and Oldman rivers. Over the course of a few days, massive bone bed deposits were exposed along a bend of the Jumpingpound Creek at the foot of an escarpment along the south margin of the Crawford Plateau (Figure 1). Over 50 percent of the original landform is believed to have been removed during the floods and a substantial proportion of these bone beds subsequently washed down the creek towards the town of Cochrane (Leyden et al. 2016). In 2015, the landowners revealed the presence of the remnant bone beds to the senior author during surveys undertaken to assess flood-related impacts along the creek. At that time, at least three discrete faunal horizons/bone beds were observed along an exposed profile almost 2 metres deep (Figure 2). The main bone bed was measured to be over 50 centimetres in thickness (Figure 3). Upon realizing that the deposits consisted almost entirely of bison bone and were located at the footing of a small sandstone cliff, it was determined that the location represented a previously unrecorded buffalo jump locality. The site was subsequently named the "Wearmouth Buffalo Jump" in honour of the current landowners and descendants of the family who originally homesteaded the area (Leyden et al. 2016; Leyden and Landals 2017a).

2. Methods

The Wearmouth Buffalo Jump locality was investigated over the course of two field seasons (see Leyden et al. 2016; Leyden and Landals 2017a, 2017b). When the site was first identified in 2015, it was determined to be at immediate and ongoing risk of additional flood-related impacts. A 2-by-2-metre test excavation was undertaken later that season with the goal of delineating and characterizing the nature of the deposits. It was positioned immediately atop the densest portion of the bone bed along the creek (Figure 4). Excavations proceeded by natural levels. Where natural levels exceeded 10 centimetres in thickness, sub-levels were implemented to facilitate documentation, but maintain consistency. Due to the density of bone encountered and the onset of winter conditions, excavations were terminated at a depth of approximately 175 centimetres below surface (bs). Three discrete faunal horizons were identified during investigations. Within these major bone beds, eight "Cultural

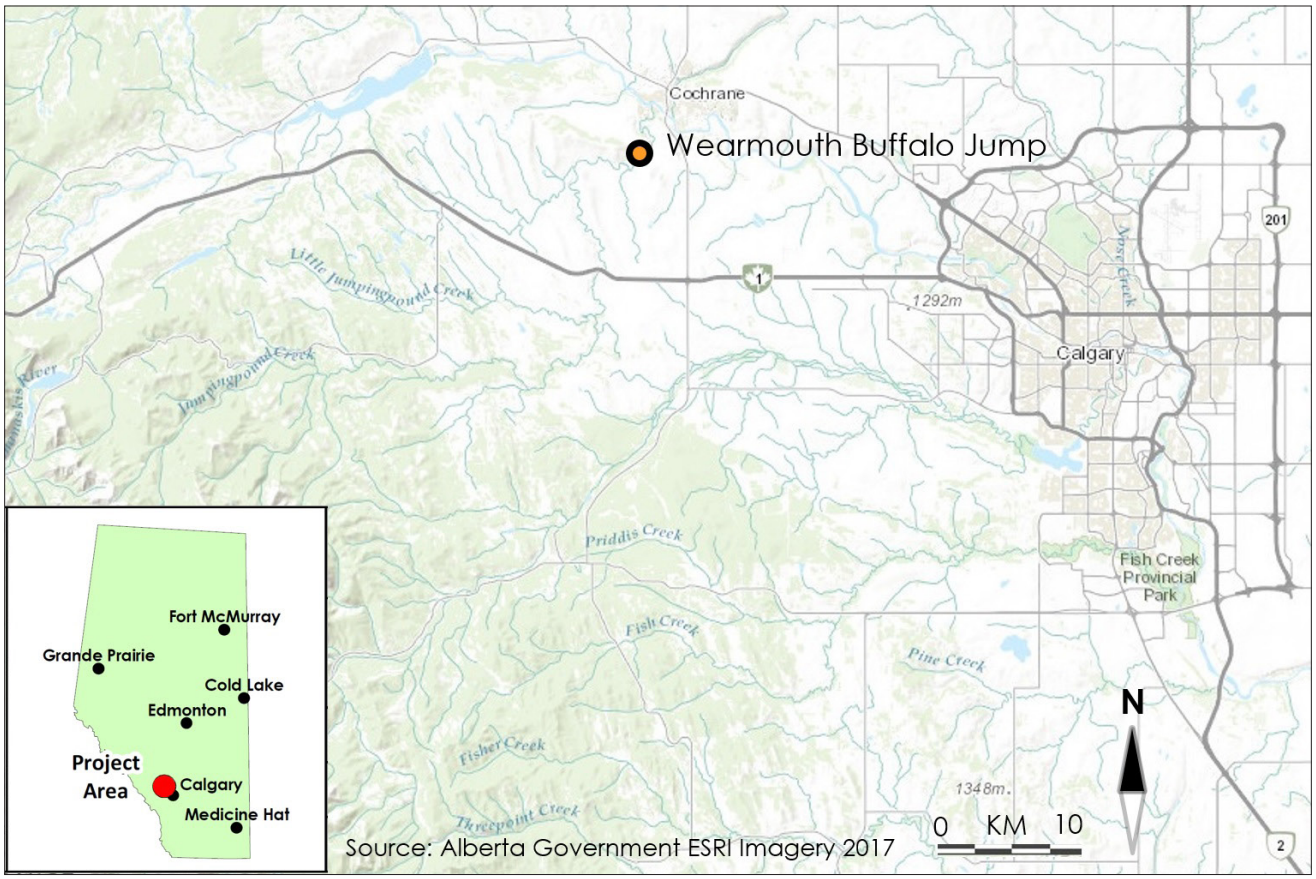

Figure 1. Location of the Wearmouth Buffalo Jump (Site EgPp-26).

Figure 2. View north across Jumpingpound Creek showing cliff and bone beds associated with the Wearmouth Buffalo Jump (photo courtesy of K. Zbeetnoff, 2015).

Figure 3. View east along Jumpingpound Creek showing cutbank with massive bone bed deposits (photo courtesy of L. Bohach, 2015).

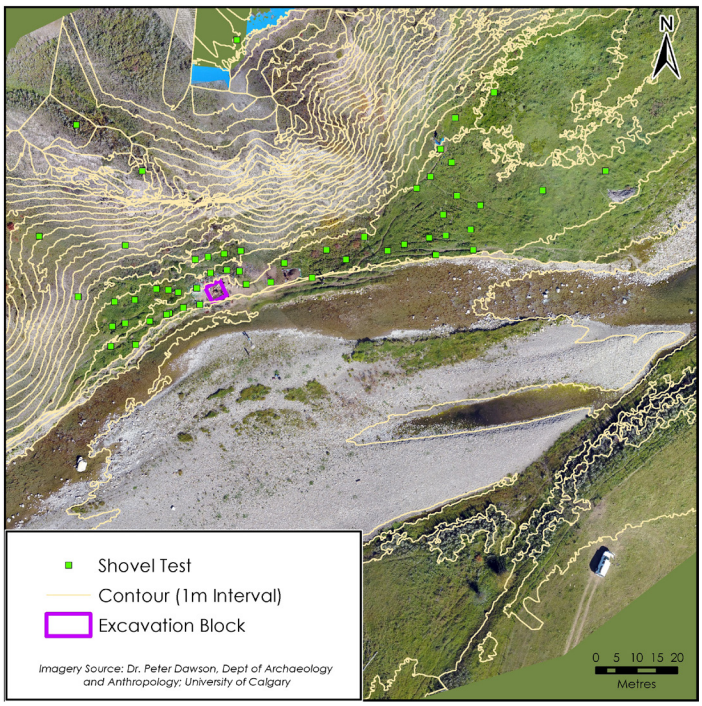

Figure 4. Map showing position of excavation block and shovel tests at the Wearmouth Buffalo Jump.

Units" (CU) were defined initially, based upon changes in soil, artifact density, and overall character as observed during the excavation program.

Investigations resumed in 2016, at which time a shovel-testing program was initiated along the landform at the foot of the cliff. Shovel tests were excavated in a grid at 5- to 10-metre intervals (see Figure 4). The tests were excavated in 10-centimetre levels and the contents screened to enhance recovery. Shovel tests were terminated when further excavation proved unfeasible due to encountering unpassable substrates (bone beds, rock) or achieving untenable depths. Detailed digital imagery of the site was also collected at this time by researchers at the University of Calgary utilizing drone technology, high resolution cameras, and terrestrial laser scanning techniques (Dawson 2017, as cited in Leyden and Landals 2017a; Pennanen et al. 2017). These data resulted in a detailed high resolution record of the site for use during the current assessment and also in future analyses. A remote sensing assay of the landform associated with the kill deposits was also undertaken and included both Ground Penetrating Radar (GPR) and Electromagnetic Induction (EM; Margaret Patton, e-mail communication, February 20, 2017; also see Leyden and Landals 2017a).

The 2016 activities included completion and expansion of the 2015 test excavation block with the addition of 8 square metres around the west, north, and east sides of the perimeter. All units were subsequently excavated to depths of approximately 200 centimetres bs, at which point a single 1-by-2-metre central unit was employed to continue excavations to depths of approximately 260 centimetres bs, at which point the water table was encountered. Additional units were partially removed from around the perimeter of the block to "back step" the excavation. Despite some initial efforts to record three-point provenience during the 2015 excavations, this approach was abandoned as a generalized strategy and levels were subsequently excavated and collected by quadrants throughout the remainder of the program. Three-point provenience was recorded for non-faunal *in situ* materials or faunal remains of a specialized nature (including unique features and specific articulations). Digital imagery was used to supplement the field recording program and was employed to create composite excavation floor mosaics to retain a relative record of artifact density and distribution on a level-by-level basis for the 2016 excavations. All excavated sediments were hand-screened using ¼-inch (6-mm) mesh to enhance recovery.

Cataloguing of the collected materials proceeded using methods approved by Alberta Culture and Tourism and closely modelled on the system developed for the Oldman River Dam Project (Brumley 1990). A standard analysis of collected lithic materials was undertaken, including metric recording, raw material determination, and artifact classification (debitage, tool, fire-broken rock [FBR], etc.). Historic materials were similarly analyzed, but historically relevant documentation was also researched. Given the vast amount of faunal material collected, the faunal analysis was the key focus. Faunal materials were counted, weighed, assigned to a size class, and were identified by taxon, bone element and body side, bone portion, age (based on epiphyseal fusion),

condition (burning, carnivore or rodent gnawing, insect damage, cutmarks, impact fractures, etc.), and pathological condition (where present). Where relevant, these data were used to calculate measures of abundance, such as NISP (Number of Identified Specimens) and MNI (Minimum Number of Individuals), and to examine cultural practices and infer age and sex compositions relative to the various temporal cohorts.

A series of specialized post-hoc analyses were also implemented to provide further evaluation of the collected assemblage and enhance the findings of the more conventional faunal analysis. Thin sections were obtained from selected bison molars in an effort to evaluate dental cementum development with respect to season of death (Howie and Horn 2017 and Peach 2017, as cited in Leyden and Landals 2017a). A series of bone samples were submitted for AMS radiocarbon dating (Leyden et al. 2016; Leyden and Landals 2017a). Finally, soil samples appearing to contain insect remains and puparia were submitted to the Natural History Museum in London, UK for an entomological analysis, with the goal of providing identification of taxa and interpretation with respect to apparent instances of insect damage observed on a significant proportion of the recovered bone (Hall et al. 2017, as cited in Leyden and Landals 2017a).

3. Results

3.1 Radiocarbon dating

Radiocarbon dating was undertaken on six samples representing CU5a, CU5c, CU6, CU8, CU10, and CU12, respectively (Table 1; Leyden et al. 2016; Leyden and Landals 2017a). The resulting conventional dates were all found to occur within a fairly restricted calendrical range (approximately AD 1735 to 1870), consistent with a Protohistoric through Historic Period provenance. Because direct and sustained European contact did not begin in southern Alberta until the 1870s, for convenience this time range is referred to as the "Protohistoric Period" in this paper. Unfortunately, the date ranges provided by this analysis did not follow the specific progression indicated by the stratigraphy of the site, a circumstance which frequently occurs at sites with strata representing very short time spans from relatively recent temporal contexts. As a result, while establishing the recent temporal range of the site, the date ranges are not considered to be accurate enough to date the individual cultural units with certainty.

3.2 Field studies

At total of 47 shovel tests were excavated to evaluate the Wearmouth Buffalo Jump. Of these, 42 provided direct evidence of the substantial bone deposits associated with the site and an analysis of this data revealed that the major bone beds are primarily localized beneath the cliff face and an associated draw along its east margin. In addition, evidence from the shovel-testing program provided some indication of the formation processes associated with the landform. In general, colluvial deposition was found to be most substantial along the immediate foot of the cliff and associated escarpment, resulting in significant re-deposition from areas located above the landform. In contrast, the lower terrace east of the main kill deposits has primarily formed through alluvial action, with successive flood events depositing thick layers of silt. This rapid sedimentation has led to an overall expansion of the soil profile with identifiable faunal deposits becoming increasingly buried and separated but also thinning out with increasing distance from the base of the cliff. Finally, the area of the main kill deposits demonstrates a mix of colluvial and alluvial inputs which have been heavily altered by the accrual of massive amounts of bone associated with the periodic kill events.

Following two seasons of excavation, a total of six discrete faunal horizons were identified at the jump containing up to 14 distinct cultural units (Figure 5, Table 2). Two of these (CU4 and CU11) later were determined to represent transitional or partially compressed layers between other cultural units and were not considered during subsequent

Table 1. AMS radiocarbon dates from bison bone collected during the 2015 and 2016 field seasons.

Sample Catalog #	Lab ID #	Cultural Unit	Depth (cm bs)	Sample Description	$\delta^{13}C$ (‰)	$\delta^{15}N$ (‰)	Conventional Radiocarbon Age (BP)	Calibrated Range (BP, 2 Sigma)
13763*	C-107949	CU5a	75	thoracic vertebra	–18.64	7.41	258 ± 22***	NA
13764*	C-107950	CU5c	125	rib	–19.1	6.97	196 ± 22	NA
13765*	C-107951	CU6	150	maxilla	–18.64	7.88	181 ± 22	NA
13766*	C-107952	CU8	170–180	rib	–17.88	7.01	189 ± 22	NA
50351**	Beta-453516	CU10	200–210	naviculo-cuboid	–19.2	5.70	160 ± 30	270–0
50352**	Beta-453517	CU12	240–250	long bone fragment	–19.0	6.90	190 ± 30	280–0

* Bone collagen tested at the University of Alberta. Raw data provided by Alberta Culture and Tourism (ACT) in 2016 and summarized here. Calibration not provided.
** Bone collagen tested at Beta Analytic of Florida. Reported in 2016 (see Appendix G). Calibration using INTCAL 13.
*** Rejected.

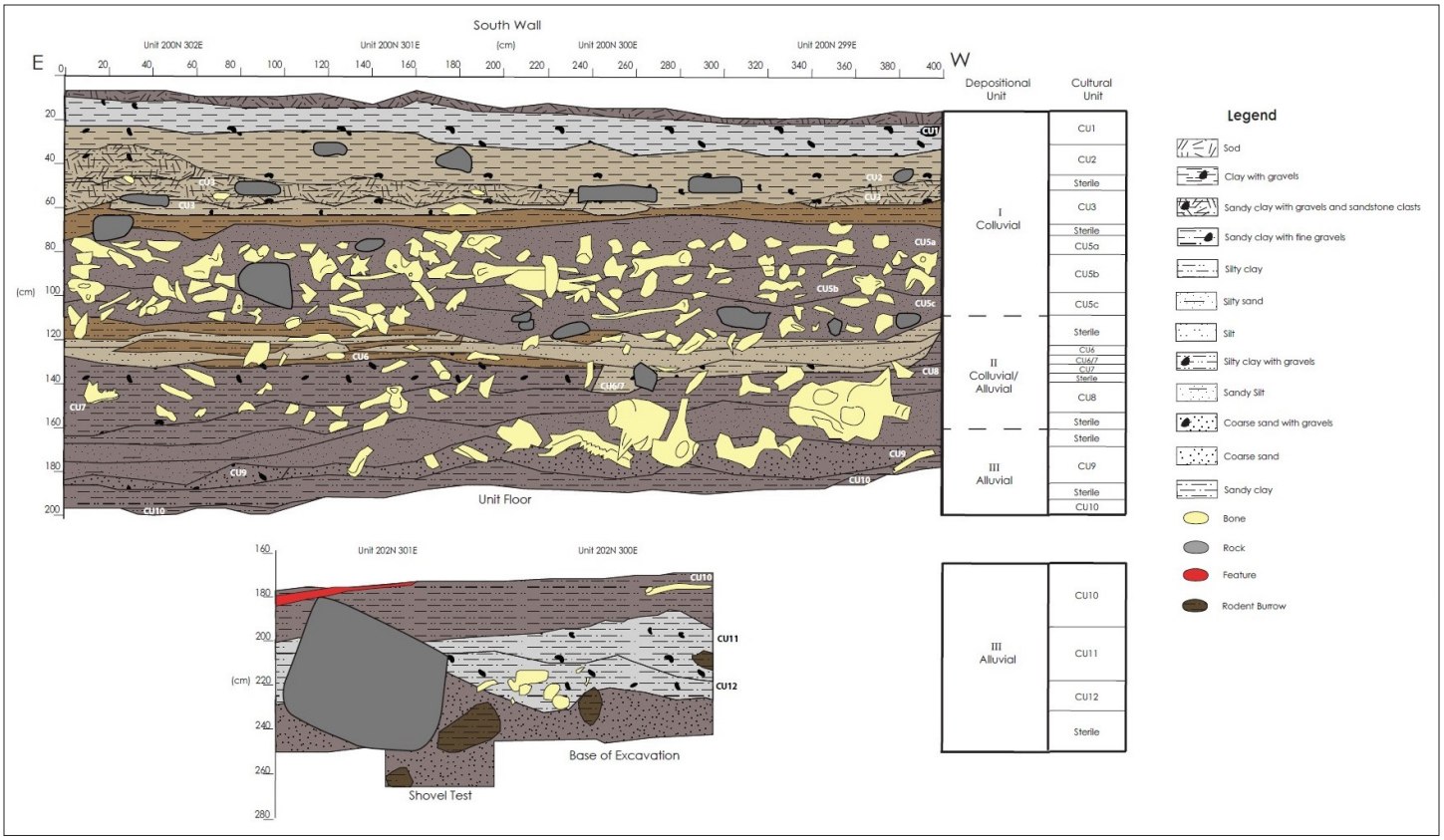

Figure 5. South wall excavation profile at the Wearmouth Buffalo Jump.

Table 2. Summary of excavation results by cultural unit (CU).

CU		Approximate Depth (cm bs)	Faunal Horizon*	Number of Square Metres	Mean Faunal Count per Unit by CU
1		0–20		12	151
2		20–45		12	435
3		45–55	A	12	903
4		55–65		4**	482
5	a	65–85	B	12	4,652
	b	85–105		12	3,076
	c	105–130		12	1,632
6		135–150		10***	1,025
7		155–165	C	10***	1,486
8		165–180		10***	262
9		185–195	D	10***	1,407
10		195–210	E	2	595
11		210–225	F	2	30
12		225–245		2	234

* Distinct horizons of bone visible in profile as delineated by significant fluvial events.
** CU4 was only distinguished in units excavated in 2015 (Leyden et al. 2016); during the 2016 excavations, it was too compressed to satisfactorily distinguish from CU3 and CU5.
*** Due to the necessity to pedestal large boulders along the north margin of the excavation, and to provide back-sloping, the northernmost quadrants in the northern row of units were not excavated at these levels, reducing the sample to 10 square metres.

analyses. Additionally, the two uppermost CUs (CU1 and CU2) are thought to represent partially disturbed or ephemeral horizons heavily influenced by colluvial inputs originating higher above the landform. While some cultural materials were collected from within these horizons (including a hammerstone and at least three projectile points), they are thought to derive primarily from other activity areas located along the escarpment overlooking the kill.

The remaining undisturbed cultural units occur between 45 and 250 centimetres bs. Each of these units contains bone with evidence of metal cutmarks indicating that the deposits associated with the site are entirely associated with the Protohistoric through to the Historic Period, approximately AD 1735 to 1870 (Figure 6). The uppermost deposits (45 to 135 centimetres bs) including Faunal Horizon A associated with CU3 and the massive bone bed (Faunal Horizon B), composed of CU5a, CU5b, and CU5c, are most definitively associated with Historic Period activities. Faunal Horizon B clearly represents the period of most intense activity at the site. Over half of the total MNI for bison (n = 155) is recorded from within this bone bed. While the associated faunal assemblage is heavily fragmented and dense (Figure 7), it also contains several unique Historic Period specimens, including a large number with metal cutmarks, at least one

Figure 6. Detail of a thoracic vertebra associated with CU5b showing deeply incised metal cutmarks.

Figure 7. View northwest showing top of massive bone bed associated with Faunal Horizon B (CU5a) as exposed in excavation block.

horse bone, and a scapula exhibiting a probable bullet hole (Figure 8). Other Historic Period evidence includes a metal trade point and a glass trade bead. Some evidence of more traditional cultural activity was also observed, including the recovery of a stone projectile point tip imbedded in a rib, the identification of at least two instances of probable bead manufacture from canid long bones, and the recovery of an ochre-stained bison horn core.

In contrast, deeper cultural units show a more mixed expression of historic evidence and Precontact Period materials. The fauna from these layers is much less fragmented and exhibits somewhat more selective butchering patterns focused towards higher utility butchering units (Figure 9). Greater evidence of stone tool use occurs in association with Faunal Horizon C (containing CU6, CU7, CU8) and Faunal Horizon D (CU9) between 135 and 190 centimetres bs. These lower cultural units contain several large core choppers that were likely utilized to initially dismember animals, representing a much greater reliance upon heavy stone tools during primary butchering than is evident in later cultural deposits where metal axes appear to have been used. In addi-

Figure 8. Detail of scapula associated with CU5a showing impact scar from a probable bullet.

Figure 9. View west showing base of Faunal Horizon C (CU8) as exposed in excavation block.

tion, the majority of stone projectile points (n=9) recovered at the Wearmouth Buffalo Jump occur in association with these older CUs. While similar butchering patterns appear to continue to the base of the cultural deposits (~250 centimetres bs); the more restricted excavation area associated with Faunal Horizon E (CU10) and Faunal Horizon F (CU12) limits interpretation. Nevertheless, each of these bone beds contained one unique feature, with CU10 providing evidence of the only distinct burning feature associated with the site (a possible fire used to heat cooking stones) and CU12 yielding a bison skull that exhibits unusual damage (Figure 10).

3.3 Entomological studies

An interesting feature of the faunal assemblage associated with the site was a comparative absence of cultural burning, an activity frequently noted in association with kill site deposits. While it is unclear why there appeared to have been little systematic burning, its absence may have resulted in another atypical feature of the Wearmouth Buffalo Jump deposits: an apparent profusion of insect activity and related damage to the accumulated bone assemblage. An entomological study by researchers from the Natural History Museum in London, UK, confirmed that multiple horizons at the site had been infested by blow flies (Calliphoridae) to an unprecedented degree, based on a detailed analysis of the voluminous puparia and frass (insect waste) identified within the cultural deposits (Figure 11; Hall et al. 2017, as cited in Leyden and Landals 2017a).

Analysis of the faunal assemblage revealed a high incidence of atypical wear and/or damage that initially was thought to be related to the massive insect presence, based upon the association of insect puparia with the interior cavities of bones throughout soils in direct association with damaged remains (Figure 12). The entomological study

Figure 10. Axial view of a female bison skull recovered in association with CU12 showing deliberate damage to the frontal bones.

Figure 11. Detail of puparia and frass from within the cranial vault of a bison skull recovered in association with CU5b.

Figure 12. Detail of puparia from within a horn core recovered in association with CU5b.

was undertaken to confirm this interpretation and indicated that the unusual patterns likely resulted as a byproduct of unprecedented numbers of fly larvae regurgitating gastric juices as they consumed the carrion. This mode and intensity of damage (>11% of the total assemblage) has not been described previously in relation to faunal assemblages from bison kill sites and has implications for taphonomic interpretation of other mass death assemblages.

4. Discussion

4.1 Geography and landscape considerations

Jumpingpound Creek represents a natural geographic feature that bison herds would have crossed while moving toward the Bow River between the mountain foothills to the west and the open plains to the east. Located near the mouth of the creek, the area situated between the Bow River and Crawford Plateau creates a small, but dedicated, gathering basin that appears to have been used to "feed" the Wearmouth Buffalo Jump (Figure 13). Once gathered, animals would have been driven east towards the steep western escarpment of the creek, then diverted south and west around the southern tip of Crawford Plateau. At this point, they would have been run at a perpendicular angle into a large drainage channel emanating from a spring associated with a wooded area near the apex of the landform (Figure 14). The spring travels directly to the top of the cliff face associated with the jump and it seems probable that the drainage channel was used as a natural, or possibly artificially, reinforced barrier to divert bison south (at the last minute) over the cliff. This approach is associated with a significant "false horizon" effect obscuring the nature of the drop until the last possible second (Figure 15).

The specific geography associated with the approach to the Wearmouth Buffalo Jump also appears to correlate with the compact nature of the resulting kill site and its associated bone deposits. The drainage channel atop the cliff not only acts to direct the stampeding herds, but appears to restrict much of the resulting jump activity to the center of the small, rhomboidal cliff face associated with the site. This has resulted in heavily concentrated kill deposits spread across an area no greater that 35 metres in length along the foot of the jump. The coulee may also have acted as a secondary kill locality. At least two other secondary kills sites (EgPp-30 and EgPp-31) occur further east along the escarpment associated with the Wearmouth Buffalo Jump and may represent opportunistic events associated with animals that broke away during the various drives towards the main cliff. Finally, like most major kill sites, the Wearmouth Buffalo Jump appears to be closely associated with at least two major processing/camp areas along the flats and terraces adjacent to the kill deposits, both of which were initially recorded in the 1970s, many years prior to the identification of the main kill site (Reeves and Graspointner 1970a and 1970b).

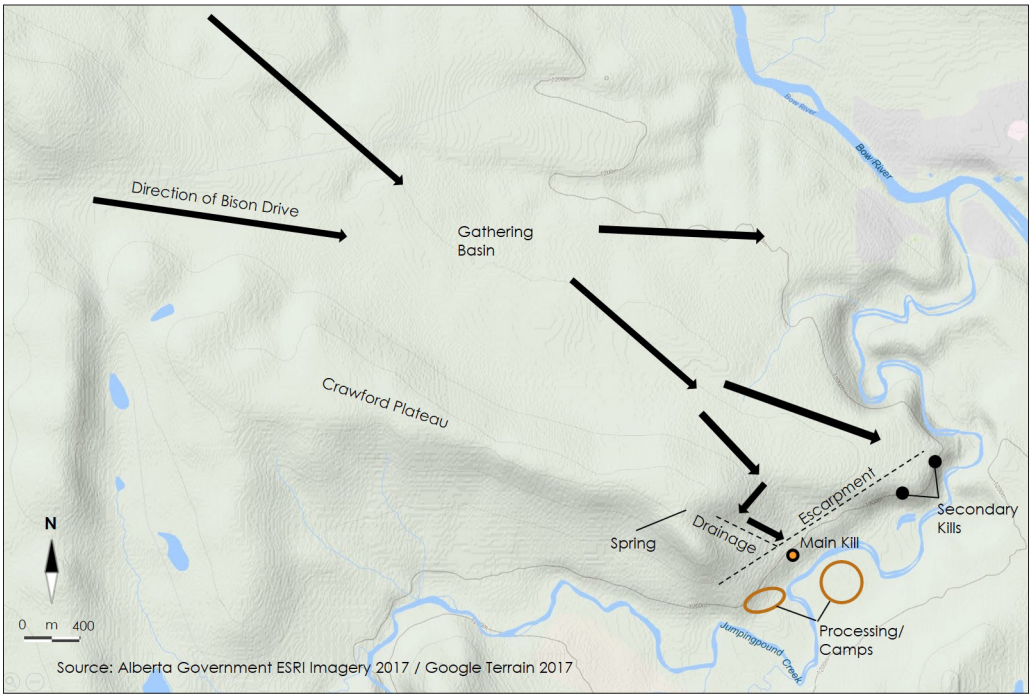

Figure 13. Map showing probable gathering basin, direction of drive, secondary kills and probable processing/camp areas associated with the use of the Wearmouth Buffalo Jump.

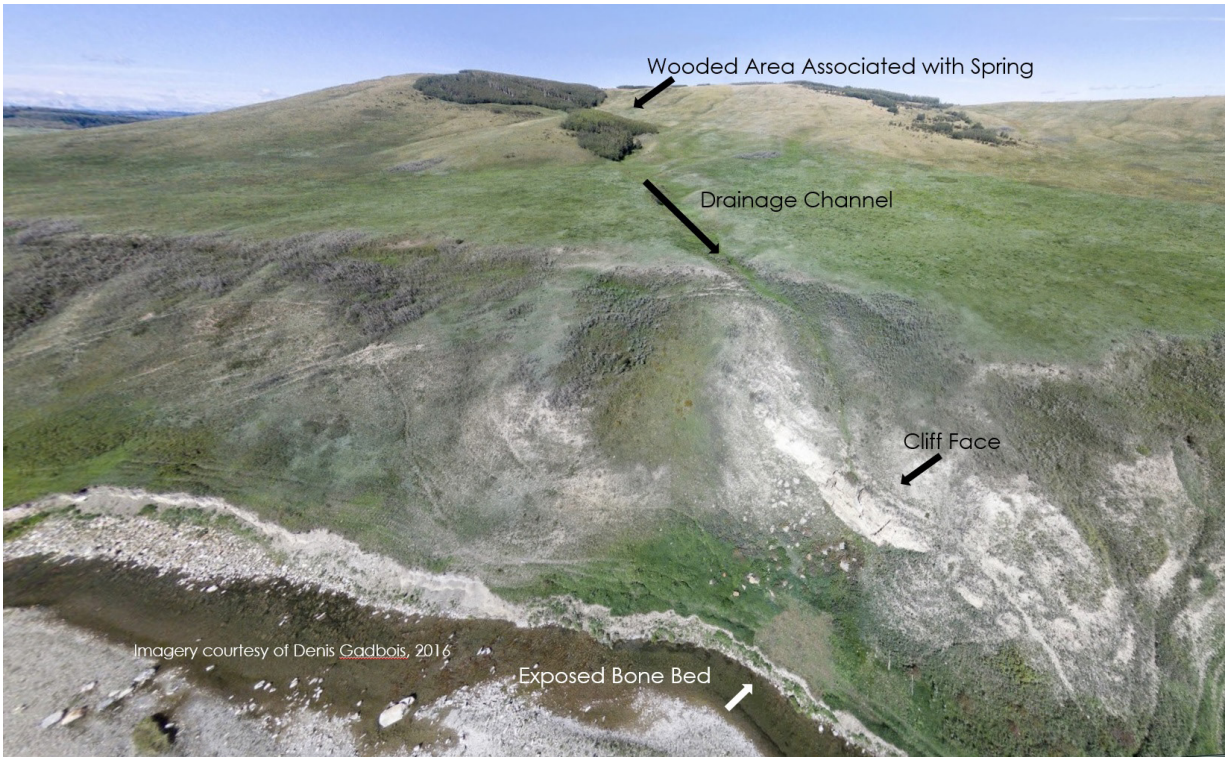

Figure 14. Aerial drone imagery looking northwest showing details of Crawford Plateau and the escarpment associated with the Wearmouth Buffalo Jump.

Figure 15. High contrast black and white image looking southeast along drainage channel leading to the cliff (solid white arrow) demonstrating the "false horizon" effect along the margins of the escarpment (dashed white arrows) associated with the Wearmouth Buffalo Jump (photo courtesy of K. Belanger, 2015).

4.2 Archaeological and cultural significance

Evidence recovered, in particular the occurrence of metal cutmarks observed in each of the identified CUs, clearly associates the cultural deposits of the Wearmouth Buffalo Jump with the Protohistoric through Historic Period in southern Alberta. Given the historic settlement of the area by the ancestors of the current landowners in 1885, the recorded extirpation of the bison locally by about 1879 to 1880, and historic records suggesting that the last communal buffalo jump employed by the Piikani along the mountain foothills occurred in 1874, it seems unlikely that the events associated with the use of the Wearmouth Buffalo Jump should be more recent than about 1870 (Foothills Historical Society 1976; Verbicky-Todd 1984). Conversely, the earliest use of the site appears to be limited by the period during which metal trade goods would have been available to local Indigenous groups. While the Blackfoot would likely have acquired metal implements between 1730 and 1740 (Binnema 2001), it is possible that the "Snake" (Eastern Shoshone) were present in the local region at an earlier period. They are known to have acquired metal tools in advance of the Blackfoot just prior to the turn of the eighteenth century (Binnema 2001) and thus set a probable lower limit for the earliest horizons at the site of about 1700 (Figure 16).

The stone projectile points recovered from within the cultural strata associated within Faunal Horizons C and D also provide some opportunity to refine the dating of the site. Those points that were complete enough to compare to Forbis' (1962) projectile point scheme, following the method described by Vickers (1986), appear to indicate a superficial progression through the protohistoric variants of the Old Women's Phase point typology (Figure 17). Faunal Horizon D (CU9) represents the oldest component to possess projectile points, and the styles from this horizon appear to be definitively associated with the Old Women's Phase. As many have concluded that the protohistoric Old Women's Phase is a material expression of Protohistoric Period Blackfoot culture (Reeves 1983; Walde et al. 1995; Binnema 2001; Peck 2011), it seems reasonable to posit that Faunal Horizon D is affiliated with the Blackfoot and therefore should post-date the period when the Blackfoot first obtained metal trade goods between about 1730 and 1740 (Binnema 2001). Similarly, the cultural deposits associated with Faunal Horizon C also must post-date this period. Although the projectile points associated with these horizons can be seriated using the Old Women's typology, specific characteristics of some of the points (notably systematic basal asymmetry and a higher quality of manufacture) may suggest the possibility of alternative cultural affiliations. Regardless, the projectile point sample associated with each of the CUs is too small to allow for any definitive interpretations.

Based upon specific characteristics of the artifact assemblage its seems reasonable to suggest that the cultural strata associated with Faunal Horizon B and all later levels

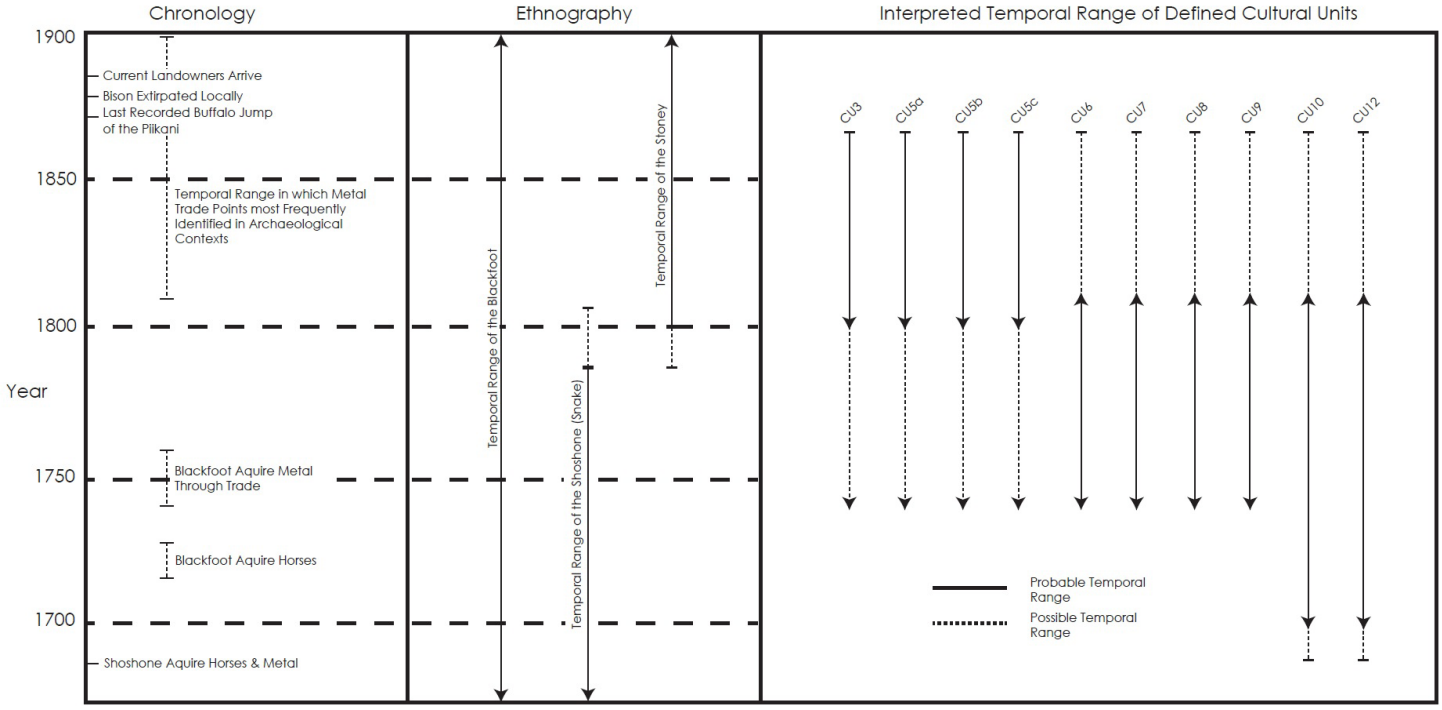

Figure 16. A chronological summary of the Wearmouth Buffalo Jump.

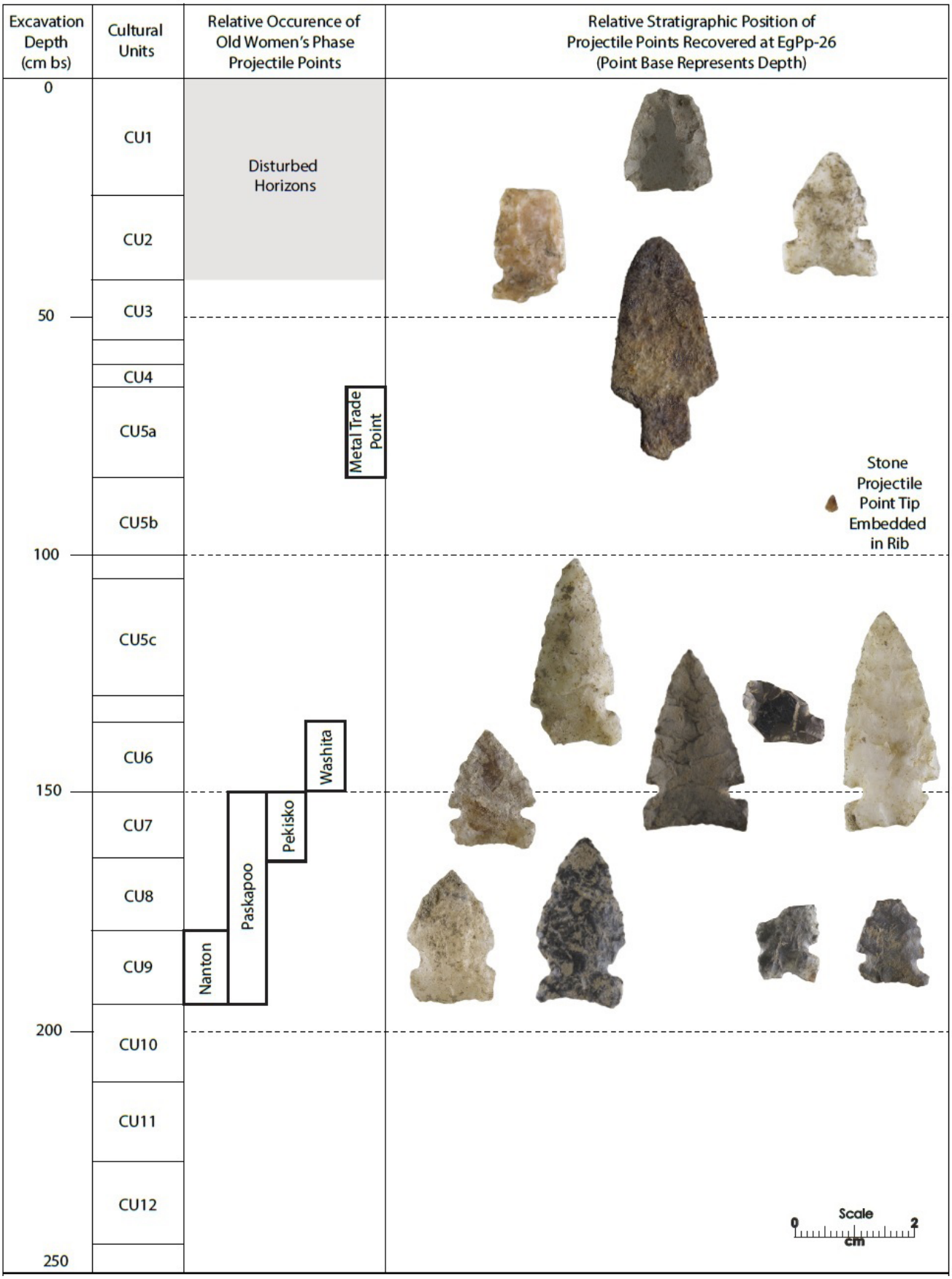

Figure 17. A relative chronology of the projectile points associated with the Wearmouth Buffalo Jump.

appear to be strongly affiliated with the early to mid-nineteenth century. At this point, both the Blackfoot and their allies, along with the Stoney Nakoda, were firmly established within and adjacent to the region (Dempsey 1979) and either group may reasonably be assumed to have some association to the Wearmouth Buffalo Jump. It remains unclear if the increased intensity of use identified during this time period relates more to a functional change or a cultural change through time.

4.3 Traditional significance

Modern sources agree that Jumpingpound Creek has conclusive Indigenous references in both the Nakoda and Blackfoot traditions. The Stoney Nakoda name for the creek is *to-ko-jap-tah-wap-ta* (Karamitsanis 1992) or alternately *Tokijarhpabi-wapta* (Aubrey 1990), which translates approximately as "place where Blackfoot camped River", and appears to associate the early history of the location with the Blackfoot peoples. The accepted Blackfoot name for the area is *nina-pis'kun* (alternately *nena-pis'kun*) (Dawson 1884; Dempsey 1956; Holmgren and Holmgren 1972; Karamitsanis 1992). It is documented in the accompanying "Appendix II" to George Dawson's 1884 map of his surveys in the "Bow and Belly River Regions," with the given translation of "Men's Pound" (Dawson 1884). Several authors have subsequently speculated that "Men's Pound" is a reference to the traditional "Men's Camp" as depicted in the Blackfoot legend of the "First Marriage" (Dempsey 1956; Fromhold 2014; Oetelaar 2014). Briefly, the tradition describes how men and women lived in separate camps following creation, but eventually came together through the "act of marriage" at the site of the Women's Camp near a buffalo jump used exclusively by the women. The location of the original Women's Camp is now largely accepted to be the site of the Old Women's Buffalo Jump near Cayley (Forbis 1962).

While most of the traditions give little detail concerning the Men's Camp, Robert Lowie provides a version of the legend in which the Men's Camp is described as being situated "northwest of Calgary" (Lowie as cited in Wissler and Duvall 1908:22). Nevertheless, the most descriptive account appears to have been transcribed during an interview with the Blackfoot Chief Big Plume in which he prefaces a version of the marriage narrative as follows:

> *At Morley, opposite the Rev. John Macdougall's* [sic] *house, and down the river, said Big Plume, there is a little stream; they call it the men's kraäl or enclosure; on one side of the stream is a cut bank and big stones; this was the men's boundary, beyond which they were not to pass. They used to hunt Buffalo and drive them over the cut bank ...* [Big Plume as cited by Hale 1885:186].

In Big Plume's account, the location of the creek described in association with the "Men's Kraäl" is undoubtedly Jumpingpound Creek. Moreover, Big Plume provides corroboration for the assertion that the Men's Camp of the marriage tradition, is in fact associated with a well-used buffalo jump. This would appear to provide good evidence to suggest that the Men's Camp of the legend is synonymous with the geographic locality of the Men's "Pis'kun" along Jumpingpound Creek.

5. Conclusions

The bone bed at the foot of the Wearmouth Buffalo Jump represents one of the densest such deposits ever recorded in Alberta. Despite excavating less than 12 square metres to depths of around 2.6 metres bs, a remarkable cumulative MNI of 248 bison is estimated. Based on an analysis of the remnant deposits in the context of the damage caused by the 2013 floods, it is conservatively estimated that the total MNI of the original undisturbed kill deposit contained the remains of more than 8,500 individual animals. Even more shocking is the realization that over a period of a few days in June 2013, the skeletal remains of potentially as many as 4,000 bison were dislodged from the site and washed downstream towards the confluence with the Bow River and the town of Cochrane.

Based upon the collected information, the Wearmouth Buffalo Jump represents a Protohistoric Period through Historic Period killsite of substantial proportion. Best estimates for its period of use places the time frame between about AD 1700 and 1870. Many different Indigenous groups are known to have been present throughout southwestern Alberta during this 170-year span. Of particular interest during the eighteenth century are the Blackfoot (including their associates) and the Shoshone—with the Blackfoot (including allies such as the Atsina and Tsuu T'ina) and the Stoney of greater relevance throughout the nineteenth century. Projectile points recovered in the lower cultural horizons at the site appear to demonstrate a relationship to the Blackfoot, but the presence of some variability may indicate intermittent periods of culture change. Tradition holds that Jumpingpound Creek may be the site of the "Men's Pound" or camp as referenced in the Blackfoot legend of the "First Marriage." However, the considerable complexity of the varying interrelationships between different cultural groups at this time period may be too great to be accurately reflected in the archaeological record.

Currently, the assemblage associated with the site does not provide sufficient resolution to assert any such affiliations more positively.

Due to the massive nature of the archaeological deposits associated with the Wearmouth Buffalo Jump, the investigations conducted in 2015 and 2016 were undertaken with the goal to recover a representative sample of the associated deposits and to provide some basic interpretations, while organizing and introducing the materials to facilitate more detailed future research. Despite the limited areal extent of the excavations, the recovered assemblage represents a large, stratified sample of bison remains from a single geographic locality associated exclusively with the Protohistoric to Historic Period and should be ideally suited to a variety of more detailed faunal analyses. Moreover, the assemblage represents one of the largest collections of metal tool cutmarks yet recovered from an archaeological context in the province of Alberta. It is hoped that future detailed analysis of the recovered faunal assemblage will provide a better understanding of questions such as seasons of use, butchering patterns, and the effects of culture change throughout this dynamic period.

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